Deutsches Institut für Bautechnik

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European Technical Assessment Body for construction products

Designated in accordance with Article 39 of Regulation (EU) No 2024/3110 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-23/1021 of 24 April 2026

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	KARL undercut anchor KH for HPL in accordance with EN 438-7:2005
Product family to which the construction product belongs	Fastener for the rear fixing of facade panels made of high-pressure decorative laminates (HPL) in accordance with EN 438-7:2005
Manufacturer	KEIL Befestigungstechnik GmbH Olpener Straße 13a 51766 Engelskirchen GERMANY
Manufacturing plant	Plant 1
This European Technical Assessment contains	15 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Article 95(4) of Regulation (EU) 2024/3110, on the basis of	EAD 330030-00-0601
This version replaces	ETA-23/1021 issued on 4 November 2025

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Specific Part

1 Technical description of the product

The KARL undercut anchor KH is a special anchor made of stainless steel, consisting of a crosswise slotted anchor sleeve with self-tapping teeth with an M6 internal thread and an screw-in element. The screw-in element can be a corresponding M6 hex bolt with an integrated serrated locking ratchet, a threaded pin with an M6 serrated locking nut, or a stepped internal hex bolt with an M8 serrated locking nut.

The anchor is inserted into a drill hole created by the stop drill and then expanded by the special setting tool under rotation, whereby the anchor cuts the undercut itself. The anchor is seated form-fitted and in a controlled position after the screw-in part been screwed-in. The anchors are mounted flush with the facade panel.

The product description is given in Annex A. The material values, dimensions and tolerances of the components of the fastener not indicated in the annexes shall correspond to the values laid down in the technical documentation.

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 fastener 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 fasteners 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 to breakout or pull-out failure under tension load	See Annex C 1 and C 2
Characteristic resistance to breakout or pull-out failure under shear load	See Annex C 1 and C 2
Characteristic resistance to breakout or pull-out failure under combined tension and shear load	See Annex C 1 and C 2
Edge distance and spacing	See Annex C 1 and C 2
Durability	Corrosion Resistance Class (CRC) III in accordance with EN 1993-1-4:2015
Characteristic resistance to steel failure under tension and shear loads	See Annex C 1 and C 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

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 24 April 2026 by Deutsches Institut für Bautechnik

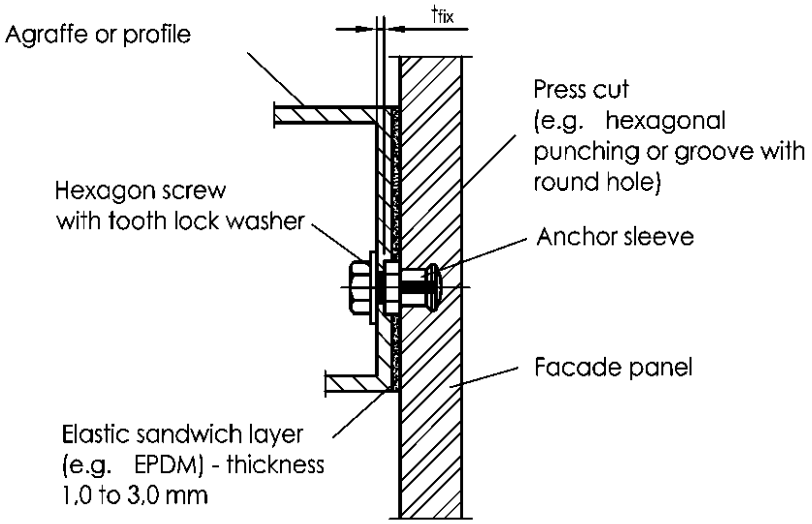
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Aksünger

