Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment ETA-12/0042 of 8 June 2018

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	SHARK PRO
Product family to which the construction product belongs	Plastic anchor for multiple use in concrete and masonry for non-structural applications
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	manufacturing plant 2
This European Technical Assessment contains	35 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	ETAG 020, edition March 2012, used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011

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Specific Part

1 Technical description of the product

The Würth plastic anchor SHARK PRO in the sizes SHARK PRO 6, SHARK PRO 8, SHARK PRO 10, SHARK PRO 12 and SHARK PRO 14 is a plastic anchor consisting of a plastic sleeve made of polyamide and an accompanying specific screw of galvanised steel or stainless steel.

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against the wall of the drilled hole.

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)

The essential characteristics regarding mechanical resistance and stability are included under the Basic Works Requirement Safety in use.

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A 1
Resistance to fire	See Annex C 3

3.3 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annexes C 1, C 2, C 7 – C 21
Characteristic resistance for bending moments	See Annex C 1, C 2
Displacements under shear and tension loads	See Annex C 3
Anchor distances and dimensions of members	See Annex B 3, B 4

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

In accordance with guideline for European technical approval ETAG 020, March 2012 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: 97/463/EC.

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 at Deutsches Institut für Bautechnik.

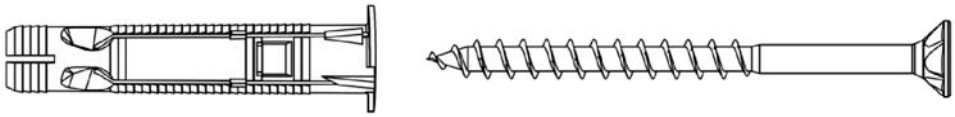
Issued in Berlin on 8 June 2018 by Deutsches Institut für Bautechnik

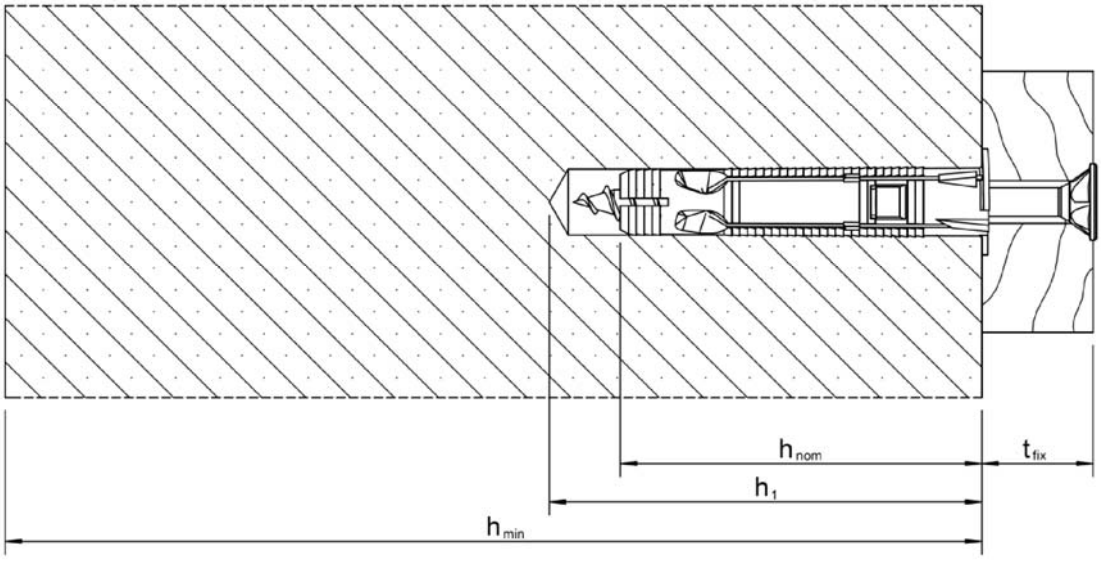
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Ziegler

Deutsches Institut für Bautechnik DIBt

Plastic anchor SHARK PRO – pre-positioned installation





Intended use

Plastic anchor for **pre-positioned anchorages** for multiple use in cracked or non-cracked concrete and masonry.

Legend:

h_{nom}: Overall plastic anchor embedment depth in the base material
h_1: Depth of drilled hole to deepest point
h_{min}: minimum thickness of member
t_{fix}: Thickness of fixture

SHARK PRO	Annex A 1
Product description Product and installed condition pre-positioned installation	

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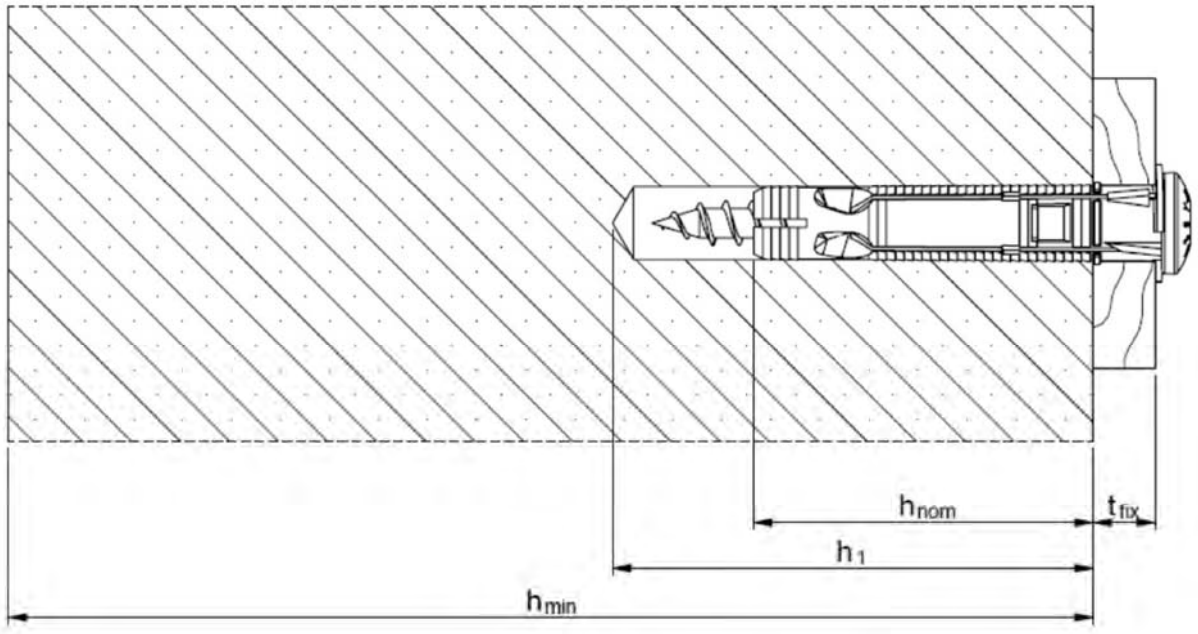
Plastic anchor SHARK PRO 12 – in-place installation



Intended use

Plastic anchor SHARK PRO 12 for **in-place installation** for multiple use in cracked or non-cracked concrete and masonry.

