

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-16/0302
of 30 January 2017

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

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Product family
to which the construction product belongs

Fastener for the rear fixing of facade panels made of
glass-ceramics

Manufacturer

MAGNA Naturstein GmbH
Straße der Einheit 18
06179 Teutschenthal
DEUTSCHLAND

Manufacturing plant

Teutschenthal, Deutschland
Teutschenthal, Germany

This European Technical Assessment
contains

13 pages including 3 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

European Assessment Document (EAD)
330030-00-0601

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Specific part

1 Technical description of the product

The undercut anchor fischer FZP-G Z for the rear fixing of structural glass-ceramics is a special anchor of size M8 which consists of a cone bolt with external thread made of stainless steel, an expansion ring made of stainless steel, a washer made of polyamide and a round nut made of stainless steel.

The anchor is put together with a plastic cap into an undercut drill hole in the façade panels and is placed form-fit by driving-in the washer or by applying a torque moment to the round nut.

The product description is given in Annex A.

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 anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchors of at least 50 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 resistance for tension and shear loads	See Annex C 1
Anchor distances and dimensions of members	See Annex C 1

3.2 Safety in case of fire (BWR 2)

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

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

In accordance with EAD No. 330030-00-0601 the applicable European legal act is: [97/161/EG].
 The system to be applied is: 2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

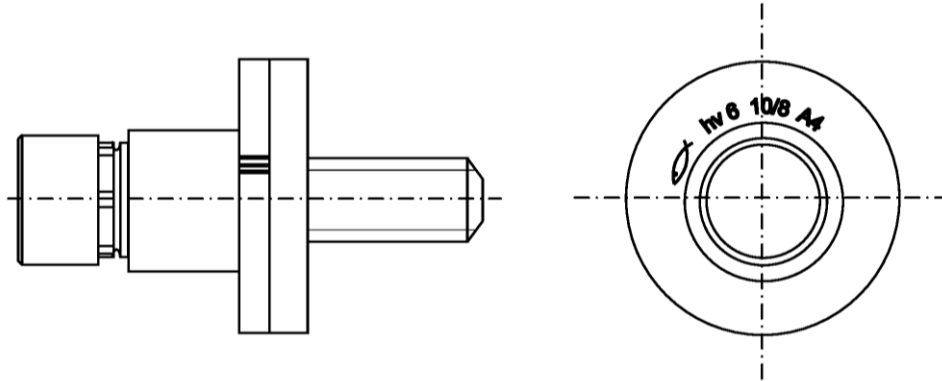
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 30 January 2017 by Deutsches Institut für Bautechnik

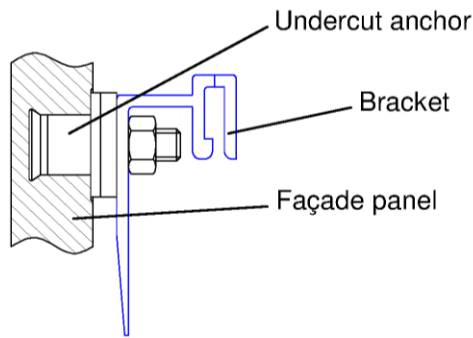
Andreas Kummerow
p. p. Head of Department

