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European Technical Assessment ETA 13/0063 of 28/06/2016

(English language translation, the original version in Czech language)

Technical Assessment Body issuing the ETA: Technical and Test Institute for Construction Prague	
Trade name of the construction product	PV 45-PRO
Product family to which the construction product belongs	Product area code: 33 Injection anchors for use in masonry
Manufacturer	DEWALT/ POWERS Richard-Klinger-Straße 11 65510 Idstein Germany
Manufacturing plant(s)	DEWALT Plant 1 Germany
This European Technical Assessment contains	17 pages including 13 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 029, edition 2013, used as European Assessment Document (EAD)
This version replaces	ETA 13/0063 issued on 25/06/2013

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

1. Technical description of the product

The PV 45-PRO polyester resin styrene-free for masonry is bonded anchor consisting of a cartridge with injection mortar, a steel element and a plastic sleeve. The steel elements are the commercial threaded rods with hexagon nut and washer. The steel elements are made of galvanized or zinc plated steel, stainless or high corrosion resistance steel.

The anchor is placed into a drilled hole filled with injection mortar. The steel element is anchored via the bond between metal part, injection mortar and masonry.

The illustration and the description of the product are given in Annex A.

2. Specification of the intended use in accordance with the applicable EAD

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 provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 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 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
Reduction factor for job site tests (β – factor)	See Annex C 1
Characteristic resistance for tension and shear loads	See Annex C 5 to C 35
Characteristic resistance for bending moments	See Annex C 2
Displacement under shear and tension loads	See Annex C 5 to C 34
Edge distances and spacing	See Annex C 4 to C 34

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Regulation (EU) No 305/2011), these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For basic requirement safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are taken into account.

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

According to the Decision 97/177/EC of the European Commission[1] the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Injection anchors for use in masonry	For fixing and/or supporting to masonry, structural elements (which contributes to the stability of the construction works) or heavy units	-	1

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

5.1 Tasks of the manufacturer

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technical and Test Institute for Construction Prague [2] The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of anchors in order to undertake the actions laid down in section 5.2. For this purpose, the control plan referred to in this section and section 5.2 shall be handed over by the manufacturer to the notified body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Assessment.

[1] Official Journal of the European Communities L 073 of 14.03.1997

[2] The control plan is a confidential part of the documentation of the European technical assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

5.2 Tasks of the notified bodies

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

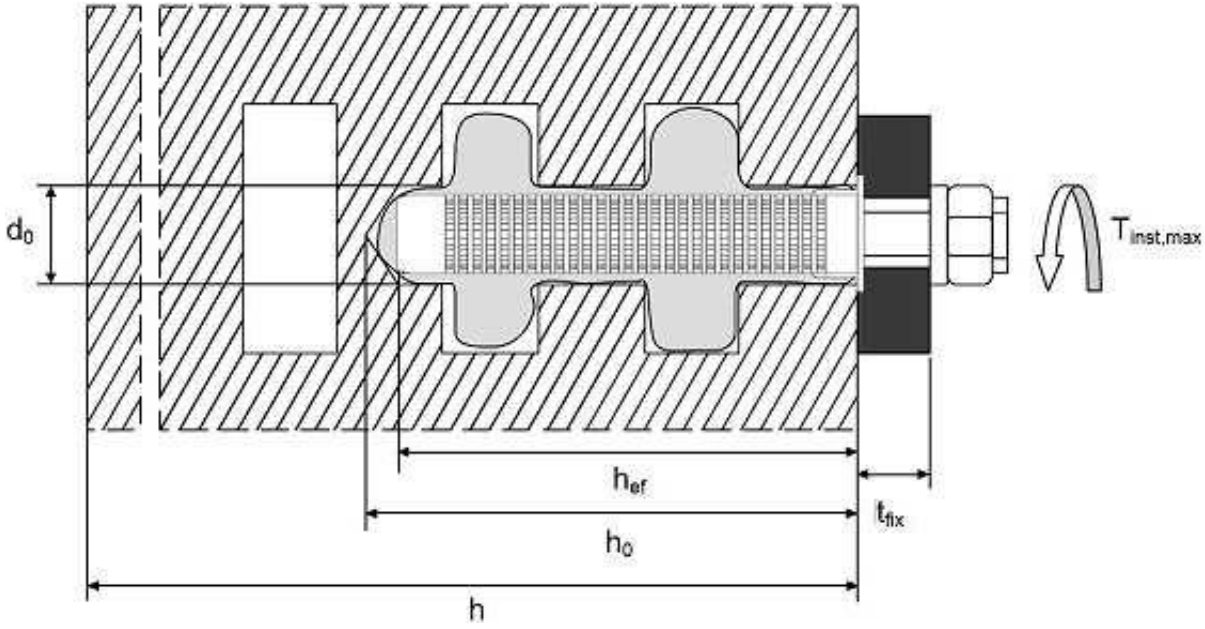
The notified certification body involved by the manufacturer shall issue a certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.
In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled the notified body shall withdraw the certificate of constancy of performance and inform Technical and Test Institute for Construction Prague without delay.