Legend:

h_{nom}: Overall plastic anchor embedment depth in the base material
h_1: Depth of drilled hole to deepest point
h_{min}: Thickness of member
t_{fix}: Thickness of fixture

SHARK PRO	Annex A 2
Product description Product and installed condition in-place installation – SHARK PRO 12	

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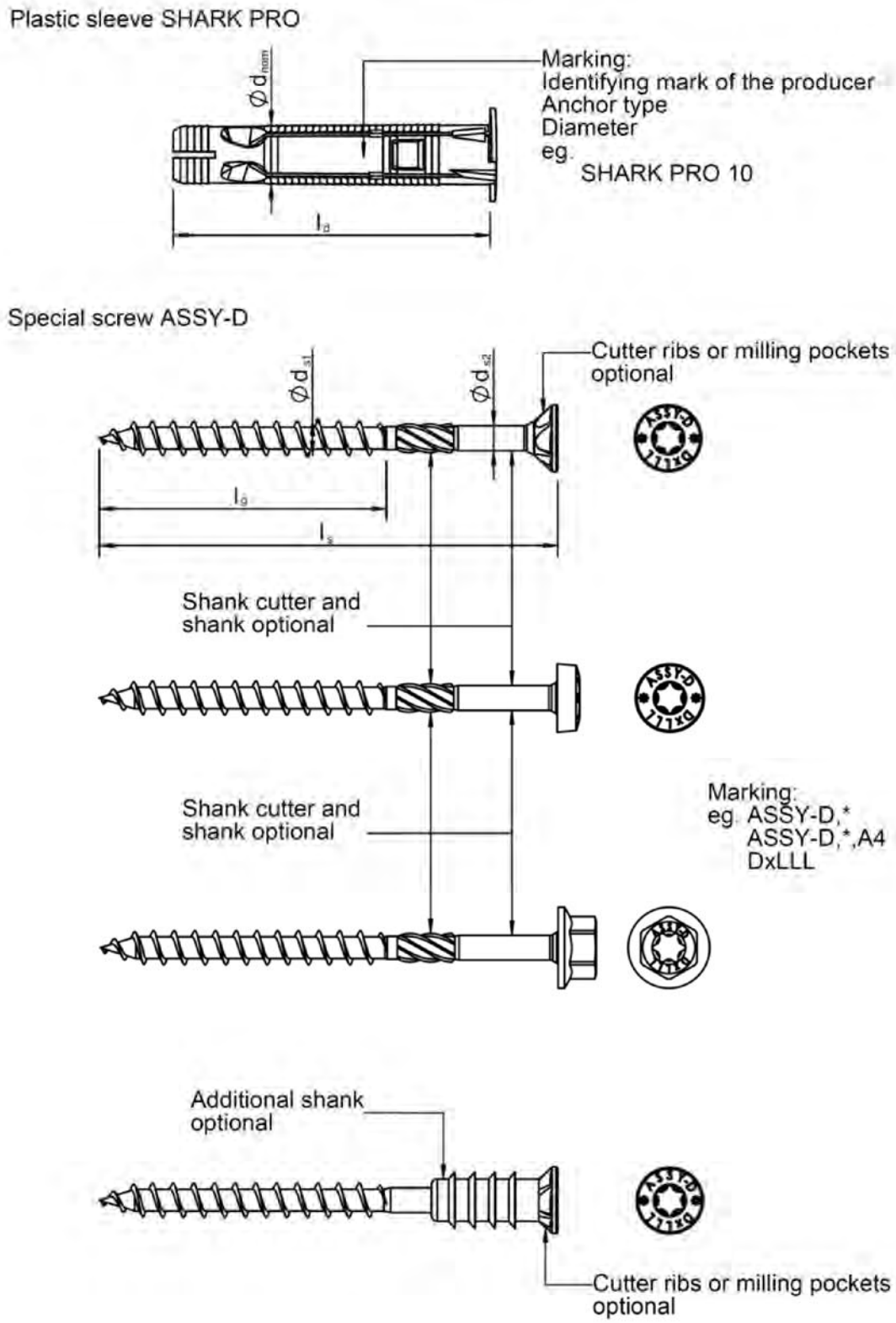

SHARK PRO	**Annex A 3**
Product description Anchor types / specific screw – marking	

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Table A 1.1: Anchor Dimensions

Anchor type			SHARK PRO					
			6	8	10	12		14
Overall plastic anchor embedment depth[1]	$h_{nom} \geq$	[mm]	34	45	55	57	65	75
Plastic sleeve								
Plastic sleeve diameter	$\varnothing d_{nom} =$	[mm]	6	8	10	12		14
Length of plastic sleeve	l_d	[mm]	35	46	56	66		76
Flat collar diameter	$\varnothing d_k =$	[mm]	10	13	16	19.5		22.5
Thickness of flat collar	$l_k \geq$	[mm]	0.5	0.7	0.8	1		1.2
Special screw ASSY-D								
Screw diameter	$d_{s1} =$	[mm]	5	6	8	10		12
Screw diameter	$d_{s2} =$	[mm]	3.7	4.4	5.8	7.3		8.3
Length of screw	$l_s =$	[mm]	t_{fix} + 40	t_{fix} + 50	t_{fix} + 60	t_{fix} + 70		t_{fix} + 80
Length of thread	$l_g \geq$	[mm]	40	50	60	76		80
Thickness of fixture for screw l_s = 50 mm	t_{fix}	[mm]	1-10	-	-	-		-
Thickness of fixture for screw l_s = 60 mm	t_{fix}	[mm]	1-20	1-10	-	-		-
Thickness of fixture for screw l_s = 70 mm	t_{fix}	[mm]	10-30	1-20	1-10	-		-
Thickness of fixture for screw l_s = 80 mm	t_{fix}	[mm]	20-40	10-30	1-20	1-10[2]		-
Thickness of fixture for screw l_s = 90 mm	t_{fix}	[mm]	30-50	20-40	10-30	1-20		1-10
Thickness of fixture for screw l_s = 100mm	t_{fix}	[mm]	40-60	30-50	20-40	1-30		1-20
Thickness of fixture for screw l_s = 110mm	t_{fix}	[mm]	50-70	40-60	30-50	10-40		1-30
Thickness of fixture for screw l_s = 120mm	t_{fix}	[mm]	60-80	50-70	40-60	20-50		10-40
Thickness of fixture for screw l_s = 130mm	t_{fix}	[mm]	70-90	60-80	50-70	30-60		20-50
Thickness of fixture for screw l_s = 140mm	t_{fix}	[mm]	80-100	70-90	60-80	40-70		30-60
Thickness of fixture for screw l_s = 150mm	t_{fix}	[mm]	90-110	80-100	70-90	50-80		40-70
Thickness of fixture for screw l_s = 160mm	t_{fix}	[mm]	100-120	90-110	80-100	60-90		50-80
Thickness of fixture for screw l_s = 170mm	t_{fix}	[mm]	110-130	100-120	90-110	70-100		60-90
Thickness of fixture for screw l_s = 200mm	t_{fix}	[mm]	140-160	130-150	120-140	100-130		90-120
Thickness of fixture for screw l_s = 220mm	t_{fix}	[mm]	160-180	150-170	140-160	120-150		110-140
Thickness of fixture for screw l_s = 240mm	t_{fix}	[mm]	180-200	170-190	160-180	140-180		130-160

[1] See Annex A1, A2
[2] For SHARK PRO 12

SHARK PRO

Product description
Anchor dimensions

Annex A 4

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Table A 2.1: Materials

Designation	Material
Plastic sleeve	Polyamide. colour anthrazit or brown
Special screw	Carbon steel according to EN ISO 4042:1999, galvanised Stainless steel, 1.4401, 1.4571 or 1.4578

SHARK PRO	**Annex A 5**
Product description Materials	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads:
- Multiple fixing of non-structural applications

Base materials:

- Reinforced or unreinforced normal weight concrete with strength classes ≥ C12/15 (use category a), according to EN 206-1:2000, Annex C 1, C 2, Precast prestressed hollow core slabs according to Annex C 21.
- Solid brick masonry (use category b), according to Annex C 7, C 8, C 11 - C 12, C 16 - C 19.
  Note: The characteristic resistance is also valid for larger brick sizes and larger compressive strength of the masonry unit.
- Hollow brick masonry (use category c), according to Annex C 9, C 10, C 13 - C 15.
- Autoclaved aerated concrete (use category d), according to Annex C 20
- Mortar strength class of the masonry ≥ M2,5 at minimum according to EN 998-2:2010.
- For other base materials of the use categories a, b, c and d the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B Edition March 2012.

