world of balustrades

Sets – Products – Safety

Pauli + Sohn GmbH

Made by Pauli – Quality is our passion

Always one step ahead... for more than 30 years, Pauli + Sohn has been a trendsetting brand for innovative glass fittings made in Germany. Our products are developed within competent teams who understand the customer's requirements and find the products that suit the application and satisfy the latest guidelines and building laws. Exquisitely finished, high quality materials such as stainless steel, die-cast zinc, brass and aluminium guarantee excellent quality, safety and longevity. We round off our offer with training courses on matters relating to building laws. Highest demands on security are integral to our consultation services.

Well protected!

Alongside top-class design, safety comes first for our products for balustrades and railings. Our products not only have to look perfect; they must also provide maximum functionality and reliability.

Benefit from this quality philosophy in your outdoor and indoor areas. Discover the diversity of P+S balustrade and railing systems. Experience what we understand by application-oriented diversity and individual design.

Up to the minute in building law – the Pauli Academy

At the Pauli + Sohn training centres, our competent lecturers prepare you for new regulations in building law and deepen your knowledge on the laws currently in place. Tailored to the respective course participants, the seminars offer reliable support on the consultation and planning of your clients' building projects. Our training centres also provide you with valuable suggestions and bring you closer to the entire Pauli + Sohn product world.

Given the close collaboration between our technicians and designers, we develop products that are as innovative as they are design-oriented. We create details you will never want to give up again and technologies that make the old, familiar problems simply disappear. We also incorporate the continual feedback received from our customers at training events into action to make good products even better.

Learn more about our current training dates on the Internet at www.pauli.de.

New in glass design 2013

New building laws and product innovations are continually changing the prerequisites for implementing building projects. The experts at the Pauli Academy have made it their mission to keep you up to date on all important matters regarding balustrade glazing and architectural glass fitting design. Our seminars conclude with a corresponding certificate.

Seminar on balustrade glazing

The seminar on balustrade glazing familiarizes you with the the various designs and the requirements of the corresponding building laws. The tailored seminar delivers valuable information on proper adherence to technical rules, general building approvals and approval in the individual case. You learn how to use this knowledge to generate real competitive advantages.

Basics, building law and applications

- Building law requirements and their implementation
- New in-ground profile for transparent balustrade glazing
- Various design possibilities for French balconies
- Solar applications in the balustrade area
- Applications compliant with TRAV (technical rules for safety balustrades)
- Glass thickness measurement for clamp mounts in compliance with AbZ Z-70.2-28 (national technical approval)

Certificate	Planner	Processor
✓	✓	✓

Seminar on architectural glass fitting design, Level I

Our experts have developed a two-level seminar concept that gives you the basics on building law and structural analysis and provides you with possible solutions for difficult problems. By participating in Level I, you gain the basic knowledge of building law and structural analysis to be able to identify and apply the current stipulations, standards and technical rules.

Basics, building law and structural analysis

- Current building law for beginners
- Properties of various types of glass
- Adoption of the 2012 Eurocodes and new glass standard – what are the changes? Glass rules and new DIN 18008, new Eurocodes, EC1
- Assumed loads pursuant to DIN 1055 and Eurocode 1
- Structural analysis for beginners
- Working with glass thickness dimensioning programs

Certificate	Planner	Processor
✓	✓	✓

Seminar on architectural glass fitting design, Level II

Level II goes into detail and shows how the basic knowledge from Level I gives you the necessary certainty when planning and designing, and how you can apply the correct regulations to your projects.

Products, anchoring, mini-workshop

- Various design possibilities for balustrades
- New in-ground profile for balustrade glazing
- Point fixings in facades and roofs
- French balconies
- Basics and pitfalls of anchor systems
- Consolidation of learned material in mini-workshop

Certificate	Planner	Processor
✓	✓	✓

Safety and transparency – TRAV-compliant systems

Maximum transparency is a strong trend. The cp-*1400*, cp-*1402* and cp-*1440* systems allow elegant balustrade glazing without posts, but with tested safety. The system profile allows easy assembly and excellent adjustability.

The new cp-*1400* system profile

- Structural analysis for various models
- General type approval pending – no pendulum impact tests required
- Glass thicknesses 2 x 8 mm, 2 x 10 mm
- Various types of glass
- Structures made with SentryGlas®
- Rail loads 0.5 kN/m and 1.0 kN/m
- Balustrade heights up to 1100 mm
- Floor mounting and fascia mounting

starting page 10

Securing floor-level windows – French balconies

Floor-level windows provide transparency and a fuller view. Yet, fall protection is mandatory for every installation. So as to retain the clear view and elegant optics, precious combinations of glass and metal are the ideal solution. We offer various type-tested models that stand out for safety, elegance and easy assembly.

starting page 22

We combine tested safety with clever energy generation – the cp-mini*solar* system

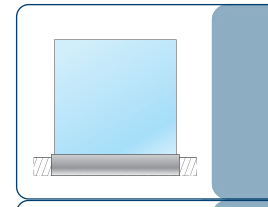
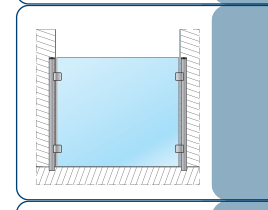
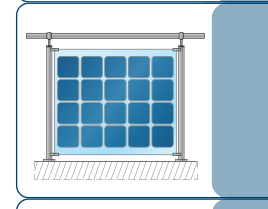
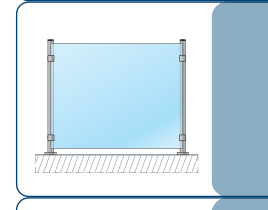
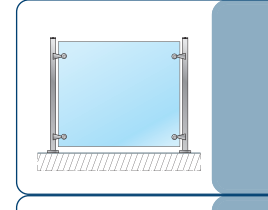
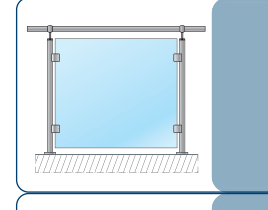
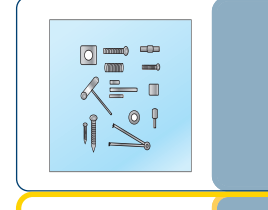
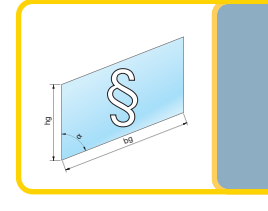
The cp-mini*solar* system combines tested safety with clean energy generation. Balustrade glazing facing the south side brings an added value that is all too often neglected and is the ideal complement for corresponding energy concepts. **starting page 38**

Boundary, privacy shield or design element – the cp-glass *barrier* system

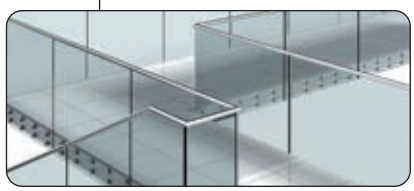
Whether used as a low-maintenance boundary, custom designed privacy shield or chic design element, the cp-glass *barrier* system offers many application and design possibilities for the garden or commercial premises. The system combines easy assembly and tested safety with practically unlimited variation in glass design.
starting page 60

Clamp systems, point fixings and tried-and-tested railing systems

In addition to the innovations presented, you will find our tried-and-tested classics for diverse building possibilities. Our "Design + Safety" category was updated in 2012.

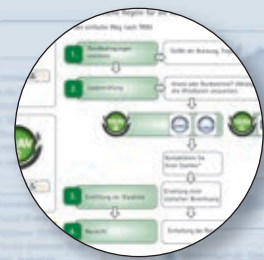
content



INFO

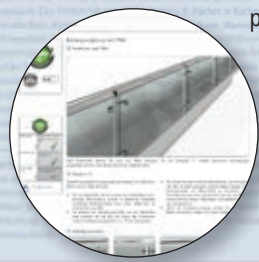
CURRENT RULES REGARDING TRAV

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.



planning process
page 234

overview TRAV
page 235

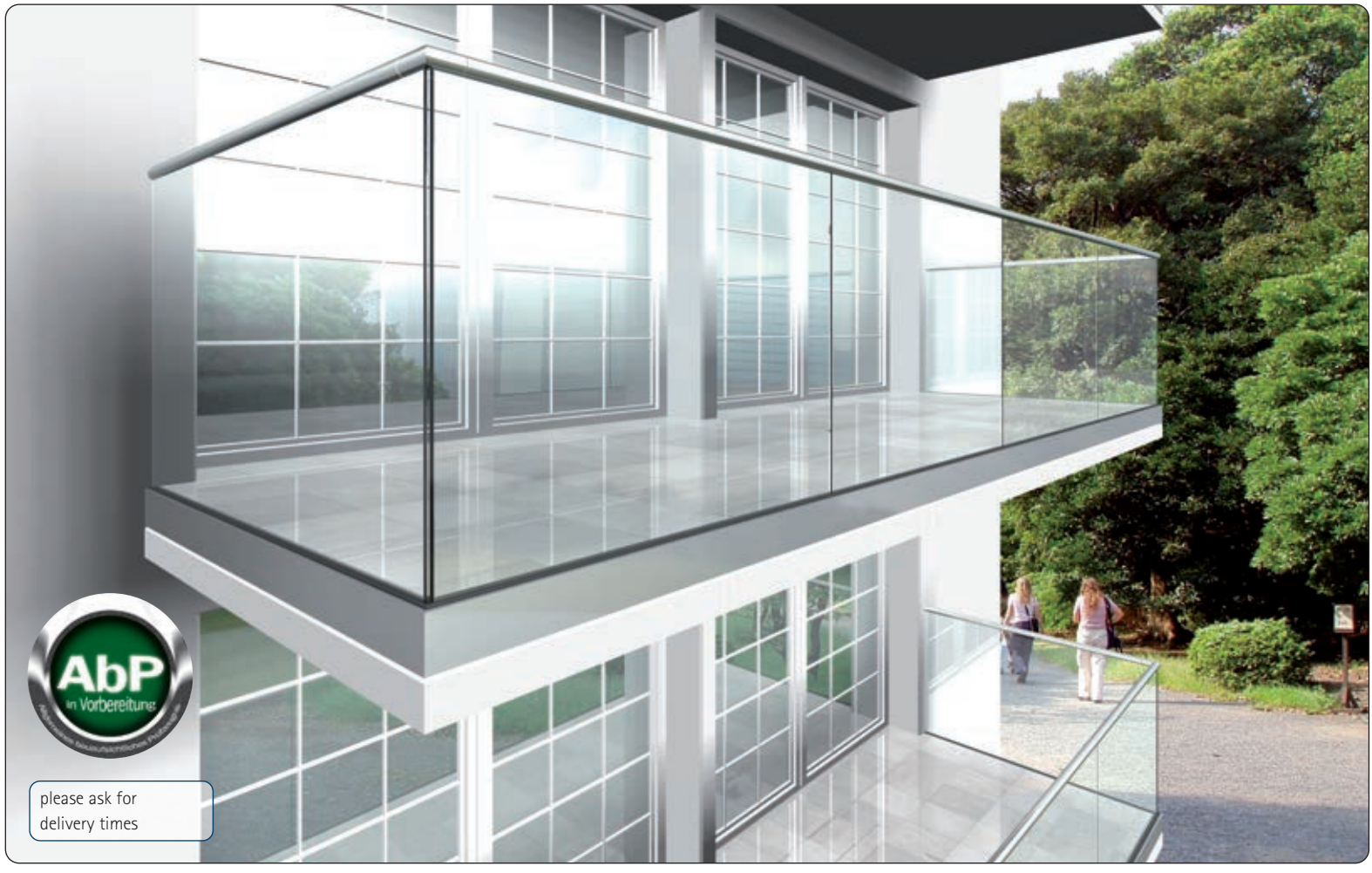


design table Kat C
page 236

design table Kat B
page 238

- railing system cp-*1400*
  cp-*1402*
  cp-*1440*

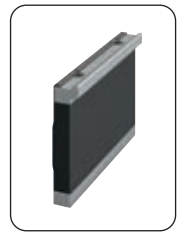
system profile cp-*1400* for floor mounting



System profile for floor mounting

The cp-*1400* system profile has been developed specifically for modern, postless balustrade architecture. Postless fall-protection railing offers maximum transparency. With early planning, it is extremely easy to implement and assemble, thanks to the development of an integrated adjustment feature for aligning the glass panes. General type approval is pending for the clamp system. This eliminates the need for costly proofs for the specified glass dimensions.

1400-1E123-
base profile for
floor mounting



1400-10EPDM
clamping jaw

1400-2EPDM-
lower glazing
profile

1400-6KU3-5000
upper glazing
profile

item no.	article name	length	material	finish	
1400-E123-17-5000	sytem profile set	5000 mm	aluminium	stainless steel effect	17,52 mm
1400-E123-17-V	sytem profile set	max. 5000 mm	aluminium	stainless steel effect	17,52 mm
1400-E123-21-5000	sytem profile set	5000 mm	aluminium	stainless steel effect	21,52 mm
1400-E123-21-V	sytem profile set	max. 5000 mm	aluminium	stainless steel effect	21,52 mm

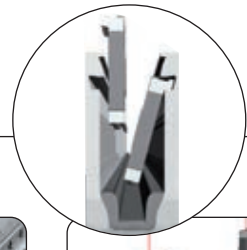
stainless steel effect = polished aluminium, silver anodized

INFO

You will find a checklist for your planning purposes on page 232.

INFO

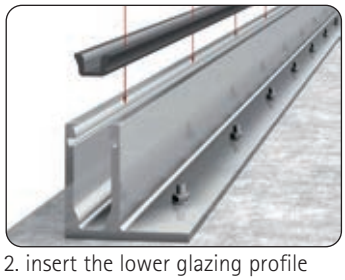
Items labelled with V are cut to length and mitred upon request to adapt them to your installation site.



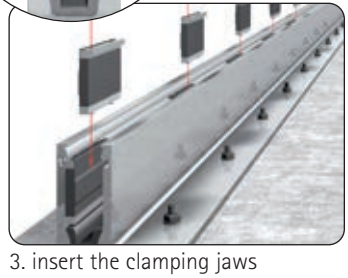
Insertion
from above!

floor mounting

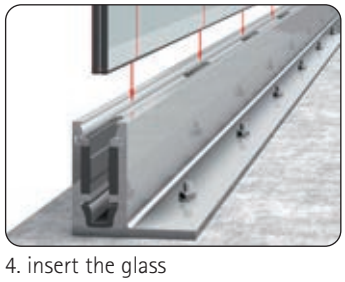
1. affix the profile



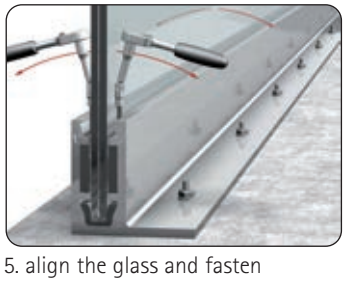
2. insert the lower glazing profile



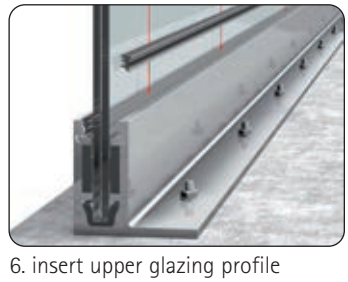
3. insert the clamping jaws



4. insert the glass



5. align the glass and fasten



6. insert upper glazing profile

7. finished system with screed cover

system profile cp-*1402* for front mounting

System profile for front mounting

The cp-*1402* system profile is optimal for modernizing buildings. Being fastened at the front, the clamp profile provides a clear view down to floor level. The integrated adjustment system for aligning the glass panes ensures perfect assembly. It doesn't get any clearer than that. After assembling the glass, the system is completed with a front panel. General type approval is pending for the clamp system. This eliminates the need for costly proofs for the specified glass dimensions.

1x

1402-1E123-
base profile for
front mounting

1400-10EPDM
clamping jaw

1x

1400-2EPDM-
lower glazing
profile

2x

1400-6KU3-5000
upper glazing
profile

1x

1402-2E123-5000
panel

item no.	article name	length	material	finish	
1402E123-17-5000	sytem profile set	5000 mm	aluminium	stainless steel effect	17,52 mm
1402E123-17-V	sytem profile set	max. 5000 mm	aluminium	stainless steel effect	17,52 mm
1402E123-21-5000	sytem profile set	5000 mm	aluminium	stainless steel effect	21,52 mm
1402E123-21-V	sytem profile set	max. 5000 mm	aluminium	stainless steel effect	21,52 mm

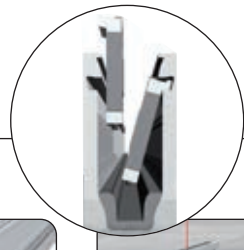
stainless steel effect = polished aluminium, silver anodized

INFO

You will find a checklist for your planning purposes on page 232.

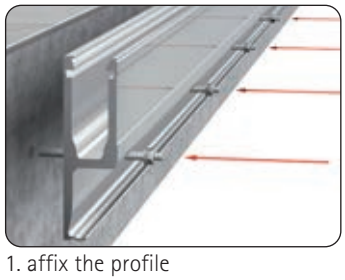
INFO

Items labelled with V are cut to length and mitred upon request to adapt them to your installation site.

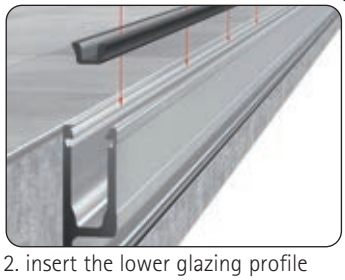


Insertion
from above!

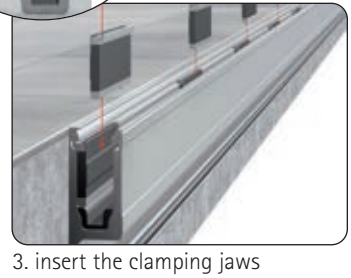
front mounting



1. affix the profile

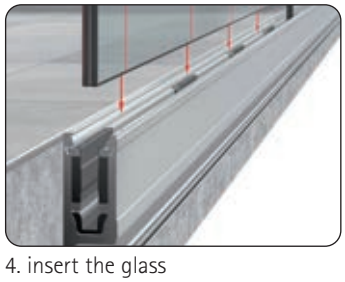


2. insert the lower glazing profile



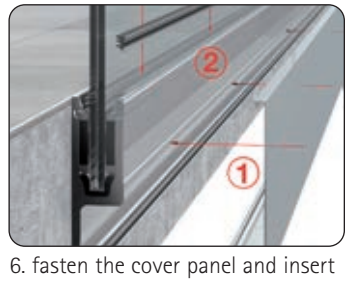
3. insert the clamping jaws

7. finished system with cover panel



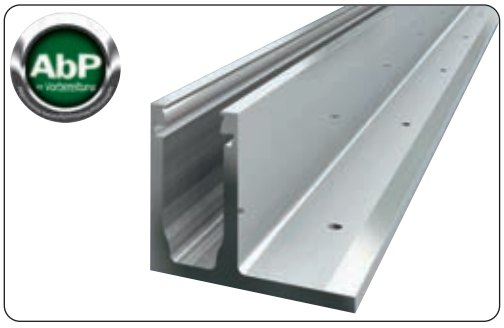
4. insert the glass

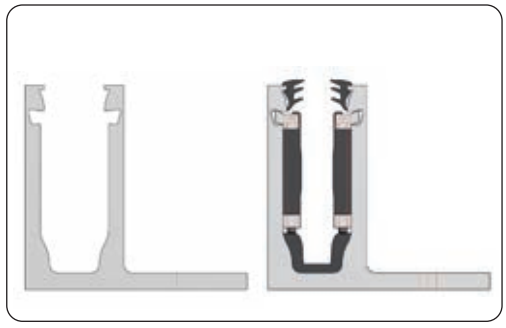
5. align the glass and fasten



6. fasten the cover panel and insert the upper glass seal

base profile for floor mounting



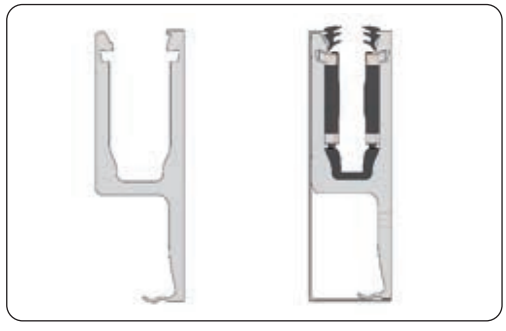


item no.	length	material	finish	
1400-1E123-17-5000	5000 mm	aluminium	stainless steel effect	17,52 mm
1400-1E123-21-5000	5000 mm	aluminium	stainless steel effect	21,52 mm

INFO

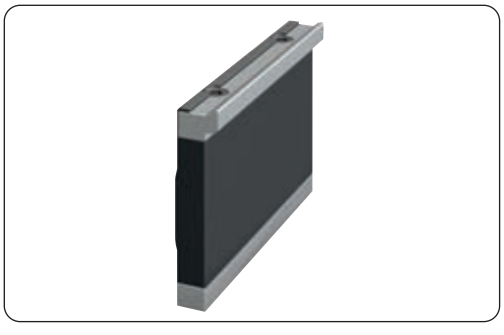
Stainless steel effect = polished aluminium, silver anodized. Other surfaces available upon request.

base profile for front mounting



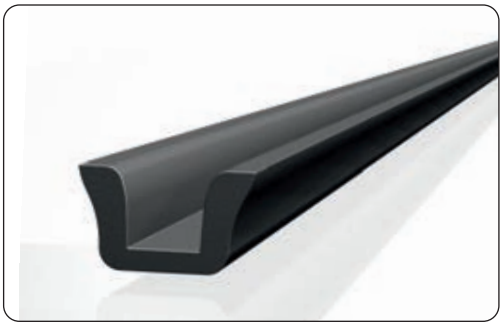
item no.	length	material	finish	
1402-1E123-17-5000	5000 mm	aluminium	stainless steel effect	17,52 mm
1402-1E123-21-5000	5000 mm	aluminium	stainless steel effect	21,52 mm

clamping jaw



item no.	material
1400-10EPDM	aluminium/plastic

lower glazing profile

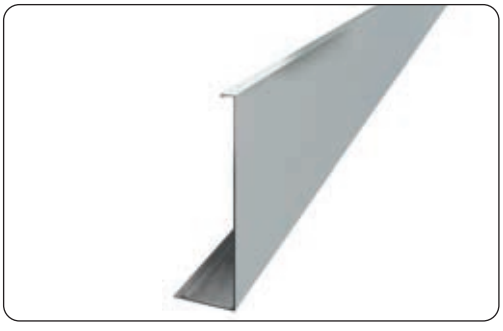


item no.	material	length	
1400-2EPDM-17-5000	plastic	5000 mm	17,52 mm
1400-2EPDM-21-5000	plastic	5000 mm	21,52 mm

upper glazing profile

item no.	material	length
1400-6KU3-5000	plastic	5000 mm

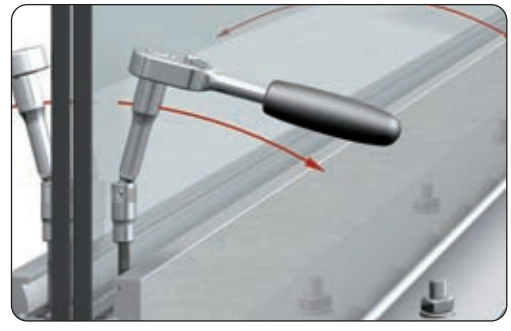
panel for cp-*1402*



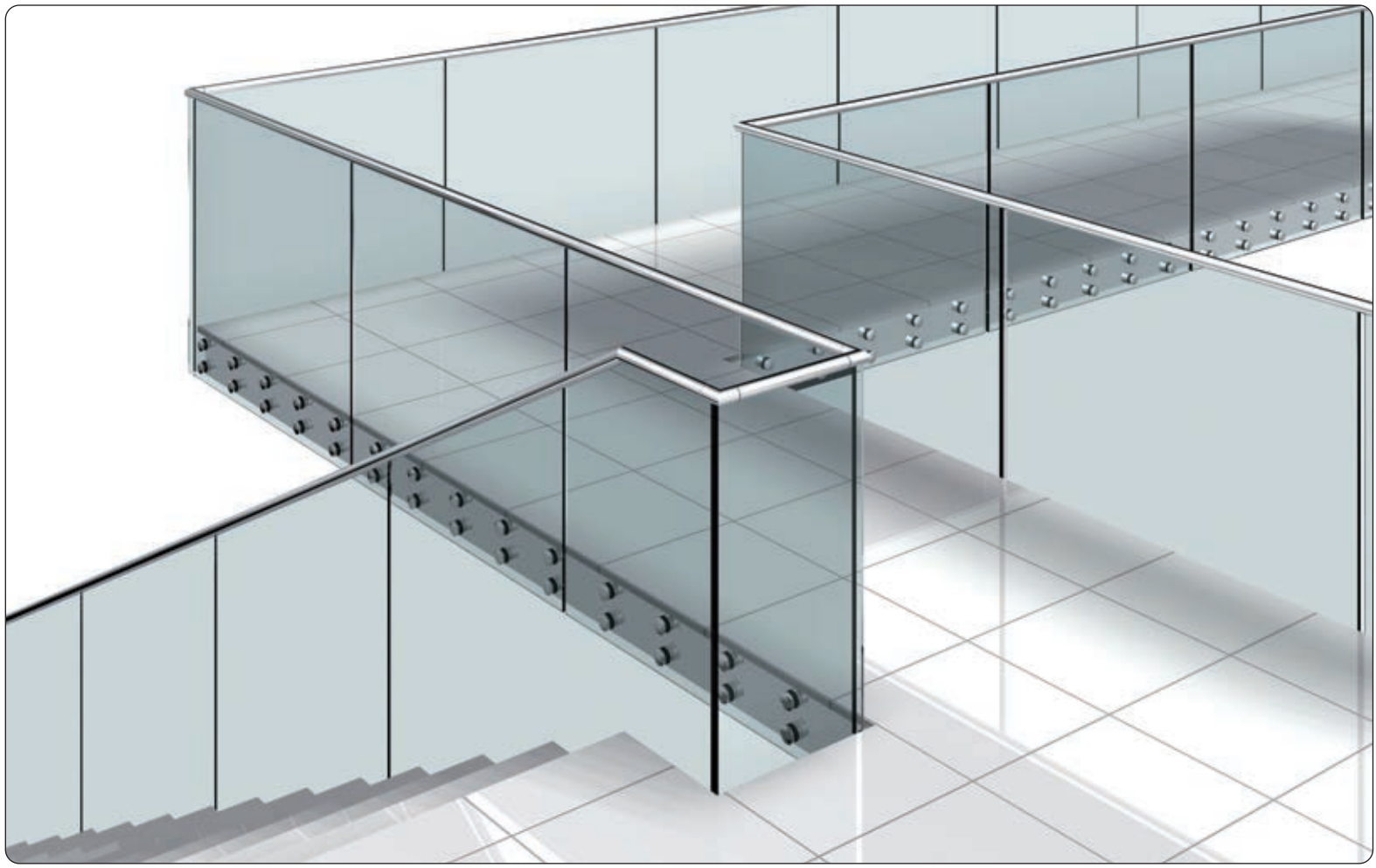
item no.	material	finish
1402-2E123-5000	aluminium	stainless steel effect

assembly tool

item no.	length
1411ST8-50	50 mm
1411ST8-100	100 mm



balustrade system cp-*1440*

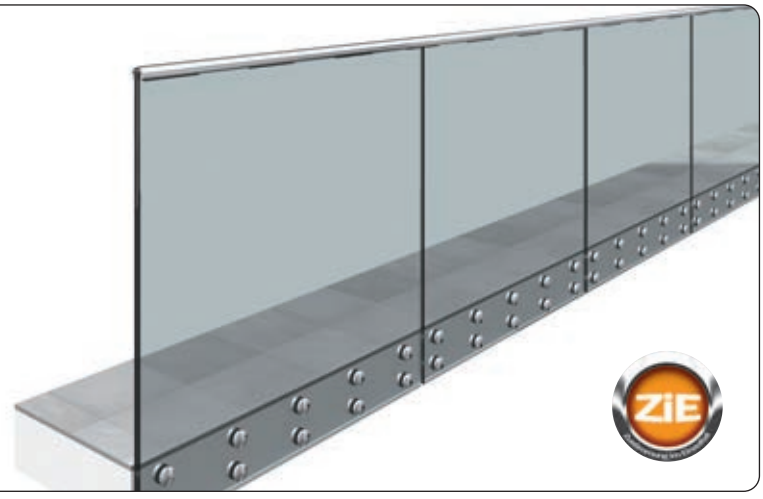


Balustrade system with point fixings

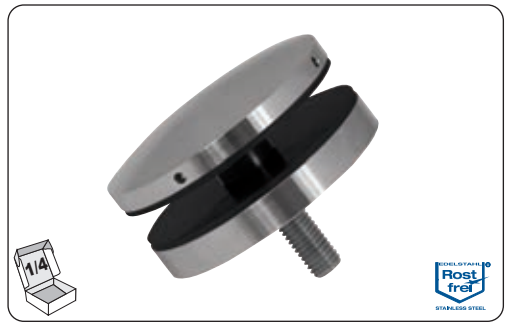
The cp-*1440* balustrade system requires no posts. Fall-protection railing without posts offers maximum transparency. This is where the TRAV Category C point fixings come in. Structural analyses exist for various models.

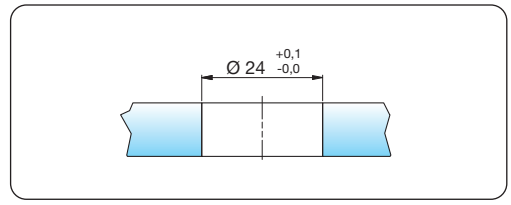
INFO

You will find TRAV-compliant point fixings starting on page 110 and information on the cp-*1440* balustrade system on page 231.



TRAV-compliant point fixings





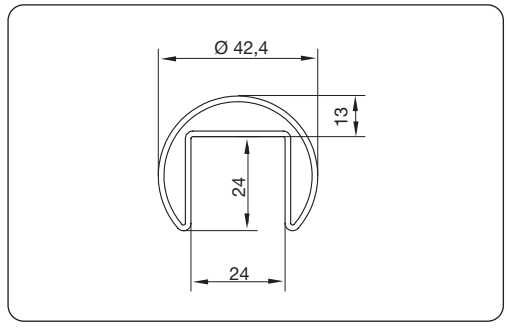
accessoires		included	
	Z060		DIN913 M10 x 90 mm

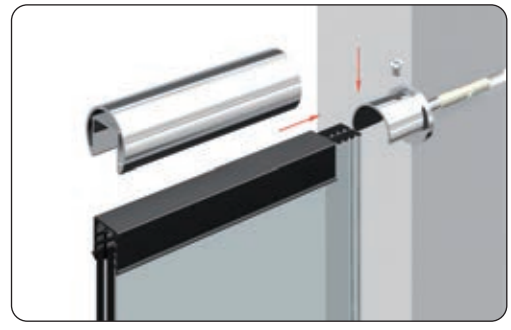
item no.	Ø	head	material
7073VA	72	flat	A2
7077VA	72	beveled	A2

INFO

Further information for point fixing according to TRAV can be found on page 114 and 115.

slotted round tube



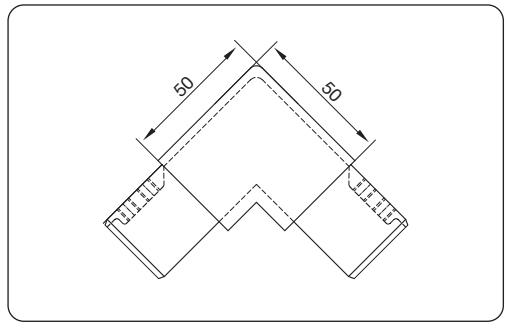


item no.	Ø tube x s	L	material	finish
10213642A4	42,4 x 1,5	6000 mm	**A4**	finish 240
10213642A4-V	42,4 x 1,5	cut to length	**A4**	finish 240

INFO

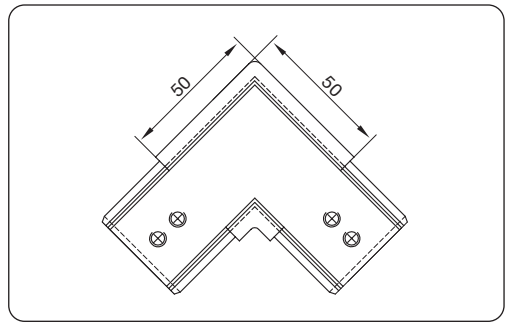
information for point fixing according to TRAV category B can be found on page 238.

corner connector vertical, for slotted round tube



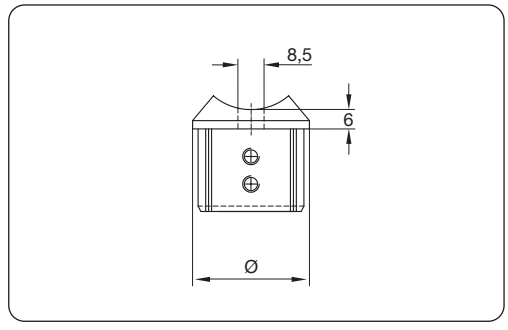
item no.	Ø tube x s	material	finish
10213742A4	42,4 x 1,5	**A4**	finish 240

corner connector horizontal, for slotted round tube



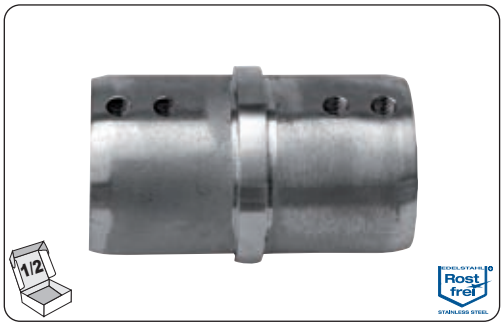
item no.	Ø tube x s	material	finish
10213842A4	42,4 x 1,5	**A4**	finish 240

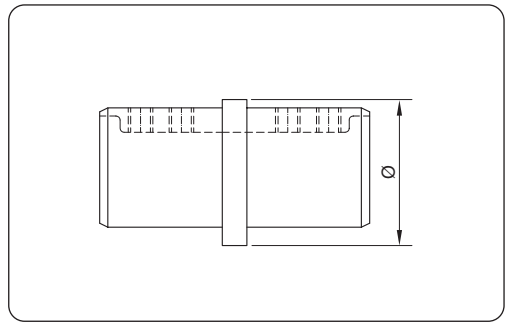
slotted round tube connector 90°



item no.	Ø tube x s	adapter	material	finish
10213942A4	42,4 x 1,5	Ø 42,4	**A4**	finish 240

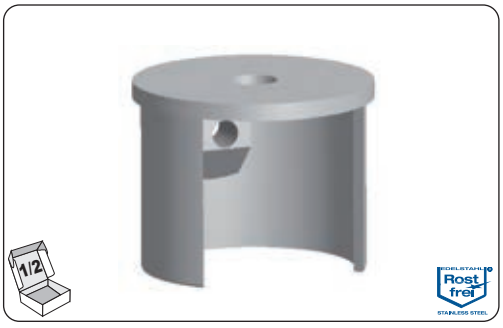
slotted round tube connector 180°

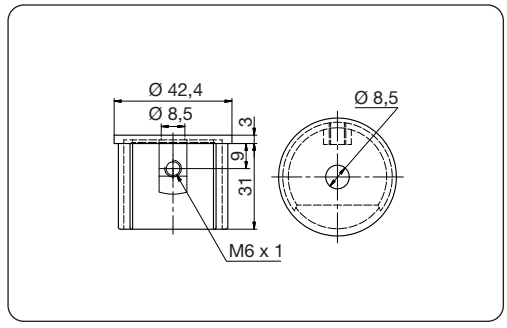




item no.	Ø tube x s	material	finish
10214042A4	42,4 x 1,5	**A4**	finish 240

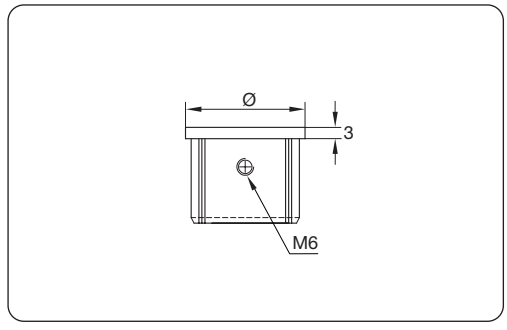
slotted round tube connector, wall mounting





item no.	Ø tube x s	material	finish
10233842A4	42,4 x 1,5	**A4**	finish 240

slotted round tube end cap, flat

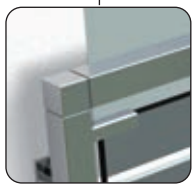


item no.	Ø tube x s	material	finish
10214142A4	42,4 x 1,5	**A4**	finish 240

elastomeric profile for slotted tube systems

item no.	glass thickness	Ø
10214542KU	8 - 10,76	42,4 x 1,5
10214642KU	12 - 16,76	42,4 x 1,5
10214742KU	16,76 - 18	42,4 x 1,5
10214842KU	20 - 21,52	42,4 x 1,5

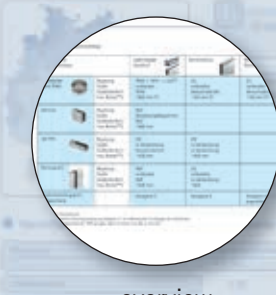
content



INFO CURRENT RULES REGARDING FRENCH BALCONIES

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.

general information
page 242

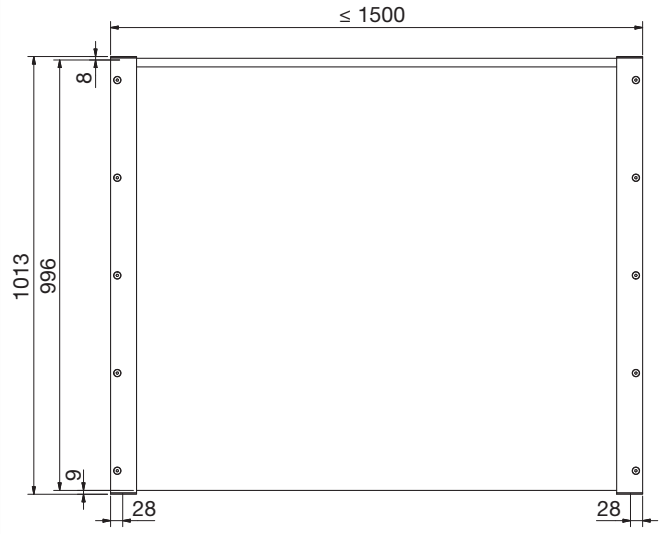


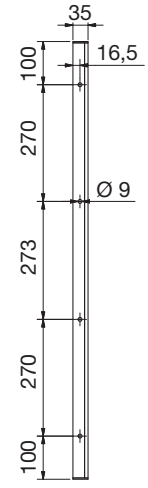
overview
page 243

dimensions
page 244

- french balconies

set with clamp rails in the reveal, with edge protection profile





reduction measurements glass:

• top	5 mm
• bottom	5 mm
• left	26 mm
• right	26 mm

static calculation available

please ask for delivery times

Set-7240-12	13,52 mm
Set-7240-16	17,52 mm

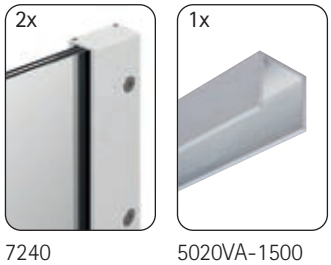
AbP

INFO

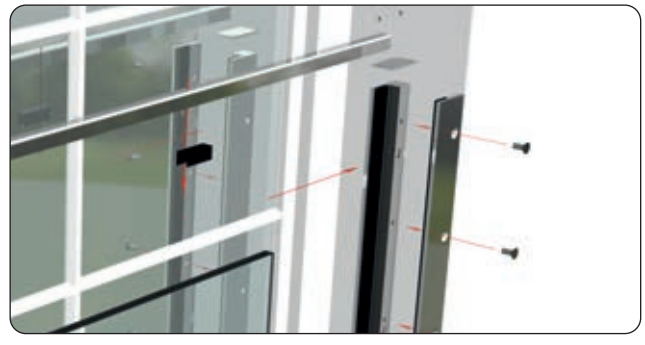
No drill holes in the glass required.
Glass sizes in design and safety page 244.

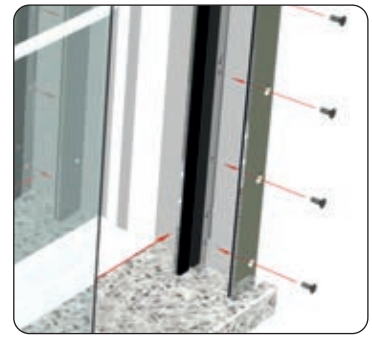
RAL9016 E1/23 RAL

set comprised of

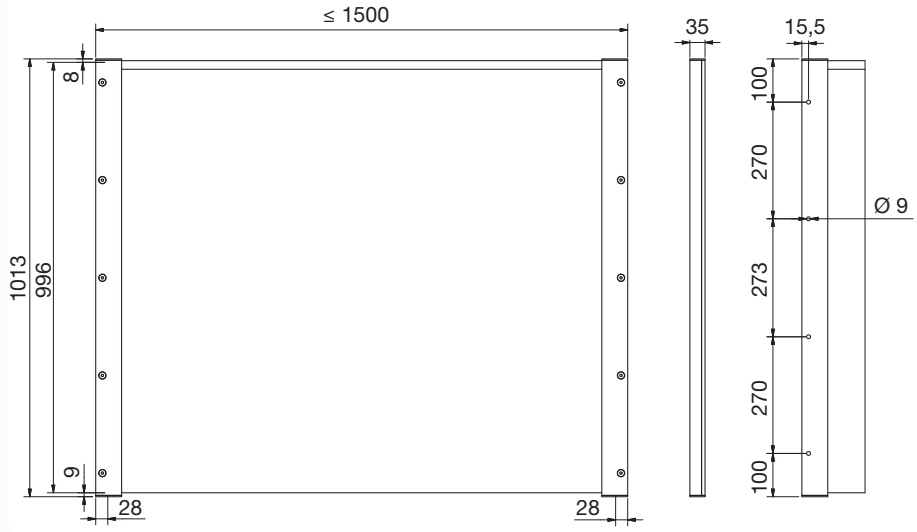


7240 5020VA-1500





set with clamp rails against the wall, with edge protection profile



reduction measurements glass:

• top	5 mm
• bottom	5 mm
• left	26 mm
• right	26 mm

static calculation available

please ask for delivery times

Set-7242-12	13,52 mm
Set-7242-16	17,52 mm

AbP

INFO

No drill holes in the glass required.
Glass sizes in design and safety page 244.

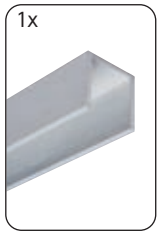
RAL9016 E1/23 RAL

set comprised of

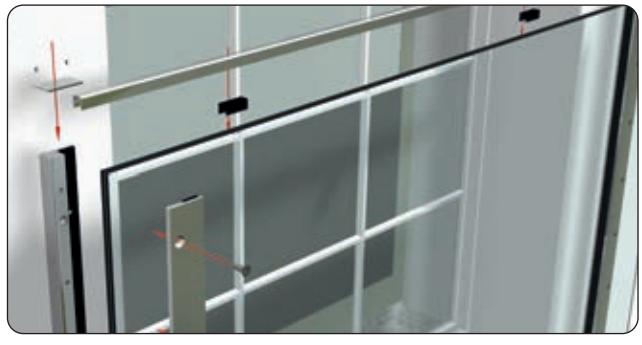
2x

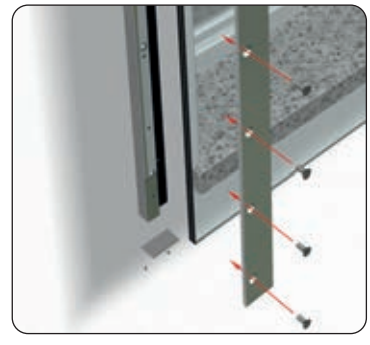
7242

1x

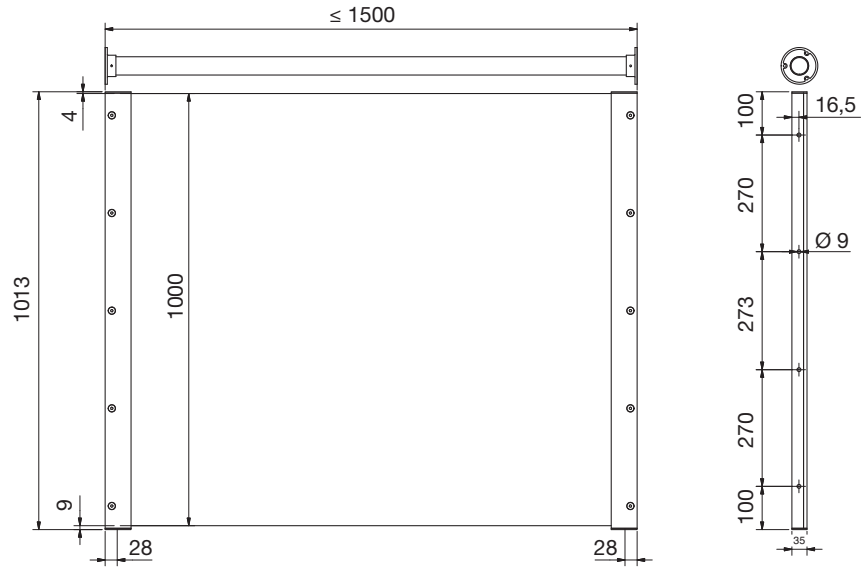


5020VA-1500





set with clamp rails with independent handrail, without edge protection profile



reduction measurements glass:

• top	4 mm
• bottom	9 mm
• left	28 mm
• right	28 mm

please ask for delivery times

Set-7244-12	13,52 mm
Set-7244-16	17,52 mm

RAL9016 E1/23 RAL

INFO

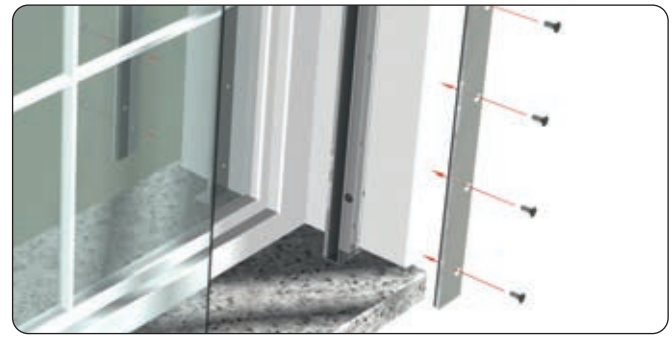
No drill holes in the glass required.
Glass sizes in design and safety page 245.

set comprised of

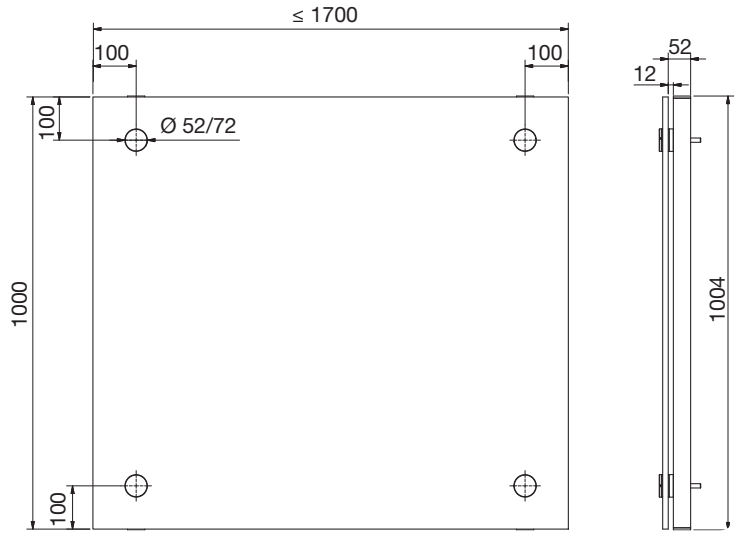
7240

10200142A2-1500

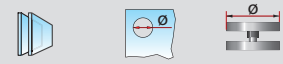
10238940A4



set with point fixings against the wall, without handrail, without edge protection profile

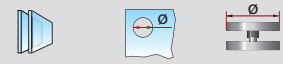


Set-7246 with 7072VA



13,52 mm 22 mm 52 mm

Set-7247 with 7073VA

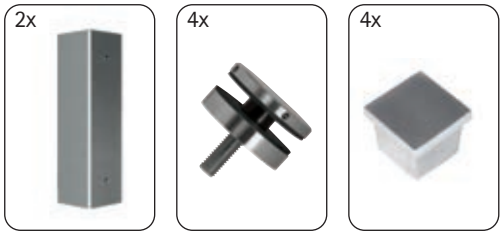


17,52 mm 24 mm 72 mm
21,52 mm

INFO

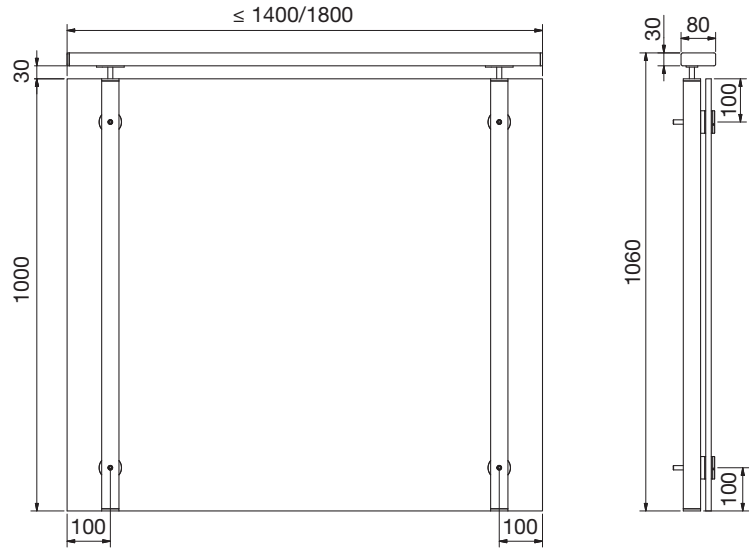
Glass sizes in design and safety page 246.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

set comprised of



7246-1A2 7072VA /7073VA 10209540A2

set with point fixings against the wall, with handrail



please ask for delivery times

Set-7248 with 7072VA, 7248-2A2-1400

13,52 mm | 22 mm | 52 mm

Set-7249 with 7073VA, 7248-2A2-1800

17,52 mm
21,52 mm | 24 mm | 72 mm

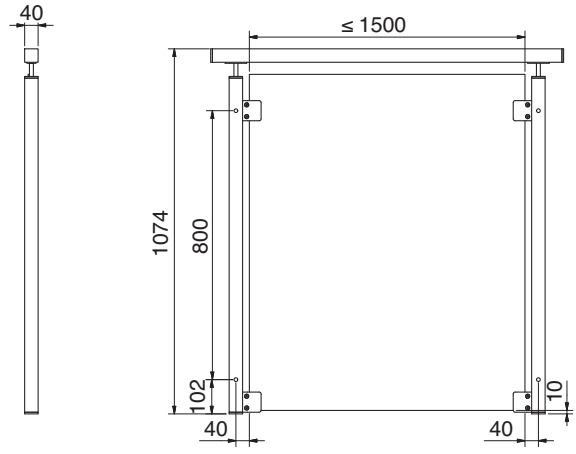
INFO

Glass sizes in design and safety page 247.
The design is analogous to TRAV, approval in the individual case is required due to the outdoor application.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

set comprised of

2x	4x	2x	2x	2x	2x	1x	2x
							
7246-1A2	7072VA /7073VA	10209540A2	10240112A2	10205900A2	10209640A2	7248-2A2-1400 7248-2A2-1800	7248-1VA2

set with clamp fixtures to the side, with hand rail



Please specify the glass thickness when ordering:

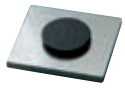
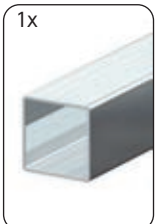
_____ mm

INFO

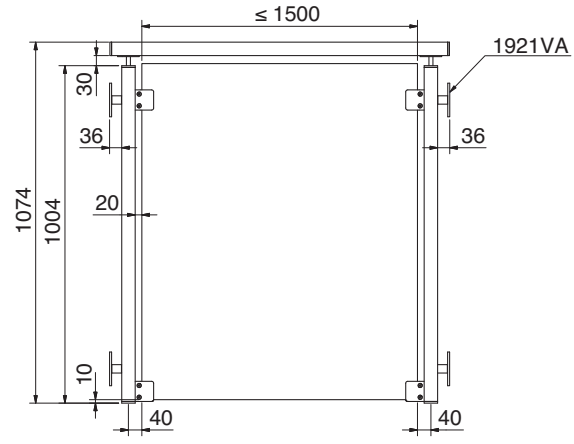
Glass up to 1500 mm. Glass sizes in design and safety page 248.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

Set-7250 — 8,76 - 12,76 mm

set comprised of

1x	1x	4x	2x	4x	1x	2x	2x	2x
								
7250-1A2-L	7250-1A2-R	9332VA2	4899VA	10209540A2	10200040A2-1700	10240112A2	10205900A2	10209640A2

set with clamp fixtures in the reveal, with handrail, without edge protection profile



Please specify the glass thickness when ordering:

_____ mm

INFO

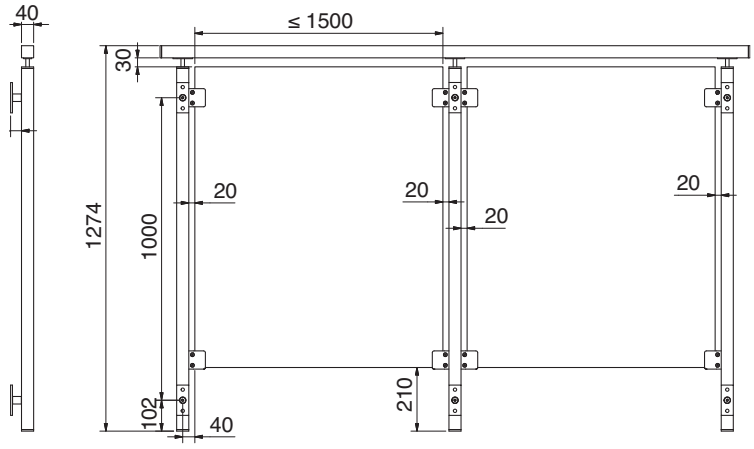
Glass up to 1500 mm. Glass sizes in design and safety page 248.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

Set-7252 — 8,76 - 12,76 mm

set comprised of

1x	1x	4x	2x	4x	1x	2x	2x	2x
7252-1A2-L	7252-1A2-R	9332VA2	4899VA	10209540A2	10200040A2-1700	10240112A2	10205900A2	10209640A2

set with clamp fixtures against the wall, with handrail, without edge protection profile



Please specify the glass thickness when ordering:

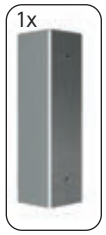
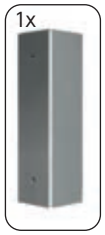
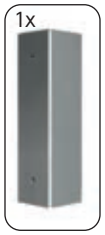
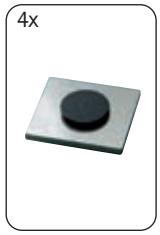
_____ mm

INFO

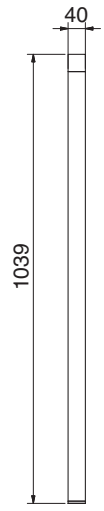
Glass up to 1500 mm. Glass sizes in design and safety page 248.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

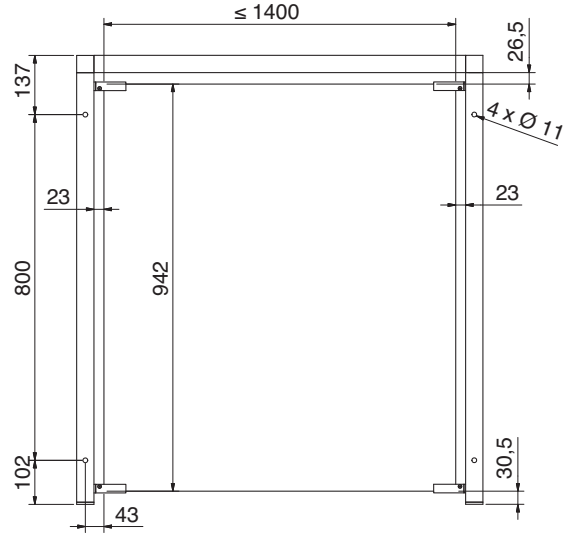
Set-7256 — 8,76 - 12,76 mm

set comprised of

1x	1x	1x	8x	4x	5	1x	2x	3x	3x
									
7256-1A2-L	7256-2A2	7256-1A2-R	9332VA2	4899VA	10209540A2	10200040A2-1700	10240112A2	10205900A2	10209640A2

set with cp-mini against the wall, with handrail, without edge protection profile





INFO

Glass up to 1400 mm. Glass sizes in design and safety page 249.
The shock resistance of cp-mini is proven by general type testing. Additional approval in the individual case is required due to the outdoor application.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

Set-7258 13,52 mm

set comprised of

7258-1A2

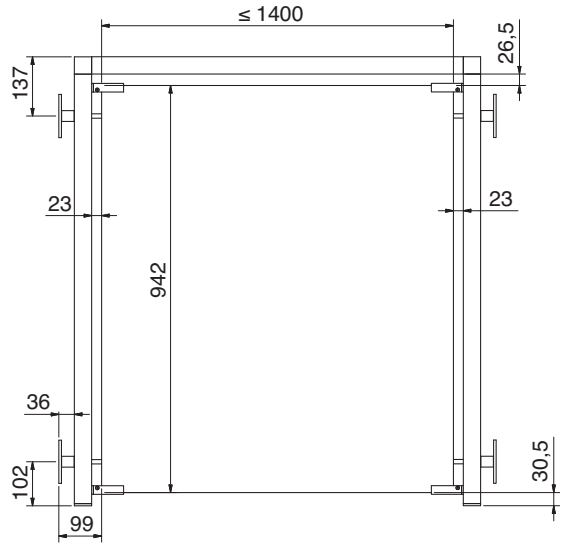
9410VA

10200040A2-1450

10209540A2

10209140A4

set with cp-mini in the reveal, with handrail, without edge protection profile

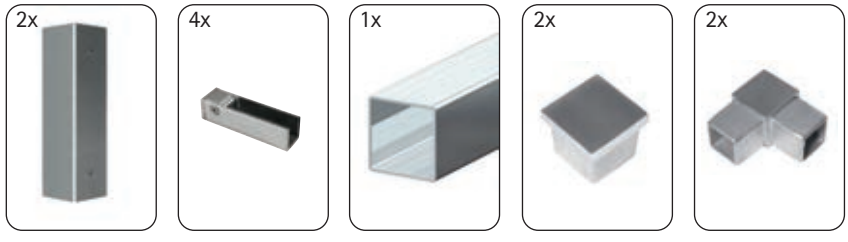


INFO

Glass up to 1400 mm. Glass sizes in design and safety page 249.
The shock resistance of cp-mini is proven by general type testing. Additional approval in the individual case is required due to the outdoor application.
Fastening set (1921VA) for wall mounting is not included in the set. Fastening set on page 36.

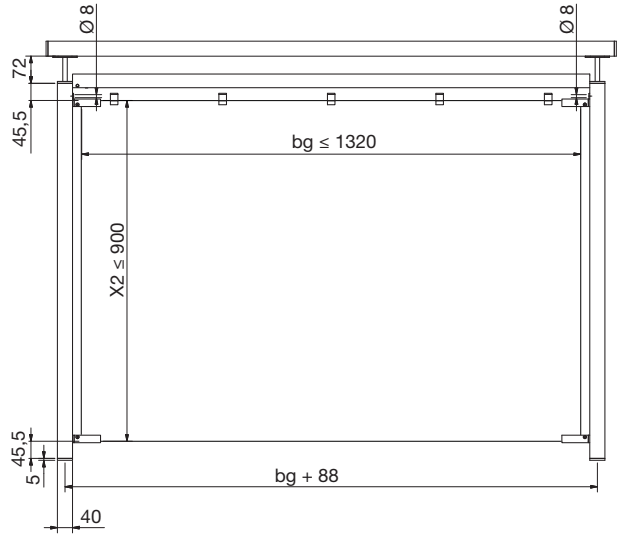
Set-7260 — 13,52 mm

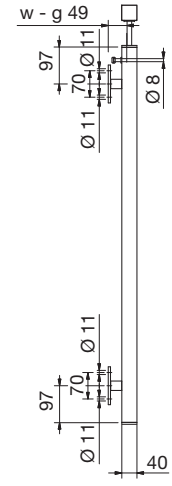
set comprised of



7260-1A2 | 9410VA | 10200040A2-1450 | 10209540A2 | 10209140A4

set with cp-minisolar, with handrail and edge protection (wire channel)





bg = glass width, w = wall, g = glass

Please specify when ordering:

- X2 (glass height): _____ mm

INFO

You will find further information on our solar system starting on page 38.

- fastening set (SET-9410VA-12S) starting page 44

SET-7262A2 — 11,52 mm + PV

set comprised of

7262-1A2-L

7262-1A2-R

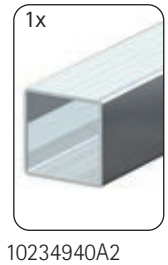
10209540A2

10209640A2

10205212A2

10205900A2

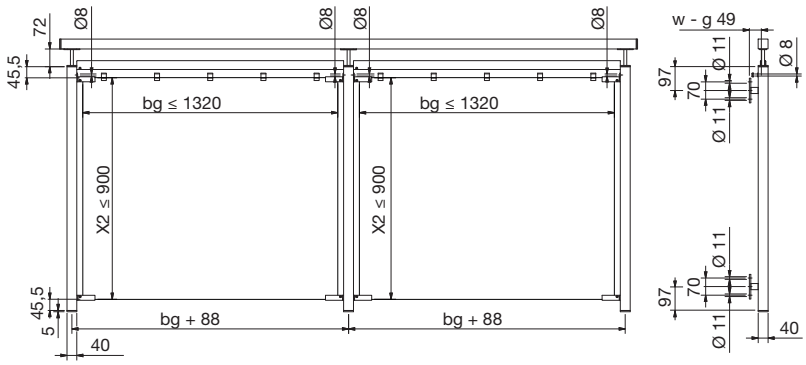
1921VA



10234940A2

SET-9410VA-12S

double set with cp-minisolar, with handrail and edge protection (wire channel)



bg = glass width, w = wall, g = glass

Please specify when ordering:

- X2 (glass height): _____ mm

INFO

You will find further information on our solar system starting on page 38.

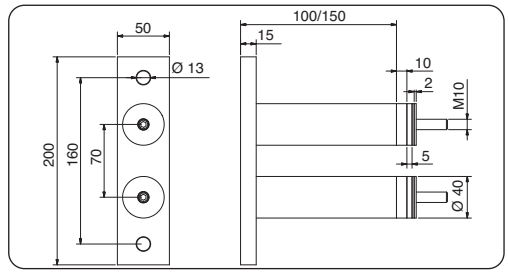
- fastening set (SET-9410VA-12S) starting page 44

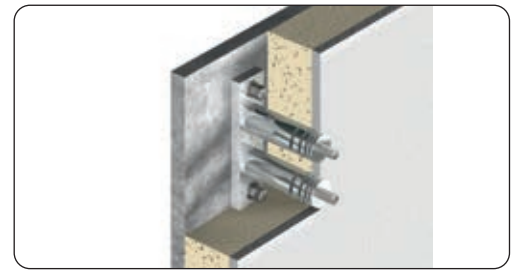
SET-7264A2 — 11,52 mm + PV

set comprised of

1x	1x	1x	5x	3x	3x	3x	6x	1x	2x
									
7262-1A2-L	7262-2A2	7262-1A2-R	10209540A2	10209640A2	10205212A2	10205900A2	1921VA	10200740A2	SET-9410VA-12S

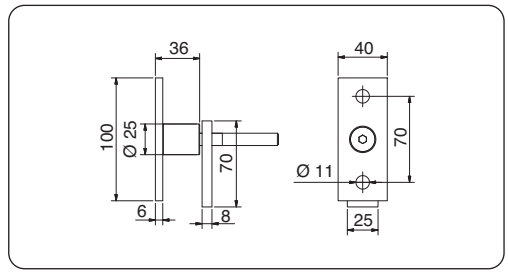
mounting plate





item no.	material	finish
1919VAM10-100-2	A2	finish 240
1919VAM10-150-2	A2	finish 240

fastening set



item no.	material	finish
1921VA	A2	finish 240

LOCTITE® 638

- short bonding time
- high strength
- DVGW tested

1023300CTP: 10-ml-bottle
1023310CTP: 50-ml-bottle

1023300CTP / 1023310CTP

LOCTITE®638 is a special adhesive used to bond cylindrical join parts. It can be especially used if adhesive gaps of up to 0.25 mm can arise and maximum stability is required at room temperature. The product hermetically bonds tight metal surfaces. It prevents screws coming loose by themselves and leakages caused by impacts and vibrations. Typical applications include attaching sliding bushings in casings, on shafts, stainless steel tube end caps, stainless steel plug fittings and bearings.

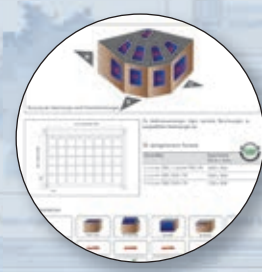
application of french balconies

content

INFO CURRENT RULES REGARDING SOLAR BALUSTRADE GLAZING

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.

general information
page 224

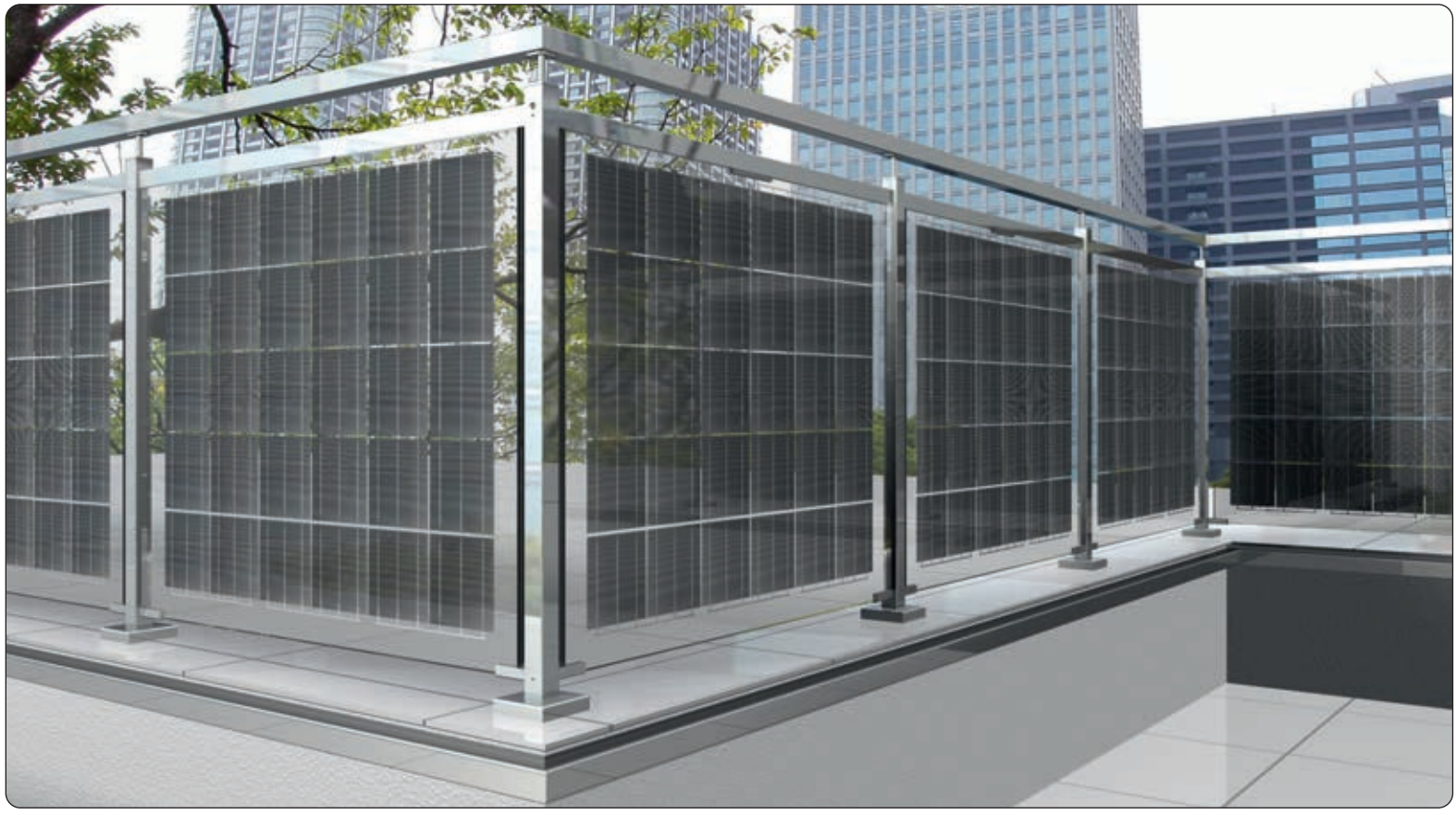


dimensions
page 225

advantages
page 226

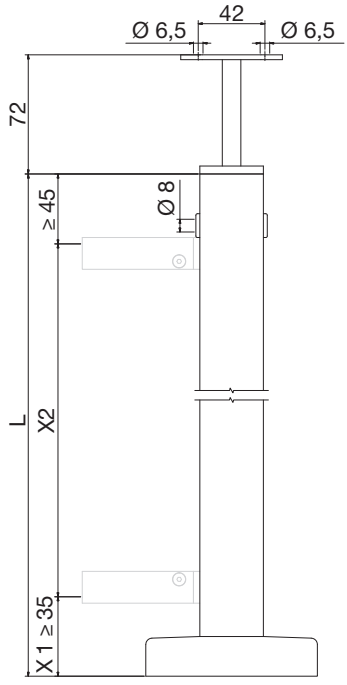
- cp-mini*solar*

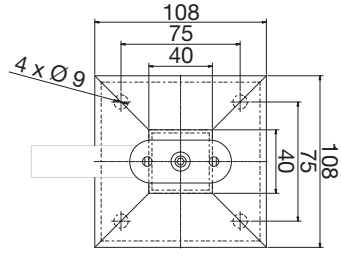
cp-mini*solar* for rectangular tubing



selection of post variants

end post set for cp-mini*solar*





Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102290PSA2-S — 11,52 mm + PV

INFO

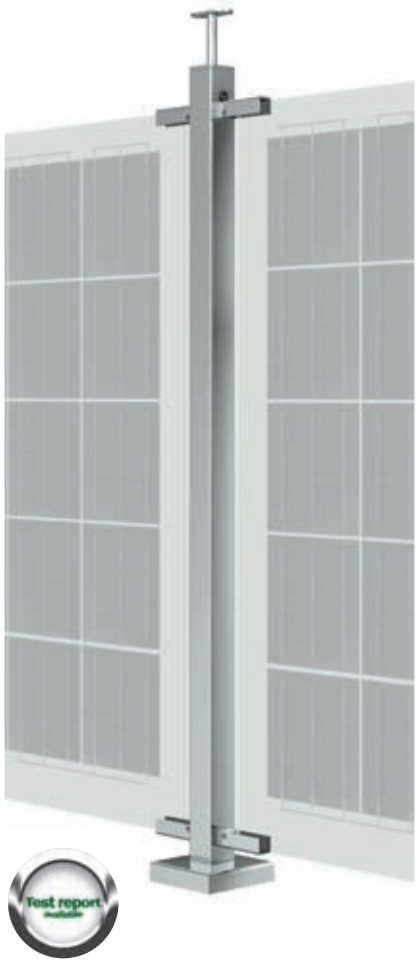
You will find further information on our solar system starting on page 224.

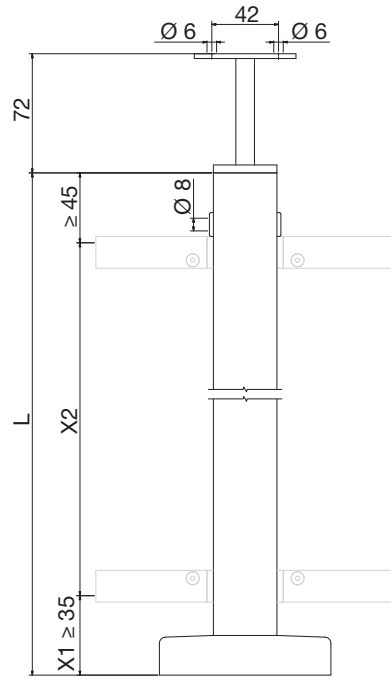
- fastening set starting on page 44
- handrail accessories starting on page 173

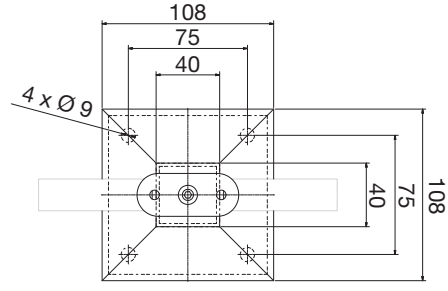
set comprised of

1x	1x	1x	1x	1x	1x	1x	2x
							
102290-1PSA2	10238940A4	10209640A2	10205212A2	10205900A2	S7991A2D6X12	9407-2EPDM	9407-1EPDM

middle post set for cp-mini*solar*







Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102291PSA2-S — 11,52 mm + PV

INFO

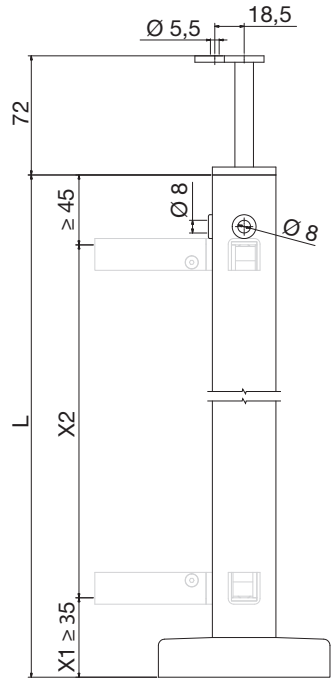
You will find further information on our solar system starting on page 224.

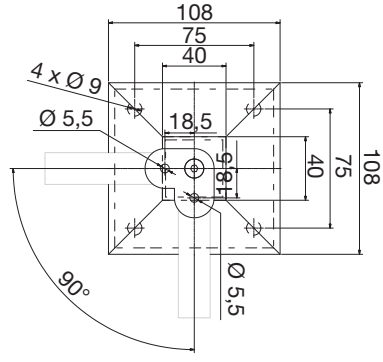
- fastening set starting on page 44
- handrail accessories starting on page 173

set comprised of

1x	1x	1x	1x	1x	1x	2x
						
102290-1PSA2	10238940A4	10209640A2	10205212A2	10205900A2	S7991A2D6X12	9407-2EPDM

corner post set for cp-mini*solar*





Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102292PSA2-S — 11,52 mm + PV

INFO

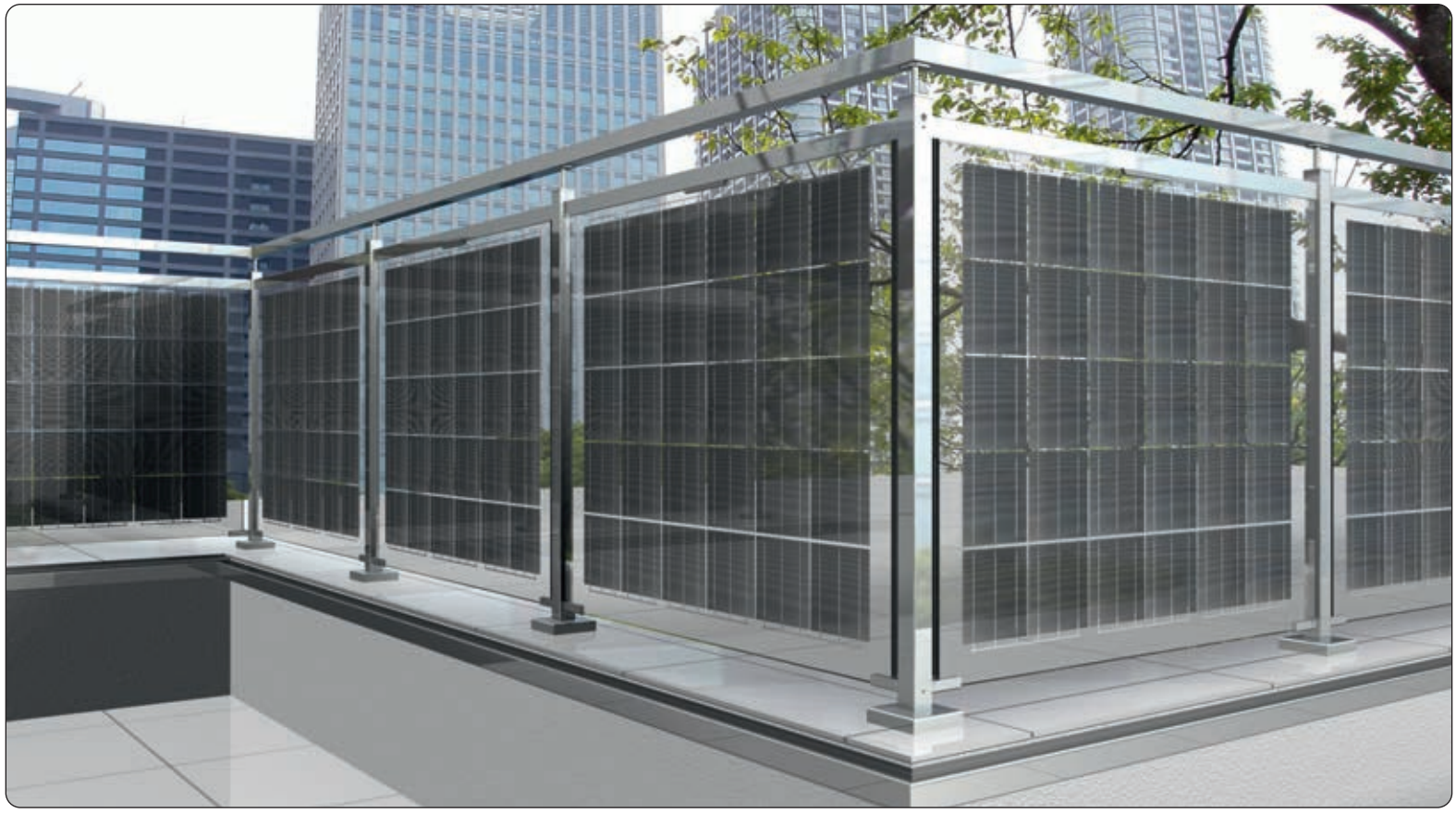
You will find further information on our solar system starting on page 224.

