Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-19/0182 of 20 January 2020

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 HAMMER
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	Plant 2
This European Technical Assessment contains	16 pages including 11 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, version March 2012, used as EAD according to Article 66 Paragraph 3 Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The nailed-in anchor SHARK HAMMER is a plastic anchor consisting of a plastic sleeve made of polyamide and an accompanying specific nail of galvanised steel.

The plastic sleeve is expanded by hammering the specific nail 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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A 1

3.2 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annexes C 1 – C 4
Characteristic resistance for bending moments	See Annex C 1
Displacements under shear and tension loads	See Annex C 1
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.

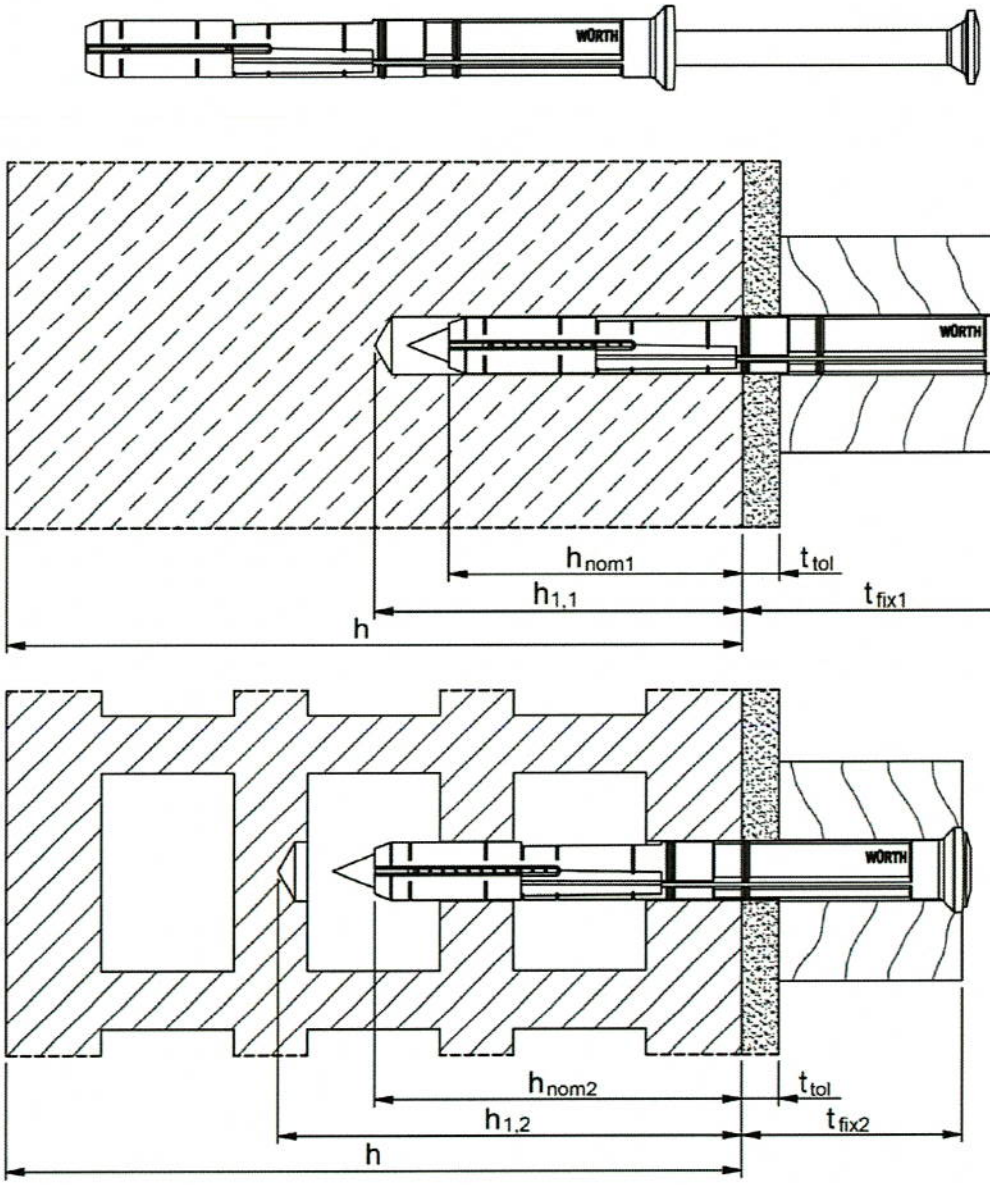
Issued in Berlin on 20 January 2020 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Aksünger

