

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-13/0675  
of 7 August 2019

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Trigon SG

Product family  
to which the construction product belongs

Insulated glass units with structural sealant punctually  
anchored

Manufacturer

HUECK System GmbH & Co. KG  
Loher Straße 9  
58511 Lüdenscheid  
DEUTSCHLAND

Manufacturing plant

HUECK System GmbH & Co. KG  
Loher Straße 9  
58511 Lüdenscheid  
DEUTSCHLAND

This European Technical Assessment  
contains

32 pages including 16 annexes which form an integral  
part of this assessment

This European Technical Assessment is  
issued in accordance with Regulation (EU)  
No 305/2011, on the basis of

EAD 090035-00-0404

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## Specific part

### 1 Technical description of the product

This European Technical Assessment applies to insulating glass units for glass façades with the trade name "Trigon SG". The insulating glass units are fastened punctually to a mullion-transom system. For that purpose retaining devices (toggles), which are fixed to the supporting construction, grip into a U-profile which is glued into the insulating glass edge. The insulating glass units may consist of two or three glass panes. The U-profile is inserted in the insulating glass edge next to the inner pane. The outer panes are borne via the structural sealant of the insulating glass edge, the inner pane is held mechanically via retaining devices (Annexes 1 and 2).

For the self-weight of the insulating glass unit mechanical self-weight supports are fixed to the supporting construction and for the case of bond failure there are wind protection devices (emergency retainers) optionally.

The maximum dimensions of the insulating glass units are 3000 mm x 5000 mm (width x height or height x width respectively). The insulating glass units are fixed on at least two sides by the toggles.

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the elements for "Trigon SG" are used in compliance with the specifications and conditions given in the Annexes A to D.

The insulating glass units for "Trigon SG" are installed in mullion-transom façades. The application is suitable also for structures with an angle of inclination to vertical up to 10° in direction to the substructure.

The insulating glass units for "Trigon SG" may be installed as horizontal respectively overhead glazing at inclinations with respect to the horizontal ranging from 7° to 80°.

The structural bond shall not be permanently subjected to tension.

By using special toggles, polygonal façades are executed.

The use of insulating glass units for the stiffening of other building elements is not intended.

For the use in structures the following types are differentiated in accordance with ETAG 002-1:

Type I: Mechanical transfer of the self-weight of the facade element to the sealant-support frame and thence to the structure. The structural sealant transfers all other actions. Devices are used to reduce danger in the event of bond failure.

Type II: Mechanical transfer of the self-weight of the facade element to the sealant-support frames and thence to the structure. The structural sealant transfers all other actions and no devices are used to reduce danger in the event of bond failure.

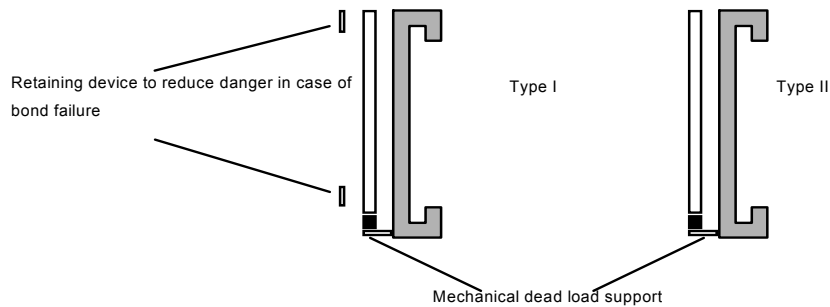


Figure 1: Schematic examples of types I and II

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of "Trigon SG" of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product and references to the methods used for its assessment

#### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic bending strength of the different glass products	See Annex A
Heat-soaking process	Use scenario 1a/1b; see Annex A
Compound effect of laminated safety glass	Use scenario 2a/2b; see Annex A
Load-bearing capacity: Mechanical self-weight support, retaining devices, wind protection devices (emergency retainers)	See Annex C
Structural bonding: Substrates and adhesive; load-bearing capacity	See Annex B
Impact resistance: for infill elements used as barrier against falling down	See Annex D
Wind resistance	No performance determined
Durability	Covered under "structural bonding"

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A 1
Resistance to fire	No performance determined

#### 3.3 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Air permeability Trigon SG 50	A 4
Watertightness Trigon SG 50	RE 1200

### 3.4 Protection against noise (BWR 5)

Essential characteristic	Performance
Air permeability Trigon SG 50	A 4
Watertightness Trigon SG 50	RE 1200

### 3.5 Energy economy and heat retention (BWR 6)

TRIGON 50 with PP insulating web

Profile	$b_f$ [mm]	$l_f$ [mm]	$U_t / U_m$ [W/m <sup>2</sup> K]
519 300	50	32	1.408
519 352	50	100.5	1.476
519 356	50	193.5	1.504

$$U_t / U_m \text{ [W/m}^2\text{K]} = 0.0006 * l_f \text{ [mm]} + 1.3999$$

TRIGON 60 with PP insulating web

Profile	$b_f$ [mm]	$l_f$ [mm]	$U_t / U_m$ [W/m <sup>2</sup> K]
523 300	60	32	1.336
523 352	60	100.5	1.398
523 356	60	193.5	1.425

$$U_t / U_m \text{ [W/m}^2\text{K]} = 0.0005 * l_f \text{ [mm]} + 1.3281$$

TRIGON 50 with foam profiles

Profile	$b_f$ [mm]	$l_f$ [mm]	$U_t / U_m$ [W/m <sup>2</sup> K]
519 300	50	32	0.911
519 352	50	100.5	0.939
519 356	50	193.5	0.951

$$U_t / U_m \text{ [W/m}^2\text{K]} = 0.0002 * l_f \text{ [mm]} + 0.9075$$

TRIGON 60 with foam profiles

Profile	$b_f$ [mm]	$l_f$ [mm]	$U_t / U_m$ [W/m <sup>2</sup> K]
523 300	60	32	0.874
523 352	60	100.5	0.901
523 356	60	193.5	0.913

$$U_t / U_m \text{ [W/m}^2\text{K]} = 0.0002 * l_f \text{ [mm]} + 0.8705$$

$b_f$  = profile height [mm]

$l_f$  = profile depth [mm]

$U_t$  value transom

$U_m$  value mullion

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**4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base**

In accordance with EAD 15-09-0035-04.04 the applicable European legal act is: 1996/582/EC<sup>1</sup>.

The systems to be applied are:

- System 1 for Type II according to Figure 2
- System 2+ for Type I according to Figure 2

In addition the European legal act is: 2003/656/EC<sup>2</sup> is valid for the reaction to fire of products according to this European Assessment Document.

The systems to be applied are:

- System 1, 3, 4

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 7 August 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Herr

<sup>1</sup> Official Journal of the European Communities no L 254/62 of 8.10.1996  
<sup>2</sup> Official Journal of the European Communities no L 231/15 of 17.9.2003

## Annex A

### Characteristics of the different glass products

A double or triple insulating glass unit is installed for "Trigon SG". Depending on the use scenarios given below and the requirements due to the designing results for the existing actions at the place of installation the suitable glass products are chosen.

The basic glass type of all glass products is float glass according to EN 572-9<sup>3</sup> made of soda lime silicate glass. Dependent on the appropriate use scenario the following products are suitable: thermally toughened soda lime silicate safety glass according to EN 12150-2<sup>4</sup>, coated glass according to EN 1096-4<sup>5</sup>, heat soaked thermally toughened soda lime silicate safety glass according to EN 14179-2<sup>6</sup>, heat soaked thermally toughened soda lime silicate safety glass according to EN 14179-2 but with deviating requirements concerning the duration of the holding phase of four hours and the involvement of a third party for controlling the heat-soaking process, heat strengthened soda lime silicate glass (TVG) according to EN 1863-2<sup>7</sup> and laminated safety glass (VSG) according to EN 14449 with an interlayer made of polyvinyl butyral (PVB). The PVB-interlayer has to feature the following properties for tear strength > 20 N/mm<sup>2</sup> and for elongation at rupture > 250 %.

Glazing used for the outer pane of the insulating glass unit is to be produced of heat soaked thermally toughened soda lime silicate safety glass according to EN 14179-2 or heat soaked thermally toughened soda lime silicate safety glass according to EN 14179-2 but with deviating requirements concerning the duration of the holding phase of four hours and involving a third party for controlling the heat-soaking process with respect to the appropriate use scenario.

The characteristic bending strength of the glass panes according to EN 1288-3<sup>8</sup> shall be given in the "Declaration of Performance" as basis for the designing respectively to ensure that they will safely transmit the wind load to the support frame via the structural sealant.

The glass panes coated or entirely or partially enamelled may only be used for bonding, if the adhesive behaviour of the surfaces has been verified according to ETAG 002-1 with the adhesives described in Annex B. The specification of the enamel or coating shall be defined in the respective European technical approval of the sealant or in another European technical approval or in national stipulations. If other enamels or coatings of the glass panes are used, the bonded area of the glass pane shall be left out from this enamel or coating.

The coating is given in the "Declaration of Performance".

In the case of overhead glazing the lower glass pane of the insulating glass unit is made of laminated safety glass.

Furthermore it shall be observed that when using the coated glass according to EN 1096-4 as laminated safety glass the coated glass surface may not be oriented towards the PVB-interlayer.

The insulating glass units shall comply with the regulations for insulating glass units as per EN 1279-5<sup>9</sup>.

3	EN 572-9	Glass in building – Basic soda lime silicate glass products – Part 9: Evaluation of conformity/Product standard
4	EN 12150-2	Glass in building – Thermally toughened soda lime silicate safety glass – Part 2: Evaluation of conformity/Product standard
5	EN 1096-4	Glass in building - Coated glass - Part 4: Evaluation of conformity/Product standard
6	EN 14179-2	Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard
7	EN 1863-2	Glass in building – Heat strengthened soda soda lime silicate glass – Part 2: Evaluation of conformity/Product standard
8	EN 1288-3	Glass in building - Determination of the bending strength of glass - Part 3: Test with specimen supported at two points (four point bending)
9	EN 1279-5	Glass in building - Insulating glass units – Part 5: Evaluation of conformity

### Use scenarios

- 1a Use of monolithic exterior panes for the insulated glass unit (e.g. in Germany at installation height of more than 4 m): Heat-soaked thermally toughened soda lime silicate safety glass is required according to EN 14179-1<sup>10</sup> but with duration of the holding phase of four hours and involving a notified body for controlling the heat-soaking process.
- 1b Use of monolithic exterior panes for the insulated glass unit (e.g. in Germany at installation height of less than 4 m): Thermally toughened soda lime silicate safety glass according to EN 12150-1<sup>11</sup>, -2 or according EN 14179-1, -2.
- 2a Use of laminated safety glass for the exterior or interior pane of the insulated glass unit according to EN 14449<sup>12</sup> with PVB-interlayer; Compound effects are not respected.
- 2b Use of laminated safety glass for the exterior or interior pane of the insulated glass unit according to EN 14449; Compound effects are respected regarding  $G = 0.4 \text{ N/mm}^2$ .