- fastening set starting on page 44
- handrail accessories starting on page 173

set comprised of

1x	1x	1x	1x	1x	1x	2x
						
102291-1PSA2	10238940A4	10209640A2	10205212A2	10205900A2	S7991A2D6X12	9407-1EPDM

cp-mini*solar* for rectangular tubing



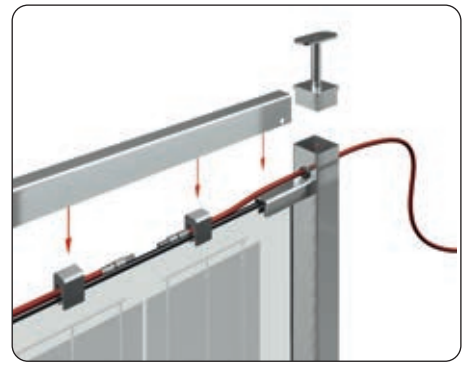
fastening set per filling

INFO

The quantity of fastening sets equals the number of railing segments.

cp-mini*solar* fastening set

* cuttable



example application

Please specify when ordering:

- quantity of fastening sets
  piece

Fastening set suitable for VSG 11.52 mm plus solar cells (≤0.45 mm).
Other glass thicknesses available upon request. Glass is not included in the set!

Customer must shorten profile to required length and drill second countersunk hole.

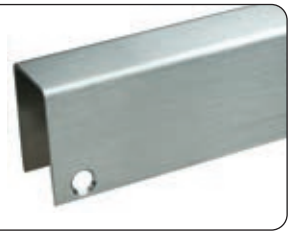
SET-9410VA-12S	11,52 mm + PV

set comprised of

4x

9410VA-12S

1x



9409VA-1500

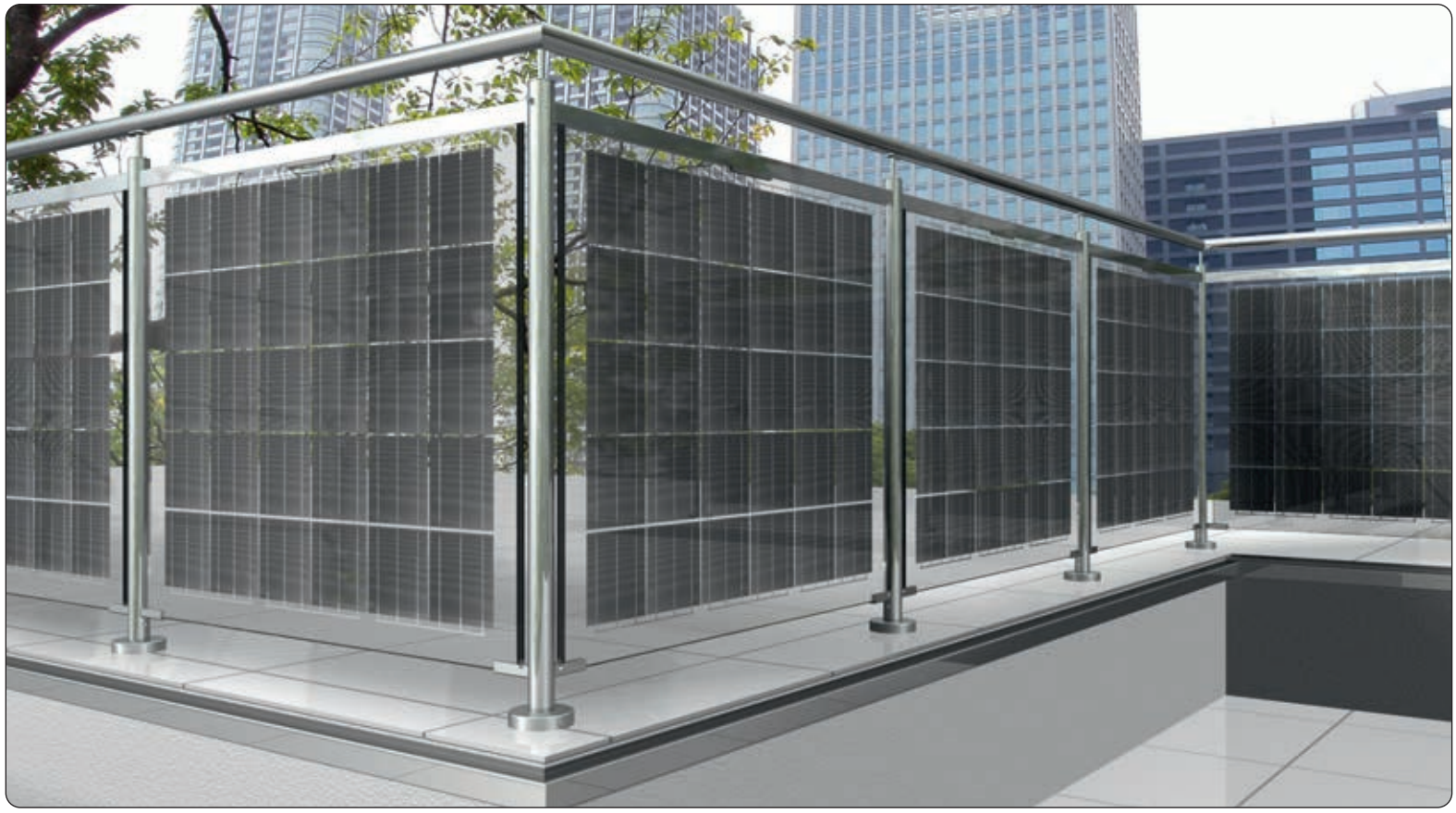
5x

9408POM-12

4x

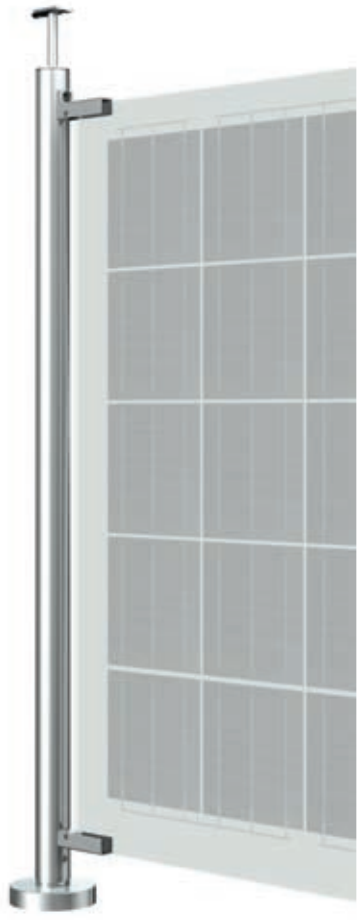
S6912A2D6x30

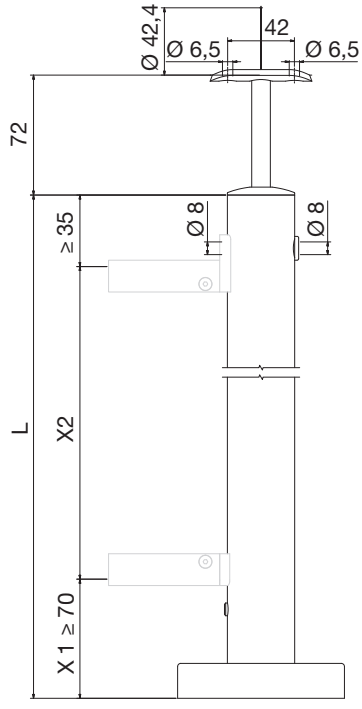
cp-mini*solar* for round tubing

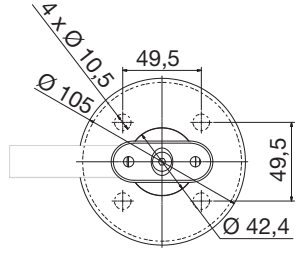


selection of post variants

end post set for cp-mini*solar*







Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102293PSA2-S — 11,52 mm + PV

INFO

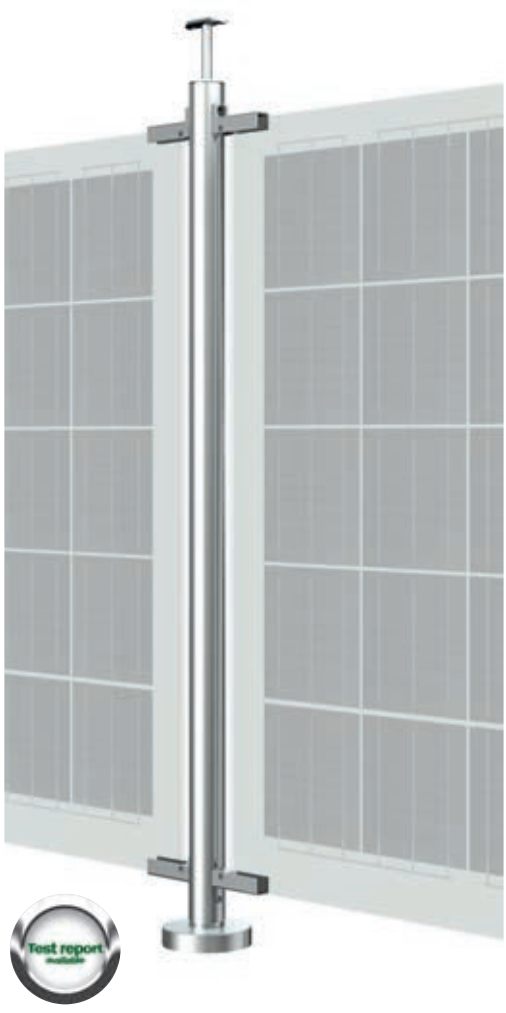
You will find further information on our solar system starting on page 224.

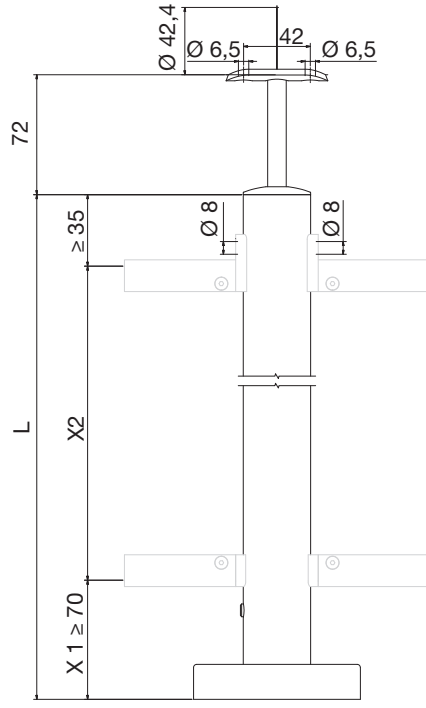
- fastening set starting on page 52
- handrail accessories starting on page 150

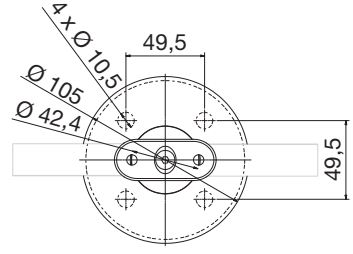
set comprised of

1x	1x	1x	1x	1x	1x	1x	1x	2x
								
10209742A2	10211642A2	102293-1PSA2	10204942A2	10205212A2	10206033A2	S7991A2D6X12	9407-2EPDM	9407-1EPDM

middle post set for cp-mini*solar*







Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102294PSA2-S — 11,52 mm + PV

INFO

You will find further information on our solar system starting on page 224.

- fastening set starting on page 52
- handrail accessories starting on page 150

set comprised of


1x
10209742A2


1x
10211642A2


1x
102294-1PSA2


1x
10204942A2

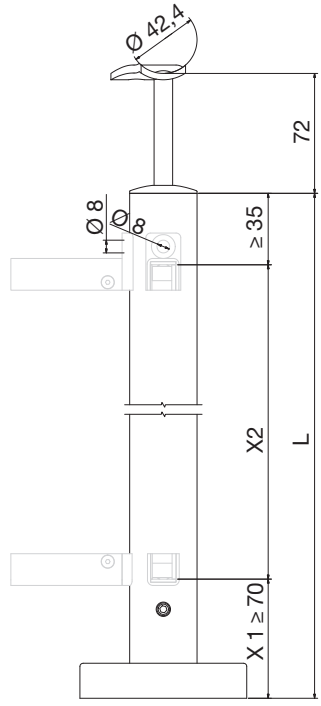

1x
10205212A2

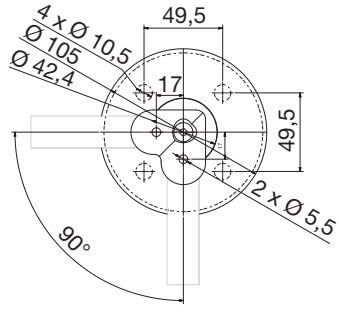

1x
10206033A2


1x
S7991A2D6X12


2x
9407-1EPDM

corner post set for cp-mini*solar*





Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass):
  mm
- X2 (glass height):
  mm
- L (total length):
  mm

102295PSA2-S	11,52 mm + PV

INFO

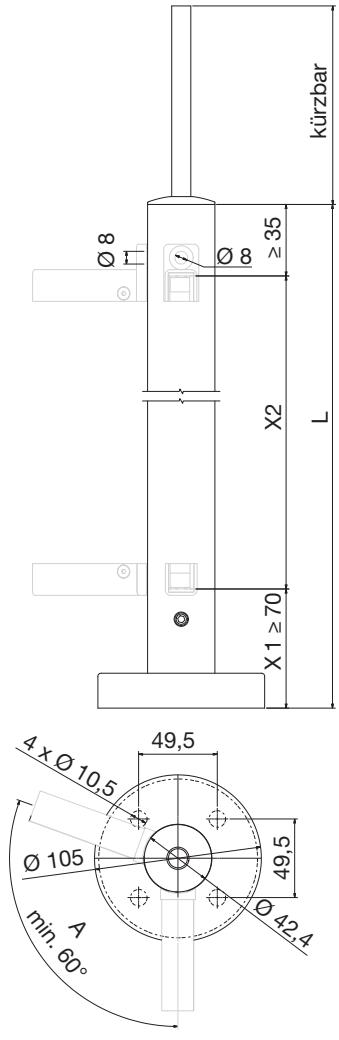
You will find further information on our solar system starting on page 224.

- fastening set starting on page 52
- handrail accessories starting on page 150

set comprised of

1x	1x	1x	1x	1x	1x	1x	2x
							
10209742A2	10211642A2	102295-1PSA2	10204942A2	10205212A2	10206233A2	S7991A2D6X12	9407-1EPDM

corner post set, variable, for cp-mini*solar*



Please specify when ordering:

- X1 (upper edge of floor to bottom edge of glass): mm
- X2 (glass height): mm
- L (total length): mm
- A (angle): °

102296PSA2-S — 11,52 mm + PV

INFO

You will find further information on our solar system starting on page 224.

- fastening set starting on page 52
- handrail accessories starting on page 150

set comprised of

1x	1x	1x	1x	1x	2x
					
10209742A2	10211642A2	102295-1PSA2	10204942A2	10205312A2	9407-1EPDM

cp-mini*solar* for round tubing

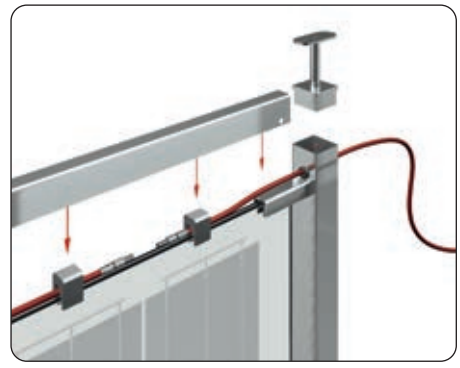
fastening set per filling

INFO

The quantity of fastening sets equals the number of railing segments.

cp-mini*solar* fastening set

* cuttable



example application

Please specify when ordering:

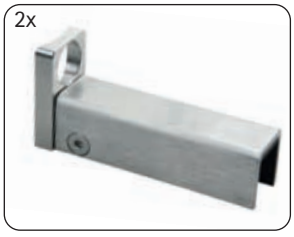
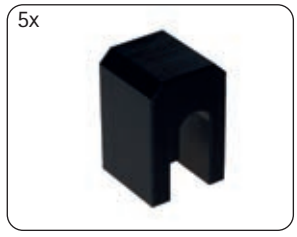
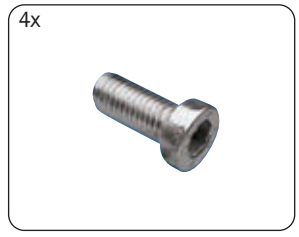
- quantity of fastening sets
  piece

Fastening set suitable for VSG 11.52 mm plus solar cells (≤0.45 mm).
Other glass thicknesses available upon request. Glass is not included in the set!

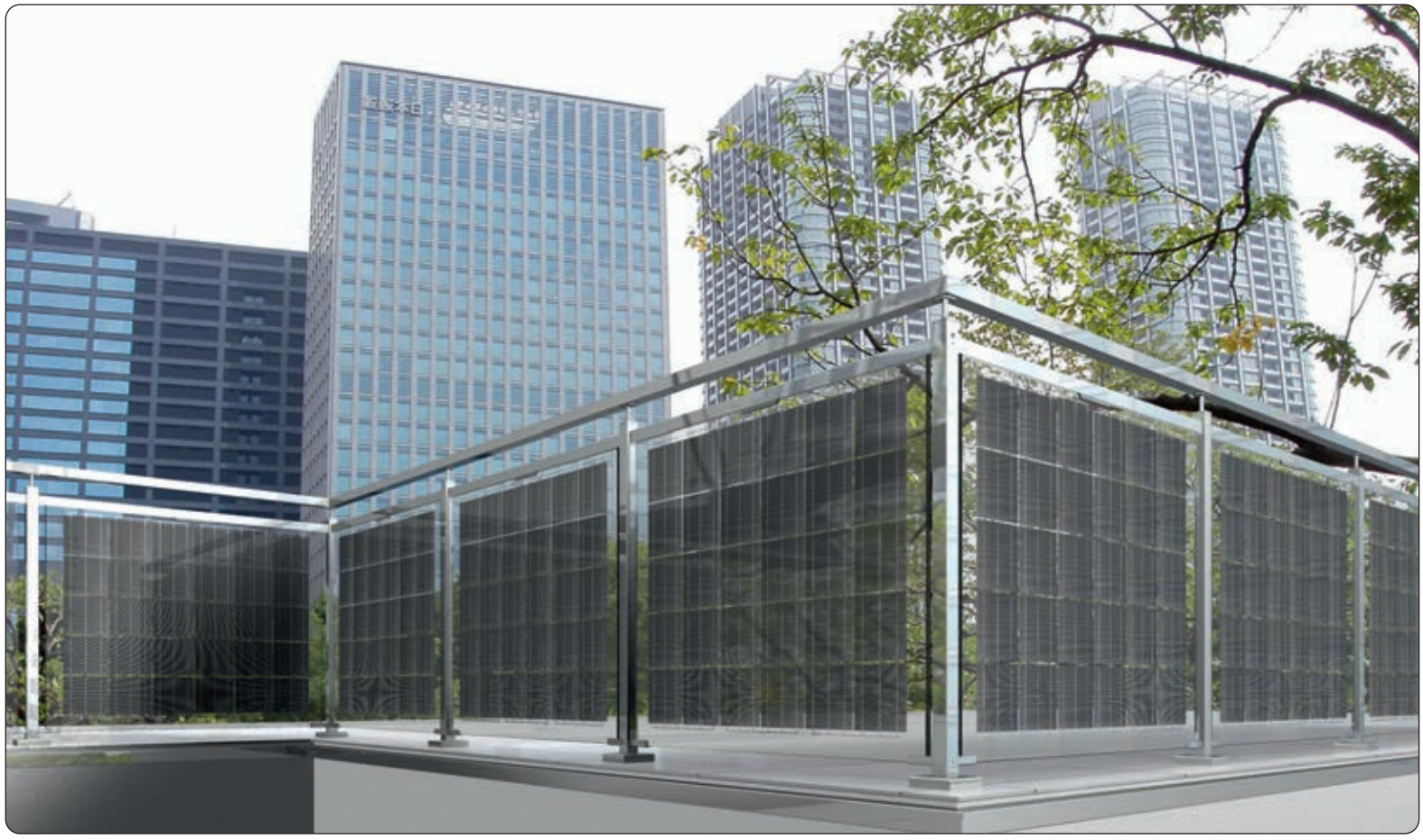
Customer must shorten profile to required length and drill second countersunk hole.

SET-9420VA-12S	11,52 mm + PV

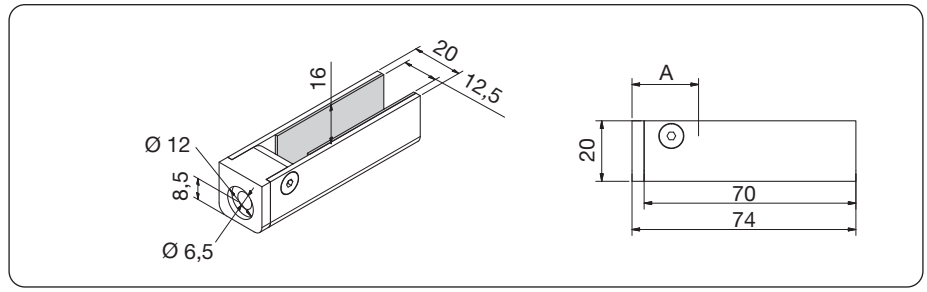
set comprised of

2x 	2x 	1x 	5x 	4x 
9420VA-EL-12	9420VA-12S	9419VA-1500	9408POM-12	S6912A2D6x30

content



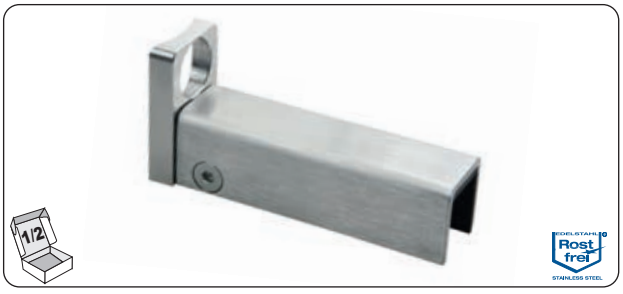
cp-mini*solar* for square tube

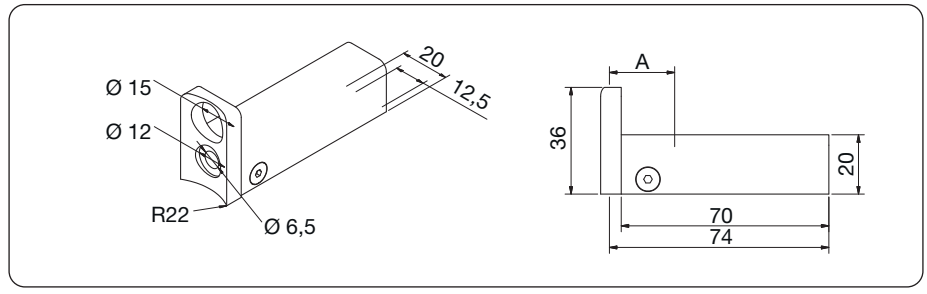


item no.	material	info	VSG
9410VA-12S	A2/K240	180° straight	12 mm

A = gap to subtract for glass 24 mm/fastening screw DIN 6912 M6 included in fastening set

cp-mini*solar* for round tube

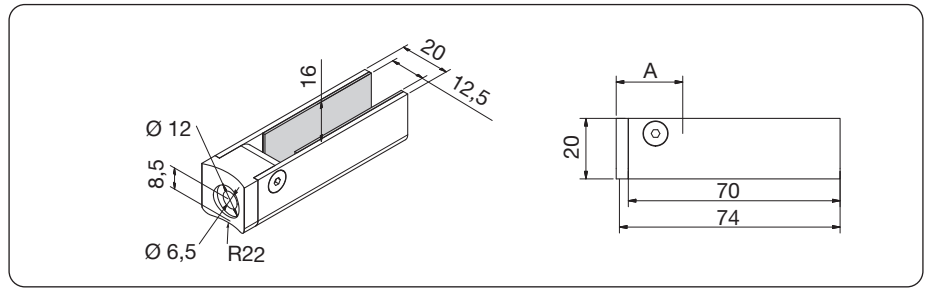




item no.	material	info	VSG
9420VA-EL-12	A2/K240	180° straight	12 mm

A = gap to subtract for glass 24 mm/fastening screw DIN 6912 M6 included in fastening set

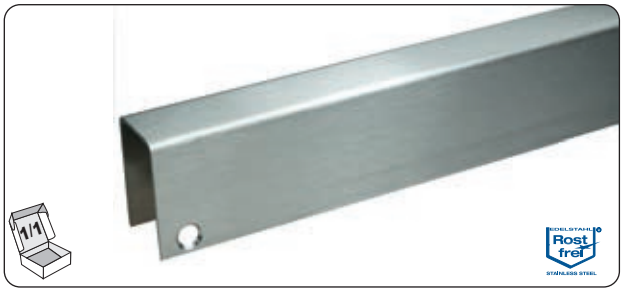
cp-mini*solar* for round tube

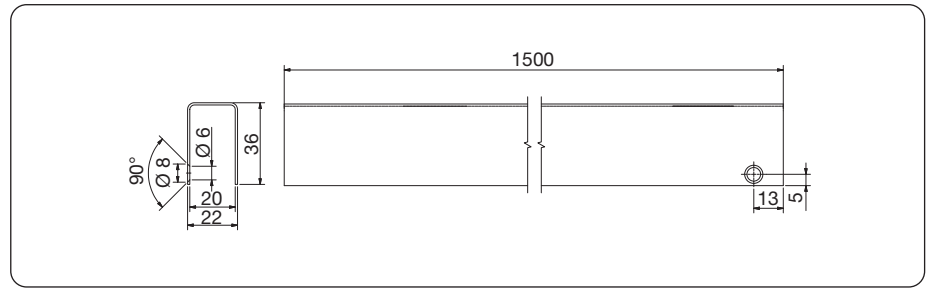


item no.	material	info	VSG
9420VA-12S	A2/K240	180° straight	12 mm

A = gap to subtract for glass 24 mm/fastening screw DIN 6912 M6 included in fastening set

cable cover profile for cp-mini*solar*

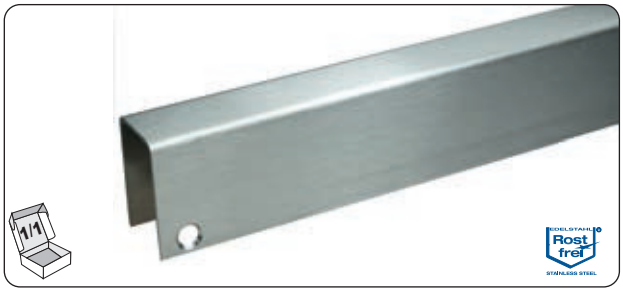


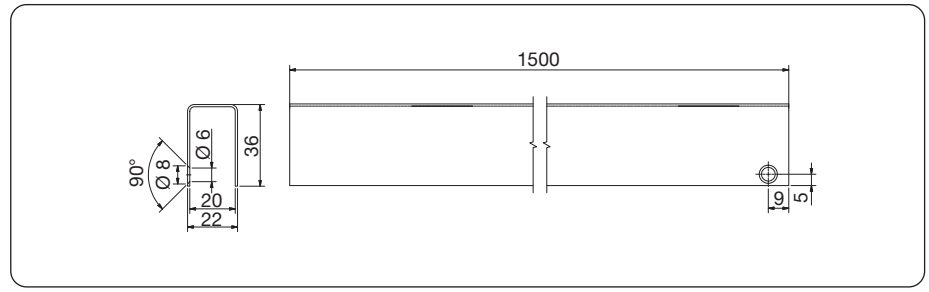


item no.	material	info
9409VA-1500	A2/K240	length 1500mm can be shortend, for square tube

Customer must shorten profile to required length and drill second countersunk hole.

cable cover profile for cp-mini*solar*

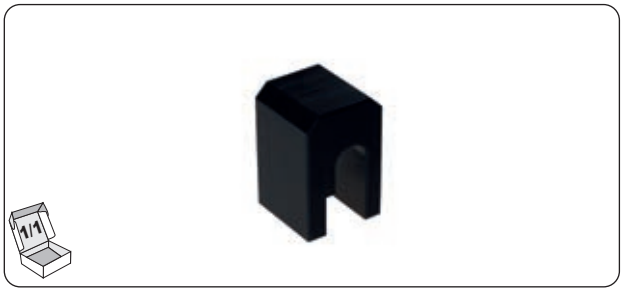


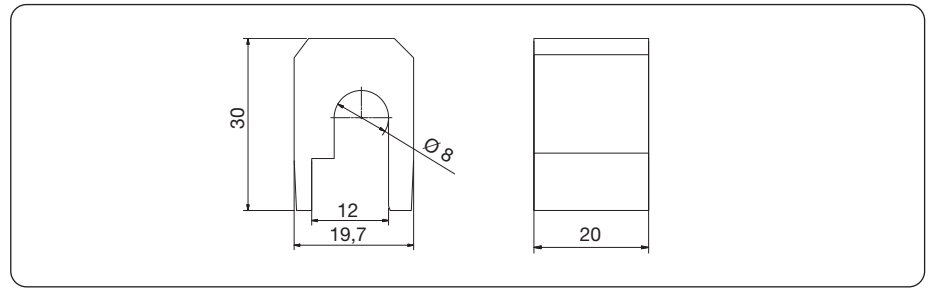


item no.	material	info
9419VA-1500	A2/K240	length 1500mm can be shortend, for round tube

Customer must shorten profile to required length and drill second countersunk hole.

spacer for cable cover profile





item no.	material	info
9408POM-12	POM	for fastening and protecting the cables

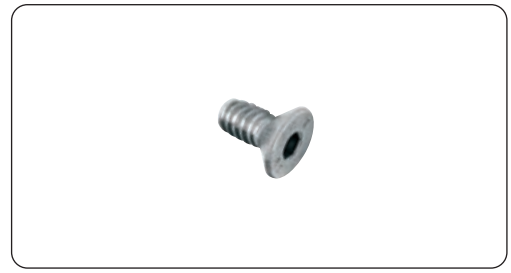
accessories for cp-mini*solar*

item no.: 9407-2EPDM

dummy plug

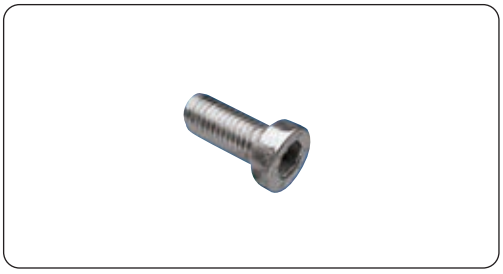
item no.: 9407-1EPDM

plug with through-hole Ø 8 mm



item no.: S7991A2D6X12

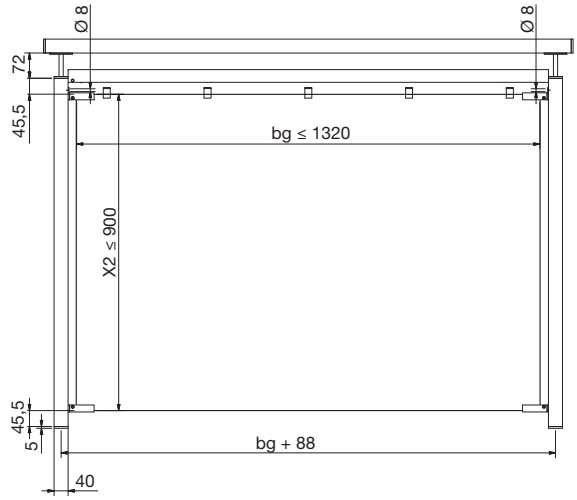
countersunk female hex head screw DIN 7991 - M6x12

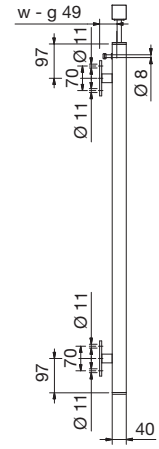


item no.: S6912A2D6x30

cylinder female hex head screw DIN 6912 - M6x30 for cp-mini*solar*

cp-mini*solar* set with handrail and edge protection (cable cover)





bg = glass width, w = wall, g = glass

set comprised of


1x
7262-1A2-L


1x
7262-1A2-R


4x
9410VA-12S


4x
10209540A2


2x
10209640A2


2x
10205212A2


2x
10205900A2

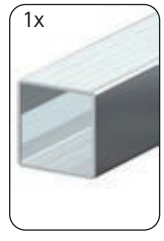

1x
9407-2EPDM


4x
9407-1EPDM


1x
9409VA-1500


5x
9408POM-12


4x
1921VA

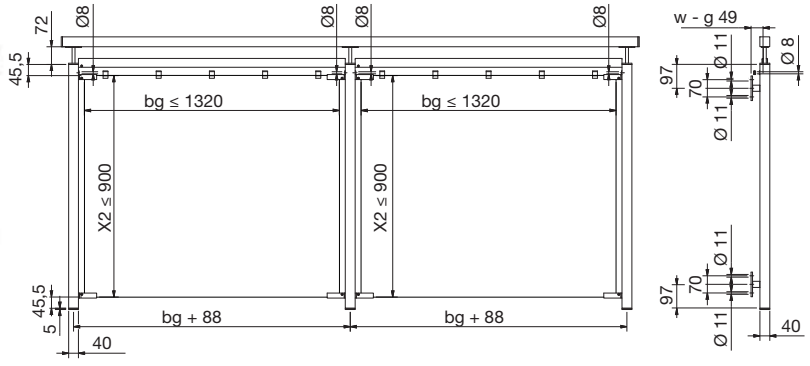

1x
10234940A2

Please specify when ordering:

- X2 (glass height): _____ mm

including screw set; excluding fastening material for wall mounting

double-set with cp-mini*solar* with handrail and edge protection (Kabelabdeckung)



bg = glass width, w = wall, g = glass

set comprised of


1x
7262-1A2-L


1x
7262-2A2


1x
7262-1A2-R


8x
9410VA-12S


5x
10209540A2


3x
10209640A2


3x
10205212A2


3x
10205900A2

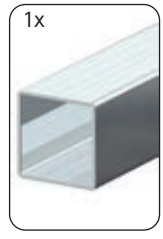

1x
9407-2EPDM


6x
9407-1EPDM


2x
9409VA-1500


10x
9408POM-12


6x
1921VA

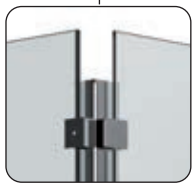

1x
10200740A2

Please specify when ordering:

- X2 (glass height): _____ mm

including screw set; excluding fastening material for wall mounting

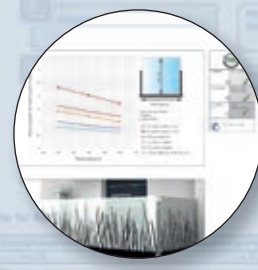
content



INFO CURRENT RULES REGARDING GLASS BARRIERS

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.

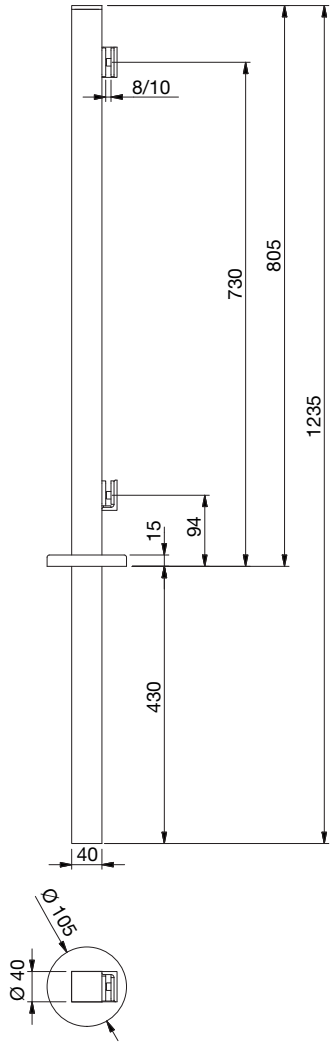
general information
page 228



design table
page 229

cp-glass *barrier*

end post set for cp-glass *barrier* for insertion into concrete foundation, installable on right and left



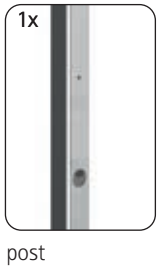
static calculation available

INFO

You will find further information on our cp-glass *barrier* starting on page 228.

SET-7351VA2-800 | 8-10 mm

set comprised of


1x post

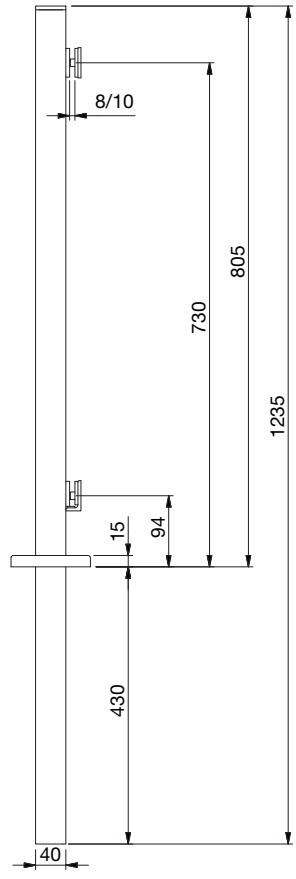

1x cover plate

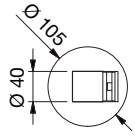

1x clamp bottom


1x clamp top


1x end cap

middle post set for cp-glass *barrier* for insertion into concrete foundation, 180°





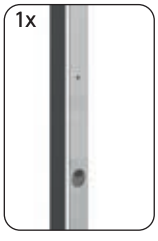
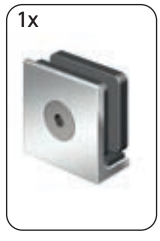
static calculation available

INFO

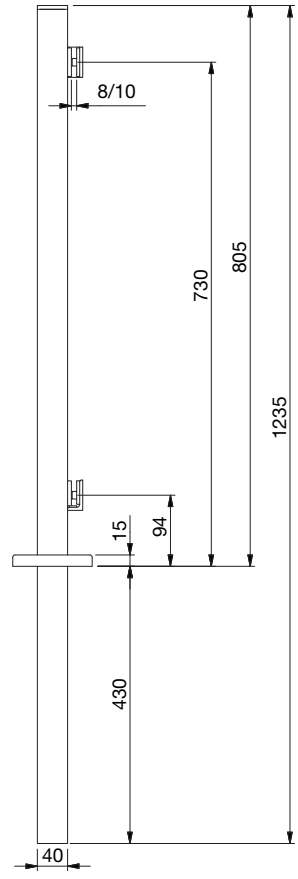
You will find further information on our cp-glass *barrier* starting on page 228.

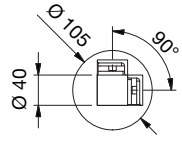
SET-7350VA2-800 | 8-10 mm

set comprised of

1x	1x	1x	1x	1x
				
post	cover plate	clamp bottom	clamp top	end cap

corner post set for cp-glass *barrier* for insertion into concrete foundation, 90°



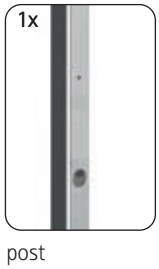


INFO

You will find further information on our cp-glass *barrier* starting on page 228.

SET-7352VA2-800 — 8-10 mm

set comprised of


1x post


1x cover plate

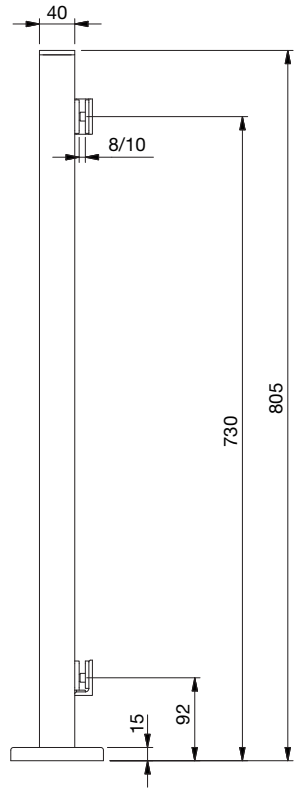

2x clamp bottom

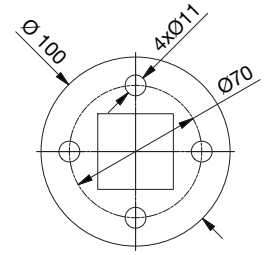

2x clamp top

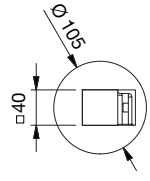

1x end cap

application of cp-glass *barrier*

end post set for cp-glass *barrier* for floor mounting, installable on right and left







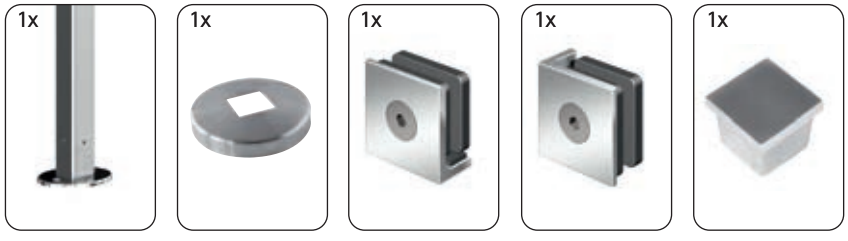
static calculation available

INFO

You will find further information on our cp-glass *barrier* starting on page 228.

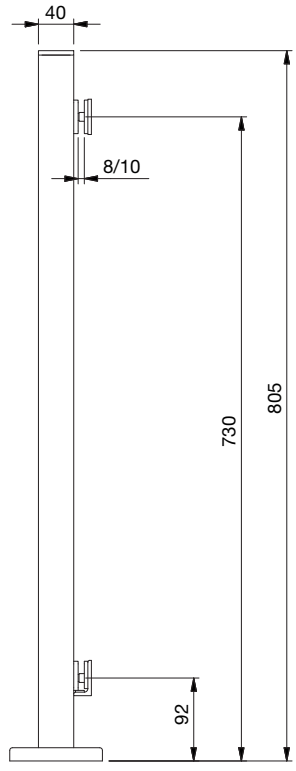
SET-7356VA2-800 8-10 mm

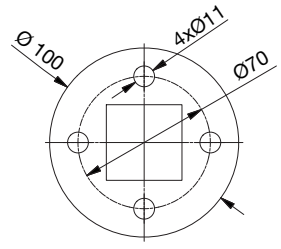
set comprised of

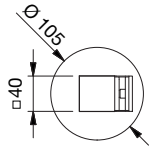


post | cover plate | clamp bottom | clamp top | end cap

middle post set for cp-glass *barrier* for floor mounting, 180°







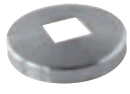
static calculation available

INFO

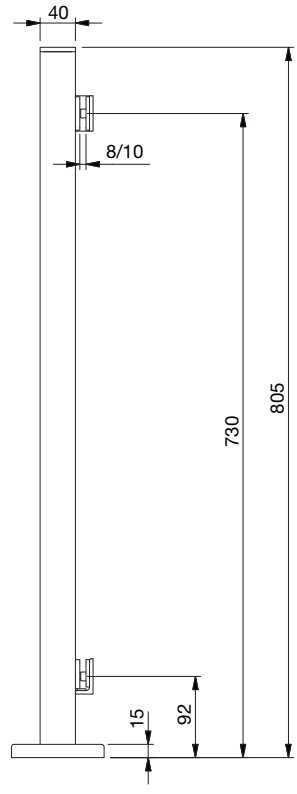
You will find further information on our cp-glass *barrier* starting on page 228.

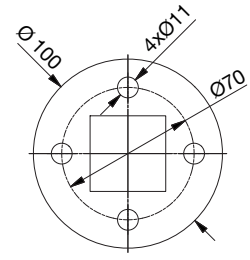
SET-7355VA2-800 | 8-10 mm

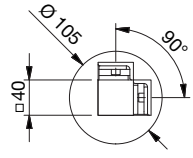
set comprised of

1x	1x	1x	1x	1x
				
post	cover plate	clamp bottom	clamp top	end cap

corner post set for cp-glass *barrier* for floor mounting, 90°







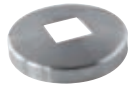
static calculation available

INFO

You will find further information on our cp-glass *barrier* starting on page 228.

SET-7357VA2-800 | 8-10 mm

set comprised of

1x	1x	2x	2x	1x
				
post	cover plate	clamp bottom	clamp top	end cap

application of cp-glass *barrier*

systematics and combination possibilities

		clamps p. 72	TRAV fixtures p. 110	Banano p. 120	cp-mini p. 104
posts	Ø 33,7 x 2,0	✓	✓	–	–
	Ø 42,4 x 2,0	✓	✓	✓	✓
	Ø 48,3 x 2,0	✓	✓	✓	–
	Ø 60,3 x 2,0	✓	✓	–	–
	30 x 30 x 2,0	✓	✓	✓	✓
	40 x 40 x 2,0	✓	✓	✓	✓
infills	VSG = 2 x ESG	✓ AbZ ETA	✓ TRAV	✓ AbP	✓ AbP
	VSG = 2 x SPG	✓ AbZ ETA	–	–	○ ZiE
	VSG = 2 x TVG	✓ AbZ ETA	✓ TRAV	○	○ ZiE
	ESG-H	✓ AbZ ETA	–	–	–
	TRESPA®	✓ ETB	○	○	○
hand railing	metal	✓	✓	✓	✓
	plugged on	railings according to TRAV category B on page 234 onward			
	without	○ ZiE	✓ ZiE	○ ZiE	○ ZiE

✓ possible

○ possible on request

– not possible

ETA european technical approval (ETA-11/0380) - page 194

AbZ national technical approval (AbZ Z-70.2-28) - page 194

TRAV technical rules for the use of safety barrier glazing (TRAV) - page 194

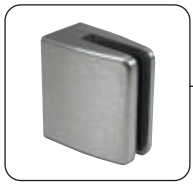
AbP Banano and cp-mini with an general test certificate from building authorities - page 194

ZiE individual approval (ZiE) - page 194

ETB ETB proof - page 194

ETB ETB proof with general test certificate for TRESPA® panels - page 194

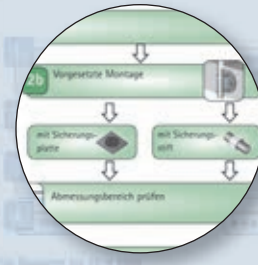
content



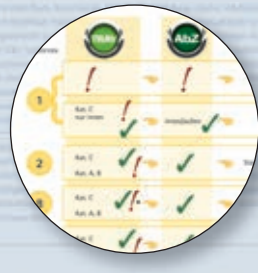
INFO CURRENT RULES REGARDING CLAMP FIXTURES

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.

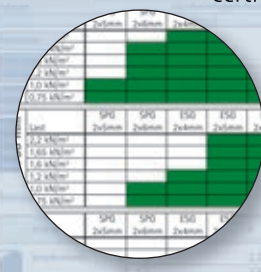
wind loads
page 202



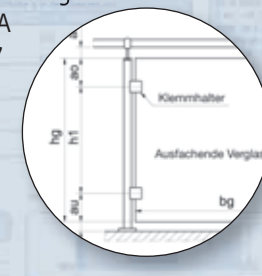
certification according to AbZ/ETA
page 207



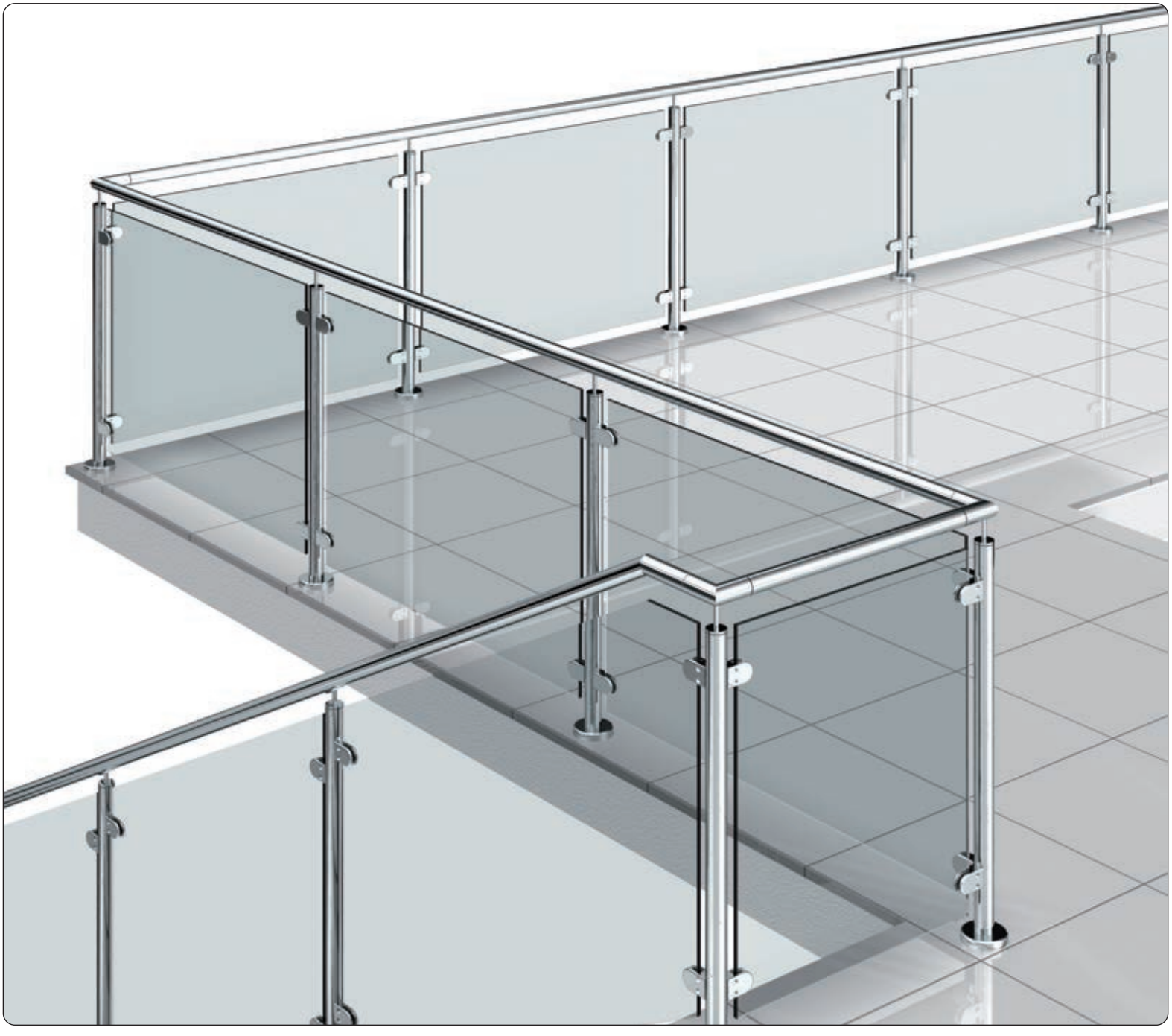
planning process
page 195



design table
from page 208 onwards

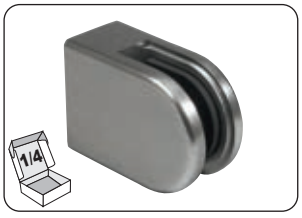


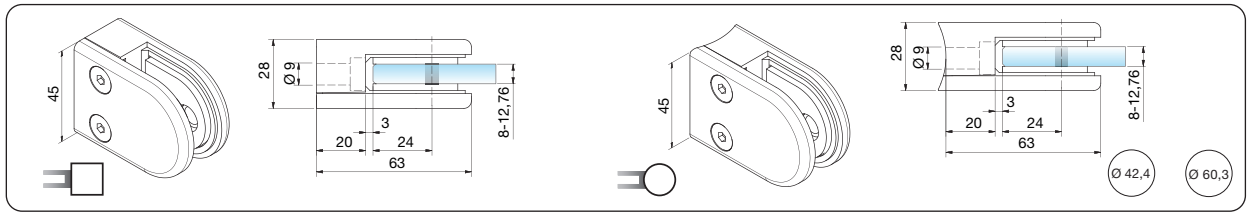
checklist
page 214



- clamp fixtures

zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	
4808	8,76 mm	8 mm		
4809	9,52 mm			
4810	10,76 mm	10 mm		
4811	11,52 mm			
4812	12,76 mm	12 mm		
4842	8,76 mm	8 mm		R20/R30
4843	9,52 mm			R20/R30
4852	10,76 mm	10 mm		R20/R30
4854	11,52 mm			R20/R30
4853	12,76 mm	12 mm		R20/R30

material/finish — ZN = zinc

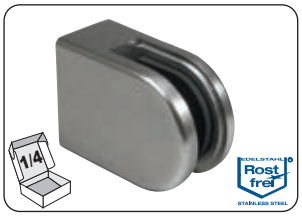
accessories

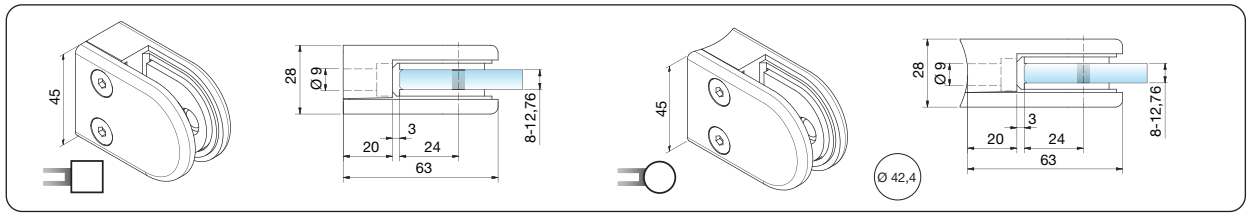
9320VA

page 207-213

glass build according to AbZ/ETA

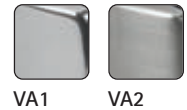
stainless steel (A4)





item no.	VSG	Mono	safety	
9302	8,76 mm	8 mm		
9300	9,52 mm			
9303	10,76 mm	10 mm		
9301	11,52 mm			
9304	12,76 mm	12 mm		
9306	8,76 mm	8 mm		R22
9305	9,52 mm			R22
9307	10,76 mm	10 mm		R22
9309	11,52 mm			R22
9308	12,76 mm	12 mm		R22

material/finish — VA = stainless steel



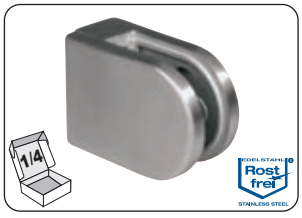
accessories

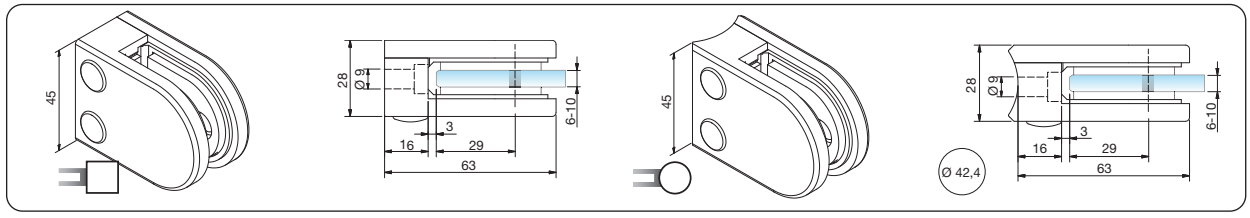
4820VA

page 207-213

glass build according to AbZ/ETA

stainless steel (A2)





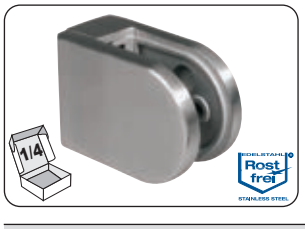
item no.	VSG	Mono	
48 05 00 006 02 02		6 mm	
48 05 00 067 02 02	6,76 mm		
48 05 00 008 02 02		8 mm	
48 05 00 087 02 02	8,76 mm		
48 05 00 095 02 02	9,52 mm		
48 05 00 010 02 02		10 mm	
48 05 21 006 02 02		6 mm	R21
48 05 21 067 02 02	6,76 mm		R21
48 05 21 008 02 02		8 mm	R21
48 05 21 087 02 02	8,76 mm		R21
48 05 21 095 02 02	9,52 mm		R21
48 05 21 010 02 02		10 mm	R21

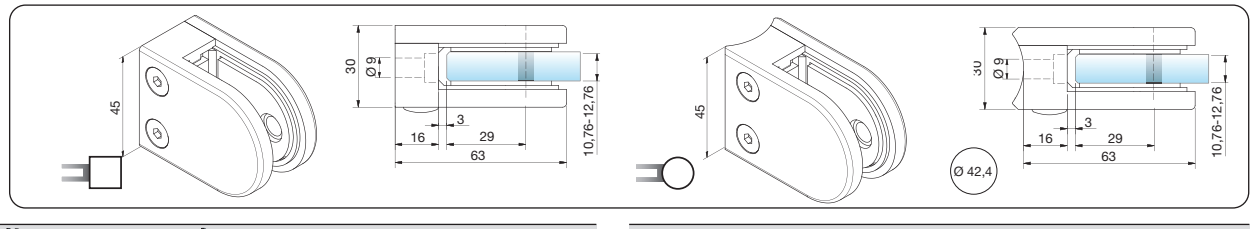
material/finish — VA = stainless steel

VA2

included

stainless steel (A2)





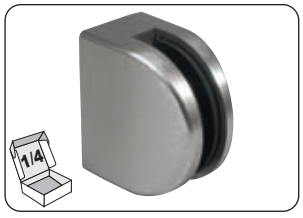
item no.	VSG	Mono	
48 10 00 107 02 02	10,76 mm		
48 10 00 115 02 02	11,52 mm		
48 10 00 012 02 02		12 mm	
48 10 00 127 02 02	12,76 mm		
48 10 21 107 02 02	10,76 mm		R21
48 10 21 115 02 02	11,52 mm		R21
48 10 21 012 02 02		12 mm	R21
48 10 21 127 02 02	12,76 mm		R21

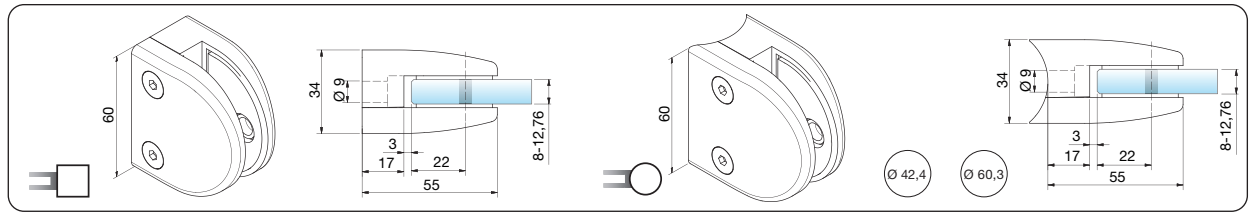
material/finish — VA = stainless steel

VA2

included

zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	also approved with	
4813	8,76 mm	8 mm			
4821	9,52 mm				
4814	10,76 mm	10 mm			
9013	11,52 mm				
9014	12,76 mm	12 mm			
4816	8,76 mm	8 mm			R22/R30
4827	9,52 mm				R22/R30
4817	10,76 mm	10 mm			R22/R30
9016	11,52 mm				R22/R30
9017	12,76 mm	12 mm			R22/R30

material/finish — ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12 ZN22 ZN22-K

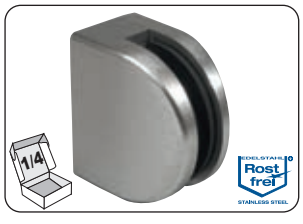
accessories

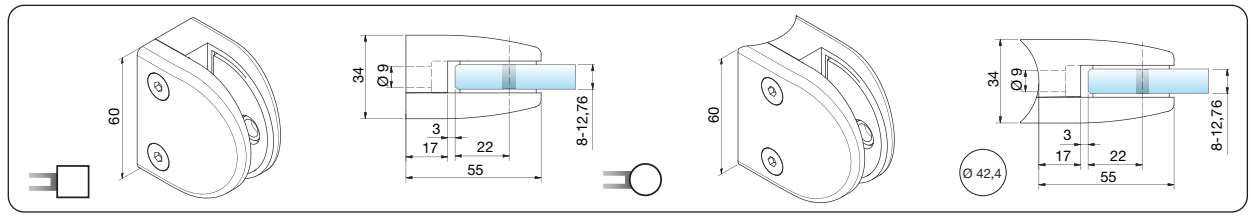
9320VA

page 207-213

glass build according to AbZ/ETA

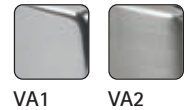
stainless steel (A4)





item no.	VSG	Mono	safety	also approved with	
9322	8,76 mm	8 mm			
9320	9,52 mm				
9323	10,76 mm	10 mm			
9321	11,52 mm				
9324	12,76 mm	12 mm			
9326	8,76 mm	8 mm			R22
9325	9,52 mm				R22
9327	10,76 mm	10 mm			R22
9329	11,52 mm				R22
9328	12,76 mm	12 mm			R22

material/finish — VA = stainless steel



VA1 VA2

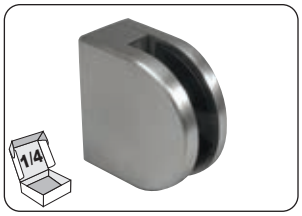
accessories

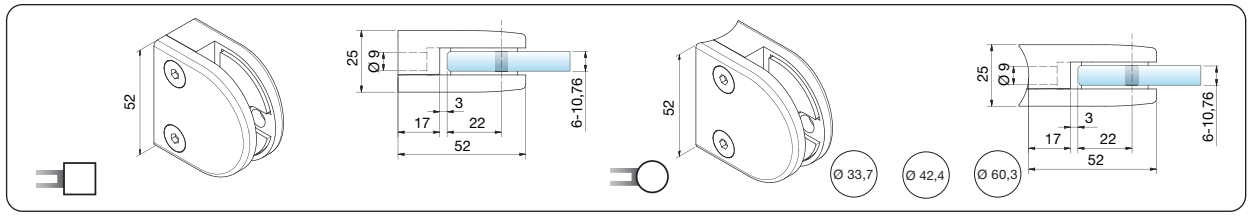
9320VA

page 207-213

glass build according to AbZ/ETA

zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety		
11111	6,76 mm	6 mm			
11110	9,52 mm		ETA AbZ		
11112	8,76 mm	8 mm	ETA AbZ ETB		
11113	10,76 mm	10 mm	ETA AbZ		
11116	6,76 mm	6 mm			R15/R20/R27
11117	8,76 mm	8 mm	ETA AbZ ETB		R15/R20/R27
11119	9,52 mm		ETA AbZ		R15/R20/R27
11118	10,76 mm	10 mm	ETA AbZ		R15/R20/R27

material/finish — ZN = zinc

ZN0 ZN22 ZN22-K

accessories

4820VA

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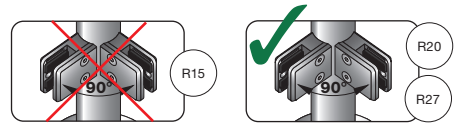
glass build according to AbZ/ETA



ETA 11/0380 AbZ ETB

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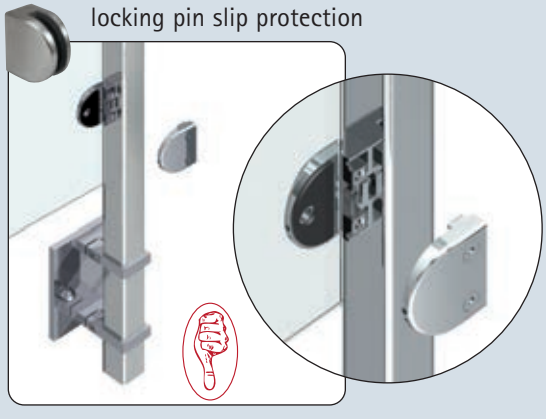
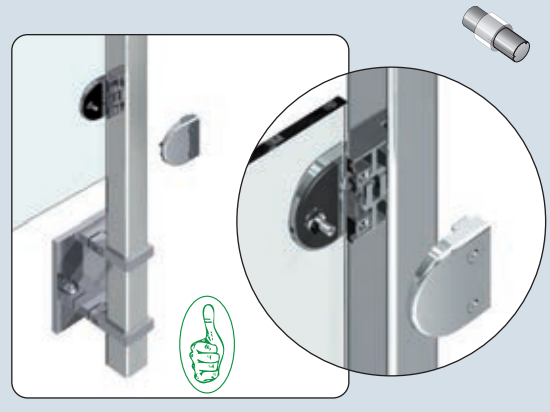
VA1 VA2

locking pin slip protection

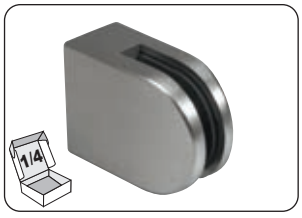


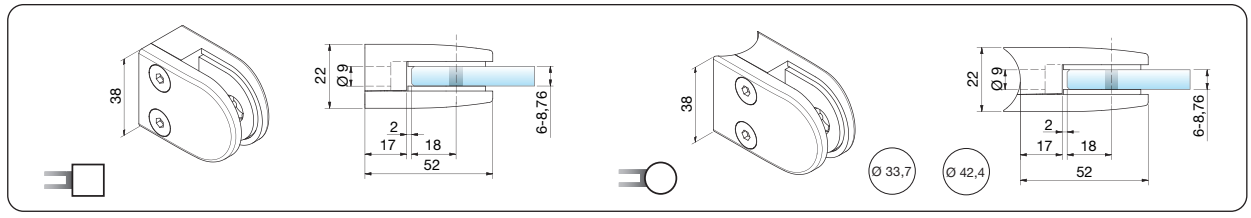
The use of the locking pin provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip.



For further details and a list of approved clamps, please see page 210.

zinc (ZN, ZAMAK®)



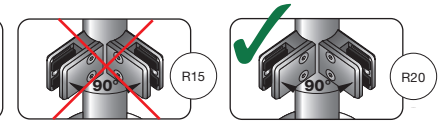


item no.	VSG	Mono	safety	
4819	6,76 mm	6 mm		
4818	8,76 mm	8 mm		
4823	6,76 mm	6 mm		R15/R20
4822	8,76 mm	8 mm		R15/R20

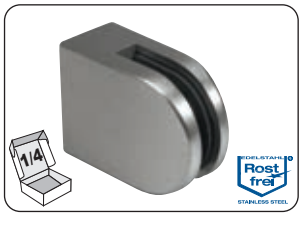
material/finish — ZN = zinc

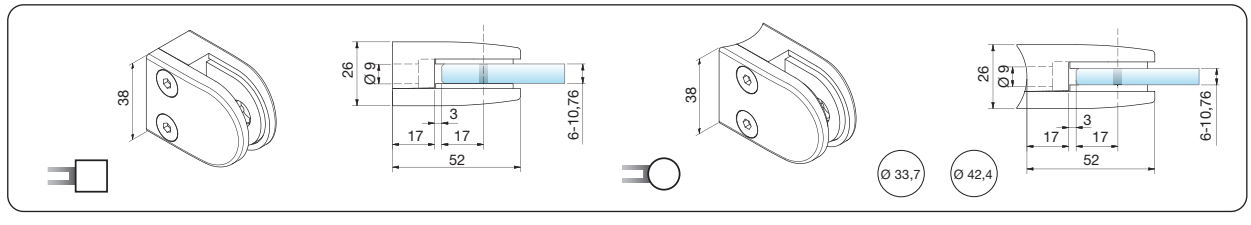
accessories

4824VA



stainless steel (A2)





item no.	VSG	Mono		
9312	6,76 mm	6 mm		
9313	8,76 mm	8 mm		
9314	10,76 mm	10 mm		
9316	6,76 mm	6 mm		R16/R21
9317	8,76 mm	8 mm		R16/R21
9318	10,76 mm	10 mm		R16/R21

material/finish — VA = stainless steel

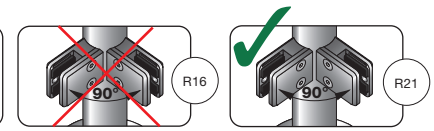
VA1

VA2

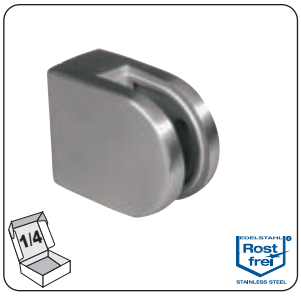
9316VA, 9317VA, 9318VA radius R21 only available in VA2!

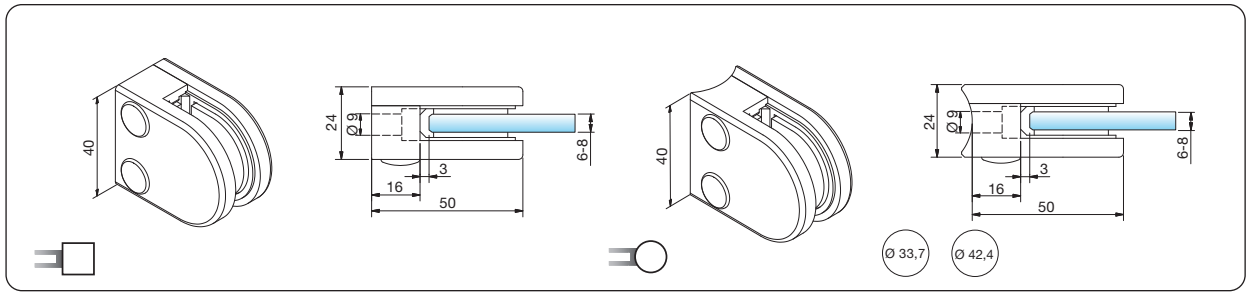
accessories

4820VA



stainless steel (A2)

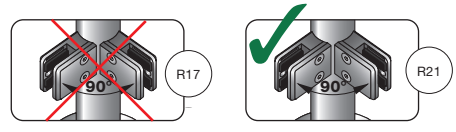




item no.	VSG	Mono	
48 01 00 006 02 02		6 mm	
48 01 00 067 02 02	6,76 mm		
48 01 00 008 02 02		8 mm	
48 01 17 006 02 02		6 mm	R17
48 01 17 067 02 02	6,76 mm		R17
48 01 17 008 02 02		8 mm	R17
48 01 21 006 02 02		6 mm	R21
48 01 21 067 02 02	6,76 mm		R21
48 01 21 008 02 02		8 mm	R21

material/finish — VA = stainless steel

VA2



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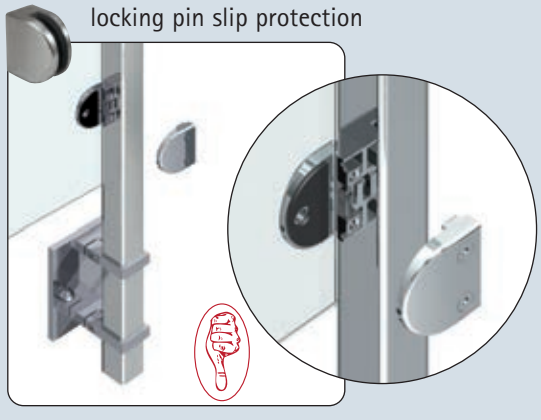
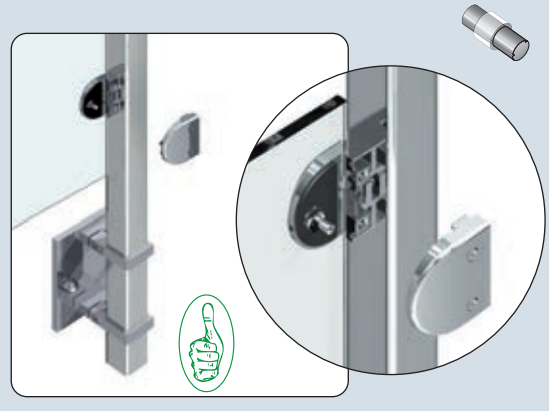
VA1

VA2

locking pin slip protection

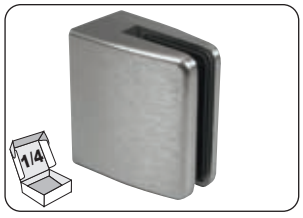


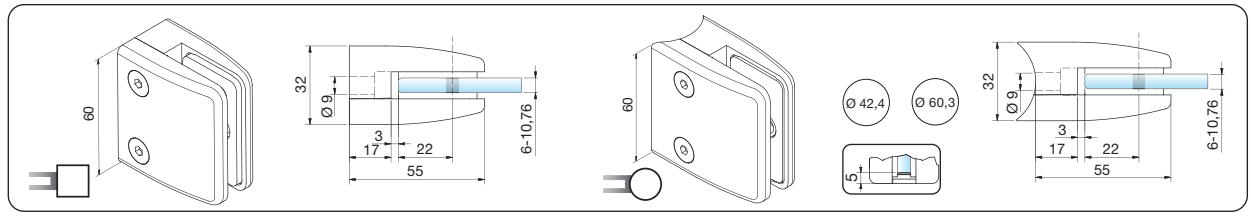
The use of the locking pin provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip.