Deutsches Institut für Bautechnik DIBt

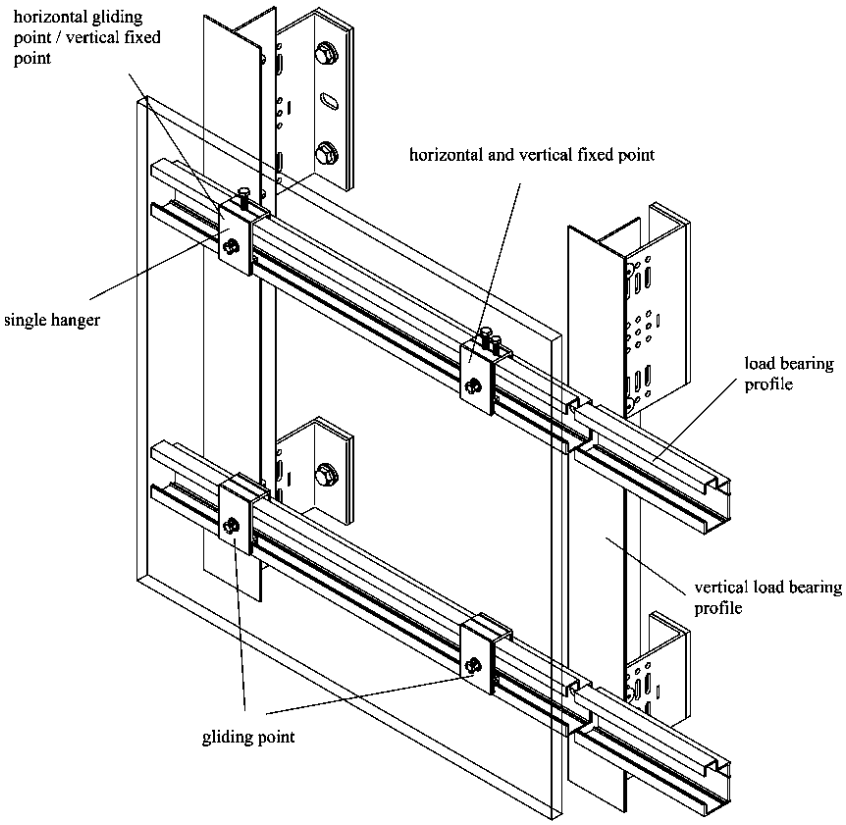
Installed fastener

Installed anchor



Flush fixing

Fixing example



KARL undercut anchor KH for HPL in accordance with EN 438-7:2005

Product description
Installed fastener and fixing example

Annex A 1

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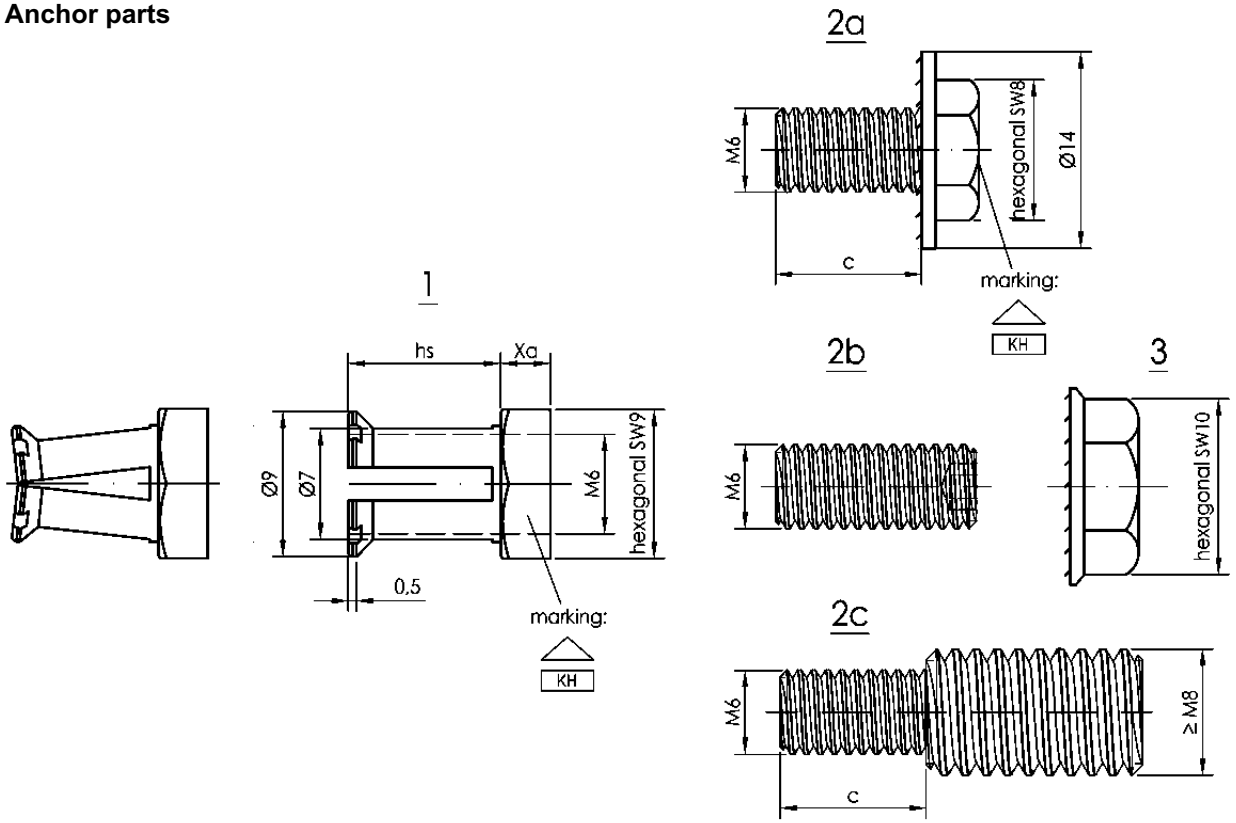
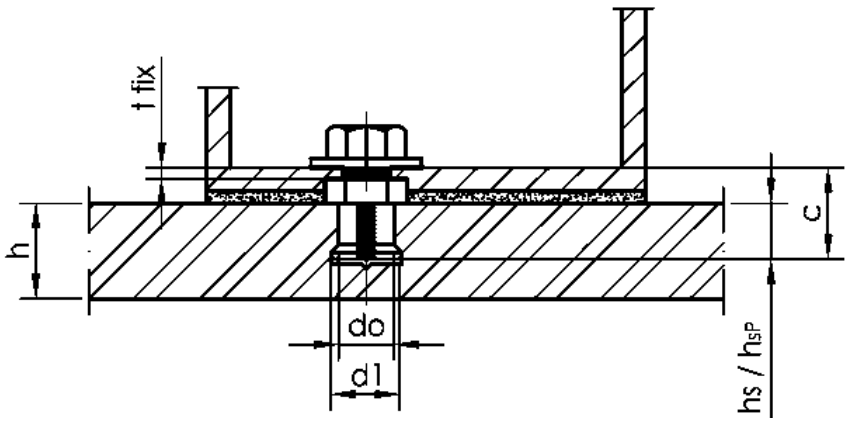
Anchor parts





c: the screw lenght must be adjusted to the respective design

Drawing scale not true to real scale

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex A 2
Product description Dimensions and materials	

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Table A1: Characteristic values of anchor installation

Anchor Type				**KH 4,0**	**KH 5,5**
anchorage depth		h_s=	[mm]	4,0	5,5
anchor head height		x_a=	[mm]	3	
panel thickness		h=	[mm]	≥ 8	≥ 10
diameter of the drill hole		d_o=	[mm]	7	
diameter of the undercut		h_1=	[mm]	9	
screw length		c=	[mm]	$h_{sp} + x_a + t_{fix}$	
installation torque moment		T_{inst}=	[Nm]	$2,5 \leq T_{inst} \leq 4,0$	
Materials					
1	anchor sleeve KARL			stainless steel A4/70; 1.4404 according to EN 10088:2014	
2a	hex bolt with locking ratchets			stainless steel A4/70; 1.4404, 1.4404 or 1.4578 according to EN 10088:2014	
2b	threaded pin			stainless steel A4/70; 1.4404, 1.4404 or 1.4578 according to EN 10088:2014	
2c	threaded bolt			stainless steel A4/70; 1.4404, 1.4404 or 1.4578 according to EN 10088:2014	
3	nut with locking ratchets			stainless steel A4/70; 1.4404 according to EN 10088:2014	

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005

Product description
Dimensions and materials

Annex A 3

Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads.