10	EN 14179-1	Glass in building - Heat soaked thermally toughened soda lime silicate safety glass – Part 1: Definition and description
11	EN 12150-1	Glass in building – Thermally toughened soda lime silicate glass – Part 1: Definition and description
12	EN 14449	Glass in building – Laminated glass and laminated safety glass – Evaluation of conformity/Product standard



## Annex B

### Structural bonding and sealing

#### Bonding profiles

U-profiles are inserted and bonded in the load-bearing insulating glass edge next to the inner pane. The following products are to be used as U-profiles into which the retaining devices (toggles) are inserted. The U-profiles are inserted continuously or in pieces of the length of 100 mm along the supported edges of the pane. The U-profiles may be used in combination with the given adhesives - see the following tables.

Table 1: U-profiles for insulating glass units (Annexes 3 and 6)

Product	Art. No.**	Surface condition	Adhesives that may be used
Stainless Steel 1.4301 with strength class S275	Z 917109	plate rolled blank, classified by either 2B (0.3 µm<Ra<0.5 µm) or 2R, according to EN 10088-2 <sup>13</sup> , Table 6	DOWSIL 993
Stainless Steel 1.4301 with strength class S275	Z 917109	ETA-03/0038 classified by either 2B (0.3 µm<Ra<0.5 µm) or 2R, according to EN 10088-2, Table 6	Sikasil SG 500
EN AW 6060 aluminium as per EN 573-3 <sup>14</sup> , state T66 as per EN 755-2 <sup>15</sup>	P 499633	Anodised aluminium: colours E6-C0 and E6-C35, Fa. König, Metallveredelung GmbH, Lauchringen*; colours E6-C0 and E6-C35, Fa. HD Wahl GmbH, Jettingen-Scheppach* colours E6-C0 and E6-C35, Fa. Königsdorf Oberflächentechnik GmbH, Wolfhagen*	DOWSIL 993
EN AW 6060 aluminium as per EN 573-3, state T66 as per EN 755-2	P 499633	Anodised aluminium: colours E6-C0 and E6-C35, Fa. König, Metallveredelung GmbH, Lauchringen*; colours E6-EV1 and E6-C35, Fa. HD Wahl GmbH, Jettingen-Scheppach*	Sikasil SG 500
* The anodising process is to be conform to the specifications described in the test reports respectively deposited in Deutsches Institut für Bautechnik.			
** Concerning the U-profiles the Art.No. are the same for continuous devices and devices in pieces.			

<sup>13</sup> EN 10088-2:2014 Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes

<sup>14</sup> EN 573-3:2009 Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products

<sup>15</sup> EN 755-2:2008 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties

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### Adhesives

Two-component silicone adhesives are to be used for the structural bonding considering the following detailed specifications. For all parts of load transmission by bonding – glass to glass and glass to the U-profile – the adhesives and surfaces according to the respective ETA of the silicone shall be respected.

Table 2: Structural sealants

Structural sealant	Manufacturer	Associated ETA
DOWSIL 993	DOW Europe GmbH	ETA-01/0005
Sikasil SG 500	SIKA SERVICES AG	ETA-03/0038

The properties of the structural sealant, such as the load-bearing capacity of the bonding, are given in the associated ETA for the structural sealant listed in Table 2.

### Materials in contact

Only compatible materials may be installed adjacent to the structural sealant, and this compatibility is to be proven in the assessment procedure. Neighbouring materials may be used in the combinations specified in the following table.

Spacers are applied for which a system check according to EN 1279-2<sup>16</sup> is available. The edge seal of the insulating glass is manufactured with a primary seal of butyl according to the following table and a secondary seal (load-bearing insulating glass edge) of silicone sealants according to Table 2.

Tabelle 3: Compatibility of materials in contact (Annexes 4, 5 and 16)

Permissible combinations of structural sealants and materials in contact												
Manu- facturer	Structural sealant	Inner seal / butyl						Setting block/ formed part	Sealing/ weather joint		Sealing Schaump rofil PE	Sealing EPDM TSP 706
		BU-S, Kömmerling	Terostat 969 H.B. Fuller	Polybutylen GD 115 Kömmerling	Sika Glaze IG-5 PIB SIKA SERVICES AG	Fenzi Butylter, Fenzi Group S.p.a.	Naftotherm M82 Kömmerling		Silicone, M+S Silicon GmbH Co. KG	DOWSIL 791 DOW Europe GmbH		
DOW Europe GmbH	DOWSIL 993	X		X			X	X	X		X	X
SIKA SERVICES AG	Sikasil SG 500		X	X	X	X		X		X	X	X

<sup>16</sup> EN 1279-2:2002

Glass in building - Insulating glass units - Part 2: Long term test method and requirements for moisture penetration

### **Details for the bonding process**

The bonding of the insulating glass units "Trigon SG".is only done in the manufacturing plants that are instructed by HUECK System GmbH & Co. KG. A list of authorized bonding shops is deposited with Deutsches Institut für Bautechnik. The processing guidelines of the companies HUECK System GmbH & Co. KG and of the manufacturer of the silicone sealant shall be respected,

The surfaces to be sealed may only be prepared in conformity with the manufacturing directives given by the sealant manufacturer.

Bubbles, holes or inclusions in the structural sealant are not permissible.

For the structural design calculation of the bonding the design rules of the Member State, in which the Trigon SG Insert Elements will be used, shall be respected.

## Annex C

### Characteristics and load-bearing capacities of the glass supports, retaining devices (toggles), wind protection devices (emergency retainers)

#### Glass supports

The glass supports (Annexes 7, 8 and 9) with a width of 100 mm support the self-weight of the glass panes. The length of the supporting device depends on the total thickness of the insulating glass unit.

The resistance of the different glass supports is given in table 4 to table 6. For the load-bearing capacity a deformation of 2 mm and a relative deformation of two glass panes of 0.5 mm are respected.

Table 4: Load bearing capacity of standard glass supports (Full element)

System	Article No. glass support	$F_{Rk}$ [kN]
Trigon 50	996165	2,60
	996166	2,60
	996167	3,00
	996168	3,00
Trigon 60	996327	2,60
	996328	2,60
	996329	3,00
	996330	3,00
	499682	4,50
	499635	6,00

Table 5: Load bearing capacity of reinforced glass supports (full element)

System	Article No. transom	Glass thickness [mm]	Variation	$F_{Rk}$ [kN]
Trigon 50 Trigon 60	519353 or 519354	40 to 48	without angle	2,60
			with 1 angle	3,10
			with 2 angles	3,50
		50 to 58	without angle	2,20
			with 1 angle	2,70
			with 2 angles	3,10

Table 6: Load bearing capacity of glass supports for high infill weights (full element)

System	T-connector	Fixing of vertical glass support	Insert profile in mullion	F <sub>Rk</sub> [kN]
Trigon 50/ Trigon 60	Standard T-connector	4 screws	without insert profile	4,44
		2 screws/2 bolts		
	T-connector for high loads	4 screws		7,22
		2 screws/2 bolts		
	Insert profile as T-connector	4 screws	with insert profile	9,92
		2 screws/2 bolts		

### Retaining devices (toggles)

The toggles are made of aluminum EN AW 6063 T66 according to EN 573-3 and EN 755-2 (Annex 10).

For the positioning of the toggles the distance "e" between two toggles is limited to  $150 \text{ mm} < e \leq 400 \text{ mm}$ . The first toggle is situated at min. 50 mm and max. 200 mm from the corner in the case of the horizontal pane edge and at min. 50 mm and max. 150 mm in the case of the vertical pane edge (Annex 13). The distances may vary within the given range for special applications.

The minimum embedment depth of the toggles into the U-profiles is to be 7 mm.

If only two sides of the pane are supported, two toggles right next to each other (corner of the pane) are regarded as one.

For polygonal façades special toggles according Annex 11 may be used.

The toggles can be fixed in two different ways, V1 with the fixing screw in the screwing channel only and V2 being screwed into the screwing channel and through its web into the profile (Annex 15).

The toggles shall be verified for the effects of actions for special application. The load capacities for the polygonal toggles shall be distinguished between infields in polygonal façades where two elements of similar size are placed side by side and endfields of a polygonal façade.

The load bearing capacity of the different toggles is given in table 7.

Table 7: Load bearing capacity of the toggles

Group	Type	Article No.	$F_{Rk,V1}$ [kN]	$F_{Rk,V2}$ [kN]
Standard toggle one-sided	-	993945	0,68	1,37
	-	993974		
	-	996395		
		939331		
		939332		
		939184		
Standard toggle two-sided	-	993946	2,66	2,77
	-	993975		
		996396		
		939141		
Polygonal toggle A-D in infields	A	993976	0,68	1,37
	B	993977		
	C	993978		
	D	993979		
Polygonal toggle E-H in infields	E	993980	2,34	2,33
	F	993981		
	G	993982		
	H	993983		
Polygonal toggle I-O in infields	I	993984	5,34	4,89
	J	996279		
	K	996278		
	L	996277		
	M	996276		
	N	996275		
	O	996255		
Polygonal toggle P-T in infields	P	996256	2,62	3,91
	Q	996257		
	R	996258		
	S	938086		
	T	938087		
Polygonal toggles A-T in endfields	A-T	-	0,68	1,37

### Mechanical safety devices (emergency retainers)

For the loading case of bond failure the horizontal wind suction loads are absorbed and passed on by emergency retainers. Two types of emergency retainers are used. One of them is flat (plate), made of stainless steel 1.4310, the other "hat-shaped", made of aluminium EN AW 6063 T66 according to EN 573-3 and EN 755-2 (Annex 12). The minimum distance between two emergency retainers is 500 mm. The distance of the first emergency retainer from the corner of the pane shall be less than half of the distance between two of them.

The necessity to use such emergency retainers is regulated by the respective Member States.

The load bearing capacity of the safety devices are given in table 8.

Table 8: Load capacity of mechanical safety devices

Safety device	Article No.	Load	$F_{Rk}$ [kN]
Hat	997260	one-sided	3,17
		symmetric	5,84
Plate	997259	one-sided	2,54
		symmetric	3,62

The design calculation is to be done in accordance with the national provisions of the Member States.

Annex D

**Tested compositions of glazing units for the use as barrier against falling down (dynamic load from height 900 mm)**

For the following compositions of insulating glass units with structural bonding the impact tests according to EN 12600 are passed with a drop height of 900 mm in the context of issuing this ETA. The verification of static actions for the use as barrier against falling down is to be done in addition according to the requirements of the Member State.