Temperature Range:

- Temperature Range a): 24 °C bis + 40 °C (max. long temperature +24 °C und max. short temperature + 40 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- For in-place installation the specific screw made of galvanized steel may also be used in structures subject to external atmospheric exposure, if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore there shall be an external cladding or a ventilated rainscreen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e. g. undercoating or body cavity protection for cars).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel).
- 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).

Design:

- The anchorages are designed in accordance with the ETAG 020, Annex C Edition March 2012 under the responsibility of an engineer experienced in anchorages and masonry work.
- 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.
- Fasteners are only to be used for multiple use for non-structural application, according to ETAG 020 Edition March 2012.

Installation:

- Hole drilling by the drill modes according to Annex C 7 - C 21
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Installation temperature ≥ -20 °C
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks

SHARK PRO	**Annex B 1**
Intended use Specifications	

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Table B 1.1: Installation parameters in concrete

Anchor type			**SHARK PRO**				
			6	**8**	**10**	**12**	**14**
Drill hole diameter	d_0 =	[mm]	6	8	10	12	14
Overall plastic anchor embedment depth in the base material [1)]	$h_{nom} \geq$	[mm]	34	45	55	57 / 65	75
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6.4	8.45	10.45	12.45	14.45
Depth of drilled hole to deepest point [1)]	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}				
Drill method		[-]	Hammer drilling				
Diameter of clearance hole in the fixture Pre-positioned installation	$d_f \leq$	[mm]	5.5	6.5	8.5	10.5	12.5
Diameter of clearance hole in the fixture In-place installation	$d_f \leq$	[mm]	-	-	-	14.5	-

[1)] See Annex A1, A2

SHARK PRO	**Annex B 2**
Intended use Installation parameters for use in concrete	

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Table B 2.1: Minimun thickness of member, edge distance and spacing in concrete

SHARK PRO 6: Fixing points with a spacing a ≤ 35 mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1. For a > 35 mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1.

SHARK PRO 8: Fixing points with a spacing a ≤ 40 mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1. For a > 40 mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1.

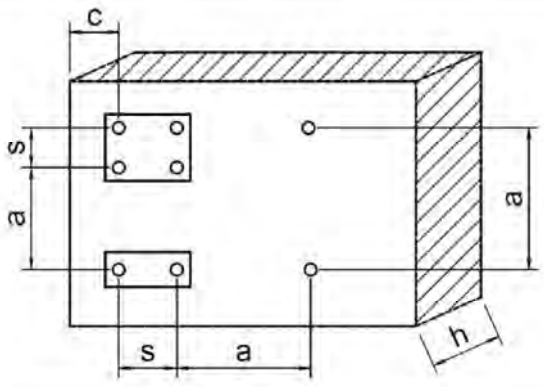
SHARK PRO 10: Fixing points with a spacing a ≤ 80 mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1. For a > 80 mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1.

SHARK PRO 12: Fixing points with a spacing a ≤ 100 mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1. For a > 100 mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1.

SHARK PRO 14: Fixing points with a spacing a ≤ 110 mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1. For a > 110 mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1, C 2.1.

		h_{nom} [mm]		h_{min} [mm]	$c_{cr,N}$ [mm]	c_{min} [mm]	s_{min} [mm]
SHARK PRO 8	Concrete ≥ C16/20	34		100	80	80	80
	Concrete C12/15	34		100	120	110	110
SHARK PRO 8	Concrete ≥ C16/20	45		100	80	80	80
	Concrete C12/15	45		100	110	110	110
SHARK PRO 10	Concrete ≥ C16/20	55		100	80	80	80
	Concrete C12/15	55		100	110	110	110
SHARK PRO 12	Concrete ≥ C16/20	57	65	120	150	150	150
	Concrete C12/15	57	65	120	210	210	210
SHARK PRO 14	Concrete ≥ C16/20	75		120	150	150	150
	Concrete C12/15	75		120	210	210	210

Concrete:



SHARK PRO

Annex B 3

Intended use
Minimum thickness, edge distances and spacing for use concrete

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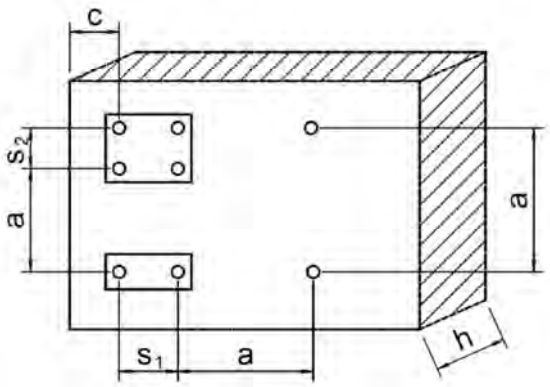
Table B 3.1: Minimum thickness of member, edge distance and anchor spacing in masonry and autoclaved aerated concrete

			Masonry		Autoclaved aerated concrete AAC 4	AAC 6	AAC 4	AAC 6
Anchor type SHARK PRO			**10**	**12**	**10**		**12**	
Minimum thickness of member	h_{min}	[mm]	100[1)]	100[1)]	175		175	
Single anchor								
Minimum spacing	a_{min}	[mm]	250	250	250		250	
Minimum edge distance	c_{min}	[mm]	100	100	80	100	100	100
Anchor group								
Spacing perpendicular to free edge	$s_{1,min}$	[mm]	200	200 [1)]	100	125	100	100
Spacing parallel to free edge	$s_{2,min}$	[mm]	250	250[1)]	100	125	250	250
Minimum allowable edge distance	c_{min}	[mm]	100[1)]	100[1)]	80	100	100	100

[1)] depends on the brick size (see the following annexes C 7 - C 21)

Masonry and autoclaved aeratedconcrete



SHARK PRO

Intended use
Minimum member thickness, edge distances and spacings for use in masonry and AAC

Annex B 4

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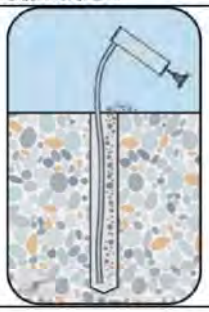
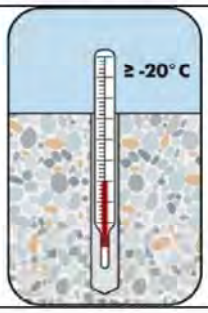
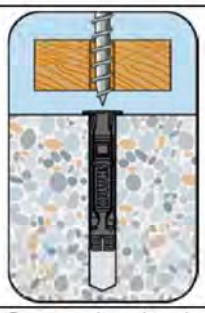
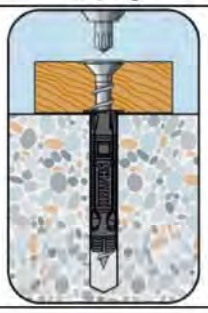
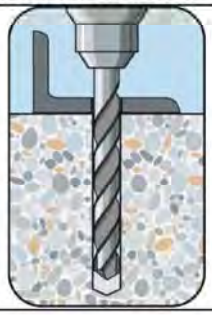
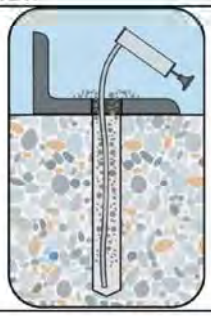
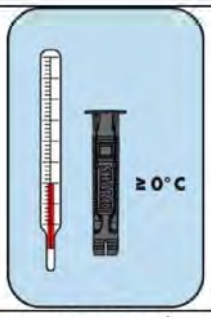
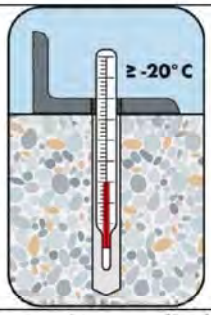
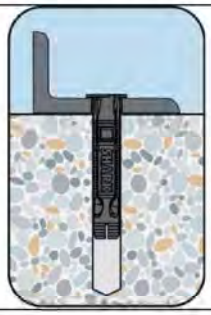
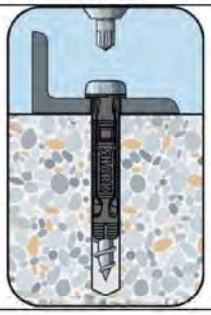
Installation instructions pre-positioned installation