Base materials:
The HPL façade panels shall be classified “EDS” or “EDF” in accordance with EN 438-6:2016

Table B1: Characteristic value of the panel

		HPL (General)	Fundermax (Max Compact)	Resopal (Resoplan F)	Trespa (Meteon FR)
panel thickness $h_{nom} \geq$	[mm]	8	8	8	8
resistance to bending stress crosswise and lengthwise $\sigma_{5\%} \geq$	[N/mm²]	80	100	80	158
E-Modul crosswise $E \geq$	[N/mm²]	9000	9000	9000	9000

Use conditions (Environmental conditions):
According to EN 1993-1-4:2015 according to the Corrosion Resistance Class of the fastener III

Design:
- Each façade panel is fixed with at least four anchors in a rectangular arrangement via single agraffes on the 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 façade panels are aranged in a "reclined" or "uprigth" position,
- Façade panels of Fundermax GmbH and Resopal GmbH also may be fixed at façade soffits.
- 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)
- Two fixing points of the façade panel are designed such that they are able to carry the dead load of the façade panel.
- The load-bearing profiles are arranged symmetrically. The arrangement of the agraffes ensures a symmetric introduction of the load into the substructure.
- When using agraffes 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.
- Joint construction between the façade panels is done by a joint filler or are kept open; it is ensured that additional stresses (e.g. by temperature) do not lead to important additional loadings.
- 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.

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Notes for design

General

The design values of the actions shall be calculated on basis of EN 1990:2010 in consideration of the existing loads. The combinations of actions shall be equal to EN 1990:2010. The actions shall be specified according to EN 1991-1-1:2010 to EN 1991-1-7:2010. Corresponding national regulations shall be taken into consideration. The unfavourable combination is decisive. Where necessary for the design of the anchor and the façade panel several combinations shall be analysed separately.

The typical fundamental combination for façade panels considers actions from dead load $F_{Ek.G}$ (permanent action) and wind $F_{Ek.w}$ (leading variable action).

The verification of structural stability of the façade panels including its fixing by the anchor is carried out separately. For the determined forces conditions is to be verified, that the following equation is observed:

$F_{Ed} \leq F_{Rk} / \gamma_M$

with F_{Ed} [kN] = design value of the relevant existing force (N_{Ed}, V_{Ed}, σ_{Ed})

F_{Rk} [kN] = characteristic resistance to the relevant force (N_{Rd}, V_{Rd}, σ_{Rd}) according to Annex C 1

γ_M [-] = partial safety factor according to Annex C 1

In case of coincident stress of an anchor due to tension and shear load the value for trilinear function with combined tension and shear load according to Annex C 1 is to used.

If the façade panels do not meet the characteristic values of the panel according to Annex B1, Table B1, the characteristic load-bearing capacity values (N_{Rk} and V_{Rk} from Annex C1 and C2) must also be multiplied by the following factor α_{F0}

$N_{Rd} = N_{Rk} \times \alpha_{F0}$

$V_{Rd} = V_{Rk} \times \alpha_{F0}$

$$\alpha_{F0} = \min\left\{\frac{\sigma_{5\%,\min}}{\sigma_{5\%,\text{Table } B1}}; \frac{E_{,\min}}{9000\ \text{N/mm}^2}; 1\right\}$$

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex B 2
Intended use Specifications	

Flush fixing

Torsion of horizontal load-bearing profiles resulting from dead load of the façade panels

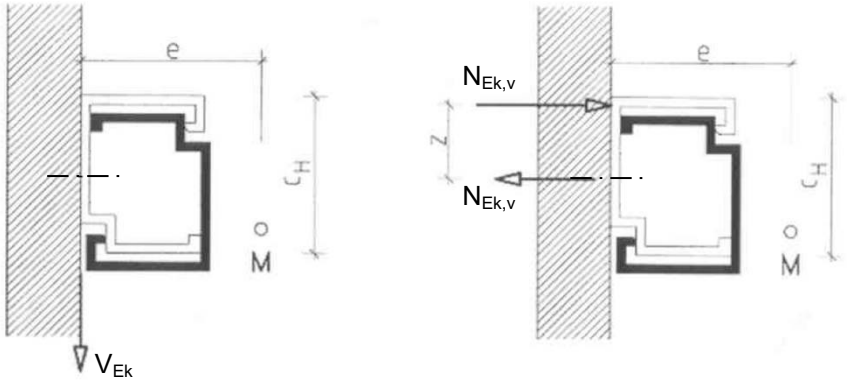
For flush fixed anchors and for installation of horizontal load-bearing profiles permanent loads due to torsion of the profile shall be considered in addition to actions from dead loads and wind in direction of the anchor axes. Simplifying these permanent loads can be determined as follows:

$N_{Ek.V} = V_{Ek} \cdot 2e/c_H$

V_{Ek} = shear load due to dead load of the façade panel

e und c_H [mm] see picture

M shear centre

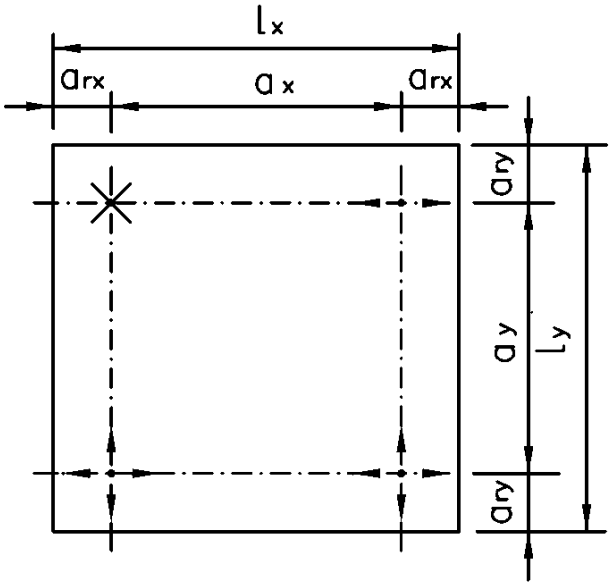


KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex B 3
Intended use Specifications	

Installation:

- During transport and storage on site the façade panels are protected from damages; the façade panels are not be hung up jerkily (if need be lifters shall be used for hanging up the façade panels).
- The drillings are done at the factory or on site under workshop conditions; when making the drillings on site the execution is supervised by the responsible project supervisor or a skilled representative of the project supervisor.
- Making of the cylindrical drilling is done with the KARL stop drill bit according to Annex B 5 or a suitable cutter/drill bit, all in accordance with the information deposited with Deutsches Institut für Bautechnik.
- The screwed in part must fit flush with the tip of the anchor sleeve.
- Before any assembly, please check, if the screwed in part fits flush with the tip of the anchor sleeve by way of a test assembly
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole.
- The façade are installed by skilled specialists and the laying instructions of the manufacturer shall be paid attention to.
- Between agraffe and façade panel an elastic sandwich layer may be placed. (see Annex A 1)

Definition of edge distance and spacing



legend

a_{rx} = distance of the anchor to the edge in horizontal direction

a_{ry} = distance of the anchor to the edge in vertical direction

L_x = length of the façade panel in horizontal direction

L_y = length of the façade panel in vertical direction

= fixed point between plate and substructure

= horizontal skid between plate and substructure

= horizontal and vertical skid between plate and substructure

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex B 4
Intended use Definition of edge distance and spacing	