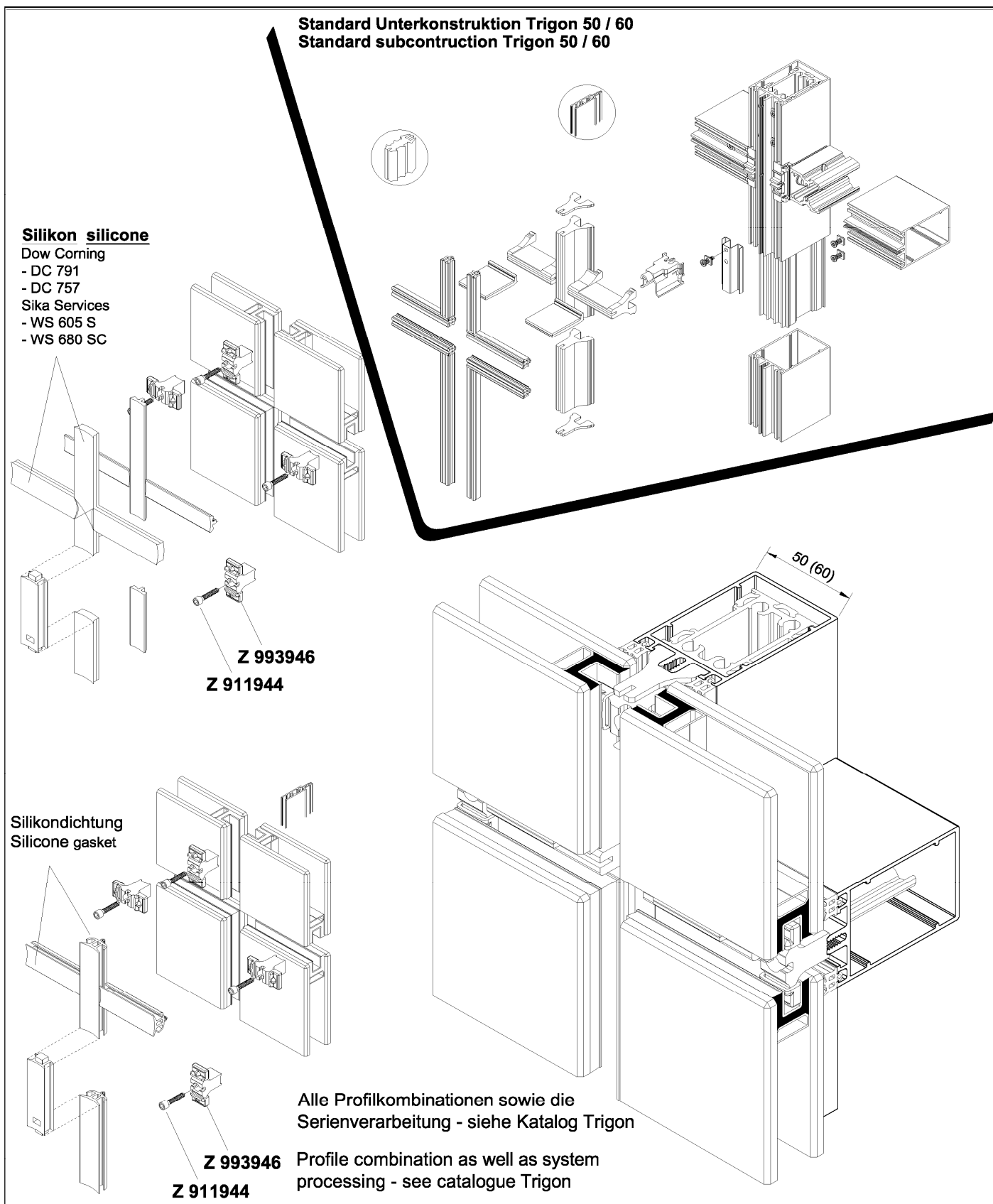
For the test setting the panes are fixed by toggles with a distance of max 200 mm and 150 mm to the edge. Every second fixing shall consist of two toggles according to V2. The single togglees are according to V1. For VA and V2 see Annex 14.

Tabelle 9: Dimensions and setting of the panes

Glass	Drop height of the pendulum*	Dimensions				setting (inside > outside)**
		min. B [mm]	max. B [mm]	min. H [mm]	max. H [mm]	
Two panes	900 mm	1100	1500	2100	2500	55.2 VSG made of Float / SZR / 8 ESG
		2100	2500	1100	1500	55.2 VSG made of Float / SZR / 8 ESG
		600	2500	1000	3300	66.2 VSG made of Float / SZR / 8 ESG
		300	500	1000	4000	44.2 VSG made of Float / SZR / 4 ESG
Three panes	900 mm	600	2500	1000	3300	66.2 VSG made of Float / SZR / 4 ESG / SZR / 8 ESG
						66.2 VSG made of Float / SZR / 8 ESG / SZR / 8 ESG
* Drop height for pendulum acc. to EN 12600		**VSG – Laminated safety glass acc. EN 14449; SZR – gas space; ESG – Thermally toughened safety glass acc. EN 12150-2				



English translation prepared by DIBt

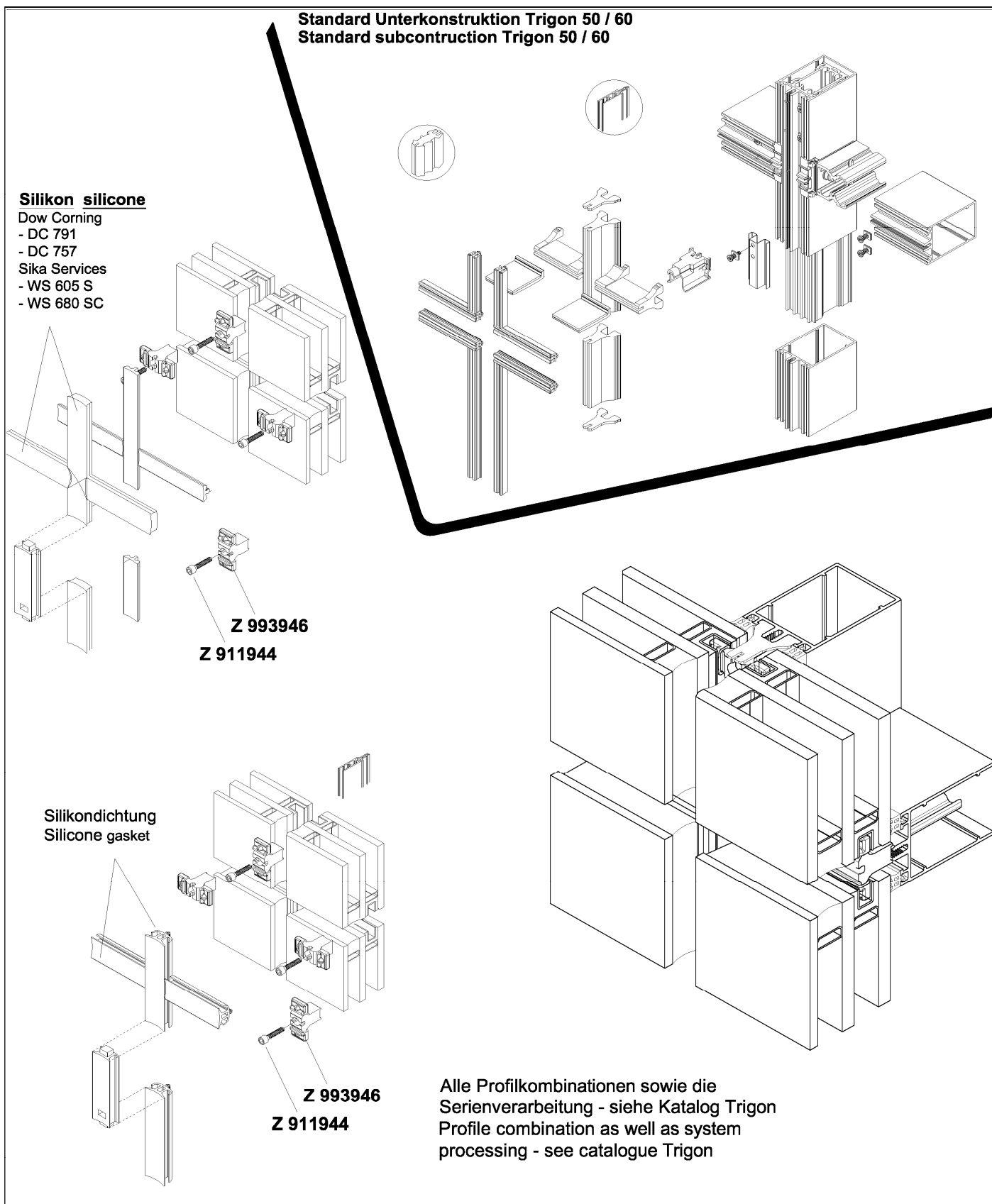


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Trigon SG

Trigon SG System scheme

Annex 1



electronic copy of the eta by dibt: eta-13/0675

Trigon SG

Trigon SG System scheme

Annex 2

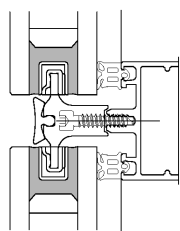
English translation prepared by DIBt

Systemübersicht Trigon mit 2-fach und 3-fach Isolierverglasung und Brüstungsverglasung  
System-scheme Trigon with double and triple insulating glazing and spandrel glazing

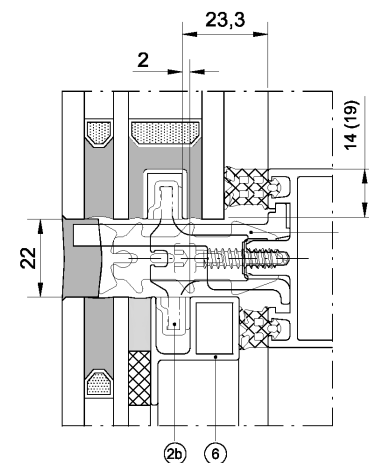
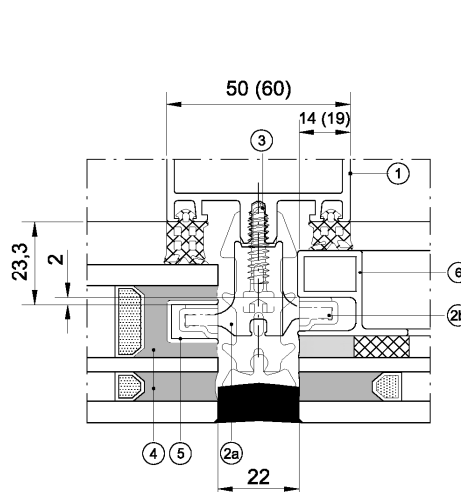
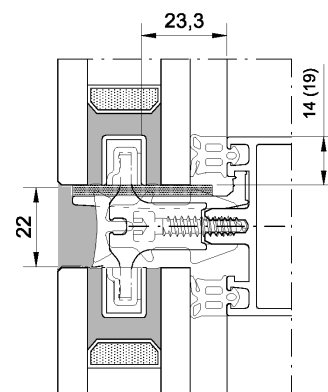
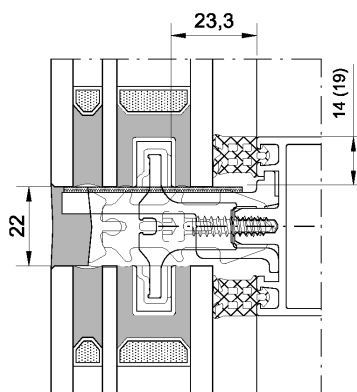
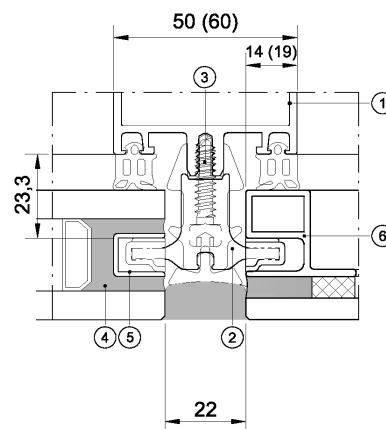
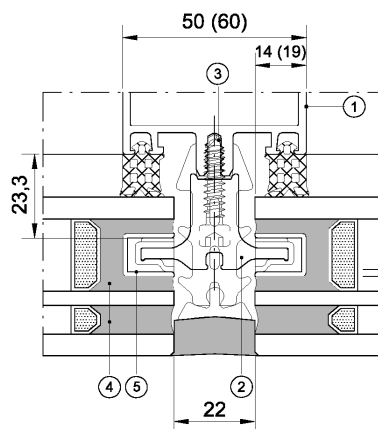
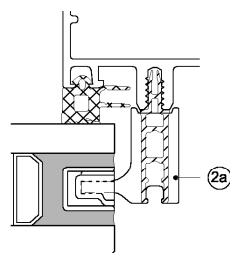
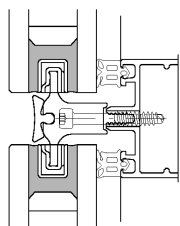
- ① Pfostenprofil / Riegelprofil  
Mullion profile / Transom profile
- ② Glashalter Doppelseitig Z 993946  
Double toggle
- ②a Glashalter Einseitig Z 993945  
Single toggle
- ②b Glashalter Einseitig 2mm Versatz bei einer Brüstungsverglasung (P519903)  
Single toggle 2mm offset by parapet glazing (P519903) Z 996395
- ③ Fassadenschraube  
Façade fixing screw
- ④ Dow coming DC993/ Sikasil SG 500  
Sealant
- ⑤ Alu / Edelstahl U-Profil P 499633 / Z 917109  
Alu / stainless steel U-profile
- ⑥ Aluminiumprofil P 519903  
Aluminium profile