Deutsches Institut für Bautechnik DIBt

Plastic anchor SHARK HAMMER



Legend:

h_{nom1}:	Overall plastic anchor embedment depth in the base material concrete
h_{nom2}:	Overall plastic anchor embedment depth in the base material masonry
$h_{1,1}$:	Depth of drilled hole to deepest point in the base material concrete
$h_{1,2}$:	Depth of drilled hole to deepest point in the base material masonry
h:	Thickness of member
t_{fix1}, t_{fix2}:	Thickness of fixture and non-load bearing layer
t_{tol}:	Thickness of non-load bearing layer

SHARK HAMMER	Annex A 1
Product description Product and installed condition	

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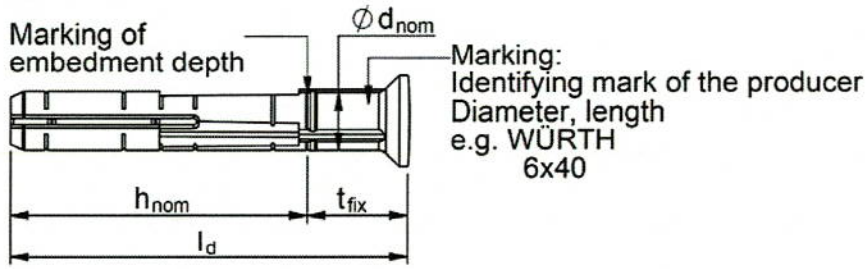
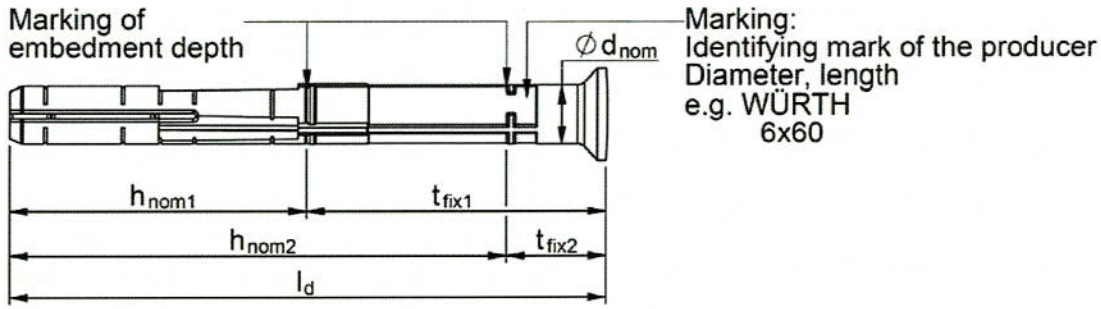
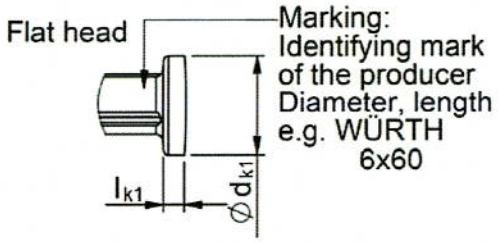
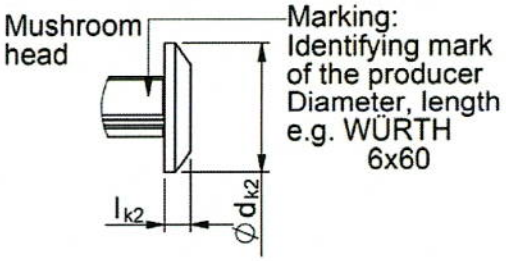
Plastic sleeve