		
1) Drill the bore hole	2) Clean the drilled bore hole	3) Temperature anchor sleeve ≥ 0 °C
		
4) Temperature anchoring base ≥ -20 °C	5) Set anchor in place, before screwing it must be checked that the hole of the fixture is positioned axial over the anchor sleeve	6) screw in the screw through the fixture until flush

Installation instructions in-place installation

		
1) Drill the bore hole	2) Clean the drilled bore hole	3) Temperature anchor sleeve ≥ 0 °C
		
4) Temperature anchoring base ≥ -20 °C	5) Set anchor in place	6) Screw in the screw untilf flush

SHARK PRO

Annex B 5

Intended use
Installation instructions pre-positioned installation and in-place installation

Deutsches Institut für Bautechnik DIBt

Table C 1.1: Characteristic resistance of the screw, galvanized steel for use in concrete

Anchor type			**SHARK PRO,** galvanised steel					
Failure of expansion element (special screw)			**6**	**8**	**10**	**12**		**14**
Overall plastic anchor embedment depth	h_{nom}	[mm]	**34**	**45**	**55**	**57**	**65**	**75**
Characteristic tension resistance	$N_{Rk,s}$	[kN]	5.66	9.07	16,34	23.76		29.91
Partial safety factor	γ_{Ms} [1)]	[-]	1.5	1.5	1.5	1.5		1.5
Characteristic shear resistance	$V_{Rk,s}$	[kN]	2.83	4.54	8.17	11.88		14.96
Partial safety factor	γ_{Ms} [1)]	[-]	1.25	1.25	1.25	1.25		1.25
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	2.54	5.17	12.50	21.92		30.96
Partial safety factor	γ_{Ms} [1)]	[-]	1.25	1.25	1.25	1.25		1.25
Pull-out failure (plastic sleeve)								
Concrete ≥ C16/20								
Characteristic resistance 24°C[2)] / 40°C[3)]	$N_{Rk,p}$	[kN]	0.9	1.2	4.0	5.0		6.0
Partial safety factor	γ_{Mc} [1)]	[-]	1.8	1.8	1.8	1.8		1.8
Concrete = C12/15								
Characteristic resistance 24°C[2)] / 40°C[3)]	$N_{Rk,p}$	[kN]	0.9	0.9	3.0	4.0		5.0
Partial safety factor	γ_{Mc} [1)]	[-]	1.8	1.8	1.8	1.8		1.8

1) In absence of other national regulations
2) Maximum long term temperature
3) Maximum short term temperature

SHARK PRO

Performances
Characteristic resistance of the screw, galvanized steel for use in concrete

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C 2.1: Characteristic resistance, stainless steel for use in concrete

Anchor type			**SHARK PRO**, stainless steel				
Failure of expansion element (special screw)			**6**	**8**	**10**	**12**	**14**
Overall plastic anchor embedment depth	h_{nom}	[mm]	**34**	**45**	**55**	**57** / **65**	**75**
Characteristic tension resistance	$N_{Rk,s}$	[kN]	4.95	8.37	15.44	20.79	26.17
Partial safety factor	γ_{Ms} [1)]	[-]	1.87	1.87	1.87	1.87	1.87
Characteristic shear resistance	$V_{Rk,s}$	[kN]	2.47	3.97	7.15	10.40	13.09
Partial safety factor	γ_{Ms} [1)]	[-]	1.56	1.56	1.56	1.56	1.56
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	2.23	4.53	10.94	19.18	27.09
Partial safety factor	γ_{Ms} [1)]	[mm]	1.56	1.56	1.56	1.56	1.56
Pull-out failure (plastic sleeve)							
Concrete ≥ C16/20							
Characteristic resistance 24°C [2)] / 40°C [3)]	$N_{Rk,p}$	[kN]	0.9	1.2	4.0	5.0	6.0
Partial safety factor	γ_{Mc} [1)]	[-]	1,8	1.8	1.8	1.8	1.8
Concrete = C12/15							
Characteristic resistance 24°C [2)] / 40°C [3)]	$N_{Rk,p}$	[kN]	0.9	0.9	3.0	4.0	5.0
Partial safety factor	γ_{Mc} [1)]	[-]	1.8	1.8	1.8	1.8	1.8

1) In absence of other national regulations
2) Maximum long term temperature
3) Maximum short term temperature

SHARK PRO	**Annex C 2**
Performances Characteristic resistance of the screw, stainless steel for use in concrete	

Table C 3.1: Displacements [1] under tension and shear loading in concrete and masonry

Anchor type		Tension load			Shear load		
	h_{nom} [mm]	F [2] [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	F [2] [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
SHARK PRO 6	≥ 34	0.5	0.11	0.22	0.5	0.8	1.2
SHARK PRO 8	≥ 45	0.5	0.13	0.26	0.6	1.99	2.99
SHARK PRO 10	≥ 55	1.6	0.16	0.32	1.4	1.15	1.73
SHARK PRO 12	≥ 57	2.0	0.35	0.7	2.0	1.77	2.66
SHARK PRO 14	≥ 75	2.8	0.41	0.82	2.8	1.61	2.42

1) Valid for all ranges of temperatures
2) Intermediate values by linear interpolation

Table C 3.2: Displacements [1] under tension and shear loading in AAC

Anchor type		Tension			Shear load		
	h_{nom} [mm]	F [2] [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	F [2] [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
SHARK PRO 10	55	0.1	0.1	0.2	0.1	0.2	0.3
SHARK PRO 12	57	0.43	0.22	0.44	0,43	0,86	1,29

1) Valid for all ranges of temperatures
2) Intermediate values by linear interpolation

Table C3.3: Values under fire exposure in concrete C20/25 to C50/60 in any load direction, no permanent centric tension load and without lever arm, fastening of façade systems

Anchor type	Fire resistance class	F [1]
SHARK PRO 10	**R 90**	≤ 0,8 kN
SHARK PRO 12	**R 90**	≤ 0,8 kN
SHARK PRO 14	**R 90**	≤ 0,8 kN

1) $F_{Rk} / (\gamma_m \times \gamma_F)$

Footnotes for Annex C 7- C 21

1) Characteristic resistance F_{Rk} for tension, shear or combined tension and shear loading.
The characteristic resistance is valid for single plastic anchor or for a group of two or four plastic anchors with a spacing equal or larger than the minimum spacing s_{min} according to Table B 3.1. The specific conditions for the design method have to be considered according to ETAG 020 Anhang C.
2) In absence of other national regulations
3) Maximum long term temperature
4) Maximum short term temperature

SHARK PRO	**Annex C 3**
Performances Displacements under tension and shear loading in concrete, masonry and autoclaved aerated concrete, values under fire exposure in concrete	

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Table C 4.1: Base material: Concrete and solid masonry