For further details and a list of approved clamps, please see page 210.

zinc (ZN, ZAMAK®)

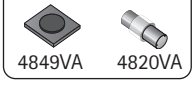




item no.	VSG	Mono	safety	also approved with	
9001	6,76 mm	6 mm			
4804	8,76 mm	8 mm			
9002	9,52 mm				
4805	10,76 mm	10 mm			
9005	6,76 mm	6 mm			R20/R33
4806	8,76 mm	8 mm			R20/R33
9006	9,52 mm				R20/R33
4807	10,76 mm	10 mm			R20/R33

material/finish — ZN = zinc

accessories



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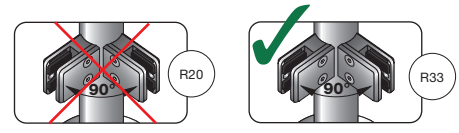
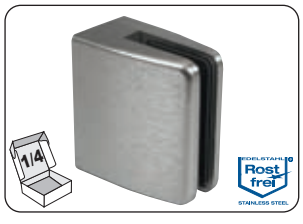
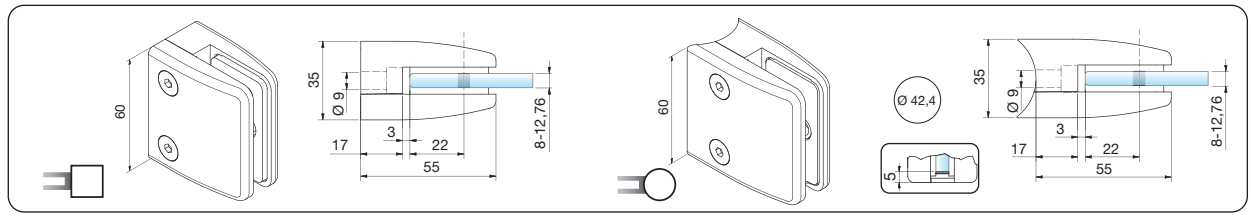
glass build according to AbZ/ETA



stainless steel (A4)

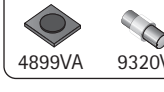


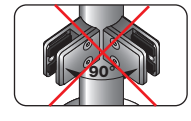


item no.	VSG	Mono	safety	also approved with	
9332	8,76 mm	8 mm			
9330	9,52 mm				
9333	10,76 mm	10 mm			
9331	11,52 mm				
9334	12,76 mm	12 mm			
9336	8,76 mm	8 mm			R22
9335	9,52 mm				R22
9337	10,76 mm	10 mm			R22
9339	11,52 mm				R22
9338	12,76 mm	12 mm			R22

material/finish — VA = stainless steel

accessories





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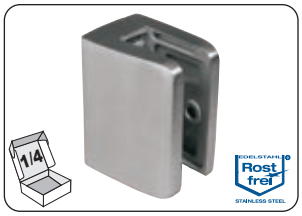
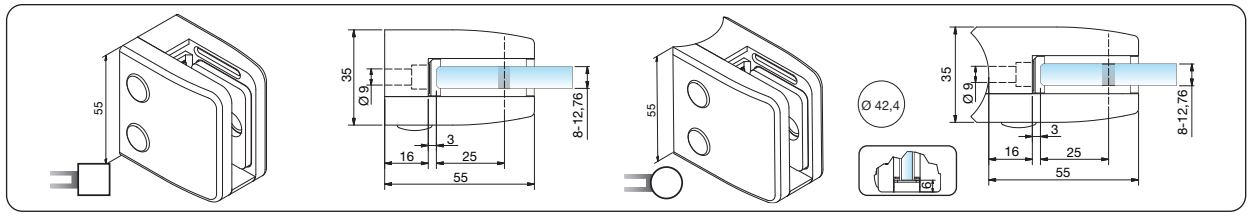
glass build according to AbZ/ETA

stainless steel (A2)



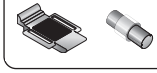


item no.	VSG	Mono	
48 25 00 008 02 02		8 mm	
48 25 00 087 02 02	8,76 mm		
48 25 00 095 02 02	9,52 mm		
48 25 00 010 02 02		10 mm	
48 25 00 107 02 02	10,76 mm		
48 25 00 115 02 02	11,52 mm		
48 25 00 012 02 02		12 mm	
48 25 00 127 02 02	12,76 mm		
48 25 21 008 02 02		8 mm	R21
48 25 21 087 02 02	8,76 mm		R21
48 25 21 095 02 02	9,52 mm		R21
48 25 21 010 02 02		10 mm	R21
48 25 21 107 02 02	10,76 mm		R21
48 25 21 115 02 02	11,52 mm		R21
48 25 21 012 02 02		12 mm	R21
48 25 21 127 02 02	12,76 mm		R21

material/finish	VA = stainless steel

VA2

included



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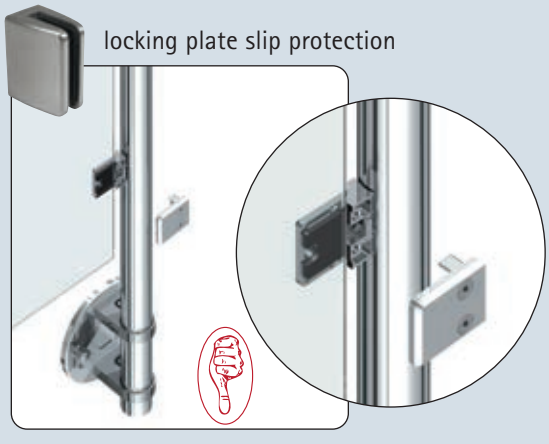
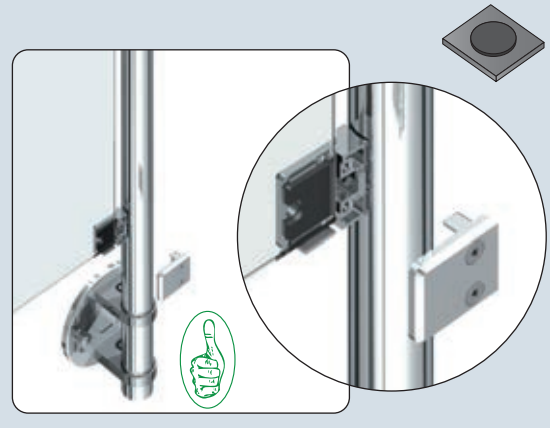
VA1 VA2

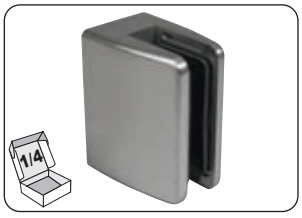
locking plate slip protection

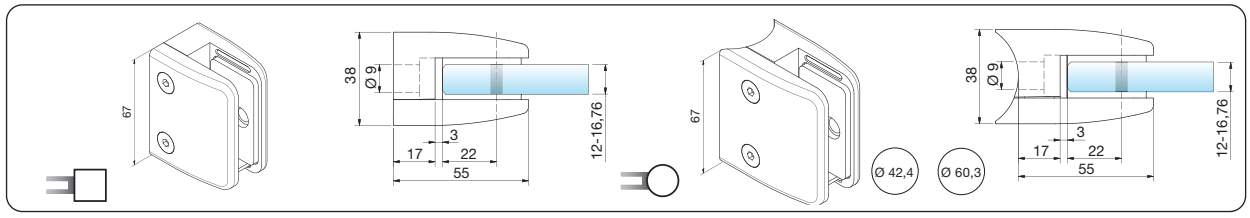




The use of the locking plate provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip. For further details and a list of approved clamps, please see page 212.

zinc (ZN, ZAMAK®)

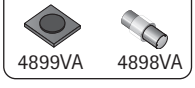




item no.	VSG	Mono	safety	also approved with		
4891	12,76 mm	12 mm				
4890	13,52 mm					
4892		14 mm				
9082		15 mm				
4893	16,76 mm					
4894	12,76 mm	12 mm				R22/R30
4897	13,52 mm					R22/R30
4895		14 mm				R22/R30
9086		15 mm				R22/R30
4896	16,76 mm					R22/R30

material/finish — ZN = zinc

accessories



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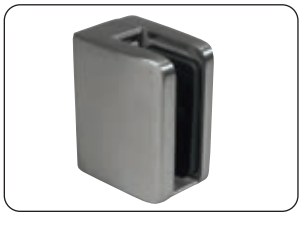
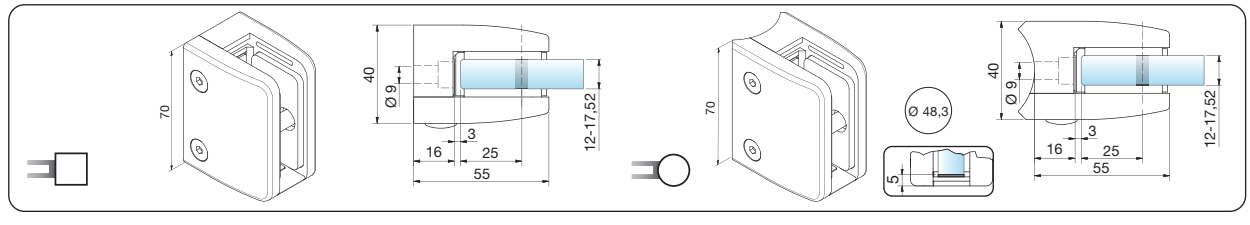
glass build according to AbZ/ETA

zinc (ZN, ZAMAK®)



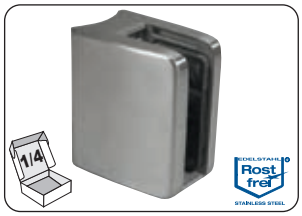


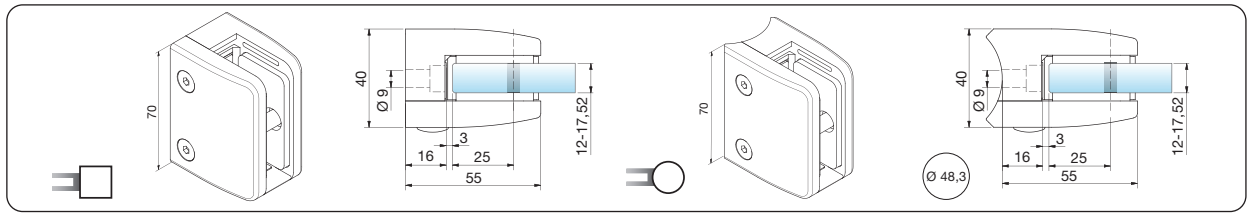
item no.	VSG	Mono		
9090		12 mm		
9091	12,76 mm			
9092		16 mm		
9093	16,76 mm			
9094	17,52 mm			
9095		12 mm		R24
9096	12,76 mm			R24
9097		16 mm		R24
9098	16,76 mm			R24
9099	17,52 mm			R24

material/finish — ZN = zinc

included

stainless steel (A4)





item no.	VSG	Mono	
9390		12 mm	
9391	12,76 mm		
9392		16 mm	
9393	16,76 mm		
9394	17,52 mm		
9395		12 mm	R24
9396	12,76 mm		R24
9397		16 mm	R24
9398	16,76 mm		R24
9399	17,52 mm		R24

material/finish	VA = stainless steel

VA2

included

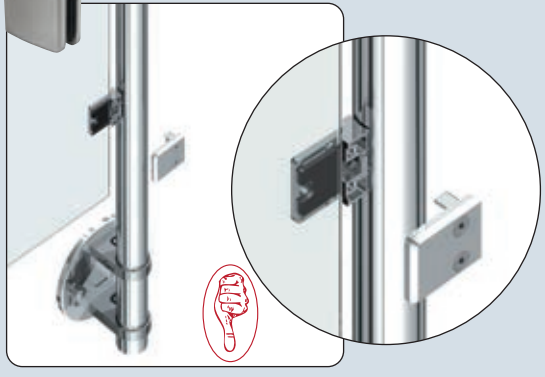
INFO

treatment products
page 183

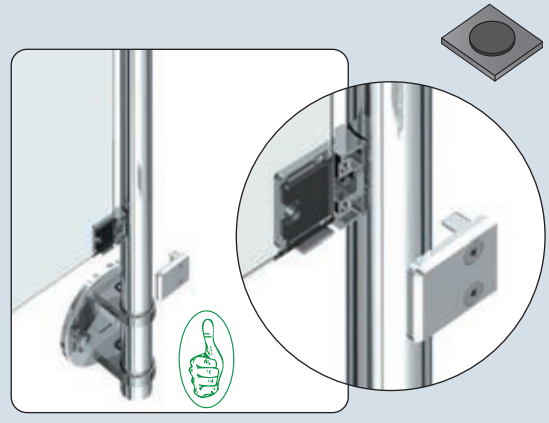
VA1

VA2

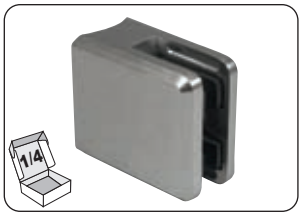
locking plate slip protection

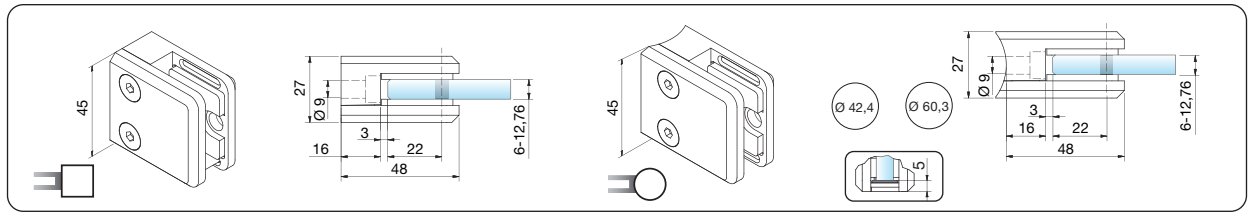


The use of the locking plate provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip. For further details and a list of approved clamps, please see page 212.



zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	also approved with	
4844	6,76 mm	6 mm			
4845	8,76 mm	8 mm			
4841	9,52 mm				
4846	10,76 mm	10 mm			
9044	11,52 mm				
9045	12,76 mm	12 mm			
4851	6,76 mm	6 mm			R22/R30
4847	8,76 mm	8 mm			R22/R30
4859	9,52 mm				R22/R30
4848	10,76 mm	10 mm			R22/R30
9047	11,52 mm				R22/R30
9048	12,76 mm	12 mm			R22/R30

material/finish — ZN = zinc

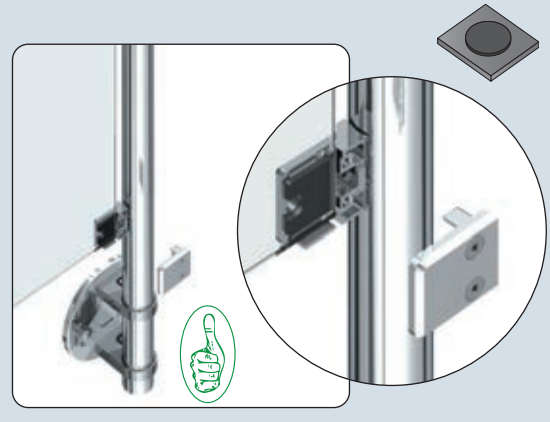
accessories

page 207-213

glass build according to AbZ/ETA

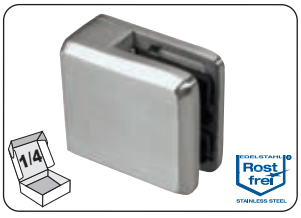
INFO

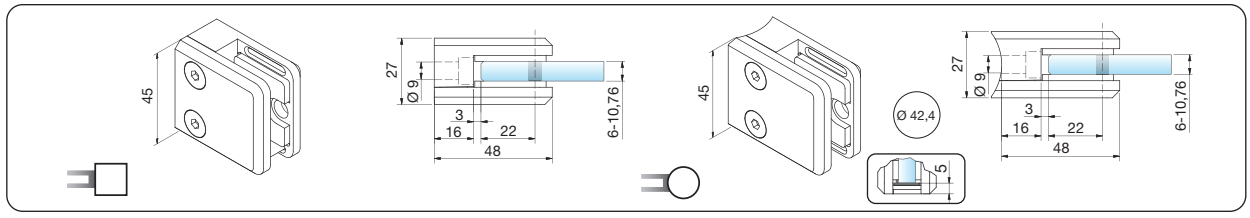
locking pin slip protection



The use of the locking pin provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip. For further details and a list of approved clamps, please see page 212.

stainless steel (A4)





item no.	VSG	Mono	safety	also approved with	
9342	6,76 mm	6 mm			
9343	8,76 mm	8 mm			
9341	9,52 mm				
9344	10,76 mm	10 mm			
9346	6,76 mm	6 mm			R22
9347	8,76 mm	8 mm			R22
9349	9,52 mm				R22
9348	10,76 mm	10 mm			R22

material/finish — VA = stainless steel

VA1 VA2

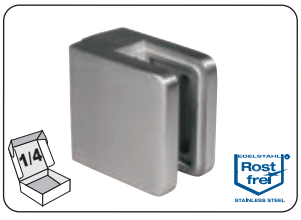
accessories

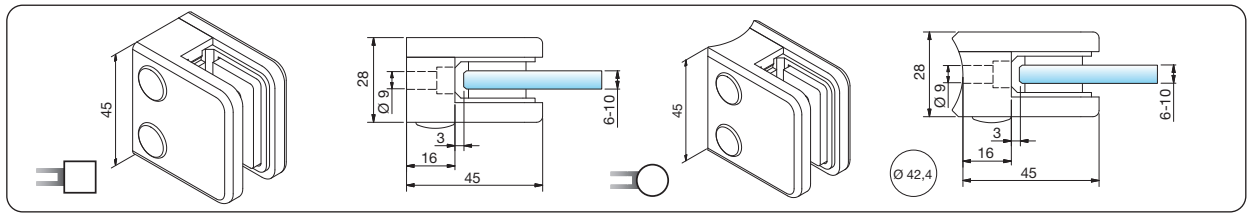
4849VA 9320VA

page 207-213

glass build according to AbZ/ETA

stainless steel (A2)



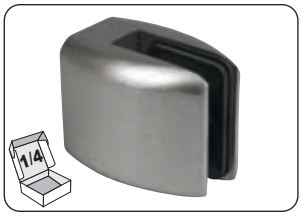


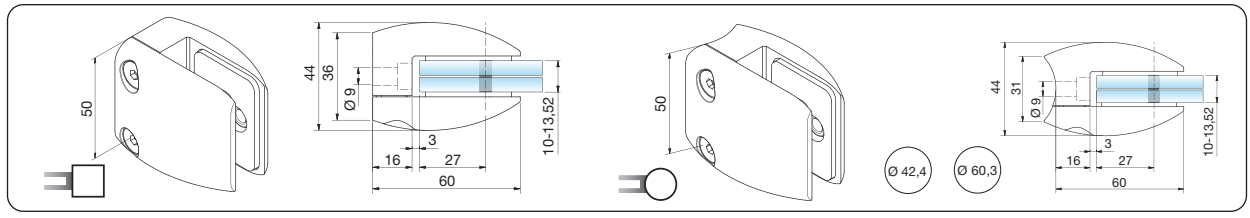
item no.	VSG	Mono		
48 15 00 006 02 02		6 mm		
48 15 00 067 02 02	6,76 mm			
48 15 00 008 02 02		8 mm		
48 15 00 087 02 02	8,76 mm			
48 15 00 095 02 02	9,52 mm			
48 15 00 010 02 02		10 mm		
48 15 21 006 02 02		6 mm		R21
48 15 21 067 02 02	6,76 mm			R21
48 15 21 008 02 02		8 mm		R21
48 15 21 087 02 02	8,76 mm			R21
48 15 21 095 02 02	9,52 mm			R21
48 15 21 010 02 02		10 mm		R21

material/finish — VA = stainless steel

VA2

zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	
9032	8,76 mm			
9032	9,52 mm			
4831	10,76 mm		ETA AbZ	
4831	11,52 mm		AbZ	
4834		10 mm		
4832	12,76 mm		ETA AbZ	
4832	13,52 mm		ETA AbZ	
4835		12 mm		
9036	8,76 mm			R22/R30
9036	9,52 mm			R22/R30
4836	10,76 mm		ETA AbZ	R22/R30
4836	11,52 mm		ETA AbZ	R22/R30
4838		10 mm		R22/R30
4837	12,76 mm		ETA AbZ	R22/R30
4837	13,52 mm		ETA AbZ	R22/R30
4839		12 mm		R22/R30

material/finish — ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12 ZN22 ZN22-K

accessories

4828VA

page 207-213

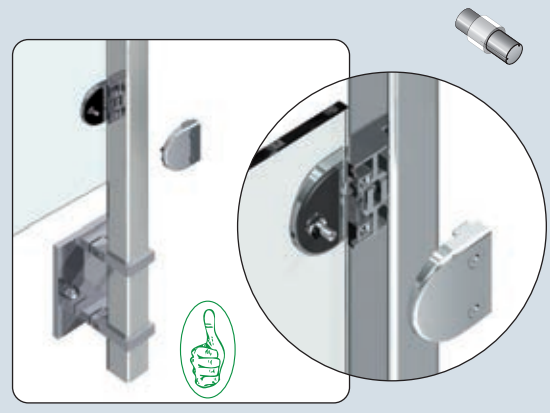
glass build according to AbZ/ETA

ETA 11/0380 AbZ

INFO

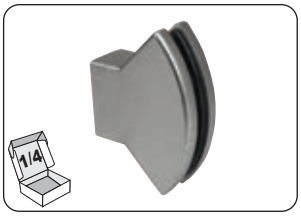
locking pin slip protection

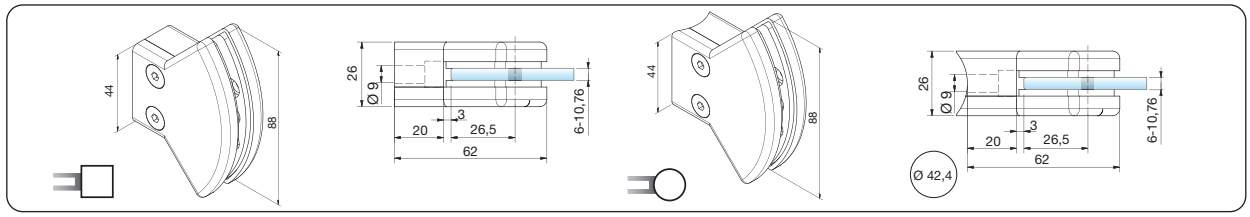
The use of the locking pin provides the prescribed level of mechanical protection needed to ensure that the fascia-mounted glass panel does not slip.



For further details and a list of approved clamps, please see page 210.

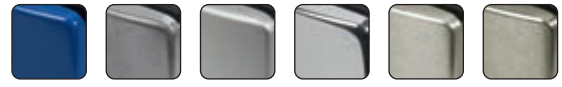
zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	also approved with	
9520	6,76 mm	6 mm			
9521	8,76 mm	8 mm			
9523	9,52 mm				
9522	10,76 mm	10 mm			
9720	6,76 mm	6 mm			R20
9721	8,76 mm	8 mm			R20
9723	9,52 mm				R20
9722	10,76 mm	10 mm			R20

material/finish — ZN = zinc



RAL ZN0 ZN1 ZN5 ZN22 ZN22-K

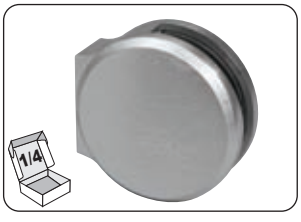
accessories

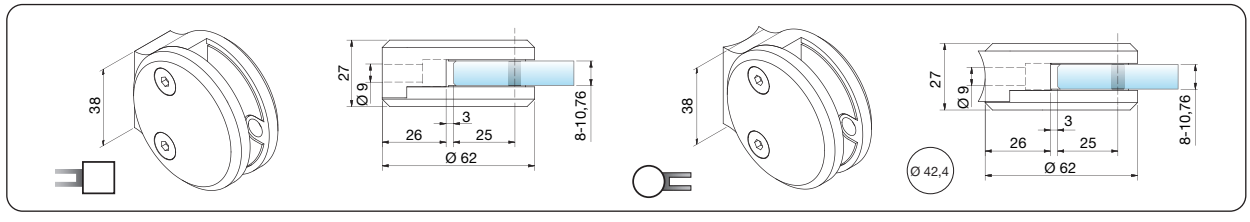
4820VA

page 207-213

glass build according to AbZ/ETA

zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	
4855	8,76 mm	8 mm		
4856	10,76 mm	10 mm		
4857	8,76 mm	8 mm		R20
4858	10,76 mm	10 mm		R20

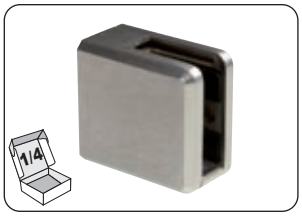
material/finish — ZN = zinc

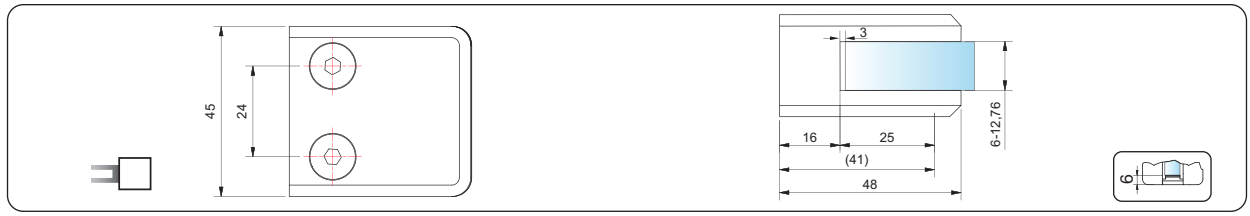
RAL ZN0 ZN1 ZN5 ZN12 ZN22 ZN22-K

accessories

4820VA

special clamp fixtures in zinc (ZN, ZAMAK®)

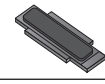


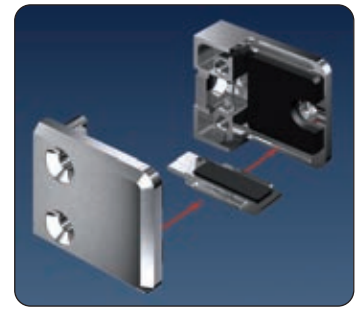


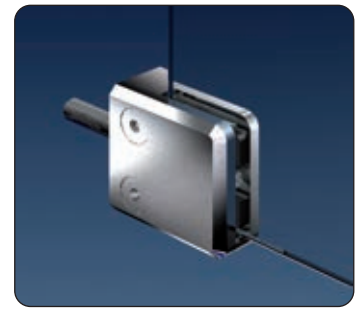
item no.	VSG	Mono
9070ZN	6,76 mm	6 mm
9071ZN	8,76 mm	8 mm
9072ZN	9,52 mm	
9073ZN	10,76 mm	10 mm
9074ZN	11,52 mm	
9075ZN	12,76 mm	12 mm

material/finish — ZN = zinc

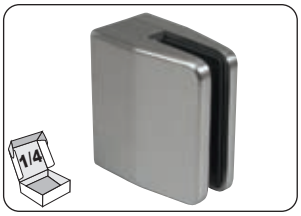
includes

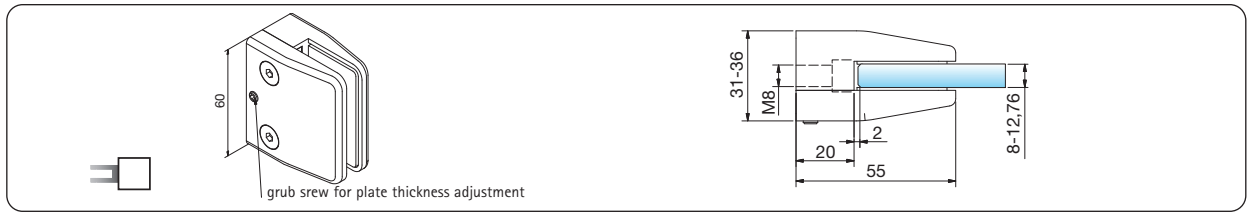






special clamp fixtures in zinc (ZN, ZAMAK®)

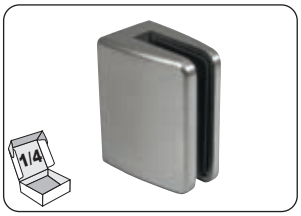


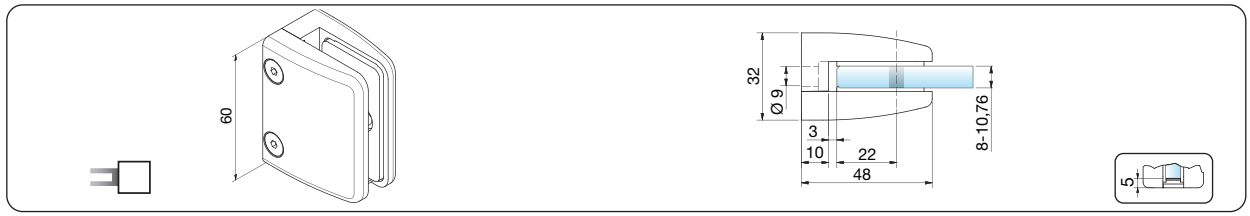


item no.	VSG	Mono		
4803	8,76 - 12,76 mm	8 - 12 mm		

material/finish — ZN = zinc

special clamp fixtures in zinc (ZN, ZAMAK®)





item no.	VSG	Mono	safety	also approved with	
4801	8,76 mm	8 mm			
4800	9,52 mm				
4802	10,76 mm	10 mm			

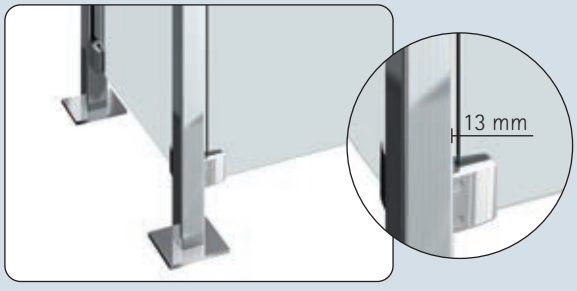
material/finish — ZN = zinc

accessories

glass build according to AbZ/ETA

INFO

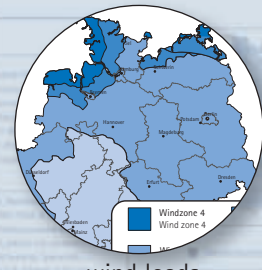
minimal edge distance



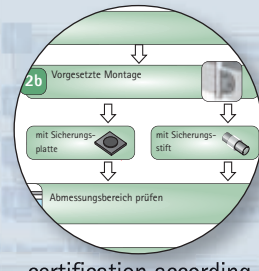
content

INFO CURRENT RULES REGARDING CLAMP FIXTURES

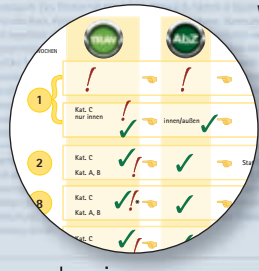
Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.



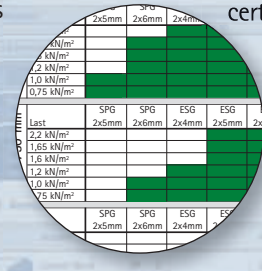
wind loads
page 202



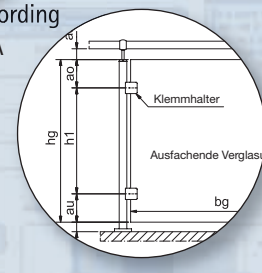
certification according to AbZ/ETA
page 207



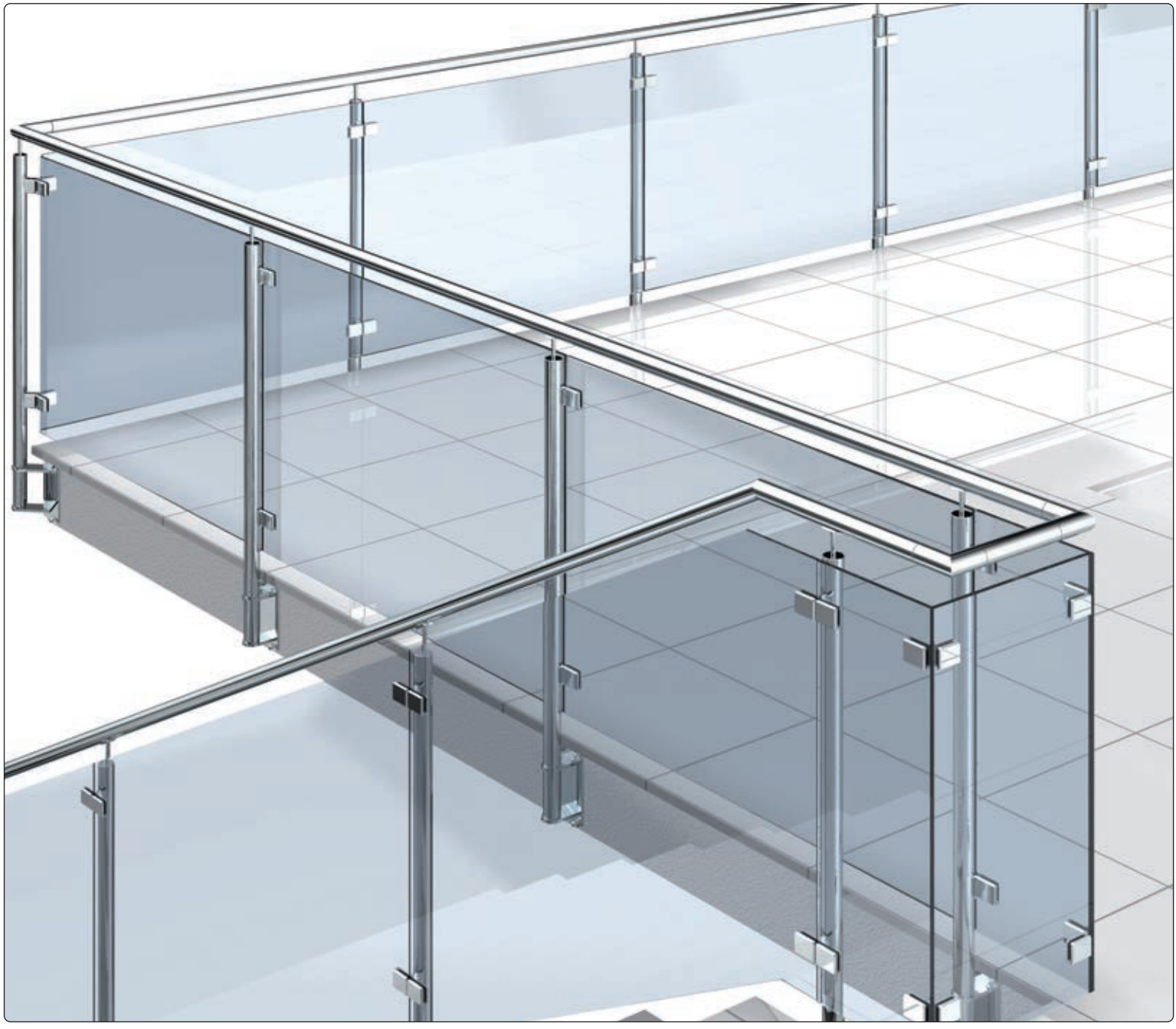
planning process
page 195



design table
from page 208 onwards

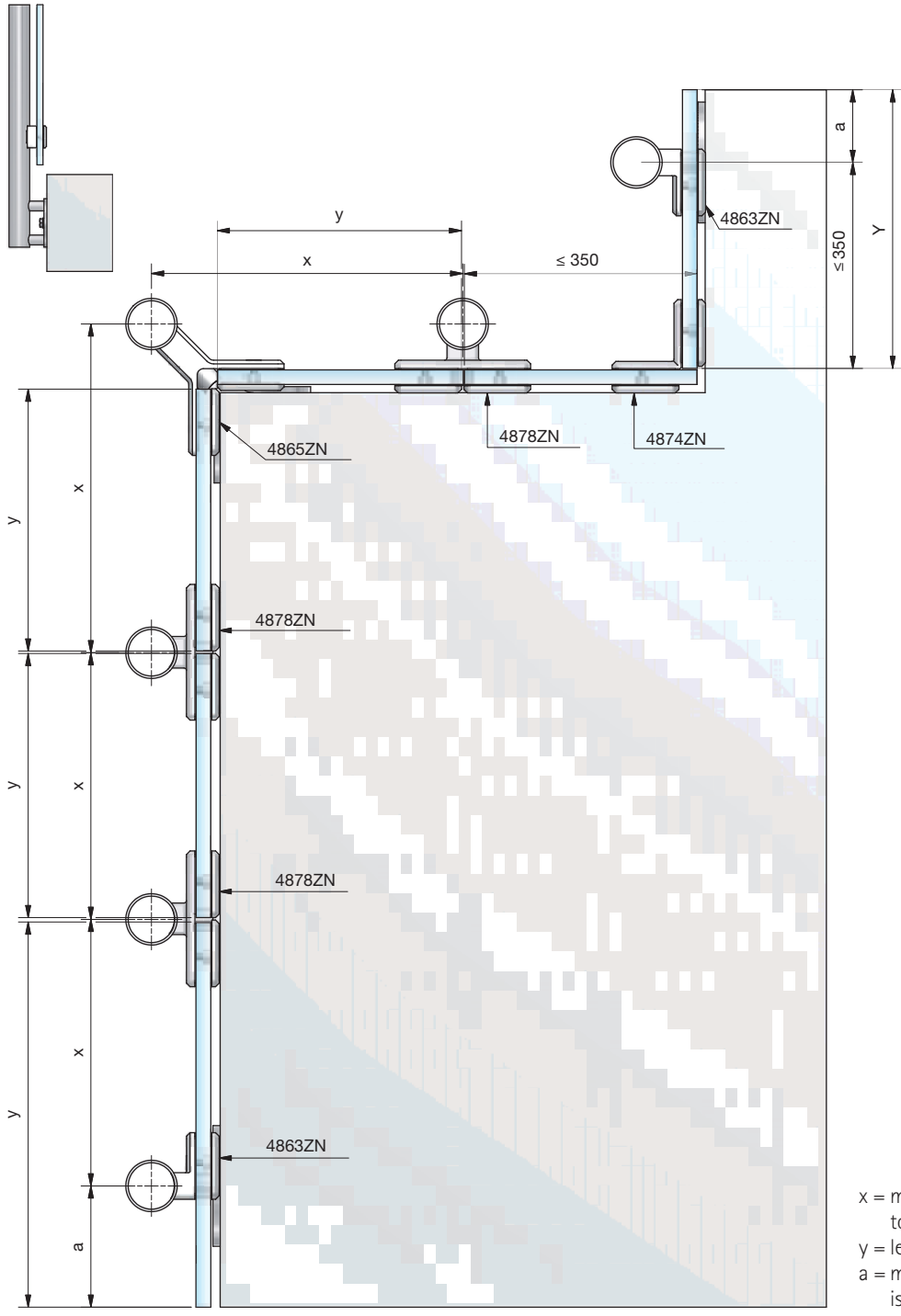


checklist
page 216



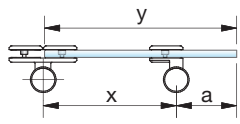
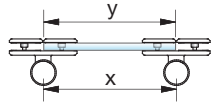
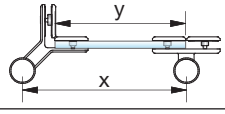
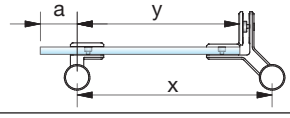
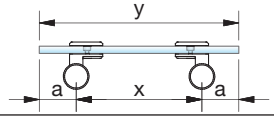
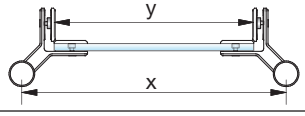
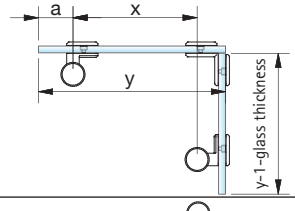
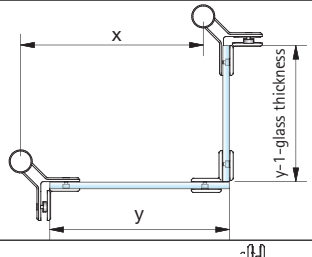
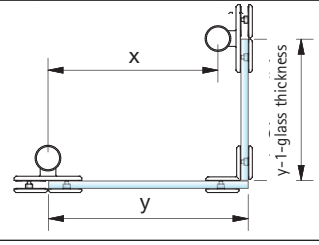
- clamp fixtures for fascia mounting

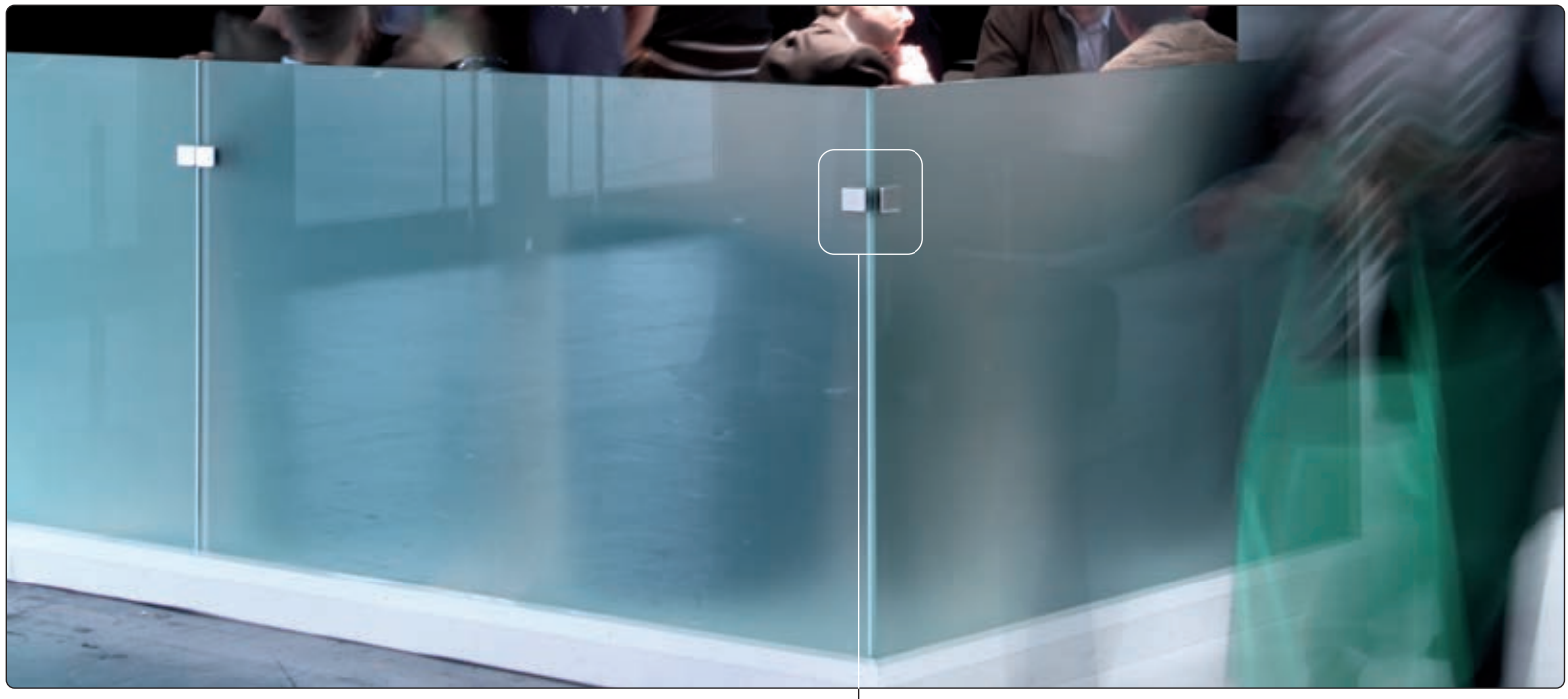
overview

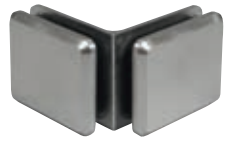


x = measurement tube-middle to tube-middle
y = length to infill
a = max. overlapping of infill is 150mm

overview

item no.	application	glass thickness	Ø 38,4	Ø 40	Ø 42,4	Ø 48,3	Ø 50	Ø 60
4878ZN-4863ZN		8-10-12	-1	-1	-1	-1	-1	-1
4878ZN-4878ZN		8-10-12	-2	-2	-2	-2	-2	-2
4865ZN-4878ZN		8-10	-52	-53	-54,5	-57	-52	-55,5
4863ZN-4865ZN		8-10	-52	-53	-54,5	-57	-52	-55,5
4863ZN-4863ZN		8-10-12	0	0	0	0	0	0
4865ZN-4865ZN		8-10	-104	-106	-109	-114	-104	-111
4863ZN-4874ZN		8 10 12	+44 +46 +44	+45 +47 +49	+46 +48 +50	+49 +51 +53	+50 +52 +54	+55 +57 +59
4865ZN-4874ZN		8 10	-1,5 -3,5	-1,5 -3,5	-1,5 -3,5	-1,5 -3,5	-4,5 -6,5	-4,5 -6,5
4878ZN-4874ZN		8 10 12	+43 +45 +47	+44 +46 +48	+45 +47 +49	+48 +50 +52	+49 +51 +53	+54 +56 +58

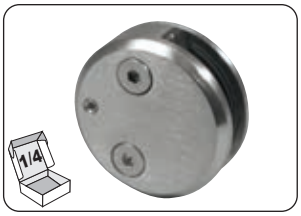


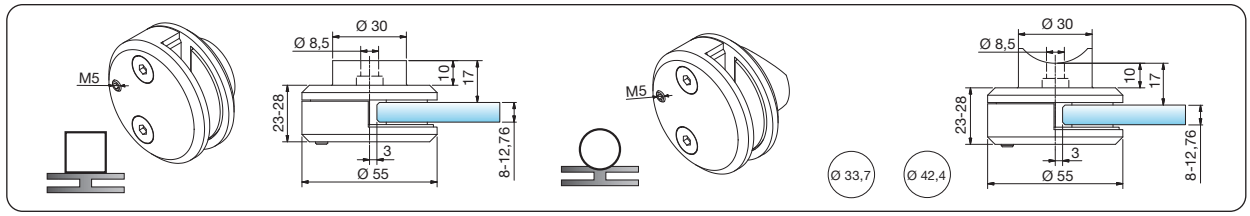


4874

4876

zinc (ZN, ZAMAK®)



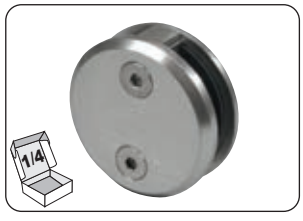


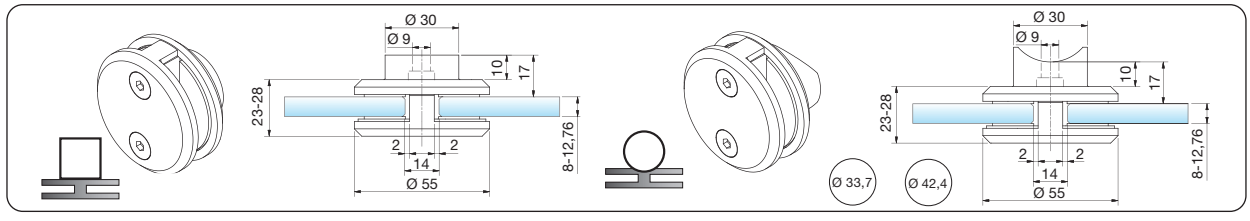
item no.	VSG	Mono	safety	
4860	8,76 - 12,76 mm	8 - 12 mm		
4861	8,76 - 12,76 mm	8 - 12 mm		R17,5/R23

When ordering, please indicate the cutting direction and tube diameter.

material/finish — ZN = zinc

zinc (ZN, ZAMAK®)

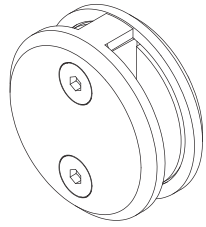


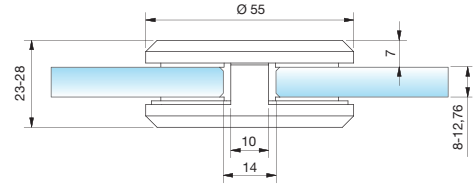


item no.	VSG	Mono	safety	
4866	8,76 - 12,76 mm	8 - 12 mm		
4867	8,76 - 12,76 mm	8 - 12 mm		R17,5/R23

material/finish — ZN = zinc

zinc (ZN, ZAMAK®)



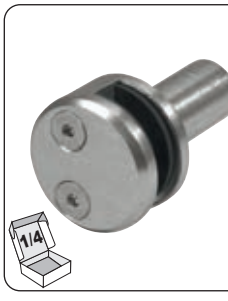


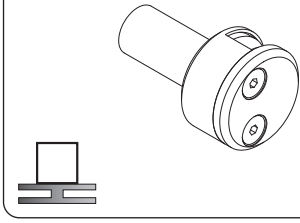
item no.	VSG	Mono
4868	8,76 - 12,76 mm	8 - 12 mm

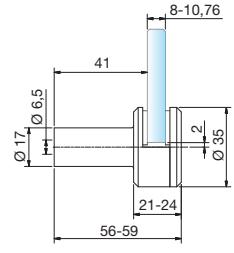
material/finish — ZN = zinc

RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)





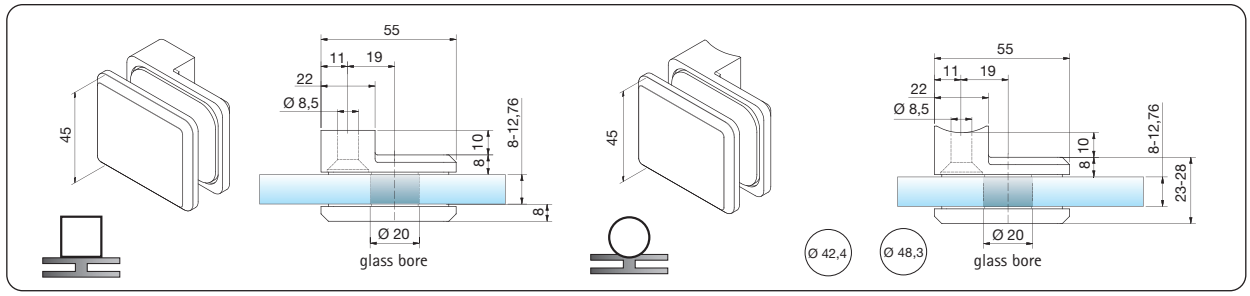


item no.	VSG	Mono	safety
4840	8,76 mm	8 mm	
4850	10,76 mm	10 mm	

material/finish — ZN = zinc

RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)

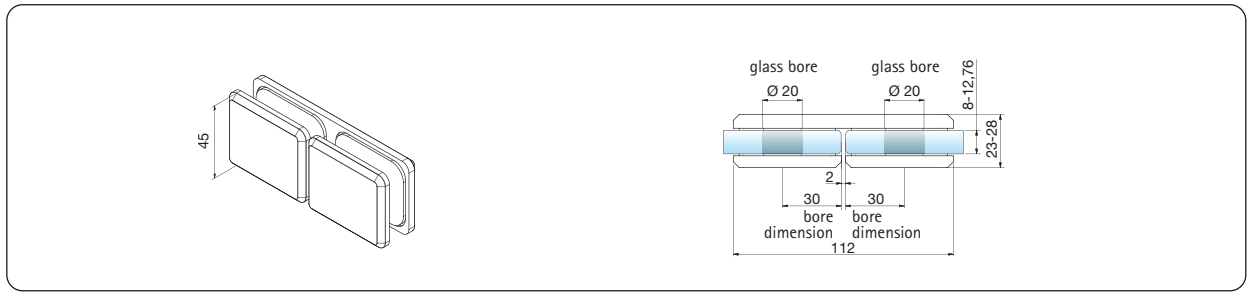


item no.	VSG	Mono	
4862	8,76 - 12,76 mm	8 - 12 mm	
4863	8,76 - 12,76 mm	8 - 12 mm	R20/R27

material/finish — ZN = zinc

RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)

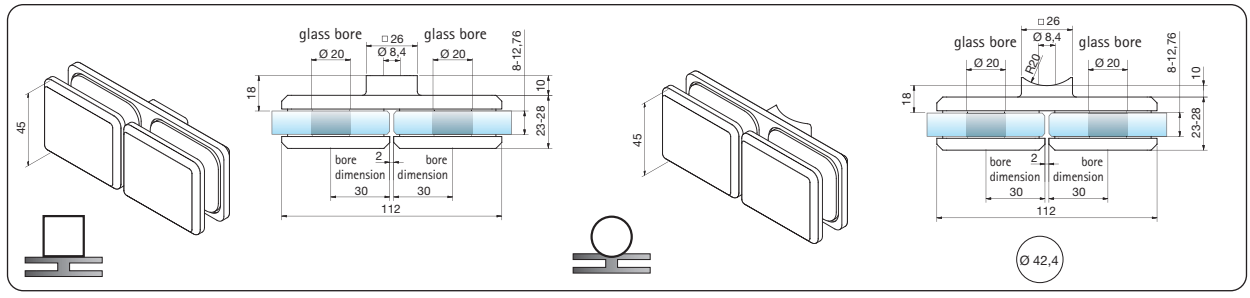


item no.	VSG	Mono
4876	8,76 - 12,76 mm	8 - 12 mm

material/finish — ZN = zinc

RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)

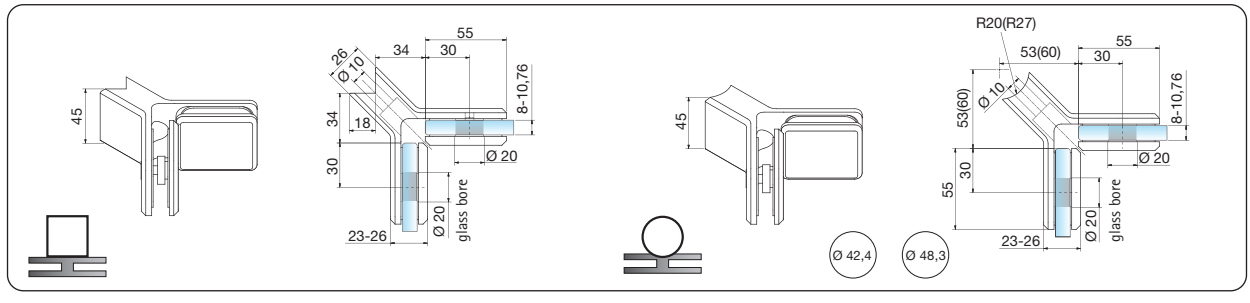


item no.	VSG	Mono		
4877	8,76 - 12,76 mm	8 - 12 mm		
4878	8,76 - 12,76 mm	8 - 12 mm		R20

material/finish — ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12 ZN22 ZN22-K

zinc (ZN, ZAMAK®)

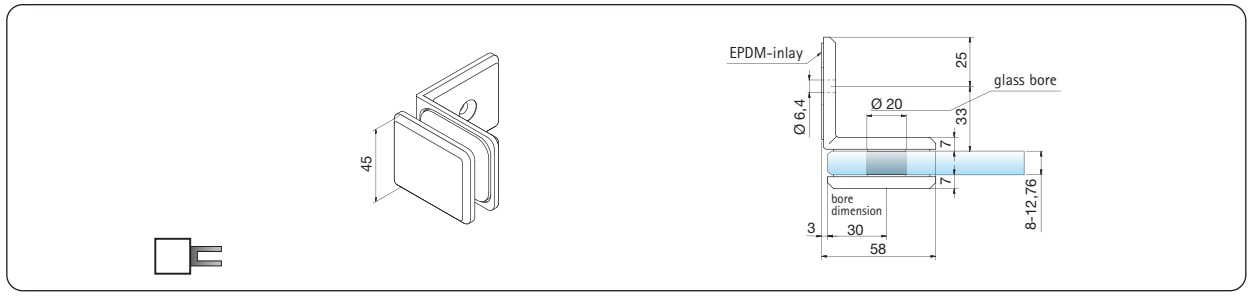


item no.	VSG	Mono		
4864	8,76 - 10,76 mm	8 - 10 mm		
4865	8,76 - 10,76 mm	8 - 10 mm		R20/R27

material/finish — ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12 ZN22 ZN22-K

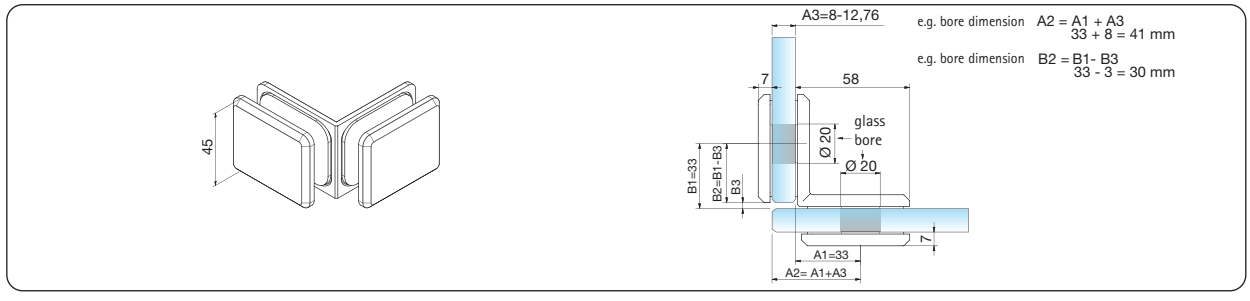
zinc (ZN, ZAMAK®)



item no.	VSG	Mono	safety
4875	8,76 - 12,76 mm	8 - 12 mm	

material/finish — ZN = zinc

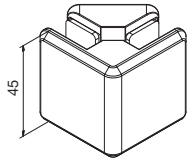
zinc (ZN, ZAMAK®)

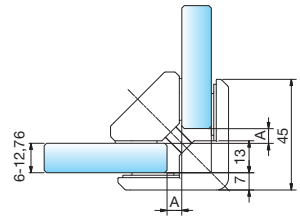


item no.	VSG	Mono	safety
4874	8,76 - 12,76 mm	8 - 12 mm	

material/finish — ZN = zinc

zinc (ZN, ZAMAK®)





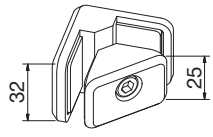
glass	A
9,52 - 12,76	5
7,52 - 8,76	6
6,00 - 6,76	8

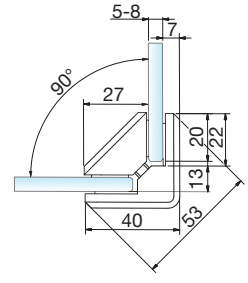
item no.	VSG	Mono
4830	6,76 - 12,76 mm	6 - 12 mm

material/finish — ZN = zinc

RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)



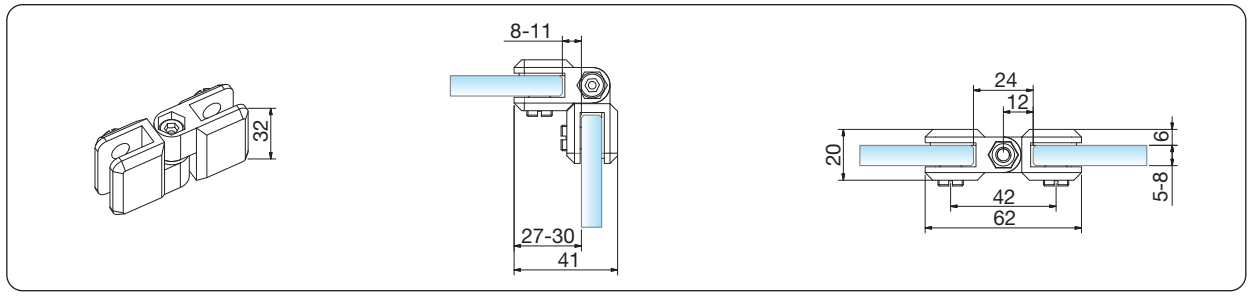


item no.	info	Mono
4880	corner bracket 90°	5 - 8 mm

material/finish — ZN = zinc

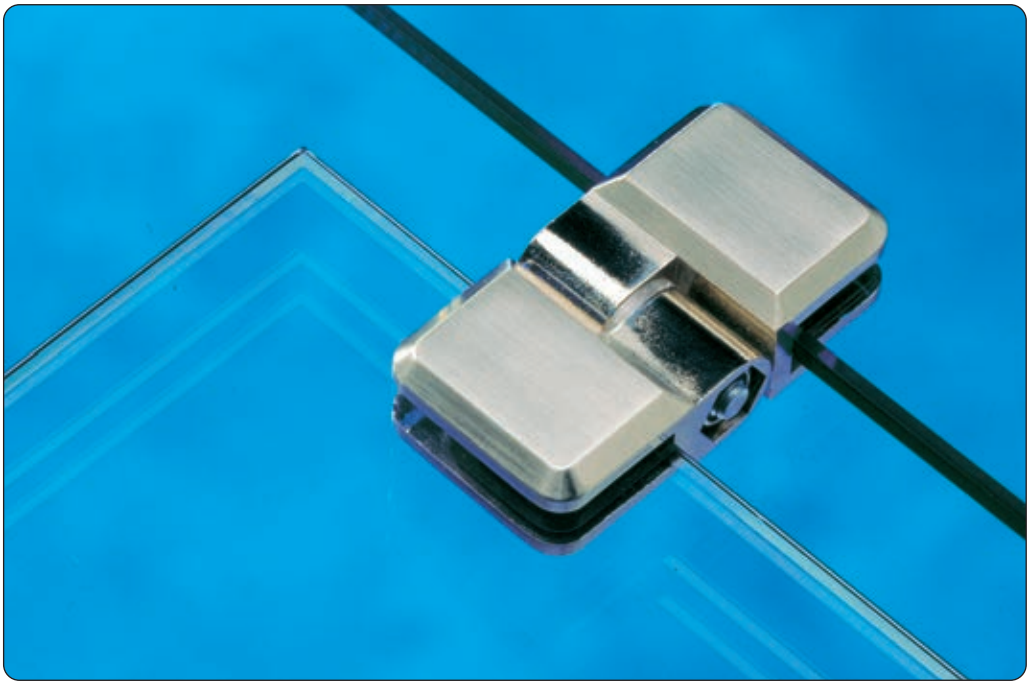
RAL | ZN0 | ZN1 | ZN5 | ZN12 | ZN22 | ZN22-K

zinc (ZN, ZAMAK®)

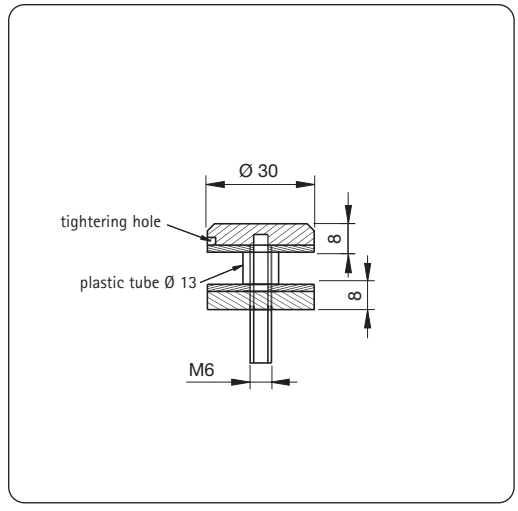


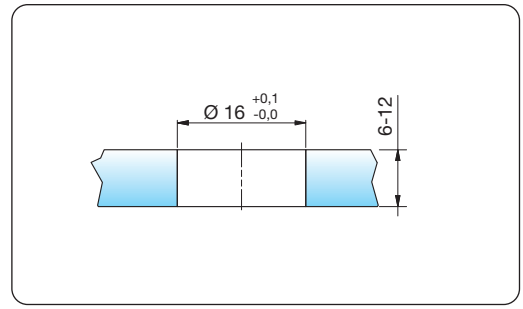
item no.	info	Mono
4885	hinge and variable connector, opening angle 90° - 270°	5 - 8 mm

material/finish — ZN = zinc



zinc point fixing





item no.: 4870 / 4872		
point fixing	Ø 30	raised head
material/finish		ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12

ZN22 ZN22-K

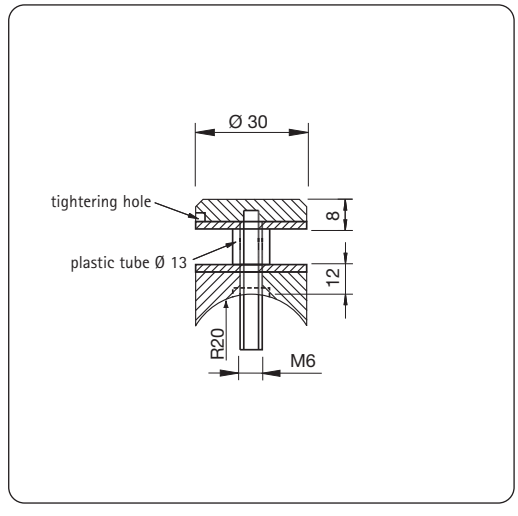
accessories

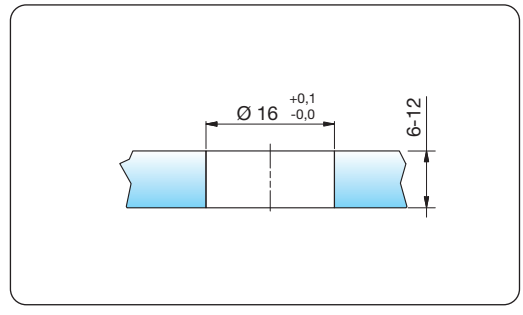
Z057

includes

4870ZN
M6 x 60 mm

4872ZN
M6 x 60 mm, hanger bolt





item no.: 4871		
point fixing	Ø 30	raised head
material/finish		ZN = zinc

RAL ZN0 ZN1 ZN5 ZN12

ZN22 ZN22-K

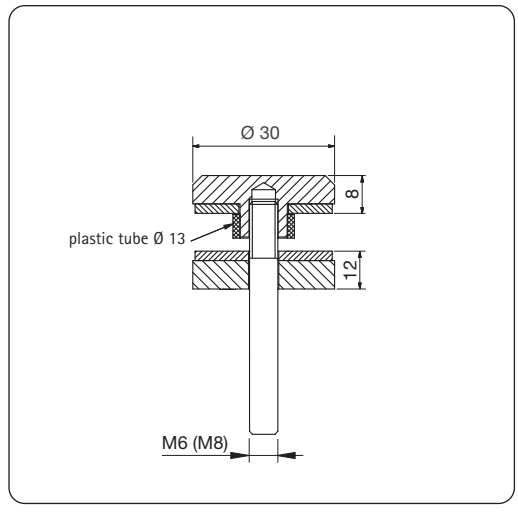
accessories

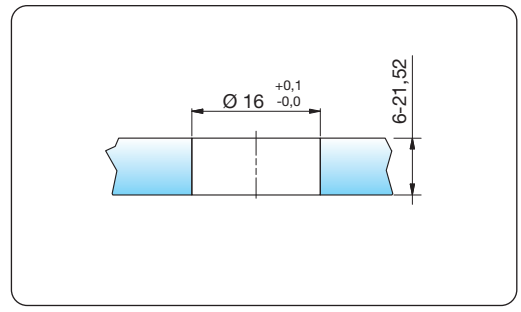
Z057

includes

M6 x 60 mm

stainless steel





item no.: 1341 / 1341-M8 / 1351		
point fixing	Ø 30	raised head
material/finish		VA = stainless steel

VA VA1

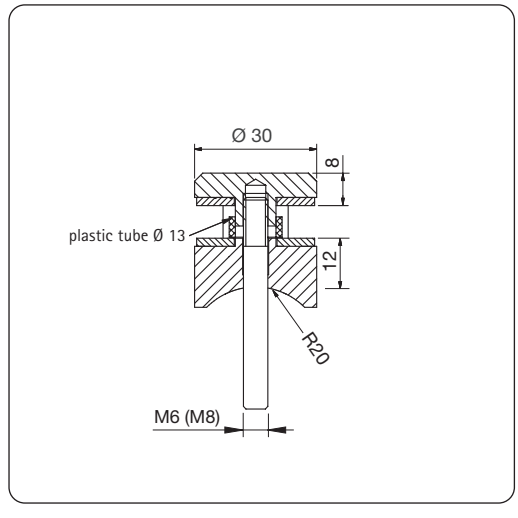
accessories

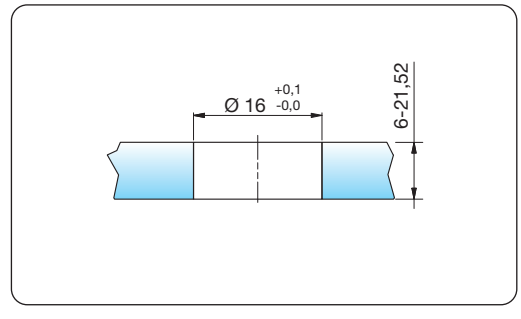
Z057

includes

1341VA M6(M8) x 60 mm

1351VA M6 x 60 mm, hanger bolt





item no.: 1339 / 1339-M8		
point fixing	Ø 30	raised head
material/finish		VA = stainless steel

VA VA1

accessories

Z057

includes

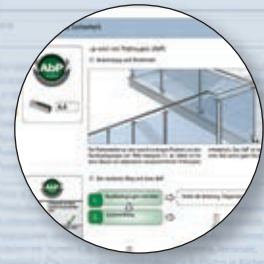
1339VA M6(M8) x 60 mm

content

INFO

CURRENT RULES REGARDING cp-mini

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.



cp-mini AbP
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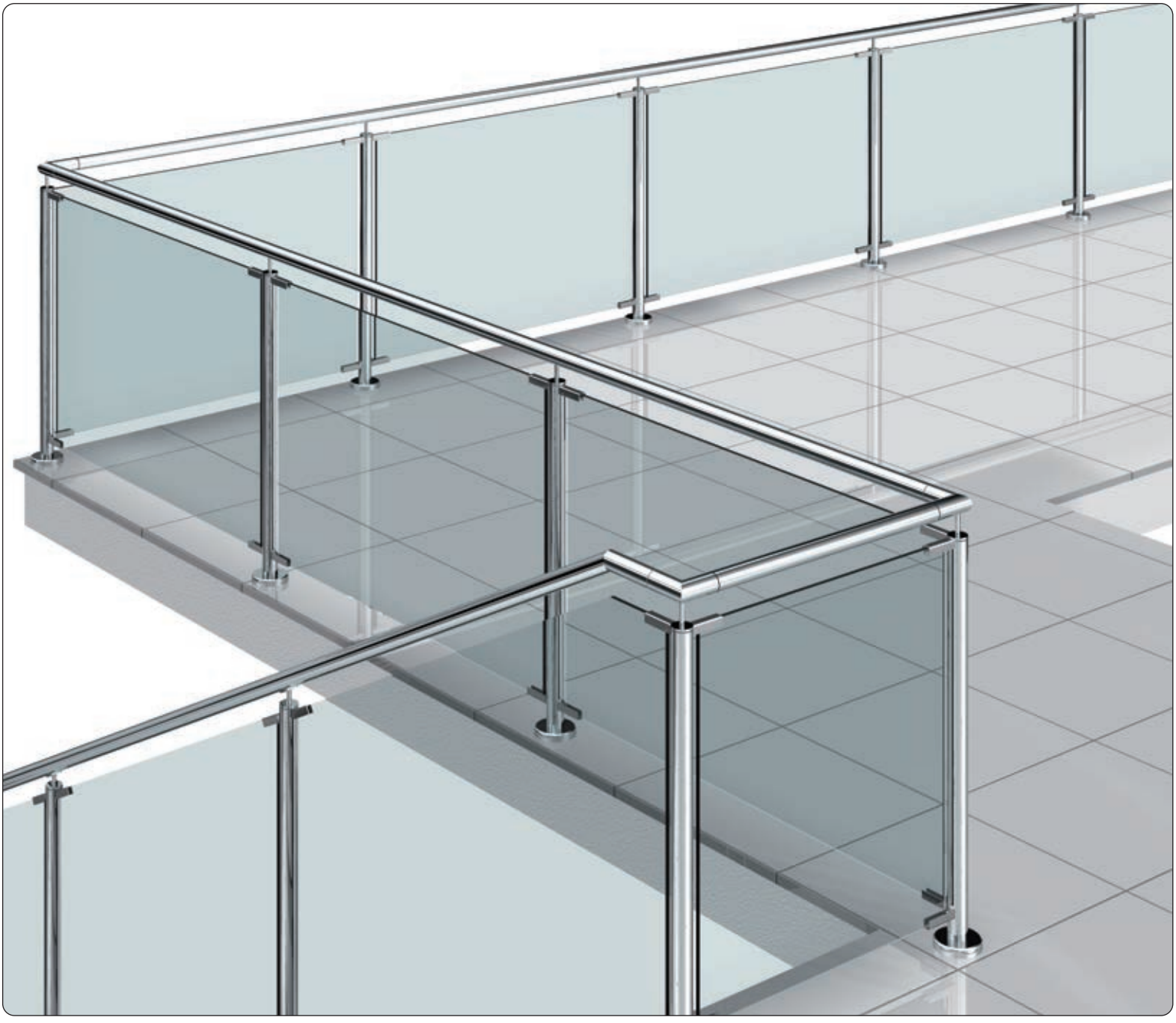
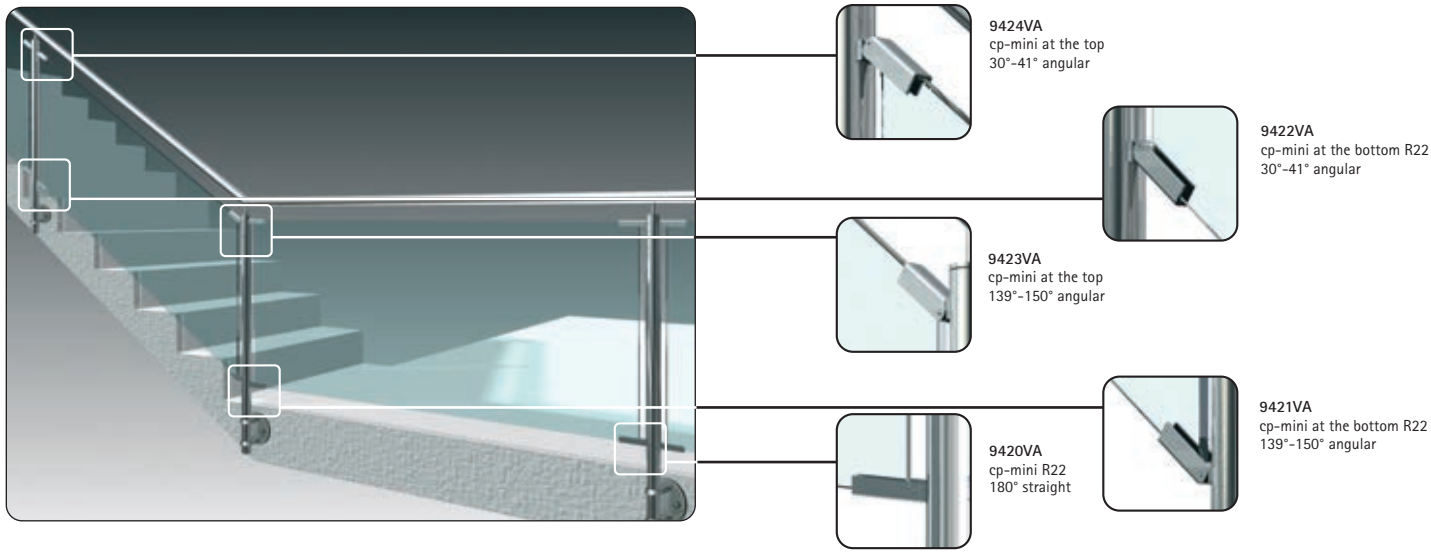
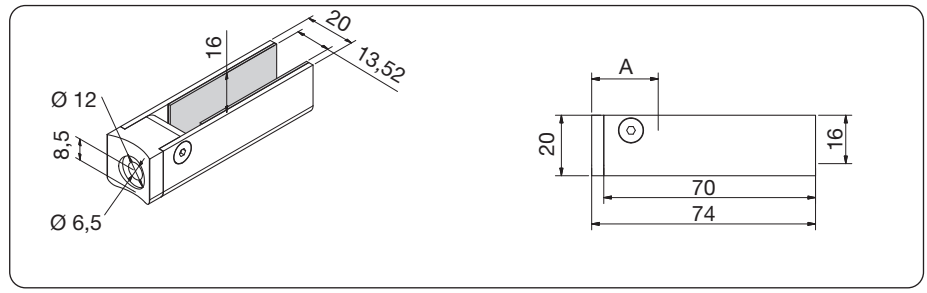


balustrade glazing with cp-mini

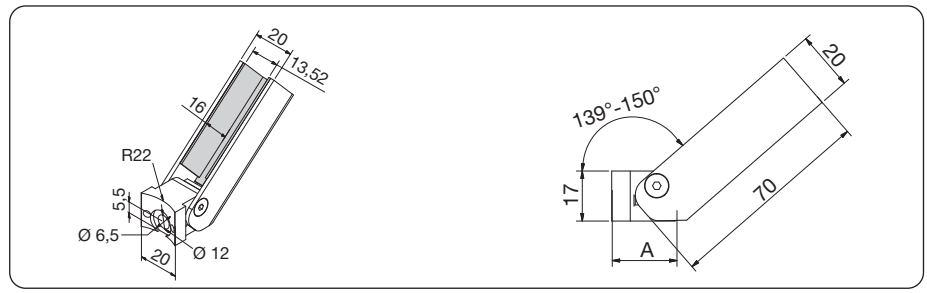
cp-mini for round tube





item no.	material	info	VSG	
9420VA	A2/K240	180° straight	13,52 mm	R22

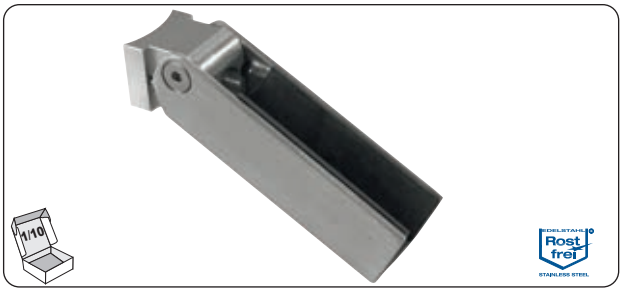
A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