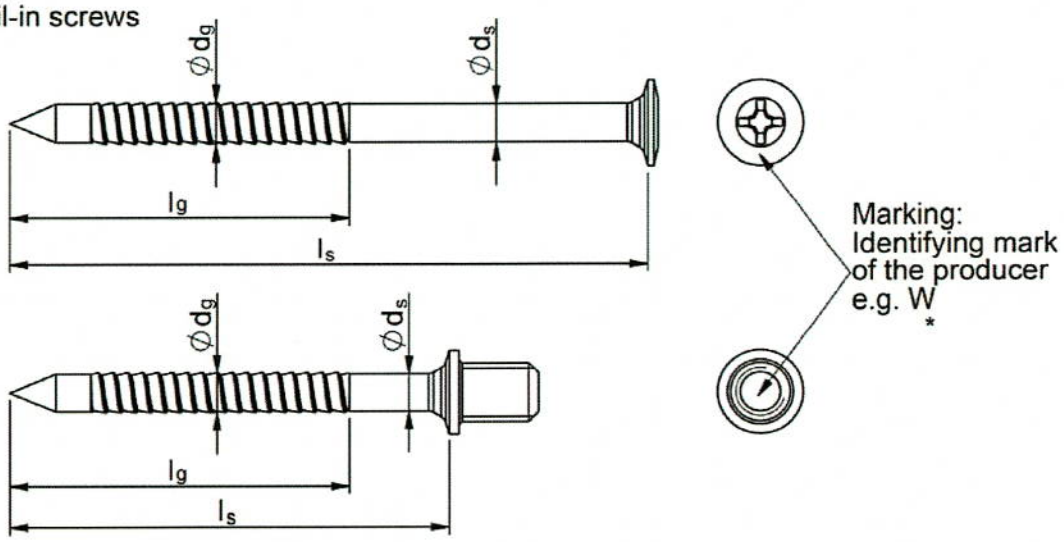








Nail-in screws



SHARK HAMMER	Annex A 2
Product description Plastic sleeve and nail-in screws	

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Table A 1.1: Anchor dimensions

Anchor type			**SHARK HAMMER**		
			6	**8**	
Overall plastic anchor embedment depth[1)]	$h_{nom} \geq$	[mm]	30	40	50
Plastic sleeve					
Plastic sleeve diameter	$\varnothing\ d_{nom} =$	[mm]	6	8	
Length of plastic sleeve	$l_d \geq$	[mm]	40	45	60
Flat collar diameter	$\varnothing\ d_{k1} =$	[mm]	10	12,8	
	$\varnothing\ d_{k2} =$	[mm]	13	17	
Thickness of flat collar	$l_{k1} =$	[mm]	2,1	2,5	
	$l_{k2} =$	[mm]	2,6	3,0	
Nail-in screw					
Diameter thread	$\varnothing\ d_g =$	[mm]	4,1	5,1	
Diameter shank	$\varnothing\ d_s =$	[mm]	3,85	4,75	
Length of screw	$l_s =$	[mm]	$t_{fix} + 33$	$t_{fix} + 45$	$t_{fix} + 55$
Length of thread	$l_g =$	[mm]	33	44	

[1)] See Annex A1, A2

Table A 2.1: Materials

Designation	**Material**
Plastic sleeve	Polyamide, colour anthrazit
Nail-in screw	Carbon steel according to EN ISO 4042:2018, galvanised

SHARK HAMMER	Annex A 3
Product description Anchor dimensions, 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/A1:2004/A2:2005, Annex C1, C 2.
- Solid brick masonry (use category b), according to Annex C 3.
  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 2, C 4.
- Mortar strength class of the masonry ≥ M2,5 at minimum according to EN 998-2:2010.
- For other base materials of the base material groups a, b and c the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B, Version March 2012.

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

Use conditions (Environmental conditions):
- Structures subject to dry internal conditions (zinc coated steel).
- The specific screw made of galvanised 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).

Design:
- The anchorages are designed in accordance with ETAG 020, Annex C, Version 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, Version March 2012.

Installation:
- Hole drilling by the drill modes according to Annex C 2 – C 4.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation temperature: ≥ 0 °C.
- Temperature anchor sleeve: ≥ 0 °C.
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks.

SHARK HAMMER	Annex B 1
Intended use Specifications	

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Table B 1.1: 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**
Solid masonry (use category "b")					
Sand-lime solid brick KS acc. to DIN V 106:2005-10 EN 771-2:2011	≥ NF	≥ 240x115x71	10 12 15 20	≥ 2,0	**Annex C 3** 771-2-011

Table B 2.1: 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	≥ 12DF	≥ 498x175x249	8 10 12 15	≥ 1,2	**Annex C 2** 771-1-124
Sand-lime perforated brick KS L acc. to DIN V 106:2005-10 EN 771-2:2011	≥ 2DF	≥ 240x115x113	8 12 16 20 24	≥ 1,4	**Annex C 4** 771-2-012

SHARK HAMMER

Intended use
Concrete, solid masonry and hollow or perforated masonry - format, minimum compressive strength, bulk density class

Annex B 2

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Table B 3.1: Installation parameters in concrete