Base material	Format	Measurement [mm]	Minimum compressive strength [N/mm²]	Bulk density class [kg/dm³]	Annex
Concrete (use category "a")					
Concrete ≥ C12/15					**Annex C 1** **Annex C 2**
Solid masonry (use category "b")					
Solid brick Mz acc. to DIN 105-100: 2012-01 EN 771-1:2011 e.g. Wienerberger GmbH	≥ NF	≥ 240x115x71	10 20 28 36 47	≥ 1.8	**Annex C 7** 771-1-020
	≥ 3DF	240x175x113	10 12 20 26		**Annex C 8** 771-1-041
Sand-lime solid brick KS acc. to DIN V 106:2005-10 EN 771-2:2011	≥ NF	≥ 240x115x71	10 20 28 39,5	≥ 2.0	**Annex C 11** 771-2-011
Sand-lime solid brick Silka XL Basic, **Sand-lime solid brick Silka XL Plus,** DIN V 106:2005-10 EN 771-2:2011 Z-17.1-997 e. g. Xella International GmbH	-	≥ 498x240x498	10 20 28	≥ 1.6	**Annex C 12** 771-2-028 771-2-010
Concrete solid block Vn and **Vbn** acc. to DIN 18153-100:2005-10 EN 771-3:2011 Bisotherm GmbH	≥ NF	≥ 240x115x71	10 20 28 35,1	≥ 2.0	**Annex C 16** 771-3-004
Lightweight concrete solid block V and **Vbl, e.g. Bisophon** acc. to DIN V 18152-100:2005-10 EN 771-3:2011 Bisotherm GmbH	≥ 3DF	≥ 240x175x113	10 20 25	≥ 2.0	**Annex C 17** 771-3-017
Lighweight concrete solid block V and Vbl, e.g. BisoBims acc. DIN V 18152-100:2005-10 EN 771-3:2011 Bisotherm GmbH	≥ NF	≥ 240x115x71	4 6	≥ 1.2	**Annex C 18** 771-3-007
Lighweight concrete solid block V and Vbl, e.g. Bisophon acc. DIN V 18152-100:2005-10 EN 771-3:2011 Bisotherm GmbH	≥ 3DF	≥ 240x175x113	2 4 6	≥ 1.2	**Annex C 19** 771-3-016

SHARK PRO

Performances
Concrete (use category "a") and solid masonry (use category "b") - format, measurement, minimum compressive strength, bulk density, Annex

Annex C 4

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Table C 5.1: Base material: Hollow or perforated masonry

Base material	Format	Measurement [mm]	Minimum compressive strength [N/mm²]	Bulk density class [kg/dm³]	Annex
Hollow or perforated masonry (use category "c")					
Hollow brick HLz acc. to DIN 105-100: 2012-01 EN 771-1:2011 e.g. Wienerberger GmbH e.g. Schlagmann Baustoffwerke GmbH & Co. KG	≥ 12DF	≥ 373x240x238	4 6 8 10	≥ 1.2	**Annex C 9** 771-1-036
Hollow brick HLz acc. to DIN 105-100: 2012-01 EN 771-1:2011 e.g. Wienerberger GmbH e.g. Schlagmann Baustoffwerke GmbH & Co. KG	≥ 9 DF	≥ 373x175x238	10 20 30	≥ 1.2	**Annex C 10** 771-1-055
Sand-lime perforated brick KS L acc. to DIN V 106:2005-10 EN 771-2:2011	≥ 2DF	≥ 240x115x113	8 10 12 20 24	≥ 1.4	**Annex C 13** 771-2-012 771-2-004
Sand-lime perforated brick KS L acc. to DIN V 106:2005-10 EN 771-2:2011 e. g. Xella International GmbH	≥ 8DF	≥ 248x240x238	6 8 10 12 14.4	≥ 1.4	**Annex C 14** 771-2-013
Sand-lime perforated brick KS L acc. to DIN V 106:2005-10 EN 771-2:2011 e. g. Heidelberger Kalksandstein GmbH	≥ 12DF	≥ 498x175x248	6 8 10 12 23	1,4	**Annex C 15** 771-2-044

SHARK PRO

Annex C 5

Performances
Hollow or perforated masonry (use category "c") - format, measurement, minimum compressive strength, bulk density, Annex

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Table C 6.1: Base material: Autoclaved aerated concrete (use category "d")

Base material	Format	Measurement [mm]	Minimum compressive strength [N/mm²]	Bulk density class [kg/dm³]	Annex
Autoclaved aerated concrete AAC acc. to EN 771-4:2011	-	≥ 499x175x249	4 - 7	≥ 0.3	**Annex C 20**

Table C 7.1: Base material: Precast prestressed hollow core slabs

Base material	Format	Measurement [mm]	Minimum compressive strength [N/mm²]	Bulk density class [kg/dm³]	Annex
Precast prestressed hollow core slabs acc. to DIN EN 1168:2011-12	-	-	≥ C30/37	-	**Annex C 21**

SHARK PRO

Performances
Autoclaved aerated concrete (use category "d") and precast or prestressed hollow core elements -measurement, minimum compressive strength, bulk density class, Annex

Annex C 6

Base material solid masonry: Solid brick Mz, NF

Table C 8.1.1 Brick data

Description of brick 771-1-020			**Mz**
Type of brick			Solid brick Mz
Bulk density	$\rho \geq$	[kg/dm³]	1.8
Standard, approval			DIN 105-100: 2012-01; EN 771-1:2011
Format (measurement)		[mm]	≥ NF (≥ 240x115x71)
Minimum thickness of member	h_{min} =	[mm]	115

Table C 8.1.2 Installation parameters

Anchor size SHARK PRO			**10**	**12**	
Drill hole diameter	d_0 =	[mm]	10	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12,45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}		
Drill method		[-]	Hammer drilling		
Overall plastic anchor embedment depth pre-positioned installation	$h_{nom} \geq$	[mm]	55	65	
Overall plastic anchor embedment depth in-place installation	$h_{nom} \geq$	[mm]	-	55	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5	10,5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-	14,5	
Minimum spacing	$s_{1,min} = s_{2,min} \geq$	[mm]	-	75	250
Minimum edge distance	$c_{min} \geq$	[mm]	100	250	100

Table C 8.1.3 Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**	
Solid brick Mz, $f_b \geq$ 10 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.9	0.9	0.40
Solid brick Mz, $f_b \geq$ 20 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.5	1.5	0.50
Solid brick Mz, $f_b \geq$ 28 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.0	2.0	0.75
Solid brick Mz, $f_b \geq$ 36 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.5	2.5	0.9
Solid brick Mz, $f_b \geq$ 47,4 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	3.5	3.5	1.2
Partial safety factor	γ_{Mm} [2]	[-]	2.5		

Footnotes see Annex C 3

SHARK PRO	**Annex C 7**
Solid masonry: Solid brick Mz, NF Brick data, installation parameters, characteristic resistance	

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Base material solid masonry: Solid brick Mz, 3DF

Table C 8.2.1: Brick data

Description of brick 771-1-041			**Mz**
Type of brick			Solid brick Mz
Bulk density	$\rho \geq$	[kg/dm³]	1.8
Standard, approval			DIN 105-100: 2012-01; EN 771-1:2011
Producer of brick			e.g. Wienerberger GmbH
Format (measurement)		[mm]	≥ 3DF (≥ 240x175x113)
Minimum thickness of member	h_{min} =	[mm]	175

Table C 8.2.2: Installation parameters

Anchor size SHARK PRO			**10**	
Drill hole diameter	d_0 =	[mm]	10	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}	
Drill method		[-]	Hammer drilling	
Overall plastic anchor embedment depth	$h_{nom} \geq$	[mm]	55	
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8.5	
Minimum edge distance	$c_{min} \geq$	[mm]	55	100

Table C 8.2.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**	
Solid brick Mz, $f_b \geq 8$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.75	0.9
Solid brick Mz, $f_b \geq 12$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.2	-
Solid brick Mz, $f_b \geq 20$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.0	1.5
Solid brick Mz, $f_b \geq 26$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.0	2.0
Partial safety factor	γ_{Mm}[2]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO	**Annex C 8**
Performances Solid masonry: Solid brick Mz, 3DF Brick data, installation parameters, characteristic resistance	