beglaubigt:
Ziegler

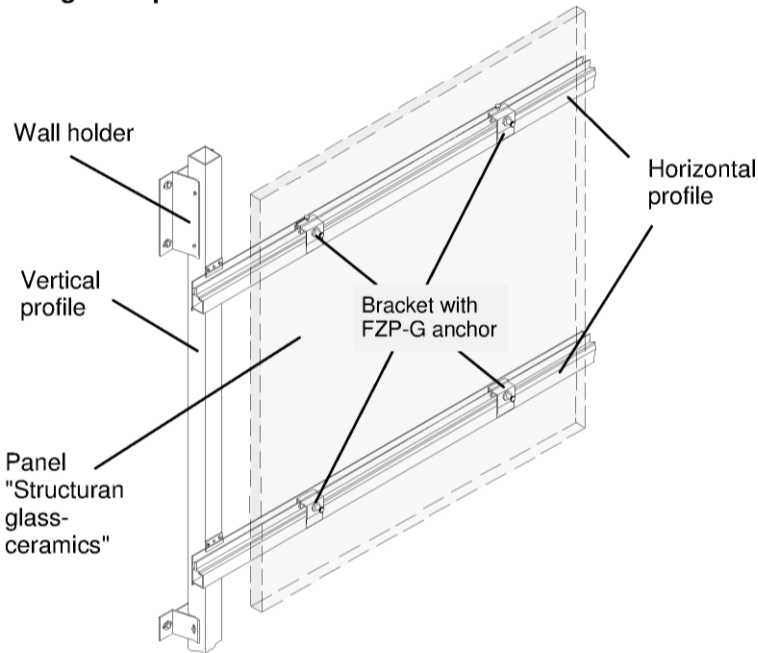
Undercut anchor fischer FZP-G-Z



Installed fastener



Fixing example



fischer FZP-G-Z for the rear fixing of structuran glass-ceramics

Product description
Installed fastener and fixing example

Annex A 1

Anchor FZP-G-Z

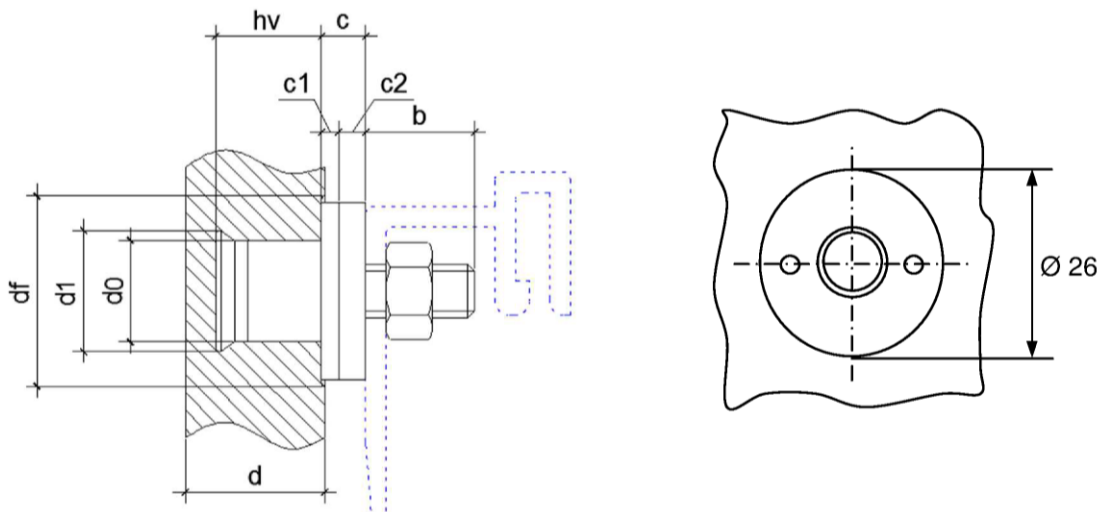


Table A1: Dimensions of the installed product

Anchor type		FZP-G-Z
anchorage depth	$h_v =$ [mm]	15,5 $+0,4 / -0,4$
panel thickness	d [mm]	21,0 < d < 23,0
diameter of drill hole	$d_0 =$ [mm]	15,0 $+0,3 / -0,1$
Diameter of undercut	$d_1 =$ [mm]	18,0 $+0,2 / -0,3$
Length of the screw thread	$b \geq$ [mm]	11
Thickness of washer and nut	$c =$ [mm]	6,5
Thickness of washer	$c_1 \geq$ [mm]	2,5
Thickness of round nut	$c_2 \geq$ [mm]	4,0
Diameter of round nut	$d_f \geq$ [mm]	26,0
installation torque moment	T_{inst} [Nm]	$4,0 \leq T_{inst} \leq 5,0$