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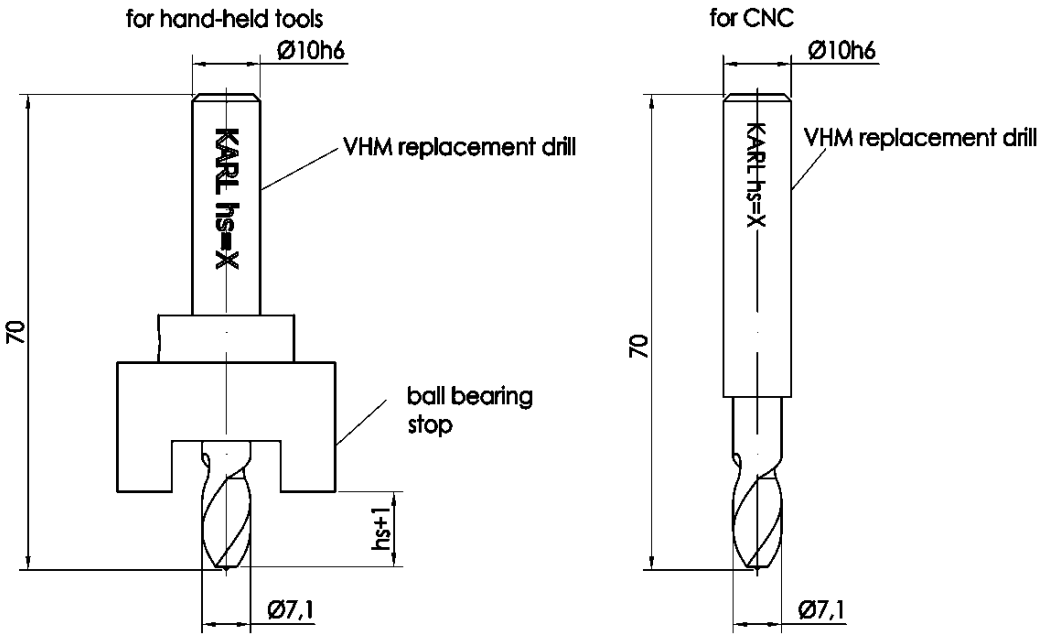
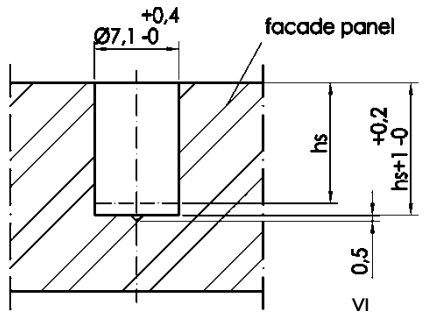
KARL drill hole geometry

Geometry of the stop drill

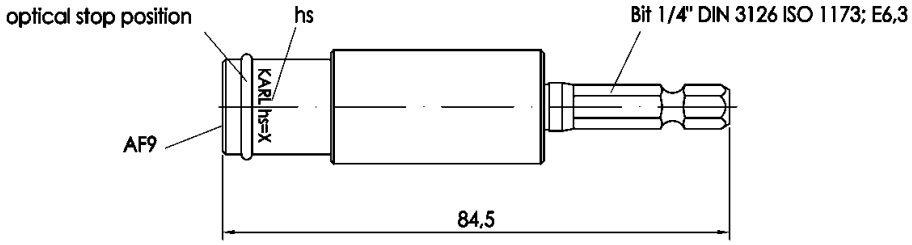
for KARL stop drill hs=x



Geometry of the drill hole

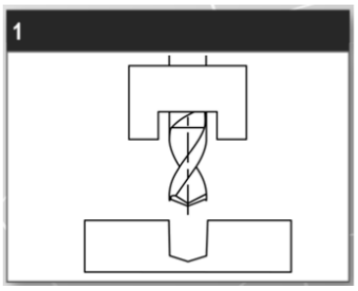


KARL setting tool

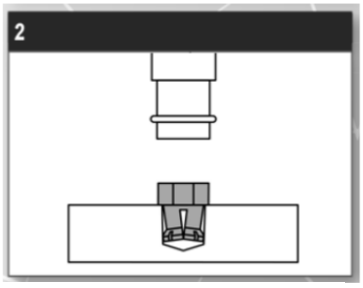


KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex B 5
Intended use KARL undercut anchor KH drill hole dimensions and setting tools and testing equipment	

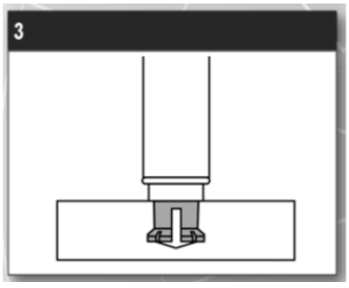
Installation instructions KARL



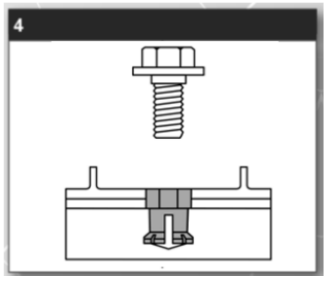
a) Cylindrical drilling and clean the bore hole



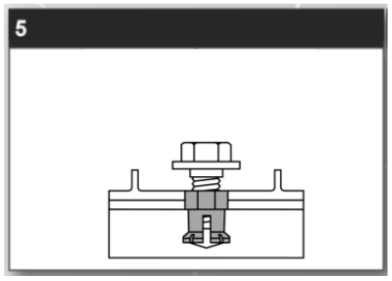
b.) Insert the sleeve and set the setting tool on the anchor head