Base material hollow masonry: Hollow brick HLz, 12DF

Table C 8.3.1: Brick data

Description of brick 771-1-036			**HLz**
Type of brick			Hollow brick
Bulk density	$\rho \geq$	[kg/dm³]	1.2
Standard, approval			DIN 105-100: 2012-01; EN 771-1:2011
Producer of brick			e.g. Schlagmann Baustoffwerke GmbH & Co. KG
Format (measurement)		[mm]	≥ 12DF (≥ 373x240x238)
Minimum thickness of member	h_{min} =	[mm]	240

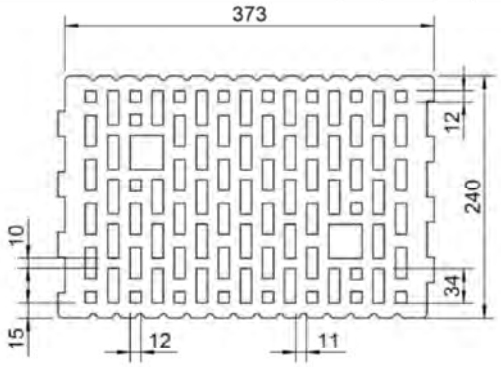

Table C 8.3.2: Installation parameters

Anchor size SHARK PRO			**10**
Drill hole diameter	d_0 =	[mm]	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}
Drill method		[-]	Rotary drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	55
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8.5
Minimum edge distance	$c_{min} \geq$	[mm]	100

Table C 8.3.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**
Hollow brick HLz, $f_b \geq 4$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.9
Hollow brick HLz, $f_b \geq 6$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.5
Hollow brick HLz, $f_b \geq 8$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.0
Hollow brick HLz, $f_b \geq 10$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.5
Partial safety factor	γ_{Mm}[2]	[-]	2.5

Footnotes see Annex C 3

SHARK PRO	**Annex C 9**
Performances Hollow masonry: Hollow brick HLz, 12DF Brick data, installation parameters, characteristic resistance	

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Base material hollow masonry: Hollow brick HLz, 9DF

Table C 8.4.1: Brick data

Description of brick 771-1-055			**HLz**
Type of brick			Hollow brick
Bulk density	$\rho \geq$	[kg/dm³]	1.2
Standard, approval			DIN 105-100: 2012-01; EN 771-1:2011
Producer of brick			e.g. Schlagmann Baustoffwerke GmbH & Co. KG
Format (measurement)		[mm]	≥ 9DF (≥ 373x175x238)
Minimum thickness of member	h_{min} =	[mm]	175

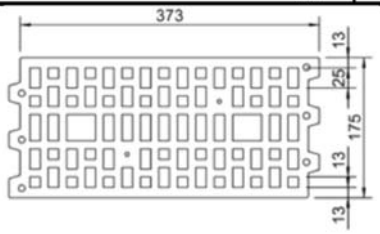

Table C 8.4.2: Installation parameters

Anchor size SHARK PRO			**12**	
Drill hole diameter	d_0 =	[mm]	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}	
Drill method		[-]	Rotary drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =		65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	10,5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$		14,5	
Minimum spacing	$s_{1,min} = s_{2,min} \geq$		75	250
Minimum edge distance	$c_{min} \geq$	[mm]	195	100

Table C 8.4.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**12**
Hollow brick HLz, $f_b \geq 10$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.75
Hollow brick HLz, $f_b \geq 20$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	1.5
Hollow brick HLz, $f_b \geq 30$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	2.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5

Footnotes see Annex C 3

SHARK PRO	**Annex C 10**
Performances Hollow masonry: Hollow brick HLz, 9DF Brick data, installation parameters, characteristic resistance	

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Base material solid masonry, sand-lime solid brick KS, NF

Table C 8.5.1: Brick data

Description of brick 771-2-011			**KS**
Type of brick			Sand-lime solid brick
Bulk density	$\rho \geq$	[kg/dm³]	2.0
Standard, approval			DIN V 106:2005-10; EN 771-2:2011
Producer of brick			e.g. Xella International GmbH Dr.-Hammacher-Str. 49 D-47119 Duisburg
Format (measurement)		[mm]	≥ NF (≥240x115x71)
Minimum thickness of member	h_{min} =	[mm]	115

Table C 8.5.2: Installation parameters

Anchor size SHARK PRO			**10**	
Drill hole diameter	d_0 =	[mm]	10	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}	
Drill method		[-]	Hammer drilling	
Overall plastic anchor embedment depth	h_{nom} =	[mm]	55	
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8.5	
Minimum allowable edge distance	$c_{min} \geq$	[mm]	100	250

Table C 8.5.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**	
Sand-lime solid brick KS, $f_b \geq$ 10 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.75	1.2
Sand-lime solid brick KS, $f_b \geq$ 20 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.2	2.0
Sand-lime solid brick KS, $f_b \geq$ 28 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.5	2.5
Sand-lime solid brick KS, $f_b \geq$ 39,5 N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	2.0	3.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO

Annex C 11

Performances
Solid masonry: Sand-lime solid brick KS, NF
Brick data, installation parameters, characteristic resistance

Base material solid masonry, sand-lime solid brick Silka XL Basic, Silka XL Plus

Table C 8.6.1: Brick data

Description of brick 771-1-028			Silka XL Basic, Silka XL Plus
Type of brick			Sand-lime solid brick
Bulk density	$\rho \geq$	[kg/dm³]	1.6
Standard, approval			DIN V 106:2005-10; EN 771-2:2011; Z-17.1-997
Producer of brick			z.B. Xella International GmbH Dr.-Hammacher-Str. 49 D-47119 Duisburg
Format (measurement)		[mm]	(≥ 498x240x498)
Minimum thickness of member	h_{min} =	[mm]	240

Table C 8.6.2: Installation parameters

Anchor size SHARK PRO			**12**	
Drill hole diameter	d_0 =	[mm]	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}	
Drill method		[-]	Hammer drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =		65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	10,5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$		14,5	
Minimum spacing	$s_{1,min} = s_{2,min} \geq$		75	250
Minimum edge distance	$c_{min} \geq$	[mm]	150	100

Table C 8.6.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**12**
Sand-lime solid brick Silka XL Basic $f_b \geq$ **10 N/mm²** Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	2.5
Sand-lime solid brick Silka XL Basic $f_b \geq$ **20 N/mm²** Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	3.5
Sand-lime solid brick Silka XL Basic $f_b \geq$ **28 N/mm²** Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	4,0
Partial safety factor	γ_{Mm} [2]	[-]	2.5

Footnotes see Annex C 3

SHARK PRO	**Annex C 12**
Performances Solid masonry: Sand-lime solid brick Silka XL Basic Brick data, installation parameters, characteristic resistance	

Base material hollow masonry, sand-lime perforated brick KS L, 2DF

Table C 8.7.1: Brick data

Description of brick 771-2-004, 771-2-012			**KS L**
Type of brick			Sand-lime perforated brick
Bulk density	$\rho \geq$	[kg/dm³]	1.4
Standard, approval			DIN V 106:2005-10; EN 771-2:2011
Producer of brick			-
Format (measurement)		[mm]	≥ 2DF (≥ 240x115x113)
Minimum thickness of member	h_{min} =	[mm]	115

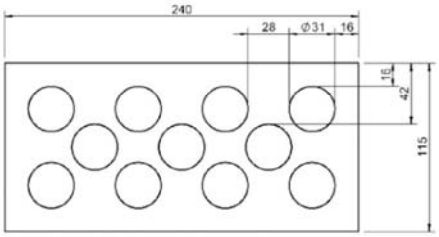

Table C 8.7.2: Installation parameters

Anchor size SHARK PRO			**10**	**12**
Drill hole diameter	d_0	[mm]	10	12
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm – t_{fix}	
Drill method		[-]	Rotary drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =		55	65
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-	57
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5	10.5
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-	14.5
Minimum edge distance	$c_{min} \geq$	[mm]	100	100

