

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-16/0808
of 11 May 2017

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Trade name of the construction product

Product family
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment
contains

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

Deutsches Institut für Bautechnik

K-A-L-M Bonded anchor VMK-SF / masonry

Injection system for use in masonry

KALM
Befestigungssysteme GmbH
Marie-Curie-Straße 5
67661 Kaiserslautern
DEUTSCHLAND

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Befestigungssysteme GmbH
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18 pages including 3 annexes which form an integral part
of this assessment

Guideline for European technical approval of "Metal
Injection Anchors for Use in Masonry", ETAG 029,
April 2013,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

**European Technical Assessment
ETA-16/0808**

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English translation prepared by DIBt

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Specific part

1 Technical description of the product

The K-A-L-M bonded anchor VMK-SF consists of a mortar cartridge with KALM injection mortar VMK-SF, a perforated sleeve and an anchor rod with hexagon nut and washer. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

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

The description of the product 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 bonded 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 bonded anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for anchors in masonry units	See Annex C1
Displacements under shear and tension loads	See Annex C2
Edge distances and spacing	See Annex B6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of 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)

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

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 029, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [97/177/EC].

The system to be applied is: 1

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

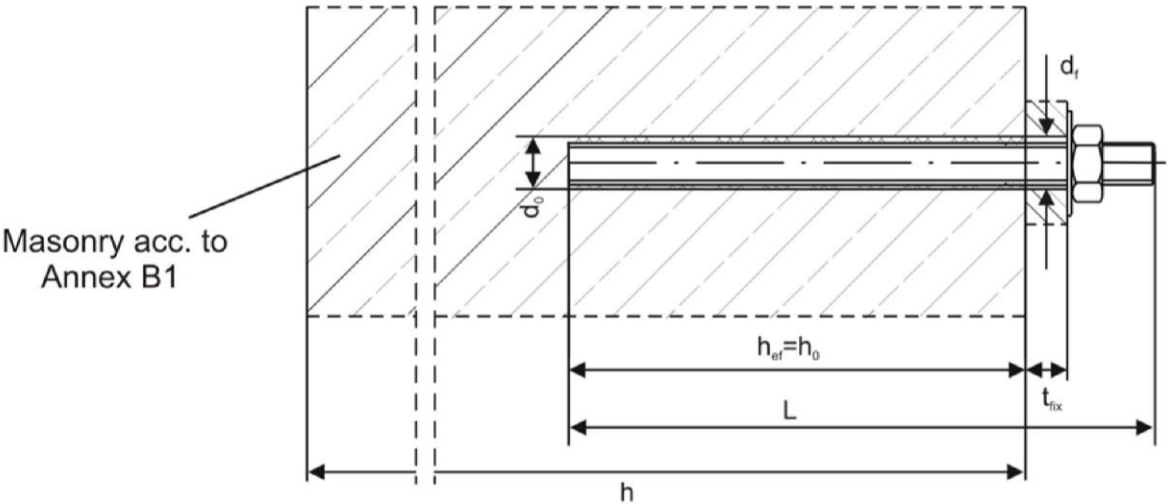
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 11 May 2017 by Deutsches Institut für Bautechnik