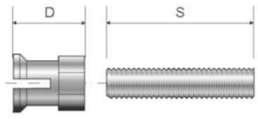
c.) Spread the anchor sleeve under rotation and pressure

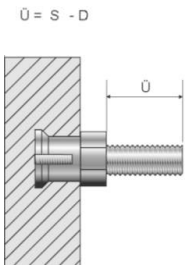


d.) Attach the hanger



e.) Screwing in the Screw





a) Insert the sleeve into the bore hole
b) Place the setting tool on the sleeve head
c) Expand the anchor sleeve under rotation and pressure
d) Screw the grub screw into the sleeve
e) Fixing grub screw with the nut with locking ratchet
f) installed undercut anchor

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005	Annex B 6
Intended use Installation instruction of KARL Undercut Anchor KH	

Table C1: characteristic values of the KARL Undercut Anchor KH hs=4,0

				HPL (General)			Fundermax (Max Compact)	Resopal (Resoplan F)	Trespa (Meteon FR)
Setting depth (=embedment depth)		h_s =	[mm]	4,0			4,0	4,0	4,0
spacing		a ≤	[mm]	337	1000	1250	1000[2)]	1000[2)]	1000[2)]
resistance to	tension load	N_{Rk} =	[kN]	1,12	0,85	0,76	1,23	0,85	1,37
	shear load	V_{Rk} =	[kN]	3,01			4,15	3,01	3,95
partial safety factor [1)]		γ_M =	[-]	2,0			2,0	2,0	2,0
edge distance		a_{rx} or a_{ry} ≥	[mm]	50			50	50	50
Value for tri-linear function with combined tension and shear load		X	[-]	1,0					

1) in absence of other national regulations

2) additional spacings see Annex C 2

Table C2: characteristic values of the KARL Undercut Anchor KH hs=5,5

				HPL (General)			Fundermax (Max Compact)	Resopal (Resoplan F)	Trespa (Meteon FR)
Setting depth (=embedment depth)		h_s =	[mm]	5,5			5,5	5,5	5,5
spacing		a ≤	[mm]	337	1000	1250	1000[2)]	1000[2)]	1000[2)]
resistance to	tension load	N_{Rk} =	[kN]	1,78	1,25	1,05	1,38	1,25	1,57
	shear load	V_{Rk} =	[kN]	3,95			3,81	3,95	3,06
partial safety factor [1)]		γ_M =	[-]	2,0			2,0	2,0	2,0
edge distance		a_{rx} or a_{ry} ≥	[mm]	50			50	50	50
Value for tri-linear function with combined tension and shear load		X	[-]	1,0					

1) in absence of other national regulations

2) additional spacings see Annex C 2

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005

Performance
Characteristic values for the design of KARL undercut anchor KH

Annex C 1

Table C3: characteristic values for KARL Undercut Anchor KH with different span widths for 8 mm Panel

				Fundermax (Max Compact)			Resopal (Resoplan F)			Trespa (Meteon FR)		
Setting depth (=embedment depth)		h_s =	[mm]	4,0			4,0			4,0		
Spacing		a ≤	[mm]	337	1000	1250	337	1000	1250	337	1000	1250
resistance to	tension load	N_{Rk} =	[kN]	1,51	1,23	1,06	1,12	0,85	0,76	1,37	1,37	1,23
	shear load	V_{Rk} =	[kN]	4,15			3,01			3,95		

Table C4: characteristic values for KARL Undercut Anchor KH with different span widths for 10 mm Panel

				Fundermax (Max Compact)			Resopal (Resoplan F)			Trespa (Meteon FR)		
Setting depth (=embedment depth)		h_s =	[mm]	5,5			5,5			5,5		
spacing		a ≤	[mm]	337	1000	1250	337	1000	1250	337	1000	1250
resistance to	tension load	N_{Rk} =	[kN]	1,73	1,38	1,04	1,78	1,25	1,05	1,84	1,57	1,28
	shear load	V_{Rk} =	[kN]	3,81			3,95			3,06		

KARL undercut anchor KH for HPL in accordance with EN 438-7:2005

Performance
Characteristic values for the design of the anchor with different span width

Annex C 2