Table C 8.7.3: Characteristic resistance F_{Rk} [1)] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**
Sand-lime perforated brick KS L, $f_b \geq 8$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	0.9	-
Sand-lime perforated brick KS L, $f_b \geq 10$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	1.2	0.9
Sand-lime perforated brick KS L, $f_b \geq 12$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	1.5	-
Sand-lime perforated brick KS L, $f_b \geq 20$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	2.5	2.0
Sand-lime perforated brick KS L, $f_b \geq 24$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	2.5	2.5
Partial safety factor	γ_{Mm} [2)]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO	**Annex C 13**
Performances Hollow masonry: Sand-lime perforated brick KS L, 2DF Brick data, installation parameters, characteristic resistance	

Base material hollow masonry, sand-lime perforated brick KS L, 8DF

Table C 8.8.1: Brick data

Description of brick 771-2-013			**KS L**
Type of brick			Sand-lime perforated brick
Bulk density	$\rho \geq$	[kg/dm³]	1.4
Standard, approval			DIN V 106:2005-10; EN 771-2:2011
Producer of brick			e.g. Xella International GmbH
Format (measurement)		[mm]	≥ 8DF (≥ 248x240x238)
Minimum thickness of member	h_{min} =	[mm]	240

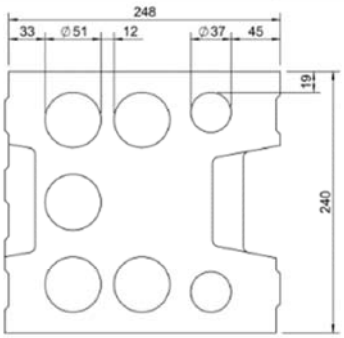

Table C 8.8.2: Installation parameters

Anchor size SHARK PRO			**10**	**12**
Drill hole diameter	d_0 =	[mm]	10	12
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm – t_{fix}	
Drill method		[-]	Rotary drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =	[mm]	55	65
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-	57
Diameter of clearance hole in the fixture pre-positioned inst.	$d_f \leq$	[mm]	8.5	10.5
Diameter of clearance hole in the fixture in-place inst.	$d_f \leq$	[mm]	-	14.5
Minimum edge distance	$c_{min} \geq$	[mm]	100	100

Table C 8.8.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**
Sand-lime perforated brick KS L, $f_b \geq 6$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.9	0.9
Sand-lime perforated brick KS L, $f_b \geq 8$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	1.2	1.2
Sand-lime perforated brick KS L, $f_b \geq 10$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	1.5	1.5
Sand-lime perforated brick KS L, $f_b \geq 12$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	2.0	2.0
Sand-lime perforated brick KS L, $f_b \geq 14{,}4$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	2.5	2.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO

Annex C 14

Performances
Hollow masonry: Sand-lime perforated brick KS L, 8DF
Brick data, installation parameters, characteristic resistance

Base material hollow masonry, sand-lime perforated brick KS L, 12DF

Table C 8.9.1: Brick data

Description of brick 771-2-044			**KS L**
Type of brick			Sand-lime perforated brick
Bulk density	$\rho \geq$	[kg/dm³]	1.4
Standard, approval			DIN V 106:2005-10; EN 771-2:2011
Producer of brick			z.B. Heidelberger Kalksandstein GmbH
Format (measurement)		[mm]	≥ 12DF (≥ 498x175x247)
Minimum thickness of member	h_{min} =	[mm]	175

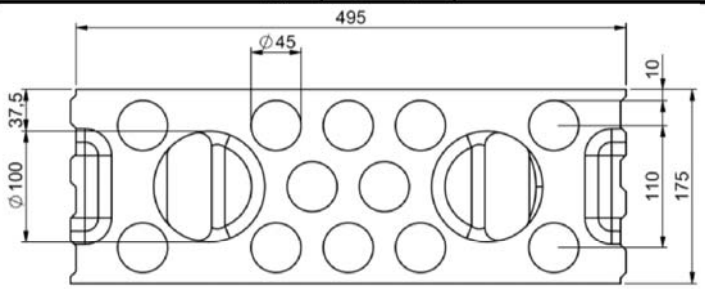

Table C 8.9.2: Installation parameters

Anchor size SHARK PRO			**12**	
Drill hole diameter	d_0 =	[mm]	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}	
Drill method		[-]	Rotary drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =		65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	10,5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$		14,5	
Minimum spacing	$s_{1,min} = s_{2,min} \geq$		75	250
Minimum edge distance	$c_{min} \geq$	[mm]	150	100

Table C 8.9.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**12**
Sand-lime perforated brick KS L, $f_b \geq 6$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.40
Sand-lime perforated brick KS L, $f_b \geq 8$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.60
Sand-lime perforated brick KS L, $f_b \geq 10$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.75
Sand-lime perforated brick KS L, $f_b \geq 12$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.90
Sand-lime perforated brick KS L, $f_b \geq 23$ N/mm², Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	1.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5

Footnotes see Annex C 3

SHARK PRO

Annex C 15

Performances
Hollow masonry: Sand-lime perforated brick KS L, 12DF
Brick data, installation parameters, characteristic resistance

Base material solid masonry, concrete solid block, Vn and Vbn, NF

Table C 8.10.1: Brick data

Description of brick 771-3-004(O)			**Vn and Vbn**
Type of brick			Concrete solid block
Bulk density	$\rho \geq$	[kg/dm³]	2.0
Standard, approval			DIN 18153-100:2005-10; EN 771-3:2011
Producer of brick			-
Format (measurement)		[mm]	≥ NF (≥ 240x115x71)
Minimum thickness of member	h_{min} =	[mm]	115

Table C 8.10.2: Installation parameters

Anchor size SHARK PRO			**10**		**12**	
Drill hole diameter	d_0 =	[mm]	10		12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45		12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	$l_s + 5$ mm – t_{fix}			
Drill method		[-]	Hammer drilling			
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =	[mm]	55		65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-		57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5		10.5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-		14.5	
Minimum edge distance	$c_{min} \geq$	[mm]	250	100	250	100

Table C 8.10.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**		**12**	
Concrete solid block Vn and Vbn, $f_b \geq 10$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	2.0	1.5	1.5	0.90
Concrete solid block Vn und Vbn, $f_b \geq 20$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	3.0	2.0	2.0	1.5
Concrete solid block Vn und Vbn, $f_b \geq 28$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	4.0	3.0	3.0	2.0
Concrete solid block Vn und Vbn, $f_b \geq 35{,}1$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	4.0	3.0	3.5	2.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5			

Footnotes see Annex C 3

SHARK PRO	**Annex C 16**
Performances Solid masonry: Concrete solid block Vn and Vbn, NF Brick data, installation parameters, characteristic resistance	

Base material solid masonry, lightweight concrete solid brick: V and Vbl, 3DF

Table C 8.11.1: Brick data

Description of brick	771-3-017		**V and Vbl**
Type of brick			Lightweight concrete solid brick
Bulk density	$\rho \geq$	[kg/dm³]	2.0
Standard, approval			DIN 18152-100:2005-10; EN 771-3:2011
Producer of brick			e.g. Bisophon, Bisotherm GmbH Eisenbahnstraße 12 D-56218 Mühlheim-Kärlich -
Format (measurement)		[mm]	≥ 3DF (≥ 240x175x113)
Minimum thickness of member	h_{min} =	[mm]	175

Table C 8.11.2: Installation parameters

Anchor size SHARK PRO			**10**	**12**	
Drill hole diameter	d_0 =	[mm]	10	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm – t_{fix}		
Drill method		[-]	Hammer drilling		
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =	[mm]	55	65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-	57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5	10.5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-	14.5	
Minimum spacing	$s_{min} \geq$	[mm]	-	75	250
Minimum edge distance	$c_{min} \geq$	[mm]	100	180	100