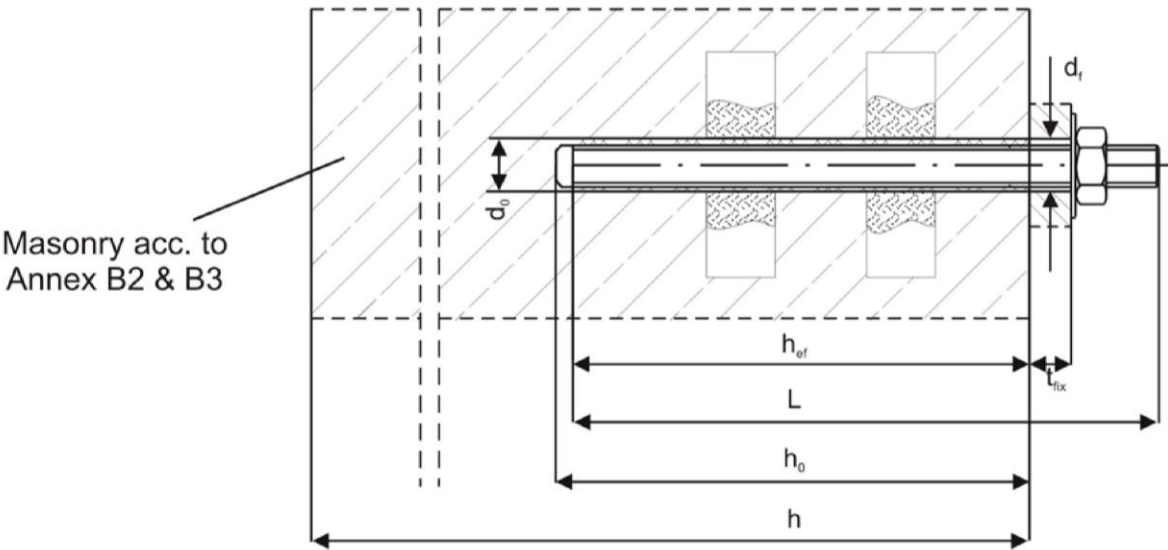
Andreas Kummerow
Head of Department

beglaubigt:
Wittstock

Installation Conditions



Installation conditions for hollow brick with sleeve

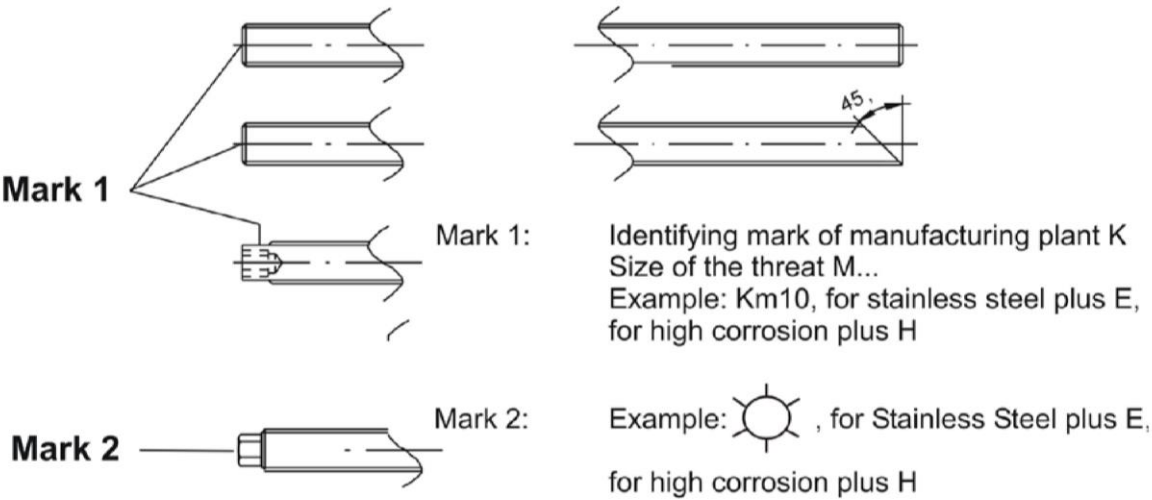
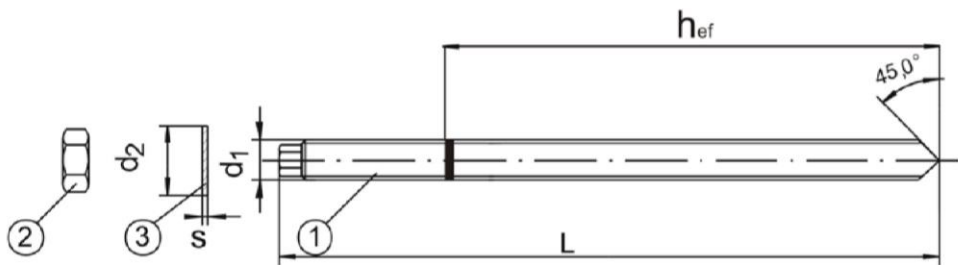


K-A-L-M bonded anchor VMK-SF / Masonry

Product Description
Installation Conditions

Annex A1

Anchor rod for VMK-SF in Masonry



Anchor size			M 8	M10	M12
Threaded rod	Ø d ₁	[mm]	M 8	M10	M12
	L ≥	[mm]	90	100	120
	h _{eff}	[mm]	80	90	110

K-A-L-M bonded anchor VMK-SF / Masonry		Annex A2
Product Description Threaded rod		