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Product description
Dimensions of the undercut hole and installed product

Annex A 2

Assembly items of the anchor FZP-G-Z (drawn not to scale)

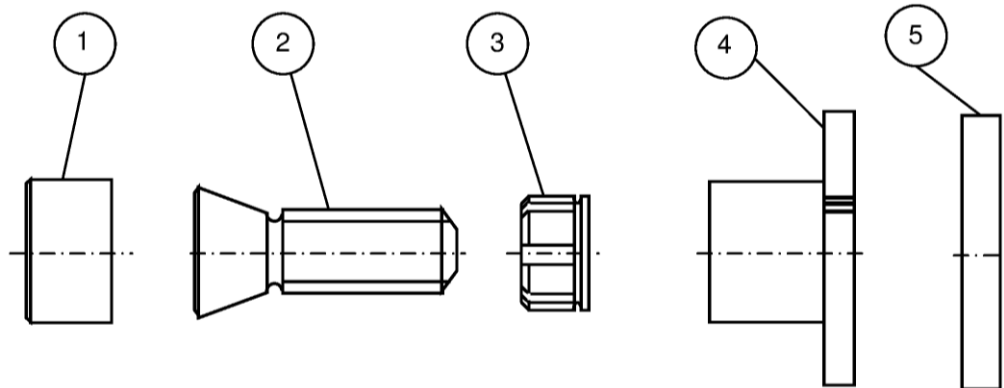


Table A2: Dimensions and materials of the anchor parts

Designation	Material	Size
① Plastic cap	Thermoplastic polyurethane (TPU)	Ø 15
② Cone bolt	Stainless steel 1.4401 or 1.4571 according to EN 10 088:2014	M8
③ Expansion ring	Stainless steel 1.4401 or 1.4571 according to EN 10 088:2014	Ø 15
④ Washer	Polyamide PA6	Ø 26
⑤ Round nut	Stainless steel 1.4401 or 1.4571 according to EN 10 088:2014	Ø 26

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Product description
Dimensions and Materials of the anchor parts

Annex A 3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads.

Base materials:

- The façade panels are made of glass ceramic. Glass granulates are mixed with various additives, shaped into panels and sintered. The sintered panels are cooled under controlled conditions.

Use conditions (Environmental conditions):

- Structures subjected to dry internal conditions.
- Structures subjected to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Installation:

- During transport and storage on site the panels must be protected from damages; the façade panels are not be hung up jerkily (if needed lifters shall be used for hanging up the façade panels); façade panels and reveal panels respectively with incipient cracks are not be installed.
- The drilling hole may be executed with the drilling equipment under workshop conditions using the special drill FZPB (Annex B 2); the execution shall be supervised by the responsible project supervisor or a representative of the project supervisor.
- The drilling hole shall comply to the specification given in Annex A 2.
- In case of aborted hole, a new drilling shall be made at a minimum distance of at least twice the depth of the aborted hole.
- The geometry of the drill hole is checked on 1 % of all drillings. The dimensions shall be checked and documented according to manufacturer's information and testing instructions:
 - Diameter of the undercut drill hole by means of an internal quicktest according to Annex B 2
 - Diameter of the cylindrical hole
 - Depth position of the undercut h_v

If the tolerances given in Annex A 2, Table A1 are exceeded, the geometry of the drill hole shall be checked on 25% of the drillings performed. No further drill hole may exceed the tolerances otherwise all the drill holes shall be controlled. Drilling holes falling below or exceeding the tolerances shall be rejected.

Note: Checking the geometry of the drill hole on 1 % of all drillings means that on one of the 25 panels (this corresponds to 100 drillings in façade panels with four anchors) one drilling shall be checked. If the tolerances given in Annex A 2, Table A1 are exceeded the extent of the control shall be increase to 25 % of the drillings, i.e. one drilling each shall be checked on all the 25 panels.