Table C 8.11.3: Characteristic resistance F_{Rk}[1)] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**
Lightweight concrete solid brick V and Vbl, $f_b \geq 10$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	2.5	3.0
Lightweight concrete solid brick V and Vbl, $f_b \geq 20$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	4.0	4.0
Lightweight concrete solid brick V and Vbl, $f_b \geq 25$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	5.0	5.0
Partial safety factor	γ_{Mm}[2)]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO	**Annex C 17**
Performances Solid masonry: Lightweight concrete solid brick V and Vbl, 3DF Brick data, installation parameters, characteristic resistance	

Base material solid masonry, Lightweight concrete solid brick: V and Vbl, NF

Table C 8.12.1: Brick data

Description of brick 771-3-007			**V and Vbl**
Type of brick			Lightweight concrete solid brick
Bulk density	$\rho \geq$	[kg/dm³]	1.2
Standard, approval			DIN V 18152-100:2005-10, EN 771-3:2011
Producer of brick			e.g. BisoBims, Bisotherm GmbH Eisenbahnstraße 12 D-56218 Mühlheim-Kärlich
Format (measurement)		[mm]	≥ NF (≥ 240x115x71)
Minimum thickness of member	h_{min} =	[mm]	115

Table C 8.12.2: Installation parameters

Anchor size SHARK PRO			**10**
Drill hole diameter	d_0 =	[mm]	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}
Drill method		[-]	Hammer drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	55
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8.5
Minimum edge distance	$c_{min} \geq$	[mm]	100

Table C 8.12.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**
Lightweight concrete solid brick, V 4 and Vbl 4, $f_b \geq 4$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.3
Lightweight concrete solid brick, V 6 and Vbl 4, $f_b \geq 6$ N/mm² Characteristic resistance F_{Rk}	24°C [3] / 40°C [4]	[kN]	0.5
Partial safety factor	γ_{Mm} [2]	[-]	2.5

Footnotes see Annex C 3

SHARK PRO

Annex C 18

Performances
Solid masonry: Lightweight concrete solid brick V and Vbl, NF
Brick data, installation parameters, characteristic resistance

Deutsches Institut für Bautechnik DIBt

Base material solid masonry, Lightweight concrete solid brick: V and Vbl, 3DF

Table C 8.13.1: Brick data

Description of brick 771-3-016			**V and Vbl**
Type of brick			Lightweight concrete solid brick
Bulk density	$\rho \geq$	[kg/dm³]	1.2
Standard, approval			DIN V 18152-100:2005-10, EN 771-3:2011
Producer of brick			e.g. Bisophon, Bisotherm GmbH Eisenbahnstraße 12 D-56218 Mühlheim-Kärlich
Format (measurement)		[mm]	≥ 3DF (≥ 240x175x113)
Minimum thickness of member	h_{min} =	[mm]	175

Table C 8.13.2: Installation parameters

Anchor size SHARK PRO			**10**	**12**	
Drill hole diameter	d_0 =	[mm]	10	12	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.45	
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm – t_{fix}		
Drill method		[-]	Hammer drilling		
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =	[mm]	55	65	
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-	57	
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5	10.5	
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-	14.5	
Minimum spacing	$s_{1,min} = s_{2,min} \geq$	[mm]	-	75	250
Minimum edge distance	$c_{min} \geq$	[mm]	60	250	100

Table C 8.13.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**
Lightweight concrete solid brick, V 2 and Vbl 2, $f_b \geq 2$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.4	0.4
Lightweight concrete solid brick, V4 and Vbl 4, $f_b \geq 4$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.75	0.9
Lightweight concrete solid brick, V6 and Vbl 6, $f_b \geq 6{,}8$ N/mm² Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	1.2	1.5
Partial safety factor	γ_{Mm}[2]	[-]	2.5	

Footnotes see Annex C 3

SHARK PRO	**Annex C 19**
Performances Solid masonry: Lightweight concrete solid brick V and Vbl, 3DF Brick data, installation parameters, characteristic resistance	

Base material solid masonry: Autoclaved Aerated Concrete AAC

Table C 8.14.1: Brick data

Description of brick			**AAC**
Type of brick			Autoclaved Aerated Concrete
Bulk density	$\rho \geq$	[kg/dm³]	0.3
Standard, approval			EN 771-4:2011
Measurement		[mm]	≥ 499x175x249
Minimum thickness of member	h_{min} =	[mm]	175

Table C 8.14.2: Installation parameters

Anchor size SHARK PRO			**10**	**12**
Drill hole diameter	d_0 =	[mm]	10	12
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm – t_{fix}	
Drill method		[-]	Hammer drilling	
Overall plastic anchor embedment depth pre-positioned installation	h_{nom} =	[mm]	55	65
Overall plastic anchor embedment depth in-place installation	h_{nom} =	[mm]	-	57
Diameter of clearance hole in the fixture pre-positioned installation	$d_f \leq$	[mm]	8.5	10.5
Diameter of clearance hole in the fixture in-place installation	$d_f \leq$	[mm]	-	14.5

Table C 8.14.3: Characteristic resistance F_{Rk}[1)] in [kN] for single anchor

Anchor size SHARK PRO			**10**	**12**
Autoclaved Aerated Concrete AAC $f_b \geq 4$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	1.2	1.2
Autoclaved Aerated Concrete AAC $f_b \geq 5$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	1.5	1.5
Autoclaved Aerated Concrete AAC $f_b \geq 6$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	2.0	2.0
Autoclaved Aerated Concrete AAC $f_b \geq 7$ N/mm² Characteristic resistance F_{Rk}	24°C[3)] / 40°C[4)]	[kN]	2.0	2.0
Partial safety factor	γ_{MAAC}[2)]	[-]	2.0	

Footnotes see Annex C 3

SHARK PRO	**Annex C 20**
Performances Solid masonry: Autoclaved aerated concrete Brick data, installation parameters, characteristic resistance	

Base material precast prestressed hollow core elements

Table C 8.15.1: Brick data

Description		**Precast prestressed hollow core elements**
Base material		Precast prestressed hollow core elements ≥ C30/37
Standard, approval		DIN EN 1168: 2011-12

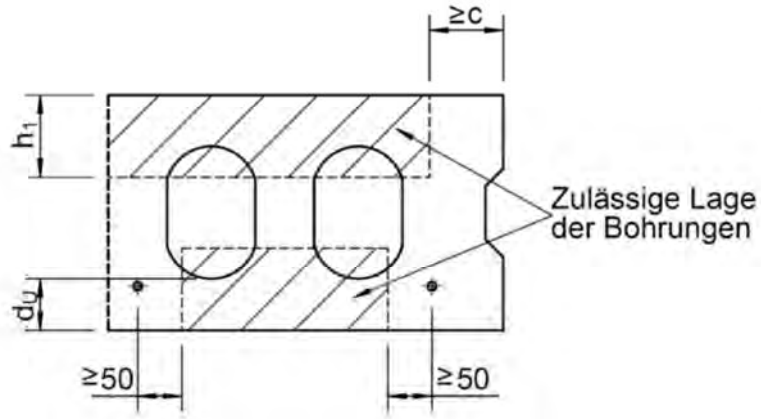

Table C 8.15.2: Installation parameters

Anchor size SHARK PRO			**10**
Member thickness	$d_u \geq$	[mm]	**25**
Drill hole diameter	d_0	[mm]	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	l_s + 5 mm - t_{fix}
Drill method		[-]	Hammer drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	55
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8.5
edge distance	c ≥	[mm]	80

Table C 8.15.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

Anchor size SHARK PRO			**10**
Member thickness	$d_u \geq$	[mm]	**25**
Precast prestressed hollow core elements ≥ C30/37, Characteristic resistance F_{Rk}	24°C[3] / 40°C[4]	[kN]	0.75
Partial safety factor	γ_{Mm} [2]	[-]	1.8

Footnotes see Annex C 3

SHARK PRO	**Annex C 21**
Performances Precast prestressed hollow core elements Brick data, installation parameters, characteristic resistance	