Befestigungsvarianten  
Fixing variants

V1



V2

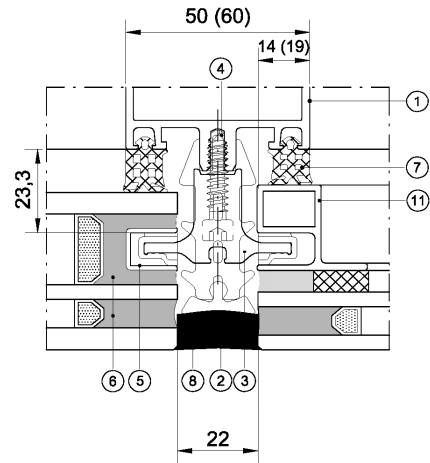
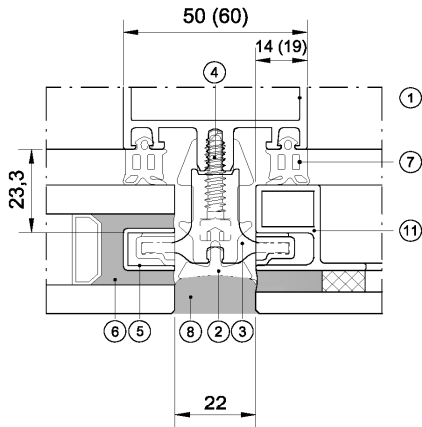


Trigon SG

Trigon SG System scheme

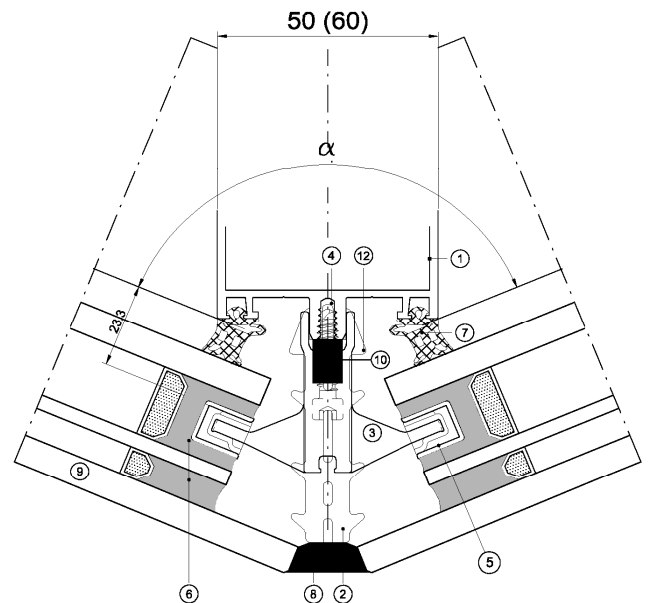
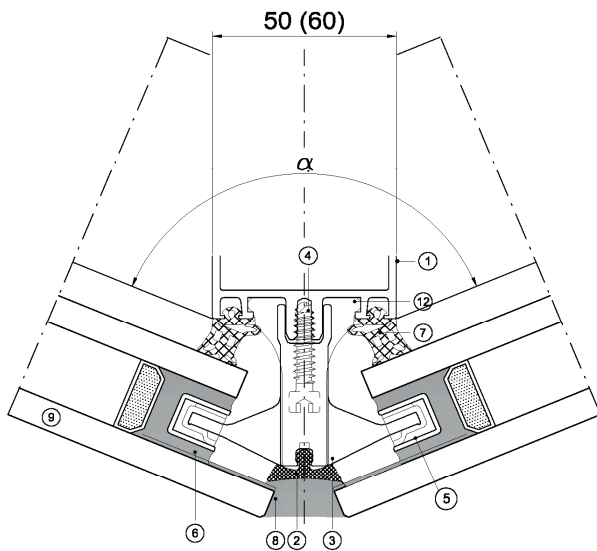
Annex 3

English translation prepared by DIBt



- ① Pfosten / Riegelprofil  
Mullion profile / Transom profile
- ② PE - Trägerprofil  
Sealing gasket
- ③ Glashalter nach Tabelle  
Single Toggle as per table
- ④ Fassadenschraube  
Façade fixing screw
- ⑤ Alu / Edelstahl U-Profil P 499633 / Z 917109  
Alu / stainless steel U-profile
- ⑥ Dow corning 993 / Sikasil SG 500  
Sealant
- ⑦ Glasdichtung innen, s. Verglasungstabelle Fassade  
Internal glazing gasket, cf. façade glazing table

- ⑧ Dow corning 791 / Sikasil WS 605 S  
Sealant acc. to. 2.1.8.8
- ⑨ Aussenscheibe aus ESG, ESG-H oder VSG aus 2x ESG  
Outer pane made of thermally toughened safety glass with or without heat-soaked or laminated glass LSG
- ⑩ Distanzklip Z 918070  
Distance clip
- ⑪ Aluminiumprofil P 519903  
Aluminium profile
- ⑫ Dämmprofil, s. Verglasungstabelle Fassade  
Insulating profile, cf. façade glazing table

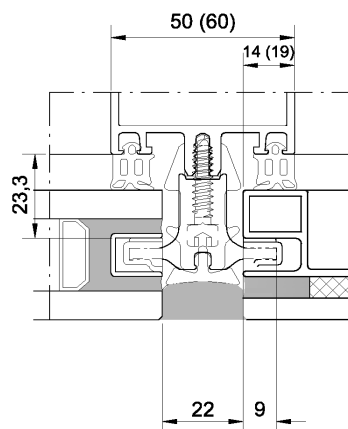
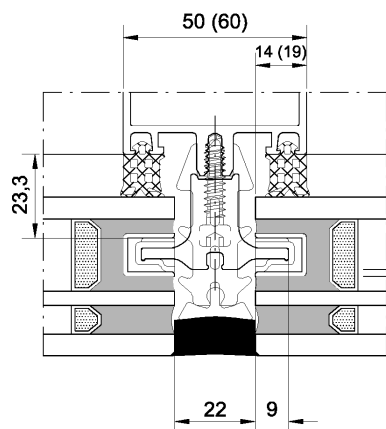


Trigon SG

Trigon SG System scheme

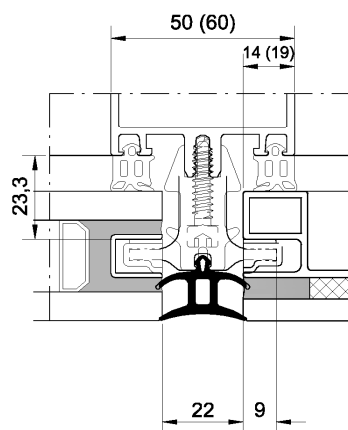
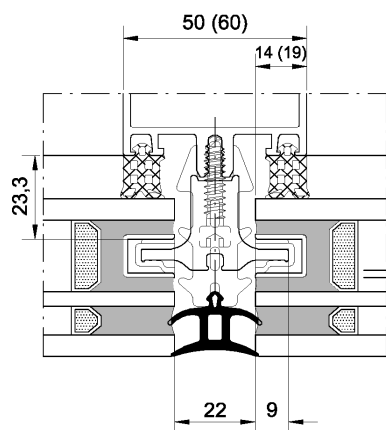
Annex 4

Systemübersicht Trigon - Wetter Versiegelung  
System-scheme Trigon - weather sealing



Nassversiegelung  
Wet seal

planmäßiger Toggleeinstand  
regular toggle setting



Trockenversiegelung  
Dry seal

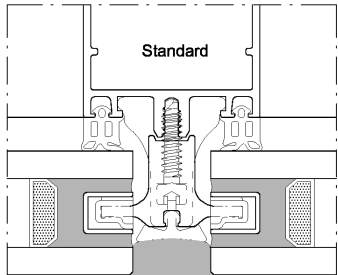
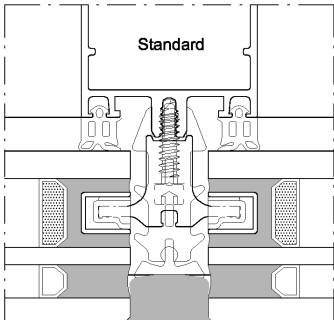
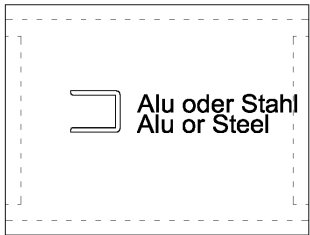
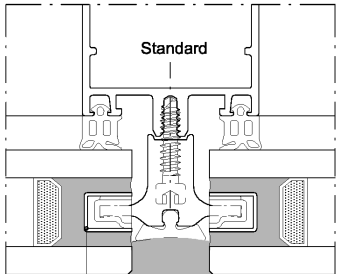
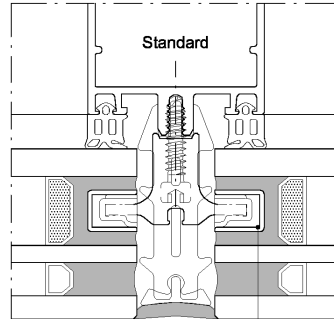
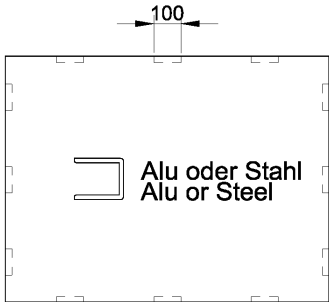
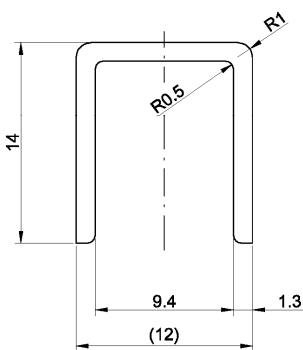
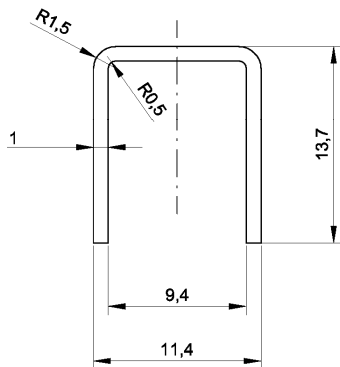
planmäßiger Toggleeinstand  
regular toggle setting