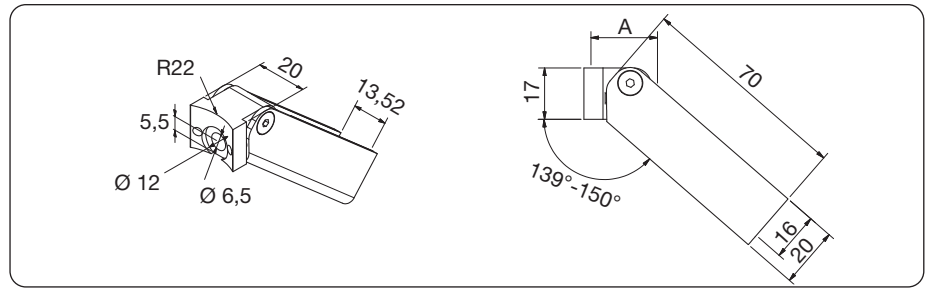


item no.	material	info	VSG	
9421VA	A2/K240	139° - 150° angular	13,52 mm	R22

A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

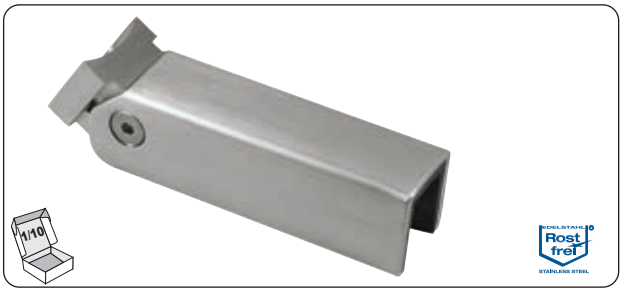
cp-mini for round tube

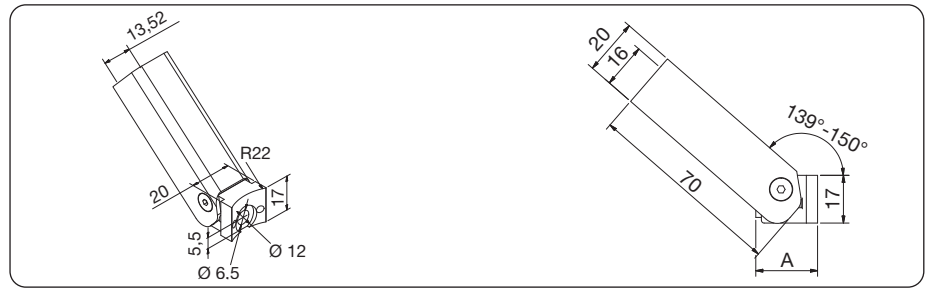




item no.	material	info	VSG	
9422VA	A2/K240	30° - 41° angular	13,52 mm	R22

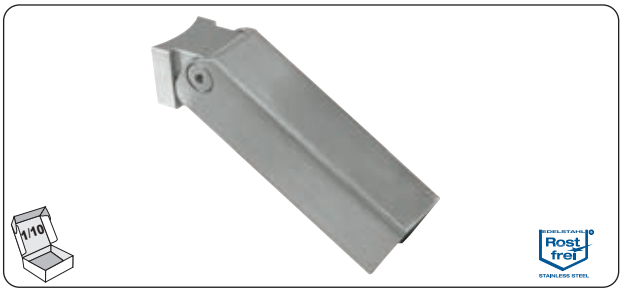
A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

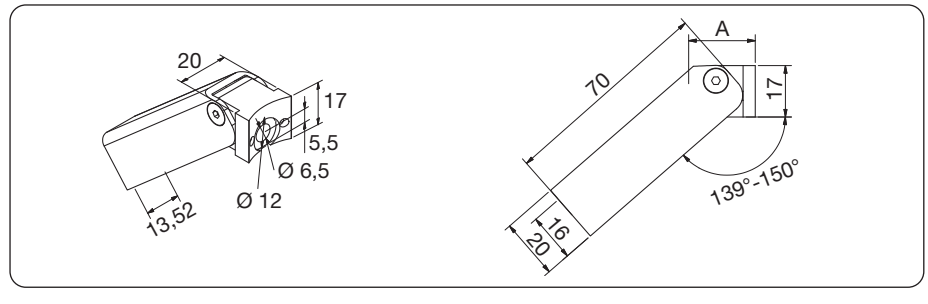




item no.	material	info	VSG	
9423VA	A2/K240	139° - 150° angular	13,52 mm	R22

A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

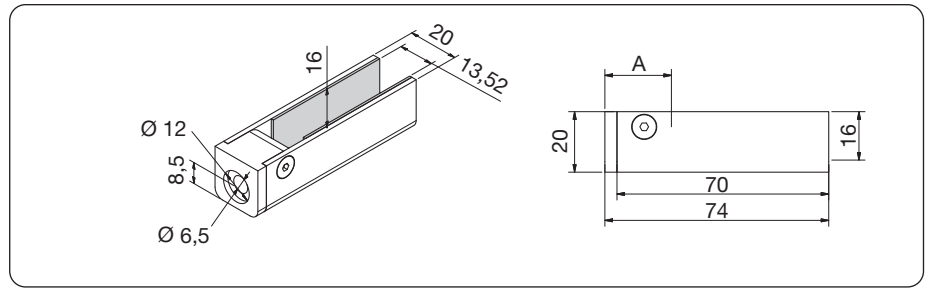




item no.	material	info	VSG	
9424VA	A2/K240	30° - 41° angular	13,52 mm	R22

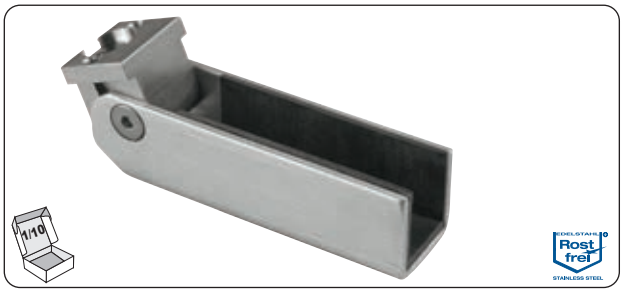
A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

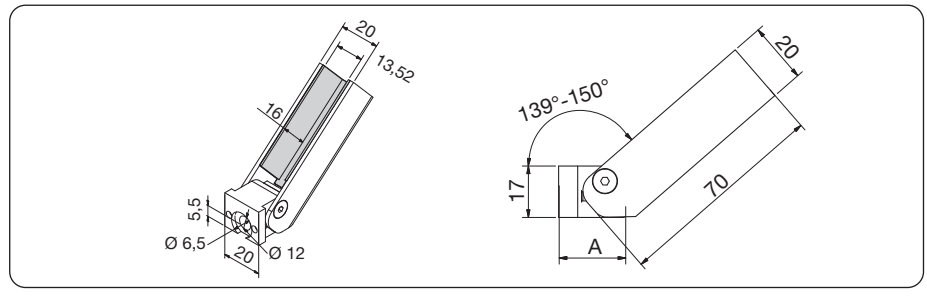
cp-mini for square tube



item no.	material	info	VSG
9410VA	A2/K240	180° straight	13,52 mm

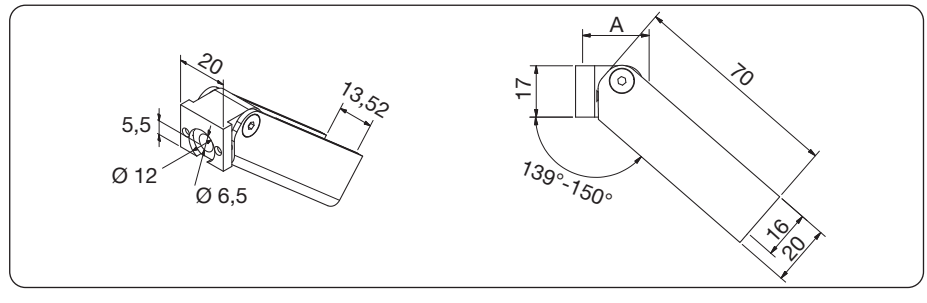
A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6





item no.	material	info	VSG
9411VA	A2/K240	139° - 150° angular	13,52 mm

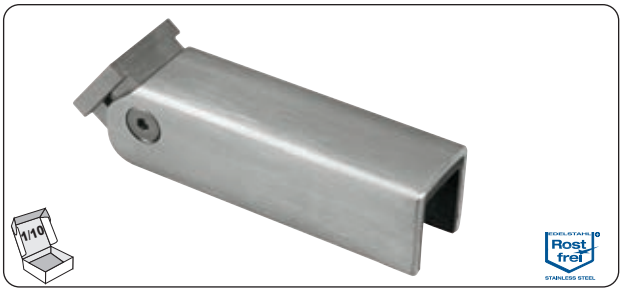
A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

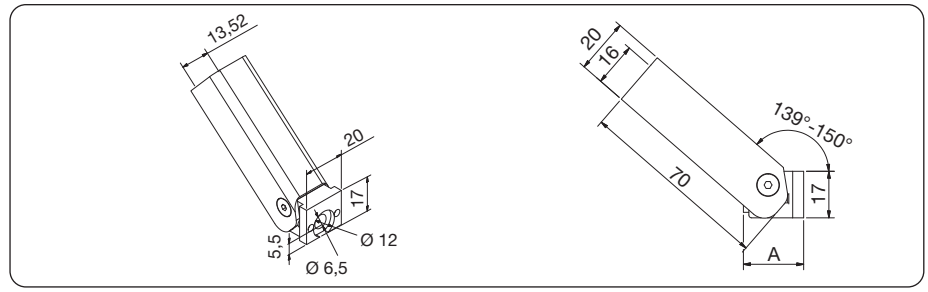


item no.	material	info	VSG
9412VA	A2/K240	30° - 41° angular	13,52 mm

A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

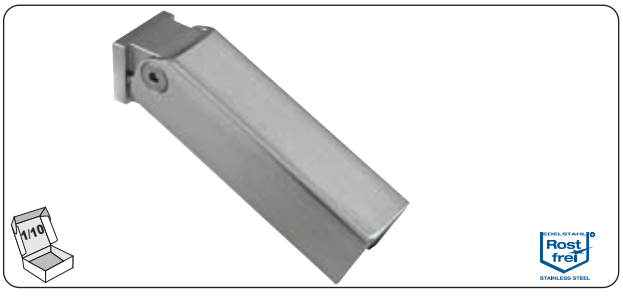
cp-mini for square tube

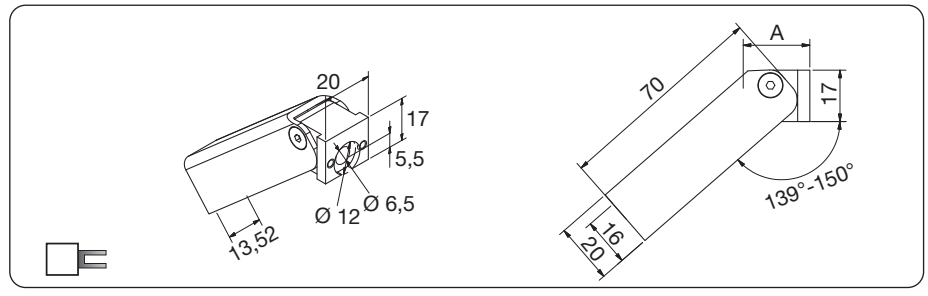




item no.	material	info	VSG
9413VA	A2/K240	139° - 150° angular	13,52 mm

A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

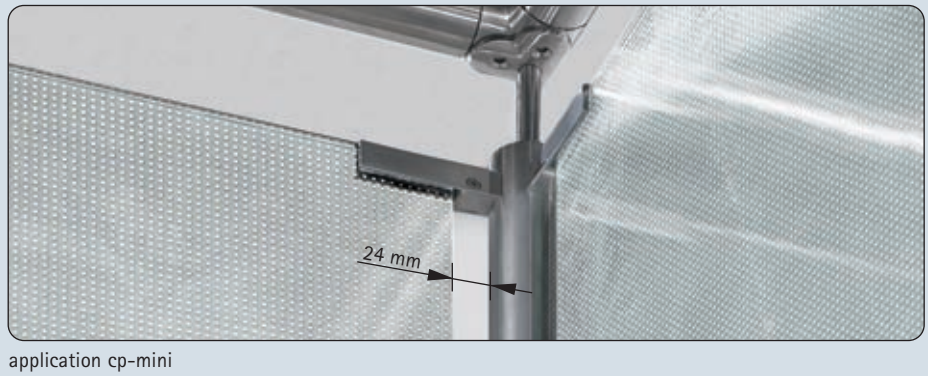




item no.	material	info	VSG
9414VA	A2/K240	30° - 41° angular	13,52 mm

A = reduction measurement glass
24 mm/fastening screw DIN 6912 M6

INFO

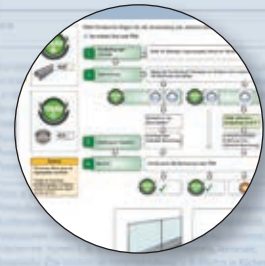


application cp-mini

content

INFO CURRENT RULES REGARDING TRAV

Armed with information on the safety aspects of balustrades, you will confidently follow the latest regulations and guidelines when planning your projects. This saves you time and money. We can also extend this service with personal consultation. Talk to us.



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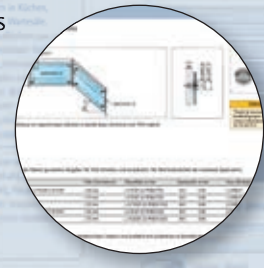

design table Kat C
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checklist
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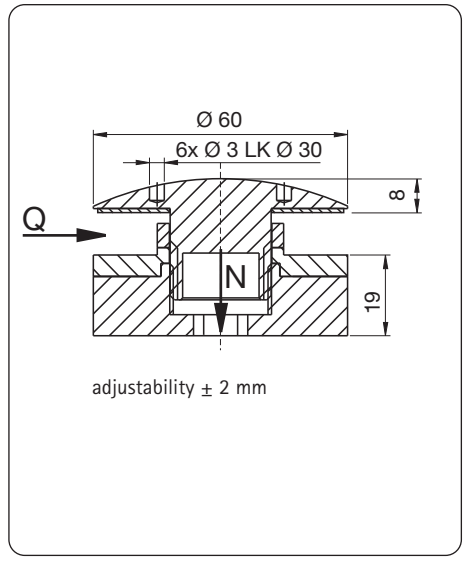
- point fixings according to TRAV

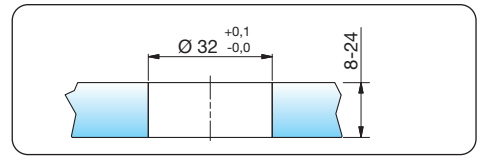
- point fixings according to TRAV

- fixed mounting bracket for TRAV

point fixings according to TRAV

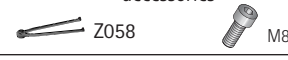


adjustability ± 2 mm

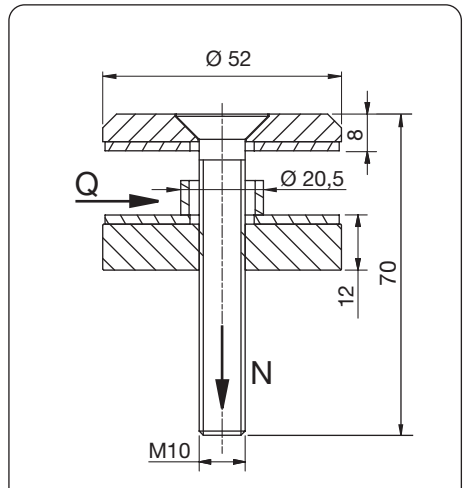


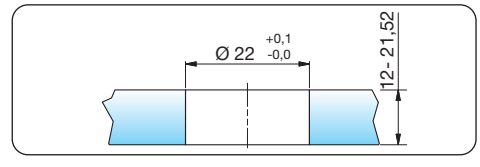
item no.: 7016	
point fixing (TRAV) with aluminum center ring	Ø 60
head:	rounded
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN
7016VA	8 - 12 mm
7016VA-16	13 - 16 mm
7016VA-20	17 - 20 mm
7016VA-24	21 - 24 mm

accessories



TRAV





item no.: 7078	
point fixing (TRAV) with EPDM	Ø 52
head:	flat
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN

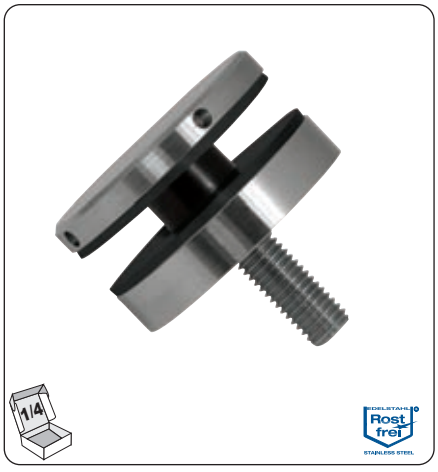
includes

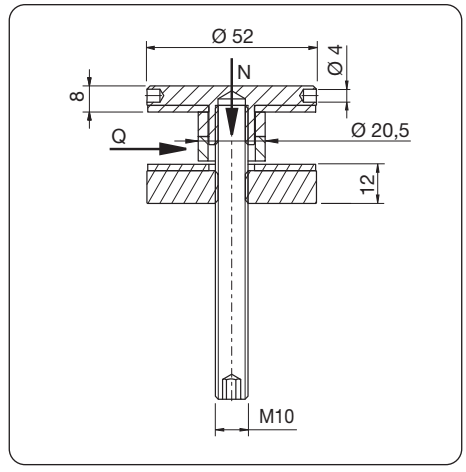
DIN7991* M10 x 70 mm

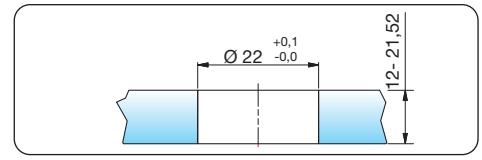
*full-threaded screw

TRAV TRPV

point fixings according to TRAV

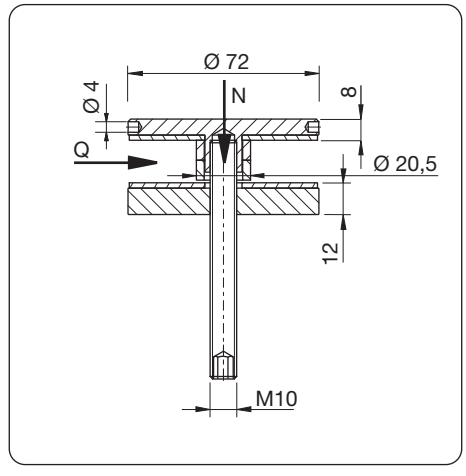


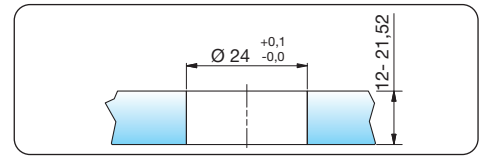




item no.: 7072	
point fixing (TRAV)	Ø 52
head:	flat
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN

accessories: Z060 — includes: DIN913 M10 x 90 mm

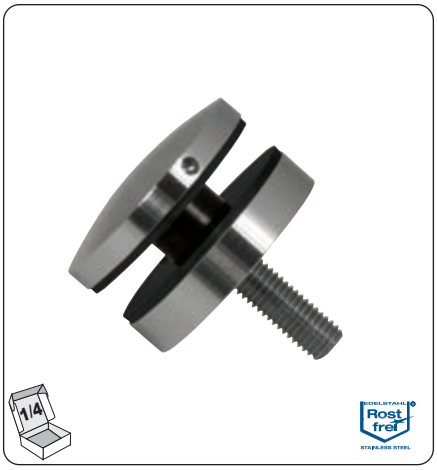


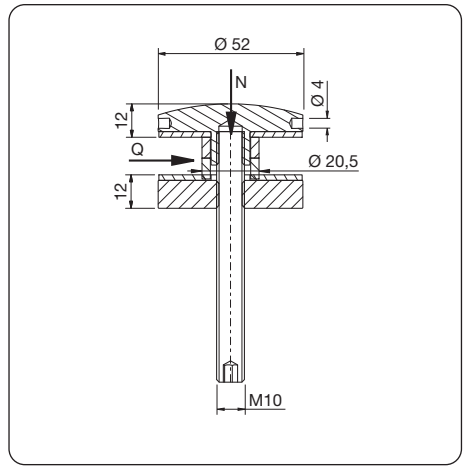


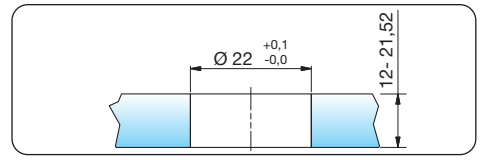
item no.: 7073	
point fixing (TRAV)	Ø 72
head:	flat
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN

accessories: Z060 — includes: DIN913 M10 x 90 mm

point fixings according to TRAV

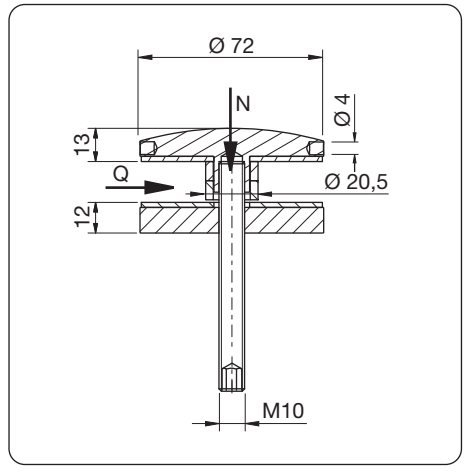


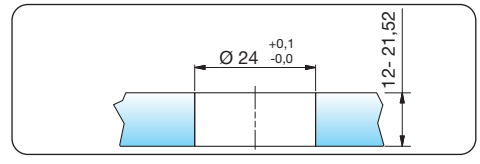




item no.: 7076	
point fixing (TRAV)	Ø 52
head:	rounded
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN

accessories	includes
Z060	DIN913 M10 x 90 mm

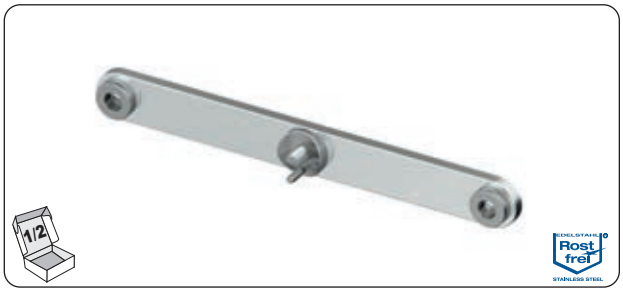


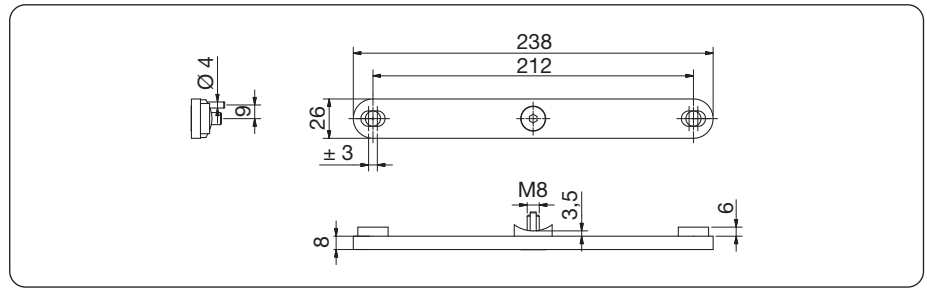


item no.: 7077	
point fixing (TRAV)	Ø 72
head:	rounded
material:	A2
max. Q: 4,0 kN	max. N: 6,0 kN

accessories	includes
Z060	DIN913 M10 x 90 mm

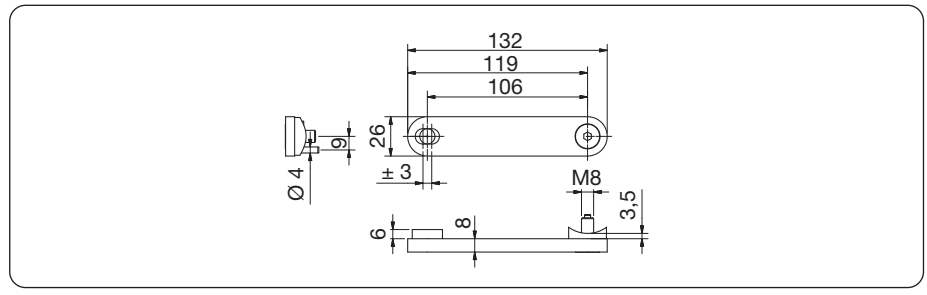
fixed 2-arm mounting bracket



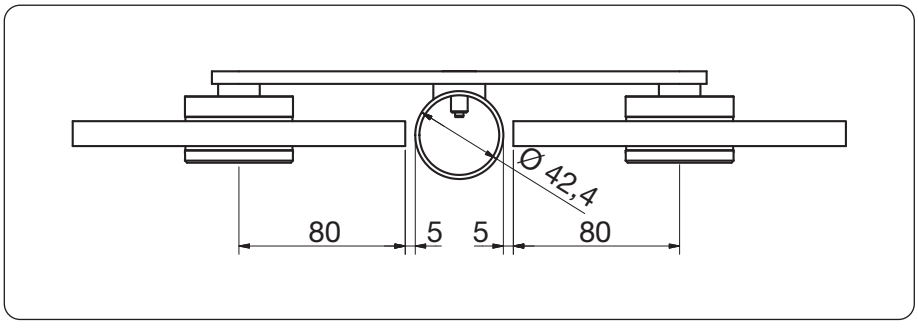


item no.	material	info	Ø tube	material thickness	
SET-7040VA	A2/K240	fixed mounting bracket with round tube adapter and detent	42,4	8 mm	

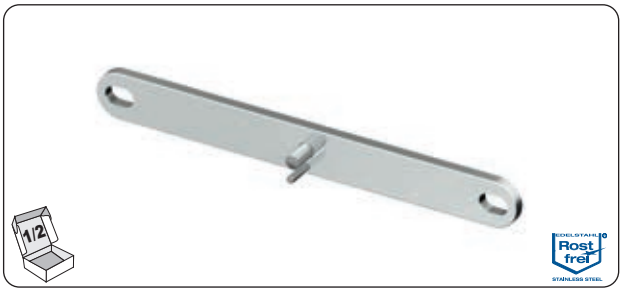
fixed 1-arm mounting bracket

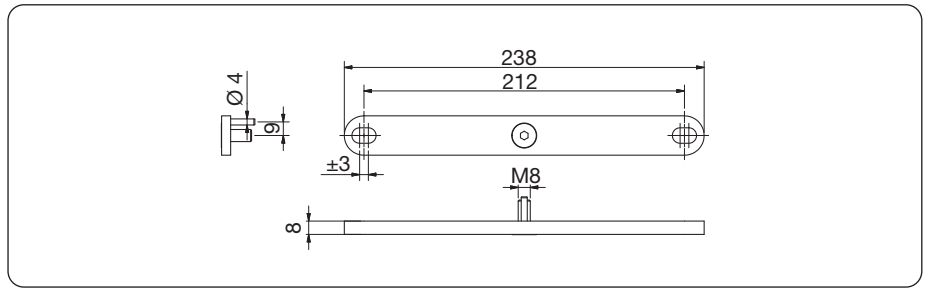


item no.	material	info	Ø tube	material thickness	
SET-7041VA	A2/K240	fixed mounting bracket with round tube adapter and detent	42,4	8 mm	



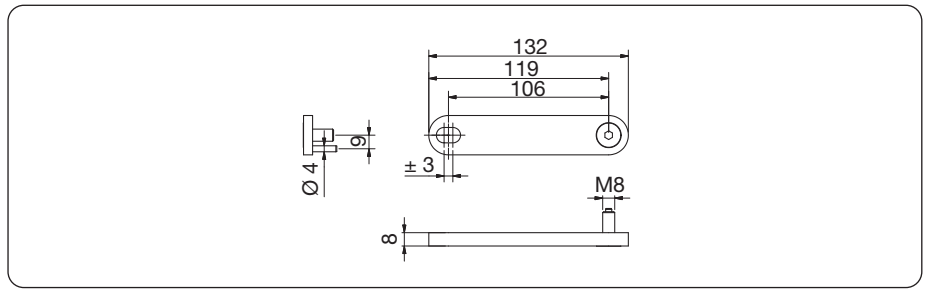
fixed 2-arm mounting bracket



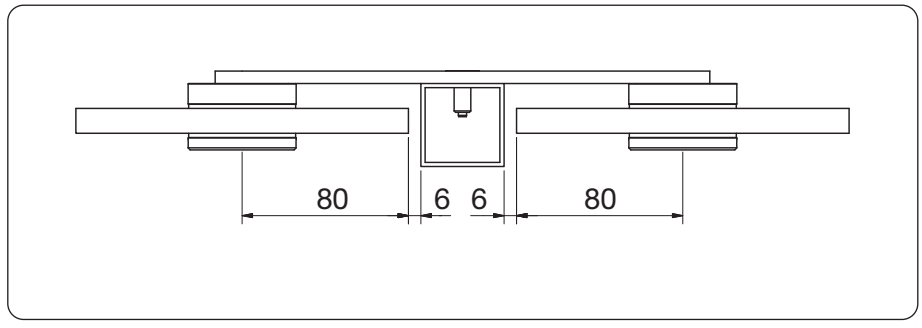


item no.	material	info	material thickness	
SET-7042VA	A2/K240	fixed mounting bracket with detent	8 mm	

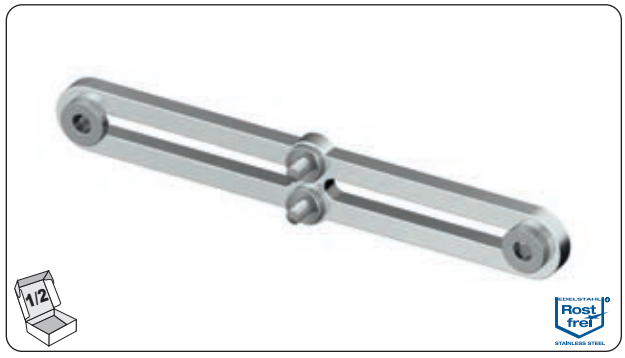
fixed 1-arm mounting bracket

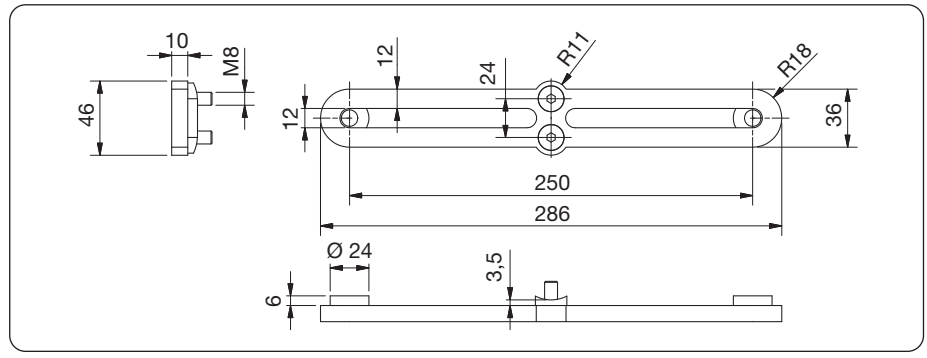


item no.	material	info	material thickness	
SET-7043VA	A2/K240	fixed mounting bracket with detent	8 mm	



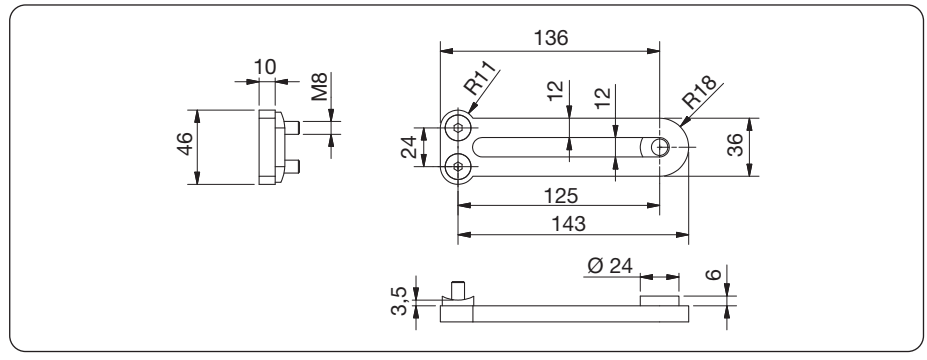
fixed 2-arm mounting bracket



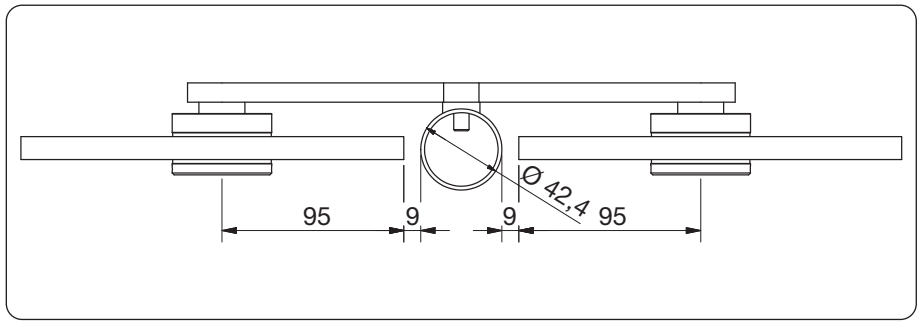


item no.	material	info	Ø tube	material thickness	
SET-7022VA	A2/K240	fixed mounting bracket with round tube adapter	42,4	10 mm	

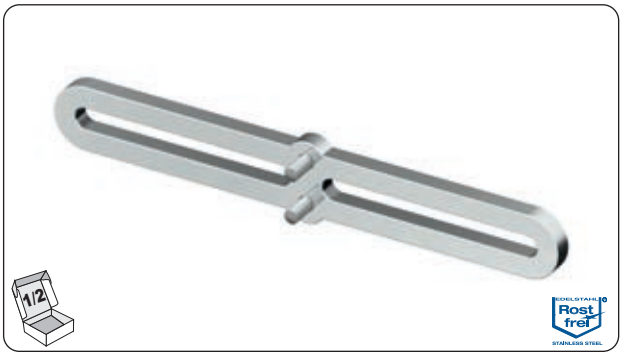
fixed 1-arm mounting bracket

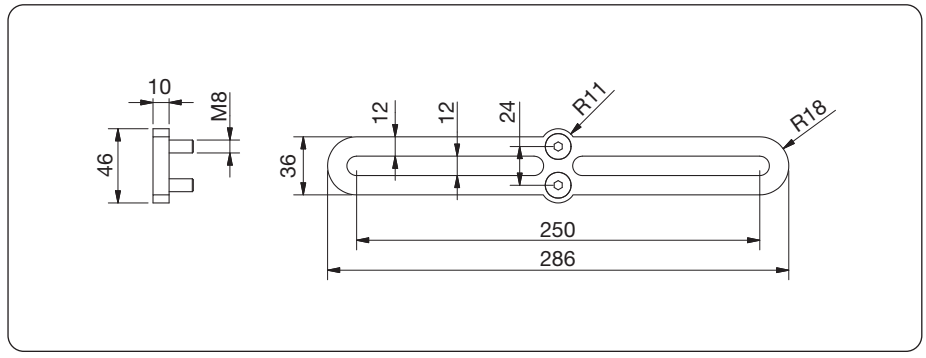


item no.	material	info	Ø tube	material thickness	
SET-7023VA	A2/K240	fixed mounting bracket with round tube adapter	42,4	10 mm	



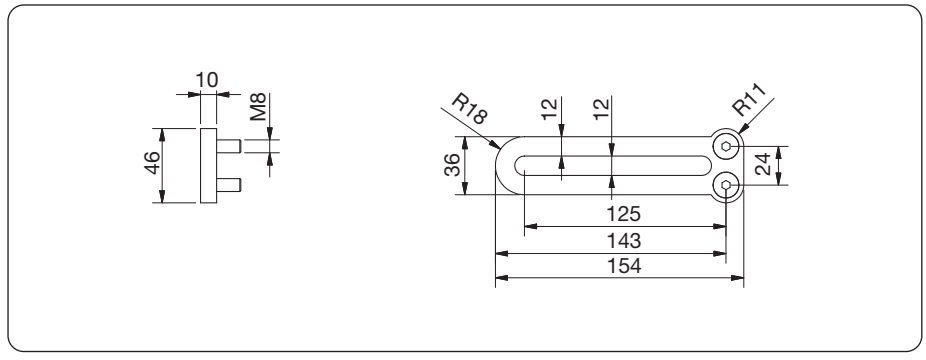
fixed 2-arm mounting bracket



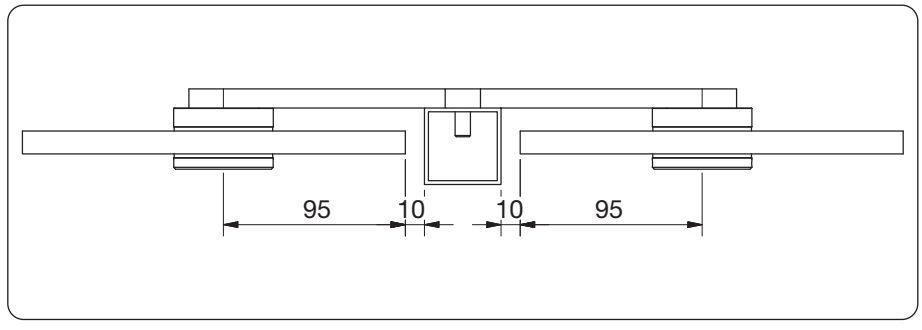


item no.	material	info	material thickness
SET-7026VA	A2/K240	fixed mounting bracket	10 mm

fixed 1-arm mounting bracket



item no.	material	info	material thickness
SET-7027VA	A2/K240	fixed mounting bracket	10 mm



content

INFO

CURRENT RULES REGARDING BANANO

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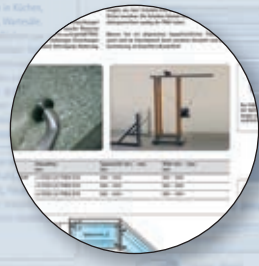

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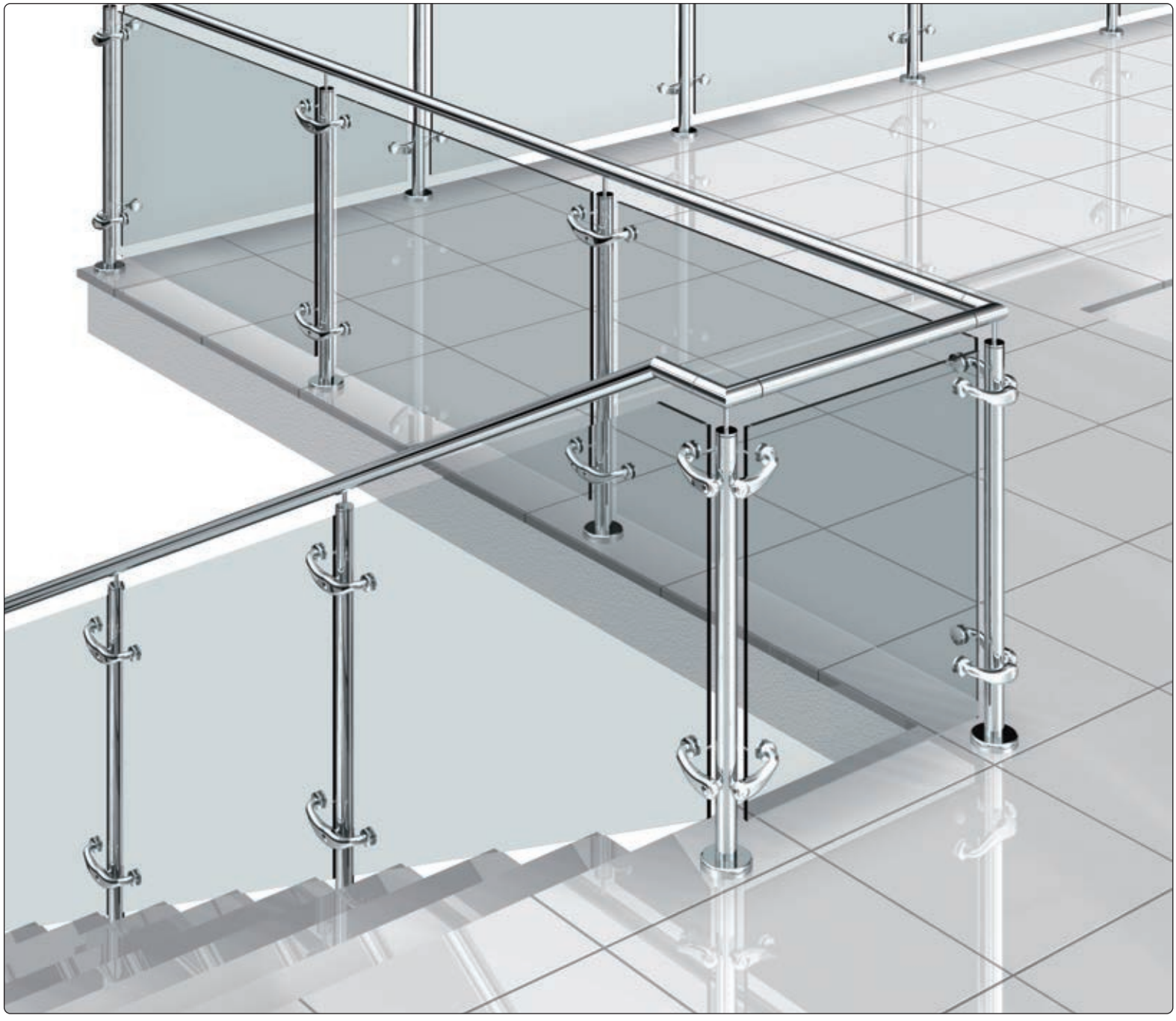
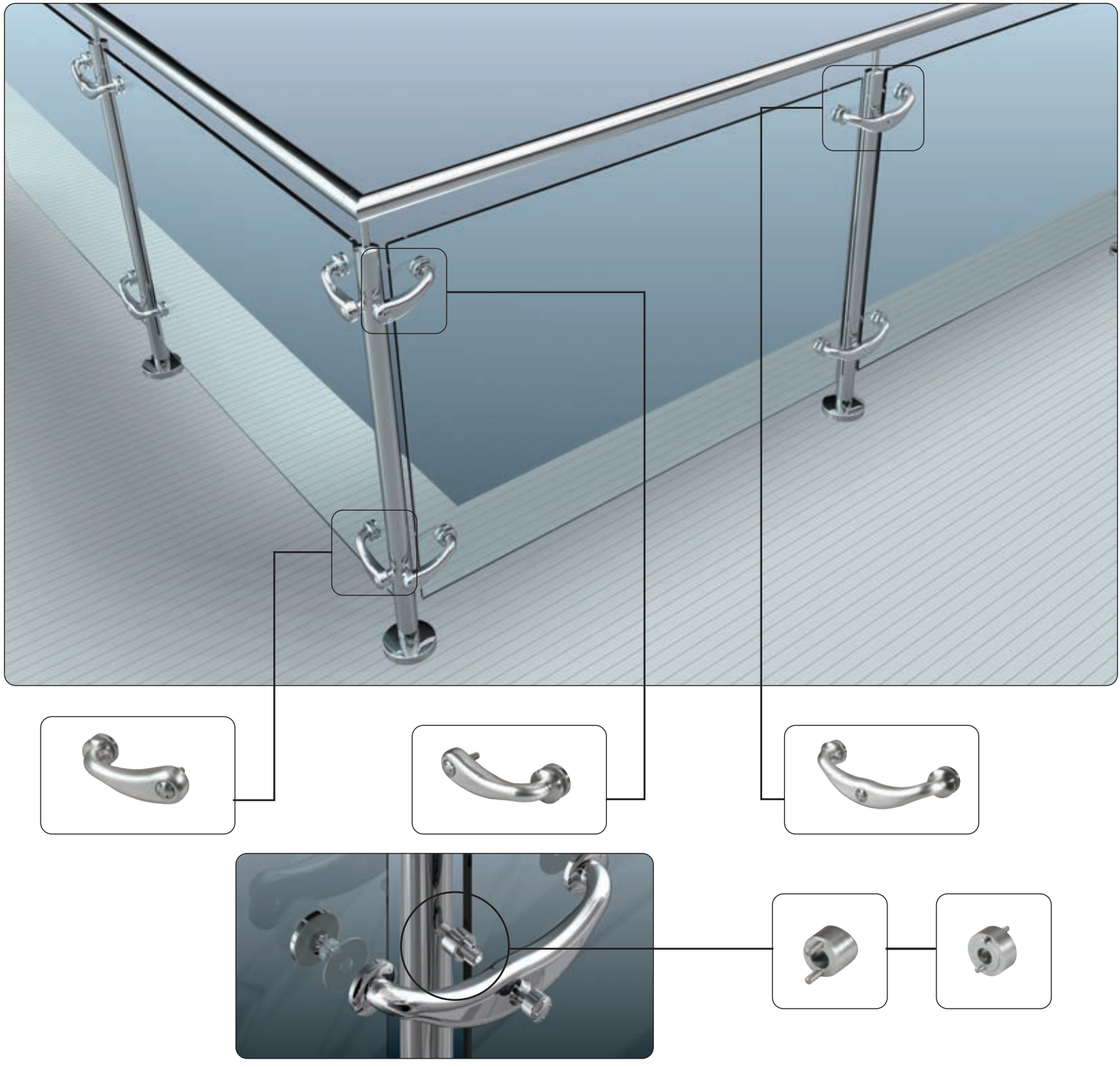
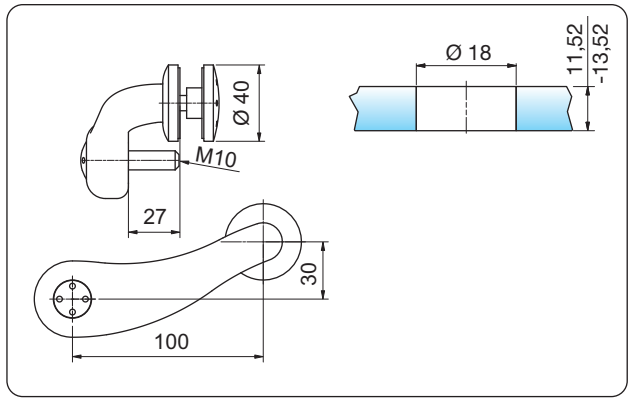


- point-fixed system Banano

- systematics and combination possibilities with Banano



connector Banano



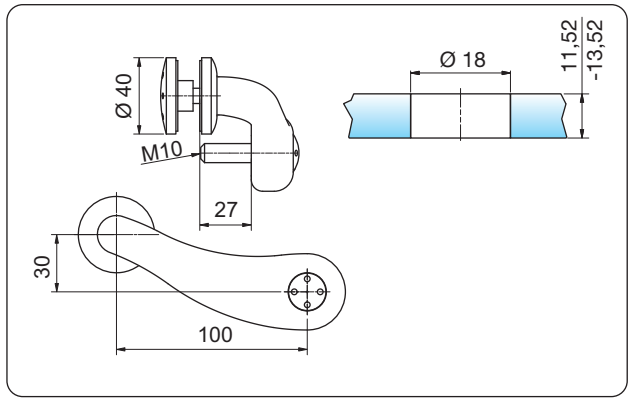
item no.: 7220R

end connector — right-hand version

material/finish: ZN=zinc

RAL ZN0 ZN1 ZN5 ZN22

accessories
Z058



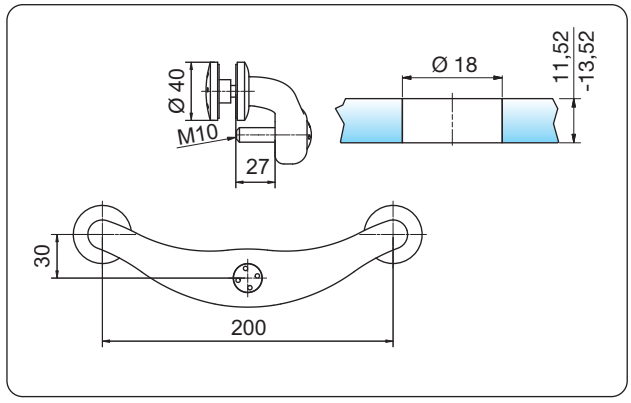
item no.: 7220L

end connector — left-hand version

material/finish: ZN=zinc

RAL ZN0 ZN1 ZN5 ZN22

accessories
Z058



item no.: 7230

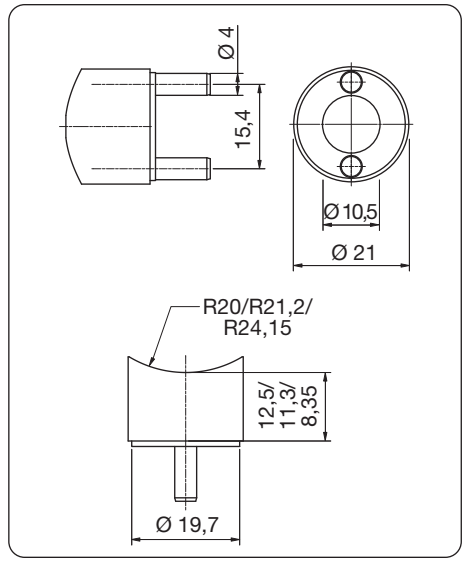
middle connector

material/finish: ZN=zinc

RAL ZN0 ZN1 ZN5 ZN22

accessories
Z058

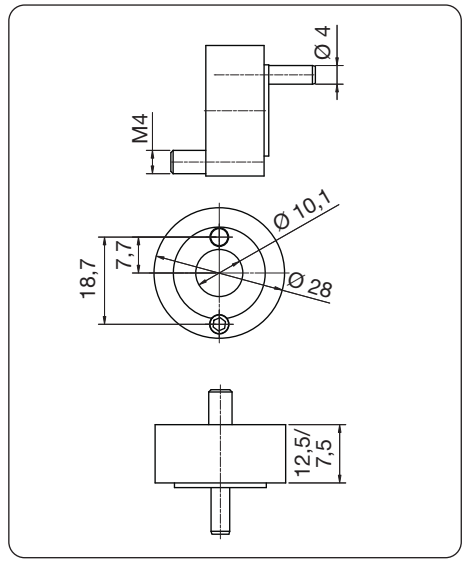
adapter Banano



item no.: 7235	
round tube adapter	R20/R21,2/R24

material/finish:	ZN=zinc

RAL ZN0 ZN1 ZN5 ZN22

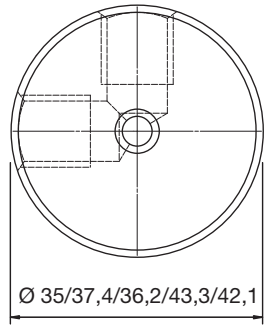


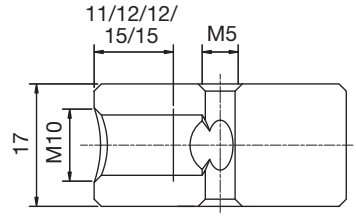
item no.: 7235VK40/7235VK50	
square tube adapter	40/50 mm

material/finish:	ZN=zinc

RAL ZN0 ZN1 ZN5 ZN22

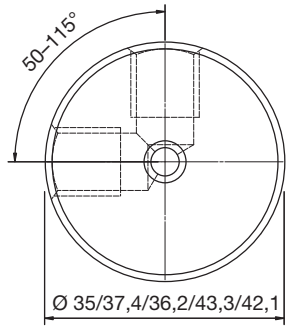
round tube fixture Banano

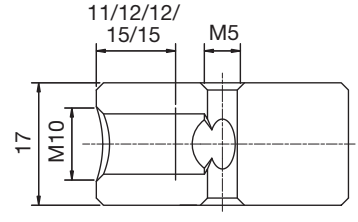




item no.	info	Ø tube x s
7221	round tube fixture	40 x 2
7222	round tube fixture	42,4 x 2
7223	round tube fixture	42,4 x 2,6
7224	round tube fixture	48,3 x 2
7225	round tube fixture	48,3 x 2,6

material
Aluminium (E0)
for item no.
7220/7230





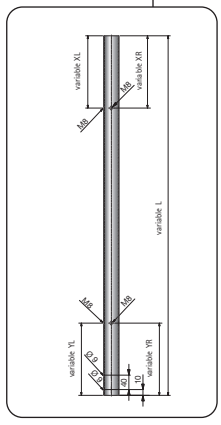
item no.	info	Ø tube x s
7221-V	round tube fixture	40 x 2
7222-V	round tube fixture	42,4 x 2
7223-V	round tube fixture	42,4 x 2,6
7224-V	round tube fixture	48,3 x 2
7225-V	round tube fixture	48,3 x 2,6

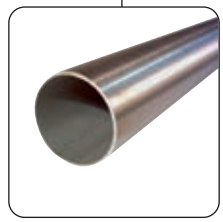
material
Aluminium (E0)
for item no.
7220/7230

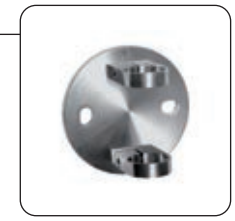
INFO

Please state the angle between the drillings.

content

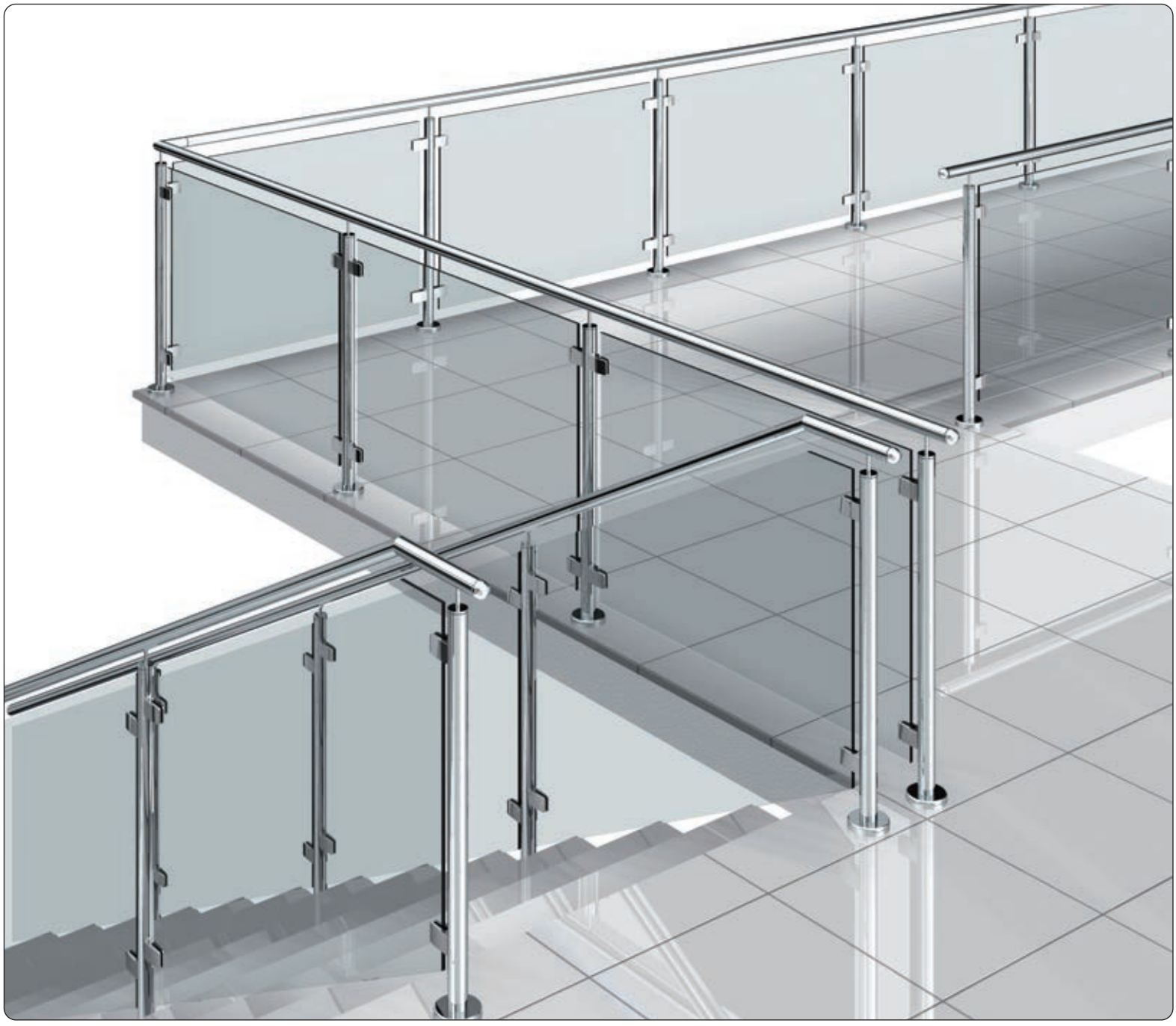






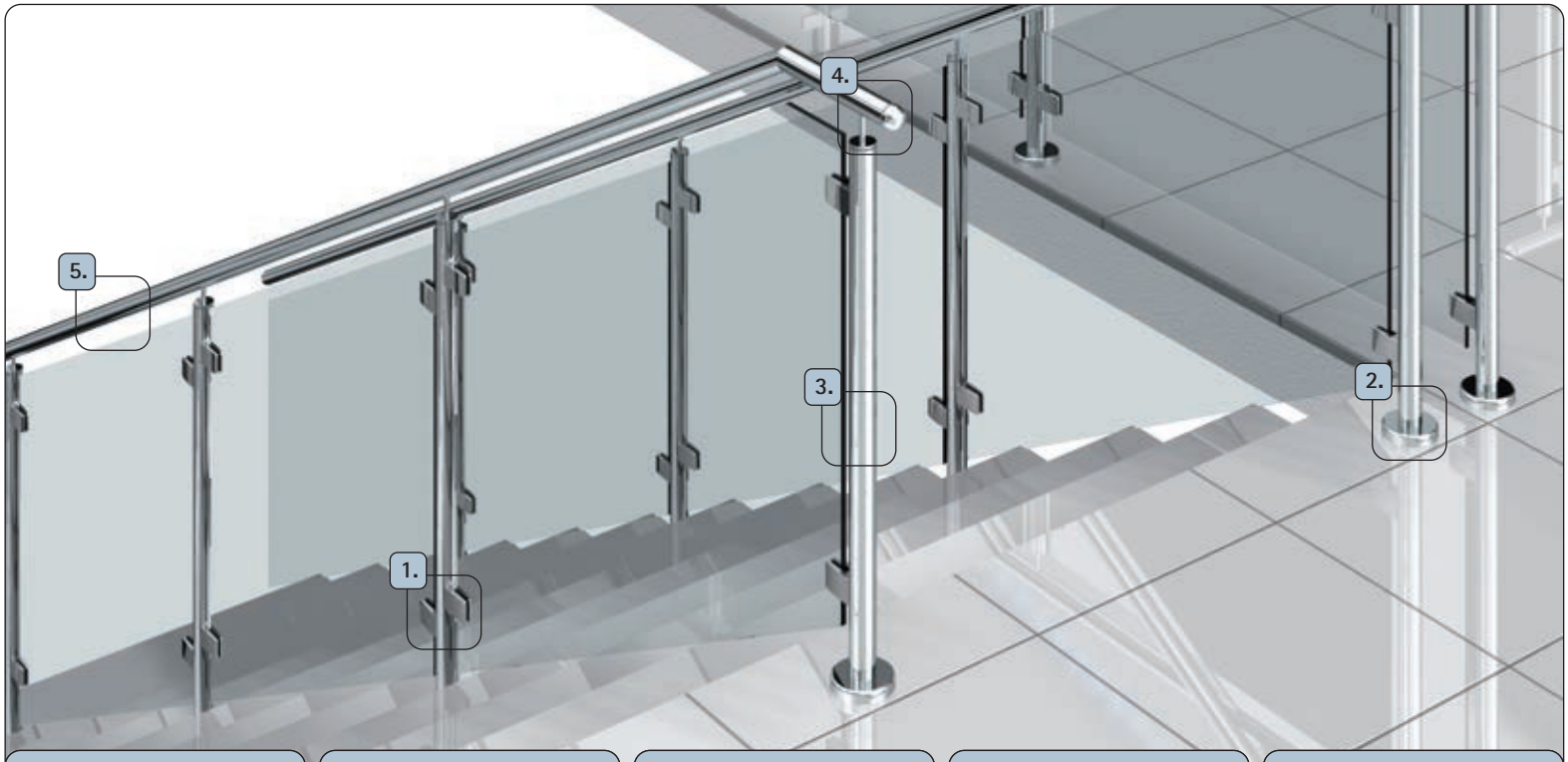
INFO

All dimensions in millimetres.



- balustrade with round tube

round tube over view



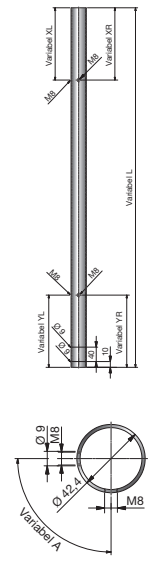
1. infill mounting types

from page 70

2. floor anchors and post wall mount

from page 129

3. selecting the proper post type



from page 136

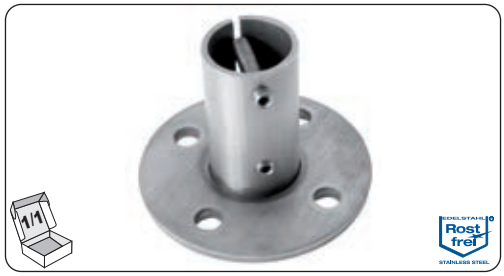
4. upper connection

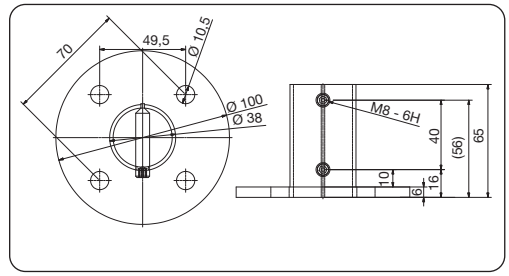
from page 144

5. handrail

from page 150

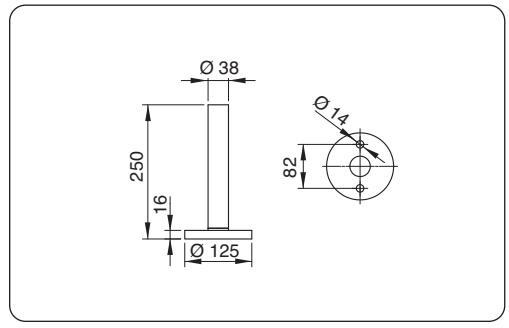
floor anchor with expansion sleeve





item no.	Ø tube x s	material	finish
10209742A2	42,4 x 2,0	A2	raw
10209742A4	42,4 x 2,0	**A4**	raw
10209748A2	48,3 x 2,0	A2	raw

floor anchor reinforced for round tube Ø 42,4 mm

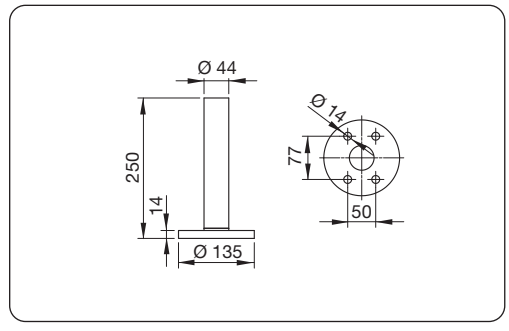


item no.	L	design	material	finish
10209838A2	250 mm	solid	A2	raw

INFO

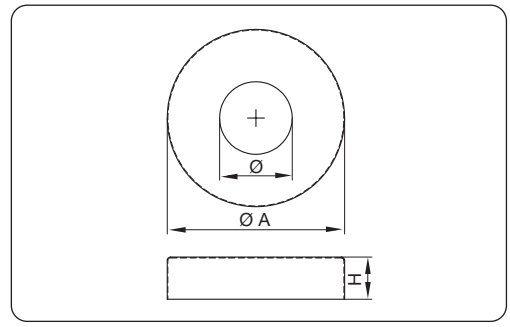
For information about the statics of our floor anchors please see page 204.

floor anchor reinforced for round tube Ø 48,3 mm



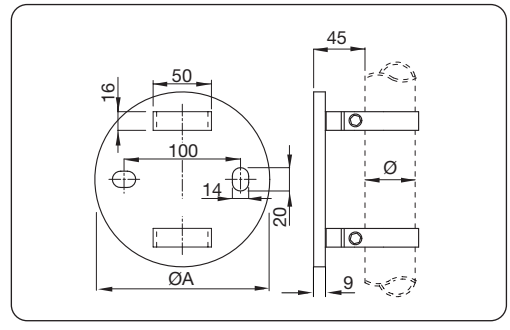
item no.	L	design	material	finish
10210044A2	250 mm	solid	A2	raw

cover plate

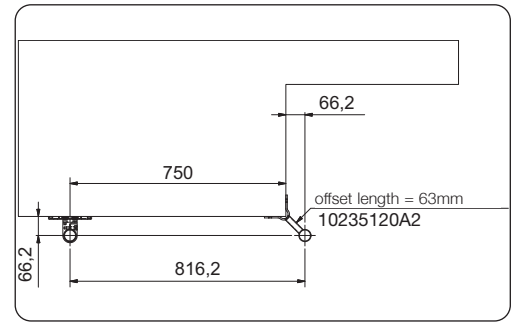


item no.	Ø	ØA	H	material	finish
10211642A2	43,0	105	25	A2	finish 240
10211648A2	49,0	105	25	A2	finish 240
10211642A4	43,0	105	15	**A4**	finish 240
10211742A2	43,0	126	25	A2	finish 240

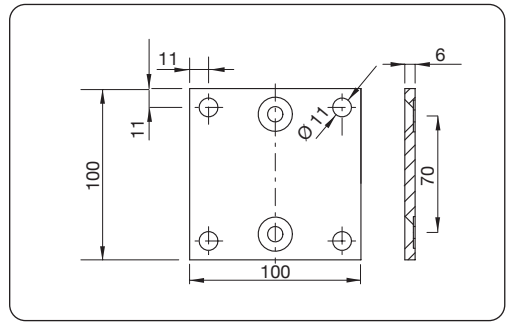
post wall mount with clamps

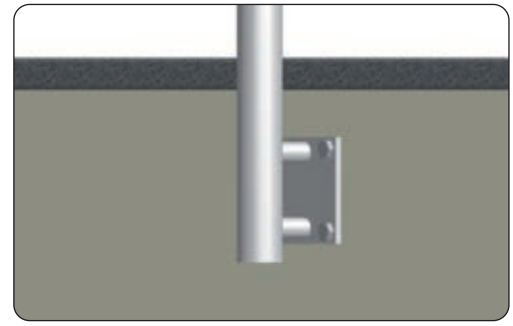


item no.	Ø tube	ØA	material	finish
10210342A2	42,4	150	A2	finish 240
10210442A2	42,4	120	A2	finish 240
10210342A4	42,4	150	**A4**	finish 240
10210442A4	42,4	120	**A4**	finish 240



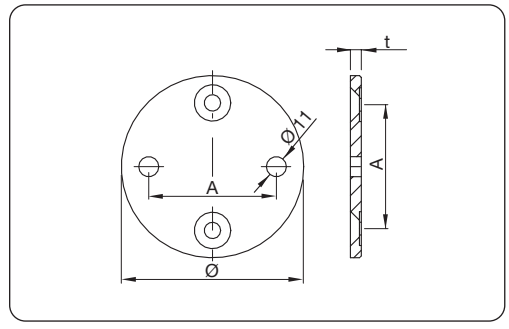
post wall mounting plate square





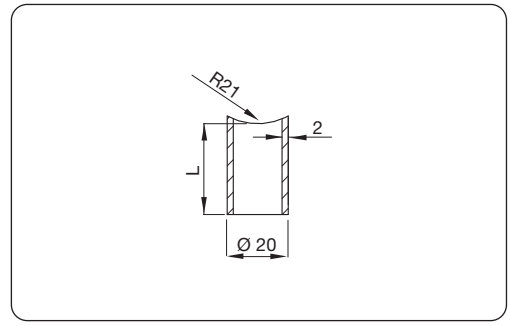
item no.	material	finish
10211100A2	A2	finish 240

post wall mounting plate round



item no.	Ø	A	t	material	finish
10210900A2	100	70	6	A2	finish 240
10211000A2	125	95	8	A2	finish 240
10210900A4	100	70	6	**A4**	finish 240

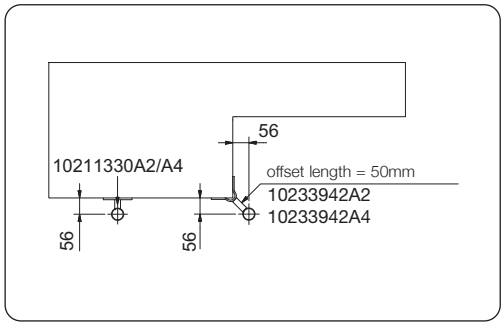
spacer for wall mount

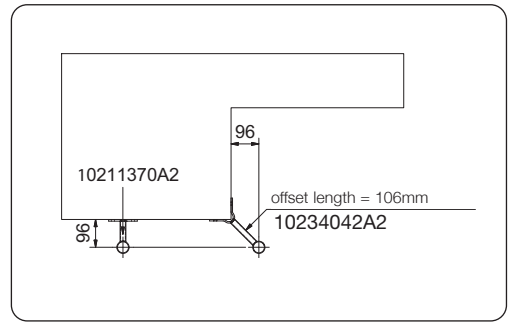


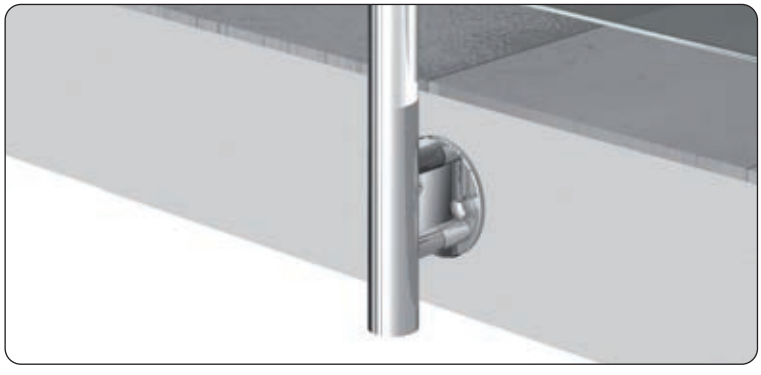
item no.	L	accessories (M8)	material	finish
10211330A2	30	S7991A2D8x50	A2	finish 240
10211370A2	70	S7991A2D8x90	A2	finish 240
10211330A4	30	S7991A2D8x50	**A4**	finish 240

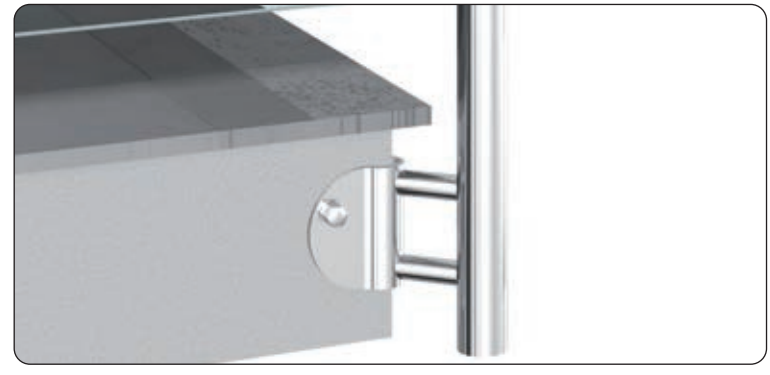
INFO

for items
10210900A2/A4 / 10211000A2 / 10211100A2
screw M8 not includes

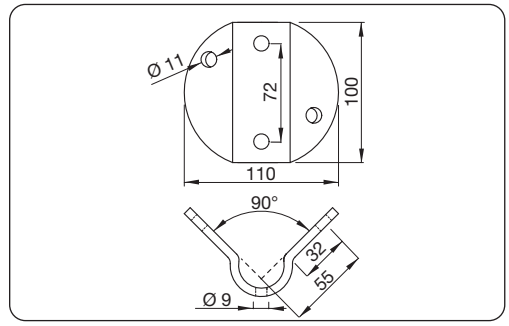






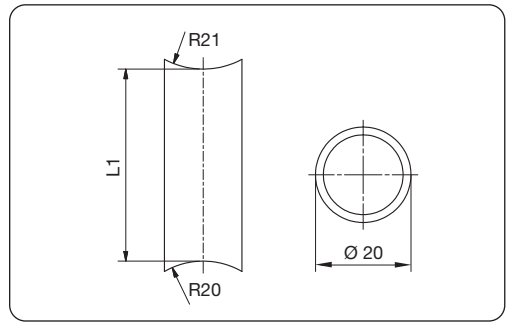


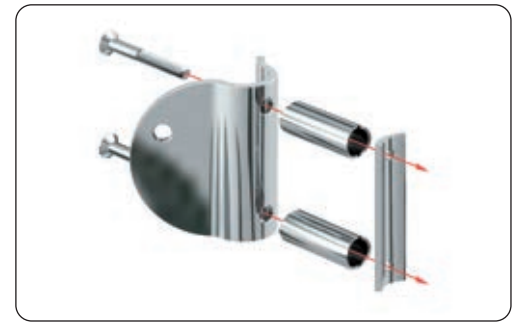
post wall mount for 90° corners



item no.	material	finish
10210600A2	A2	finish 240

spacer for wall mount

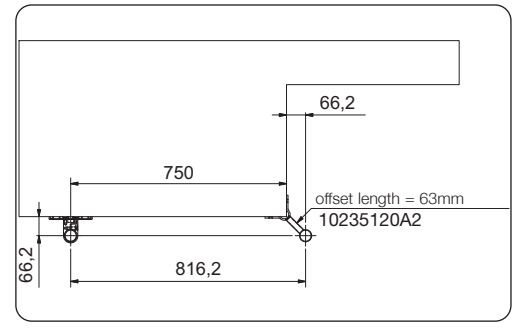




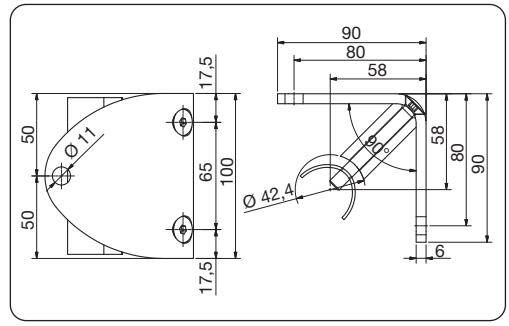
item no.	L1	accessories (M8)	material	finish
10233942A2	50	S7991A2D8x70	A2	finish 240
10233942A4	50	S7991A2D8x70	**A4**	finish 240
10235120A2	63	S7991A2D8x90	A2	finish 240
10235220A2	71	S7991A2D8x90	A2	finish 240
10234042A2	106	S7991A2D8x130	A2	finish 240

INFO

screw M8 not includes

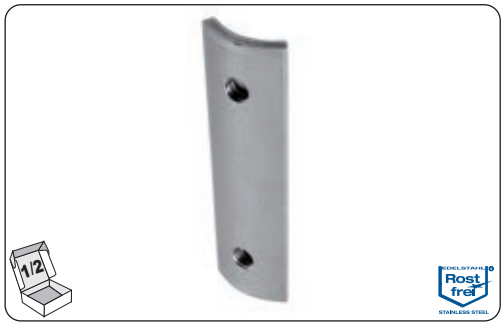


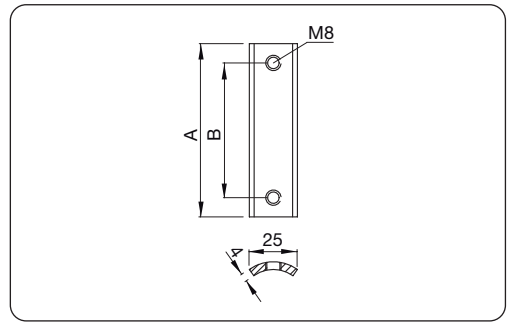
post wall mount for 90° corners



item no.	material	finish
10239642A2	A2	finish 240

internal mounting plate





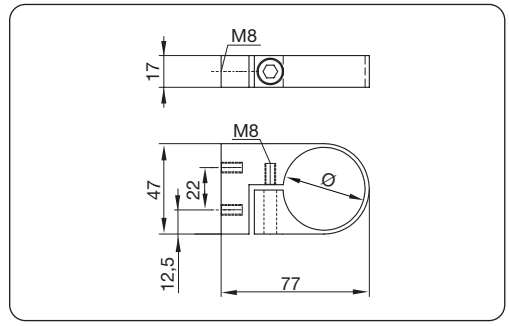
application
10210900A2, 10211242A2, 10211330A2