Materials

Part	Designation	Steel, zinc plated ≥ 5µm acc. to DIN EN ISO 4042:2001	Steel, hot-dipped galvanised ≥ 40 µm acc. to EN ISO 1461:2009
1	Threaded Rod	Steel acc. to EN 10087:1998 or EN 10263:2002, Property class 4.6, 5.8, 8.8, acc. to EN 1993-1-8:2010	Steel acc. to EN 10087:1998 or EN 10263:2002, Property class 4.6, 5.8, 8.8, acc. to EN 1993-1-8:2010
2	Hexagon nut acc. to EN ISO 4032:2013	Steel acc. to EN10087:1998 or EN 10263:2002 Property class 4,5,8 acc. to EN ISO 898-2:2013	Steel acc. to EN10087:1998 or EN 10263:2002 Property class 4,5,8 acc. to EN ISO 898-2:2013
3	Washer acc. to EN ISO 887:2006 EN ISO 7089:2000 EN ISO 7093:2000 EN ISO 7094:2000	Steel, galvanised	Steel, hot-dip galvanised

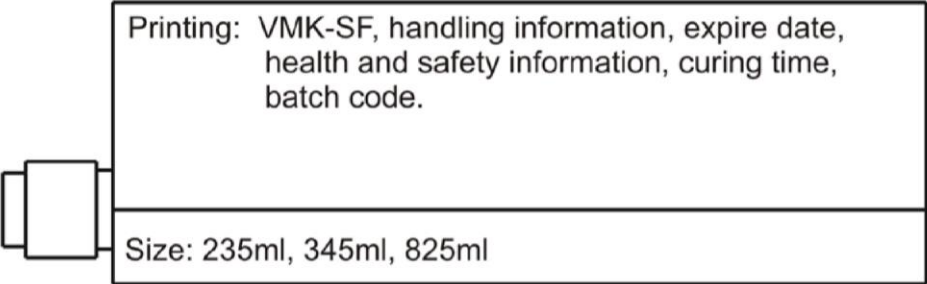
Part	Designation	Stainless Steel A4	High corrosion resistant Steel (HCR)
1	Threaded Rod	Stainless Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088-1:2014, Property class A4-70, A4-80, acc. to EN ISO 3506-1:2009	High corrosion resistant Steel 1.4529, 1.4565 acc. to EN 10088-1:2014, Property class A4-70, A4-80, acc. to EN ISO 3506-1:2009
2	Hexagon nut acc. to EN ISO 4032:2013	Stainless Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088-1:2014. Property class A4-70, A4-80, acc. to EN ISO 3506-2:2009	High corrosion resistant Steel 1.4529, 1.4565 acc. to EN 10088-1:2014, Property class A4-70, A4-80, acc. to EN ISO 3506-2:2009
3	Washer acc. to EN ISO 887:2006 EN ISO 7089:2000 EN ISO 7093:2000 EN ISO 7094:2000	Stainless Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088-1:2014	High corrosion resistant Steel 1.4529, 1.4565 acc. to EN 10088-1:2014

K-A-L-M bonded anchor VMK-SF / Masonry

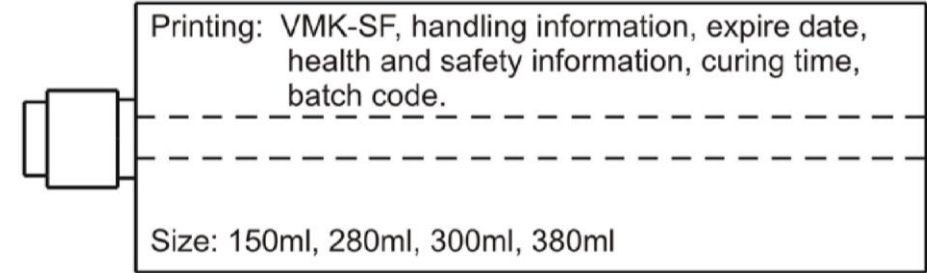
Product Description
Materials

Annex A3

Cartridges



1 Mortar Cartridge
Side by Side



2 Mortar Cartridge
Coaxial



3 Static Mixer

Sleeve



	Anchor Size	Diameter mm	Length mm	Material
SHK 15x85	M8, M10	15	85	Polyamide
SHK 20x85	M 12	20	85	Polyamide