Issued in Prague on 28.06.2016

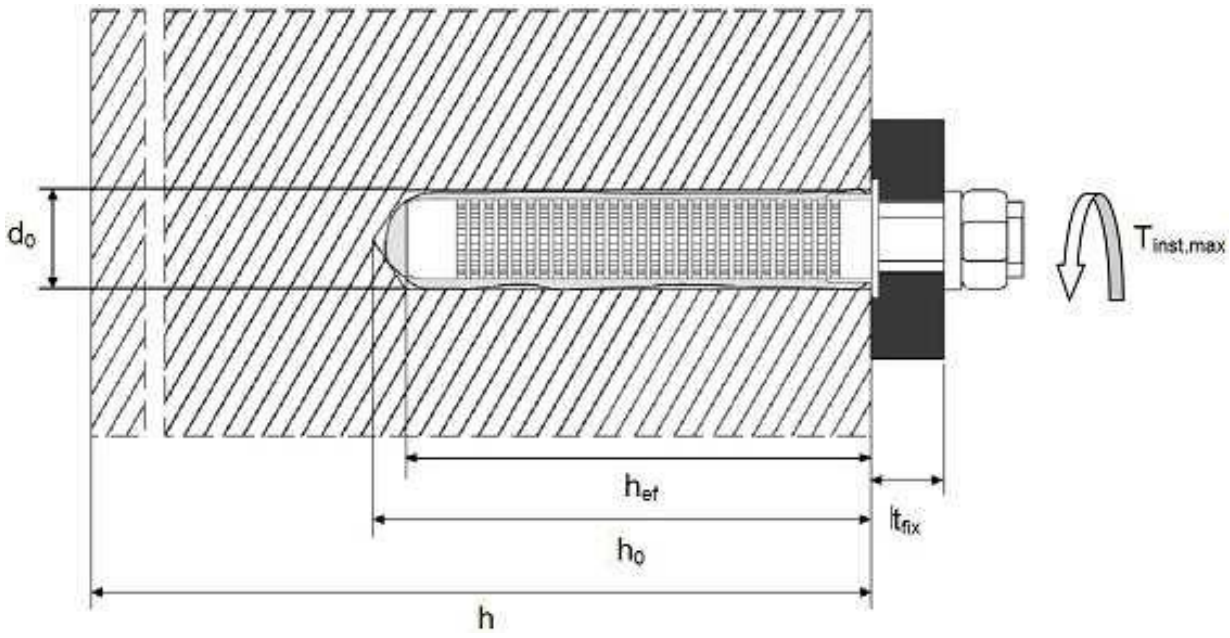
By

Ing. Mária Schaan
Head of the TAB

Installation in hollow brick; threaded rod with sleeve



Installation in solid brick; threaded rod with or without sleeve

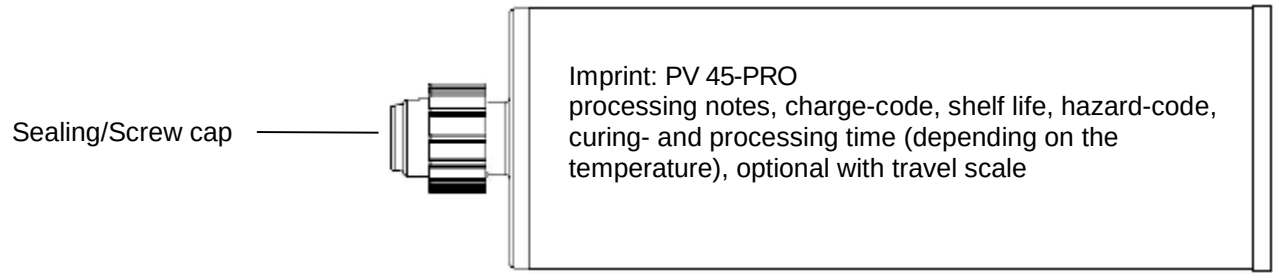


h_{ef}	= effective anchorage depth	d_0	= drill hole diameter
h_0	= drill hole depth	$T_{inst,max}$	= max installation torque moment
t_{fix}	= thickness of fixture	h	= thickness of member

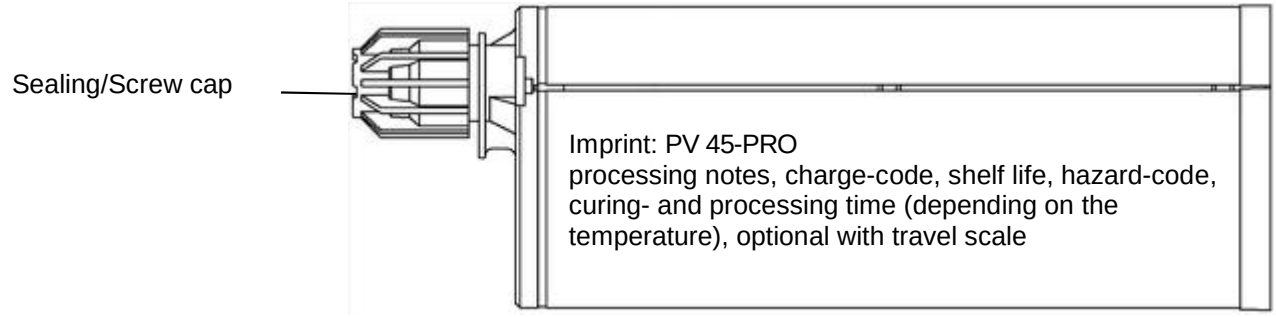
Injection system for masonry **PV 45-PRO**	**Annex A 1**
Product description Installed condition	