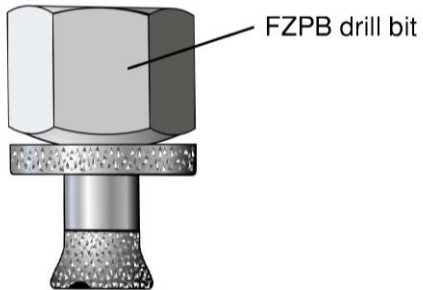
- The panels shall be installed by skilled specialists in accordance with the specifications provided by the designer and the manufacturer instructions.

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

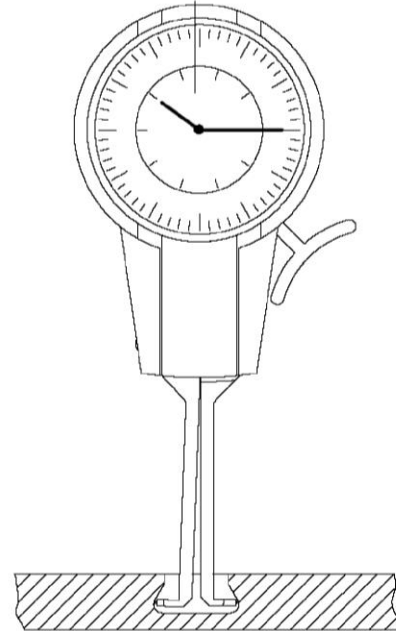
Intended use
Specifications

Annex B 1

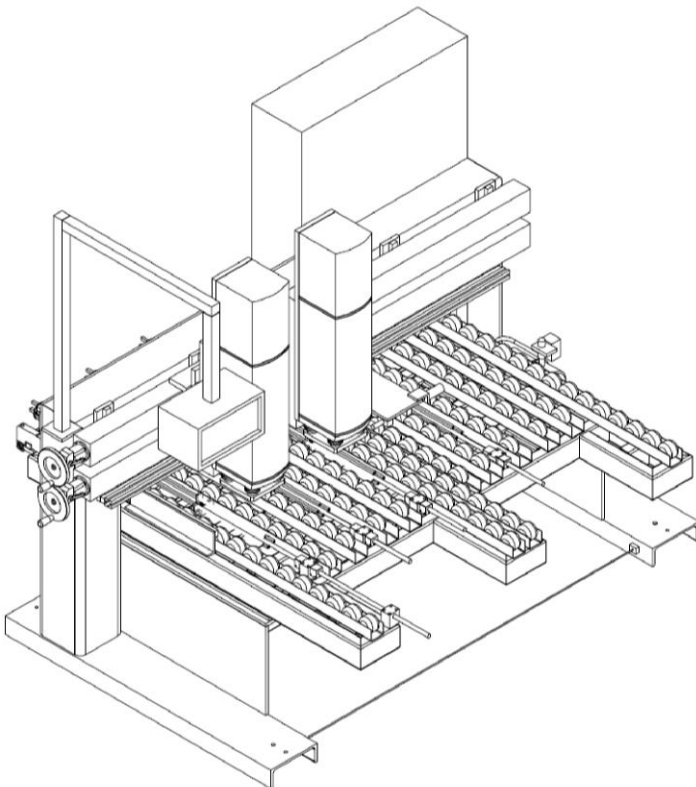
Drill geometry for façade drill



internal quicktest



Example for drilling equipment GNS 800



fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Intended use
Façade drill, drilling equipment, testing equipment

Annex B 2

Design method

The design values of the actions shall be calculated on basis of EN 1990 in consideration of the existing loads. The actions shall be specified according to EN 1991-1-1 to EN 1991-1-7. Corresponding national regulations shall be taken into consideration. The combinations of actions shall be equal to EN 1990. The unfavorable combination is decisive. Where necessary for the design of the anchor and the façade panel several combinations shall be analyzed separately. The calculation shall be carried out in a linear elastic manner.