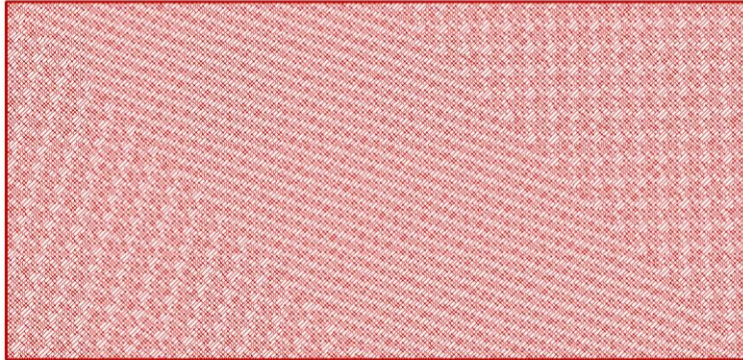
K-A-L-M bonded anchor VMK-SF / Masonry

Product Description
Cartridges / Sleeve

Annex A4

Base Material

1. Solid clay brick acc. to EN 771-1



Mz-NF

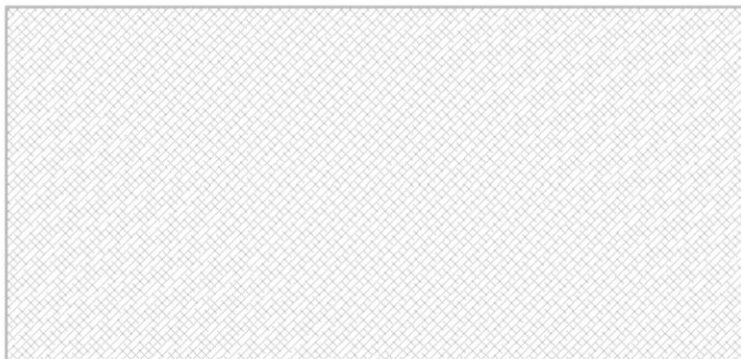
Compressive strength $f_b \geq 50 \text{ N/mm}^2$

Density $\geq 1830 \text{ kg/m}^3$

**Dimensions $\geq 240 \times 115 \times 71 \text{ mm}$
($l_{\text{unit}} \times b_{\text{unit}} \times h_{\text{unit}}$)**

Use with or without a sleeve (SHK) allowed.

2. Solid calcium silicate brick acc. to EN 771-2



KS-NF

Compressive strength $f_b \geq 28 \text{ N/mm}^2$

Density $\geq 1770 \text{ kg/m}^3$

**Dimensions $\geq 240 \times 115 \times 71 \text{ mm}$
($l_{\text{unit}} \times b_{\text{unit}} \times h_{\text{unit}}$)**

Use with or without a sleeve (SHK) allowed.

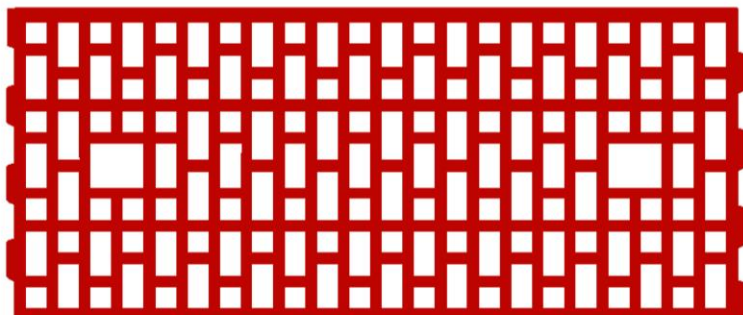
K-A-L-M bonded anchor VMK-SF / Masonry

Product Description

Base Material: Solid clay brick (MZ) / Solid Calcium silicate brick (KS)

Annex B1

3. Hollow clay brick acc. to EN 771-1

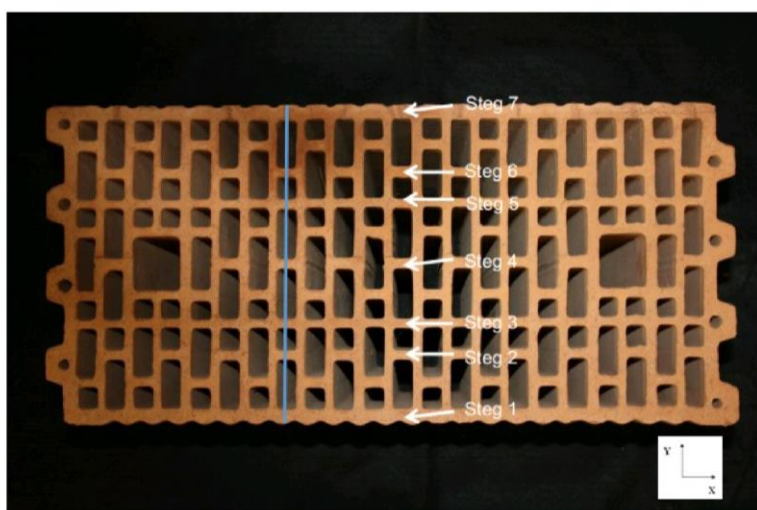


HLZ-12DF

Compressive strength $f_b = 20 \text{ N/mm}^2$

Density = 1660 kg/m^3

Dimensions = $490 \times 240 \times 238 \text{ mm}$
($l_{\text{unit}} \times b_{\text{unit}} \times h_{\text{unit}}$)