Cartridge: PV 45-PRO

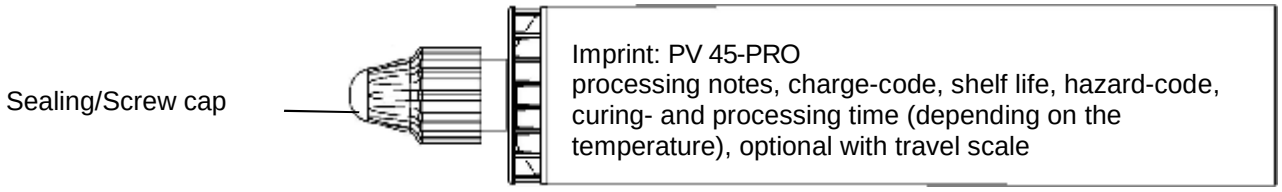
150 ml, 280 ml, 300 ml up to 333 ml, 380 ml up to 420 ml cartridge (Type: coaxial)



235 ml, 345 ml up to 360 ml, 825 ml cartridge (Type: "side-by-side")



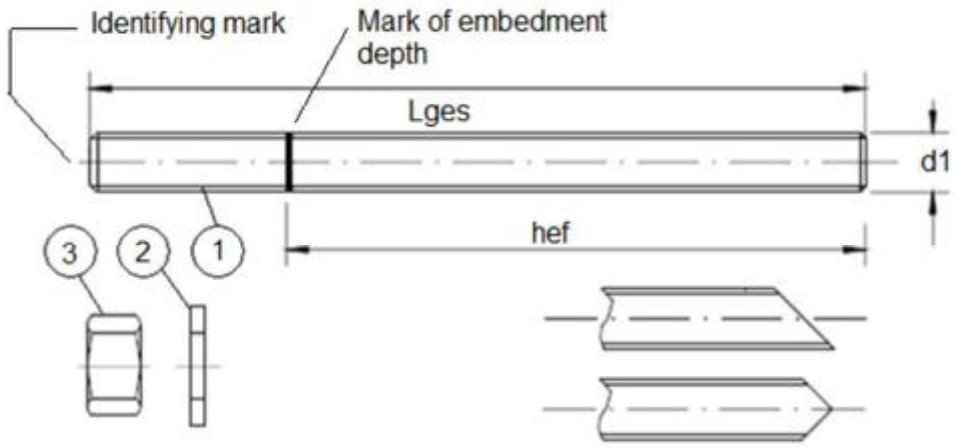
165 ml and 300 ml cartridge (Type: "foil tube")



Static mixer

Injection system for masonry **PV 45-PRO**	**Annex A 2**
Product description Injection system	

Threaded rod M8 / M10 / M12 / M16



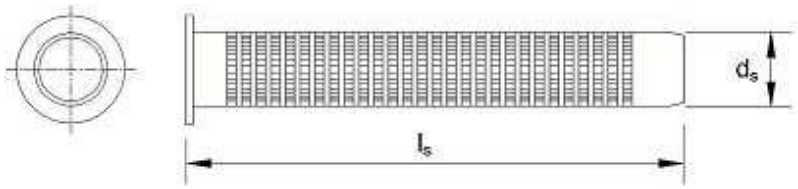
Commercial standard threaded rod with:
- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored.
- Marking of embedment depth

Part	Designation	Material
Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042:1999 or Steel, hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461:2009 and EN ISO 10684:2004+AC:2009		
1	Anchor rod	Steel, EN 10087:1998 or EN 10263:2001 Property class 4.6, 4.8, 5.8, 8.8, EN 1993-1-8:2005+AC:2009
2	Hexagon nut, EN ISO 4032:2012	Steel acc. to EN 10087:1998 or EN 10263:2001 Property class 4 (for class 4.6 or 4.8 rod) EN ISO 898-2:2012, Property class 5 (for class 5.8 rod) EN ISO 898-2:2012, Property class 8 (for class 8.8 rod) EN ISO 898-2:2012
3	Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000	Steel, zinc plated or hot-dip galvanised
Stainless steel		
1	Anchor rod	Material: A4-70, A4-80, EN ISO 3506-1:2009
2	Hexagon nut, EN ISO 4032:2012	Material: A4-70, A4-80, EN ISO 3506-1:2009
3	Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000	Material: A4-70, A4-80, EN ISO 3506-1:2009

Injection system for masonry **PV 45-PRO**	**Annex A 3**
Product description Threaded rod Materials	

Sleeve (Plastic)

SH 12x80, SH 16x85, SH 16x130 and SH 20x85



SH 16x130/200

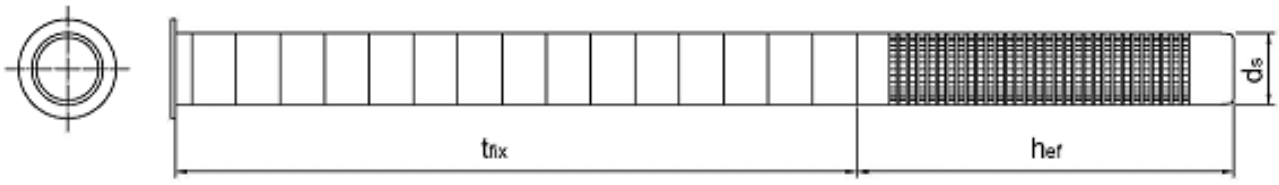


Table A2: Sizes threaded rod and sleeve (mm)

Threaded rods					Sleeves		
Size	d_1	h_{ef}	L_{min}	L_{max}	Size	d_s	l_s
[mm]						[mm]	[mm]
M8	8	80	100	500	SH12x80	12	80
M10	10	90	110	500	SH16x85	16	85
					SH16x130	16	130
					SH16x130/200	16	330
M12	12	100	110	500	SH20x85	20	85
M16	16	100	110	500	SH20x85	20	85

Injection system for masonry **PV 45-PRO**	**Annex A 4**
Product description Materials	

Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads

Base materials
- Solid brick masonry (Use category b), according to Annex B2.
- Hollow brick masonry (Use category c), according to Annex B2.
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to ETAG 029, Annex B under consideration of the β-factor to Annex C2, Table C4.