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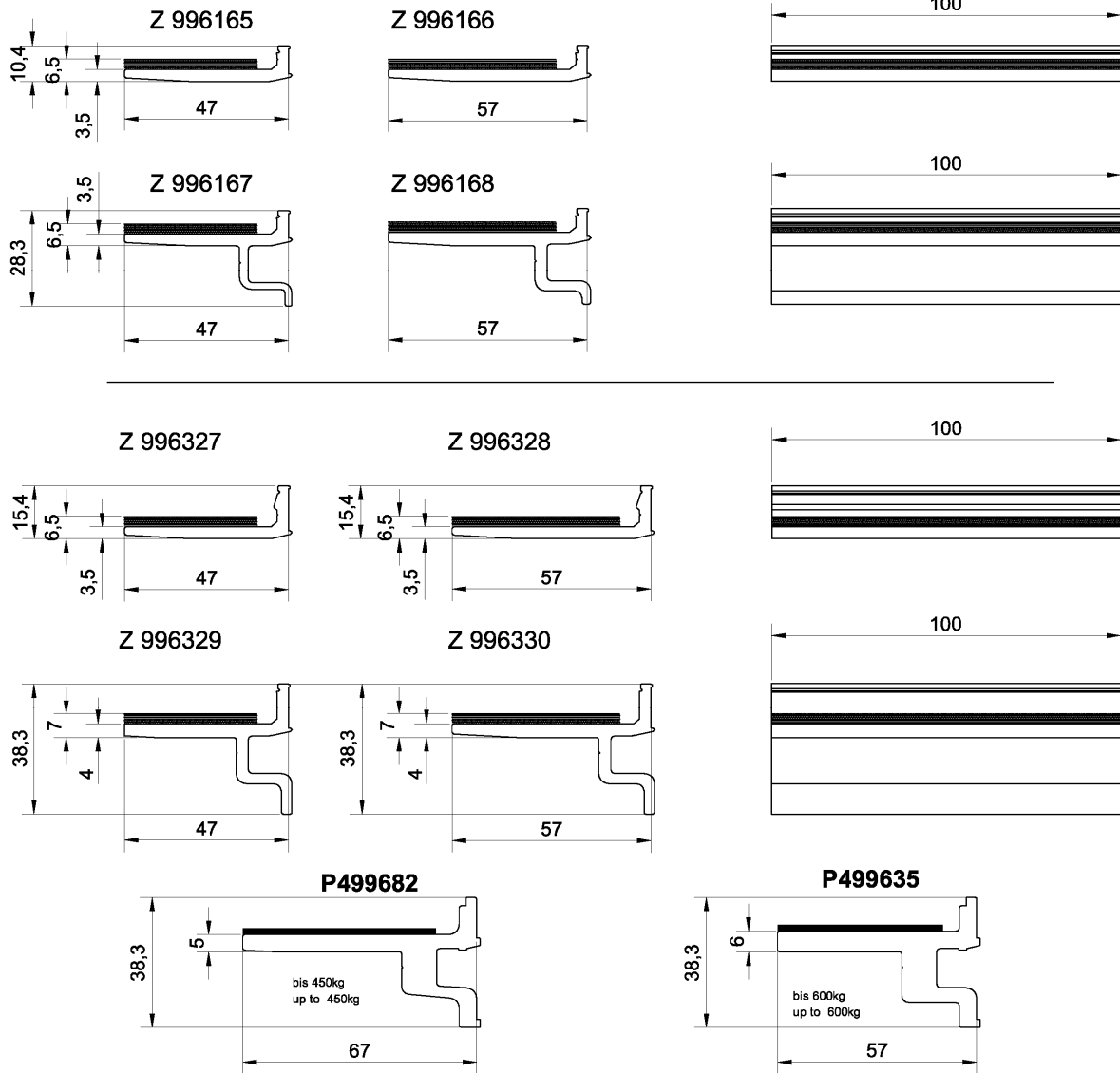
Trigon SG

Trigon SG System scheme

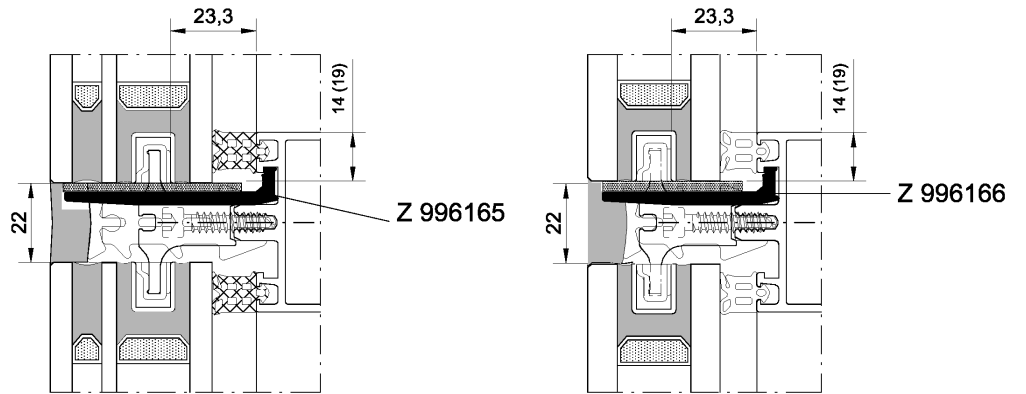
Annex 5

 <p>Standard</p>	<p>Verglasung mit durchlaufendem U - Profil Glazing with continous U - profile</p>	 <p>Standard</p>
 <p>Alu oder Stahl Alu or Steel</p>		
 <p>Standard</p>	<p>Verglasung mit U - Profil - Kurzstücken Glazing with shortpieces of U - profiles</p>	 <p>Standard</p>
<p>Aus Z 917109 oder P 499633 in Eigenfertigung hergestellt. Made of Z 917109 or P 499633 by others.</p>	 <p>100</p> <p>Alu oder Stahl Alu or Steel</p>	<p>Aus Z 917109 oder P 499633 in Eigenfertigung hergestellt. Made of Z 917109 or P 499633 by others.</p>
		
<p>Aluminium EN-AW 6060 Surface: E6-C0</p>	<p>Stainless steel 1.4301 S275 Surface: 2B seidenmatt</p>	
<p>Trigon SG Trigon SG U-profiles</p>		<p>Annex 6</p>

English translation prepared by DIBt



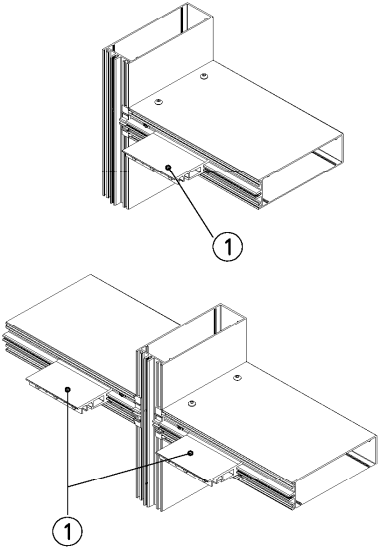
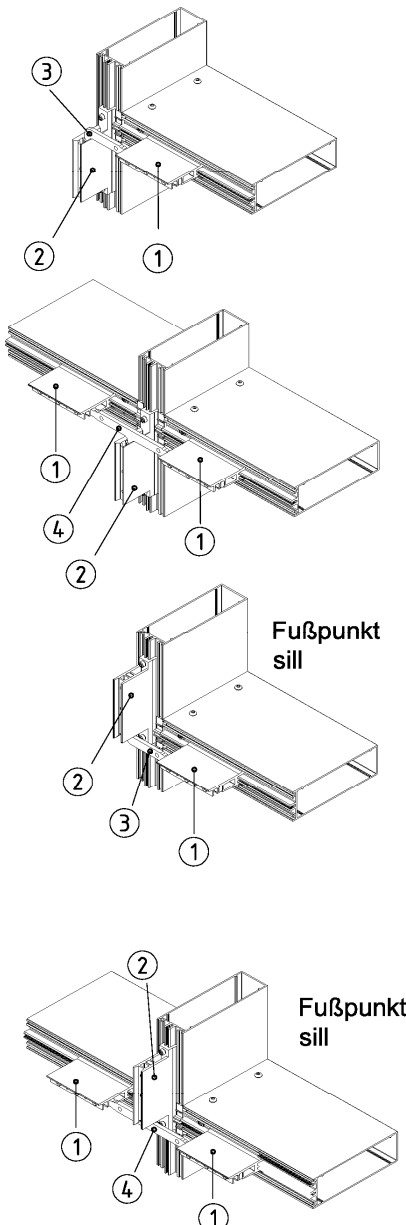
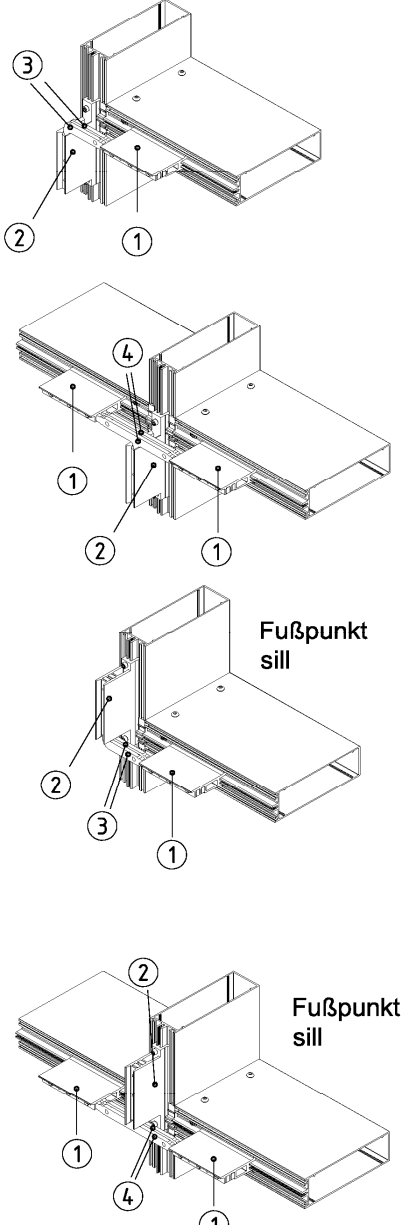
Beispiel: Position Glasträger  
Example: Position glass support