Rack in Y-Direction	
Rack Nr. (Steg)	Thickness / mm
7	12
6	8
5	7
4	8
3	7
2	8
1	11

Rack in X-Direction	
Inner Rack	4
Outer Rack	8

Hollow per row (22 rows per brick)

	Height/ mm (Y-Direction)	Width / mm (X-Direction)
Hollow between Rack 1 und 2	36	18
Hollow between Rack 2 und 3	18	18
Hollow between Rack 3 und 4	36	18
Hollow between Rack 4 und 5	36	18
Hollow between Rack 5 und 6	18	18
Hollow between Rack 6 und 7	36	18
Grip hole	36	36

Use only with Sleeve (SHK) allowed.

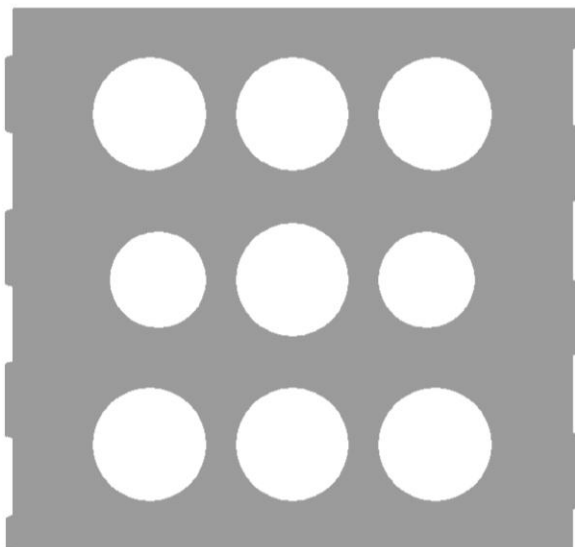
K-A-L-M bonded anchor VMK-SF / Masonry

Product Description

Base material: Hollow clay brick (HLZ)

Annex B2

4. Hollow calcium silicate brick acc. to EN 771-2



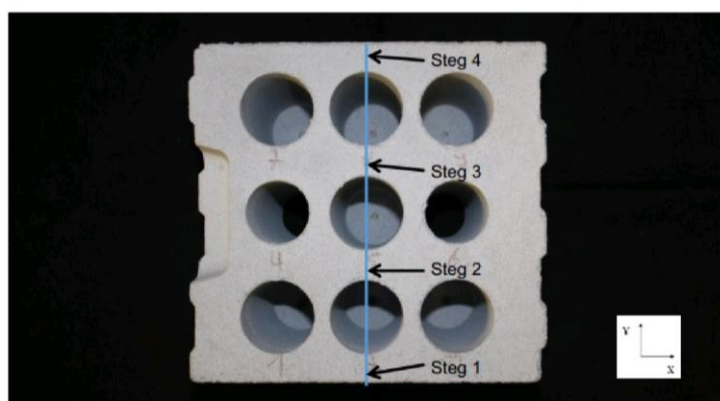
KSL-R(P)-8DF

Compressive strength $f_b = 12 \text{ N/mm}^2$

Density = 1870 kg/m^3

**Dimensions = $248 \times 240 \times 248 \text{ mm}$
($l_{\text{unit}} \times b_{\text{unit}} \times h_{\text{unit}}$)**

Use only with Sleeve (SHK) allowed.



	Diameter / mm
Hole 1	52
Hole 2	52
Hole 3	52
Hole 4	45
Hole 5	52
Hole 6	45
Hole 7	52
Hole 8	52
Hole 9	52
Grip Hole	40

Rack (Steg)	Thickness / mm	
	Y-Direction	X-Direction
Outer (1+4)	21	30
Inner (2+3)	22	10

K-A-L-M bonded anchor VMK-SF / Masonry

Product Description

Base Material: Hollow calcium silicate brick (KSL)

Annex B3

Specifications of intended use (part 1)

Anchorage subject to:

- Static and quasi-static loads: M8 to M12.