Note: The characteristic resistances are also valid for larger brick sizes and larger compressive strength of the masonry unit.

Temperature range:
- T_a: -40°C to +40°C (max. short. term temperature +40°C and max. long term temperature +24°C)

Use conditions (Environmental conditions)
- Dry and wet structures (regarding injection mortar).
- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel).
- 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).

Use categories in respect of installation and use:
- Category d/d: Installation and use in dry masonry
- Category w/w: Installation and use in wet masonry

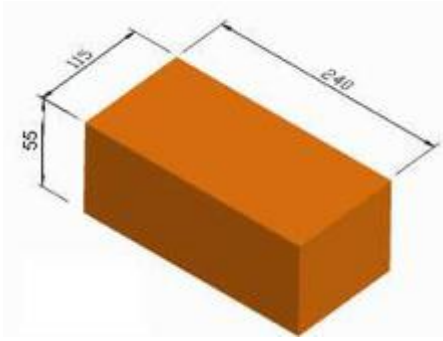
Design:
- Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.
- The anchorage are designed in accordance with the ETAG 029, Annex C, Design method A under the responsibility of an engineer experienced in anchorages and masonry work.

Installation:
- Dry or wet structures
- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Injection system for masonry **PV 45-PRO**	**Annex B 1**
Intended use Specifications	

Types of brick and dimensions (Dimensions in mm)

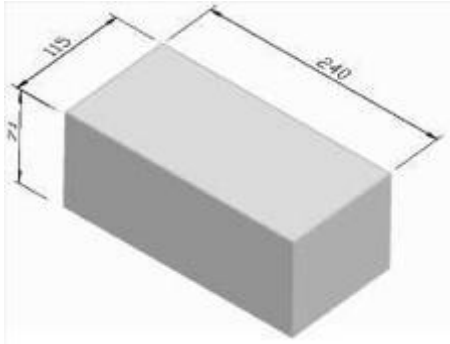
Brick No. 1



Clay masonry
MZ DF
acc. to EN 771-1
$\rho \geq 1{,}8$ [kg/dm³]
$f_b \geq 28$ [N/mm²]

Drilling method:
Hammer drilling

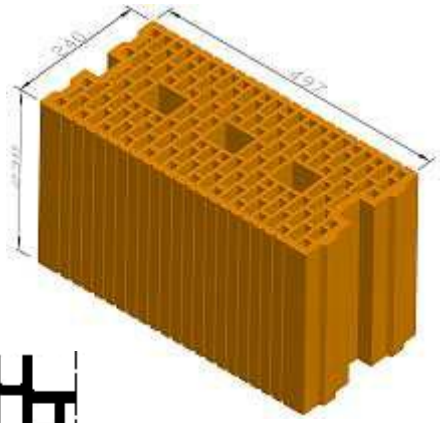
Brick No. 2



Calcium silicate masonry
KS 20 – 2,0 – NF
acc. to EN 771-1
$\rho \geq 2{,}0$ [kg/dm³]
$f_b \geq 20$ [N/mm²]

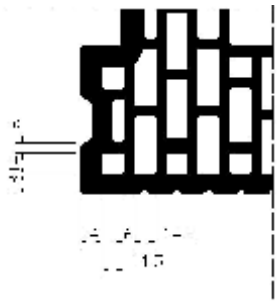
Drilling method:
Hammer drilling

Brick No. 3

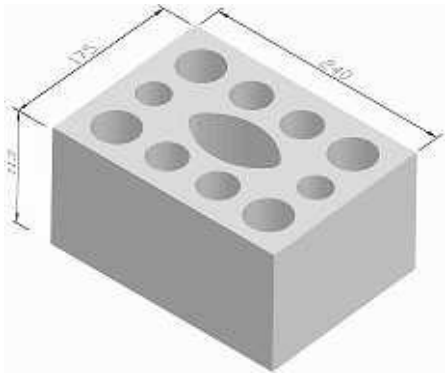


Clay masonry
16 DF
acc. to EN 771-1
$\rho \geq 0{,}9$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Drilling method:
Rotary drilling

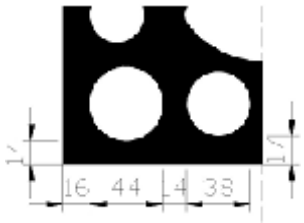


Brick No. 4

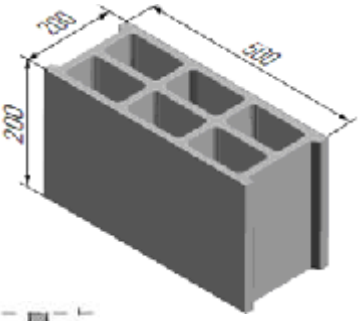


Calcium silicate masonry
KSL 12 -1,4- 3DF
acc. to EN 771-1
$\rho \geq 1{,}4$ [kg/dm³]
$f_b \geq 12$ [N/mm²]