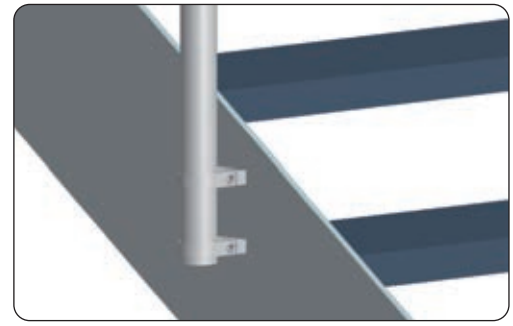
item no.	material	Ø tube	A	B	finish
10211242A2	A2	42,4	90	70	raw
10234242A2	A2	42,4	115	95	raw

INFO

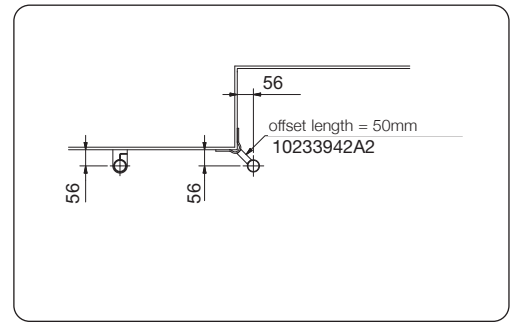
for items 10210900A2 / 10211000A2 / 10211100A2

round tube clamp

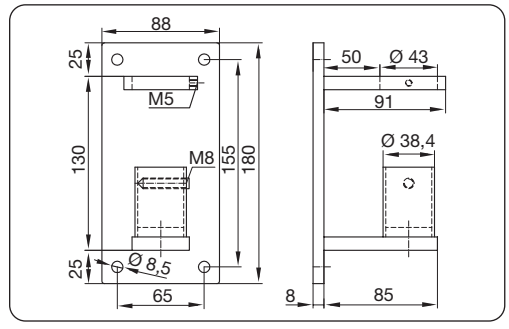


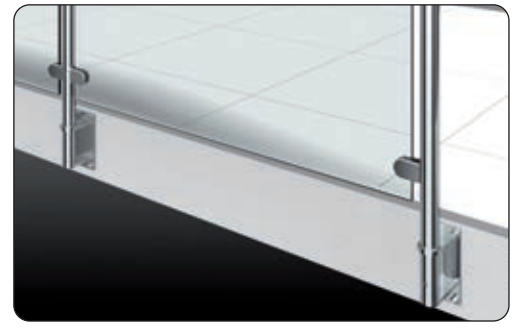


item no.	Ø tube x s	material	finish
10210842A2	42,4 x 2,0	A2	finish 240

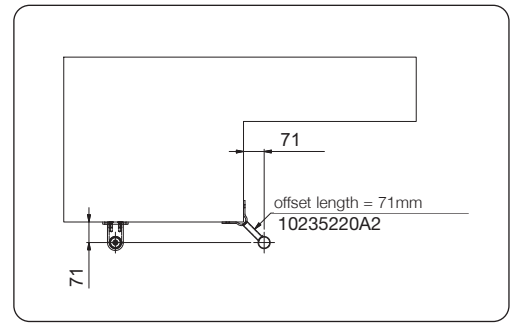


post wall mount with expansion sleeve

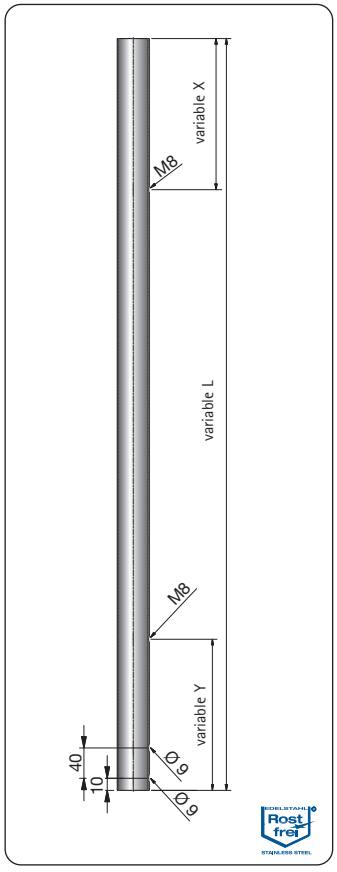


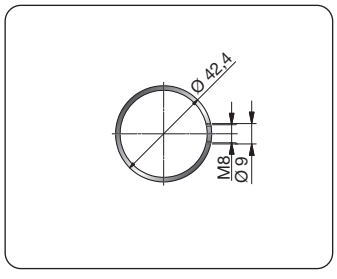


item no.	Ø tube x s	material	finish
10210542A2	42,4 x 2,0	A2	finish 240



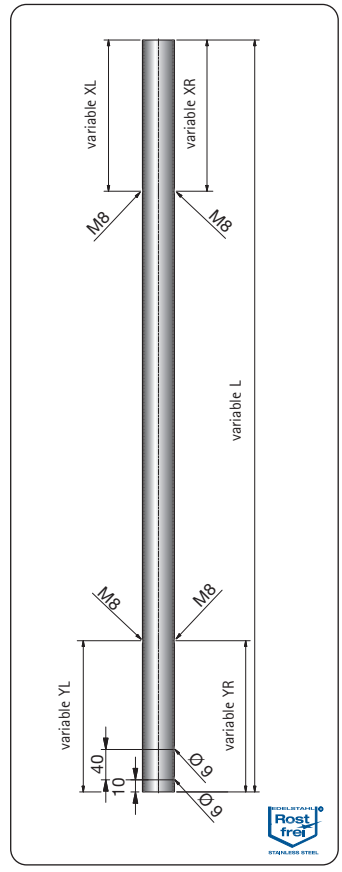
posts for floor anchor, drilled

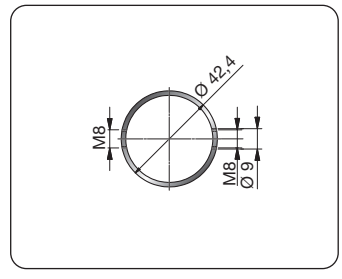




item no. 10235542	
end post, drilled	
	Ø 42,4 x 2,0 mm

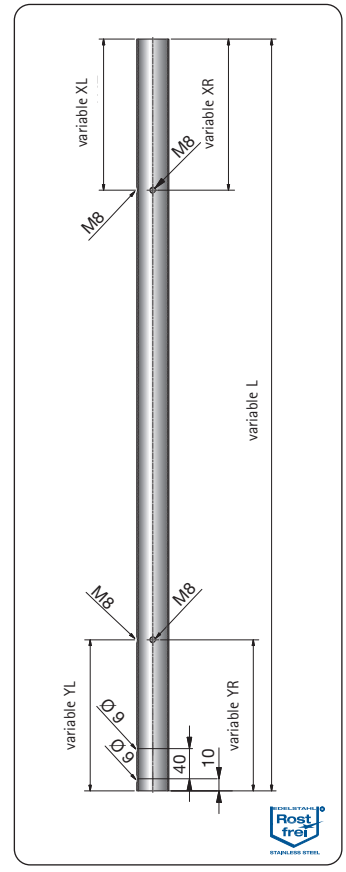
item no. 10235542A2	
material/finish	A2/K240
item no. 10235542A4	
material/finish	A4/K240

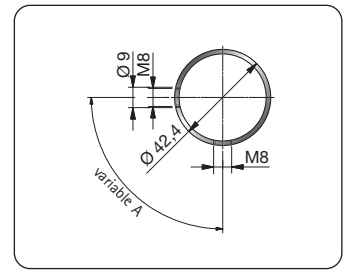




item no. 10235642	
middle post, drilled	
	Ø 42,4 x 2,0 mm

item no. 10235642A2	
material/finish	A2/K240
item no. 10235642A4	
material/finish	A4/K240





item no. 10235742	
corner post, drilled	
	Ø 42,4 x 2,0 mm

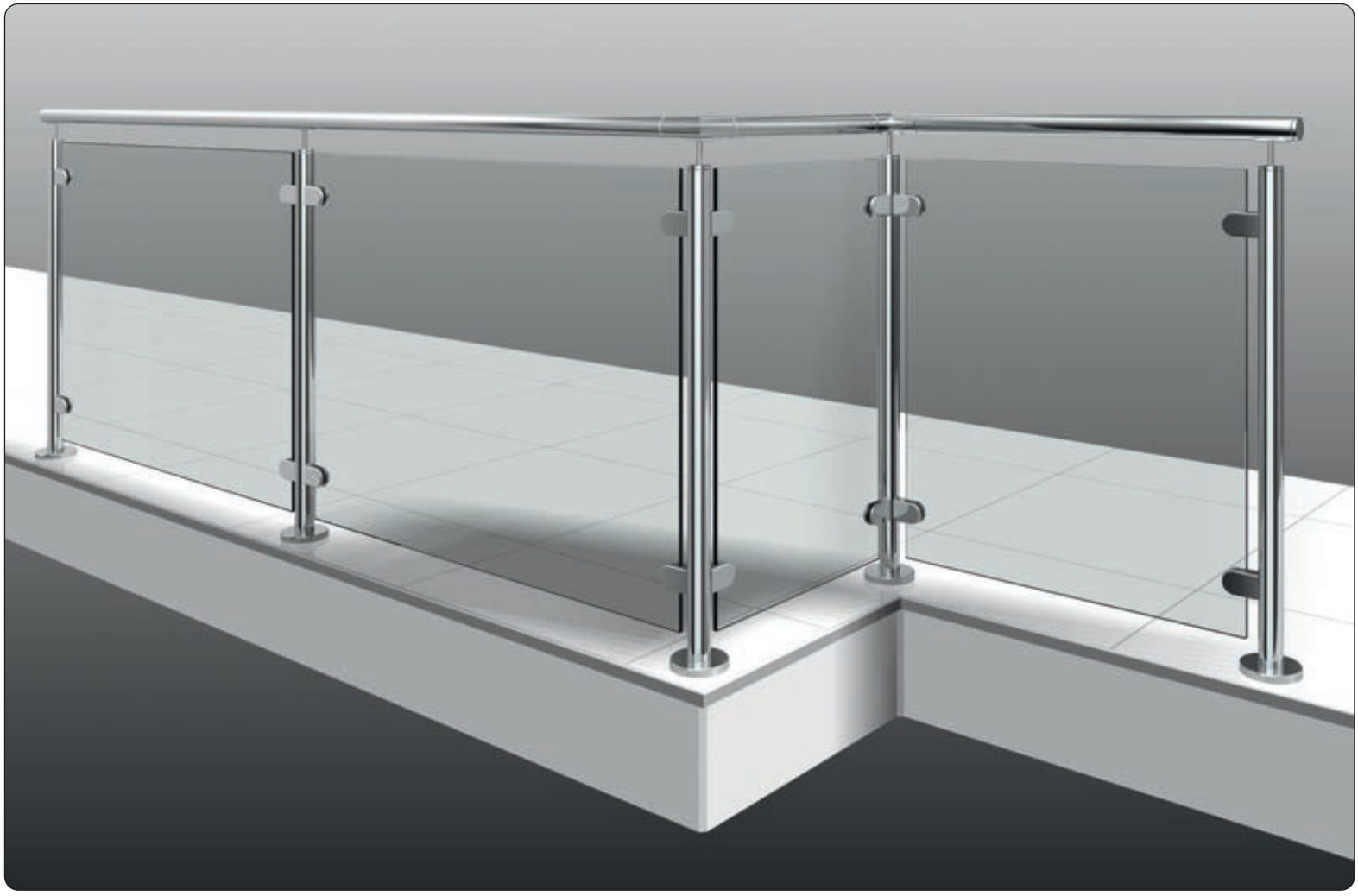
item no. 10235742A2	
material/finish	A2/K240
item no. 10235742A4	
material/finish	A4/K240

INFO

When ordering please specify the values for each variable
A; L; X; XL; XR; Y; YL; YR.

depending on the mounting type, custom drilling upon request is possible

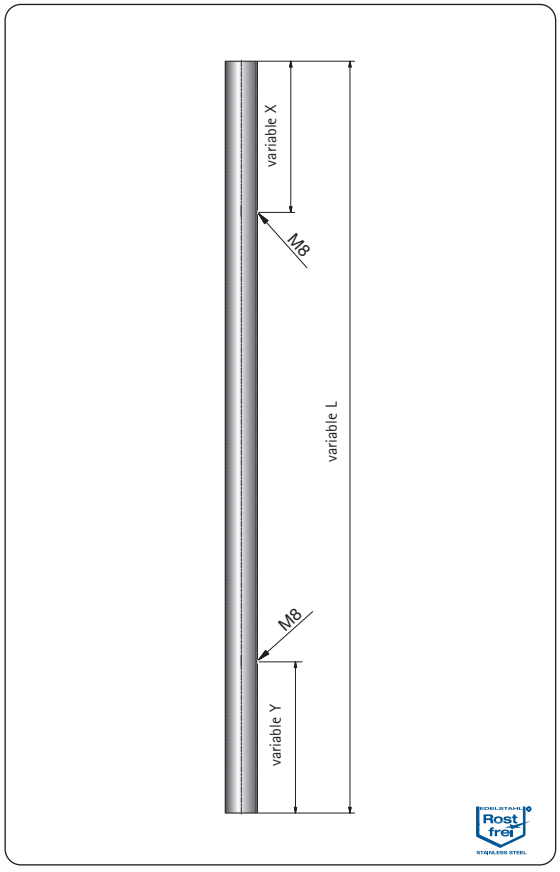
- posts for floor anchor, drilled

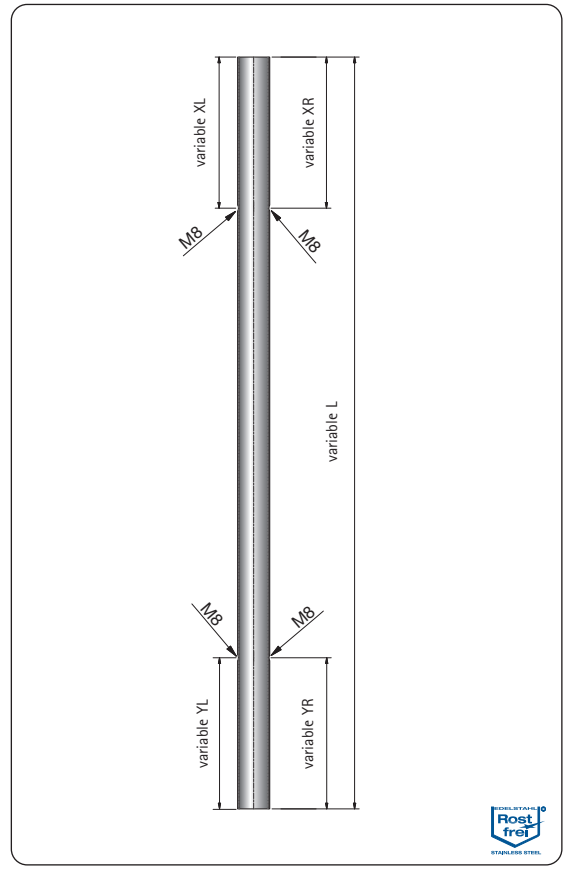


INFO

Further information and dimensions for our floor glass clamp can be found on page 129.

posts for tube clamp wall mounts and tube clamps, drilled

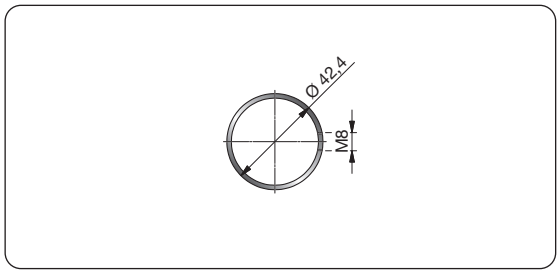


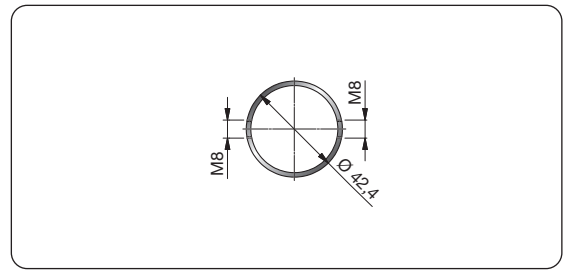


INFO

When ordering please specify the values for each variable
L; X; XL; XR; Y; YL; YR.

depending on the mounting type, custom drilling upon request is possible





item no. 10236242	
end post, drilled	
	Ø 42,4 x 2,0 mm

item no. 10236242A2	
material/finish	A2/K240
item no. 10236242A4	
material/finish	A4/K240

item no. 10236342	
middle post, drilled	
	Ø 42,4 x 2,0 mm

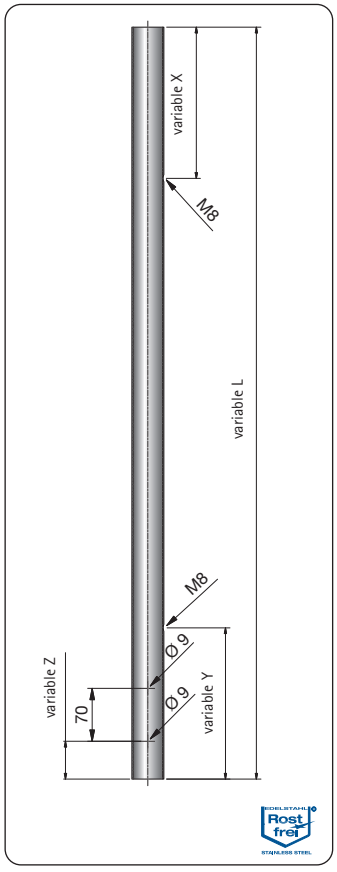
item no. 10236342A2	
material/finish	A2/K240
item no. 10236342A4	
material/finish	A4/K240

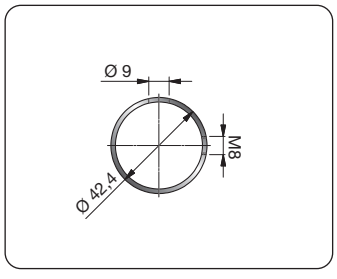
- posts for tube clamp wall mounts and tube clamps, drilled

INFO

Further information and dimensions for our tube clamp bracket can be found on page 135.

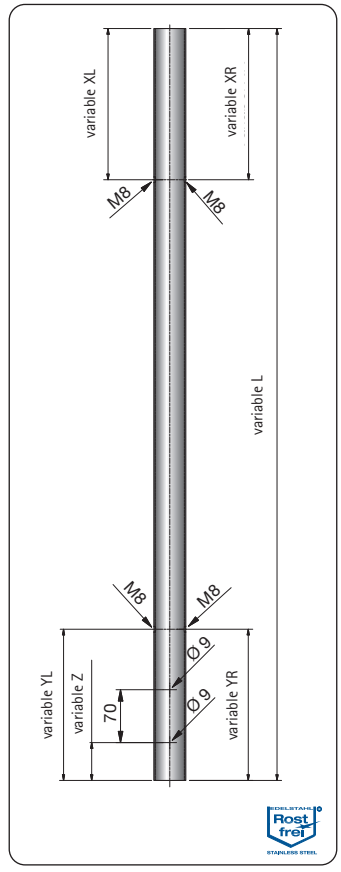
posts for offset mounts, drilled

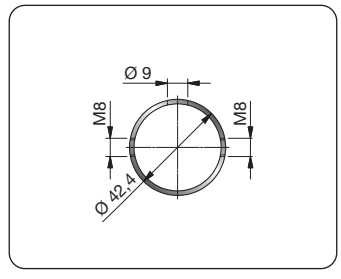




item no. 10236642	
end post left, drilled	
	Ø 42,4 x 2,0 mm

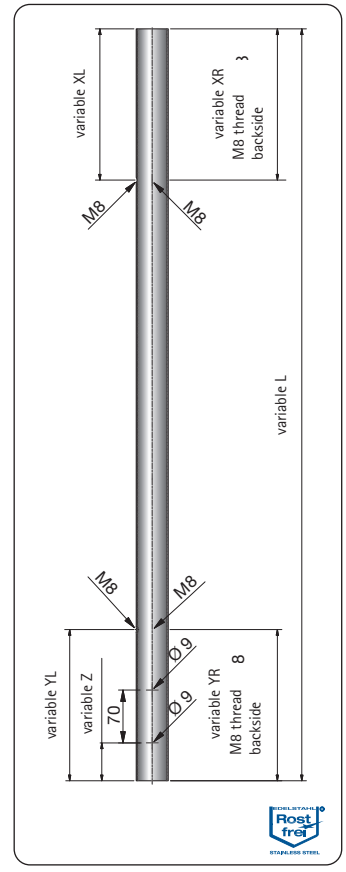
item no. 10236642A2	
material/finish	A2/K240
item no. 10236642A4	
material/finish	A4/K240

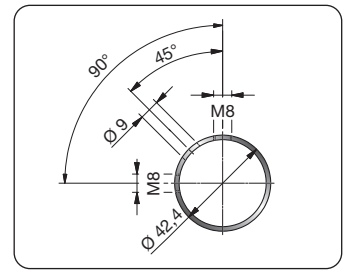




item no. 10236042	
middle post, drilled	
	Ø 42,4 x 2,0 mm

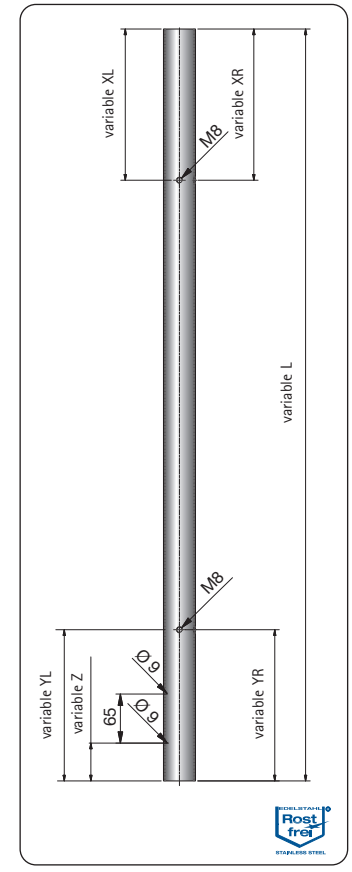
item no. 10236042A2	
material/finish	A2/K240
item no. 10236042A4	
material/finish	A4/K240

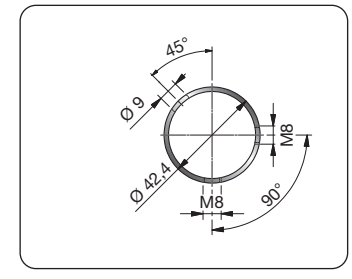




item no. 10236142	
posts for outer corner, drilled	
	Ø 42,4 x 2,0 mm

item no. 10236142A2	
material/finish	A2/K240
item no. 10236142A4	
material/finish	A4/K240

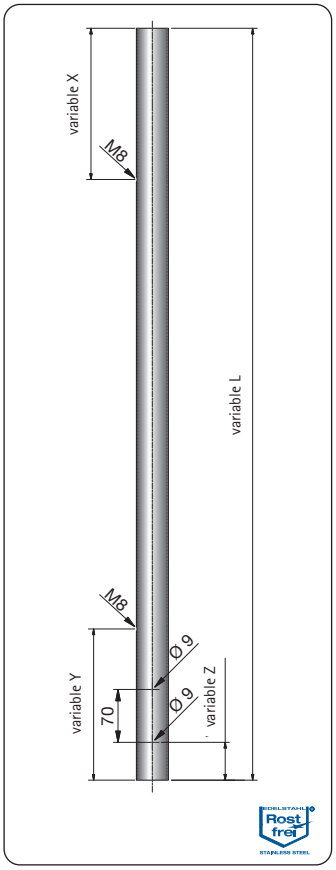


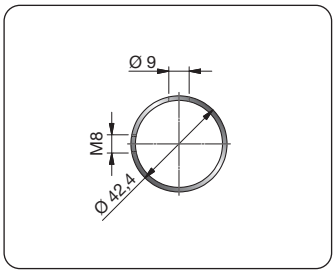


item no. 10239742	
posts for inner corner, drilled	
	Ø 42,4 x 2,0 mm

item no. 10239742A2	
material/finish	A2/K240
item no. 10239742A4	
material/finish	A4/K240

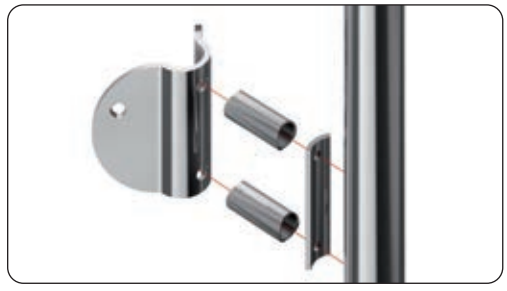
posts for offset mounts, drilled





item no. 10236742	
end post right, drilled	
	Ø 42,4 x 2,0 mm

item no. 10236742A2	
material/finish	A2/K240
item no. 10236742A4	
material/finish	A4/K240



INFO

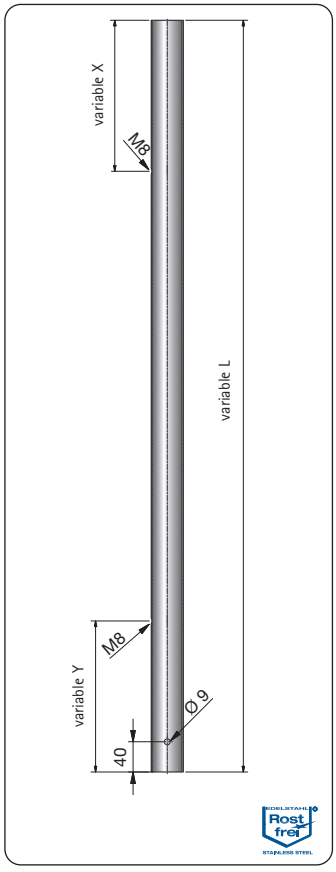
When ordering please specify the values for each variable
L; X; XL; XR; Y; YL; YR; Z.

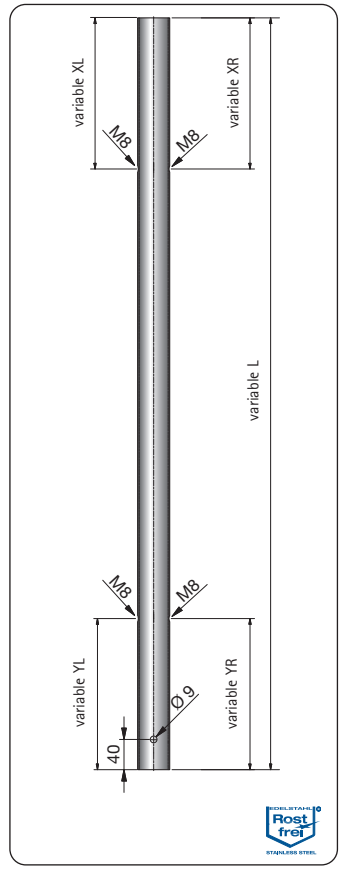
depending on the mounting type, custom drilling upon request is possible

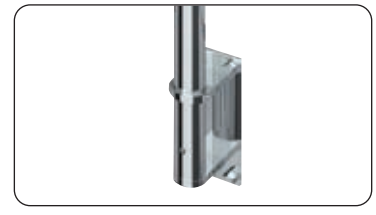
INFO

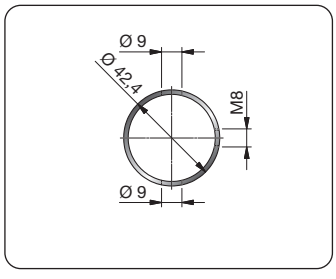
Further information and dimensions for our off sets can be found on page 132.

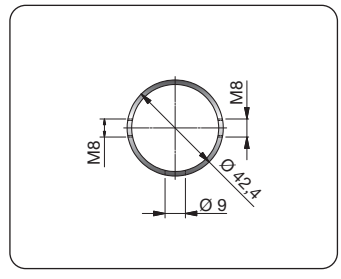
posts for expansion sleeve, drilled











item no. 10236542	
end post, drilled	
	Ø 42,4 x 2,0 mm

item no. 10236542A2	
material/finish	A2/K240
item no. 10236542A4	
material/finish	A4/K240

item no. 10236442	
middle post, drilled	
	Ø 42,4 x 2,0 mm

item no. 10236442A2	
material/finish	A2/K240
item no. 10236442A4	
material/finish	A4/K240

INFO

When ordering please specify the values for each variable
L; X; XL; XR; Y; YL; YR.

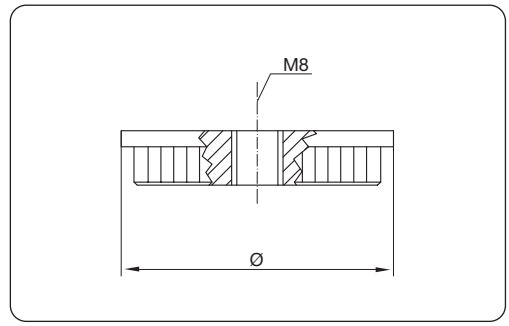
depending on the mounting type, custom drilling upon request is possible

INFO

Further information and dimensions for our post expansion base plate can be found on page 135.

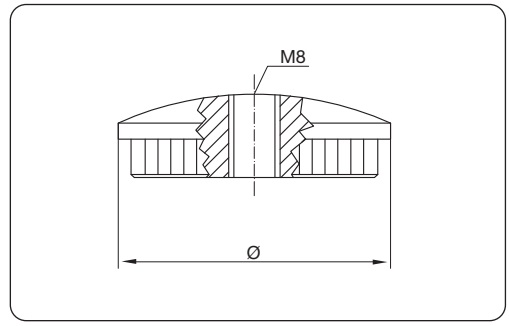
application

end cap flat, with internal thread, solid



item no.	Ø tube x s	material	finish
10204733A2	33,7 x 2,0	A2	finish 240
10204742A2	42,4 x 2,0	A2	finish 240
10204742A4	42,4 x 2,0	**A4**	finish 240

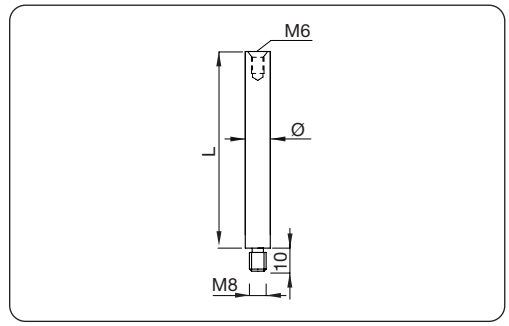
end cap rounded, with internal thread, solid



item no.	Ø tube x s	material	finish
10204933A2	33,7 x 2,0	A2	finish 240
10204942A2	42,4 x 2,0	A2	finish 240
10205042A2*	42,4 x 2,6	A2	finish 240
10204942A4	42,4 x 2,0	**A4**	finish 240

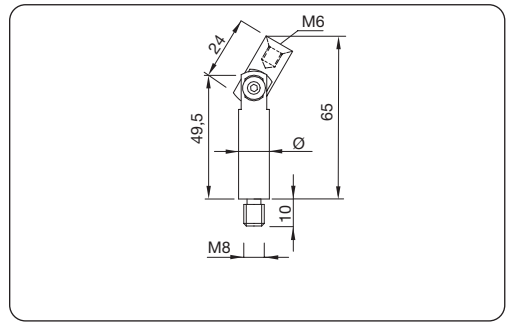
*with fins

handrail support with internal thread



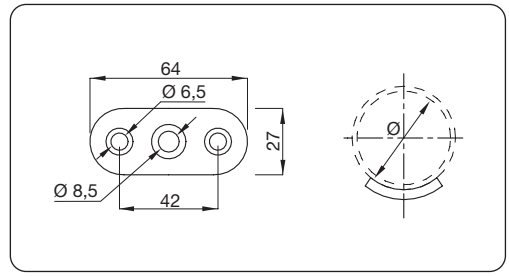
item no.	Ø bar	L	material	finish
10205212A2	12	65	A2	finish 240
10205312A2	12	115	A2	finish 240
10205414A2	14	65	A2	finish 240
10240112A2	12	28	A2	finish 240
10205412A4	12	65	**A4**	finish 240

handrail support with joint and internal thread



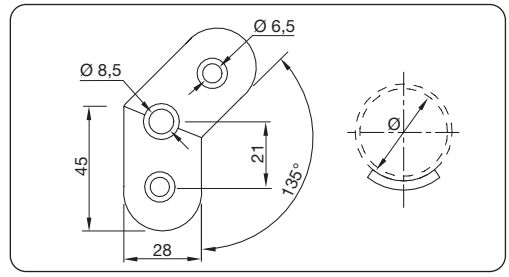
item no.	Ø bar	material	finish
10205712A2	12	A2	finish 240
10205712A4	12	**A4**	finish 240

adapter plate straight for round tube



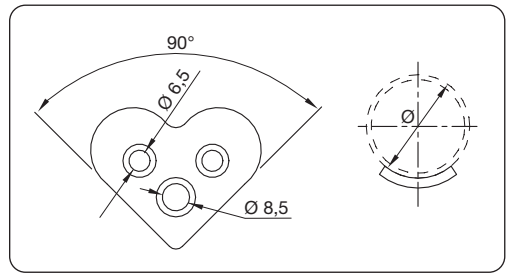
item no.	Ø adapter	material	finish
10206033A2	33,7 - 42,4	A2	finish 240
10206048A2	48,3 - 60,3	A2	finish 240
10206033A4	33,7 - 42,4	**A4**	finish 240

adapter plate 135° for round tube



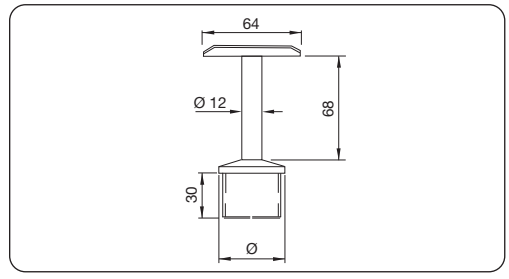
item no.	Ø adapter	material	finish
10206133A2	33,7 - 42,4	A2	finish 240
10206148A2	48,3 - 60,3	A2	finish 240
10206133A4	33,7 - 42,4	**A4**	finish 240

adapter plate 90° for round tube



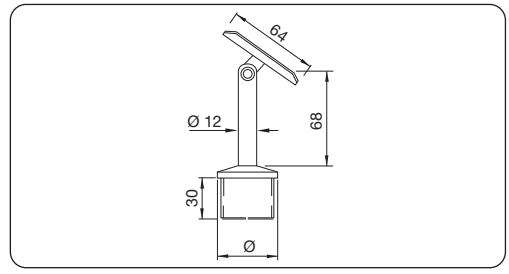
item no.	Ø adapter	material	finish
10206233A2	33,7 - 42,4	A2	finish 240
10206248A2	48,3 - 60,3	A2	finish 240
10206233A4	33,7 - 42,4	**A4**	finish 240

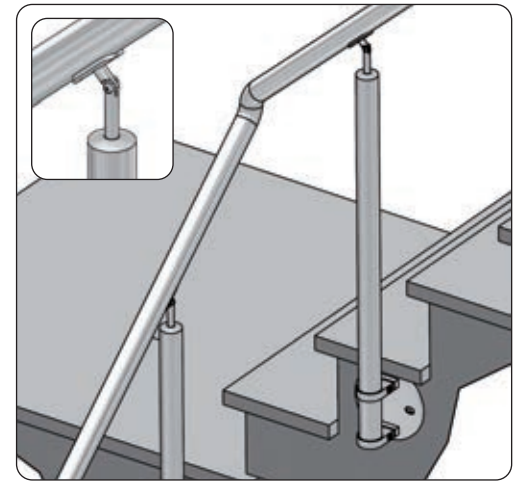
handrail support rigid, hollow



item no.	Ø tube x s	Ø adapter	material	finish
10202033A2	33,7 x 2,0	33,7 - 42,4	A2	finish 240
10202042A2	42,4 x 2,0	33,7 - 42,4	A2	finish 240
10202042A4	42,4 x 2,0	33,7 - 42,4	**A4**	finish 240

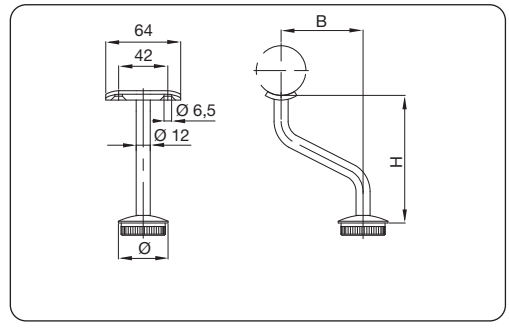
handrail support variable, hollow





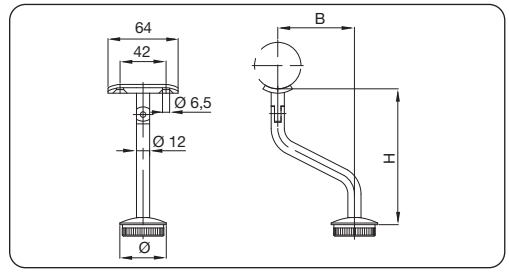
item no.	Ø tube x s	Ø adapter	material	finish
10202533A2	33,7 x 2,0	33,7 - 42,4	A2	finish 240
10202542A2	42,4 x 2,0	33,7 - 42,4	A2	finish 240
10202542A4	42,4 x 2,0	33,7 - 42,4	**A4**	finish 240

handrail support rigid, offset



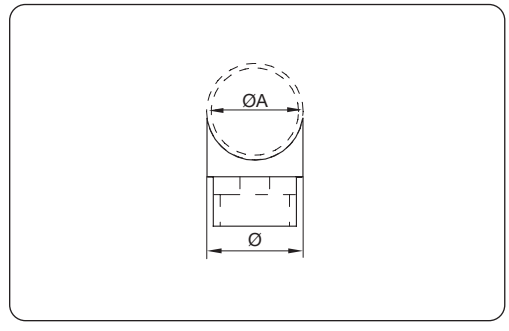
item no.	Ø tube x s	H	B	Ø adapter	material	finish
10202733A2	33,7 x 2,0	125	68	33,7 - 42,4	A2	finish 240
10202742A2	42,4 x 2,0	122	68	33,7 - 42,4	A2	finish 240
10202742A4	42,4 x 2,0	122	65	33,7 - 42,4	**A4**	finish 240

handrail support variable, offset



item no.	Ø tube x s	H	B	Ø adapter	material	finish
10202833A2	33,7 x 2,0	125	68	33,7 - 42,4	A2	finish 240
10202842A2	42,4 x 2,0	122	68	33,7 - 42,4	A2	finish 240
10202833A4	33,7 x 2,0	120	65	33,7 - 42,4	**A4**	finish 240
10202842A4	42,4 x 2,0	120	65	33,7 - 42,4	**A4**	finish 240

tube adapter 90°

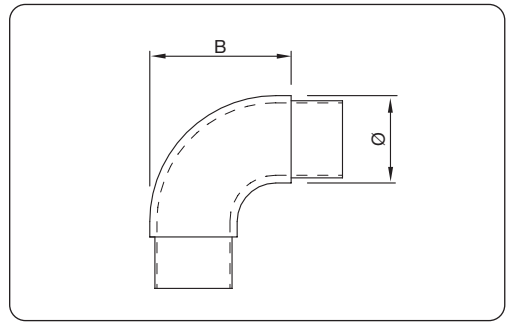


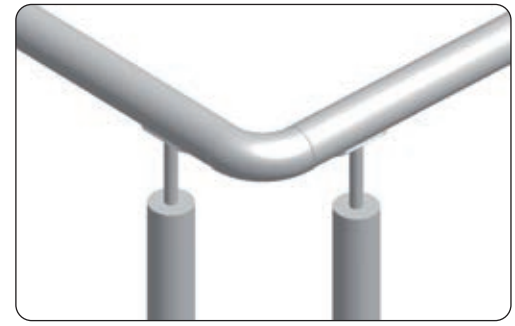
item no.	Ø tube x s	ØA adapter	material	finish
10207433A2	33,7 x 2,0	33,7	A2	finish 320
10207533A2	33,7 x 2,0	42,4	A2	finish 320
10207542A2	42,4 x 2,0	42,4	A2	finish 320
10207542A4	42,4 x 2,0	42,4	**A4**	finish 320

round tube

item no.	Ø tube x s	length	material	finish
10200133A2	33,7 x 2,0	6000	A2	finish 240
10200233A2	33,7 x 2,0	3000	A2	finish 240
10200333A2	33,7 x 2,0	2000	A2	finish 240
10200133A2-V	33,7 x 2,0	cut to length	A2	finish 240
10200142A2	42,4 x 2,0	6000	A2	finish 240
10200242A2	42,4 x 2,0	3000	A2	finish 240
10200342A2	42,4 x 2,0	2000	A2	finish 240
10200142A2-V	42,4 x 2,0	cut to length	A2	finish 240
10200148A2	48,3 x 2,0	6000	A2	finish 240
10200248A2	48,3 x 2,0	3000	A2	finish 240
10200348A2	48,3 x 2,0	2000	A2	finish 240
10200148A2-V	48,3 x 2,0	cut to length	A2	finish 240
10200142A4	42,4 x 2,0	6000	**A4**	finish 240
10200242A4	42,4 x 2,0	3000	**A4**	finish 240
10200342A4	42,4 x 2,0	2000	**A4**	finish 240
10200142A4-V	42,4 x 2,0	cut to length	**A4**	finish 240

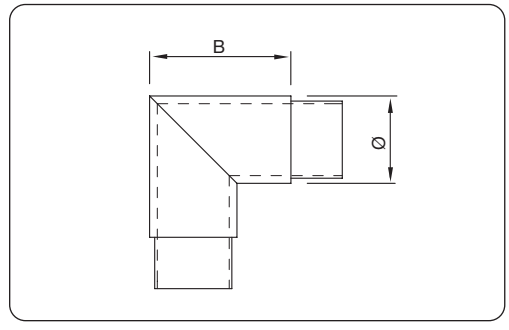
tube connector 90°, round

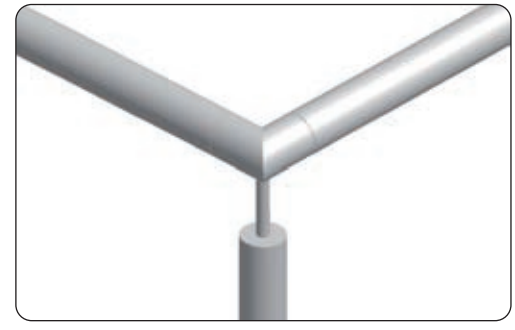




item no.	material	Ø tube x s	B	finish
10206333A2	A2	33,7 x 2,0	56	finish 320
10206342A2	A2	42,4 x 2,0	64	finish 320
10206348A2	A2	48,3 x 2,0	71	finish 320
10206342A4	**A4**	42,4 x 2,0	64	finish 320

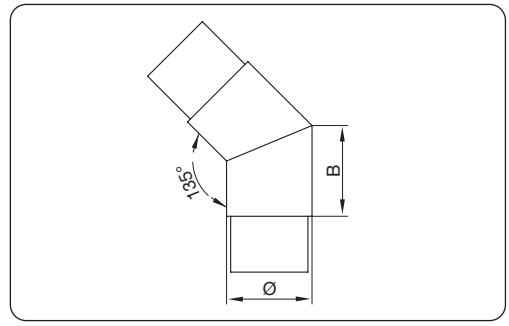
tube connector 90°, square





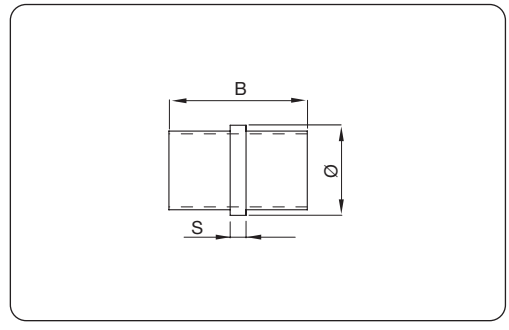
item no.	material	Ø tube x s	B	finish
10206433A2	A2	33,7 x 2,0	56	finish 320
10206442A2	A2	42,4 x 2,0	63	finish 320
10206448A2	A2	48,3 x 2,0	61	finish 320
10206442A4	**A4**	42,4 x 2,0	63	finish 320

tube connector 135°



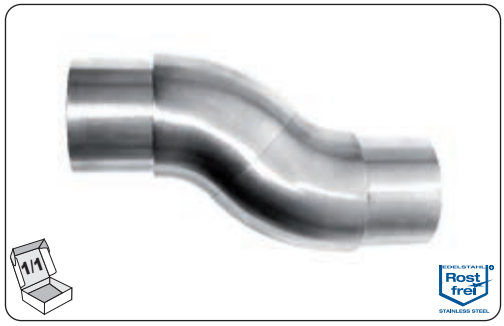
item no.	material	Ø tube x s	B	finish
10206533A2	A2	33,7 x 2,0	45	finish 320
10206542A2	A2	42,4 x 2,0	37	finish 320
10206548A2	A2	48,3 x 2,0	47	finish 320
10206542A4	**A4**	42,4 x 2,0	45	finish 320

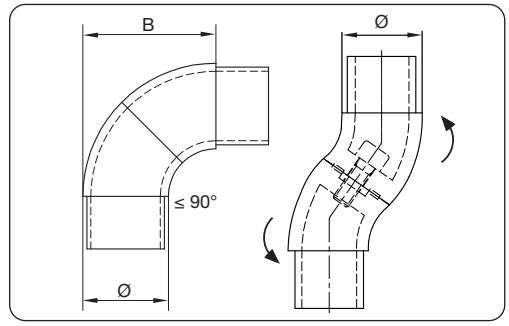
tube connector 180°

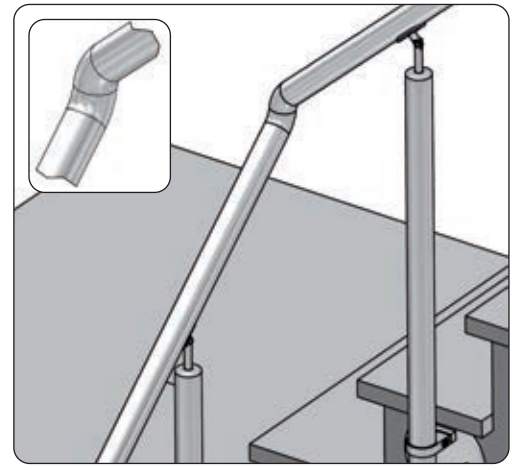


item no.	material	Ø tube x s	B	S	finish
10206633A2	A2	33,7 x 2,0	43	3,5	finish 320
10206642A2	A2	42,4 x 2,0	46	4,0	finish 320
10206648A2	A2	48,3 x 2,0	63	7,0	finish 320
10206642A4	**A4**	42,4 x 2,0	46	4,0	finish 320

tube connector, infinitely adjustable

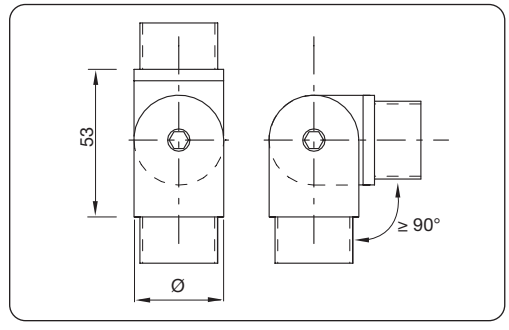


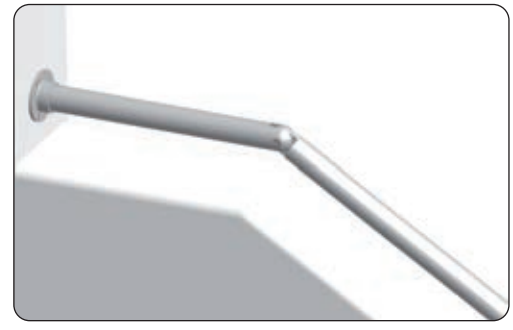




item no.	material	Ø tube x s	B	finish
10206933A4	**A4**	33,7 x 2,0	58	finish 320
10206942A4	**A4**	42,4 x 2,0	66	finish 320

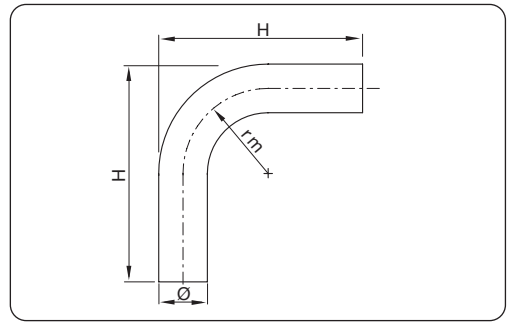
tube connector with joint

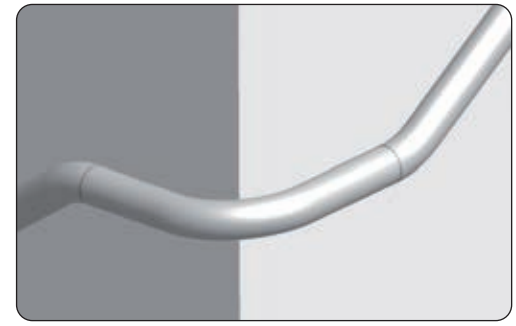




item no.	material	Ø tube x s	B	finish
10206833A2	A2	33,7 x 2,0	43	finish 320
10206842A2	A2	42,4 x 2,0	53	finish 320
10206842A4	**A4**	42,4 x 2,0	53	finish 320

welding elbow 90°

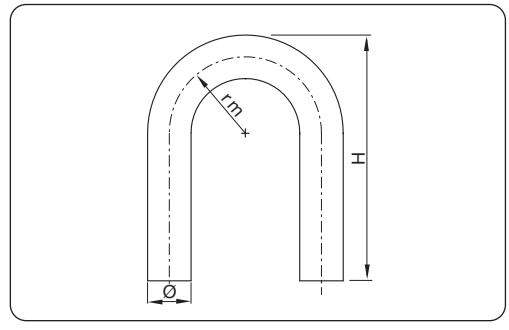


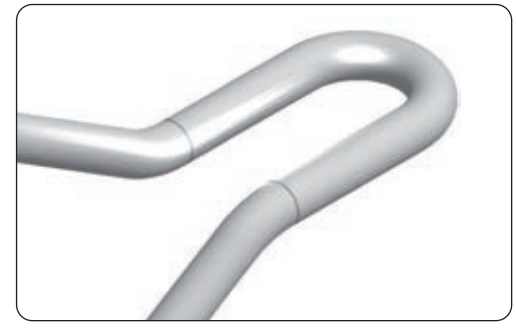


item no.	material	Ø tube x s	rm	H	finish
10208433A2	A2	33,7 x 2,0	70	180	finish 240*
10208442A2	A2	42,4 x 2,0	100	240	finish 240*

*not grinded after bending

welding elbow 180°

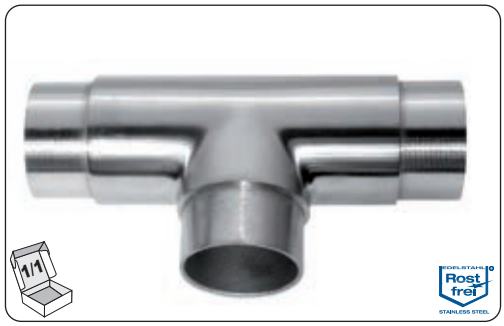


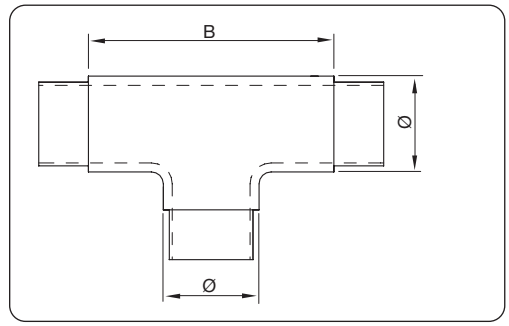


item no.	material	Ø tube x s	rm	H	finish
10208533A2	A2	33,7 x 2,0	70	180	finish 240*
10208642A2	A2	42,4 x 2,5	64	240	finish 240*
10208742A2	A2	42,4 x 2,0	85	225	finish 240*
10208842A2	A2	42,4 x 2,0	100	220	finish 240*

*not grinded after bending

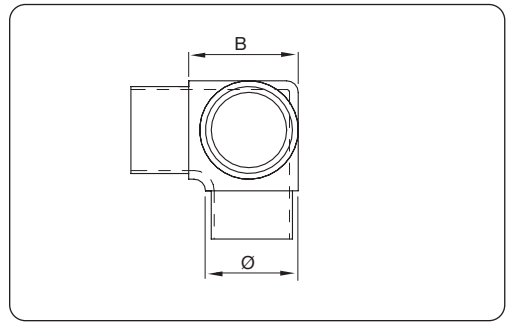
t-connector





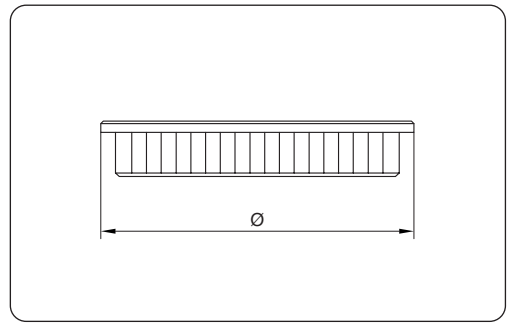
item no.	material	Ø tube x s	B	H	finish
10207133A2	A2	33,7 x 2,0	76	54	finish 320
10207142A2	A2	42,4 x 2,0	87	65	finish 320
10207133A4	**A4**	33,7 x 2,0	76	54	finish 320
10207142A4	**A4**	42,4 x 2,0	87	65	finish 320

corner connector 3-way



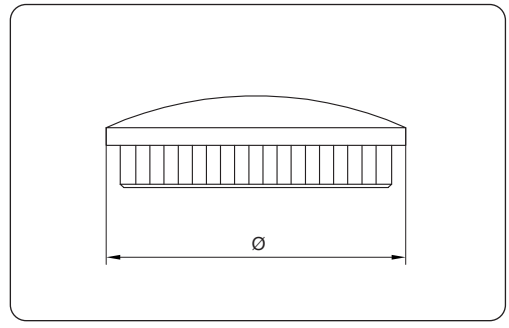
item no.	material	Ø tube x s	B	finish
10207233A2	A2	33,7 x 2,0	55	finish 320
10207242A2	A2	42,4 x 2,0	51	finish 320
10207233A4	**A4**	33,7 x 2,0	55	finish 320
10207242A4	**A4**	42,4 x 2,0	51	finish 320

end cap flat, solid



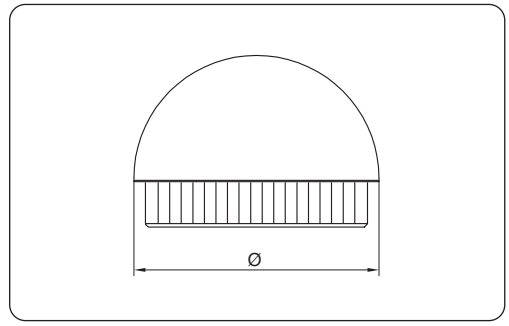
item no.	Ø tube x s	material	finish
10200933A2	33,7 x 2,0	A2	finish 240
10200942A2	42,4 x 2,0	A2	finish 240
10200948A2	48,3 x 2,0	A2	finish 240
10200942A4	42,4 x 2,0	**A4**	finish 240

end cap rounded , solid



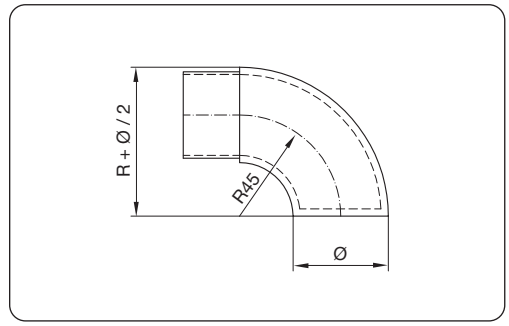
item no.	Ø tube x s	material	finish
10201133A2	33,7 x 2,0	A2	finish 240
10201142A2	42,4 x 2,0	A2	finish 240
10201148A2	48,3 x 2,0	A2	finish 240
10201142A4	42,4 x 2,0	**A4**	finish 240

end cap round, solid



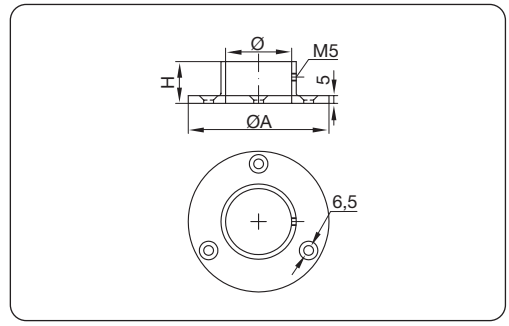
item no.	Ø tube x s	material	finish
10201233A2	33,7 x 2,0	A2	finish 240
10201242A2	42,4 x 2,0	A2	finish 240
10201248A2	48,3 x 2,0	A2	finish 240

end elbow flat



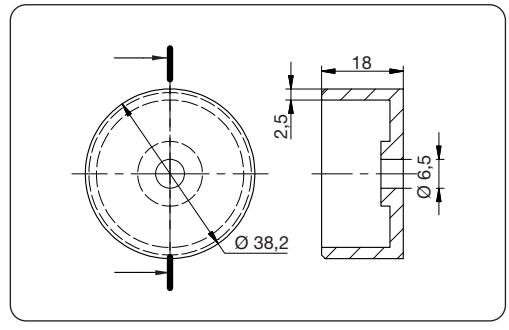
item no.	Ø tube x s	material	finish
10207942A2	42,4 x 2,0	A2	finish 320
10207933A4	33,7 x 2,0	**A4**	finish 320
10207942A4	42,4 x 2,0	**A4**	finish 320

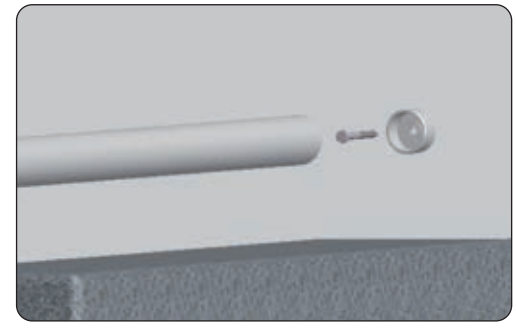
flange plate



item no.	Ø tube	ØA	H	material	finish
10210733A2	33,7	70	20	A2	finish 320
10210742A2	42,4	84	25	A2	finish 320
10210742A4	42,4	84	25	**A4**	finish 320

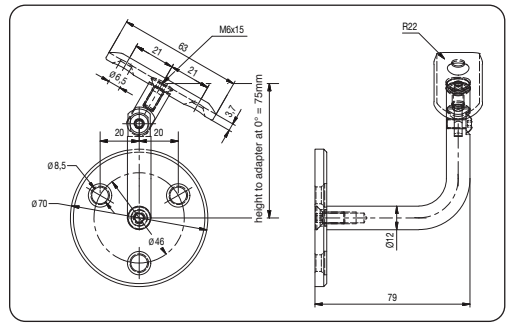
wall mounting

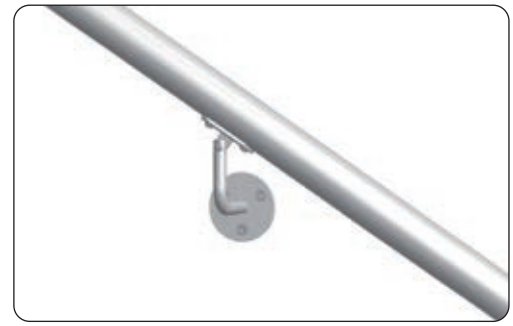




item no.	Ø Tubo x s	material	finish
10208942A4	42,4 x 2,0	**A4**	finish 240

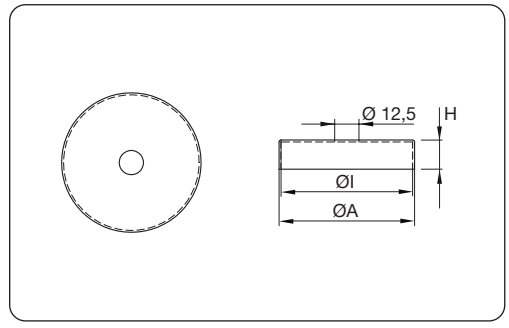
handrail support variable





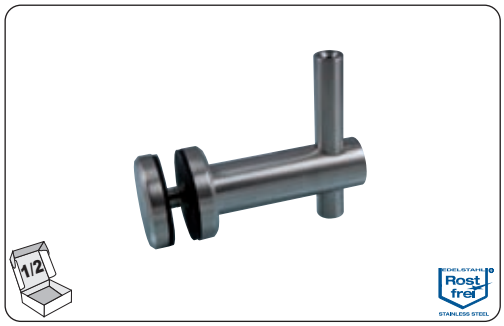
item no.	Ø adapter	material	finish
10203270A2	33,7 - 42,4	A2	finish 240

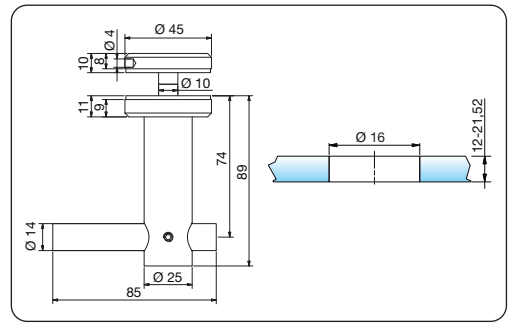
cover plate



item no.	ØA	ØI	H	material	finish
10204445A2	45	42	11	A2	finish 240
10204470A2	68	66	12	A2	finish 240
10204476A2	76	73	13	A2	finish 240
10204476A4	76	73	13	**A4**	finish 240

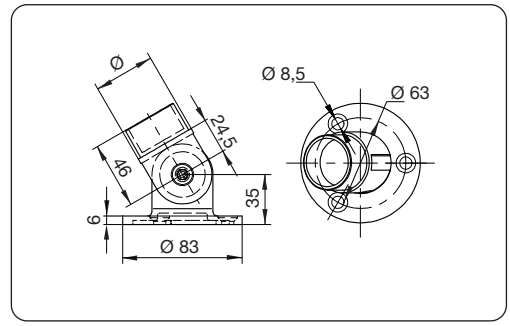
handrail support height adjustable, with glass connector and internal thread

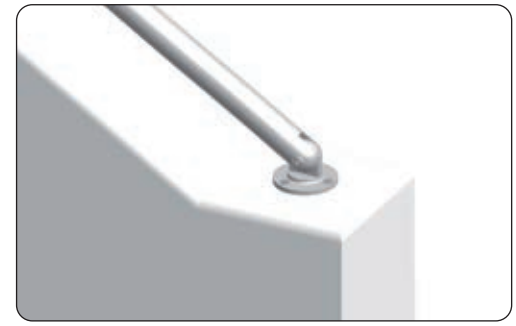




item no.		material	finish
10238044A2	12-21,52	A2	finish 240

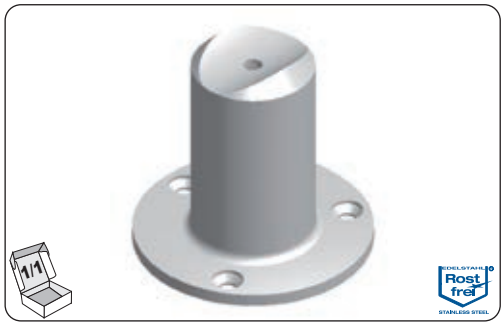
tube connector with flange plate, variable

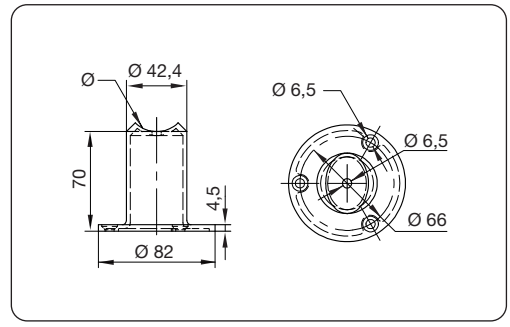


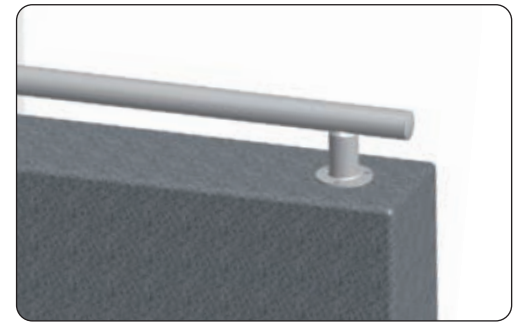


item no.	Ø tube x s	material	finish
10206742A4	42,4 x 2,0	**A4**	finish 320

flange plate with tube adapter

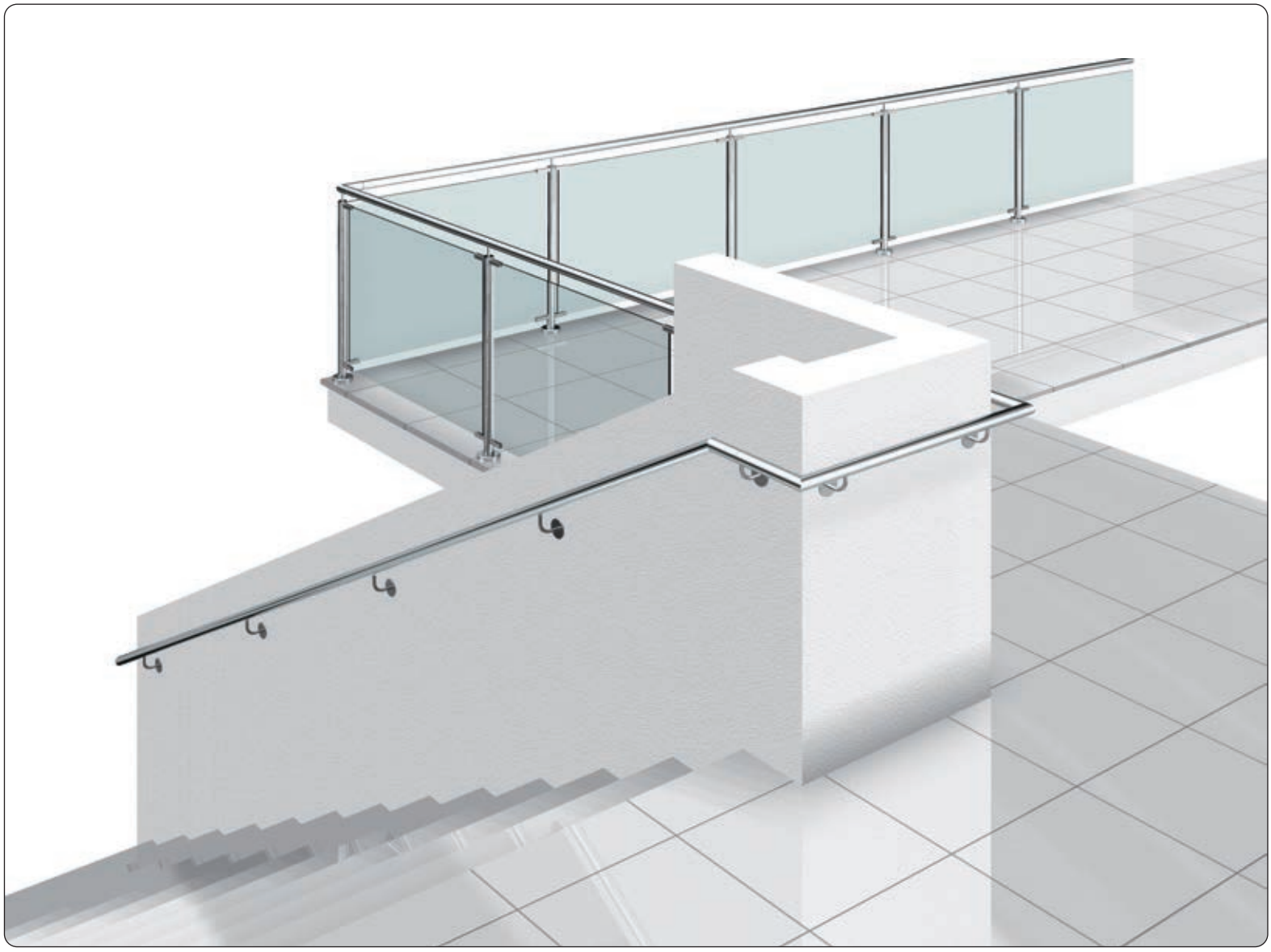






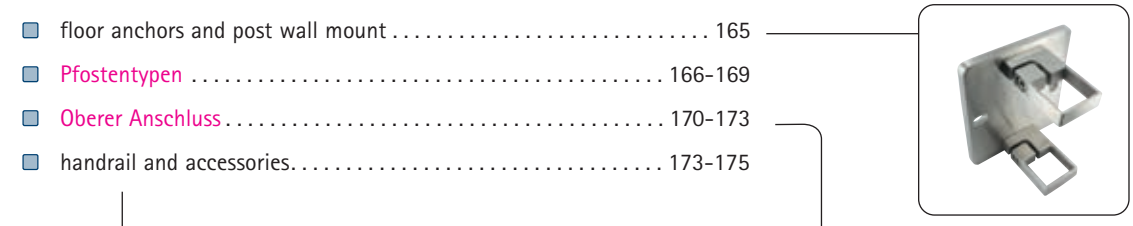
item no.	Ø adapter	material	finish
10209042A4	42,4	**A4**	finish 320

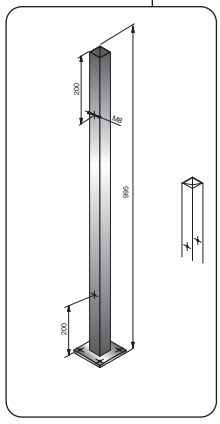
application

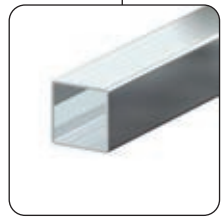


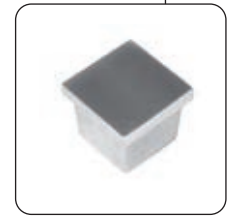
content

square tube







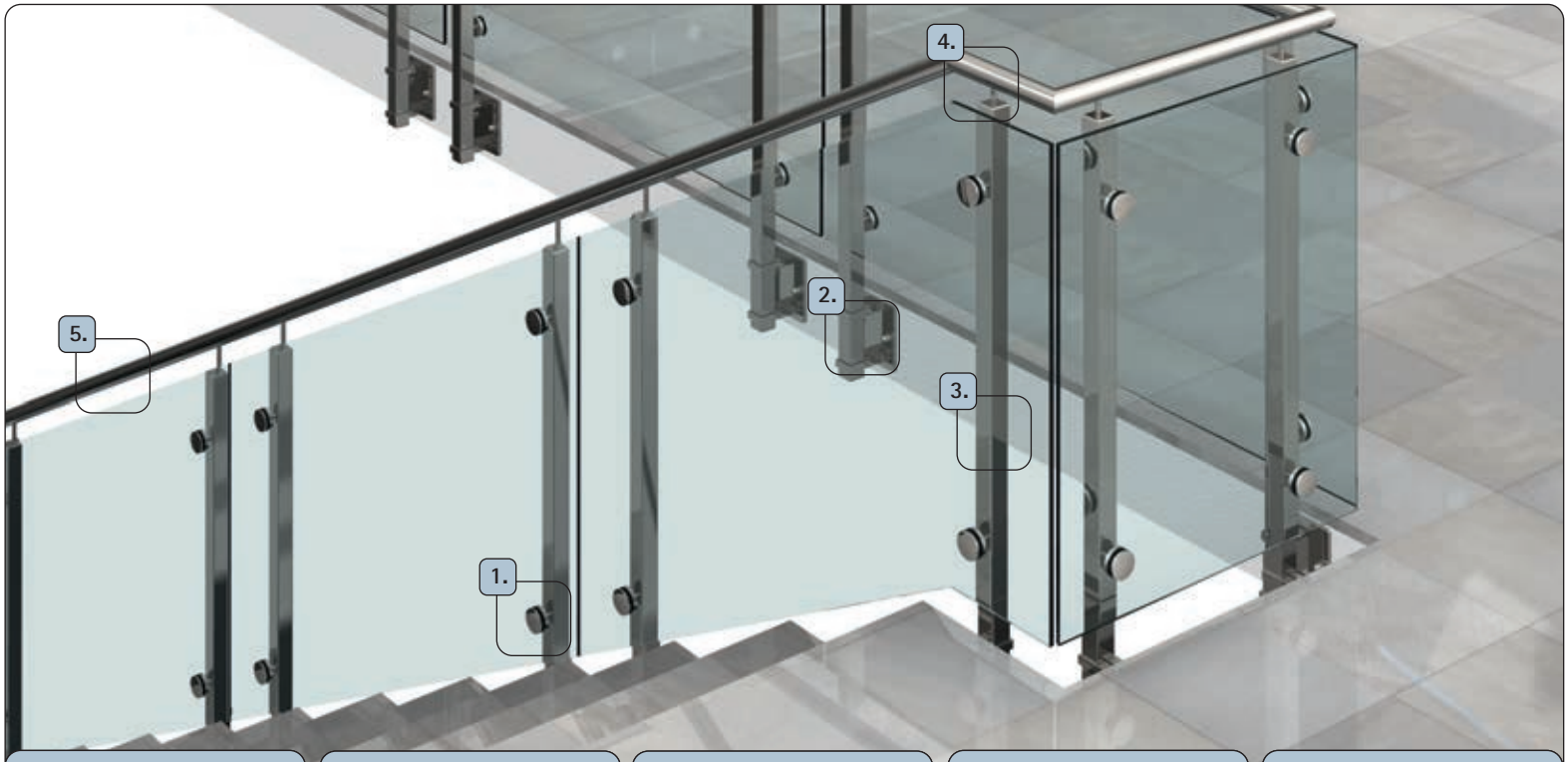


INFO

All dimensions in millimetres.