Anchor type			SHARK HAMMER 6	SHARK HAMMER 8
Drill hole diameter	d_0 =	[mm]	6	8
Overall plastic anchor embedment depth in the base material [1)]	$h_{nom} \geq$	[mm]	30	40
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4	8,45
Depth of drilled hole to deepest point [1)]	$h_1 \geq$	[mm]	40	50
Drill method		[-]	Hammer drilling	
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	6,5	8,5

1) See Annex A1, A2

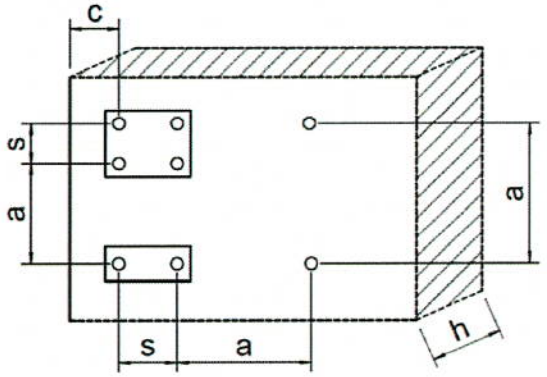
Table B 4.1: Minimum thickness of member, edge distance and spacing in concrete

SHARK HAMMER 6: Fixing points with a spacing $a \leq 90$ mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1. For $a > 90$ mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1.

SHARK HAMMER 8: Fixing points with a spacing $a \leq 120$ mm are considered as a group with a max. characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1. For $a > 120$ mm, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ acc. to Table C 1.1.

		h_{nom} [mm]	h_{min} [mm]	$c_{cr,N}$ [mm]	c_{min} [mm]	s_{min} [mm]
SHARK HAMMER 6	Concrete ≥ C16/20	30	80	60	60	90
	Concrete C12/15	30	80	84	84	126
SHARK HAMMER 8	Concrete ≥ C16/20	40	80	60	60	120
	Concrete C12/15	40	80	84	84	168

Concrete



SHARK HAMMER

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

Annex B 3

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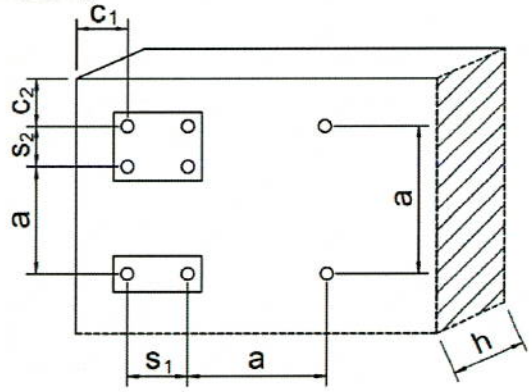
Table B 5.1: Minimum thickness of member, edge distance and anchor spacing in masonry

			masonry
SHARK HAMMER			**8**
Minimum thickness of member	h_{min}	[mm]	115 / 175[1)]
Single anchor			
Minimum spacing	a_{min}	[mm]	max.(250; s_{1min}; s_{2min})
Minimum edge distance	c_{min}	[mm]	100
Anchor group			
Spacing perpendicular to free edge	s_{1min}	[mm]	200
Spacing parallel to free edge	s_{2min}	[mm]	400
Minimum edge distance	c_{1min}	[mm]	100
Minimum edge distance	c_{2min}	[mm]	100

1) h_{min} depends on the brick size (see the following annexes C 2 - C 4)

Masonry



SHARK HAMMER

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

Annex B 4

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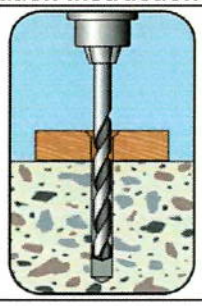
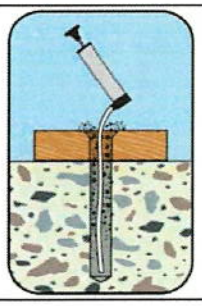
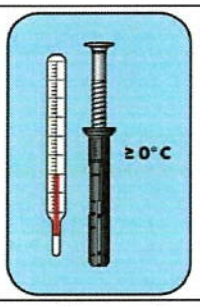
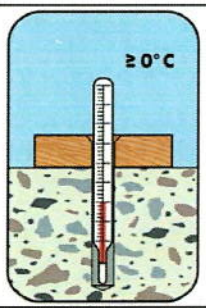
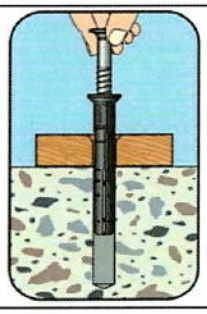
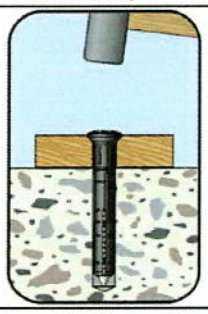
Installation instructions