Drilling method:
Rotary drilling

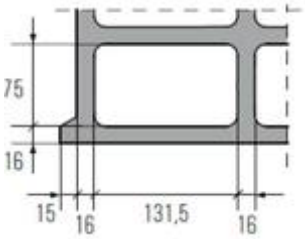


Brick No. 5



Hollow brick
Bloc creux B40
acc. to EN 771-3
$\rho \geq 1{,}0$ [kg/dm³]
$f_b \geq 4$ [N/mm²]

Drilling method:
Rotary drilling



Injection system for masonry **PV 45-PRO**	**Annex B 2**
Intended use Brick types and properties	

Installation: Steel brush

Table B2: Installation parameters in solid masonry (without sleeve)

Threaded rod			**M8**	**M10**	**M12**	**M16**
Nominal drill hole diameter	d_0	[mm]	10	12	14	18
Drill hole depth	h_0	[mm]	80	90	100	100
Effective anchorage depth	h_{ef}	[mm]	80	90	100	100
Minimum wall thickness	h_{min}	[mm]	h_{ef} + 30			
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18
Diameter of Steel brush	$d_b \geq$	[mm]	12	14	16	20
Max torque moment	$T_{inst,max}$	[Nm]	2			

Table B3: Installation parameters in solid and hollow masonry (with sleeve)

Threaded rod			**M8**	**M10**			**M12 / M16**	
Sleeve		[mm]	**SH12x80**	**SH16x85**	**SH16x130**	**SH16x130/ 330**	**SH20x85**	**SH20x85**
Nominal drill hole diameter	d_0	[mm]	12	16	16	16	20	20
Drill hole depth	h_0	[mm]	85	90	135	135 +t_{fix}[1)]	90	90
Effective anchorage depth	h_{ef}	[mm]	80	85	130	130	85	85
Minimum wall thickness	h_{min}	[mm]	115	115	195	195	115	115
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12			14	18
Diameter of brush	$d_b \geq$	[mm]	14	18			22	
Max torque moment	$T_{inst,max}$	[Nm]	2					

[1)] t_{fix} < 200 mm

Table B4: **Minimum curing time**

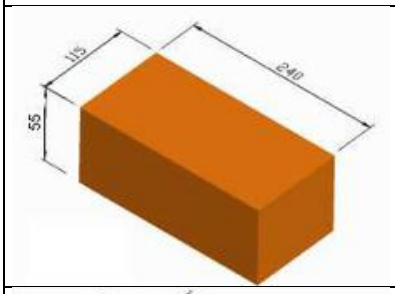
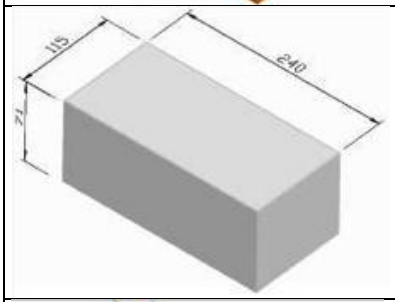
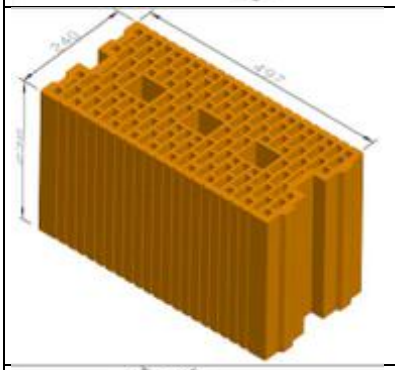
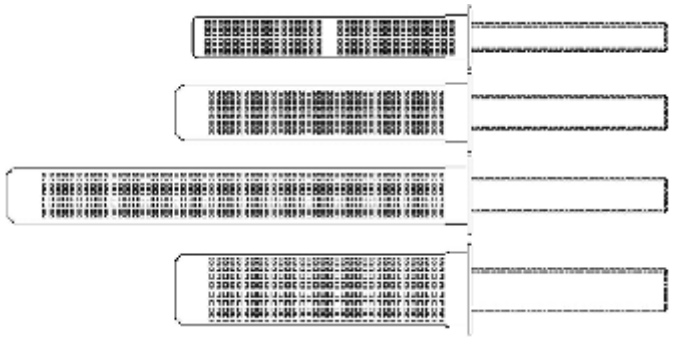
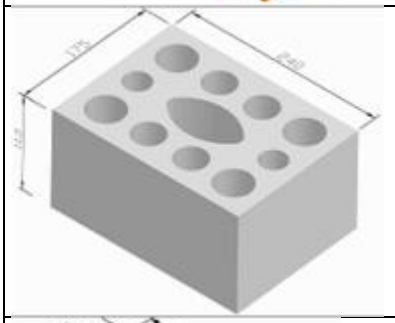
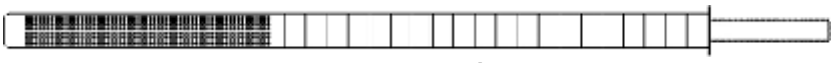
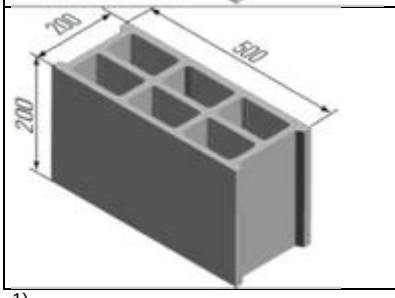
Temperature in the base material	Max. working time	Min. curing time
-5°C to -1°C	90 min	6 h
0°C to +4°C	45 min	3 h
+5°C to +9°C	25 min	2 h
+10°C to +14°C	20 min	100 min
+15°C to +19°C	15 min	80 min
+20°C to +29°C	6 min	45 min
+30°C to +34°C	4 min	25 min
+35°C to +39°C	2 min	20 min
Cartridge temperature	+5°C to +40°C	