- balustrade with square tube

square tube over view



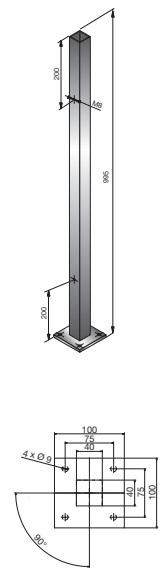
1. infill mounting types

from page 70

2. floor anchors and post wall mount

from page 165

3. selecting the proper post type

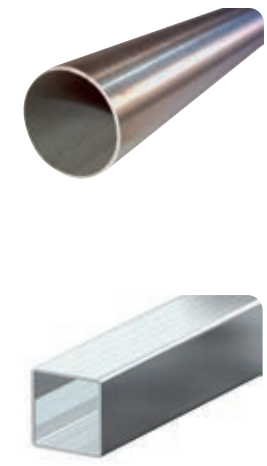


from page 166

4. upper connection

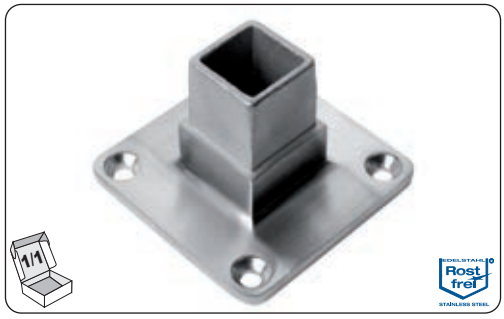
from page 170

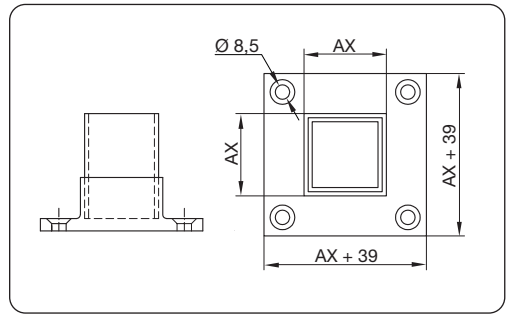
5. handrail

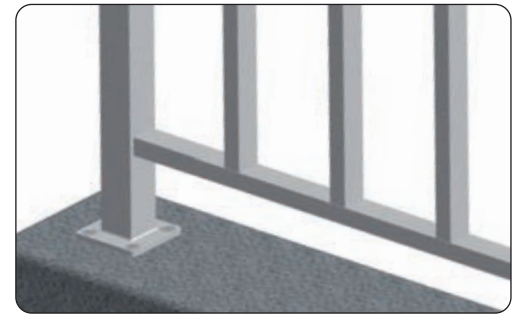


from page 150/173

flange plate

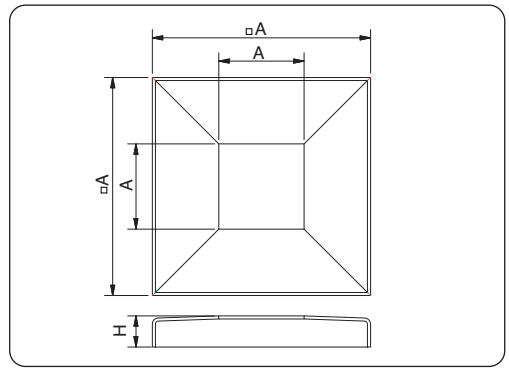






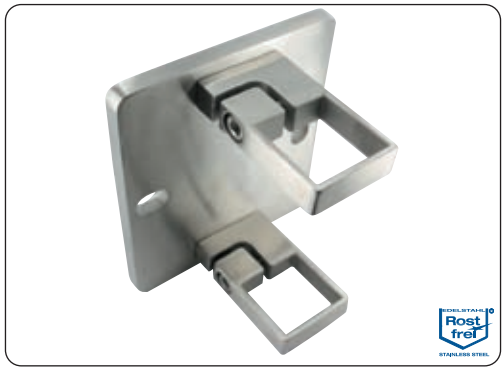
item no.	AX	material	finish
10209440A4	40 x 40 x 2,0	**A4**	finish 240

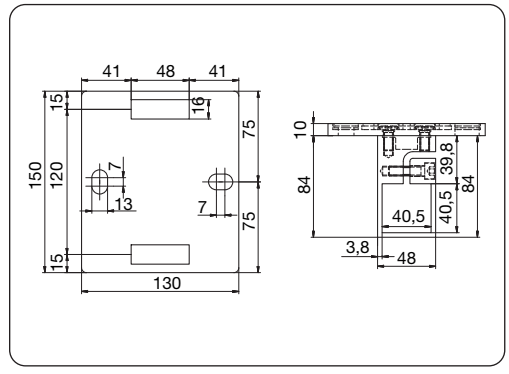
cover plate for square tube



item no.	A	□ A	H	material	finish
10238940A4	41 x 41	105	15	**A4**	finish 240

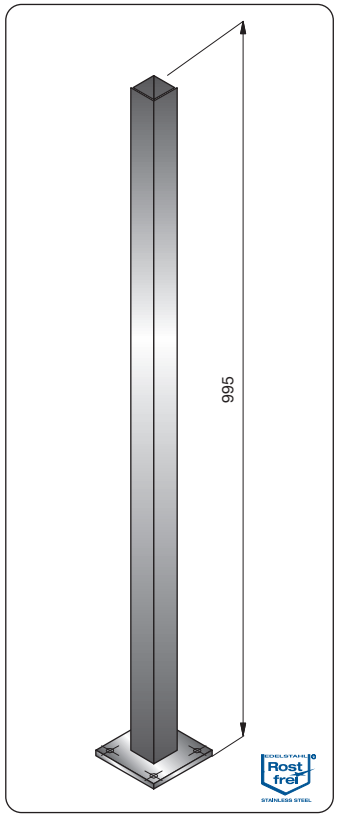
post wall mount with clamps





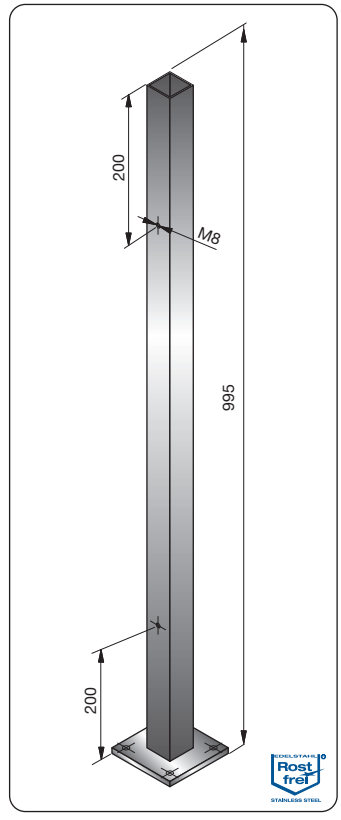
item no.	AX	material	finish
10239540A2	40 x 40 x 2,0	A2	finish 240

square tube posts with welded base plate, undrilled



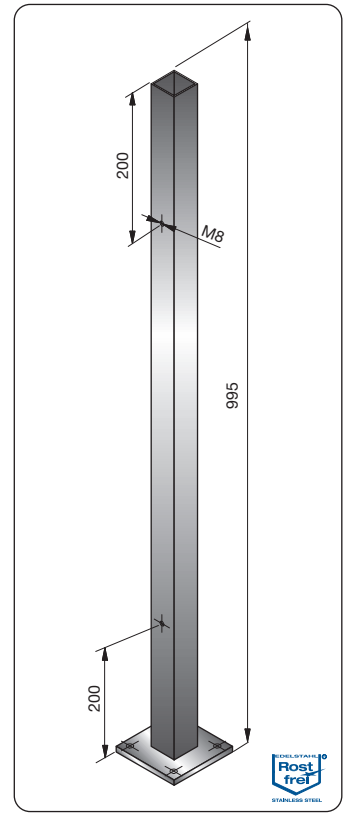
item no. 10238540
corner post, undrilled
40 x 40 x 2,0 mm

item no. 10238540A2	
material	A2
item no. 10238540A4	
material	A4



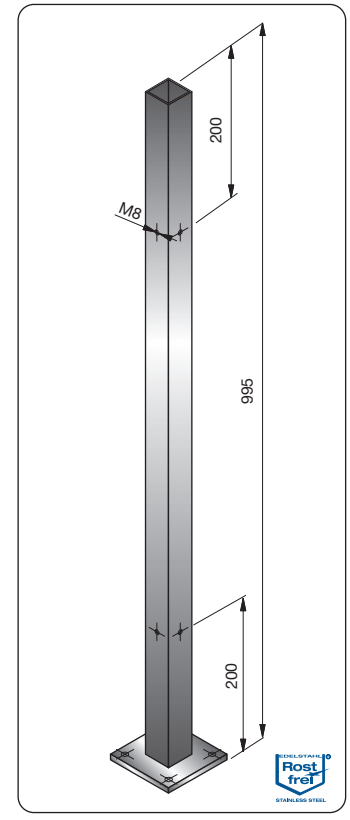
item no. 10239440
end post, drilled
40 x 40 x 2,0 mm

item no. 10239440A2	
material	A2
item no. 10239440A4	
material	A4



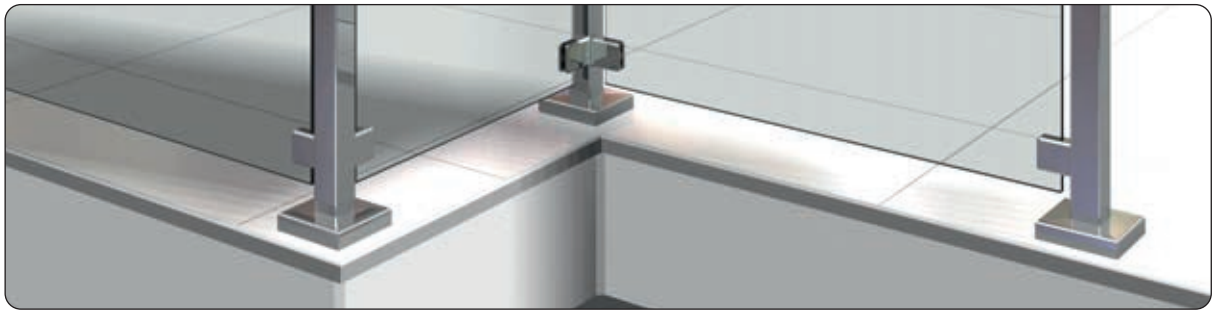
item no. 10239340
middle post, drilled
40 x 40 x 2,0 mm

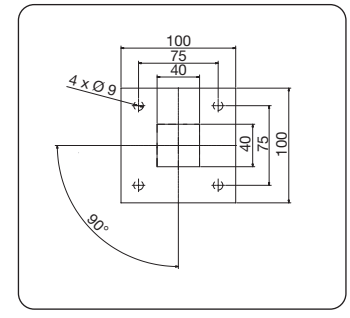
item no. 10239340A2	
material	A2
item no. 10239340A4	
material	A4



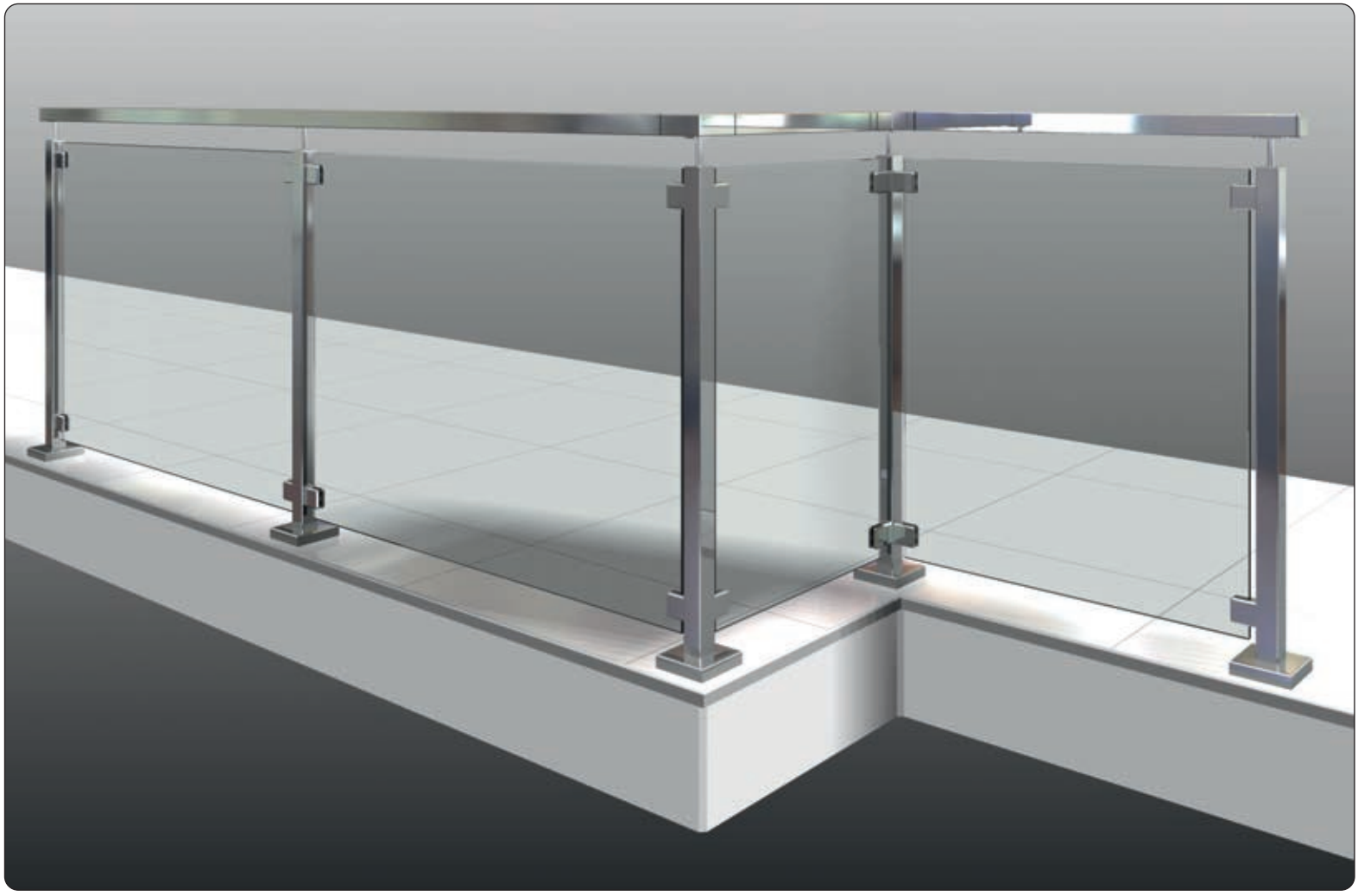
item no. 10239240
corner post, drilled
40 x 40 x 2,0 mm

item no. 10239240A2	
material	A2
item no. 10239240A4	
material	A4





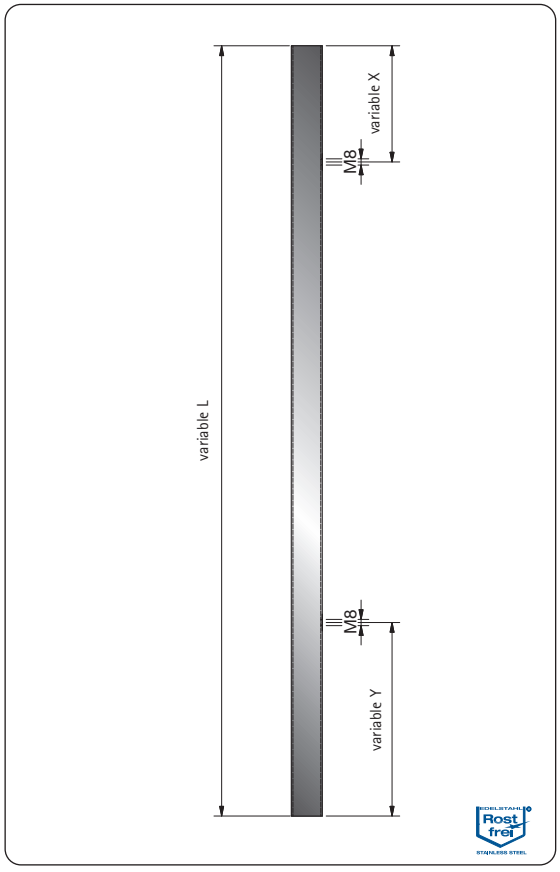
- square tube posts with welded base plate, undrilled

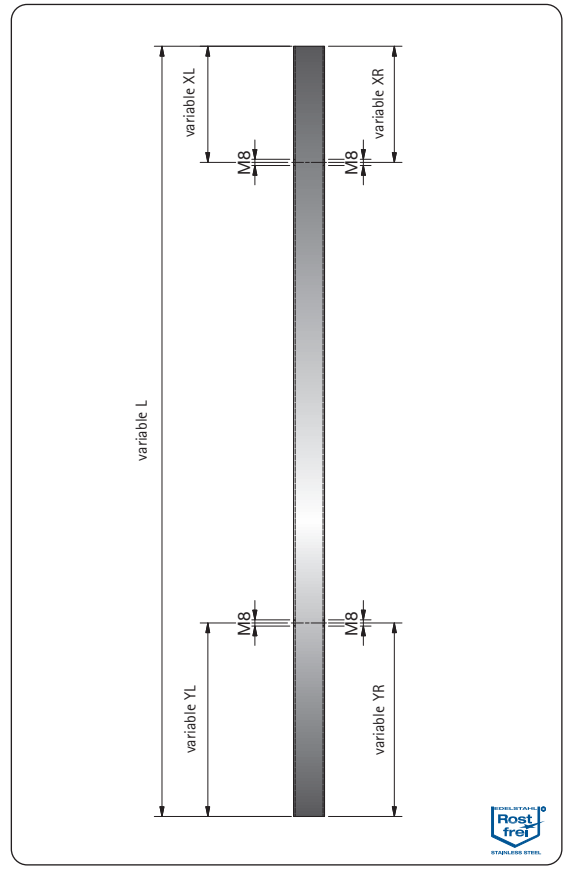


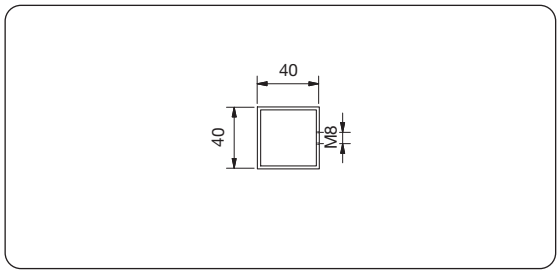
INFO

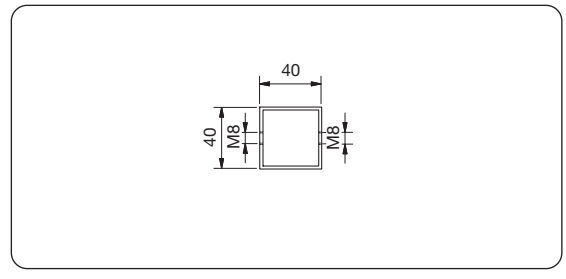
depending on the mounting type, custom drilling upon request is possible

posts for tube clamp wall mounts, drilled









item no. 10240340
end post, drilled
Ø 42,4 x 2,0 mm

item no. 10240340A2	
material/finish	A2/K240
item no. 10240340A4	
material/finish	A4/K240

item no. 10240440
middle post, drilled
Ø 42,4 x 2,0 mm

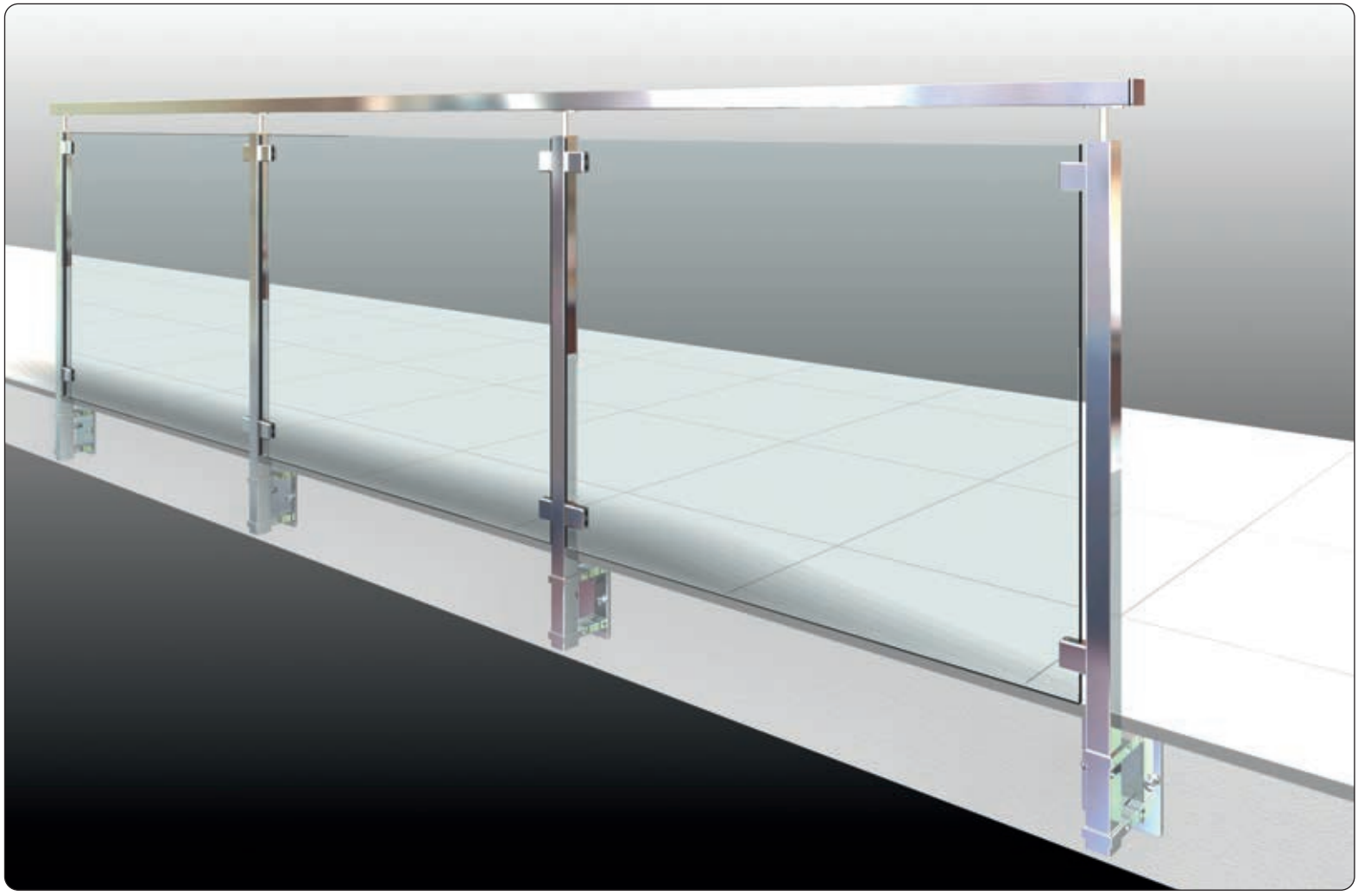
item no. 10240440A2	
material/finish	A2/K240
item no. 10240440A4	
material/finish	A4/K240

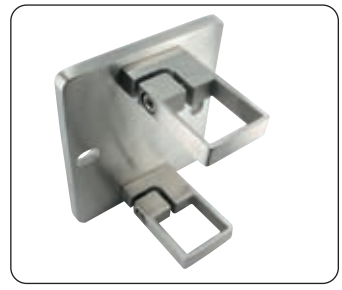
INFO

When ordering please specify the values for each variable
L; X; XL; XR; Y; YL; YR.

depending on the mounting type, custom drilling upon request is possible

- posts for tube clamp wall mounts, drilled

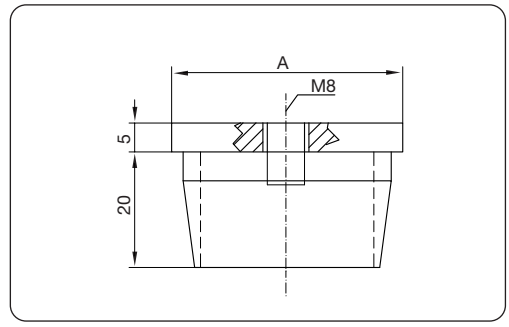


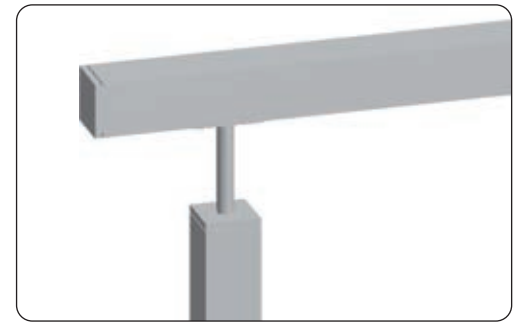


INFO

Further information and dimensions for our tube clamp bracket can be found on page 165

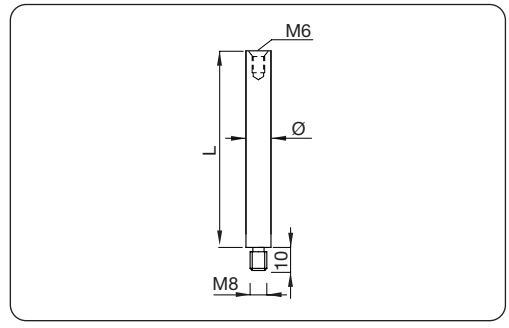
end cap with internal thread, hollow





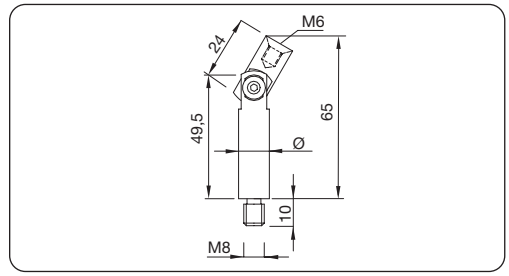
item no.	A	material	finish
10209640A2	40 x 40 x 2,0	A2	finish 240
10209640A4	40 x 40 x 2,0	**A4**	finish 240

handrail support with internal thread



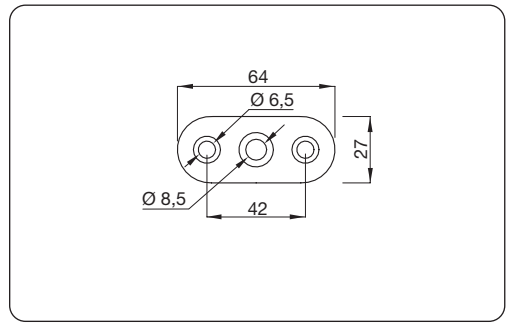
item no.	Ø bar	L	material	finish
10205212A2	12	65	A2	finish 240
10205312A2	12	115	A2	finish 240
10205414A2	14	65	A2	finish 240
10240112A2	12	28	A2	finish 240
10205412A4	12	65	**A4**	finish 240

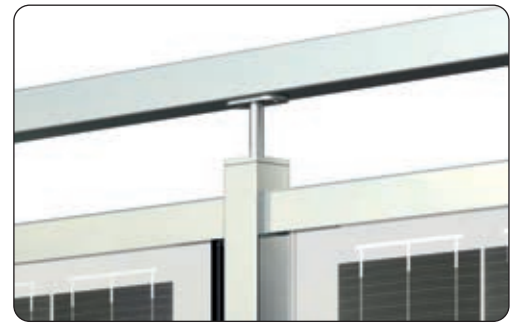
handrail support with joint and internal thread



item no.	Ø bar	material	finish
10205712A2	12	A2	finish 240
10205712A4	12	**A4**	finish 240

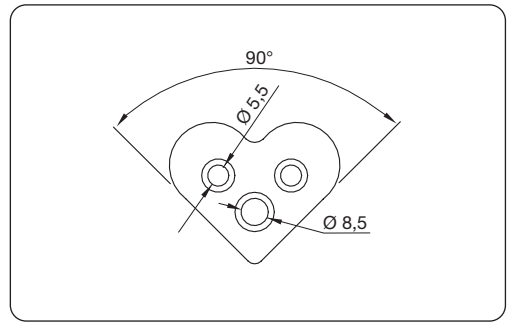
adapter plate straight for square tube

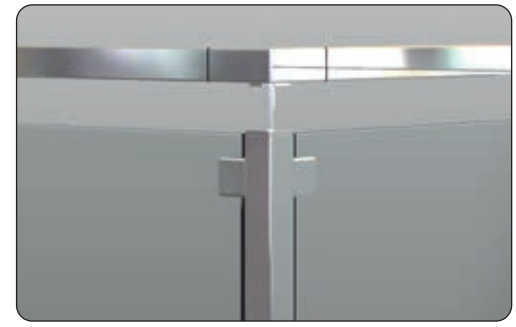




item no.	material	finish
10205900A2	A2	finish 240
10205900A4	**A4**	finish 240

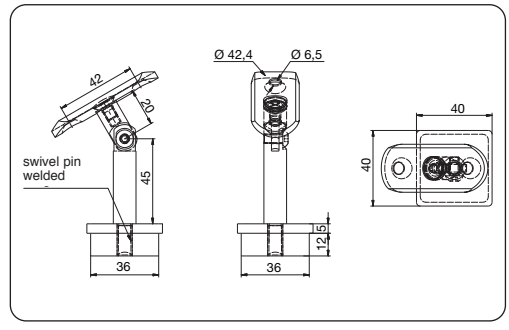
adapter plate 90° for square tube

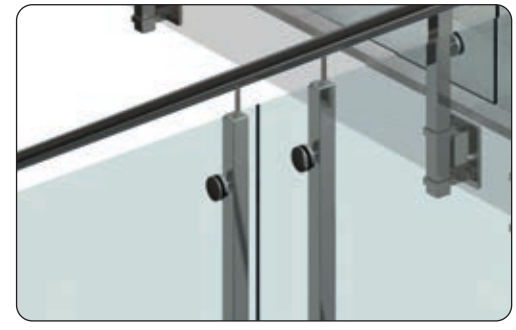




item no.	material	finish
10237940A2	A2	finish 240

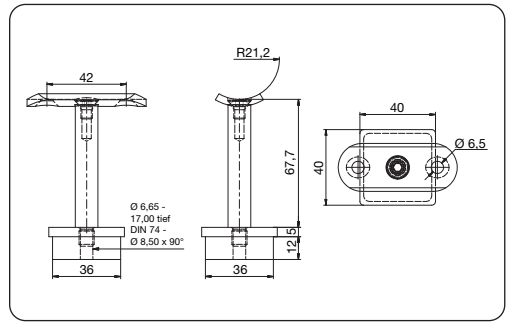
handrail support variable





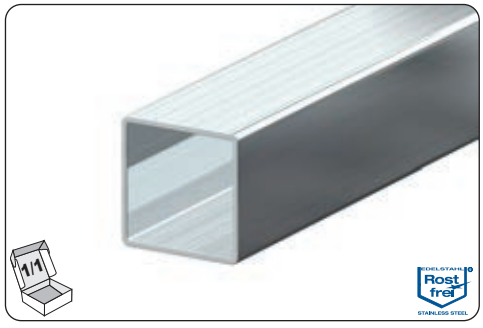
item no.	tube x s	Ø adapter	material	finish
10240040A2	40 x 40 x 2,0	33,7 - 42,4	A2	finish 240

handrail support rigid



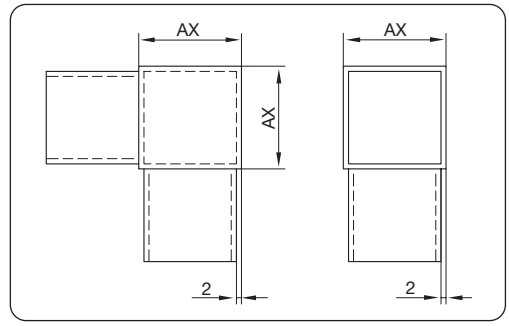
item no.	tube x s	Ø adapter	material	finish
10240240A2	40 x 40 x 2,0	33,7 - 42,4	A2	finish 240

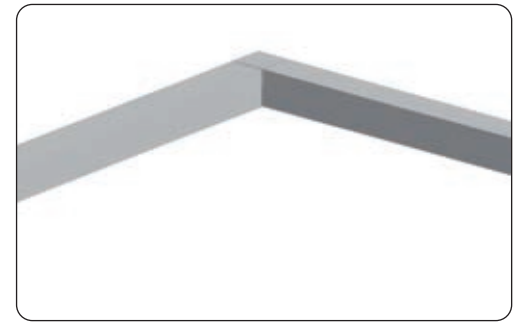
square tube



item no.	□	length	material	finish
10234740A2	40 x 40 x 2,0	6000	A2	finish 240
10200740A2	40 x 40 x 2,0	3000	A2	finish 240
10234940A2	40 x 40 x 2,0	2000	A2	finish 240
10200740A2-V	40 x 40 x 2,0	cut to length	A2	finish 240
10234740A4	40 x 40 x 2,0	6000	**A4**	finish 240
10200740A4	40 x 40 x 2,0	3000	**A4**	finish 240
10234940A4	40 x 40 x 2,0	2000	**A4**	finish 240
10200740A4-V	40 x 40 x 2,0	cut to length	**A4**	finish 240

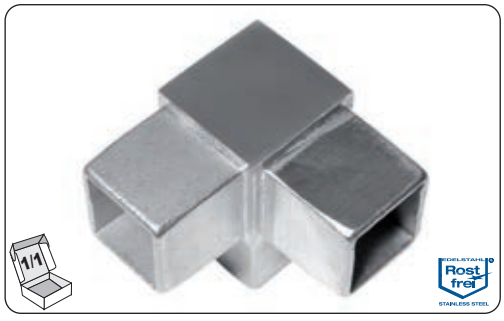
corner connector 90°

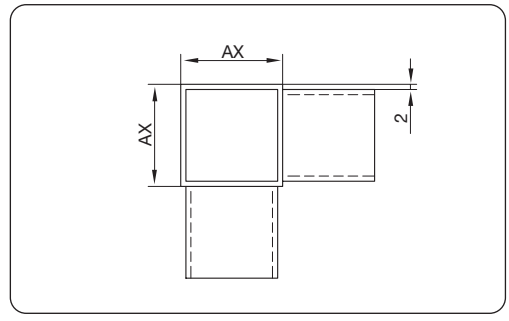


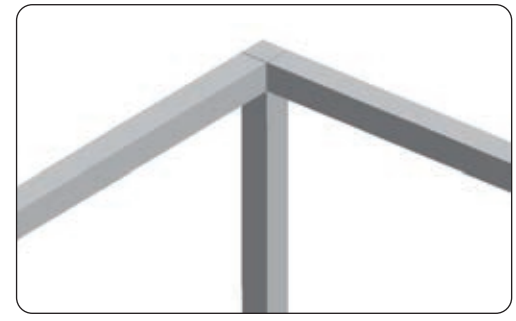


item no.	AX	material	finish
10209140A4	40 x 40 x 2,0	**A4**	finish 240

corner connector 3-way

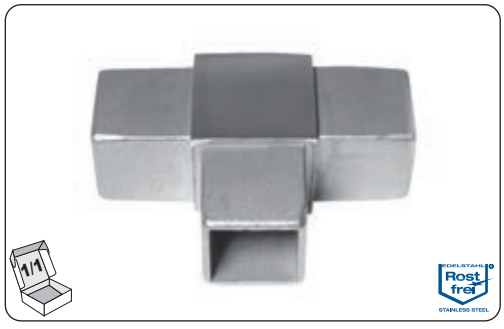


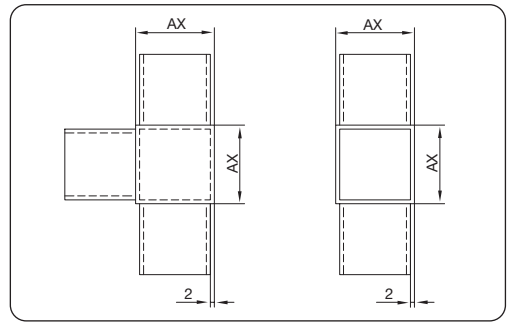


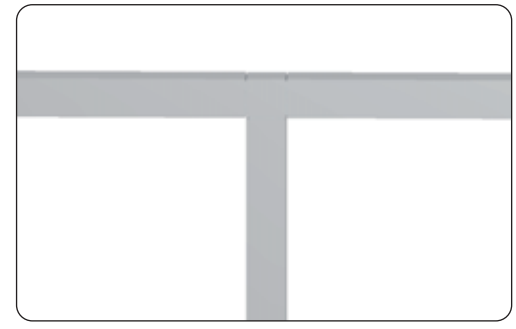


item no.	AX	material	finish
10209340A4	40 x 40 x 2,0	**A4**	finish 240

t-connector

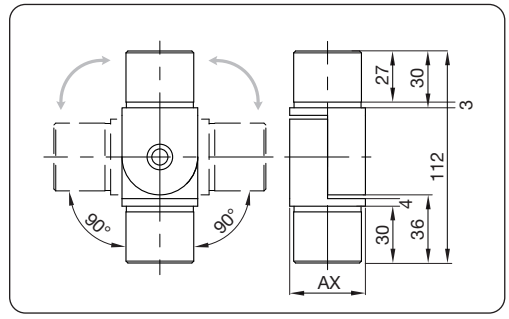






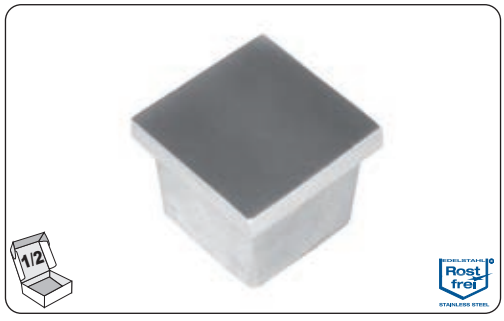
item no.	AX	material	finish
10209240A4	40 x 40 x 2,0	**A4**	finish 240

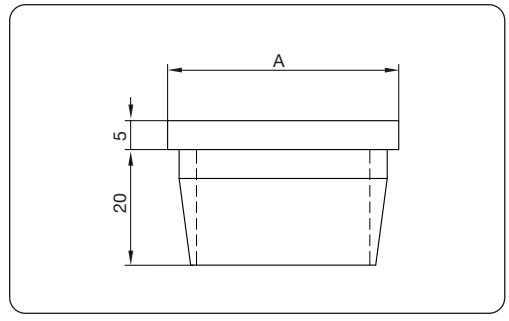
connector with joint



item no.	AX	material	finish
10234130A4	40 x 40 x 2,0	**A4**	finish 240

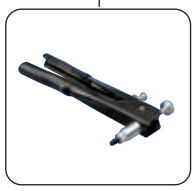
end cap flat, hollow

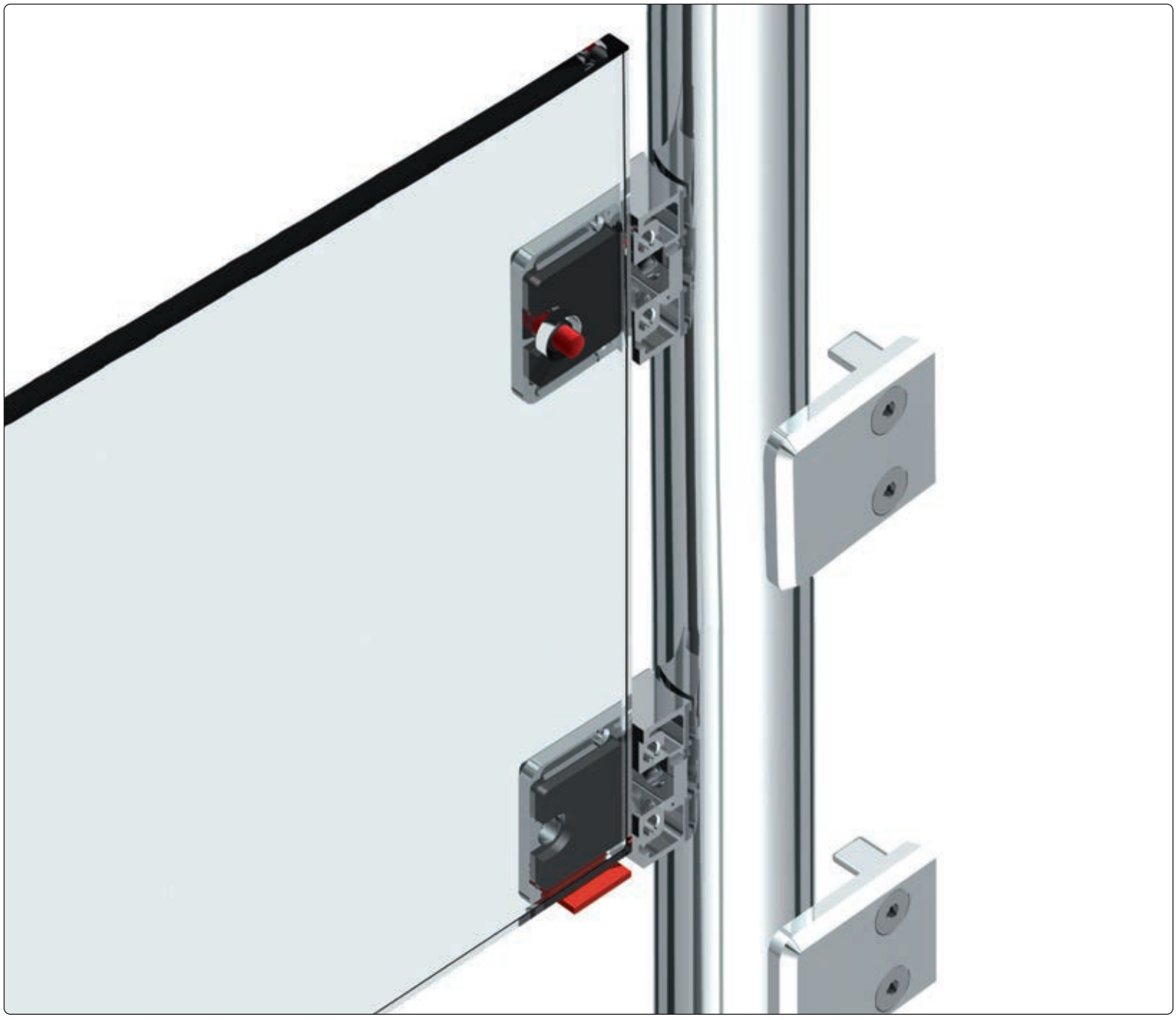




item no.	A	material	finish
10209540A2	40 x 40 x 2,0	A2	finish 240
10209540A4	40 x 40 x 2,0	**A4**	finish 240

content





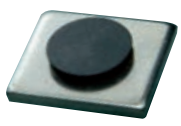
accessoires for balustrade glazing

accessoires for balustrade glazing

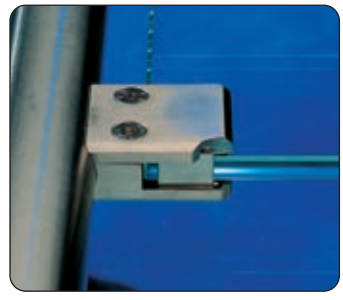
item no.	info
4826VA	Ø 4 x 12 mm, with plastic tube
4824VA	Ø 4 x 16 mm, with plastic tube
4828VA	Ø 4 x 25 mm, with plastic tube
4820VA	Ø 6 x 16 mm, with plastic tube
4898VA	Ø 6 x 25 mm, with plastic tube
9320VA	Ø 6 x 20 mm, with plastic tube

Use a hammer to drive the locking pin into the top part of the clamp

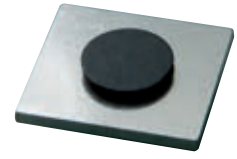
plate bore
min. Ø 10 mm ≥ glass thickness



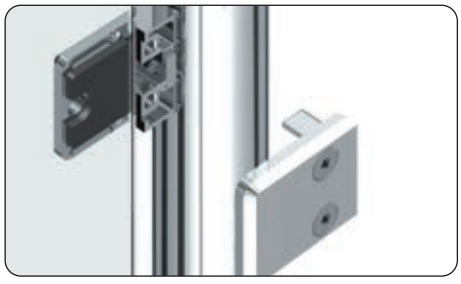
4849VA
incl. 4887KU3

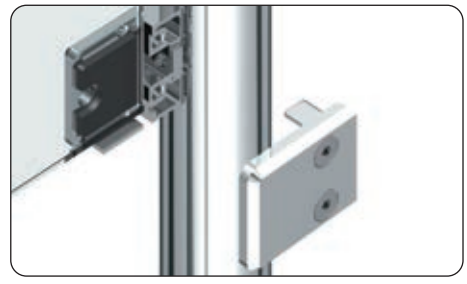


item no.	info
4849VA	18 x 20 x 2 mm, for right or left hand use
4899VA	24 x 22 x 2 mm, for right or left hand use

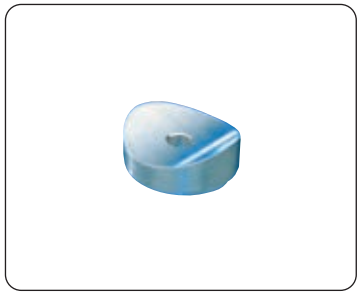


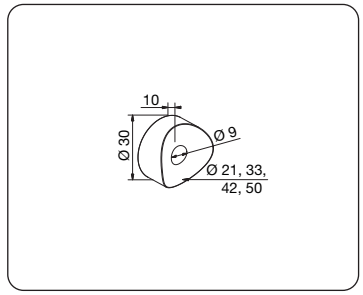
4899VA
incl. 4887KU3





accessoires for balustrade glazing

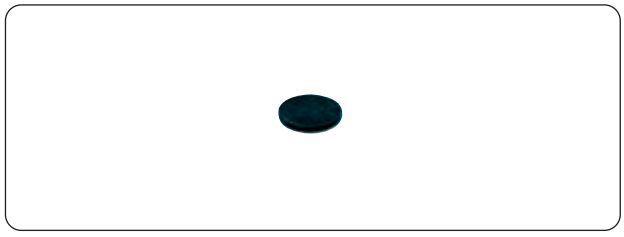




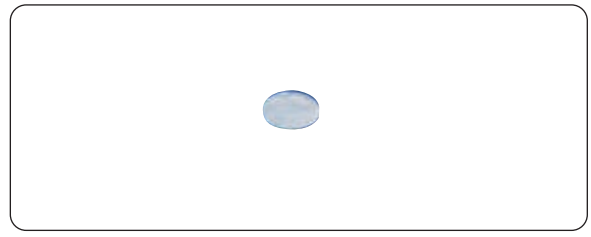
item no.: 4869	
spacer piece for round tube	
Please specify round tube diameter.	
material:	zinc
	Ø 21, 33, 42, 50
finish:	

RAL ZN0 ZN22

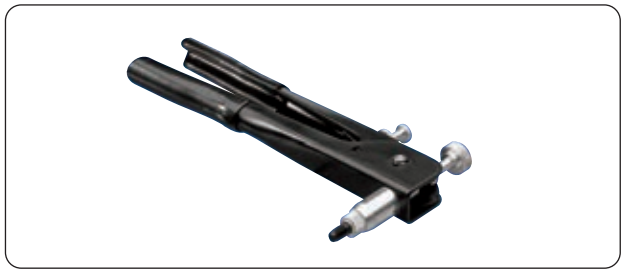
for item no.
4860, 4866, 4870, 4871, 4872



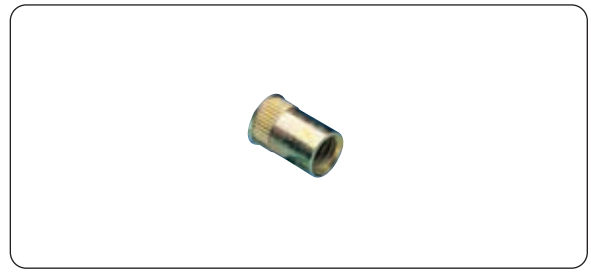
item no.: 4887KU3
Ø 12 mm x 1 mm



item no.: 3058KU0
self-adhesive plastic support, Ø 9 x 1,5 mm
suitable for use with: 4849; 4899

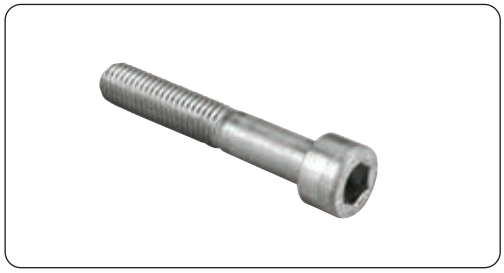


item no.: Z072
blind rivet nut pliers
incl. thread tap M8
item no.: Z074
thread tap M6



item no.: Z071
blind rivet nut with countersunk beading and knurled shank
for M8 threaded screws. Rivetable material thickness
of 0,25 – 3 mm
item no.: Z073
rivet nut for M6 threaded screws

accessoires for balustrade glazing

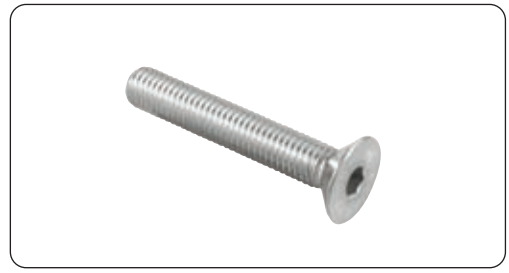


item no.: S912A2D

cylinder head screw DIN912 - M10 x 45/60

S912A2D10X45

S912A2D10X60



item no.: S7991A2D

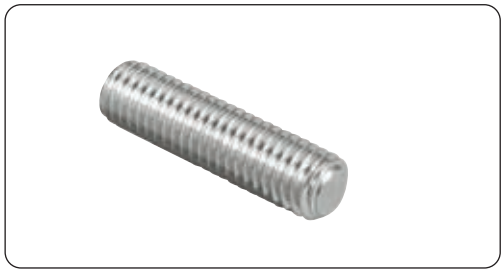
countersink screw DIN7991 - M10 x 45/60

S7991A2D10X45

S7991A2D10X60

item no.: Z098-VA

cylinder head screw DIN912 -
M8 x 20 for 4831/32/36/37

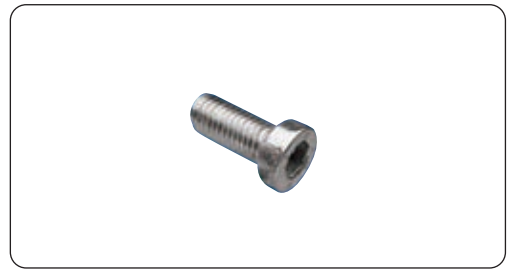


item no.: S913A2D

set screw DIN913 - M10 x 40/60

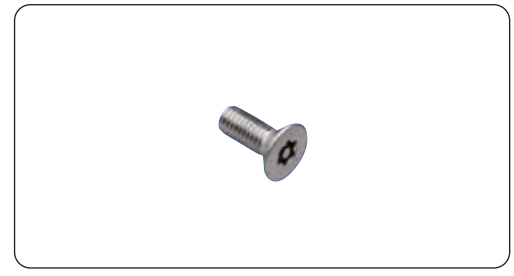
S913A2D10X40

S913A2D10X60



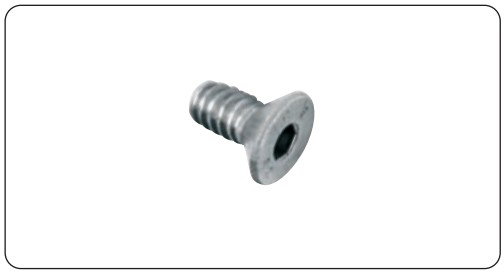
item no.: Z096* | Z097 | S6912A2D6x30

cylinder head screw DIN6912 - M8 x 20 for fitting clamp fixtures, M6 x 30 for cp-mini



item no.: Z070

special countersink tamper-resistant screw M6 x 16, V2A, for clamp fixtures, similar to DIN7991



item no.: S7991A2D6X12

countersink screw DIN 7991 - M6 x 12

item no.: S7991A2D8X70/D8x80/D8x90/D8x130

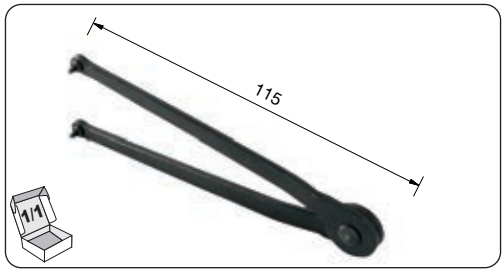
countersink screw DIN 7991 - M8 x 70/80/90/130

INFO

All unmarked screws are made of stainless steel, material: A2

* material steel zinc finish

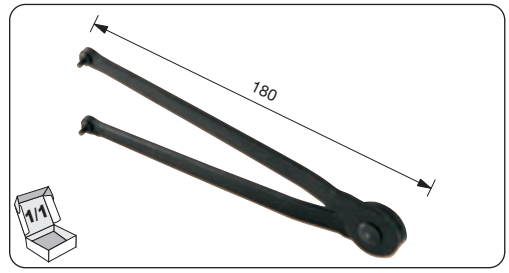
accessoires for balustrade glazing



item no.: Z059

adjustable face pin wrench 2,5 mm

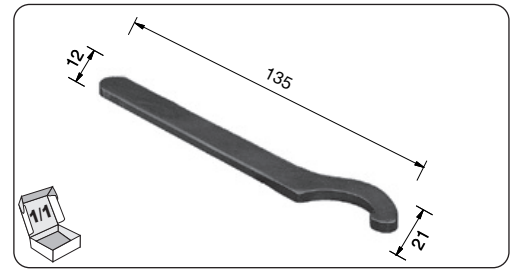
hole stud	Ø 2,5 mm, length 3 mm



item no.: Z058

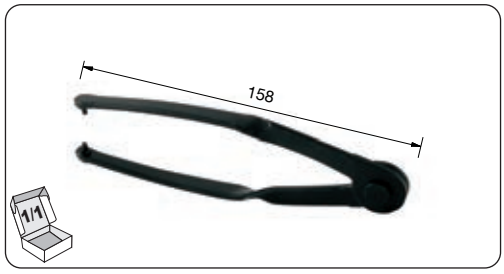
adjustable face pin wrench 3 mm

hole stud	Ø 3 mm, length 4 mm



item no.: Z057

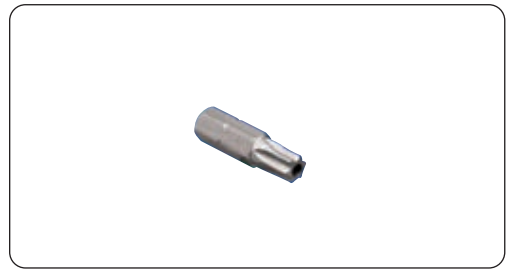
hook wrench



item no.: Z060

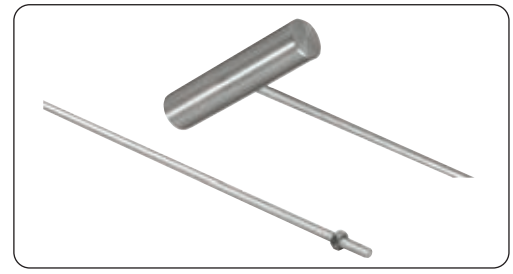
adjustable special wrench 3 mm

hole stud	Ø 3 mm, length 4 mm



item no.: Z080ST0

special bit for tamper-resistant screws
for item no.: Z070



item no.: 7229ST8

assembly aid for Banano round tube fixture
(7221*ff*)

LOCTITE® 638

item no.: 1023300CTP / 1023310CTP

LOCTITE®638 is a special adhesive used to bond cylindrical join parts. It can be especially used if adhesive gaps of up to 0.25 mm can arise and maximum stability is required at room temperature. The product hermetically bonds tight metal surfaces. It prevents screws coming loose by themselves and leakages caused by impacts and vibrations. Typical applications include attaching sliding bushings in casings, on shafts, stainless steel tube end caps, stainless steel plug fittings and bearings.

- short bonding time
- high strength
- DVGW tested

1023300CTP: 10-ml-Bottle
1023310CTP: 50-ml-Bottle

LOCTITE® 243

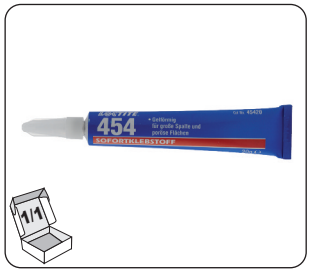
item no.: 1023320CTP / 1023330CTP

LOCTITE®243™, a medium tight screw security, which is used for sealing and securing thread connections, which have to be removed with convential tools. This product bonds hermetically sealmed between close contacting metal surfaces. The adhesive avoids self-loosing of screws as well as leakage by crashes or vibrations. Escpecially recommended for inox products and plated materials. Because of its thixotropic habit a migration of the adhesive after application on the part is reduced. Practicable for threads up to M36. Suitable for all metal threads. Loctite 243SS intermediate strength

- can be used up to M36
- removable with conventional tools
- suitable for all metal threads

1023320CTP: 5-ml-Bottle
1023330CTP: 50-ml-Bottle

LOCTITE® 454



item no.: 1023340CTP

LOCTITE® 454, instant adhesive, is used to bond hard-to-bond materials in applications where equal distribution of stress and high tensile and shearing resistance are required. The product can quickly bond a multitude of materials such as metals, plastics, wood, paper, leather and textiles. The gel-like consistency prevents the adhesive running off, even on upright surfaces. The bonding time depends on the surface material used.

- instant adhesive paste
- for hard-to-bond materials
- fast bonding period
- gel-like texture

20 ml

stainless steel 2 in 1

item no.: 1023160CTP

Stainless Steel 2 in 1 protects and preserves all metal surfaces. All that remains is a streak free surface and a radiant glow. The treated surface is perfectly protected against foreign contamination and blotching. It is versatile and also used in the food sector and suitable for cleaning and maintenance of stainless steel parts in the industry and workplaces. Coat the dry surface to be cleaned with Stainless Steel 2 in 1 and distribute it evenly or dampen a cloth with Stainless Steel 2 in 1 and wipe all the dirt, grime and oily fingerprints away.

- cleaning of weather-related debris and extraneous rust
- print resistant
- preserves and protects against staining

500 ml

citro cleaner

item no.: 1023170CTP

Citro Cleaner is a perfect cleaner for industry and workplace. It leaves a pleasant fresh orange scent. The Citro Cleaner leaves no residues. A disassembly of the parts is not required if the attached contaminants disperse with the liquid. It can remove ingrained dirt and encrustations such as oils, fats, grease, coal dust, tar, tar stains and adhesive residue on all the metals and coated surfaces.

- universal and gentle to materials
- very fast acting
- dissolves contamination quickly

500 ml

multispray

item no.: 1023180CTP

Multispray is a synthetic oil in a slow evaporating solvent. It is acid-free and is resistant to tacking. Many metals are protected for a long period against corrosion. Multispray reaches inaccessible places due to its excellent creeping properties. It leaves a thin oily protective film. It displaces water and protects the material from moisture. It loosens and dissolves fixed mechanisms, rusted bolts, nuts, hinges etc. It can also be used as a contact spray or lubrication (elimination of squeaks).

- excellent penetration
- excellent lubricity
- anti tacking

500 ml

stainless steel intensive cleaner

item no.: 1023200CTP

Stainless Steel Intensive Cleaner is a special product with highly active cleaning additives. In conjunction with the pickling polishing cloth and special pickling sponge, almost all contaminants and corrosion can be removed. For optimal effect, let the cleaner soak for a while depending on the degree of contamination. After cleaning, remove the product residue with water. Dry polish where appropriate.

- gentle to the passive layer
- excellent contamination dissolving
- pleasant aroma

1l-bottle

stainless steel surface cleaner

item no.: 1023210CTP

Stainless Steel Surface Cleaner is an acidic, very efficient product for cleaning stainless steel and nonferrous metals. Excellent contamination removal of oils, grease and rust. After cleaning, the surface brightening from the intensive cleaning can clearly be noticed. Where appropriate, treat with a passivation to regenerate the passive layer and protect the material.

- surface brightening
- very fast action
- excellent contamination dissolving

2-kg-bottle

pickling and treatment set

item no.: 1023220CTP

Pickling and Treatment set contains highly active cleaning and dissolution products for treating stainless steel. Quick and easy stainless steel treatments are made possible with the range of products selected. Thanks to its compact size, the pickling set is great for use in the workshop as well as on the job site. Of course, large quantities are also in stock.

- system solution
- handy
- incl. sponges and glasses

1 Set

stainless steel protection

item no.: 1023230CTP

Stainless Steel Protection protects metals during storage, especially out in the open. It displaces moisture and prevents further corrosion. Due to its penetration properties, it is universally applicable.

- protects against corrosion
- good creeping properties
- displaces moisture

1l-Bottle

stainless steel power pickling

item no.: 1023240CTP

Stainless Steel Power Pickling removes discolourations, scaling and corrosive products in welded areas of stainless steel or where the material might be affected by heat. It can be used for most stainless steels (austenite). It is very easy to apply and does not dry in even if left for a long time. Thanks to its transparent production, up to 30% product savings can be achieved. A dissolution treatment must be carried out after the pickling process is finished.

- very economical
- strong pickling action
- easy to rinse

2-kg-Bottle

neutraliser

item no.: 1023250CTP

Neutraliser is an alkaline product used to neutralise pickling agents and rinsing residue. The neutralisation is generally carried out in holding tanks after rinsing with water in order to prevent product reactions and staining (brown discolouration) on the surface of the material. The waste water should have a pH value of 8.5 to 9.5. Neutralisation does not replace any sewage treatment for the purposes of the Water Resources Act.

- neutralisation of pickling rinse water

2-kg-Behälter

cleaning electrolytes

item no.: 1023260CTP

Cleaning Electrolytes removes discolourations and scale from stainless steel welds and oxide residues following cutting work (the transformer device's application instructions/operating manual should be followed). The cleaning electrolyte can be completely removed using water, with residue-free cleaning required. Acidic rinse water must be treated at least until a neutral pH value is achieved.

- removal of discolourations and scale
- suitable for transformer devices
- electrolyte removed by water

1-kg-Bottle

passivation

item no.: 1023270CTP

The clean metallic surface created during the pickling process is a prerequisite to the formation of a homogeneous and dense passive layer. The passive layer can be built up again and, in particular, densified in just a short period by using the passivation solution. Rinse with clean water after the treatment.

- short exposure time
- used undiluted

2 kg Bottle

pickling sponge / pickling polishing cloth

- 1023280CTP

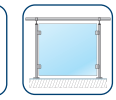
- 1023290CTP

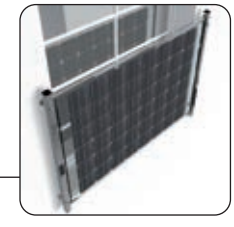
item no.: 1023280CTP

Pickling Sponge makes it easy to apply the Stainless steel intensive cleaner and surface cleaner.

item no.: 1023290CTP

Pickling Polishing Cloth is abrasive free and makes it easy to apply the Stainless steel intensive cleaner and surface cleaner.





design and safety of balustrade

balustrade building blocks

Which balustrades are possible?

A balustrade is made up of many individual parts. This chapter starts with an overview of the various components and the applications which can be realised with them.

1. construction types

- safety barrier glazing according to TRAV
- french balcony
- wind break

2. possibilities

multifaceted:

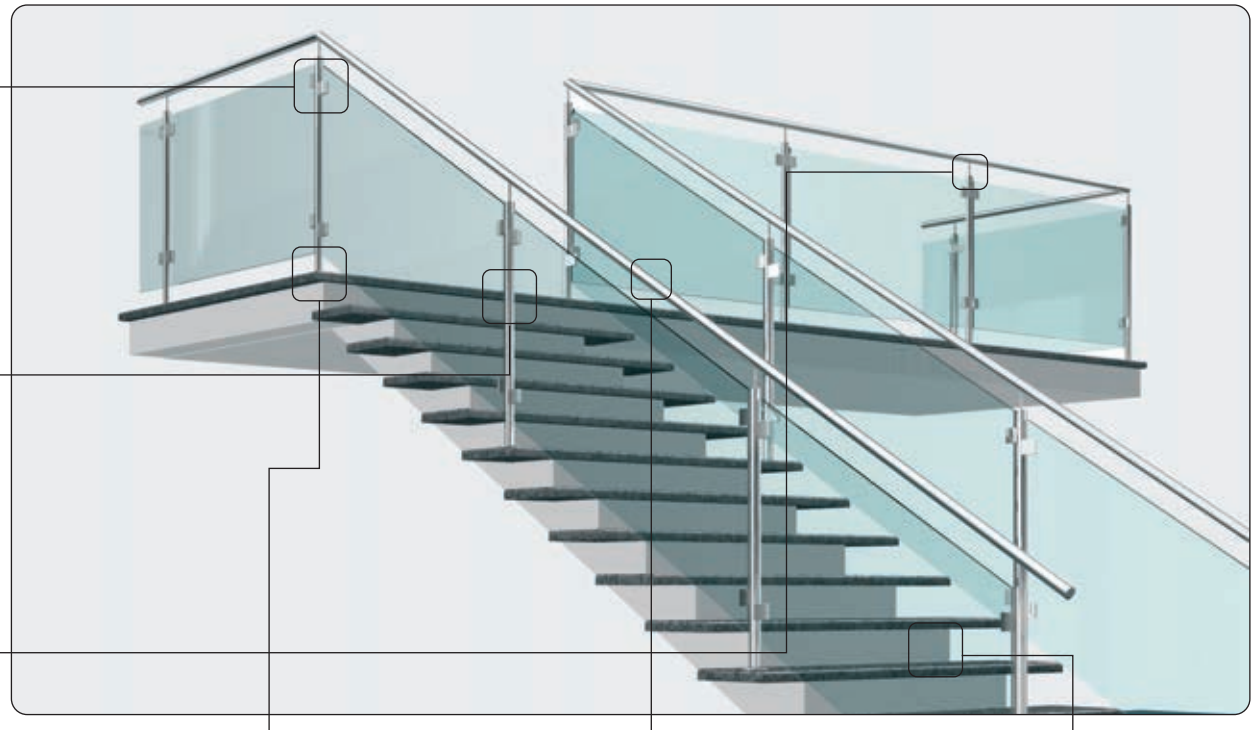
- gallery
- stairs
- balcony
- ...

3. effect of the weather

4. infill attachment

5. posts

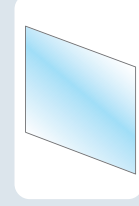
6. end caps and connectors



7. anchoring options


8. handrails


9. infill




balustrade building blocks

1. construction types

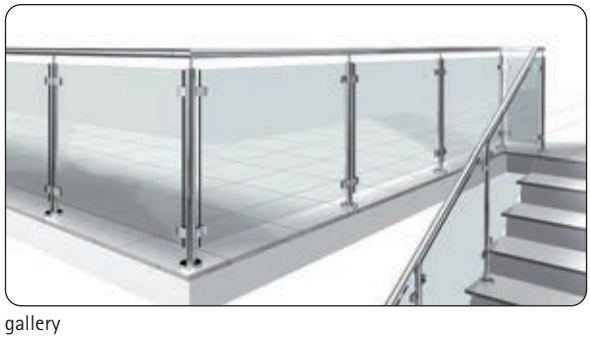
A multitude of balustrades can be realised with our balustrade systems. A small selection is shown below:

category C1 pursuant to TRAV as well as infill glazing according to AbZ/ETA

cantilever mounted with attached handrail

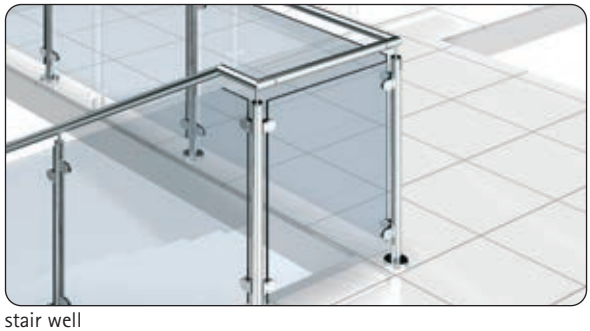
french balcony without handrail

2. possibilities



gallery

stairs



stair well

balcony

3. effect of the weather

Our balustrades are suitable for both indoor and outdoor use.

balustrade building blocks

4. infill attachment

		safety	infill	from page
	clamp fixtures	ETA	glass	70
	clamp fixtures	AbZ	glass	70
	clamp fixtures	ETB	TRESPA®	70
	TRAV fixtures	TRAV	glass	110
	Banano	AbP	glass	120
	cp-mini	AbP	glass	104
	cp-mini*solar*	ZiE	glass with photovoltaic	38
	clamping profile	AbP in preperation	glass	230

5. posts

		in mm	from page
	round tube	Ø = 33,7 | 42,4 | 48,3	150
	square tube	a x b = 40 x 40	173

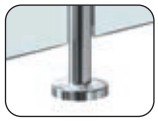
6. end caps and connectors

more caps on page: 144, 156-157, 170

more connectors on page: 151-155, 174-175

balustrade building blocks

7. floor anchoring



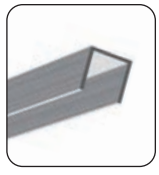
floor mounting for round tube posts
from page 129
floor mounting for square tube posts
from page 165

reinforced post anchor for round tube posts
Ø 38 mm from page 129

fascia mounting for round tube posts
from page 130
fascia mounting for square tube posts
from page 165

reinforced post anchor for round tube posts
Ø 44 mm from page 129

8. handrails and edge protection profiles



for round tube posts from page 150
for square tube posts from page 173

9. infill

glass infills pursuant to AbZ/ETA from page 207

glass infills pursuant to TRAV from page 207

TRESPA® according to ETB from page 216

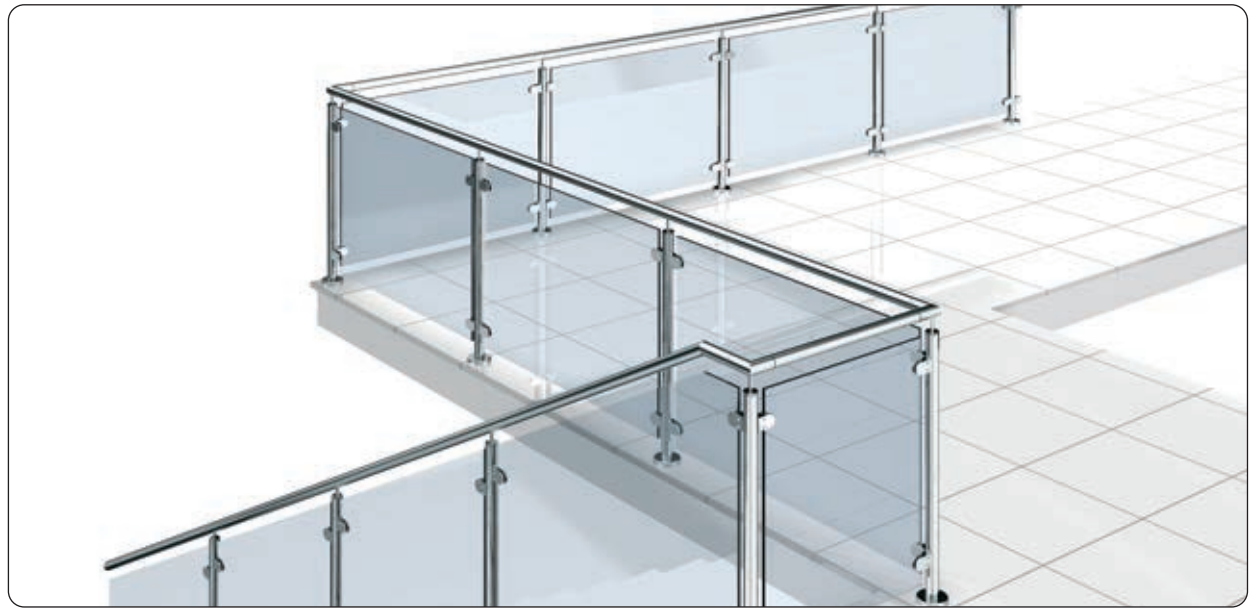
glass infills VSG with SentryGlas®

examples

- how to choose your desired balustrade

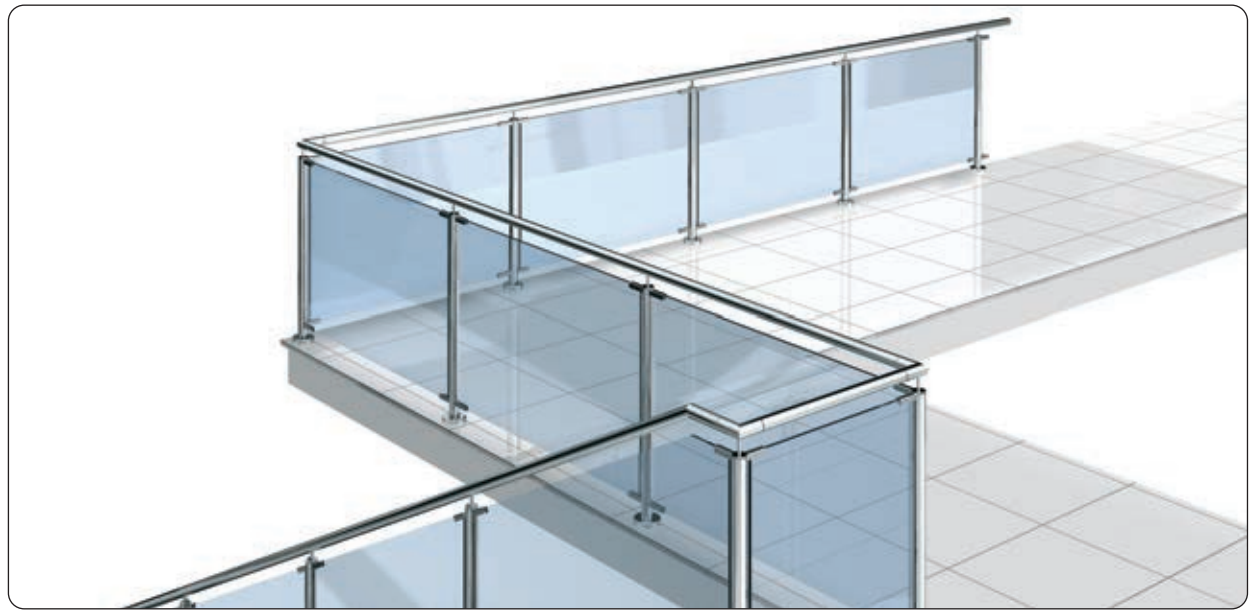
example 1

clamp with national technical approval (AbZ)
glass structure from page 207
post spacing, see page 204

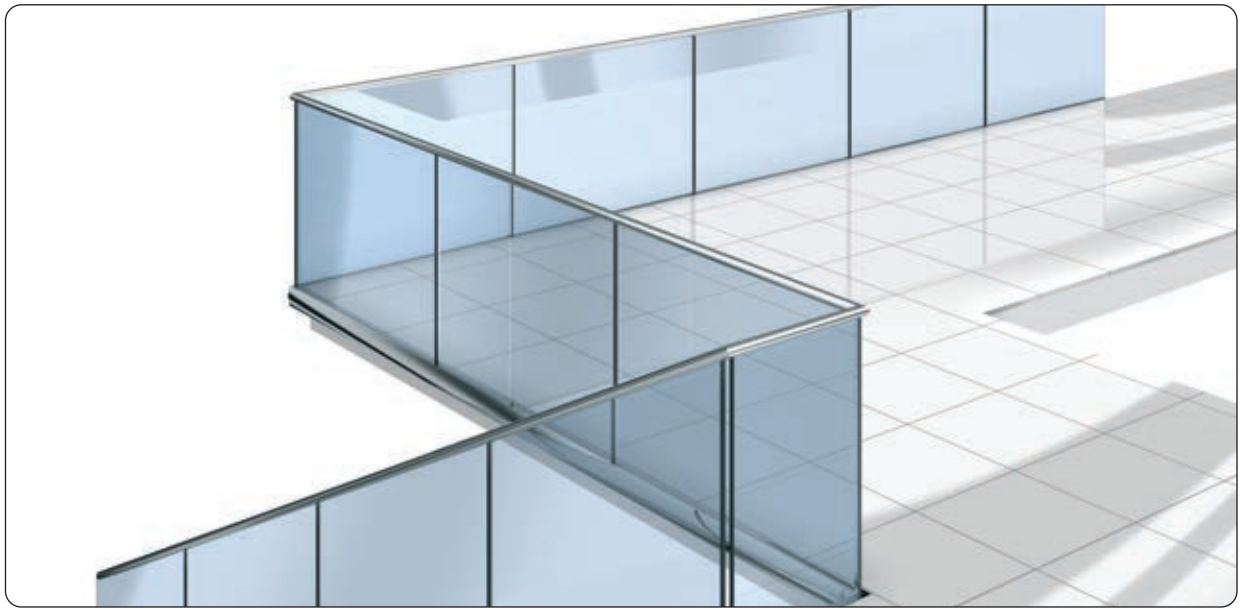


example 2

cp-mini with general test certificate from building authorities (AbP)
glass structure, see page 220



example 3



glazing linearly clamped at the bottom similar to TRAV category B (AbP in preperation)
glass structure, see page 230

example 4

TRAV fixtures
glass structure, see page 236

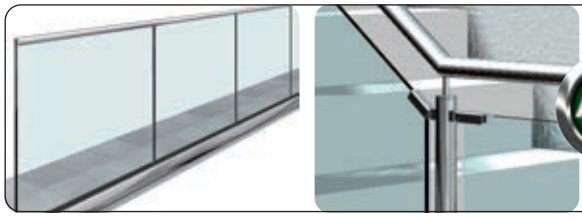
railing safety

There are high demands on safety in public and private areas. That is why our products are tested in-house and by independent external testing institutes. We have national technical approval (AbZ Z-70.2-28) for our glass balustrades with clamps and a European Technical Approval (ETA-11/0380). For the cp-mini and Banano holders, a general test certificate from building authorities (AbP) is available.

The technical rules for the use of glass safety barriers regulate the construction of such barriers. Pointed, installed glass panels (category C1) may only be used indoors, since the wind load is not taken into consideration. The glass infills are mounted using point fixings with different plate diameters. Soon, the technical rules will be replaced by the E-DIN 18008. Some P+S products have already been verified in accordance with E-DIN 18008.

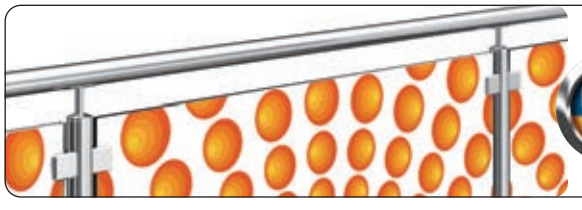
By means of the European Technical Approval (ETA), the usability and/or applicability of non-regulated designs such as balustrade glazing with clamp brackets are verified. The work carried out by planners and craftsmen is made easier by the fact that usually no further structural analysis and component testing are required. The ETA is valid throughout Europe.

The usefulness and applicability of unregulated construction types, such as balustrade glazing with clamp fixtures, is verified with the national technical approval. This makes it easier for planners and builders because no further statics or component tests are usually required. The AbZ is applies across all of Germany.