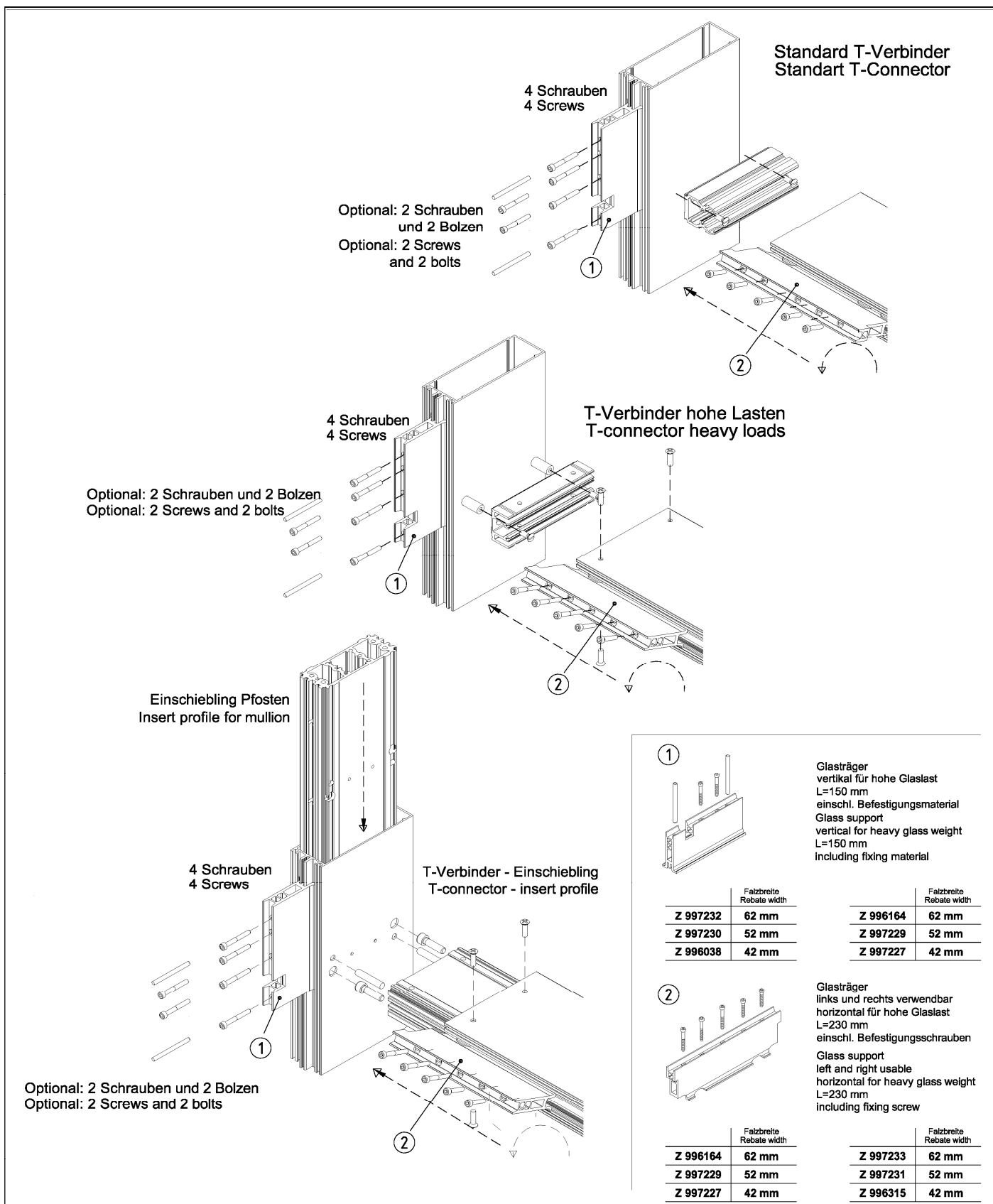
Trigon SG

Trigon SG Glass support

Annex 7

<p><b>Var. 1</b> ohne Winkel no angle</p> 	<p><b>Var. 2</b> 1 Winkel 1 angle</p> 	<p><b>Var. 3</b> 2 Winkel 2 angle</p> 
<p>① Z 996698 Falz 62mm Z 996699 Falz 52mm Z 996698 rebate 62mm Z 996699 rebate 52mm</p> <p>② Z 996700 Falz 62mm Z 996701 Falz 52mm Z 996700 rebate 62mm Z 996701 rebate 52mm</p>	<p>③ <b>Z 917910</b> Lastabtragungswinkel für T-Stoß Material Edelstahl Load transfer angle for T-joint Material stainless steel</p>	<p>④ <b>Z 917911</b> Lastabtragungswinkel für Kreuz-Stoß Material Edelstahl Load transfer angle for T-joint Material stainless steel</p>
<p>Trigon SG Trigon SG Glass support</p>		<p>Annex 8</p>





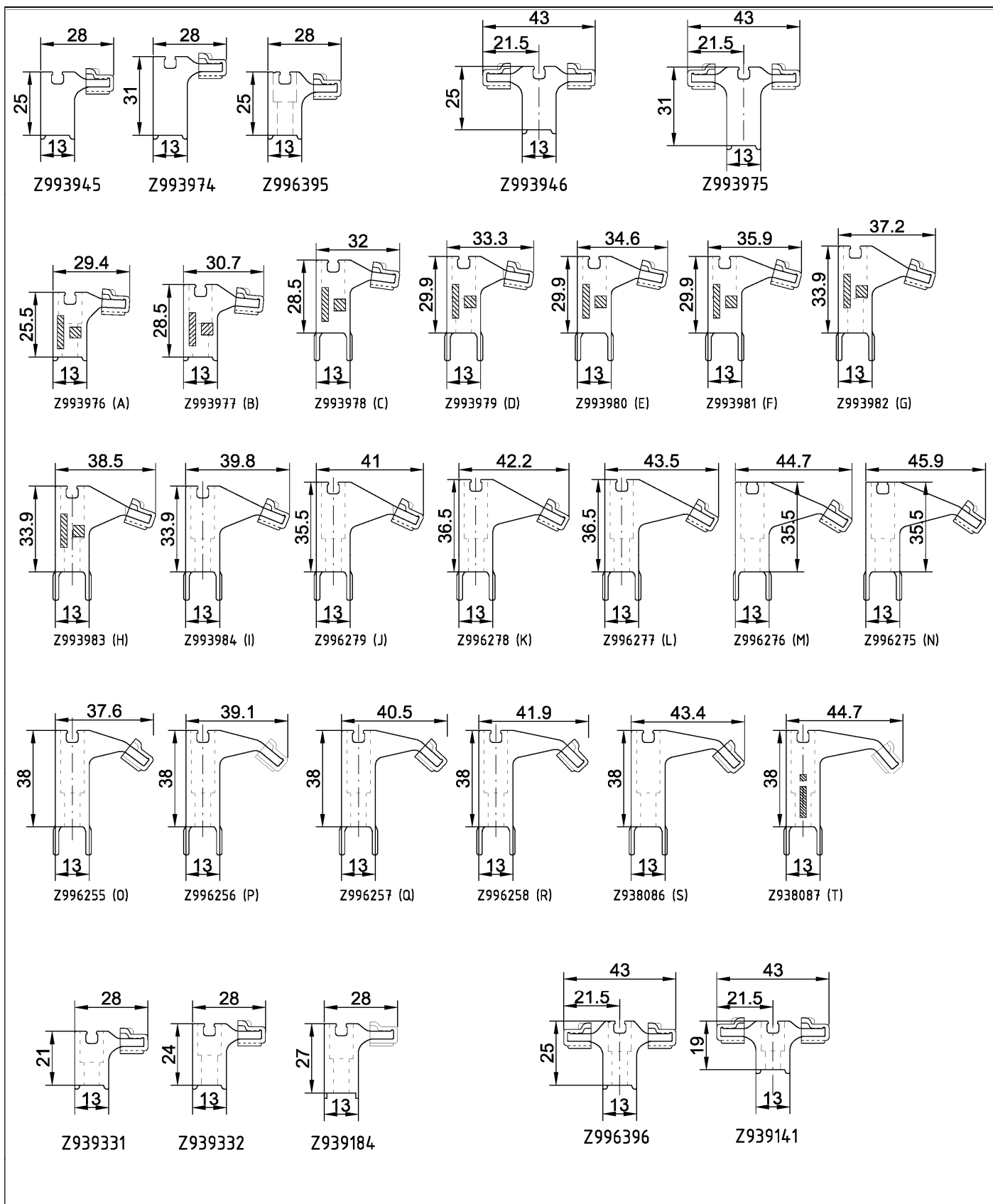
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Trigon SG

Trigon SG Glass support

Annex 9

English translation prepared by DIBt



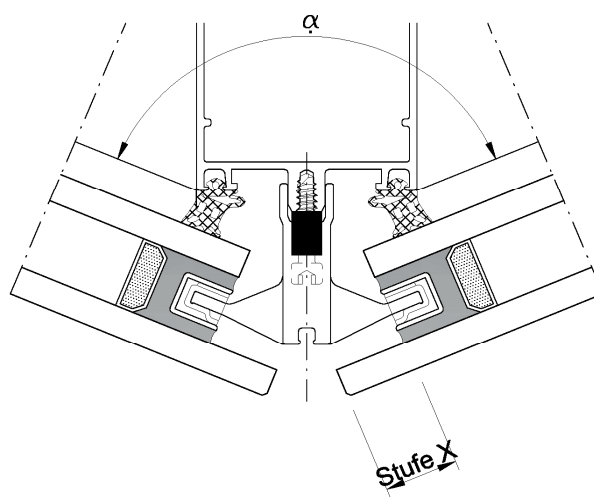
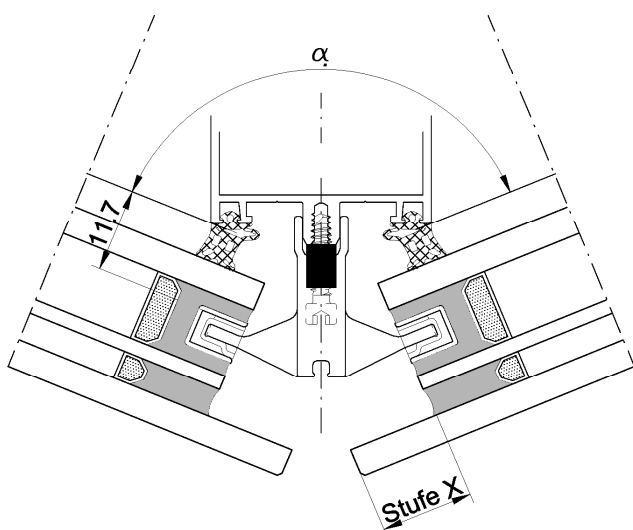
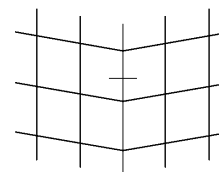
Trigon SG