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

SHARK HAMMER	Annex B 5
Intended use Installation instructions	

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

Anchor type				**SHARK HAMMER**	
Failure of expansion element (special nail-in screw)				**6**	**8**
Overall plastic anchor embedment depth		h_{nom}	[mm]	**30**	**40**
Characteristic tension resistance		$N_{Rk,s}$	[kN]	6,52	9,92
Partial safety factor		γ_{Ms} [1)]	[-]	1,60	1,60
Characteristic shear resistance		$V_{Rk,s}$	[kN]	3,26	4,96
Partial safety factor		γ_{Ms} [1)]	[-]	1,33	1,33
Characteristic bending resistance		$M_{Rk,s}$	[Nm]	3,79	7,12
Partial safety factor		γ_{Ms} [1)]	[-]	1,33	1,33
Pull-out failure (plastic sleeve)					
Concrete ≥ C16/20					
Characteristic resistance	24°C [2)] / 40°C [3)]	$N_{Rk,p}$	[kN]	0,5	0,5
Partial safety factor		γ_{Mc} [1)]	[-]	1,8	1,8
Concrete = C12/15					
Characteristic resistance	24°C [2)] / 40°C [3)]	$N_{Rk,p}$	[kN]	0,3	0,3
Partial safety factor		γ_{Mc} [1)]	[-]	1,8	1,8

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

Table C 2.1: Displacements[1)] under tension and shear loading in concrete and masonry

SHARK HAMMER 6 **SHARK HAMMER 8**		Tension load			Shear load		
	h_{nom} [mm]	N [2)] [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [2)] [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
Concrete ≥ C12/15	≥ 30 [3)]/40 [4)]	0,18	0,20	0,40	0,18	0,66	0,99
SHARK HAMMER 8							
Hollow brick HLz	≥ 50	0,06	0,02	0,04	0,06	0,41	0,62
Sand-lime solid brick KS	≥ 50	0,19	0,11	0,22	0,19	0,41	0,62
Sand-lime perforated brick KSL	≥ 50	0,16	0,32	0,64	0,16	0,41	0,62

1) Valid for all ranges of temperatures
2) Intermediate values by linear interpolation
3) SHARK HAMMER 6
4) SHARK HAMMER 8

SHARK HAMMER

Performances
Characteristic resistance of the nail-in screw for use in concrete
Displacements under tension and shear loading in concrete and masonry

Annex C 1

Deutsches Institut für Bautechnik DIBt

Base material hollow masonry: Hollow brick HLz, 12DF

Table C 3.1.1: Brick data

Description of brick	771-1-124		**HLz**
Type of brick			Hollow brick
Bulk density	$\rho \geq$	[kg/dm³]	0,9
Standard			DIN 105-100: 2012-01; EN 771-1:2011
Producer of brick			e.g. Wienerberger GmbH
Format (measurement)		[mm]	≥ 12DF (≥ 498x175x249)
Minimum thickness of member	h_{min} =	[mm]	175

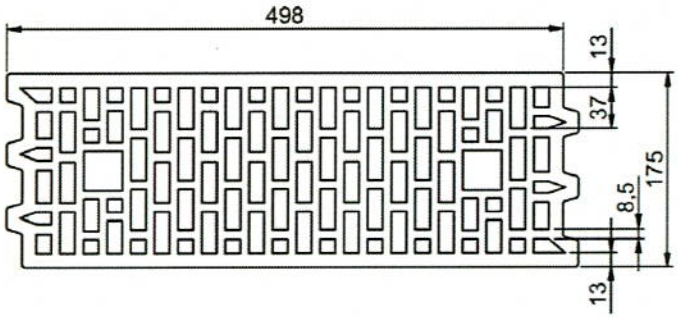

Table C 3.1.2: Installation parameters

Anchor size SHARK HAMMER			**8**
Drill hole diameter	d_0 =	[mm]	8
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	60
Drill method		[-]	Rotary drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	50
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8,5
Minimum edge distance	$c_{min} \geq$	[mm]	100