The general test certificate from building authorities (AbP) documents compliance requirements of a technical regulation. This is verified by certified inspectorates. In the case of pointed glass infills under TRAV (category C1), for example, the AbP applies to indoor use only. AbP's are issued for glazing regulated by the TRAV, for example. The AbP is applies across all of Germany.

An application for individual approval (ZiE) must be submitted to the relevant building authorities in the absence of any other regulations or approvals. The individual approval in each case only applies to that particular building project. Here, structural analyses and/or component testing and/or testing of the remaining load-bearing capacity may be necessary.



The ETB (technical regulations introduced for "components that protect against falling") guideline applies to all safety balustrades where no glass infills are used, such as TRESPA® panels.

planning process and time required

- close customer relationship and personal planning assistance

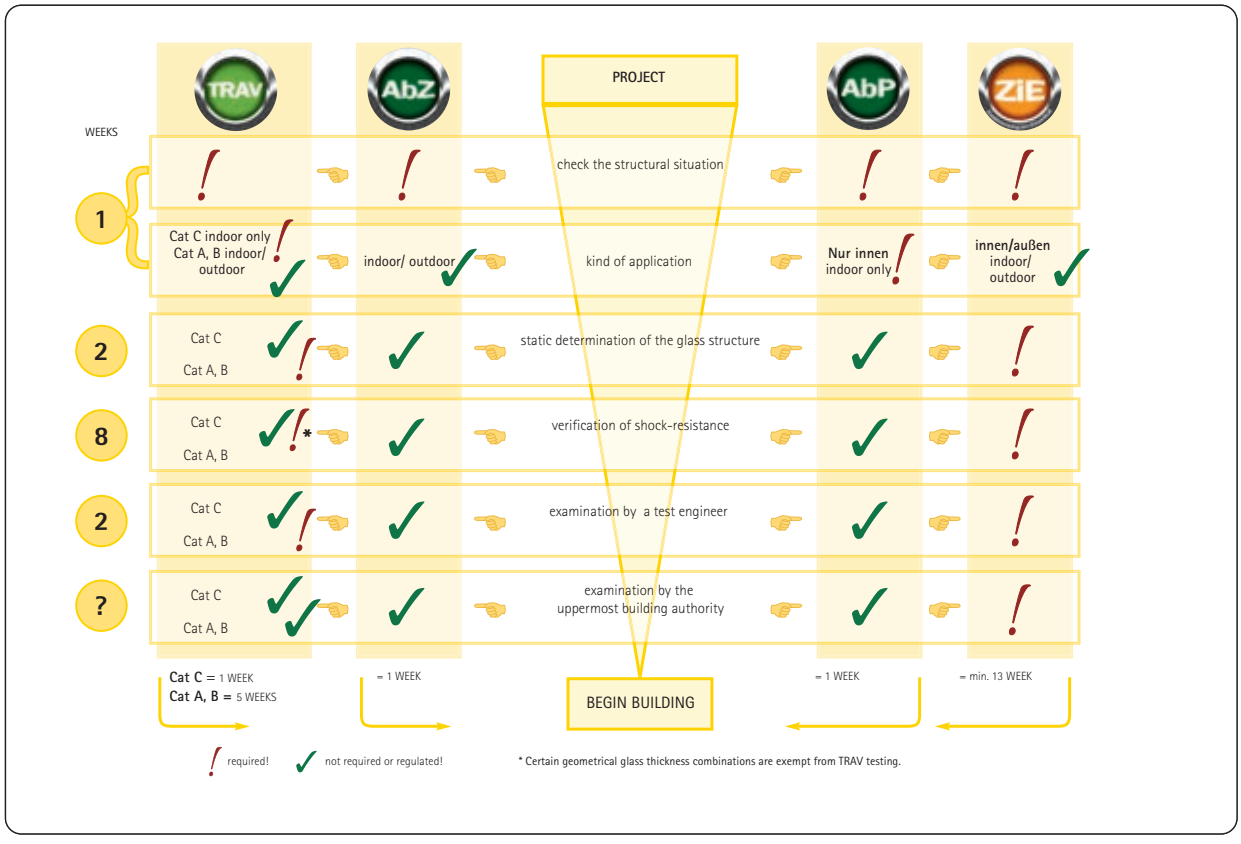
infill

IN BRIEF

Pauli + Sohn can provide national technical approvals (AbZ) in all relevant areas of glass construction.

balcony glazing application, Ahlbeck

The applicability of the regulations e.g. (TRAV) and AbZ, ETA or AbP has a significant influence on the planning and safety process. When building according to an AbZ or TRAV, you can order fittings and glass immediately. Custom solutions with individual approval (ZiE) and their individual planning steps can take anything from several weeks up to several months and there may be additional costs.
In certain circumstances where there are insignificant deviations from the AbZ or a technical regulation, unbureaucratic solutions can often be found quickly. Contact us!



FAQ, building law and structural analysis

What is required and what is not?

The building law situation in the glass sector will not become easier in Germany. On the one hand, there are technical rules and a glass standard that has not been implemented yet. On the other, terms such as individual approval (ZiE) or national technical approval (AbZ) are often used. The cases in which structural analysis are required are also often not clear to laypersons. As soon as a small change is made, this can have a significant impact on the building law situation. If everything was previously covered by an AbZ, an individual approval (ZiE) including structural analysis and component testing are suddenly now required. Since the entire building law alone would fill a complete book, only some important issues are addressed here.
If you have any questions or problems, please do not hesitate to contact us directly.

? Is a structural analysis always required?

! A structural analysis is required whenever loads (e.g. wind load) are applied. For balustrades, this means that structural analyses must almost always be carried out! However, design diagrams as provided in the AbZ Z-70.2-28 are often useful here.

? What aspects have to be observed for deviations from the structures verified in the TRAV?

! For balustrades deviating from the technical rules for the use of glass safety barriers (TRAV), the verification can also be provided by means of a general test certificate from building authorities (AbP) instead of an individual approval (ZiE), since pendulum impact tests are regulated by the TRAV.

? Is an AbP possible for french balconies?

! Unfortunately, a general test certificate from building authorities (AbP) is not possible for french balconies with a free glass edge, since the glazing cannot be classified in accordance with the categories of the technical rules for the use of glass safety barriers (TRAV) unless a handrail is mounted.

? Are there any problems with free, unprotected glass edges?

! Free glass edges must always be considered problematic and require more detailed considerations and, in most cases, an individual approval (ZiE). This is unfortunately often the case for french balconies.

? Is the verification of the glass panel sufficient?

! Not only the glass panel itself, but also beam, posts and anchorage (screw anchors) must be verified.

? Do verifications have to be provided for sample panels?

! Sample panels always require an individual approval unless they are trapezoid panels according to the data set out in the technical rules for the use of glass safety barriers (TRAV).

? How high are the requirements to be met by free glass edges?

! For designs with a free glass edge (e.g. french balcony), the impact resistance requirements are particularly high, since a previously damaged panel must be assumed. As a consequence, the required pendulum impact tests are accordingly strict.

New glass standard E-DIN 18008:

In the new glass standard E-DIN 18008, safety barrier glazing is dealt with in part 4. Here, there will be some supplements regarding the categories, the verification of impact resistance and the verification of an edge protection. Even if this standard is not implemented by the building authorities before 2013, this has now already become the state of the art. Some products by Pauli + Sohn have already been verified in accordance with E-DIN 18008.

types of glass

Wide variety and substantial differences: The types of glass which can be used for safety barrier glazing – especially for glazing with clamps according to national technical approval (AbZ) are manifold. The uncertainty among the users is correspondingly high: In this respect, some important remarks are listed below:

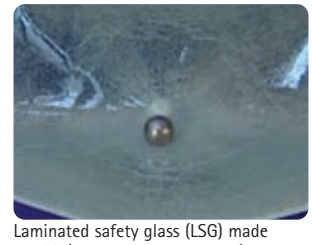
Monolithic TSG-H (toughened safety glass)

- Only permissible with heat-soak test and, for instance, pursuant to AbZ Z-70.2-28
- Structurally most resistant in terms of loads (wind loads), since the compound effect for laminated safety glass (LSG) may not be used for calculation; i.e., for applications in outdoor areas and for high wind loads, only a design in monolithic TZSG-H (toughened safety glass) is often possible due to structural reasons
- For designs in accordance with a national technical approval (AbZ), the required pendulum impact test was obviously passed
- High risk potential in the event of vandalism. Thus, please ensure that all edges are protected in accordance with AbZ.


Monolithic TSG-H (toughened safety glass)

Laminated safety glass (LSG) made of TSG (toughened safety glass)

- Relatively high load-bearing capacity
- Remaining load-bearing capacity in the event of glass breakage. In the event of an impact, however, there is a slight risk that the entire panel is pulled out of its mounting
- For designs in accordance with a national technical approval (AbZ) or technical rules for the use of glass safety barriers (TRAV), the required pendulum impact test was obviously passed
- Low risk potential in the event of vandalism


Laminated safety glass (LSG) made of TSG (toughened safety glass)

Laminated safety glass (LSG) made of partially toughened safety glass (PTSG)

- Relatively low load-bearing capacity
- For designs in accordance with a national technical approval (AbZ) or technical rules for the use of glass safety barriers (TRAV), the required pendulum impact test was obviously passed
- Low risk potential in the event of vandalism


Laminated safety glass (LSG) made of partially toughened safety glass (PTSG)

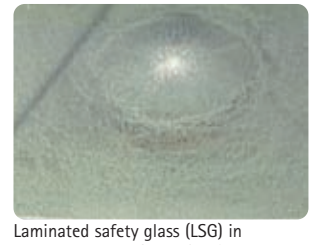
Laminated safety glass (LSG) made of Float

- Very low load-bearing capacity; thus, often not possible for outdoor use due to structural reasons
- Not suitable for panels which are supported by means of point fixings mounted in drillings
- For designs in accordance with a national technical approval (AbZ), the required pendulum impact test was obviously passed
- Low risk potential in the event of vandalism


Laminated safety glass (LSG) made of Float

Laminated safety glass (LSG) in connection with SentryGlas®

- Not regulated according to technical rules for the use of glass safety barriers (TRAV), whereby a national technical approval (AbZ) is available for SentryGlas® itself
- Very high load-bearing capacity, since the compound may be used for calculation
- High impact resistance because of the very rigid behaviour
- Well suited for balustrades with special requirements such as a free glass edge


Laminated safety glass (LSG) in connection with SentryGlas®

plan correctly

- general information

infill | rail | posts

1. post handrail, fixture system and infill selection

2. basic loads and systems

3. posts/handrail verification
-> see page 204
If mounting fixture systems or infills to other posts, separate verification is required.

4. fixture system and infill verification (impact and statics)

indoor

glass

TRESPA®

page 207 | page 207 | page 218 | page 220 | page 236 | page 238 | page 230 | page 231 | page 214

outdoor

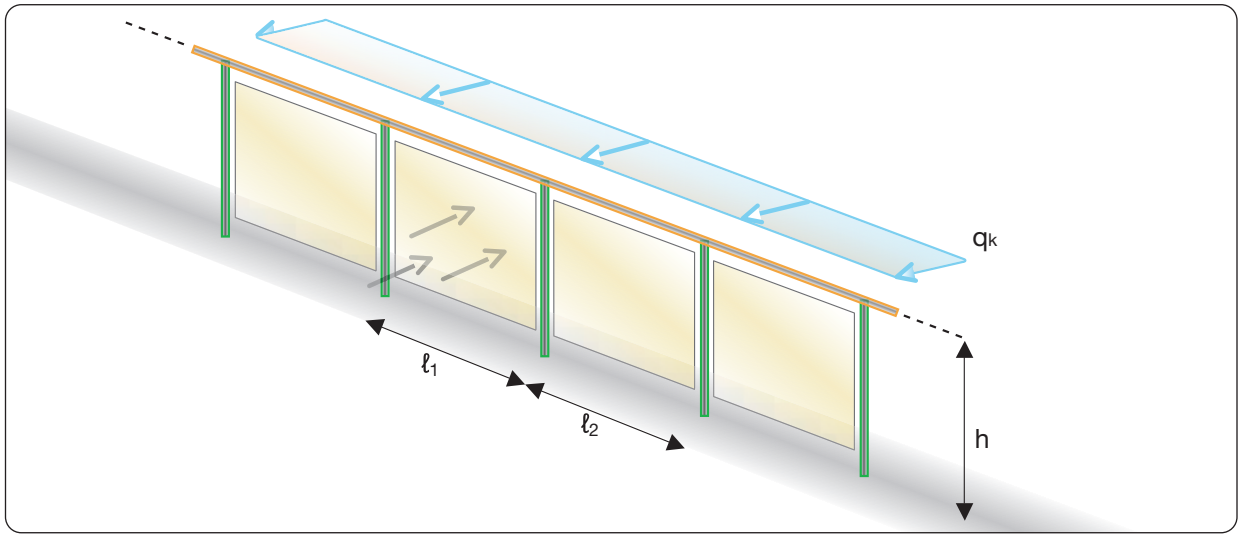
page 207 | page 207 | page 218 | page 220 | page 236 | page 238 | page 230 | page 231 | page 214

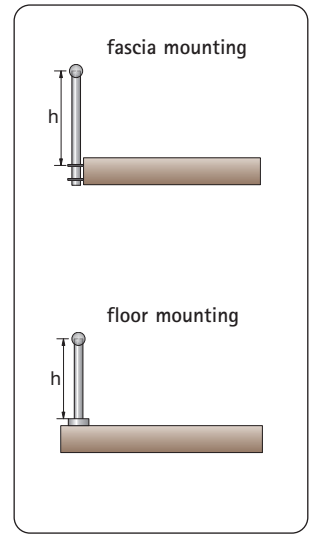
balustrade verification

2.

basics for the computation of stress

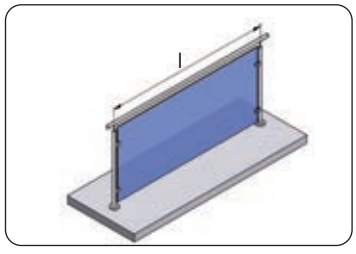
This page shows some of the basics required in advance in order to verify your balustrade quickly and simply. The total load consists of wind and rail loads. The installation site determines the different post heights (e.g., single fields or corners). This is also the basis for the verification.



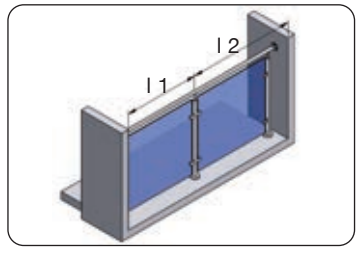


rail load | wind load | infill + mounting | rail | posts

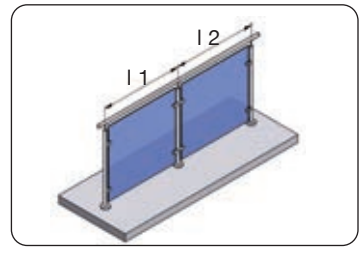
possible applications



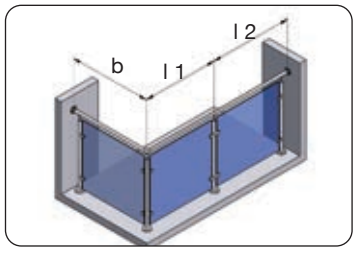
individual single



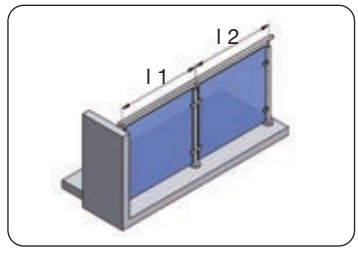
straight between walls



straight and free-standing



angled corners



end area without wall mounting

2. categories of use for ceilings, stairs and balconies

category		application	examples
A	A1	attic	A1> Roof space with a clearance height of up to 1.80 m which is not suited for residential purposes, but can be accessed.
	A2	residential and common rooms	A2> Ceilings with sufficient transverse distribution of the loads. Rooms and corridors in residential buildings, patient bedrooms in hospitals, hotel rooms including associated kitchens and bathrooms.
	A3		A3> like A2, but without sufficient transverse distribution of the loads.
B	B1	office space, work space, corridors	B1> Corridors in office buildings, office space, doctor's surgeries, nurses' rooms, common rooms including corridors, enclosures for small domestic animals.
	B2		B2> Corridors in hospitals, hotels, retirement homes, boarding schools etc.; kitchens and treatment rooms including operating rooms without heavy machinery and equipment; cellar rooms in residential buildings.
	B3		B3> All examples listed under **B1 and B2**, but with heavy machinery and equipment.
C	C1	rooms, meeting rooms and space that can be used for crowds of people (except for the categories defined under **A, B, D and L**)	C1> Space equipped with tables; e.g. day care centres, crèches, class rooms, cafés, restaurants, dining rooms, reading rooms, reception rooms, teachers' rooms.
	C2		C2> Space with fixed seating; e.g. space in churches, theatres or cinemas, congress halls, lecture theatres, waiting rooms.
	C3		C3> Freely accessible space; e.g. museum and exhibition areas, entrance areas in public buildings, hotels, court cellar ceilings that are not accessible to vehicles as well as the corridors listed under category of use C1 to C3.
	C4		C4> Sports and playing areas; e.g. ballrooms, sports halls, gymnastics and body building rooms, stages.
	C5		C5> Space for large crowds of people, e.g. in buildings such as concert halls, terraces and entrance areas as well as stands with fixed seating.
	C6		C6> Space which is used regularly by significant crowds of people, stands without fixed seating.
D	D1	sales rooms	D1> Space of salerooms with a floor space of up to 50 m² in residential, office and comparable buildings.
	D2		D2> Space in retail stores and department stores.
	D3		D3> Space like **D2**, but with increased individual loads due to high storage racks.
E	E1.1	warehouses, factories and workshops, stables, storage space and accesses	E1.1> Space in factories[a] and workshops[a] with light-duty operation and space in stables for cattle and horses.
	E1.2		E1.2> General storage space including libraries.
	E2.1		E2.1> Space in factories[a] and workshops[a] with medium- or heavy-duty operation.
T^d	T1	stairs and stair landings	T1> Stairs and stair landings in residential and office buildings.
	T2		T2> All stairs and stair landings which cannot be classified as T1 or T3 category.
	T3		T3> Accesses and stairs of stands without fixed seating, used as emergency escape routes.
Z^d		accesses, balconies etc.	Roof-top terraces, pergolas, loggias etc., balconies, stair tower landings.

a: Payloads in factories and workshops are classified as predominantly static loads. In individual cases, loads which repeat themselves frequently must, depending on the circumstances, be classified as not predominantly static loads.

b: These values are minimum values. In cases, in which higher loads prevail, the respective higher loads must be used for calculation.

c: For the distribution of the loads in rooms with ceilings without sufficient transverse distribution on supporting components, the stated value may be reduced by 0.5kN/m².

d: Regarding the impact combinations, the impact must be assigned the category of use of the respective building or part of the building.

e: If the verification of the local minimum load-bearing capacity is required (e.g. for components without sufficient transverse distribution of the loads), it must be provided on the basis of the characteristic values for the individual load Qk without any superimposition of the distributed load qk. The contact area for Qk consists of a square with a side length of 50 mm.

loads

2.

horizontal loads on partition walls and safety barriers

loaded space according to category		horizontal payload qk kN/m
(1)	A, B1, H, F1[b] to F4[b], T1, Z[a]	0,5
(2)	B2, B3, C1 to C4, D, E1.1[c], E1.2[c], E2.1[c] bis E2.5[c], FL1[b] to FL6[b], HC, T2, Z[a]	1,0
(3)	C5, C6, T3	2,0

(2) The horizontal payloads according to Table 6.12DE must be used for calculation in full for the falling direction and with 50 % for the opposite direction, however, at least with a value of 0.5kN/m.

a: For category Z, the classification to line 1 and/or line 2 must be carried out in accordance with the associated relevant category of use pursuant to Table 6.1DE.

b: Impact is excluded by means of design features.

c: For space of category E1.1, E1.2, E2.1 to E2.5 which is only inspected for monitoring and maintenance purposes, the loads must be defined in coordination with the client, however at least with a value of 0.5kN/m.

2. →

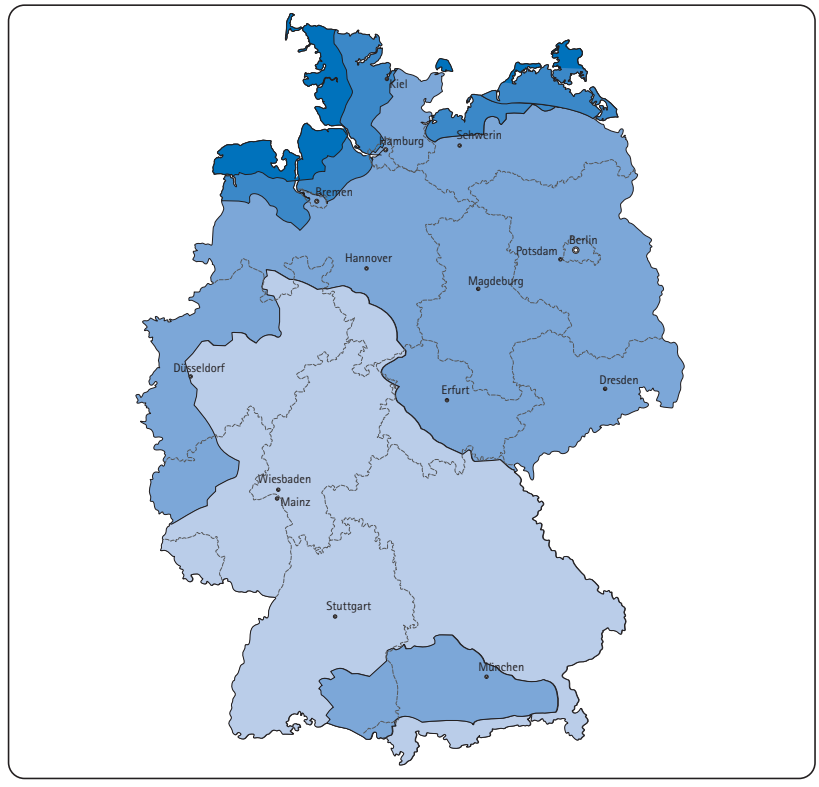
loads

wind load

Besides snow, buildings and construction elements are also subject to wind loads. The wind load - as with snow - is a climatic factor with variable effects. Of course, a lot depends on, where the balustrade built: the wind load on an island in the North Sea will be greater than in a city.

1. geographical location	Depending on the geographical location,, the site for the building project can be assigned to a zone.
2. (a) wind load zone (b) speed pressure	Depending on the site of installation and building height, the speed pressure q can now be determined.
3. determination of aerodynamic coefficients c_p for balustrades	depends on the height ratio
4. wind load	$w = q \times c_p$

NEW: According to EC1 (Eurocode 1), the beam and wind load must be superimposed.



loads

2. →

simplified speed pressures for buildings of up to 25 m in height

wind load zone	speed pressure q in kN/m² at a building height h to a limit of		
	h < 10 m	10 m < h ≤ 18 m	18 m < h ≤ 25 m
1 inland	0,50	0,65	0,75
2 inland	0,65	0,80	0,90
Baltic Sea coast and islands	0,85	1,00	1,10
3 inland	0,80	0,95	1,10
Baltic Sea coast and islands	1,05	1,20	1,30
4 inland	0,95	1,15	1,30
Baltic and North Sea coasts	1,25	1,40	1,55
Baltic Sea islands			
North Sea islands	1,40	-	-

INFO

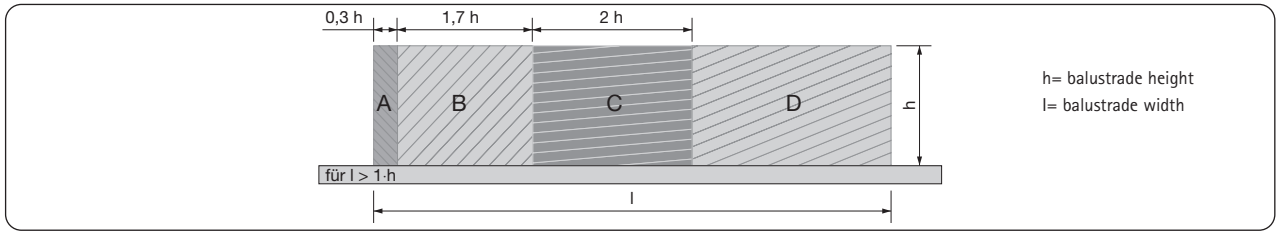
Static verification or load determination may only be performed by recognised structural engineers. Therefore, please have the load values determined checked!

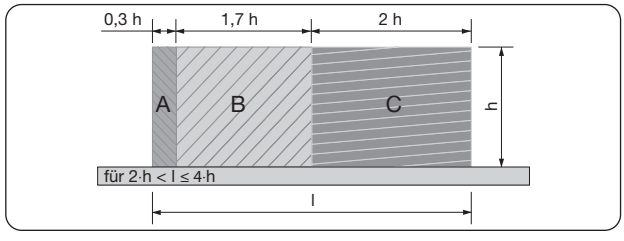
aerodynamic coefficients c_p for balustrades

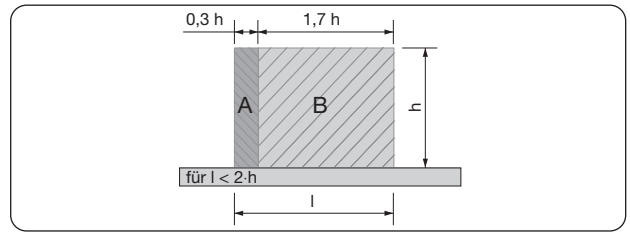
	zone		A	B	C	D
	straight wall	l/h_b ≤ 3	2,3	1,4	1,2	1,2
		l/h_b = 5	2,9	1,8	1,4	1,2
		l/h_b ≥ 10	3,4	2,1	1,7	1,2
	angled wall with side length ≥ h_b		±2,1	±1,8	±1,4	±1,2

extract from DIN 1055-4

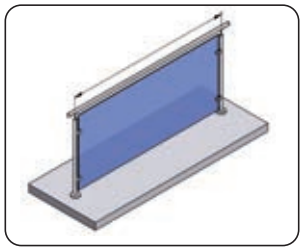
view of glass infills







3. posts/handrail verification



floor anchor standard Ø 38 mm

item no.: 10209742A2 (1)

floor anchor reinforced Ø 38 mm

item no.: 10209838A2 (2)

floor anchor reinforced Ø 44 mm

item no.: 10210044A2 (3)

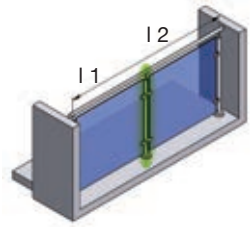
maximum post spacing values

post spacings, individual railing

post height	cross section Ø x wall width	horizontal payload *qk* 0,5 kN/m	1,0 kN/m	2,0 kN/m
1000 mm, item no.: 10209838A2 (2)	42,4 x 2 mm	3522 mm	1761 mm	880 mm
1000 mm, item no.: 10209742A2 (1)		2041 mm	1020 mm	510 mm
1100 mm, item no.: 10209838A2 (2)		3522 mm	1761 mm	880 mm
1100 mm, item no.: 10209742A2 (1)		1855 mm	928 mm	464 mm
1200 mm, item no.: 10209742A2 (1)		1701 mm	850 mm	425 mm
1000 mm, item no.: 10210044A2 (3)	48,3 x 2 mm	4736 mm	2368 mm	1184 mm
1100 mm, item no.: 10210044A2 (3)		4736 mm	2368 mm	1184 mm

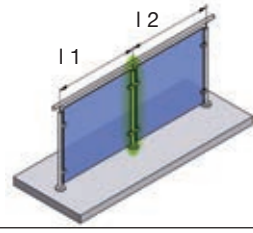
multiplier for table values in other applications

straight between walls



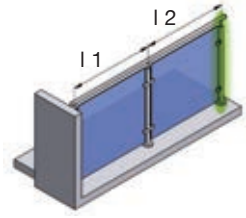
for inner posts
factor 0,5

straight and free-standing



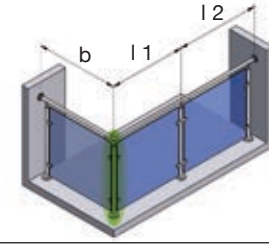
for inner posts
factor 0,5

end area without wall mounting



for outside posts
factor 1,0

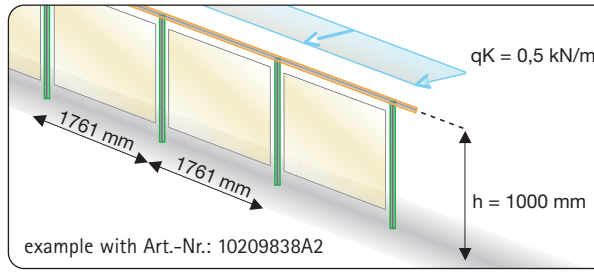
angled corners



for corner posts
factor 1,0

For other mounting conditions, the table values should be multiplied by the respective factor.

example: continuous railing, rail load 0,5 kN/m



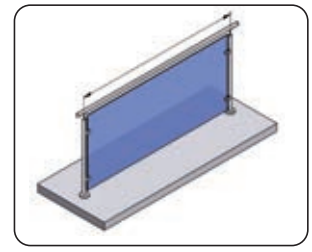
h = 1000 mm
post = Ø 42,4 x 2 mm
maximum possible distance between posts
3522 mm x 0,5 = 1761 mm

Confirmation for infill is not yet included!

connection to the building

3.

In addition to the structural analysis of infills, posts and handrails as well as to the verification of impact resistance, the load-bearing capacity of a railing is as important as the connection to the building. The planning should be carried out in a timely manner, since often many framework conditions such as applied upgraded insulation, sealing elements or posts that are very close to the edges must be considered. In addition to concrete, often other substrates must be taken into account. In general, it must be ensured that only a screw anchor system for which a national technical approval (AbZ) is available may be used. Furthermore, we recommend, for anchorages in concrete, to always use a system which is certified for the cracked tensile zone. Renowned anchor manufacturers often assist you in this. Of course, we can also provide you with the contact details of a competent engineering office. Please feel free to contact us.



floor anchor reinforced Ø 38 mm

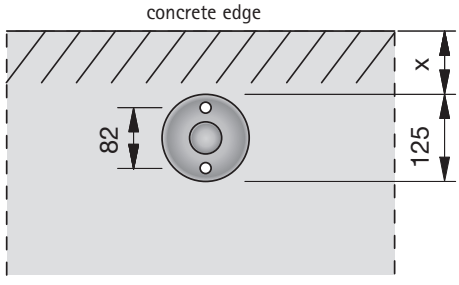
item no.:
10209838A2 (2)

floor anchor reinforced Ø 44 mm

item no.:
10210044A2 (3)

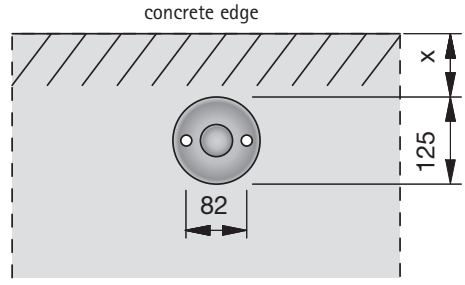
values of the screw anchor distances

A



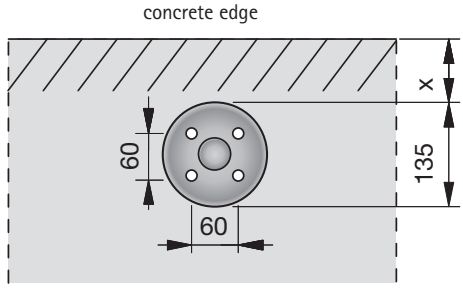
floor anchor (2) reinforced – for round tube Ø 42,4 mm

B



floor anchor (2) reinforced – for round tube Ø 42,4 mm

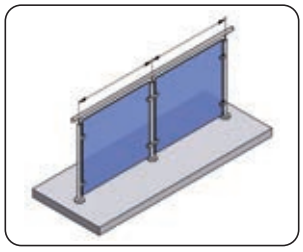
C



floor anchor (3) reinforced – for round tube Ø 48,3 mm

On the following page, you will find a table including design values.

3.



floor anchor reinforced Ø 38 mm

item no.:
10209838A2 (2)

floor anchor reinforced Ø 44 mm

item no.:
10210044A2 (3)

connection to the building

framework conditions

We would like to point out that each case must be verified separately. The following table only serves as pre-dimensioning and applies only to the stated installation situations.

- concrete C20/25
- hammer drilling
- dry drilled hole
- normal reinforcement
- screw anchor HILTI HIT-HY200 M12
- created using HILTI ProfisAnchor 2.3.2

variant	rail load	x	balustrade height	max. post spacing	anchoring depth of the screw anchor
A	0,5 kN/m	40 mm	900 mm	1600 mm	73 mm
A	1,0 kN/m	40 mm	1000 mm	1250 mm	170 mm
B	0,5 kN/m	5 mm	900 mm	1500 mm	168 mm
B	1,0 kN/m	5 mm	1000 mm	650 mm	164 mm
C	0,5 kN/m	23 mm	900 mm	1900 mm	70 mm
C	1,0 kN/m	23 mm	1000 mm	1450 mm	166 mm

clamp and infill verification AbZ Z-70.2-28 and ETA-11/0380

- simple application of the AbZ and ETA

The following pages show the approved clamps according to the AbZ and ETA. We will show briefly on this page how to choose the correct clamps by reading the AbZ and ETA tables. We would be happy to assist you with your selection.

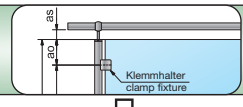
1. select floor or fascia mounting

2a floor mounting

2b fascia mounting

- with locking plate
- with locking pin

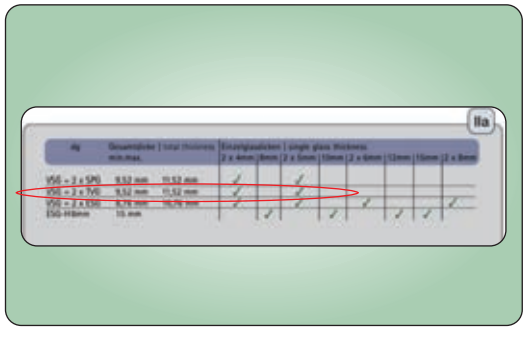
3. check the dimensional range



check the dimensional range

4a determine the indoor glass

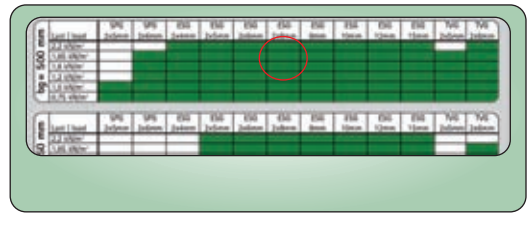
glass thickness selection



4b determine the outdoor glass

fill out the checklist, wind load recommendation is returned by P+S

select the glass thickness according to the rated value



4.1

ETA	AbZ
load-bearing capacity	glass statics available ✓
shock resistance	covered by AbZ/ETA ✓
ZiE from building authority	application not required –

We can support you!

clamp and infill verification

- clamps according to AbZ Z-70.2-28 and ETA-11/0380 with glass infills

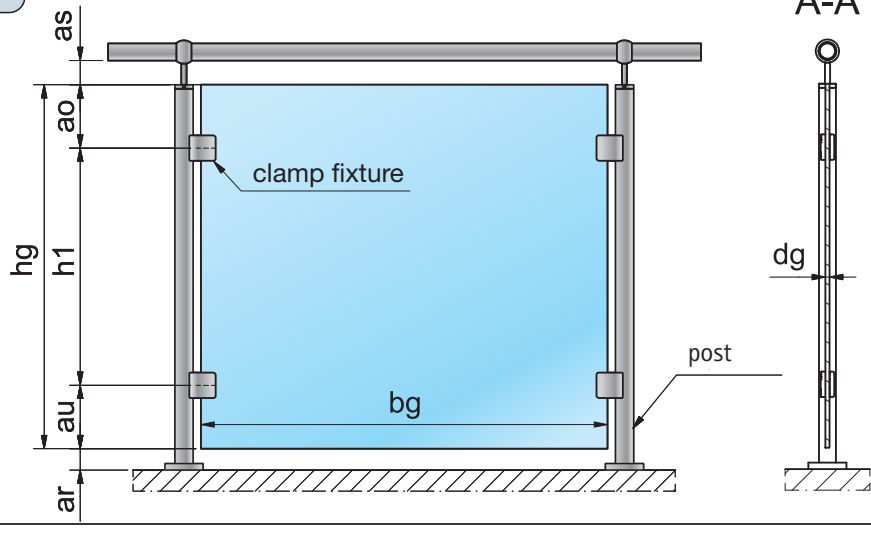
This extract from the AbZ/ETA show the dimensions of railing infills for clamps **without locking pins and without locking plates.**

procedure:

= I + II

= I + II + III

I



	min.	max.
bg	500 mm	1500 mm
ao	150 mm	250 mm
h1	500 mm	700 mm
au	150 mm	250 mm
hg	800 mm	1000 mm
as	10 mm	50*/120**mm
ar	10 mm	50*/120**mm

*without edge protection | **with edge protection

- all clamps according to the AbZ and ETA without locking pins or locking plates

application without locking pins or locking plates

item no.

4800 4801 4802

4804 4805 4806 4807 9002 9006

4841 4845 4846 4847 4848 4859 9044 9045 9047 9048 9341 9343 9344 9347 9348 9349

4890 4891 4893 4894 4896 4897 9082 9086

item no.

4808 4809 4810 4811 4812 4842 4843 4852 4853 4854 9300 9301 9302 9303 9304 9305 9306 9307 9308 9309

4813 4814 4816 4817 4821 4827 9013 9014 9016 9017 9320 9321 9322 9323 9324 9325 9326 9327 9328 9329

11110 11112 11113 11117 11118 11119

9511 9512 9513 9521 9522 9523

item no.

9330 9331 9332 9333 9334 9335 9336 9337 9338 9339

4831 4832 4836 4837

clamp and infill verification

glass structure for indoor use (for clamps without locking pins or locking plates)

II

glass structure	total thickness min.	total thickness max.	single glass thickness 2 x 4mm	8mm	2 x 5mm	10mm	2 x 6mm	12mm	15mm	2 x 8mm
VSG = 2 x SPG	9,52 mm	11,52 mm	✓		✓					
VSG = 2 x TVG	9,52 mm	11,52 mm	✓		✓					
VSG = 2 x ESG	8,76 mm	16,76 mm	✓		✓		✓			✓
ESG-H	8 mm	15 mm		✓		✓		✓	✓	

defining the glass thickness

glass structure for outdoor use with wind load (for clamps without locking pins or locking plates)

III

Possible single glass thickness for outdoor applications (for the thickness of the PVB film, see indoor areas).
Depending on the wind load and glass width (bg) without locking pins or locking plates (green fields are possible).

bg = 500 mm

wind load	SPG 2x5mm	SPG 2x6mm	ESG 2x4mm	ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm	TVG 2x5mm	TVG 2x6mm
2,2 kN/m²			■	■	■	■	■	■	■	■		■
1,65 kN/m²		■	■	■	■	■	■	■	■	■	■	■
1,6 kN/m²		■	■	■	■	■	■	■	■	■	■	■
1,2 kN/m²		■	■	■	■	■	■	■	■	■	■	■
1,0 kN/m²	■	■	■	■	■	■	■	■	■	■	■	■
0,75 kN/m²	■	■	■	■	■	■	■	■	■	■	■	■

bg = 750 mm

wind load		SPG 2x6mm	ESG 2x4mm	ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm	TVG 2x5mm	TVG 2x6mm
2,2 kN/m²				■	■	■	■	■	■	■		
1,65 kN/m²				■	■	■	■	■	■	■		■
1,6 kN/m²				■	■	■	■	■	■	■		■
1,2 kN/m²			■	■	■	■	■	■	■	■	■	■
1,0 kN/m²		■	■	■	■	■	■	■	■	■	■	■
0,75 kN/m²		■	■	■	■	■	■	■	■	■	■	■

bg = 1000 mm

wind load			ESG 2x4mm	ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm	TVG 2x5mm	TVG 2x6mm
2,2 kN/m²						■		■	■	■		
1,65 kN/m²						■	■	■	■	■		
1,6 kN/m²					■	■	■	■	■	■		
1,2 kN/m²				■	■	■	■	■	■	■		■
1,0 kN/m²				■	■	■	■	■	■	■		■
0,75 kN/m²			■	■	■	■	■	■	■	■	■	■

bg = 1250 mm

wind load				ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm		TVG 2x6mm
2,2 kN/m²								■	■	■		
1,65 kN/m²						■		■	■	■		
1,6 kN/m²						■		■	■	■		
1,2 kN/m²					■	■		■	■	■		
1,0 kN/m²					■	■	■	■	■	■		
0,75 kN/m²				■	■	■	■	■	■	■		■

bg = 1500 mm

wind load					ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm		
2,2 kN/m²									■	■		
1,65 kN/m²									■	■		
1,6 kN/m²									■	■		
1,2 kN/m²								■	■	■		
1,0 kN/m²						■		■	■	■		
0,75 kN/m²					■	■	■	■	■	■		

defining the glass thickness

INFO

loads = characteristic loads

clamp and infill verification

- clamps according to AbZ Z-70.2-28 and ETA-11/0380 with glass infills

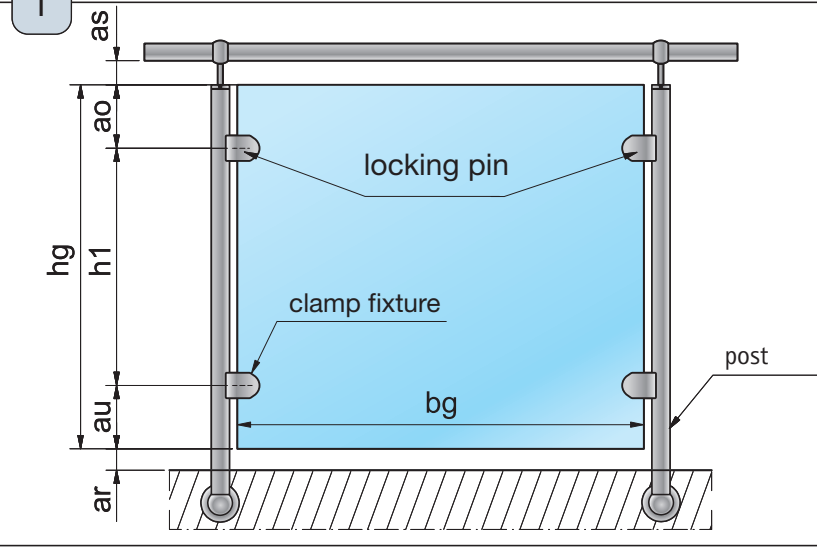
This extract from the AbZ/ETA show the dimensions of railing infills for clamps **with locking pins.**

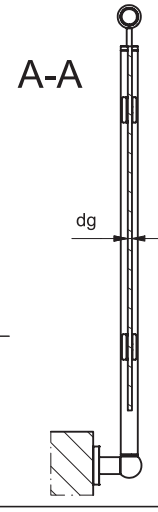
procedure:

indoor = I + II

outdoor = I + II + III

I





	min.	max.
bg	500 mm	1500 mm
ao	150 mm	250 mm
h1	500 mm	700 mm
au	150 mm	250 mm
hg	800 mm	1000 mm
as	10 mm	50*/120**mm
ar	10 mm	50*/120**mm

*without edge protection | **with edge protection

application with locking pin
e. g. 4820VA

- all clamps according to the AbZ and ETA with locking pins

locking pin possible for upper or lower clamps

item no.

4821 4827 9013 9014 9016 9017

9320 9321 9324 9325 9328 9329

This means two drillings at the top of the glass or two drillings at the bottom of the glass. The location of the hole depends on the used clamp used. From page 76 onwards.

locking pin only possible for upper clamps

item no.

9521 9522 9523 9721 9722 9723

This means two drillings at the top of the glass. The location of the hole depends on the clamp used. From page 87 onwards.

clamp and infill verification

glass structure for indoor use (for clamps with locking pins)

II

glass structure	total thickness min.	total thickness max.	single glass thickness 2 x 4mm	8mm	2 x 5mm	10mm	2 x 6mm	12mm
VSG = 2 x SPG	9,52 mm	11,52 mm	✓		✓			
VSG = 2 x TVG	9,52 mm	11,52 mm	✓		✓			
VSG = 2 x ESG	8,76 mm	16,76 mm	✓		✓		✓	
ESG-H	8 mm	15 mm		✓		✓		✓

indoor

defining the glass thickness

glass structure for outdoor use with wind load (for clamps with locking pins)

III

Possible single glass thickness for outdoor applications (for the thickness of the PVB film, see indoor areas).
Depending on the wind load and glass width (bg) with locking pins (green fields are possible).

bg = 500 mm

wind load	ESG 2x4mm	ESG 2x5mm	ESG 2x6mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm
2,2 kN/m²						
1,65 kN/m²						
1,6 kN/m²						
1,2 kN/m²						
1,0 kN/m²						
0,75 kN/m²						

bg = 750 mm

wind load		ESG 2x5mm	ESG 2x6mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm
2,2 kN/m²						
1,65 kN/m²						
1,6 kN/m²						
1,2 kN/m²						
1,0 kN/m²						
0,75 kN/m²						

bg = 1000 mm

wind load		ESG 2x5mm	ESG 2x6mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm
2,2 kN/m²						
1,65 kN/m²						
1,6 kN/m²						
1,2 kN/m²						
1,0 kN/m²						
0,75 kN/m²						

bg = 1250 mm

wind load			ESG 2x6mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm
2,2 kN/m²						
1,65 kN/m²						
1,6 kN/m²						
1,2 kN/m²						
1,0 kN/m²						
0,75 kN/m²						

bg = 1500 mm

wind load					ESG-H 10mm	ESG-H 12mm
2,2 kN/m²						
1,65 kN/m²						
1,6 kN/m²						
1,2 kN/m²						
1,0 kN/m²						
0,75 kN/m²						

outdoor

defining the glass thickness

INFO

loads = characteristic loads

clamp and infill verification

- clamps according to AbZ Z-70.2-28 and ETA-11/0380 with glass infills

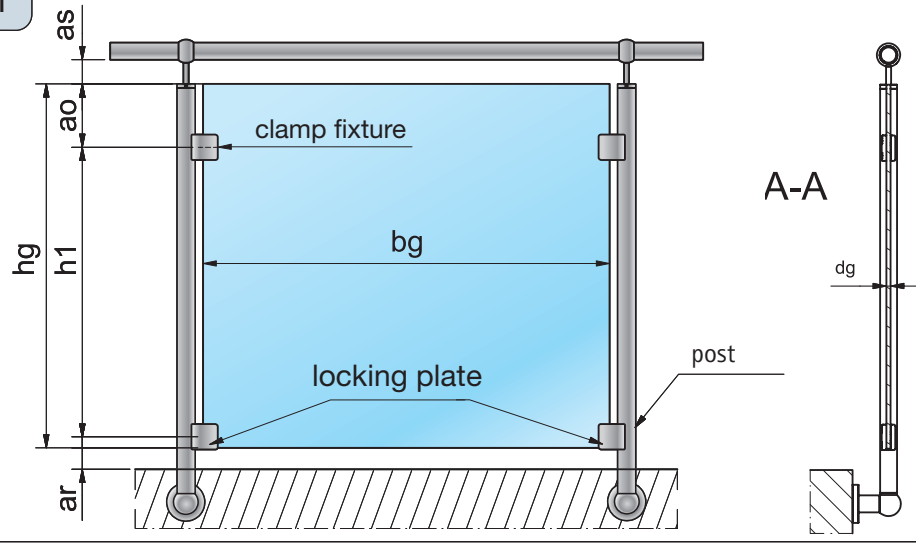
This extract from the AbZ/ETA show the dimensions of railing infills for using clamps **with locking plates.**

procedure:

indoor = I + II

outdoor = I + II + III

I



	min.	max.
bg	500 mm	1500 mm
ao	150 mm	250 mm
h1	***	
hg	800 mm	1000 mm
as	10 mm	50*/120**mm
ar	10 mm	50*/120**mm

*without edge protection | **with edge protection
***depending on the clamps used

application with locking plate
e. g. 4849VA

- all clamps according to the AbZ and ETA with locking plates

item no.

4800 4801 4802

4804 4805 4806 4807 9002 9006

4841 4845 4846 4847 4848 4859 9044 9045 9047 9048 9341 9343 9344 9347 9348 9349

item no.

4890 4891 4893 4894 4896 4897 9082 9086

9330 9331 9332 9333 9334 9335 9336 9337 9338 9339

clamp and infill verification

glass structure for indoor use (for clamps with locking plates)

II

glass structure	total thickness min.	total thickness max.	single glass thickness 2 x 4mm	8mm	2 x 5mm	10mm	2 x 6mm	12mm	15mm	2 x 8mm
VSG = 2 x ESG	8,76 mm	16,76 mm	✓		✓		✓			✓
ESG-H	8 mm	15 mm		✓		✓		✓	✓	

defining the glass thickness

glass structure for outdoor use with wind load (for clamps with locking plates)

III

Possible single glass thickness for outdoor applications (for the thickness of the PVB film, see indoor areas).
Depending on the wind load and glass width (bg) with locking plates (green fields are possible).

bg = 500 mm

wind load	ESG 2x4mm	ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm
2,2 kN/m²		■	■	■	■	■	■	■
1,65 kN/m²		■	■	■	■	■	■	■
1,6 kN/m²		■	■	■	■	■	■	■
1,2 kN/m²	■	■	■	■	■	■	■	■
1,0 kN/m²	■	■	■	■	■	■	■	■
0,75 kN/m²	■	■	■	■	■	■	■	■

bg = 750 mm

wind load		ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm
2,2 kN/m²			■	■	■	■	■	■
1,65 kN/m²			■	■	■	■	■	■
1,6 kN/m²			■	■	■	■	■	■
1,2 kN/m²		■	■	■	■	■	■	■
1,0 kN/m²		■	■	■	■	■	■	■
0,75 kN/m²		■	■	■	■	■	■	■

bg = 1000 mm

wind load		ESG 2x5mm	ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm
2,2 kN/m²				■			■	■
1,65 kN/m²				■	■	■	■	■
1,6 kN/m²				■	■	■	■	■
1,2 kN/m²			■	■	■	■	■	■
1,0 kN/m²			■	■	■	■	■	■
0,75 kN/m²		■	■	■	■	■	■	■

bg = 1250 mm

wind load			ESG 2x6mm	ESG 2x8mm	ESG-H 8mm	ESG-H 10mm	ESG-H 12mm	ESG-H 15mm
2,2 kN/m²							■	■
1,65 kN/m²				■			■	■
1,6 kN/m²				■			■	■
1,2 kN/m²				■			■	■
1,0 kN/m²				■		■	■	■
0,75 kN/m²			■	■	■	■	■	■

bg = 1500 mm

wind load				ESG 2x8mm		ESG-H 10mm	ESG-H 12mm	ESG-H 15mm
2,2 kN/m²								■
1,65 kN/m²								■
1,6 kN/m²								■
1,2 kN/m²							■	■
1,0 kN/m²				■			■	■
0,75 kN/m²				■		■	■	■

defining the glass thickness

INFO

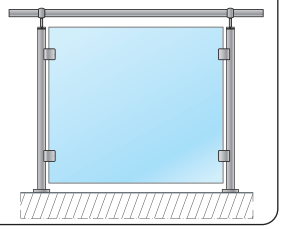
loads = characteristic loads

plan correctly

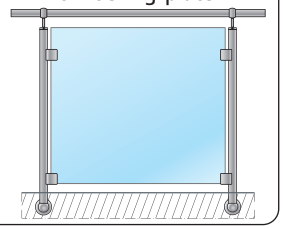
- Check list for clamp fixtures used for the installation in outdoor areas according to AbZ Z-70.2-28 and ETA-11/0380

1. railing types

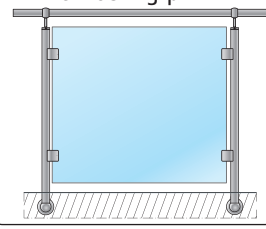
☐ floor mounting:



☐ fascia mounting with locking plate:



☐ fascia mounting with locking pin



2. posts

☐ round tube:

☐ square tube:

☐ other:

3. handrail

☐ round tube:

☐ square tube:

☐ without handrail:
ATTENTION!
National Technical Approval is not valid!!

4. glass fixation

☐ clamp fixture:

5. mounting type

☐ indoor

☐ outdoor

6. required type of glass and film

type of glass:

☐ Mono = 1x ESG-H
_____mm

☐ VSG = ESG
2 x _____mm

☐ VSG = 2x TVG
(Heat Streng-thened Glass)
2 x_____mm

☐ VSG = 2x Float
(Float-Glass)
2 x _____mm

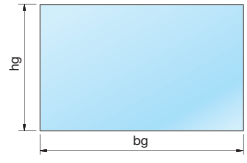
film:

☐ PVB
_____mm

☐ SentryGlas®
_____mm

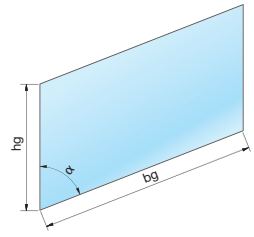
7. glass dimensions

☐



bg x hg = _____mm
_____piece

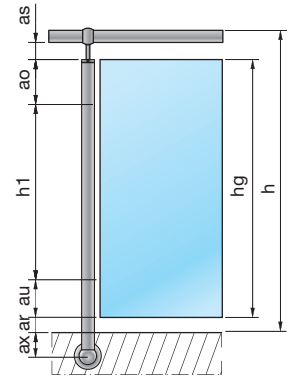
☐



bg x hg = _____mm α = ____
_____piece

☐ sample panel please enclose drawing _____piece

8. distances



as = _____
ao = _____
h1 = _____
au = _____
ar = _____
ax = (*)_____
h = _____
hg = _____
(*) only for facia mounting post spacing (axe dimension) = _____

9. impacts of wind (information only required for applications in outdoor areas)

☐ **There is no information about the load or building geometry available.**

We would like to point out that the loads to be used for calculation vary greatly due to the new load assumption standard EC1. Therefore, the required glass thickness can only be determined and, thus, planning security ensured if corresponding information is provided. This is why we are only able to determine the required glass thickness for selected load levels.

☐ Characteristic value of the impacts (usually wind load) q = _____ kN/m²

☐ **The characteristic value of the impacts is to be determined by P+S.**

Due to the new load standard EC1, determining the load has become more complicated. This load standard must be applied to all national technical approvals (AbZ) and all technical rules (i.e. e.g. also technical rules for linearly mounted glazing (TRLV)). Pauli + Sohn will assist you in determining the loads to be used for calculation. We would like to point out to you that structural analyses or load determinations can only be provided by a recognised structural engineer. This is why the value determined by P+S may only be considered to be a reference value and therefore not binding!

For the determination of the design value of the variable impact, it is absolutely necessary to provide the following information:

place of installation: _____ **PLZ:** _____

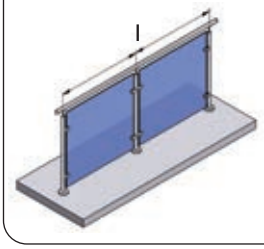
☐ inland ☐ North and Baltic Sea coasts and Baltic Sea islands ☐ North Sea islands

installation height above ground level h = _____ building height H = _____

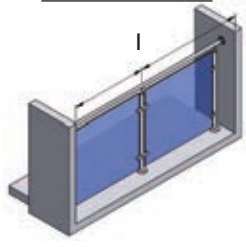
balustrade length l = _____ balustrade width b = _____

balustrade type:

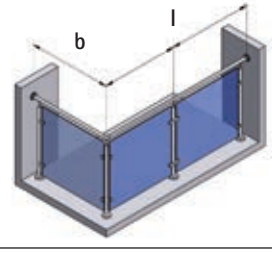
☐ straight and free-standing:



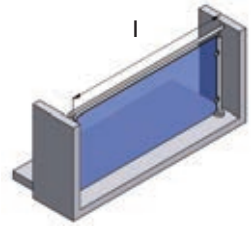
☐ straight between walls:



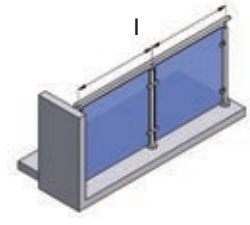
☐ angled corners:



☐ individual single:



☐ end area without wall mounting:



☐ For the determination of the design value of the variable impact, the following information is helpful for us, but not required:

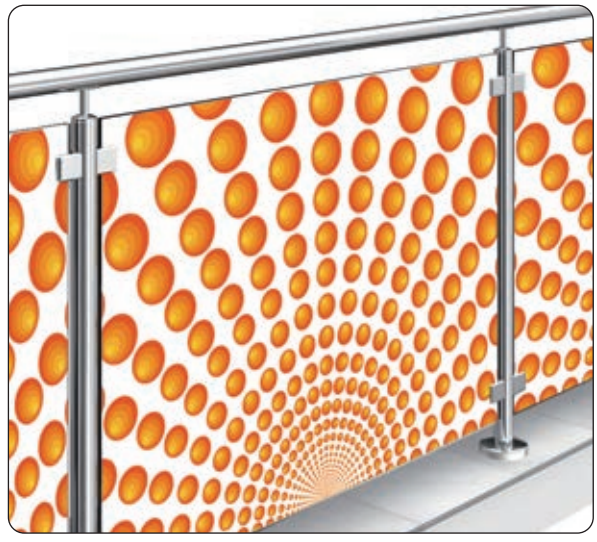
wind load zone = _____

9.2 rail load (information always required)

☐ characteristic value of the beam load qk = _____ kN/m

implemented technical building regulations

general information



ETB – implemented technical building regulations
In order to ensure that structural works do not endanger public safety, technical building regulations have been drawn up, amongst other things. They are specified in the building regulation code. The ETB guidelines for "components that protect against falling" (1995-06) regulate safety barriers - glass infills are exempted. Certain P+S products are covered by the ETB guidelines.

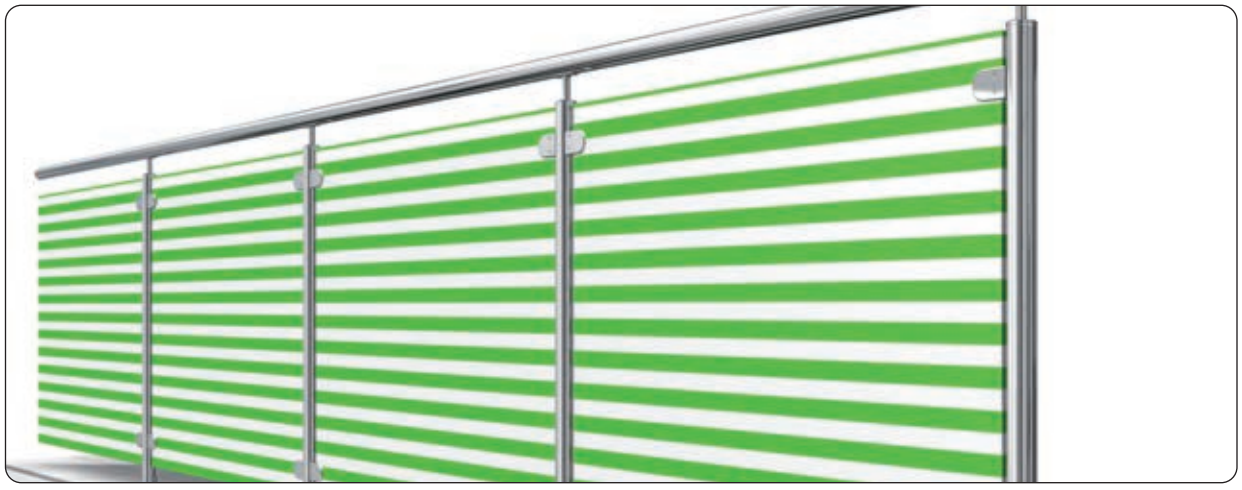
ETB with TRESPA® panel infills

Pauli + Sohn, in cooperation with the company TRESPA®, has provided certification according to ETB guidelines for "components that protect against falling" using P+S clamp system and TRESPA® laminated panels.
This opens up new ways for builders of balconies and stair railings to use tested systems.

test certificates:
available on request

TRESPA® applications

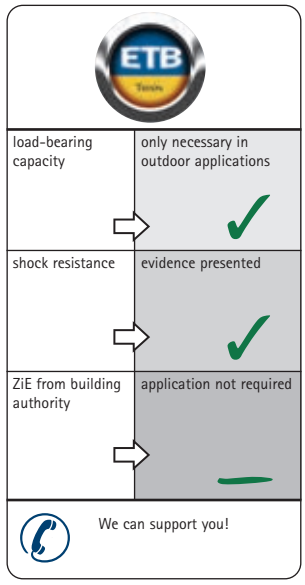
material infills



The clamp requirements (see table) fulfil the "components which protect against falling" guideline, with regard their to resistance in the case of hard or soft impacts. The tested fastening components have shown no damage when subjected to a testing load of 2,8 kN, although the clamp fixtures were prestressed in the test series. All requirements have thereby been fulfilled.

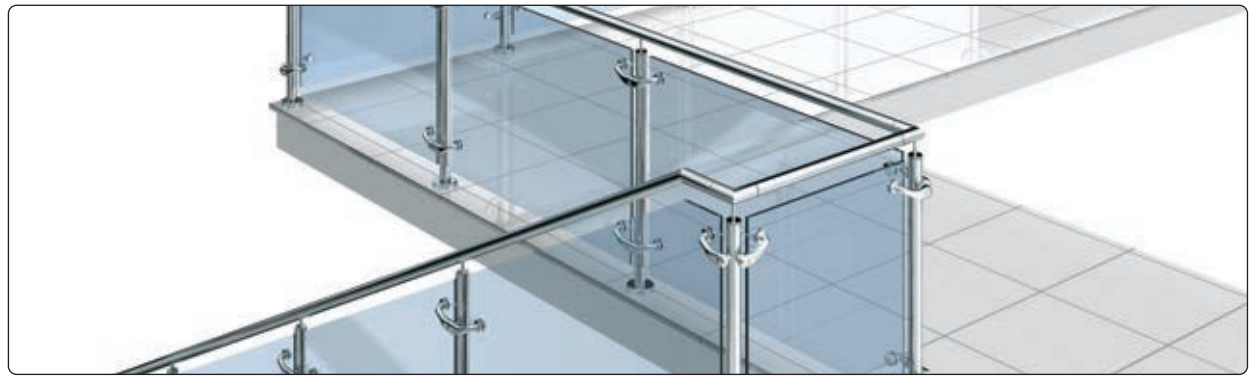
item no.	material	dimensions			□	○	*passed with
4804	ZN	8 mm	1000 mm	750 mm	□		4 clamps
4806	ZN	8 mm	1000 mm	750 mm		○	4 clamps
4805	ZN	10 mm	1500 mm	1100 mm	□		6 clamps
4807	ZN	10 mm	1500 mm	1100 mm		○	6 clamps
9333	VA	10 mm	1500 mm	1100 mm	□		6 clamps
9337	VA	10 mm	1500 mm	1100 mm		○	6 clamps
11112	ZN	8 mm	1006 mm	756 mm	□		4 clamps
11117-R15	ZN	8 mm	1006 mm	756 mm		○	4 clamps
11117-R20	ZN	8 mm	1006 mm	756 mm		○	4 clamps
9343	VA	8 mm	1002 mm	752 mm	□		4 clamps
9347	VA	8 mm	1002 mm	752 mm		○	4 clamps
9344	VA	10 mm	1502 mm	1102 mm	□		6 clamps
9348	VA	10 mm	1502 mm	1102 mm		○	6 clamps
4808	ZN	8 mm	994 mm	744 mm	□		4 clamps
4842	ZN	8 mm	994 mm	744 mm		○	4 clamps
9303	VA	10 mm	1494 mm	1094 mm	□		6 clamps
9307	VA	10 mm	1494 mm	1094 mm		○	6 clamps

*result of the ETB testing (E min. = 125Nm) passed with

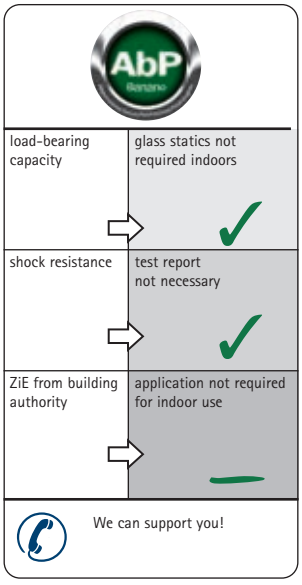


Banano with general test certificate from building authorities (AbP)

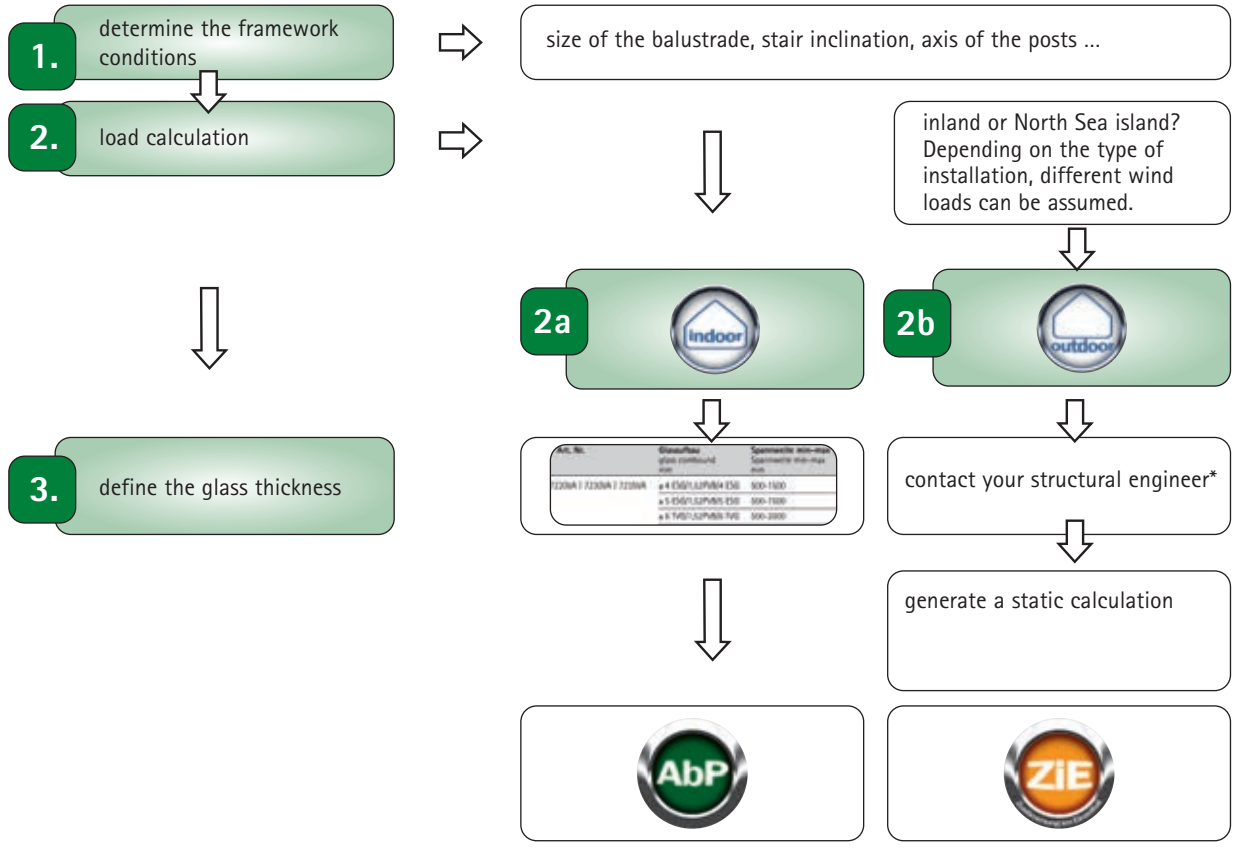
application and regulation



The connector Banano differs in some respects from the framework conditions in the TRAV category C. Therefore, a general test certificate from building authorities (AbP) must be provided for this design. For applications in indoor areas, the AbP is equivalent to an AbZ and is valid throughout Germany.



the easy way with an AbP



SERVICE

*Of course we can give you the contact data of our recommended engineers office.

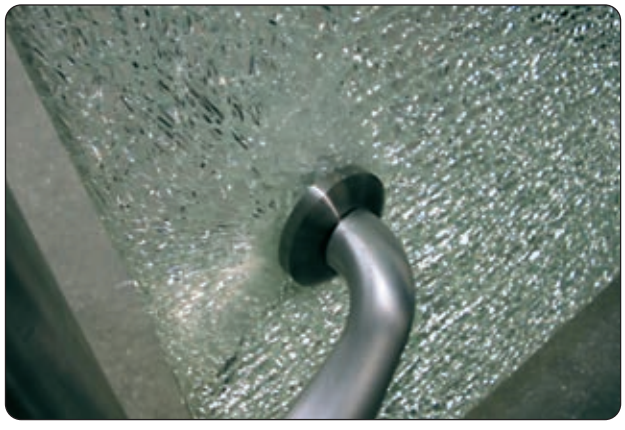
Banano with general test certificate from building authorities (AbP)

application and regulation

The verification of the load-bearing capacity under impact has been provided from the front the rear. The requirements of the TRAV in respect of testing have to be met. The load-bearing capacity of the glazing and its immediate fixing (fixtures, screw connections) under impact has been verified for the application area covered by the general certificate from building authorities (AbP).

For LSG, the regulations of building regulation code A part 1 sequential number 11.8 have to be applied. Depending on the dimensions of the panels, the LSG panels have to be made up of two tempered safety glass panels with the thicknesses stated in the table. The panels can be rectangular or parallelogram in shape, similar to the TRAV.
Railings with Banano have a general test certificate from building authorities; thus no further testing and no individual approval are required for applications in indoor areas!

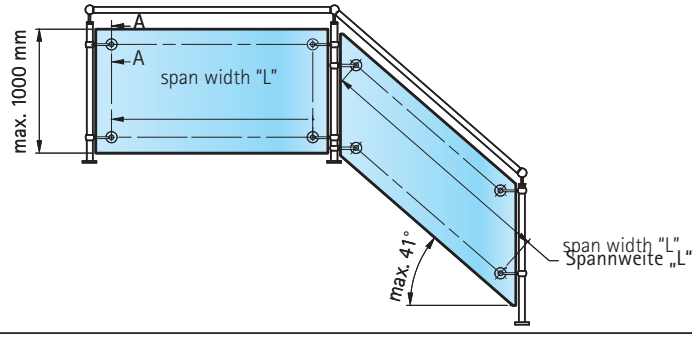
AbP Banano



indoor

The test certificate does not apply to outdoor use. For applications in outdoor areas, an additional individual approval (ZiE) is required.

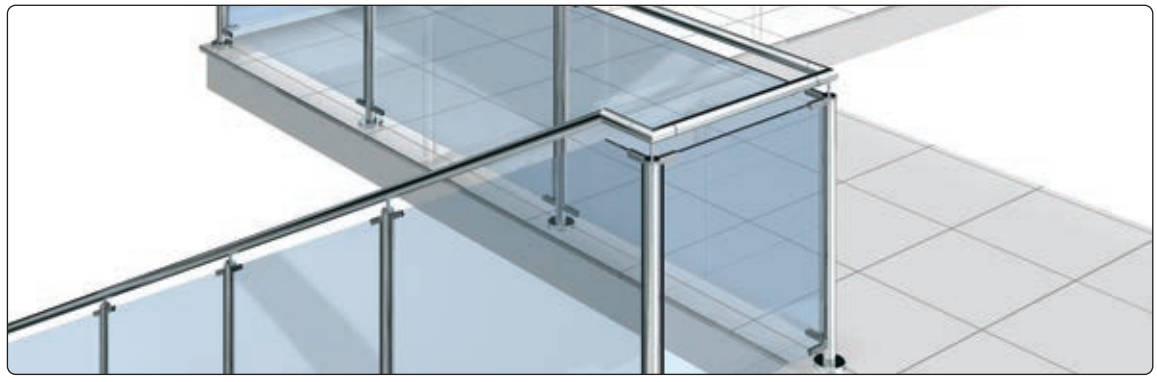
item no.	glass structure mm	min. - max. span width mm	min. - max. height mm
7220VA | 7230VA | 7235VA	≥ 4 ESG/1,52 PVB/4 ESG	500 - 1500	800 - 1000
	≥ 5 ESG/1,52 PVB/5 ESG	500 - 1500	800 - 1000
	≥ 6 ESG/1,52 PVB/6 ESG	500 - 2000	800 - 1000



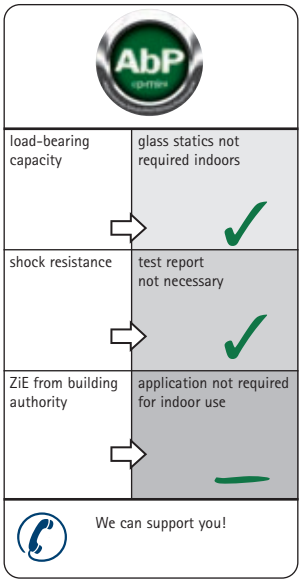
Ask for our test certificate.

cp-mini with general test certificate from building authorities (AbP)

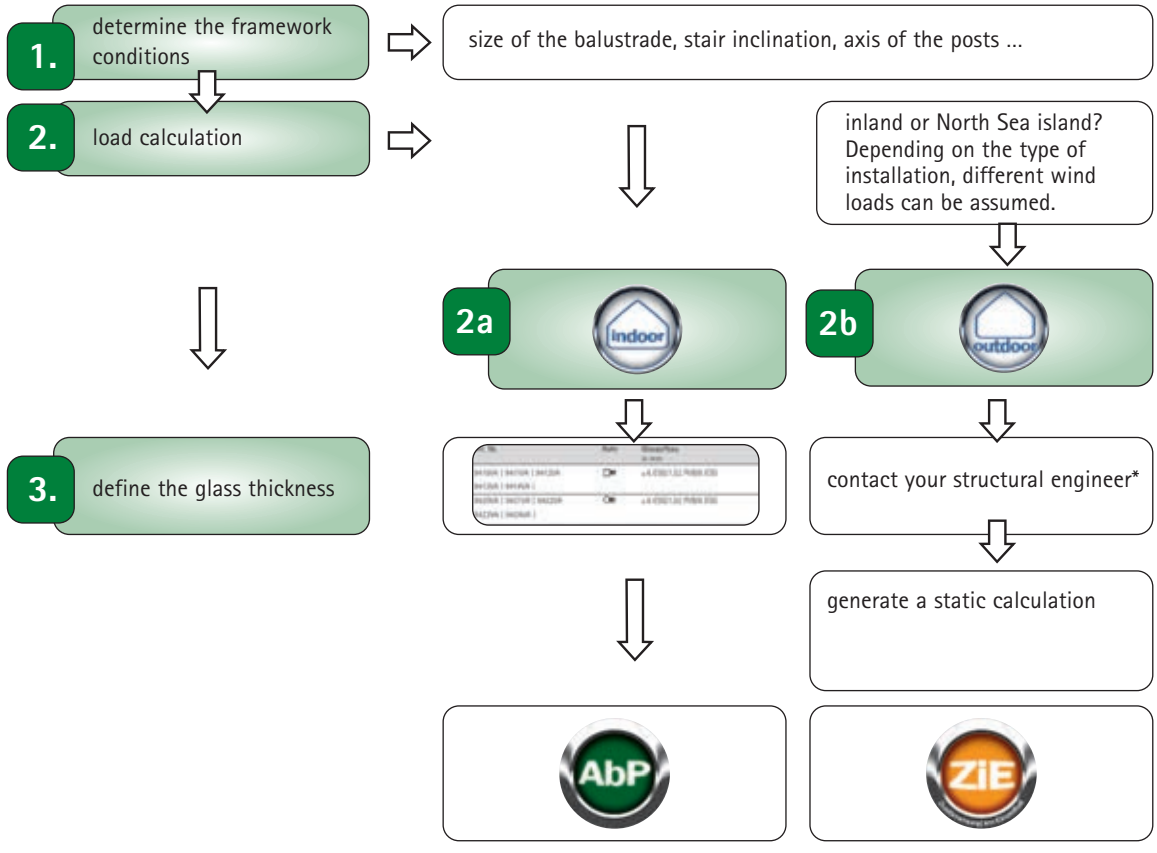
application and regulation



The cp-mini panel holder differs in some respects from the framework conditions set out in TRAV Table 3. Therefore, a general test certificate from building authorities (AbP) must be provided for this design. For applications in indoor areas, the AbP is equivalent to an AbZ and is valid throughout Germany.



the easy way with an AbP



SERVICE

*Of course we can give you the contact data of our recommended engineers office.

cp-mini with general test certificate from building authorities (AbP)

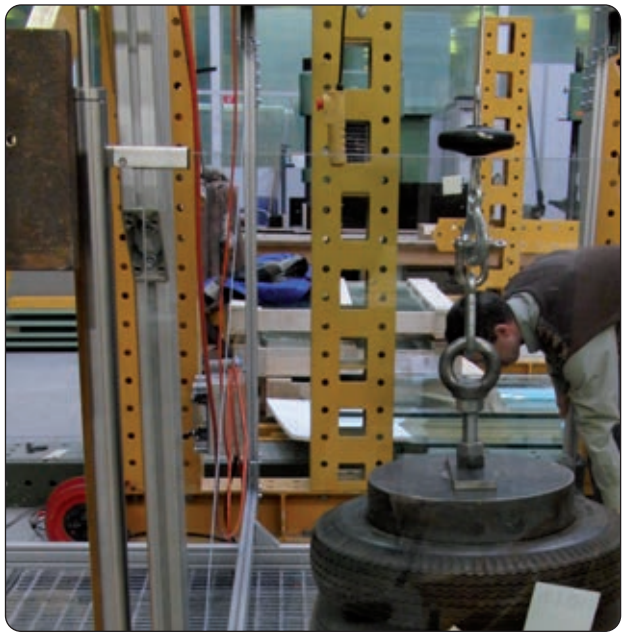
application and regulation

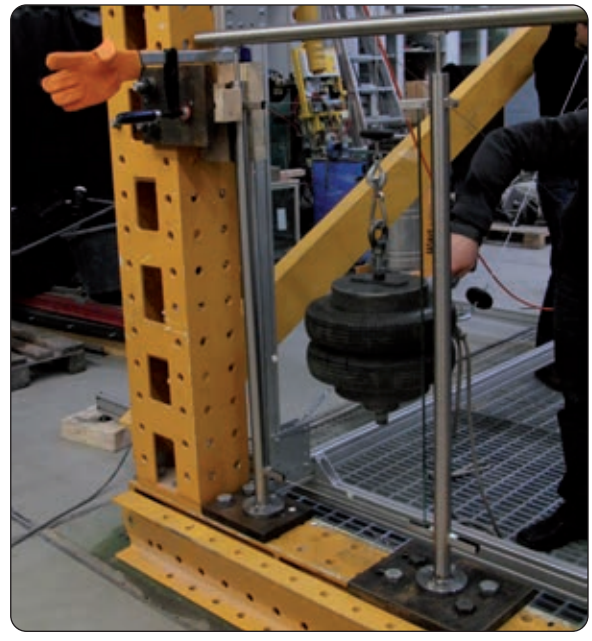
Our cp-mini panel holder has also been tested by independent institutes for different stresses in practically relevant ways. Verifications are provided according to the standards.
The requirements of the technical rules for the use of glass safety barriers (TRAV) in respect to testing have to be met. The load-bearing capacity of the glazing and its immediate fixing (fixtures, screw connections) under impact has been verified for the application area covered by the general certificate from building authorities (AbP).