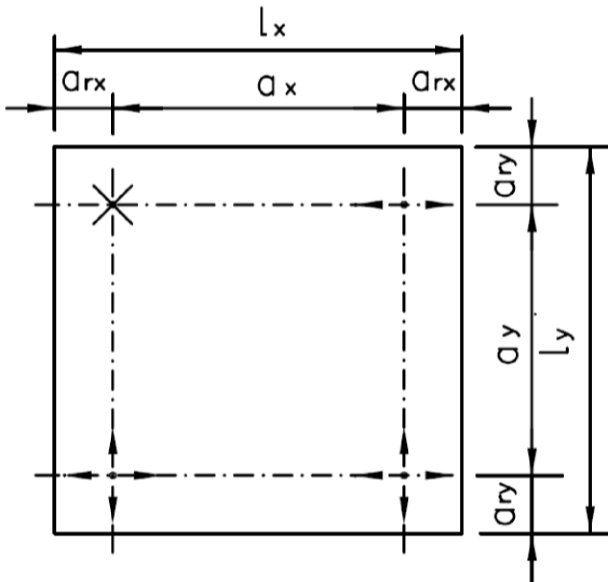
- Each façade panel is fixed technically strain-free with at least four anchors in a rectangular arrangement via agraffes on a capable substructure (for small panels or small fitted pieces, differential or fill- in pieces the number and position of the anchors shall be chosen constructively).
- The stiffness of the substructure shall be considered for the respective case of application. Additional forces in the anchors and in the connections between the panels in relation to the stiffness of the substructure have to be considered.
- Additional stress (e.g. by temperature) has to be considered for the design in case of restrained deformations of the substructure or of the façade panels.
- Torsion of horizontal load-bearing profiles resulting from dead load of the façade panels has to be considered in the design, depending on choice of the profile (open, closed) and on the fixing with the anchor (stand-off fixing).
- The substructure is constructed such that the façade panels are fixed according to Annex B 4 technically strain-free via skids (loose bearings) and one fixed point (fixed bearing) - the fixed point may be placed at the panel edge or in the panel field - and that there are no additional loads acting on the panels and their fixings due to excentric load application / load transfer (symmetrical bearing of the panels).
- For determination of the internal forces the substructure can be considered with fixed mounting.
- Two fixing points of the façade panel are designed such that they are able to carry the dead load of the façade panel.
- When using brackets on horizontal load-bearing profiles the fixing points of a façade panel situated horizontally at the same height are fastened in each case to the same load-bearing profile.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- The façade panels, their fixings as well as the substructure including its connection to wall brackets and their connection to the construction works are designed for the respective case of application under the responsibility of an engineer skilled in the field of façade construction.

fischer FZP-G-Z for the rear fixing of structur an glass-ceramics

Intended use
Design method

Annex B 3

Definition of edge distances and spacings

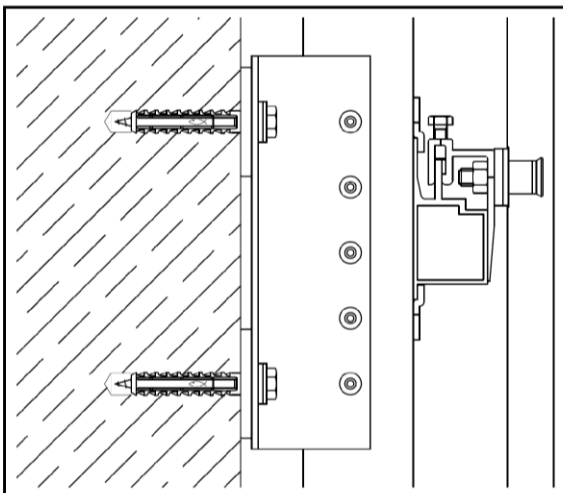


Legend:

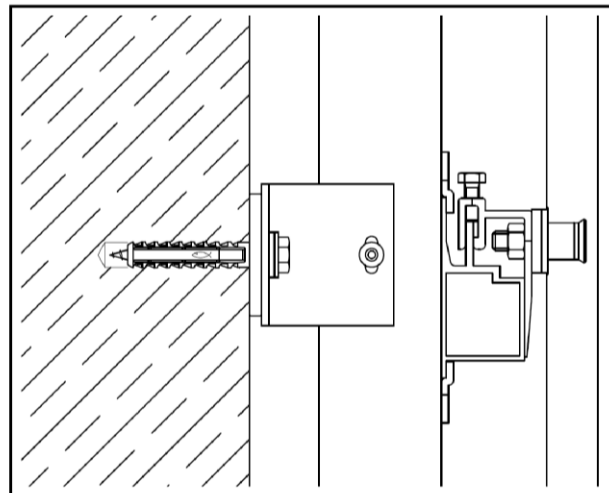
- $a_{rx,y}$ = edge distance – distance of an anchor to the panel edge
- $a_{x,y}$ = spacing – distance between anchors
- L_x = greater length of the façade panel
- L_y = smaller length of the façade panel
- * = fixed bearing (fixed point)
- +− = loose bearing (horizontal skid)
- +−+ = loose bearing (horizontal and vertical skid)

Example for fixed point and loose bearing at the substructure

fixed bearing (fixed point)



loose bearing (skid)



fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Intended use

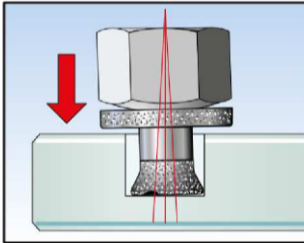
Definition of edge distance and spacing,
Example for fixed point and loose bearing

Annex B 4

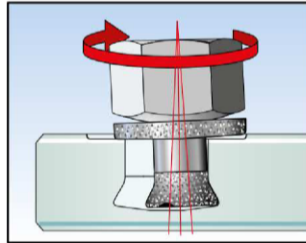
Installation instructions

1. Drilling the undercut hole with the drilling equipment

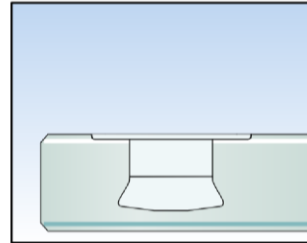
a) Cylindrical drilling



b) Undercutting



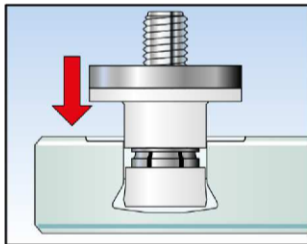
c) Finished undercut hole



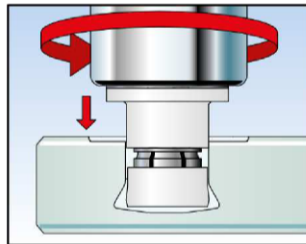
2. Checking the undercut hole according to specification of anchor manufacturer

3. Installation of the anchor

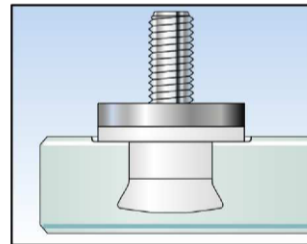
a) Insert the anchor in the undercut hole



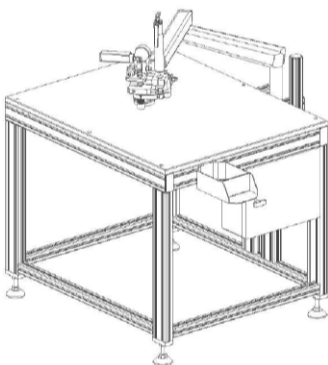
b) Set the anchor using ASV 80 G or ASV 350 GV