Injection system for masonry
PV 45-PRO

Intended use
Installation parameters and cleaning brush
Working and curing time

Annex B 3

Table B4: Allocation of anchor rods[1)], sleeves[1)] and bricks

Bricks	Valid anchor rods and sleeves
No 1 	 **M8; M10; M12; M16**
No 2 	 **SH 12x80** **SH 16x85** **SH 16x130**
No 3 	 **SH 12x80** **SH 16x85** **SH 16x130** **SH 20x85**
No 4 	 **SH 16x130/200**
No 5 	

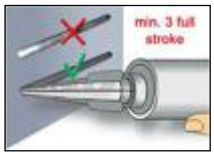
[1)] Other combinations can be used after job site test acc. to ETAG 029, Annex B
The β-factors for this job site test are given in Table C4

Injection system for masonry **PV 45-PRO**	**Annex B 4**
Intended use Allocation of anchor rods, sleeves and bricks	

Assembly instructions

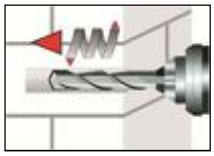
Preparation of cartridge

1. Remove the cap and attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. In case of a foil tube cartridge, cut off the clip before use. For every working interruption longer than the recommended working time (Table B4) as well as for new cartridges, a new static-mixer shall be used.

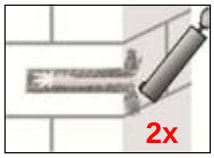


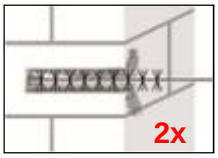
2. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes, for foil tube cartridges six full strokes, and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.

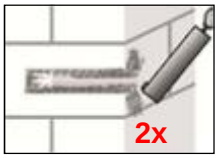
Installation in solid masonry (without sleeve)



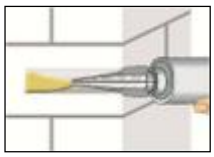
3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, with drill method according to Annex B 2, into the base material, with nominal drill hole diameter and bore hole depth acc. to the size and embedment depth required by the selected anchor. In case of aborted drill hole the drill hole shall be filled with mortar.



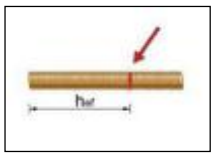


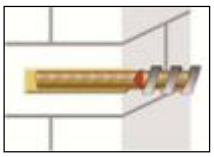


4. Blow out from the bottom of the drill hole two times. Attach the brush to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

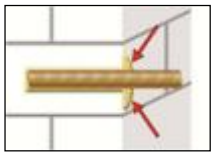


5. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets.
Observe the gel-/ working times given in Table B4.



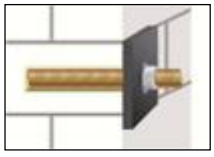


6. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



7. Be sure that the annular gap is fully filled with mortar. If no excess mortar is visible at the top of the hole, the application has to be renewed.

8. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B4).



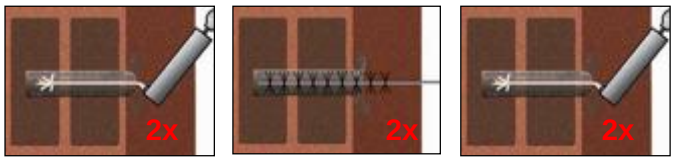
9. After full curing, the fixture can be installed with up to the max. torque (see parameters of brick Table B2) by using a calibrated torque wrench.

Injection system for masonry **PV 45-PRO**	**Annex B 7**
Intended use Assembly instructions Solid masonry without sleeve	

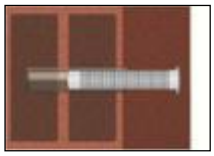
Assembly Instructions (continuation)

Installation in solid and hollow masonry (with sleeve)

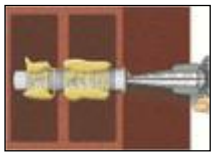
3. Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit. Drill a hole, with drill method according to Annex B 2, into the base material, with nominal drill hole diameter and drill hole depth acc. to the size and embedment depth required by the selected anchor. In case of aborted drill hole the drill hole shall be filled with mortar.



4. Blow from the bottom of the bore hole two times. Attach the brush to a drilling machine or a battery screwdriver, brush the hole clean two times, and finally blow out the hole again two times.

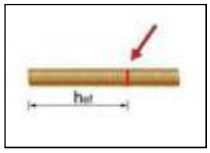


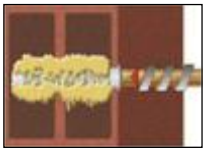
5. Insert the sleeve flush with the surface of the masonry. Only use sleeves that have the right length. Never cut the sleeve except the sleeve 16x130/330. For installing the sleeve 16x130/330 measure the required length of sleeve, cut the sleeve from the top and set the cap on it before pushing it through the fixing element.