Trigon SG Toggles

Annex 10

English translation prepared by DIBt

Winkelbereich $\alpha$ Angle range $\alpha$	Artikel Nr. Article No.	Kennung Identifier	Stufe X Step X
171° - 176°	<b>Z 993976</b>	<b>A</b>	3
166° - 171°	<b>Z 993977</b>	<b>B</b>	5
161° - 166°	<b>Z 993978</b>	<b>C</b>	7
156° - 161	<b>Z 993979</b>	<b>D</b>	9
151° - 156°	<b>Z 993980</b>	<b>E</b>	11
146° - 151°	<b>Z 993981</b>	<b>F</b>	13.5
141° - 146°	<b>Z 993982</b>	<b>G</b>	16
136° - 141°	<b>Z 993983</b>	<b>H</b>	18
131° - 136°	<b>Z 993984</b>	<b>I</b>	20.5
126° - 131°	<b>Z 996279</b>	<b>J</b>	23.5
121° - 126°	<b>Z 996278</b>	<b>K</b>	26.5
116° - 121°	<b>Z 996277</b>	<b>L</b>	29
111° - 119°	<b>Z 996276</b>	<b>M</b>	32
106° - 111°	<b>Z 996275</b>	<b>N</b>	36
101° - 106°	<b>Z 996255</b>	<b>O</b>	27
96° - 101°	<b>Z 996256</b>	<b>P</b>	31
91° - 96°	<b>Z 996257</b>	<b>Q</b>	35
86° - 91°	<b>Z 996258</b>	<b>R</b>	40
81° - 86°	<b>Z 938086</b>	<b>S</b>	45
76° - 81°	<b>Z 938087</b>	<b>T</b>	51



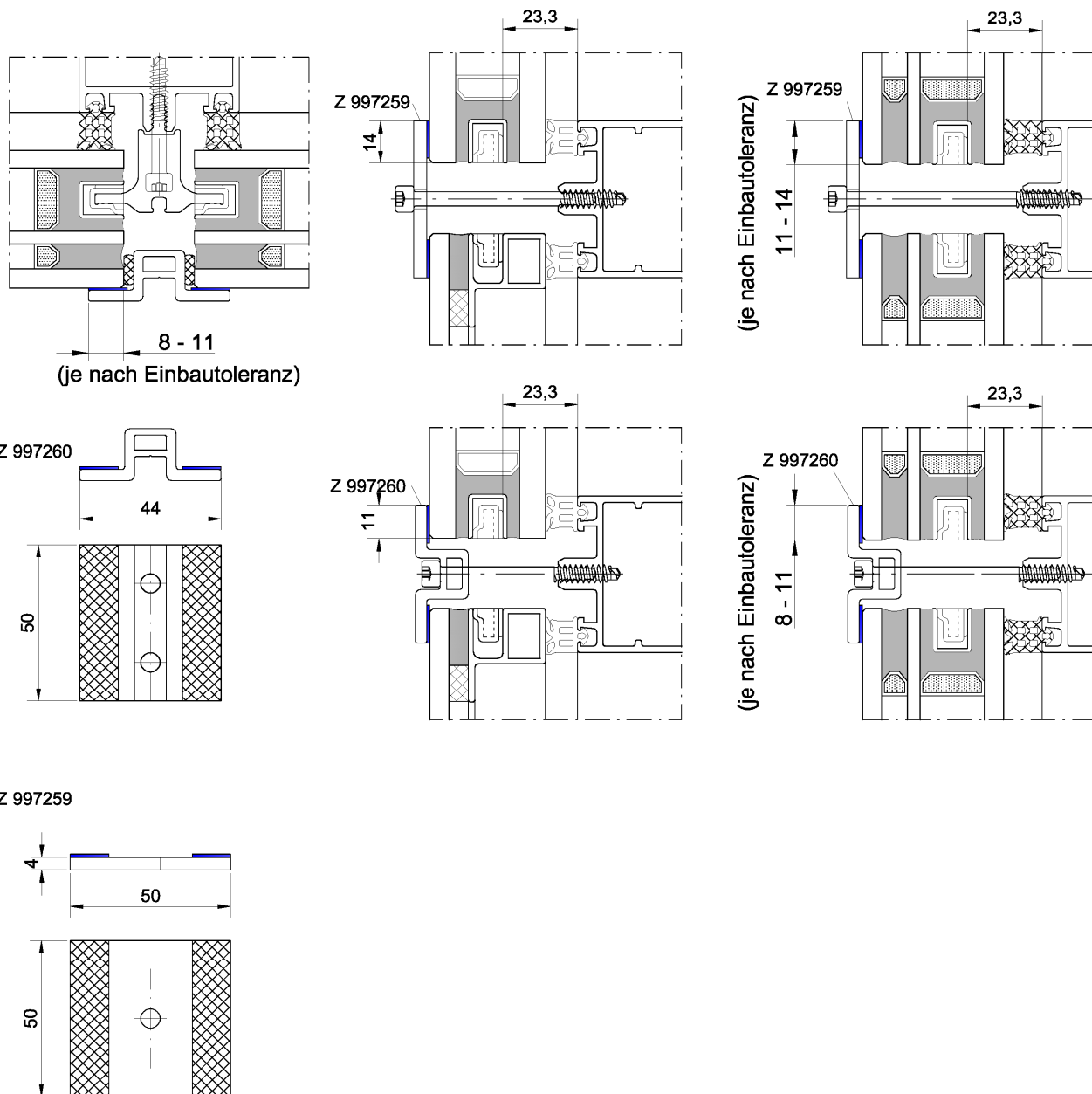
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Trigon SG

Trigon SG Toggles

Annex 11

Nothalter Trigon für 2-fach und 3-fach Isolierverglasung und Brüstungsverglasung  
Safety device for double and triple insulating glazing and spandrel glazing