For LSG (laminated safety glass), the regulations of building regulation code A part 1 sequential number 11.8 have to be applied. Depending on the dimensions of the panels, the LSG panels have to be made of two tempered safety glass panels with the thicknesses stated in the table below. The panels can be rectangular or parallelogram in shape, similar to the TRAV.
For railings with cp-mini clamps, a general test certificate from building authorities is available; thus, no further testing and no individual approval are required for application in indoor areas!

AbP cp-mini

4.4





indoor

The test certificate does not apply to outdoor use. For applications in outdoor areas, an additional individual approval (ZiE) is required, but no component testing.

application conditions according to test report

item no.	tube	glass structure in mm	min. - max. span width in mm
9410VA | 9411VA | 9412VA 9413VA | 9414VA |	□	≥ 6 ESG/1,52 PVB/6 ESG	500 - 1400
9420VA | 9421VA | 9422VA 9423VA | 9424VA |	○	≥ 6 ESG/1,52 PVB/6 ESG	500 - 1400

plan correctly

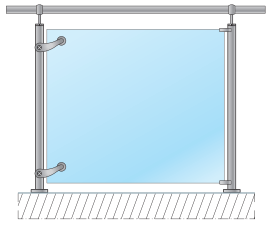
checklist for cp-mini or Banano:

☐ VSG = 2x Float (Float-Glass) 2 x _____mm

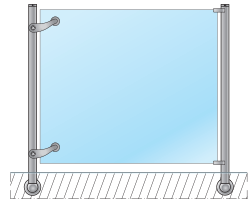
☐ PVB _____mm

1. railing types

☐ infill type:



☐ french balcony, without handrail, with edge protection:



2. posts

☐ round tube:

☐ square tube:

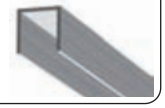
☐ other:

3. handrail

☐ round tube:

☐ square tube:

☐ edge protection:



☐ without handrail:

4. glass fixation

☐ Banano:

☐ cp-mini:

5. mounting type

☐ indoor

☐ outdoor

6. required type of glass and film

☐ VSG = ESG 2 x _____mm

☐ VSG = 2x TVG (Heat Streng-thened Glass) 2 x_____mm

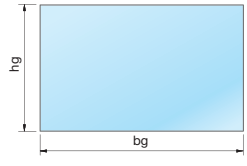
film:

☐ PVB _____mm

☐ SentryGlas® _____mm

7. glass dimensions

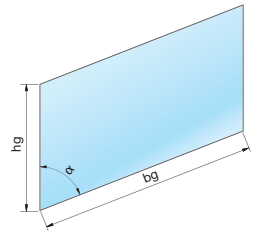
☐



bg x hg = _____mm

_____piece

☐

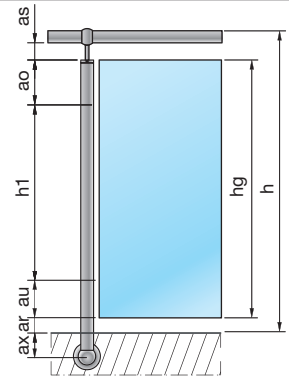


bg x hg = _____mm α = ____

_____piece

☐ sample panel please enclose drawing _____piece

8. distances



as = _____

ao = _____

h1 = _____

au = _____

ar = _____

ax = (*)_____

h = _____

hg = _____

(*) only for facia mounting

8. impacts of wind (information only required for applications in outdoor areas)

☐ **There is no information about the load or building geometry available.**

We would like to point out that the loads to be used for calculation vary greatly due to the new load assumption standard EC1. Therefore, the required glass thickness can only be determined and, thus, planning security ensured if corresponding information is provided. This is why we are only able to determine the required glass thickness for selected load levels.

☐ Characteristic value of the impacts (usually wind load) q = _____ kN/m²

☐ **The characteristic value of the impacts is to be determined by P+S.**

Due to the new load standard EC1, determining the load has become more complicated. This load standard must be applied to all national technical approvals (AbZ) and all technical rules (i.e. e.g. also technical rules for linearly mounted glazing (TRLV)). Pauli + Sohn will assist you in determining the loads to be used for calculation. We would like to point out to you that structural analyses or load determinations can only be provided by a recognised structural engineer. This is why the value determined by P+S may only be considered to be a reference value and therefore not binding!

For the determination of the design value of the variable impact, it is absolutely necessary to provide the following information:

place of installation: _____ **PLZ:** _____

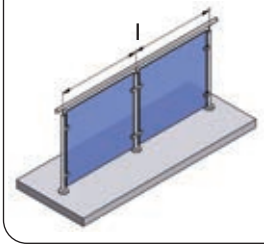
☐ inland ☐ North and Baltic Sea coasts and Baltic Sea islands ☐ North Sea islands

installation height above ground level h = _____ building height H = _____

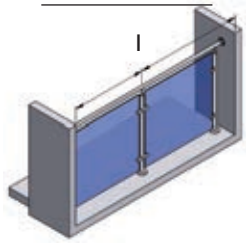
balustrade length l = _____ balustrade width b = _____

balustrade type:

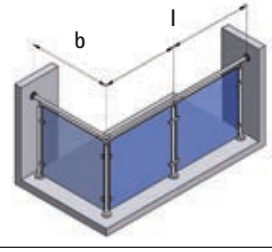
☐ straight and free-standing:



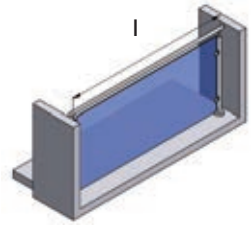
☐ straight between walls:



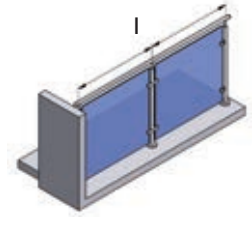
☐ angled corners:



☐ individual single:



☐ end area without wall mounting:



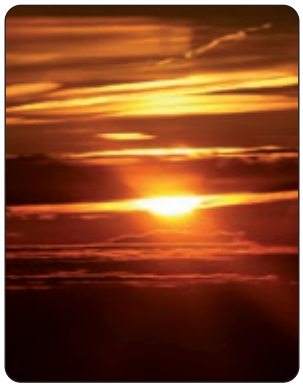
☐ **For the determination of the design value of the variable impact, the following information is helpful for us, but not required:**

wind load zone = _____

8.2 rail load (information always required)

☐ characteristic value of the beam load qk = _____ kN/m

4.4



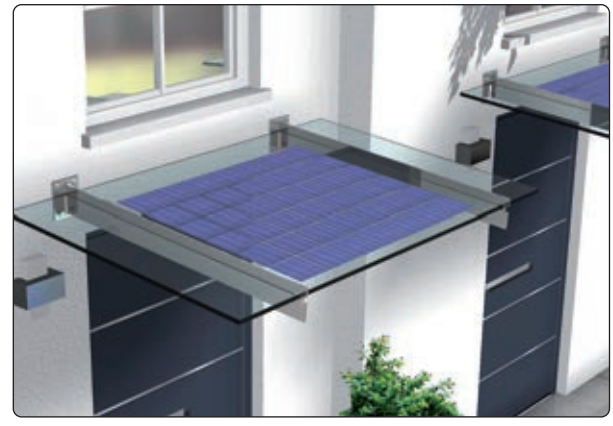
cp-mini*solar*

- clean energy from your own solar power system

solar application in the balustrade area

Using the system cp-mini*solar* for solar balustrades, you combine tested safety with the generation of clean energy. For a south-facing solar power system, the power yield amounts to 70 % of the optimally inclined roof options. Thus, the solar balustrade provides the perfect complement to the corresponding energy concept. In addition to the factors of safety and effectiveness, also visual and aesthetic aspects were taken into consideration during its development. Thus, the entire cable routing has, for instance, been integrated into the system in an "invisible" manner.

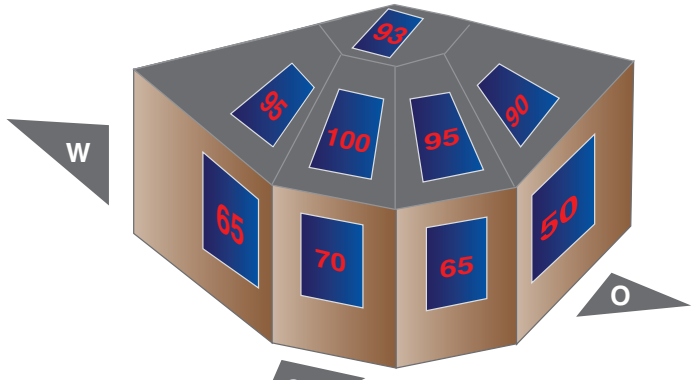
solar application in the facade area



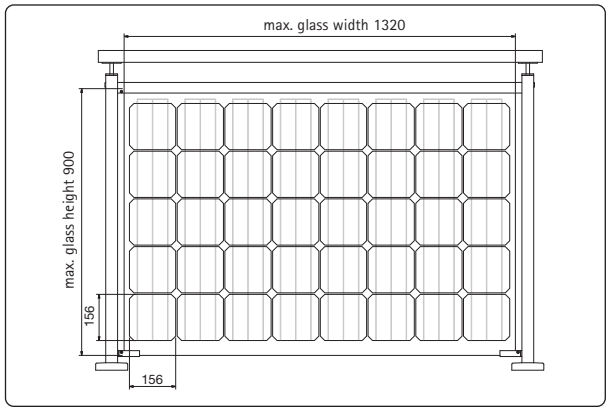
solar application in the overhead area

solar applications

advantages of solar energy



use of solar energy according to cardinal directions



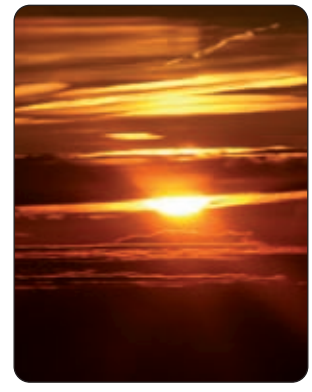
For applications in outdoor areas, structural analyses for the selected dimensions are available.

verified formats

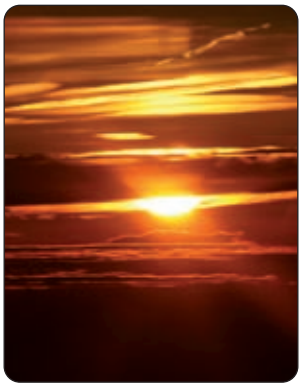
glass structure	span width width x height
2 x 5 mm ESG with PV	1000 x 900
2 x 5 mm ESG with PV	1320 x 900

possibilities

items:	flat roof	inclined roof	facades	canopies	balustrades
cp-mini*solar*	–	–	–	–	✓
3500 / 3505 3510 / 3515	✓	✓	✓	–	–
canopy set	–	–	–	✓	–

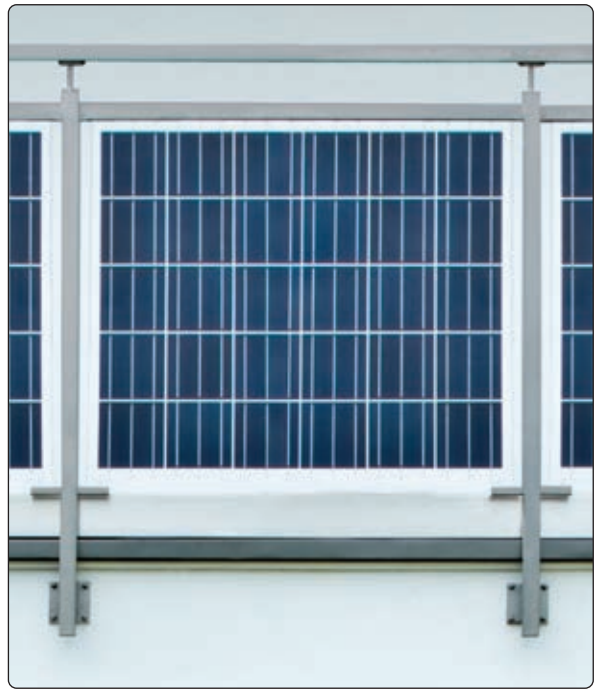


4.4



cp-mini*solar*

clean energy from your own solar power system



advantages

- Compared to fossil fuels, solar energy is infinitely available.
- The transmission and distribution costs for centrally generated electricity are approximately as high as the cost of generating electricity itself.
- Production of renewable energies from your own solar power plant.
- Modern design of railing balustrades.

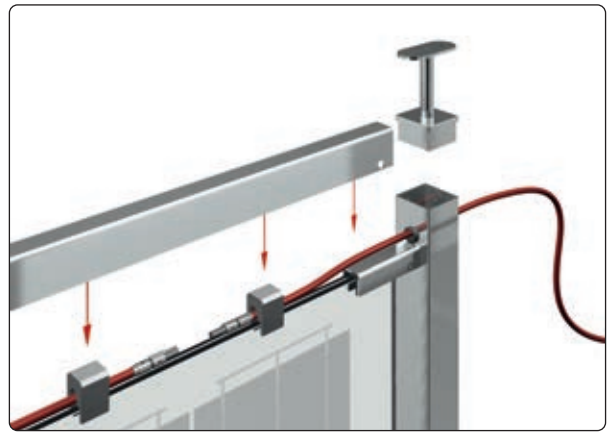
cp-mini*solar*

- tests passed successfully

4.4

At the *Universität der Bundeswehr München* [University of the German Federal Armed Forces in Munich], our holders were successfully tested with respect to impact resistance in accordance with the applicable regulations. Structural analyses were also carried out.

- verification of the load-bearing capacity of the glazing and its immediate fixing (fixtures, screw connections) under impulsive impacts provided for the cp-mini*solar* holder in connection with the solar panel
- hidden cabling of the module above the glass edge
- the requirements to be met by the testing according to the technical rules for the use of glass safety barriers (TRAV) apply



The cp-mini*solar* holder was modified in such a way that the cable can be inserted in a protected manner through a cable gland into the post. An additional component is merely used for the cable routing and as spacer for the U-profile.

SERVICE

You will find the individual parts of the cp-mini*solar* systems as of page 54.

cp-glass *barrier*

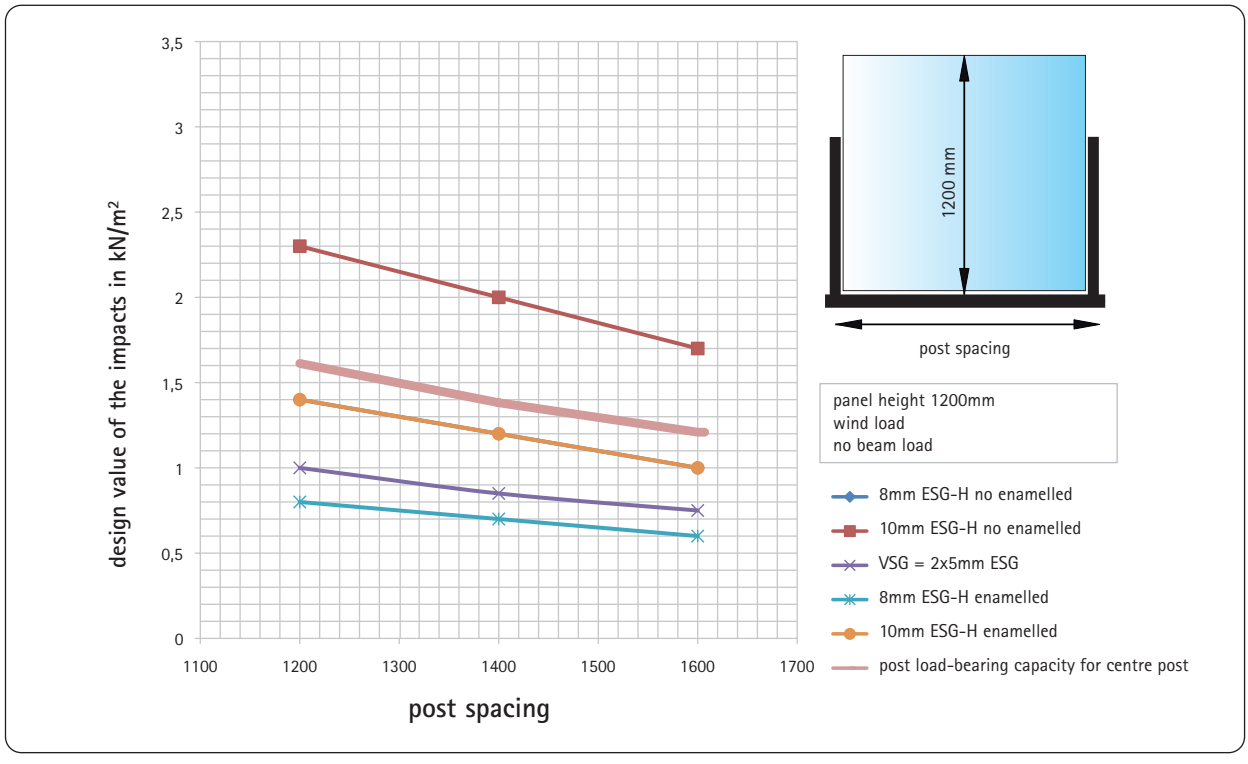
- boundary, visual cover or designer element

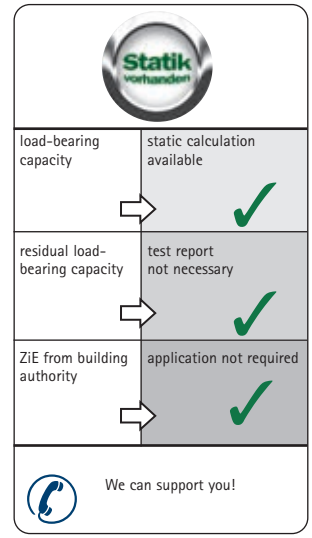
Whether as easy-to-care-for boundary, individual visual cover or stylish designer element, the cp-glas*zaun* system offers many application and design possibilities for your garden or commercial and industrial premises. The system combines easy assembly and tested safety with virtually infinite design options for glass.

application

cp-glass *barrier*

design table





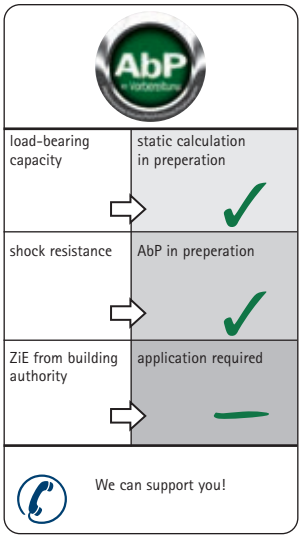
application

balustrade glazing

cp-*1400*/cp-*1402* at the lower edge

handrail
item no.: 10213642A4

- Structural analysis for various models
- General type approval pending – no pendulum impact tests required
- Glass thicknesses 2 x 8 mm, 2 x 10 mm
- Various types of glass
- Structures made with SentryGlas®
- Rail loads 0.5 kN/m and 1.0 kN/m
- Balustrade heights up to 1100 mm
- Floor mounting and fascia mounting

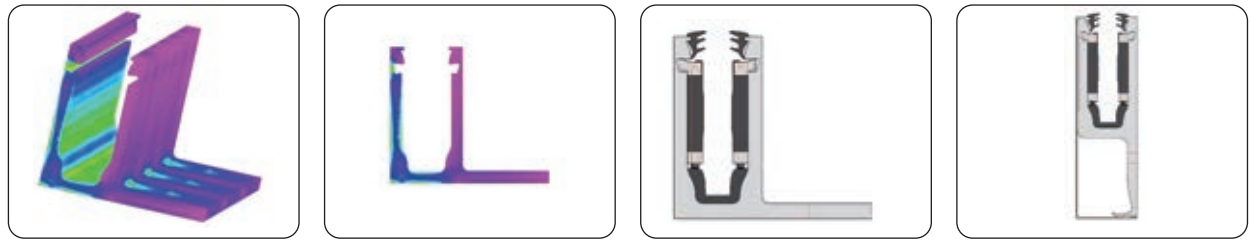


verification of impact resistance

width in mm min.	max.	height in mm min.	max.	glass structure in mm
500	2000	900	1100	≥ (10 ESG/1,52 PVB/10 ESG)
500	2000	900	1100	≥ (10 TVG/1,52 PVB/10 TVG)

Since the rail load will pass into the glass panel, a static calculation of the glass is required.

extract from the structural analysis of the profile

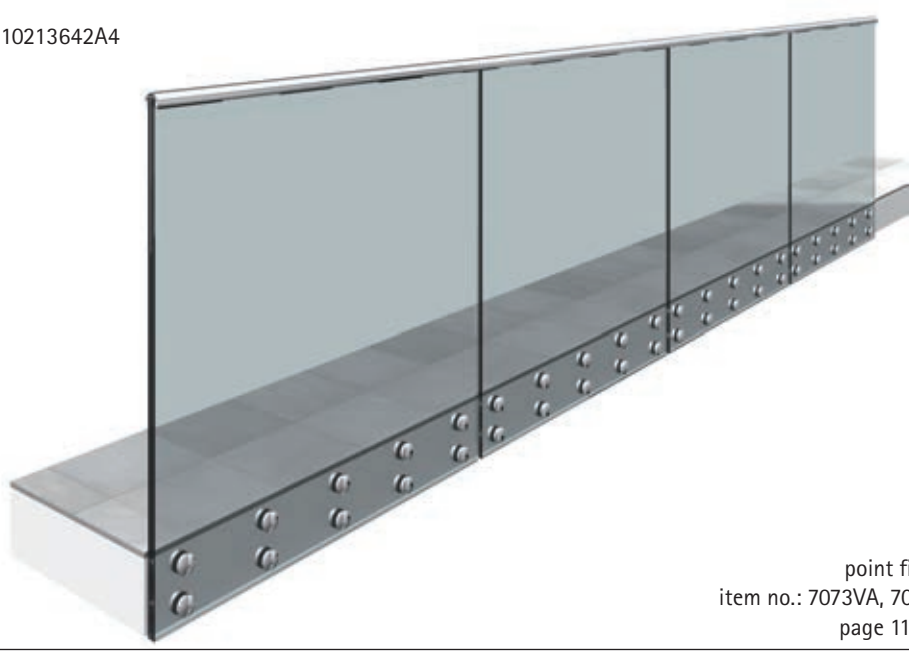


note: structural analysis and AbP in preperation

balustrade glazing

- cp-*1440* at the lower edge

handrail
item no.: 10213642A4



point fixings
item no.: 7073VA, 7077VA
page 114,115

load-bearing capacity	static calculation required ✗
residual load-bearing capacity	test report in preperation ✓
ZiE from building authority	application required ✗

We can support you!

- design table

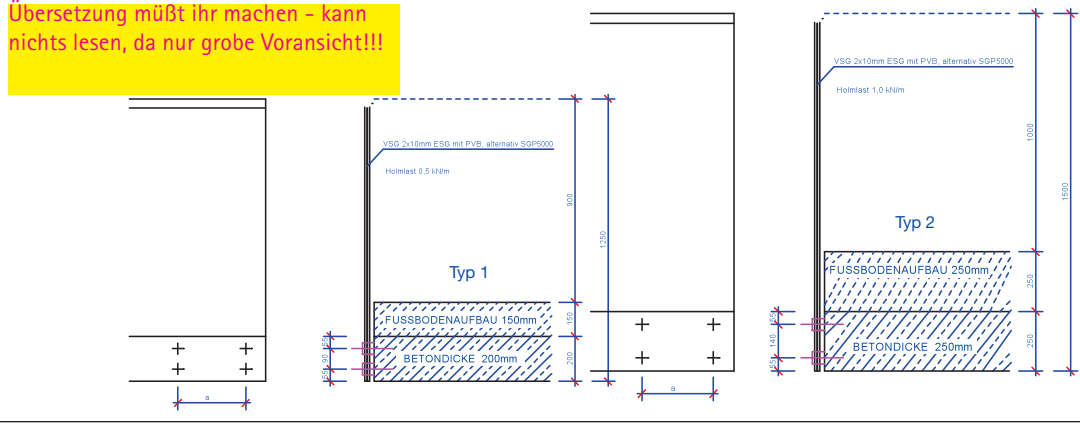
Design table only applicable to the indoor applications! The table only includes a structural analysis due to beam load for rectangular glass panels with protected edges.

Other dimensions on request.

Test reports for selected dimensions are being prepared.

glass structure	intermediate layer	Point fixing distance a	typ	rail load kN/m
2 x 10mm ESG	SentryGlas ®	300 mm	1	0,5
3 x 8mm ESG	SentryGlas ®	250 mm	2	1,0
3 x 6mm ESG	SentryGlas ®	300 mm	1	0,5
5 ESG – 8 ESG – 5 ESG	SentryGlas ®	350 mm	1	0,5
6 ESG – 12 ESG – 6 ESG	SentryGlas ®	300 mm	2	1,0

Übersetzung müßt ihr machen - kann nichts lesen, da nur grobe Voransicht!!!

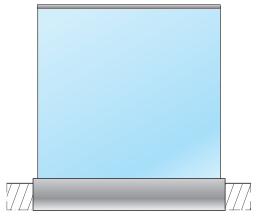


plan correctly

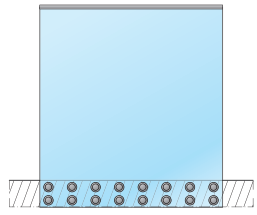
check list for the floor level glass mounting:

1. railing types

☐ clamped at the bottom A:



☐ clamped at the bottom B:



2. handrail

☐ slotted tube:

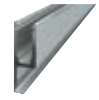
☐ edge protection:

☐ without handrail:

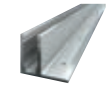
3. glass fixation

☐ TRAV fixtures:
Ø 72 mm

☐ clamping profile facia mounting:



☐ clamping profile floor mounting:



4. mounting type

☐ indoor

☐ outdoor

5. required type of glass and film

type of glass:

☐ VSG = ESG

2 x _____mm

☐ VSG = 2x TVG (Heat Streng-thened Glass)

2 x_____mm

flim:

☐ PVB

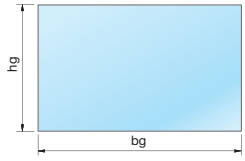
_____mm

☐ SentryGlas®

_____mm

6. glass dimensions

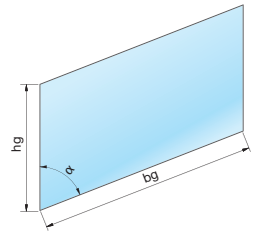
☐



bg x hg = _____mm

_____piece

☐

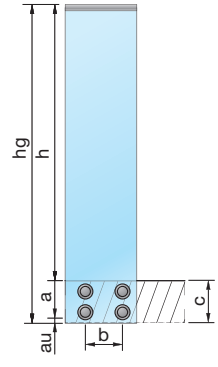


bg x hg = _____mm α = ____

_____piece

☐ sample panel please enclose drawing _____piece

7. distances



hg = _____

a = _____

au = _____

h* = _____

b* = _____

c = _____

* only for point fixings

8. impacts of wind (information only required for applications in outdoor areas)

☐ **There is no information about the load or building geometry available.**

We would like to point out that the loads to be used for calculation vary greatly due to the new load assumption standard EC1. Therefore, the required glass thickness can only be determined and, thus, planning security ensured if corresponding information is provided. This is why we are only able to determine the required glass thickness for selected load levels.

☐ Characteristic value of the impacts (usually wind load) q = _____ kN/m²

☐ **The characteristic value of the impacts is to be determined by P+S.**

Due to the new load standard EC1, determining the load has become more complicated. This load standard must be applied to all national technical approvals (AbZ) and all technical rules (i.e. e.g. also technical rules for linearly mounted glazing (TRLV)). Pauli + Sohn will assist you in determining the loads to be used for calculation. We would like to point out to you that structural analyses or load determinations can only be provided by a recognised structural engineer. This is why the value determined by P+S may only be considered to be a reference value and therefore not binding!

For the determination of the design value of the variable impact, it is absolutely necessary to provide the following information:

place of installation: _____ **PLZ:** _____

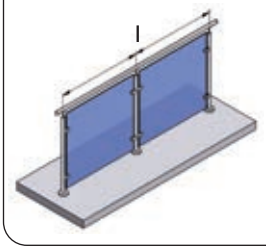
☐ inland ☐ North and Baltic Sea coasts and Baltic Sea islands ☐ North Sea islands

installation height above ground level h = _____ building height H = _____

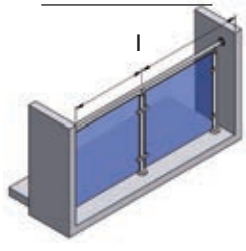
balustrade length l = _____ balustrade width b = _____

balustrade type:

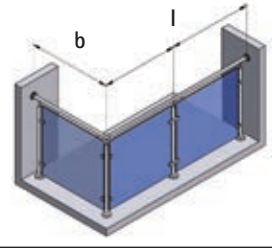
☐ straight and free-standing:



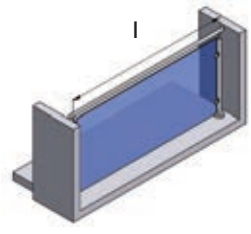
☐ straight between walls:



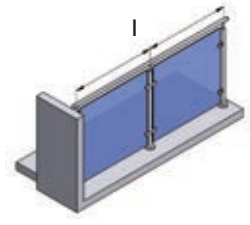
☐ angled corners:



☐ individual single:



☐ end area without wall mounting:



☐ For the determination of the design value of the variable impact, the following information is helpful for us, but not required:

wind load zone = _____

8.2 rail load (information always required)

☐ characteristic value of the beam load qk = _____ kN/m

TRAV (technical rules for safety balustrades)

the easy way according to TRAV

1. determine the framework conditions → size of the balustrade, stair inclination, axis of the posts ...

2. load calculation → Inland or North Sea island? Depending on the type of installation, different wind loads can be assumed.

TRAV B (indoor / outdoor) → contact your structural engineer* → generate a static calculation

TRAV C (indoor / outdoor) → static calculation available - please do not hesitate to contact us** → additional creation of a structural analysis if any

3. define the glass thickness

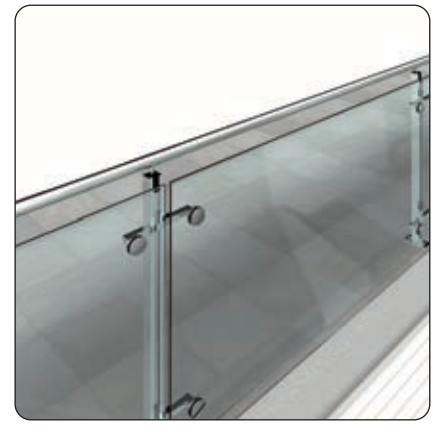
4. building law → compliance with the framework conditions as per TRAV

TRAV B ✓ | TRAV C ✓ | ZIE

SERVICE

*Of course we can give you the contact data of our recommended engineers office.

**Structural analysis available for specific framework conditions – For further information, please contact us.



TRAV (technical rules for safety balustrades)

TRAV

Scope:
The technical rules apply mechanically installed glazing described below if it is also used to safeguard persons in circulation areas from sideward falls.

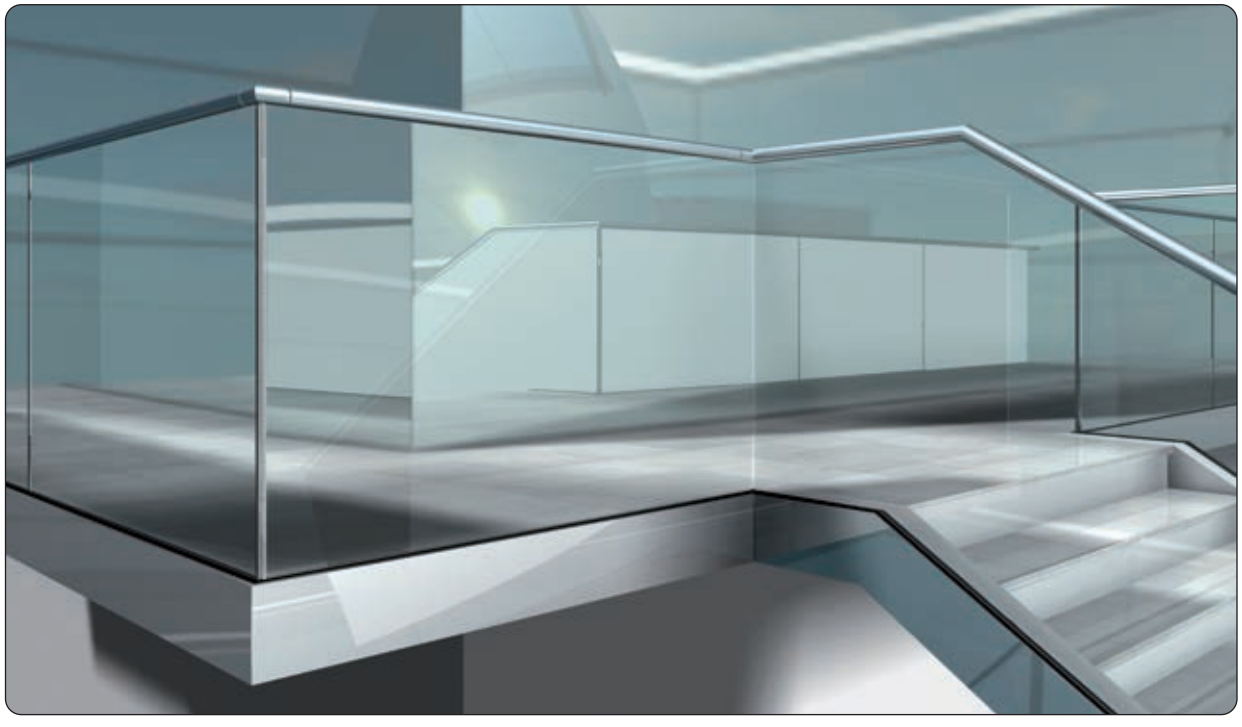
The regulations cover:
- Vertical glazing according to the TRLV which must also comply with the requirements of the TRAV due to its function to protect against falling.
- Load-bearing glass balustrades with continuous handrails and
- glass railing infills which must either meet the requirements of TRLV and the TRAV or glass railing infills which must only meet the requirements of the TRAV, e. g. pointed railing infills in indoor areas.

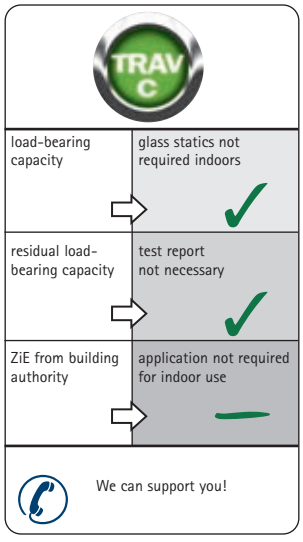
TRAV categories

Category B: glass balustrades linearly installed with a clamp construction on their lower edge with a continuous handrail linking the individual panels. In addition to protecting the upper edge of the glass balustrade, the handrail must also ensure resistance to the planned horizontal loads at handrail height (rail load), even if a balustrade element should fail.

Category C: safety barrier glazing not intended to provide horizontal load-bearing at rail height and corresponding to one of the following groups:

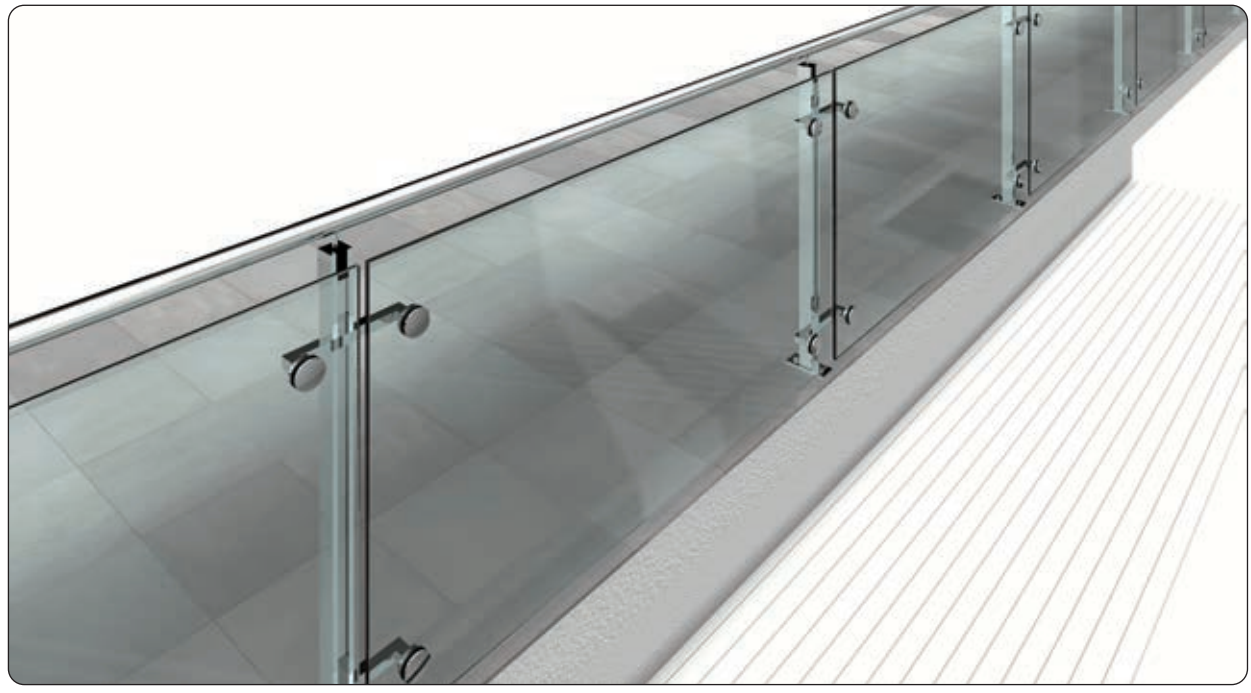
- C1: linear and or pointed railing infills installed on at least two opposite sides. secured glazing.
- C2: linear vertical glazing pursuant to the TRLV arranged below a load-bearing cross bar at rail height installed on at least two opposite sides. according to the TRLV.
- C3: category A glazing with a front-mounted, load-bearing handrail at the proper height according to building codes.





balustrade glazing according to TRAV

point fixings according to TRAV



Many point fixings meet the requirements as set out in TRAV Table 3. For category C1, specific dimensions must be adhered to. You will find this table on the following page.

category C1

Pointed category C1 fixed glazing (paragraph 6.3.3) is defined as:

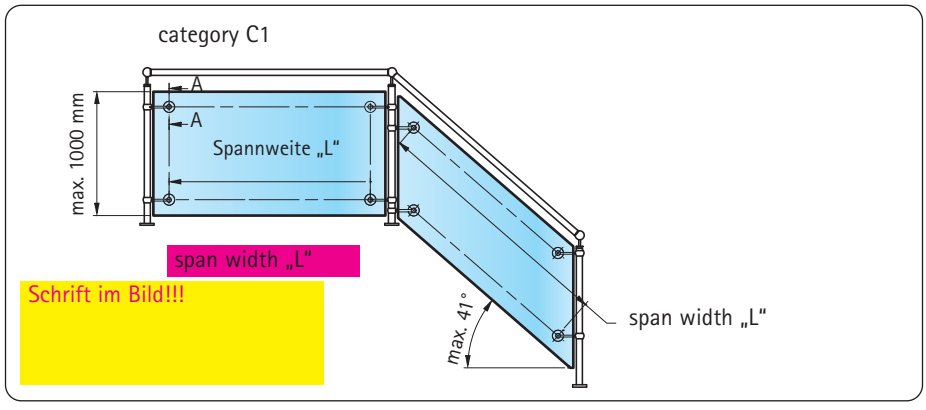
- With continuous screw connections and circular clamping plates on both sides. The plates must be mounted in the corner areas. Rectangular attached LSG railing infill with a maximum height of 1000 mm in the indoor area.
- The distance between the glass boring edges and glass edges must be 80 mm to 250 mm. The clamping plates must extend beyond the glass boring edges by at least 10 mm.
- Direct contact between clamping plates, screw connections and the glass should be prevented using suitable intermediate layers (e. g. inserts or soft PVC tube pieces). Each glass fixing must have a static load-bearing capacity of at least 2,8kN. Of course, our TRAV fixtures are verified for such a load.
- Values for pre-dimensioning can be taken from our table, request our static calculation.

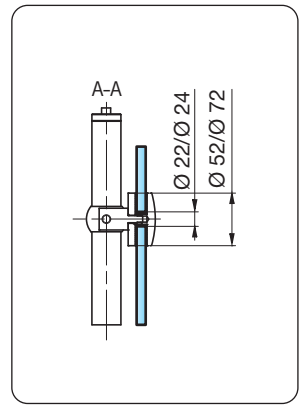
fixed mounting brackets

Of course, our new fastening lugs are verified. Please ask for our verification documents.

balustrade glazing according to TRAV

- category C1





The execution of trapezoidal panels is possible according to the drawing above in accordance with the TRAV.

SERVICE

**Structural analysis available for specific framework conditions – For further information, please contact us.

- The details in the table for LSG panels must be adhered to.
  For rectangular panels with the maximum span width.

item no.	plate diameter	glass structure in mm	span width in mm		*max. wind load
7072VA | 7076VA | 7078VA | 7016VA	≥ 50 mm	≥ 6 ESG/1,52 PVB/6 ESG	500	1200	1,5 kN/m²
7073VA | 7077VA	≥ 70 mm	≥ 8 ESG/1,52 PVB/8 ESG	500	1600	1,5 kN/m²
7073VA | 7077VA	≥ 70 mm	≥ 10 TVG/1,52 PVB/10 TVG	500	1600	2,2 kN/m²
7072VA | 7076VA | 7078VA | 7016VA	≥ 50 mm	≥ 8 ESG/1,52 PVB/8 ESG	500	1200	2,8 kN/m²
7073VA | 7077VA	≥ 70 mm	≥ 10 ESG/1,52 PVB/10 ESG	500	1600	2,5 kN/m²

INFO

loads = characteristic loads

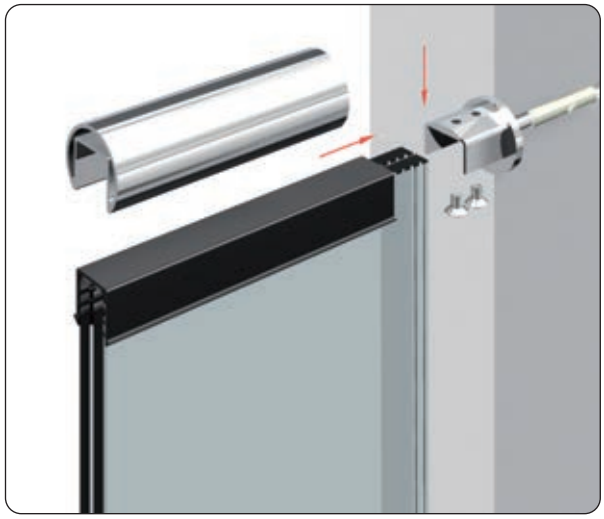
*Solely in respect of outdoor use. For applications in outdoor areas, an additional individual approval (ZiE) is required. Request our static calculation.

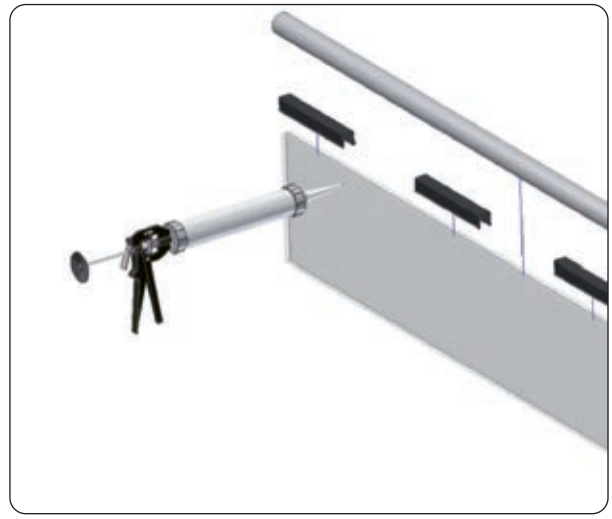
balustrade glazing according to TRAV

- handrail

Glazing according to TRAV category B involve: load-bearing glass balustrades that are linearly installed with a clamp construction on their lower edge and have an attached handrail linking their panels.

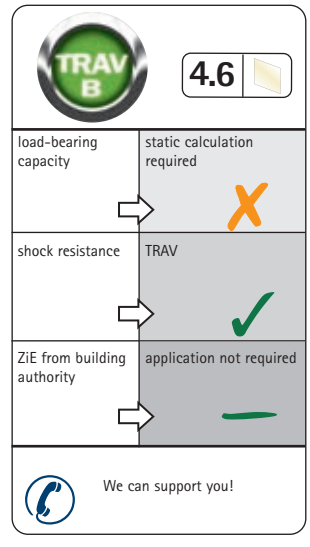
slotted tube handrail



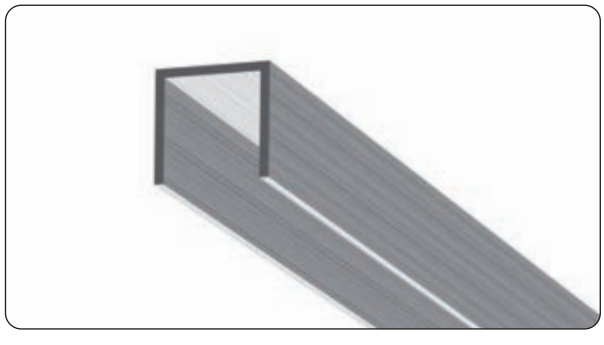


This product is a TRAV-compliant category B handrail for 20 mm laminated safety glass with 1,52 mm PVB and a glass mounting depth of at least 15 mm. The grooved tube can be used for laminated safety glass (LSG) made of 2x10 mm toughened safety glass (TSG) or 2x10 mm partially toughened safety glass (PTSG).

Glass/metal contact is prevented by attaching an elastomeric profile (with a gap of approx. 200-300 mm to the glass panel). The handrail is connected to the handrail with the glass panel by filling the remaining cavity in the U-profile with sealants in accordance with DIN 18 545-2 Group E.



edge protection profile



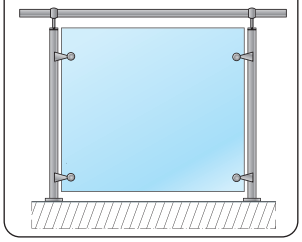
Note: A structural analysis of the handrail must be provided. In certain cases, the edge protection profile can also be used as handrail. Please do not hesitate to contact us!

plan correctly

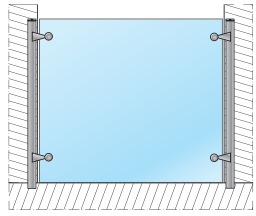
- check list for fixtures according to the technical rules for the use of glass safety barriers (TRAV):

1. railing types

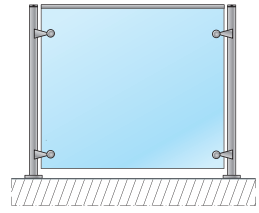
☐ floor mounting:



☐ french balcony, or without handrail:



☐ with edge protection, without handrail:



2. posts

☐ round tube:

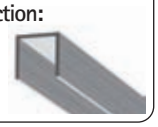
☐ square tube:

☐ ohters:

3. handrail

☐ round tube:

☐ edge protection:



☐ without handrail:

4. glass fixation

☐ TRAV fixtures:

5. mounting type

☐ indoor

☐ outdoor

6. required type of glass and film

type of glass:

☐ VSG = ESG

2 x _____mm

☐ VSG = 2x TVG (Heat Streng-thened Glass)

2 x_____mm

film:

☐ PVB

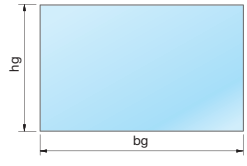
_____mm

☐ SentryGlas®

_____mm

7. glass dimensions

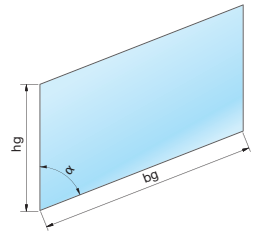
☐



bg x hg = _____mm

_____piece

☐

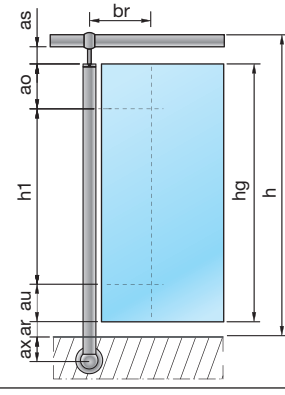


bg x hg = _____mm α = ____

_____piece

☐ sample panel please enclose drawing _____piece

8. distances



as = _____

ao = _____

h1 = _____

au = _____

ar = _____

ax = (*)_____

br = _____

h = _____

hg = _____

(*) only for facia mounting

9. impacts of wind (information only required for applications in outdoor areas)

☐ **There is no information about the load or building geometry available.**

We would like to point out that the loads to be used for calculation vary greatly due to the new load assumption standard EC1. Therefore, the required glass thickness can only be determined and, thus, planning security ensured if corresponding information is provided. This is why we are only able to determine the required glass thickness for selected load levels.

☐ Characteristic value of the impacts (usually wind load) q = _____ kN/m²

☐ **The characteristic value of the impacts is to be determined by P+S.**

Due to the new load standard EC1, determining the load has become more complicated. This load standard must be applied to all national technical approvals (AbZ) and all technical rules (i.e. e.g. also technical rules for linearly mounted glazing (TRLV)). Pauli + Sohn will assist you in determining the loads to be used for calculation. We would like to point out to you that structural analyses or load determinations can only be provided by a recognised structural engineer. This is why the value determined by P+S may only be considered to be a reference value and therefore not binding!

For the determination of the design value of the variable impact, it is absolutely necessary to provide the following information:

place of installation: _____ **PLZ:** _____

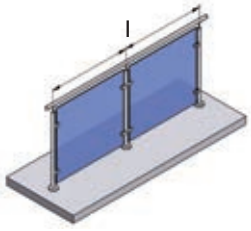
☐ inland ☐ North and Baltic Sea coasts and Baltic Sea islands ☐ North Sea islands

installation height above ground level h = _____ building height H = _____

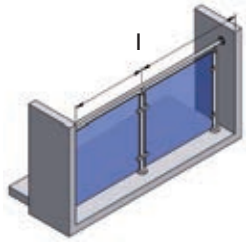
balustrade length l = _____ balustrade width b = _____

balustrade type:

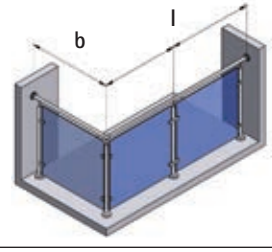
☐ straight and free-standing:



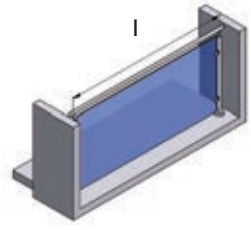
☐ straight between walls:



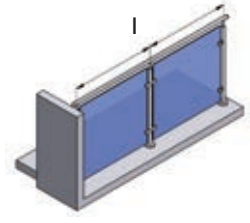
☐ angled corners:



☐ individual single:



☐ end area without wall mounting:



☐ **For the determination of the design value of the variable impact, the following information is helpful for us, but not required:**

wind load zone = _____

9.2 rail load (information always required)

☐ characteristic value of the beam load qk = _____ kN/m

french balconies

building law provisions

Floor-level windows provide transparency and a fuller view. Yet, fall protection is mandatory for every installation. So as to retain the clear view and elegant optics, precious combinations of glass and metal are the ideal solution. If you wish a free, unprotected glass edge, an individual approval (ZiE) is required. should you accept a handrail or an edge protection connected to the side, we offer verified solutions accordingly. For railings with an edge protection that is not connected to the side, a ZiE is required. We offer various type-tested models that stand out for safety, elegance and easy assembly.

french balconies

building law provisions

building law provisions		independent handrail	edge protection connected to the side	edge protection not connected to the side	free glass edge
point fixings according to TRAV 	regulation: static calculation: shock resistance: max. width(***):	TRAV + TRPV –> ZiE(**) available TRAV 1800 mm (*)	ZiE available test report 1700 mm (*)	ZiE available test report 1700 mm (*)	ZiE available test report 1700 mm (*)
clamp 	regulation: static calculation: shock resistance: max. width(***):	AbZ design tables AbZ 1500 mm			
cp-mini 	regulation: static calculation: shock resistance: max. width(***):	ZiE in preperation test report 1400 mm		ZiE in preperation in preperation 1400 mm	
	regulation: static calculation: shock resistance: max. width(***):	TRAV available TRAV TRAV	AbP in preperation available AbP in preperation 1500	ZiE available ZiE 1500	
impact resistance testing according to		category C	category C	category A	category A + attached glass panels

(*) for an edge distance of 100 mm
(**) Contrary to the widespread opinion, a point-fixed balustrade glazing of category C1 used for outdoor applications is not regulated pursuant to the technical rules for the use of safety glass barriers (TRAV); therefore, a ZiE must always be obtained.
(***) width of the glass panel

☐ set with clamp rails

AbP	in preperation
static calculation	available ✓
shock resistance	in preperation ✓
note	category C if edge protection connected, max. width: 1500 mm* —

We can support you!

* testing not yet completed

in the reveal, with edge protection (connected)

against the wall, with edge protection (connected)

exemplary versions

				no superimposition		Superimposition of wind and beam load	
per	hg in mm	bg in mm	glass structure	max. wind load	max. rail load	max. wind load	max. rail load
AbP	800-1100	1500	VSG = 2x8 ESG, 1,52 PVB*	2,5 kN/m²	1,0 kN/m	2,0 kN/m²	1,0 kN/m

clamp rail Art.-Nr. 7240 – structural analysis available

☐ VSG = ESG

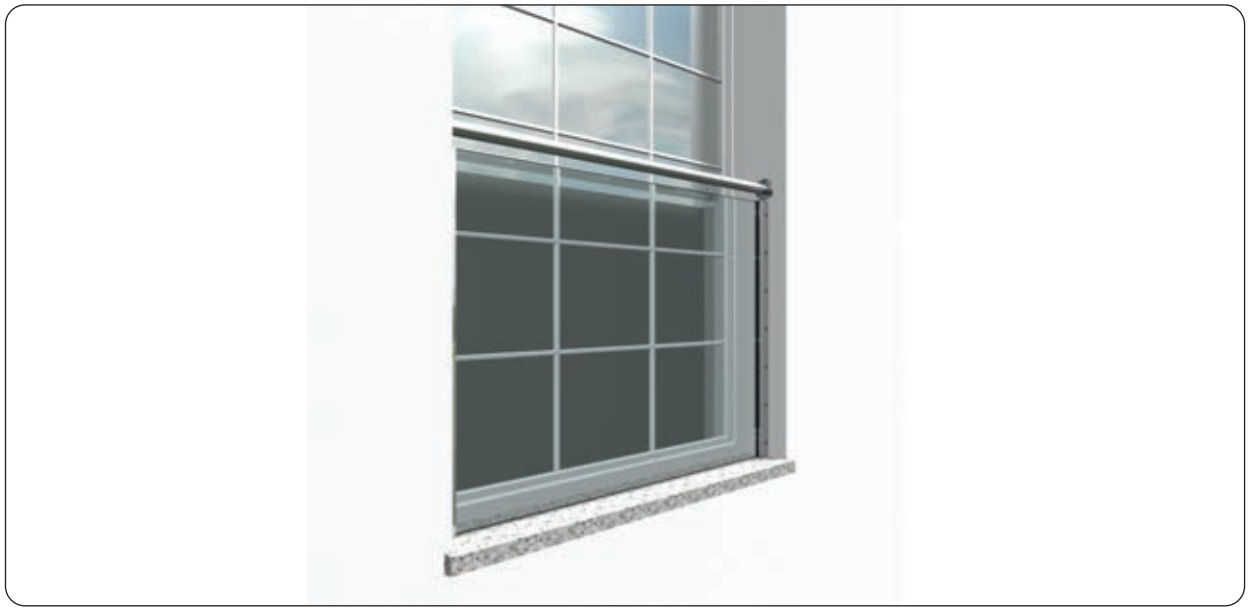
2 x _____mm

☐ VSG = 2x TVG (Heat Streng-thened Glass)

2 x_____mm

hg = glass height, **bg** = glass width

set with clamp rails



in the reveal, with independent handrail, without edge protection profile

static calculation	available
shock resistance	TRAV
note	category C

We can support you!

exemplary versions

per	hg in mm	bg in mm	glass structure	max. wind load
TRAV table 2	1000-1100	500-800	VSG = 2x6 SPG, 0,76 PVB	2,5 kN/m²
TRAV table 2	800-1100	500-1000	VSG = 2x6 ESG, 0,76 PVB	2,5 kN/m²
TRAV table 2	800-1100	500-1000	VSG = 2x8 SPG, 1,52 PVB	3,0 kN/m²
TRAV annex C	1000	1000-1500	VSG = 2x6 ESG, 0,76 PVB	1,5 kN/m²

maximum distance between handrail and glass edge: 30 mm

hg = glass height, **bg** = glass width

set with point fixings

static calculation	available ✓
shock resistance	test report available ✓
note	category A max. width: 1700 mm**

We can support you!

** for an edge distance of 100 mm

against the wall, without handrail, without edge protection profile

exemplary versions point fixings Ø 52 mm, item no. 7072 7076, 7078, 7016

					no superimposition		Superimposition of wind and beam load	
per	hg	b	bg	glass structure	max. wind load	max. rail load	max. wind load	max. rail load
ZiE	1000	1000	1200	VSG = 2x6 TVG, 1,52 PVB	1,6 kN/m²	0,5 kN/m	0,8 kN/m²	0,5 kN/m
ZiE	1000	1200	1400	VSG = 2x8 TVG, 1,52 PVB	2,0 kN/m²	0,5 kN/m	1,2 kN/m²	0,5 kN/m
ZiE	1000	1500	1700	VSG = 2x8 TVG, 1,52 PVB	1,2 kN/m²	0,5 kN/m	0,6 kN/m²	0,5 kN/m

hg = glass height, **b** = horizontal distance of the point fixings, **bg** = glass width

set with point fixings

against the wall, with handrail, without edge protection profile

static calculation	available
shock resistance	nach TRAV
note	category C max. width: 1800 mm**

We can support you!

** for an edge distance of 100 mm

The details in the table for LSG panels must be adhered to. For rectangular panels with the maximum span width.

item no.	plate Ø	**bg in mm**	glass structure in mm	span width in mm		max. wind load
7072VA | 7076VA | 7078VA | 7016VA	≥ 50 mm	**700-1400**	≥ 6 ESG/1,52 PVB/6 ESG	500	1200	1,5 kN/m²*
7073VA | 7077VA	≥ 70 mm	**700-1800**	≥ 8 ESG/1,52 PVB/8 ESG	500	1600	1,5 kN/m²*
7073VA | 7077VA	≥ 70 mm	**700-1800**	≥ 10 TVG/1,52 PVB/10 TVG	500	1600	2,2 kN/m²*
7072VA | 7076VA | 7078VA | 7016VA	≥ 50 mm	**700-1400**	≥ 8 ESG/1,52 PVB/8 ESG	500	1200	2,8 kN/m²*
7073VA | 7077VA	≥ 70 mm	**700-1800**	≥ 10 ESG/1,52 PVB/10 ESG	500	1600	2,5 kN/m²*

*Solely in respect of outdoor use. For applications in outdoor areas, an additional individual approval (ZiE) is required. Request our static calculation.

hg = glass height max. 1000 mm, **b** = horizontal distance of the point fixings, **bg** = glass width

set with clamp fixtures

ETA	AbZ
load-bearing capacity	glass statics available ✓
residual load-bearing capacity	covered by AbZ ✓
note	maximum distance between glass edge and handrail or other components: 50 mm —

We can support you!

to the side against the wall, with handrail, without edge protection

to the side in the reveal, with handrail, without edge protection

double-set to the side, against the wall, with handrail, without edge protection

exemplary versions

per	bg max	glass structure
AbZ Z-70.2-28	1500	see AbZ design table

set with cp-mini

cp-mini arranged at the top and at the bottom, against the wall, with handrail, without edge protection

cp-mini arranged at the top and at the bottom, in the reveal, with handrail, without edge protection

static calculation	available
shock resistance	test report available
note	category A

We can support you!

exemplary versions

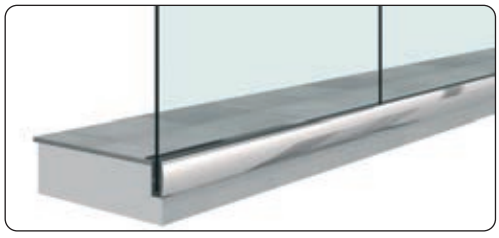
per	hg in mm	bg in mm	glass structure	max. wind load
ZiE	1000	500-1000	VSG 2x6 ESG, 1,52 PVB	1,6 kN/m²
ZiE	1000	500-1400	VSG 2x6 ESG, 1,52 PVB	0,8 kN/m²

Note: maximum distance between glass edge and handrail or other components: 30 mm

material maintenance

our products need a little bit of maintenance and care

P+S products are only made of high-quality materials. To ensure that you are satisfied with our products for many years to come, the necessary maintenance and care must be carried out. Depending on the materials used, of course, different aspects must be observed.



aluminium

Light dirt should be removed using a sponge, lukewarm water and a neutral cleaning agent. Avoid dry cleaning in any case; otherwise scratches might occur on the surface. Using a chamois leather, remaining traces of wiping or visible courses of water drops can be removed afterwards. Aluminium has a very smooth surface, but grease and oil still stay on it. Thus aluminium parts should always be degreased very thoroughly. We recommend you wear gloves to prevent leaving greasy finger prints after the cleaning process. The cleaning should be carried out using solvents, e.g. thinner and special cleaning agents and degreasers. Under no circumstances should alkaline or acid cleaning agents be used. You can clean Tarnished and already oxidised surfaces (recognisable by white corrosion products) using a non-woven abrasive web; otherwise, we recommend you use special cleaning agents.

zinc die-cast

For products made of zinc die-cast, the surface finish plays a crucial role. Powder-coated products are characterised by a very good resistance to weathering. In addition to indoor applications, it is highly recommended to use them for outdoor applications. For galvanically finished products, it must be noted that, for instance, surfaces such as chrome-plated surfaces are ideally suited for indoor and outdoor applications, whereas surfaces with a stainless steel finish or stainless steel effect are sealed with a clear varnish to be also suited for outdoor use. For all products, maintenance and care work should be carried out at regular intervals (approx. all 2 months as required). Lukewarm water and a soft cloth are ideally suited. Chemical cleaning agents, however, are unsuitable.

stainless steel

For many applications, stainless steel is the right choice in many fields of application. To maintain the desired visual effect for many years to come, we recommend you provide for regular maintenance and care. In the table listed below, you can see to which extent our materials can be used for the respective stresses. However without regular maintenance and care corrosion, depending on the stress, cannot be excluded. Using our range of cleaning and care products shown on page 182-185, you are well prepared for any type of treatment for stainless steel surfaces.

stress	A2 (304) (recommended maintenance and care interval)	A4 (316) (recommended maintenance and care interval)
low		
indoor (no chlorinated wet rooms or industrial applications)	✓ (ca. 4-6 months)	✓ (ca. 6-12 months)
normal		
outdoor (inland, not in close proximity to coastal regions, no high humidity)	✓ (ca. 2-3 months)	✓ (ca. 3-6 months)
high		
outdoor (high humidity, coast regions, watery environment, swimming pools, accumulation of hazardous substances)	–	–

cleaning stainless steel: This is how you get it clean again

For outdoor applications, stainless steel requires, of course, a little more maintenance and care than for indoor applications. For use in indoor areas, maintenance and care is usually limited to removing finger prints. Caution: Under no circumstances should you use any products containing chlorine or acids. Bleaching agents and silver polish, too, are not suited for the maintenance and care of stainless steel. Our recommendation: Always clean brushed or ground surfaces in parallel to the grinding instead of across the grinding. The following table provides you with an overview of how to remove different types of dirt from stainless steel.

type of soiling		removal
protective film	If stainless steel is covered with a protective film in its new condition, this should be removed at an early stage. Otherwise, it may become stuck to the stainless steel, as many films are not UV resistant.	Heat the film if needed (with a hairdryer) and then peel it off slowly and evenly. Ethyl alcohol can be used to carefully remove any residual glue.
lime-/ mortar	With new installations and renovations in particular, stainless steel components may become splashed with lime or mortar which can then harden on the material.	Remove residues with phosphoric acid, then rinse with clear water and dry (prevents limescale). Never use cement residue removers or diluted hydrochloric acid!
iron particles	Deposits of fine iron particles on the surface of the stainless steel may arise during construction work e.g. when grinding or cutting the steel. These should be removed immediately as they can penetrate the stainless steel's passive layer and lead to corrosion.	So-called ferrite-free cleaning sponges and special cleaning agents are particularly suitable for cleaning. However, they are only useful if there is no damage to the surface of the stainless steel. If there is already some corrosion, a stain treatment and possibly a polish may be needed (to be performed by a specialist firm).
corrosion	Stainless steel may also rust if there is damage to the surface. Help should be sought quickly with this in order to prevent the rust from extending further.	In the case of specific stains, treat the affected areas. This will re-establish the protective effects of the surface. However, there may be slight visual changes (clouding) which can be removed through careful grinding or polishing.
finger marks	There's little that can be done to prevent them but they can be removed quickly and easily.	Simply clean the affected areas with washing-up liquid. Alternatively, you can use a special cleaning agent which covers the stainless steel with an ultra-thin protective film, giving the surface a more even look.
stubborn dirt	Contaminated surfaces that cannot easily be cleaned need special treatment.	Standard household cleanser will usually do the trick, but it should not contain any abrasive particles. The surface should subsequently be rinsed with clear water. Using demineralised water helps prevent limescale.
oil and fat	Heavy oil and fat contamination.	The cleaning should best be carried out in several goes using an alcoholic cleaning agent such as ethyl alcohol or acetone, always with a clean cloth each time. The cleaning agent should be thoroughly removed to prevent residues.
residues	During renovation paint splatters can reach unprotected areas on the stainless steel surface.	Cleaning agents with alkaline or solvent-based components can easily remove colour residues.

Ensuring your stainless steels always looks good

abbreviated designations for material and design types

colours and surfaces for indoor applications

ZN = zinc

- ZN0 = rough
- ZN1 = matt chrome finish
- ZN5 = bright chrome finish
- ZN7 = bright gold finish
- ZN12 = aluminium-colour powder coated
- ZN14 = white RAL 9016 powder coated
- ZN20 = stainless steel effect
- ZN20-K = stainless steel effect with clear lacquer
- ZN22 = stainless steel finish
- ZN22-K = stainless steel finish with clear lacquer
- RAL = powder coated in RAL colours

indoor

INFO

Surcharge for minimum quantities applicable to all clamps in RAL colours.

E = aluminium

- E1/23 = stainless steel effect anodised

VA = stainless steel

- VA = finished
- VA1 = polished
- VA2 = matt brushed

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symbols used in this catalogue

- available packaging unit
- fixture for flat connection
- fixture for round tube connection
- mono glass
- laminated safety glass
- stainless steel
- square tube diameter (Ø 42,4 / Ø 60,3)
- not possible
- possible
- 90° mounting not possible
- 90° mounting possible

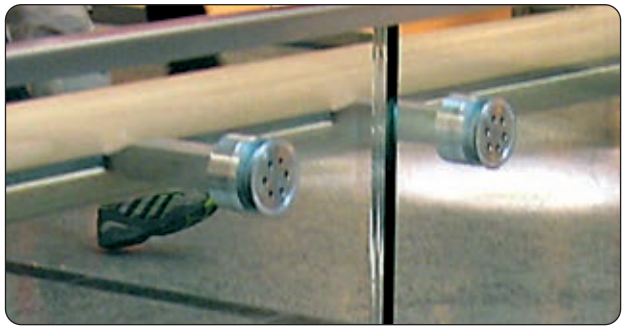
applications AbZ Z-70.2-28

Berlin, 2008

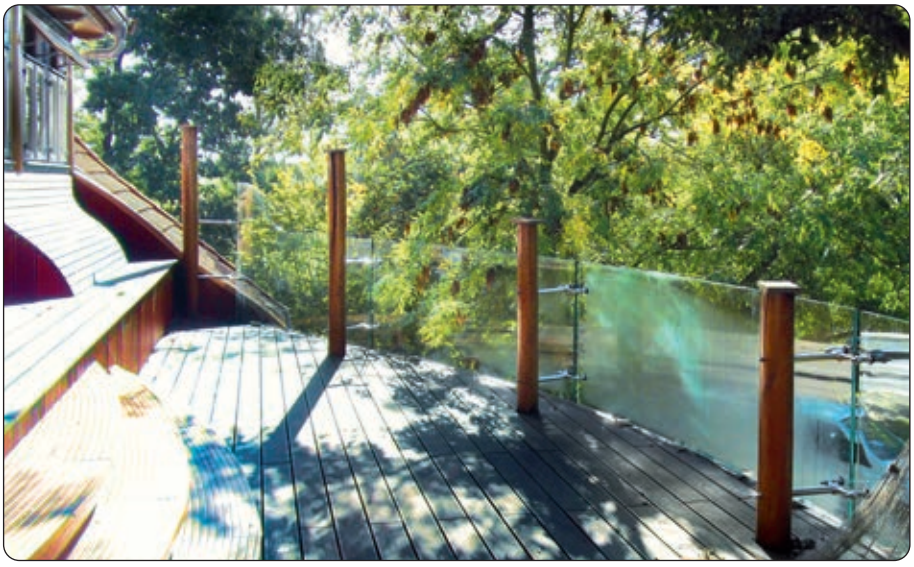
Nürnberg, 2008

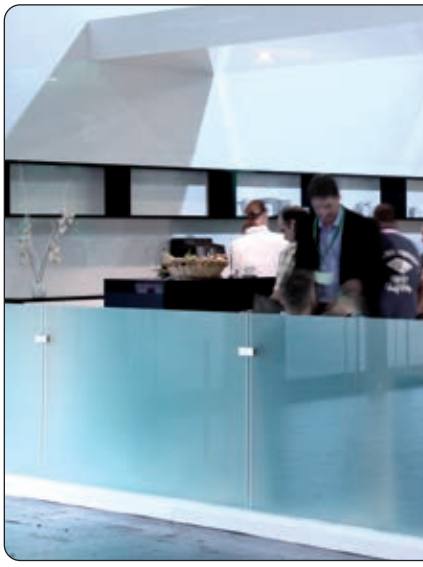
applications with AbP or ZiE

Studio 3001, 2009

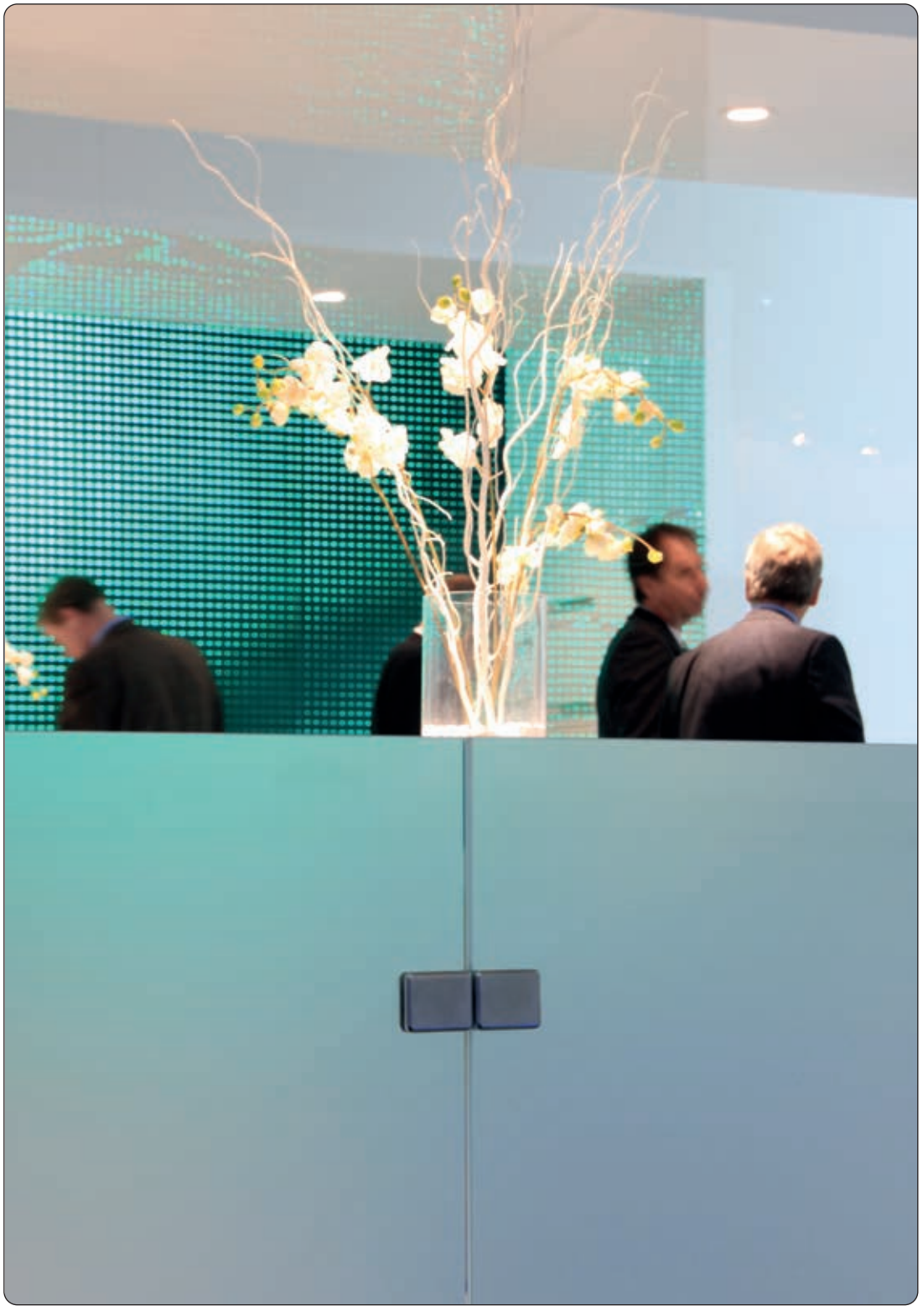


Berlin, 2009





Interzum, 2011



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