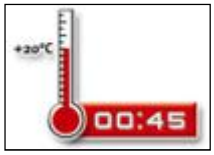
6. Starting from the bottom or back fill the sleeve with adhesive. For quantity of mortar attend cartridges label or installation instructions.

   Observe the gel-/ working times given in Table B4.

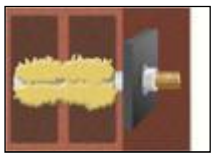




7. The position of the embedment depth shall be marked on the threaded rod. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.



8. Allow the adhesive to cure to the specified curing time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B4).



9. After full curing, the fixture can be installed with up to the max. torque (see parameters of brick Table B2) by using a calibrated torque wrench.

Injection system for masonry **PV 45-PRO**	**Annex B 8**
Intended use Assembly instructions Solid brick, Hollow brick and Solid lightweight Concrete with sleeve	

Table C1: Characteristic values for tension and shear load

Brick No.		Sleeve	Anchor size	Effective embedment depth h_{ef} [mm]	Characteristic resistance	
					N_{Rk}[1)] [kN]	V_{Rk} [2,3)] [kN]
1	Density ρ ≥ 1,8 [kg/dm³] Compressive strength f_b ≥ 28 [N/mm²]	without	M8	80	3,0	3,0
		without	M10	90	3,0	3,0
		without	M12	100	2,5	2,5
		without	M16	100	4,5	4,5
		SH 12x80	M8	80	3,5	3,5
		SH 16x85	M10	85	3,5	3,5
		SH 16x130	M10	130	5,0	4,0
		SH 16x130/200	M10	130	5,0	4,0
2	Density ρ ≥ 2,0 [kg/dm³] Compressive strength f_b ≥ 20 [N/mm²]	without	M8	80	6,0	4,0
		without	M10	90	6,0	3,5
		without	M12	100	7,0	5,0
		without	M16	100	6,0	5,0
		SH 12x80	M8	80	5,0	5,0
		SH 16x85	M10	85	5,0	4,0
		SH 16x130	M10	130	5,0	5,0
		SH 16x130/200	M10	130	5,0	5,0
3	Density ρ ≥ 0,9 [kg/dm³] Compressive strength f_b ≥ 12 [N/mm²]	SH 12x80	M8	80	1,5	1,5
		SH 16x85	M10	85	2,0	2,0
		SH 16x130	M10	130	3,0	2,5
		SH 16x130/200	M10	130	3,0	2,5
		SH 20x85	M12	85	3,5	2,5
		SH 20x85	M16	85	3,5	2,5
4	Density ρ ≥ 1,4 [kg/dm³] Compressive strength f_b ≥ 12 [N/mm²]	SH 12x80	M8	80	3,5	2,5
		SH 16x85	M10	85	3,0	2,5
		SH 16x130	M10	130	4,5	2,5
		SH 16x130/200	M10	130	4,5	2,5
		SH 20x85	M12	85	3,0	2,5
		SH 20x85	M16	85	3,0	2,5
5	Density ρ ≥ 1,0 [kg/dm³] Compressive strength f_b ≥ 4 [N/mm²]	SH 12x80	M8	80	0,4	0,4
		SH 16x85	M10	85	0,4	0,4
		SH 16x130	M10	130	2,0	2,0
		SH 16x130/200	M10	130	2,0	2,0
		SH 20x85	M12	85	0,9	0,9
		SH 20x85	M16	85	0,75	0,75
Partial safety factor γ_M					2,5[4)]	

1) For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,s}$; $N_{Rk,pb}$ according to ETAG 029, Annex C

2) For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,s}$

3) hollow masonry: $V_{Rk,c} = V_{Rk}$; solid masonry: $V_{Rk,c}$ according to ETAG 029, Annex C

4) In absence of national regulations

Table C2: β-factors for job side tests according to ETAG 029, Annex B

Brick-No.	Installation & use	β-factor
1	w/w (incl. w/d)	0,72
2		
3		
4		
5		

Injection system for masonry
PV 45-PRO

Performances
Characteristic tension load and shear load values
β-factors for job site testing under tension load

Annex C 1

Table C3: Characteristic values bending moments

			M8	M10	M12	M16
Characteristic bending moment, Steel, property class 4.8	$M_{Rk,s}$	[Nm]	15	30	52	133
Partial safety factor	$\gamma_{Ms,V}$ 1)		1,25			
Characteristic bending moment, Steel, property class 5.8	$M_{Rk,s}$	[Nm]	19	37	66	166
Partial safety factor	$\gamma_{Ms,V}$ 1)		1,25			
Characteristic bending moment, Steel, property class 8.8	$M_{Rk,s}$	[Nm]	30	60	105	266
Partial safety factor	$\gamma_{Ms,V}$ 1)		1,25			
Characteristic bending moment, Stainless steel A4, property class 70	$M_{Rk,s}$	[Nm]	26	52	92	233
Partial safety factor	$\gamma_{Ms,V}$ 1)		1,56			
Characteristic bending moment, Stainless steel A4, property class 80	$M_{Rk,s}$	[Nm]	30	60	105	266
Partial safety factor	$\gamma_{Ms,V}$ 1)		1,33			