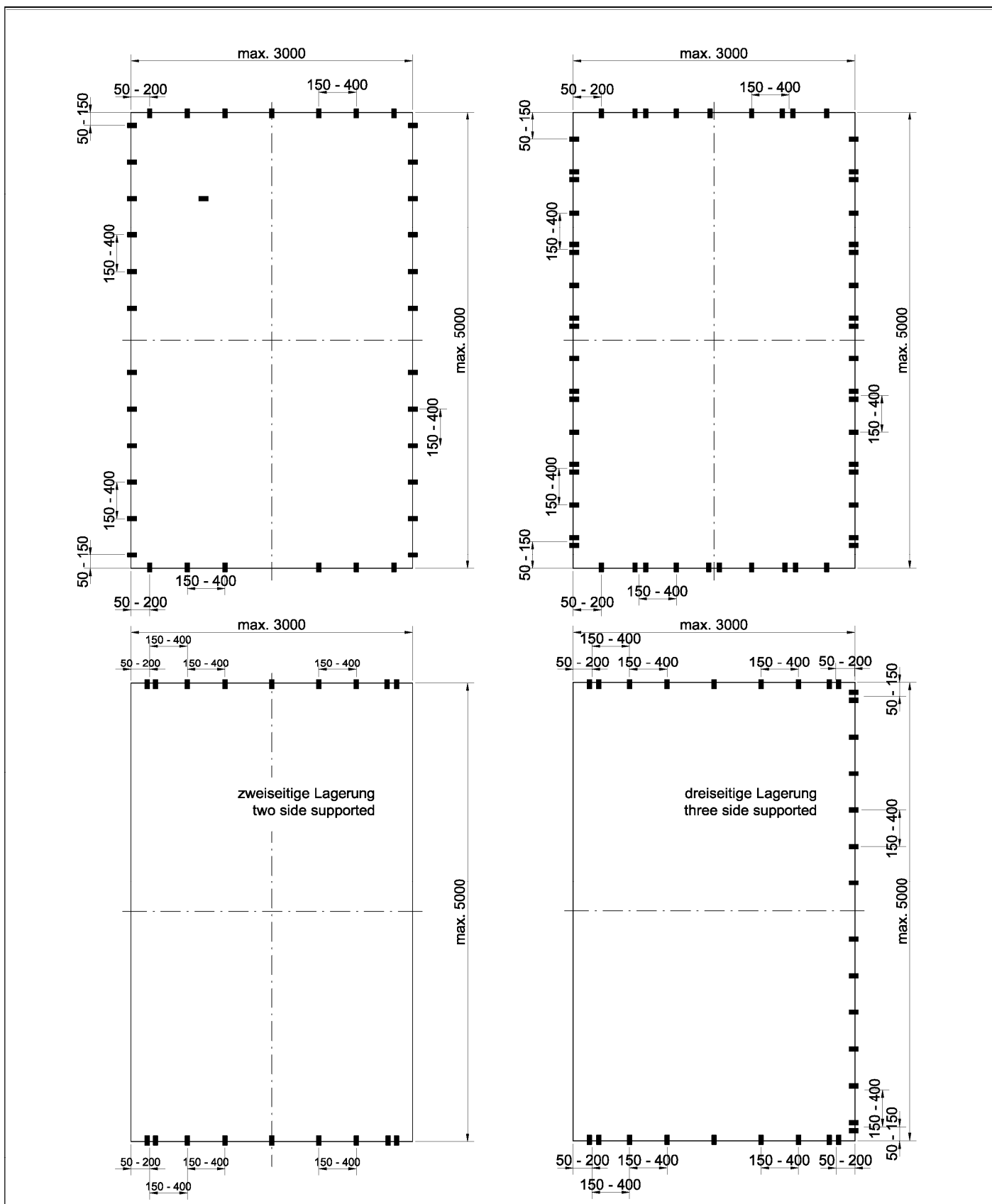


Trigon SG

Trigon SG Safety device

Annex 12

English translation prepared by DIBt



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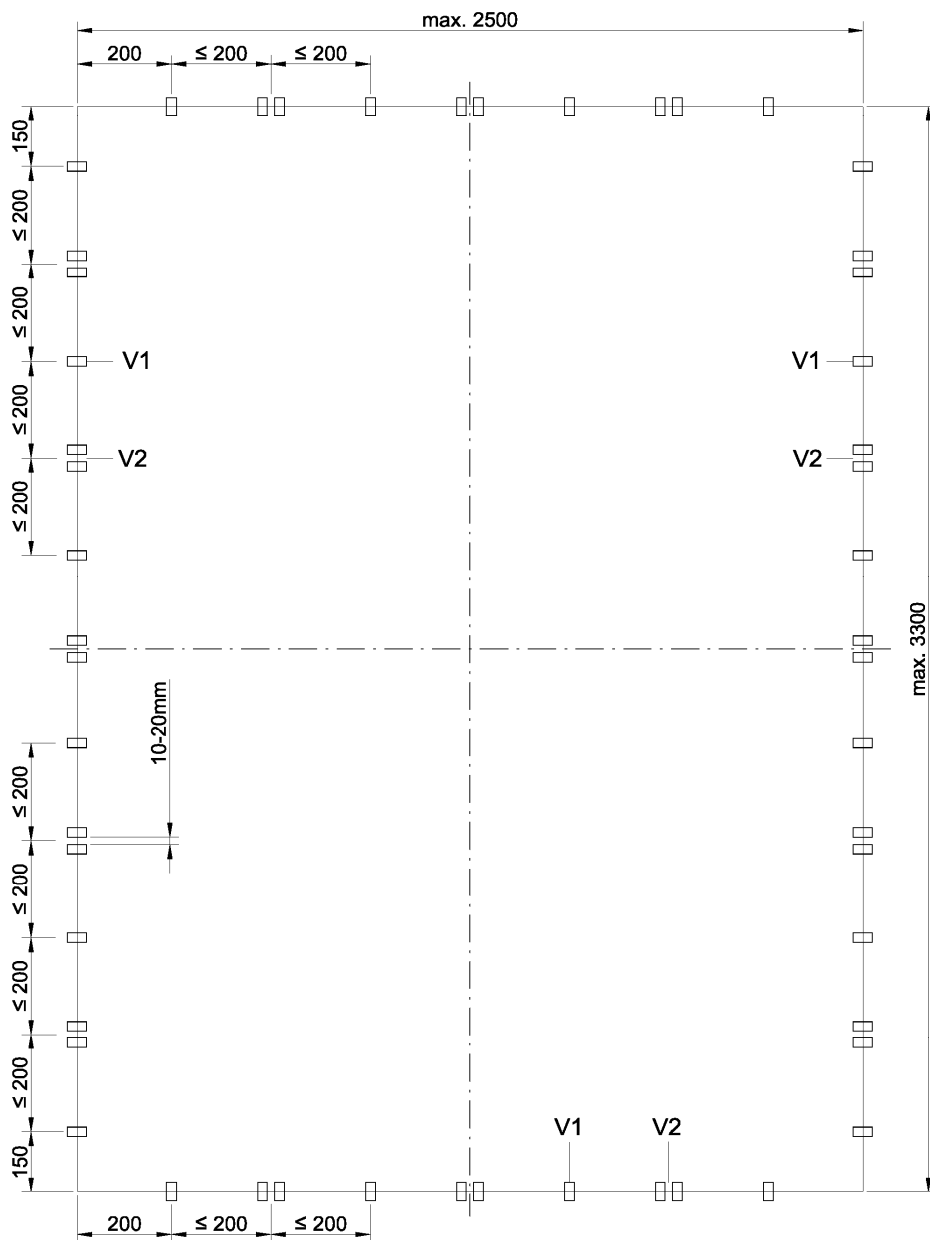
Trigon SG

Trigon SG position of toggles

Annex 13

English translation prepared by DIBt

Halteranordnung bei Anforderungen nach DIN 18008-4  
 Glass dimensions with requirements according to DIN 18008-4



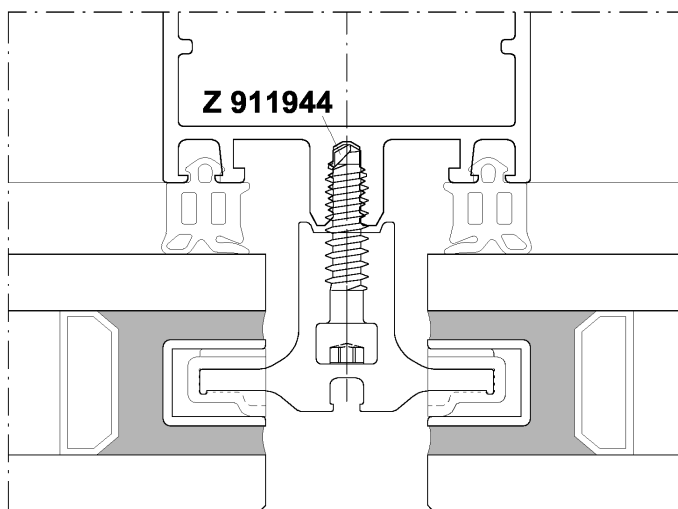
electronic copy of the eta by dibt: eta-13/0675

Trigon SG

Glazing with safety function

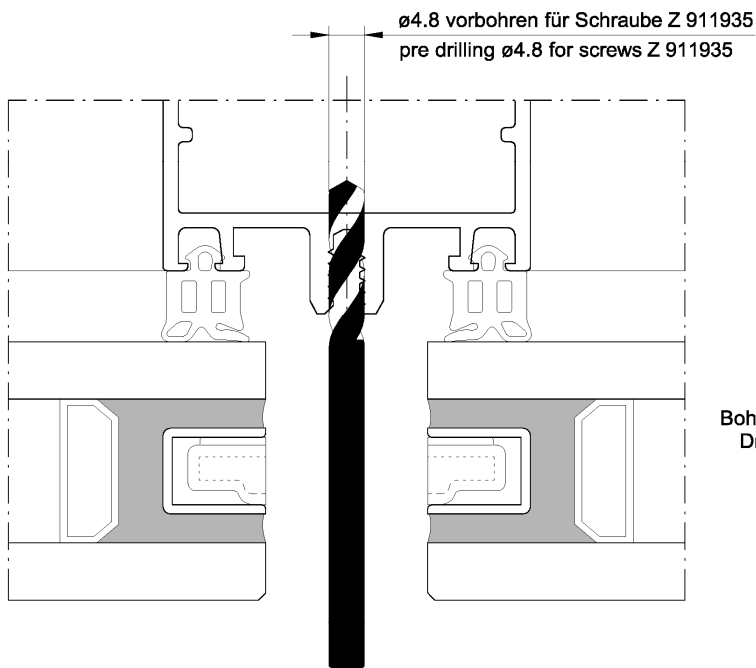
Annex 14

V1

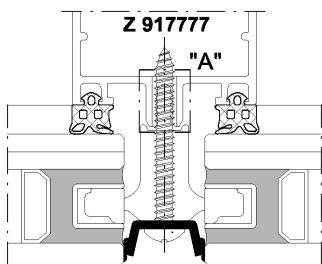


Standard

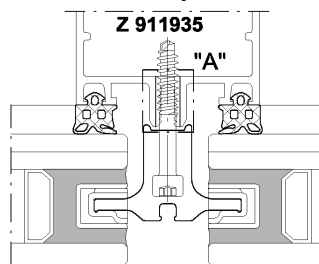
V2



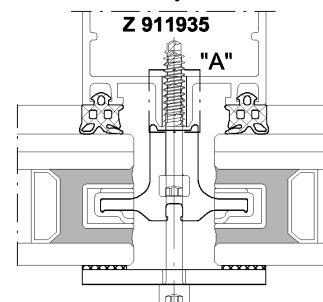
RC3



Sicherheit  
Safety



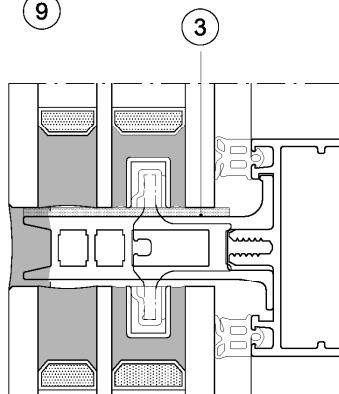
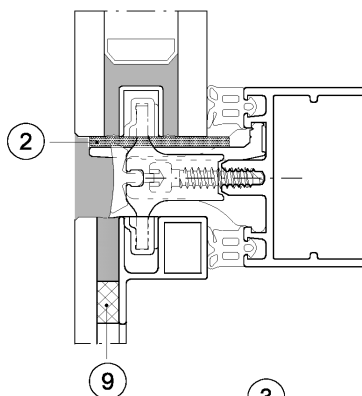
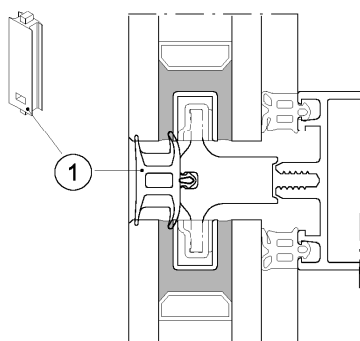
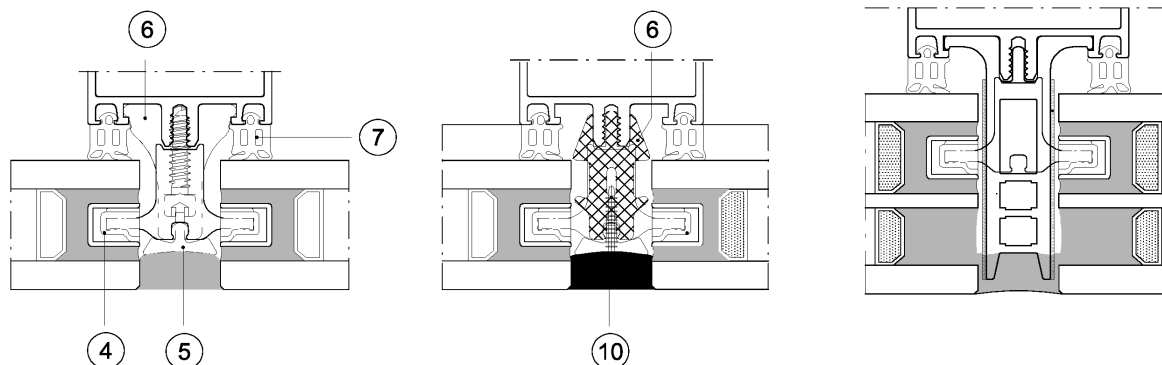
Mechanische Sicherung  
Mechanically restrained



Trigon SG

Glazing with safety function

Annex 15



Zulässige Kombinationen von Dichstoffen und angrenzenden Materialien  
Permissible combinations of structural sealants and adjacent materials

Positonsnr.:	Einsatzproduct (Insert product)	Prüfung mit Produkt: (Test with product)	Hersteller Manufacturer
1	Belüftungsformteil	Sikasil SG-500 Sikasil IG-25 DOW Corning 993	Fa. Sika Fa. DOW CORNING S.A.
2	Glasträger mit Siliconauflage	Sikasil SG-500 Sikasil IG-25 Dow Corning 993	Fa. Sika Fa. DOW CORNING S.A.
3	Silikon Glasauflage Hohe Glaslast	Sikasil SG-500 DOW Corning 993	Fa. Sika Fa. DOW CORNING S.A.
4	Toggle Kunststoffkappe -TPU	DOW Corning 791 Dow Corning 993	Fa. DOW CORNING S.A.
5	Schaumprofile - PE Illbrck Super-illen	DOW Corning 757 DOW Corning 791 DOW Corning 993 Sikasil SG-500	Fa. DOW CORNING S.A. Fa. Sika
6	Schaumprofile - PE	DOW Corning 791 DOW Corning 993 DOW Corning 756SMS	Fa. DOW CORNING S.A.
7	Dichtung - EPDM	DOW Corning 791 DOW Corning 993 DOW Corning 895 Sikasil SG-500 Sikasil IG-25 Sikasil IG-25 HM Plus Sikasil WS-605 S	Fa. DOW CORNING S.A. Fa. Sika
8	Sipro Silikonprofil	DOW Corning 995 DOW Corning 895 DOW Corning 787 DOC Corning 897 DOW Corning 794	Fa. DOW CORNING S.A.
9	Distanzband: VITO Glazemount 400 Thermalbond V-2100 Thermalbond V-2200	DOW Corning 791 Dow Corning 993 Dow Corning 756SMS	Fa. DOW CORNING S.A.
10	Kunststoff Stifte - PA	Sikasil SG-500 Sikasil WS-605 S Sikasil WS-680 SC Dow Corning 757 Dow Corning 791 Silicone Dow Corning 993	Fa. Sika Fa. DOW CORNING S.A.

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Trigon SG

Trigon SG proof of compatibility

Annex 16