Table C 3.1.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

SHARK HAMMER 8			**F_{Rk} [kN]**
Hollow brick HLz, $f_b \geq 8$ N/mm²	24°C [3] / 40°C [4]	[kN]	0,1
Hollow brick HLz, $f_b \geq 10$ N/mm²	24°C [3] / 40°C [4]	[kN]	0,15
Hollow brick HLz, $f_b \geq 12$ N/mm²	24°C [3] / 40°C [4]	[kN]	0,15
Hollow brick HLz, $f_b \geq 15$ N/mm²	24°C [3] / 40°C [4]	[kN]	0,2
Partial safety factor	γ_{Mm} [2]	[-]	2,5

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 5.1. The specific conditions for the design method have to be considered according to ETAG 020 Annex C.

2) In absence of other national regulations

3) Maximum long term temperature

4) Maximum short term temperature

SHARK HAMMER	Annex C 2
Performances Hollow masonry: Hollow brick HLz, 12DF Brick data, installation parameters, characteristic resistance	

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Base material solid masonry: Sand-lime solid brick KS, NF

Table C 3.2.1: 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			DIN V 106:2005-10; EN 771-2:2011
Producer of brick			-
Format (measurement)		[mm]	≥ NF (≥ 240x115x71)
Minimum thickness of member	h_{min} =	[mm]	115

Table C 3.2.2: Installation parameters

Anchor size SHARK HAMMER			**8**
Drill hole diameter	d_0 =	[mm]	8
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	60
Drill method		[-]	Hammer drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	50
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8,5
Minimum edge distance	$c_{min} \geq$	[mm]	100

Table C 3.2.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

SHARK HAMMER 8			**F_{Rk} [kN]**
Sand-lime solid brick KS, $f_b \geq 10$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,3
Sand-lime solid brick KS, $f_b \geq 12$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,4
Sand-lime solid brick KS, $f_b \geq 15$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,5
Sand-lime solid brick KS, $f_b \geq 20$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,6
Partial safety factor	γ_{Mm}[2]	[-]	2,5

Footnotes see Annex C 2

SHARK HAMMER	Annex C 3
Performances Solid masonry: Sand-lime solid brick KS, NF Brick data, installation parameters, characteristic resistance	

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

Table C 3.3.1: Brick data

Description of brick 771-2-012			**KS L**
Type of brick			Sand-lime perforated brick
Bulk density	$\rho \geq$	[kg/dm³]	1,4
Standard			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

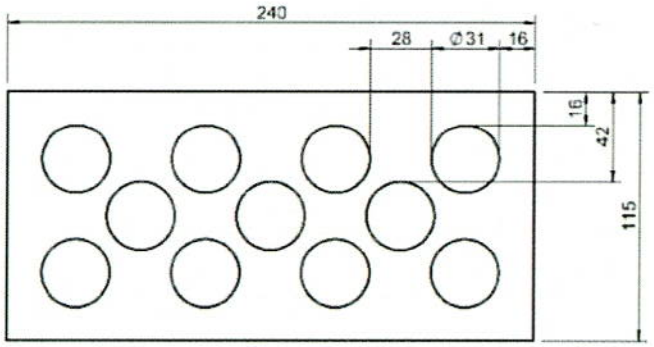

Table C 3.3.2: Installation parameters

Anchor size SHARK HAMMER			**8**
Drill hole diameter	d_0	[mm]	8
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45
Depth of drill hole to deepest point	$h_1 \geq$	[mm]	60
Drill method		[-]	Rotary drilling
Overall plastic anchor embedment depth	h_{nom} =	[mm]	50
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8,5
Minimum edge distance	$c_{min} \geq$	[mm]	100

Table C 3.3.3: Characteristic resistance F_{Rk} [1] in [kN] for single anchor

SHARK HAMMER 8			**F_{Rk} [kN]**
Sand-lime perforated brick KS L, $f_b \geq 8$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,2
Sand-lime perforated brick KS L, $f_b \geq 12$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,3
Sand-lime perforated brick KS L, $f_b \geq 16$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,4
Sand-lime perforated brick KS L, $f_b \geq 20$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,5
Sand-lime perforated brick KS L, $f_b \geq 24$ N/mm²	24°C[3] / 40°C[4]	[kN]	0,6
Partial safety factor	γ_{Mm}[2]	[-]	2,5

Footnotes see Annex C 2

SHARK HAMMER

Performances
Hollow masonry: Sand-lime perforated brick KS L, 2DF
Brick data, installation parameters, characteristic resistance

Annex C 4