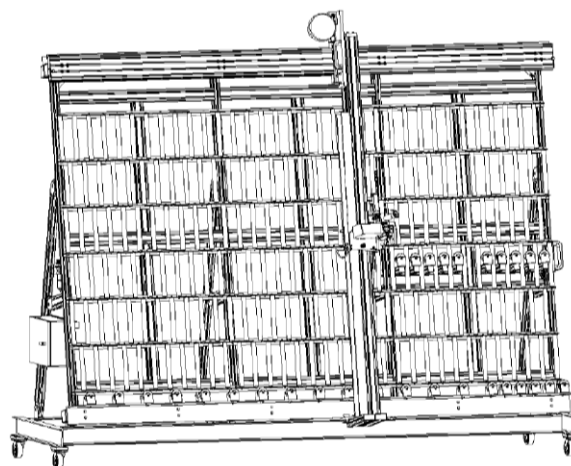
c) Installed anchor



Examples for installation tables



ASV 80 G



ASV 350 GV

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Intended use
Installation instructions

Annex B 5

Table C1: Characteristic values for the design of the anchor and façade panel

			jade	polar white		
Characteristic values of facade panel glass ceramic	panel thickness	$h =$	[mm]	22	22	
	characteristic bending strength	$\sigma_{Rk} =$	[N/mm ²]	18,7	20,0	
	partial safety factor ^{1) 5)}	$\gamma_M =$	[-]	2,0	2,0	
	modulus of elasticity	$E =$	[N/mm ²]	30.000	28.000	
	dead load	$g_k =$	[kN/m ²]	0,55	0,55	
	density	$\rho =$	[g/cm ³]	2,49	2,48	
	thermal expansion coefficient (temperature range up to 80°C)	$\alpha_T =$	[1/K]	$7,4 \times 10^{-6}$	$7,8 \times 10^{-6}$	
Characteristic values of the anchor FZP-G	characteristic resistance ²⁾	to tensile loads	$N_{Rk} =$	[kN]	3,2	3,6
		to shear loads	$V_{Rk} =$	[kN]	4,4	5,4
	partial safety factor ^{1) 5)}	$\gamma_M =$	[-]	2,0	2,0	
	anchorage depth	$h_v =$	[mm]	15,5	15,5	
	edge distance ^{3) 4)}	a_{rx} or $a_{ry} \geq$	[mm]	100	100	
	spacing	$a \geq$	[mm]	200	200	

1) In absence of other national regulations.

2) in case of coincident stress of an anchor due to tension and shear load the equations 1, 2 and 3 (see below) shall be observed

3) The edge distance may be reduced to 50 mm. For edge distances $50 \text{ mm} \leq a_r \leq 100 \text{ mm}$ the characteristic values of resistance for shear loads shall be reduced by the factor $a_r / 100$ [a_r in mm]; in case of different edge distances the smaller value is decisive

4) For small fitted pieces, differential and fill-in pieces the edge distance and spacing shall be chosen constructively

5) For overhead fixing: $\gamma_M = 2,8$

For the determined anchor forces it shall be verified that the following equation are met:

Equation 1: $\frac{N_{Ed}}{N_{Rd}} \leq 1$; Equation 2: $\frac{V_{Ed}}{V_{Rd}} \leq 1$

Equation 3: $\frac{N_{Ed}}{N_{Rd}} + \frac{V_{Ed}}{V_{Rd}} \leq 1$

With:

N_{Ed} = design value of existing anchor tension load

V_{Ed} = design value of existing anchor shear load

N_{Rd} = design value of anchor load-bearing capacity for tension load: $N_{Rd} = N_{Rk} / \gamma_M$

V_{Rd} = design value of anchor load-bearing capacity for shear load: $V_{Rd} = V_{Rk} / \gamma_M$

fischer FZP-G-Z for the rear fixing of structural glass-ceramics

Performances

Characteristic values for the design of the anchor and façade panel

Annex C 1