1) If no other national regulations exist

Table C4: Displacement under shear and tension load

Brick No.	Sleeve	Anchor size	Tension			Shear		
			Load	Displacement		Load	Displacement	
			F	δ_{NO}	$\delta_{N\infty}$	F	δ_{VO}	$\delta_{V\infty}$
			[kN]	[mm]		[kN]	[mm]	
1	without	M8	$\frac{N_{Rk}}{1{,}4 \cdot \gamma_M}$	0,1	0,2	$\frac{V_{Rk}}{1{,}4 \cdot \gamma_M}$	0,4	0,6
	without	M10		0,1	0,2		0,7	1,1
	without	M12		0,2	0,4		0,4	0,7
	without	M16		0,2	0,3		0,5	0,7
	SH 12x80	M8		0,2	0,3		2,3	3,4
	SH 16x85	M10		0,2	0,3		0,5	0,7
	SH 16x130	M10		0,2	0,3		1,1	1,6
	SH 16x130/200	M10		0,2	0,3		1,1	1,6
2	without	M8		0,2	0,3		1,6	2,4
	without	M10		0,2	0,5		1,5	2,3
	without	M12		0,2	0,3		1,1	1,6
	without	M16		0,2	0,3		1,1	1,6
	SH 12x80	M8		0,2	0,3		3,1	4,6
	SH 16x85	M10		0,2	0,3		1,5	2,2
	SH 16x130	M10		0,2	0,3		1,2	1,8
	SH 16x130/200	M10		0,2	0,3		1,2	1,8
3	SH 12x80	M8		0,3	0,6		1,1	1,6
	SH 16x85	M10		0,6	1,1		1,6	2,4
	SH 16x130	M10		0,2	0,4		0,9	1,3
	SH 16x130/200	M10		0,2	0,4		0,9	1,3
	SH 20x85	M12		0,2	0,4		1,6	2,4
	SH 20x85	M16		0,1	0,2		1,7	2,6
4	SH 12x80	M8		0,6	1,2		0,9	1,3
	SH 16x85	M10		0,7	1,4		1,3	1,9
	SH 16x130	M10		1,7	3,4		2,0	3,0
	SH 16x130/200	M10		1,7	3,4		2,0	3,0
	SH 20x85	M12		1,5	2,9		1,3	2,0
	SH 20x85	M16		1,6	3,3		0,6	0,9
5	SH 12x80	M8		0,2	0,3		0,3	0,4
	SH 16x85	M10		0,2	0,4		0,1	0,1
	SH 16x130	M10		0,5	1,0		0,6	0,9
	SH 16x130/200	M10		0,5	1,0		0,6	0,9
	SH 20x85	M12		0,5	0,9		0,1	0,2
	SH 20x85	M16		0,3	0,5		0,2	0,3

Injection system for masonry
PV 45-PRO

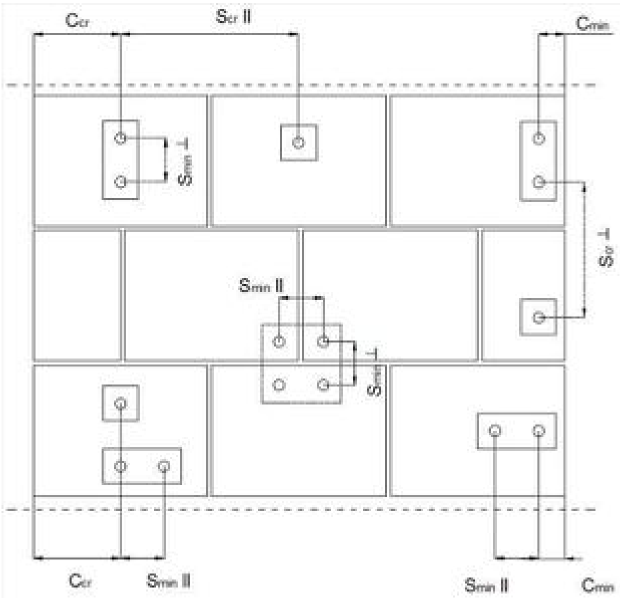
Performances
Characteristic values bending moments
Displacement under shear and tension load

Annex C 2

Table C5: Edge and axial distances

Without sleeve												
Anchor size	M8			M10			M12			M16		
Brick No.	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]
1	120	240	240	135	270	270	150	300	300	150	300	300
2	120	240	240	135	270	270	150	300	300	150	300	300

With sleeve												
Sleeve	SH 12x80			SH 16x85			SH 16x130 SH 16x130/200			SH 20x85		
Anchor size	M8			M10			M10			M12 and M16		
Brick No.	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]	c_{min} = c_{cr} [mm]	$s_{min,II}$ = $s_{cr,II}$ 1) [mm]	$s_{min,\perp}$ = $s_{cr,\perp}$ 2) [mm]
1	120	240	240	128	255	255	195	390	390	-	-	-
2	120	240	240	128	255	255	195	390	390	-	-	-
3	100	497	238	100	497	238	100	497	238	120	497	238
4	100	240	113	100	240	113	100	240	113	120	240	113
5	100	500	200	100	500	200	100	500	200	120	500	200



c_{cr} = Characteristic edge distance
$s_{cr\ II}$ = Characteristic spacing horizontal to the bed joint
$s_{cr\ \perp}$ = Characteristic spacing vertical to the bed joint
c_{min} = Minimum Edge distance
$s_{min\ II}$ = Minimum spacing horizontal to the bed joint
$s_{min\ \perp}$ = Minimum spacing vertical to the bed joint

Injection system for masonry PV 45-PRO	Annex C 3
Performances Edge distance and anchor spacing	