Base Materials:

- Solid clay brick acc. to 771-1 equivalent to Annex B1
- Hollow clay brick acc. to EN 771-1 equivalent to Annex B2
- Solid calcium silicate brick acc. to EN 771-2 equivalent to Annex B1
- Hollow calcium silicate brick EN 771-2 equivalent to Annex B3
- Minimum masonry mortar of mortar class M2,5 acc. to EN 998-2:2016

Temperature Range:

- I: -40°C to +40°C
(max. long term temperature +24 °C und max. short term temperature +40 °C)
- II: -40°C to +80°C
(max. long term temperature +50 °C and max. short term temperature +80 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
(zinc coated steel, stainless steel or high corrosion resistant steel).

Use category

- Category d/d: Installation and Use in dry Masonry.

K-A-L-M bonded anchor VMK-SF / Masonry

Intended Use
Specification (Part 1)

Annex B4

Specifications of intended use (part 2)

Design:

- Anchorages have to be designed under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. Position of the anchor within the masonry or to the supports, etc.).
- Anchorages are designed in accordance with: ETAG 029, Annex C:
with $N_{Rk,p}$, $N_{Rk,b}$, $V_{Rk,b}$ acc. to Annex C1
 $N_{Rk,s}$, $N_{Rk,pb}$, $V_{Rk,s}$, $V_{Rk,c}$, $V_{Rk,pb}$ acc. to ETAG 029, Annex C

Installation:

- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the side.
- Use category: dry base material.
- Holes in Hollow brick must be drilled by rotation drilling.
- Holes in solid brick can be drilled by hammer drilling.
- Marking and keeping of the effective anchorage depth.

Commercial standard threaded rods

- Material and mechanical properties acc. to Annex A3.
- Inspection certificate 3.1 acc. to EN 10204:2004, the documents should be stored.
- Marking of the embedment depth.

K-A-L-M bonded anchor VMK-SF / Masonry

Intended Use
Specifications (Part 2)

Annex B5

Installation parameter (with sleeve SHK)

Anchor size				M8	M10	M12
Sleeve size				15x85		20x85
Nominal diameter of the drilling hole		d_0	[mm]	15	15	20
Drilling depth		h_0	[mm]	95	95	95
Effective embedment depth		h_{ef}	[mm]	80	80	80
Effective embedment depth with sleeve		h_{ef}	[mm]	80	80	80
Diameter of clearance hole in fixture		d_f	[mm]	9	12	14
Minimum diameter of steel brush		d	[mm]	16,5	16,5	21,5
Minimum length of the rod		L_{min}	[mm]	100	120	140
Installation Torque	MZ	max. T_{inst}	[Nm]	10	10	15
	KS			10	10	15
	HLZ			5	5	10
	KSL			3	4	9
Minimum member thickness		h_{min}	[mm]	115	115	115
Minimum edge distance	Solid brick (MZ, KS)	$C_{min}=C_{cr}$	[mm]	$1,5 \cdot h_{ef}$		
Minimum spacing		$S_{min}=S_{cr}$	[mm]	$3,0 \cdot h_{ef}$		
Minimum edge distance	Hollow brick (HLZ, KSL)	$C_{min}=C_{cr}$	[mm]	$\max(100; 6d_0)$		
Minimum spacing		$S_{min} \parallel = S_{cr} \parallel$	[mm]	l_{unit}		
		$S_{min} \perp = S_{cr} \perp$	[mm]	h_{unit}		

Installation parameter (without sleeve)

Anchor size				M8	M10	M12
Nominal diameter of the drilling hole		d_0	[mm]	10	12	14
Drilling depth		h_0	[mm]	80	80	80
Effective embedment depth		h_{ef}				
Diameter of clearance hole in fixture		d_f	[mm]	9	12	14
Minimum diameter of steel brush		d	[mm]	11,4	14,0	16,0
Minimum length of the rod		L_{min}	[mm]	100	120	140
Installation Torque	MZ	max. T_{inst}	[Nm]	10	10	15
	KS			10	10	15
Minimum member thickness		h_{min}	[mm]	115	115	115
Minimum edge distance		$C_{min}=C_{cr}$	[mm]	$1,5 \cdot h_{ef}$		
Minimum spacing		$S_{min}=S_{cr}$	[mm]	$3,0 \cdot h_{ef}$		

K-A-L-M bonded anchor VMK-SF / Masonry

Intended Use
Installation parameter

Annex B6

Steel brush



Blow pump ABK



Dispenser



Maximum processing time and minimum curing time

Temperature in the anchorage base [°C]	Maximum processing time [min]	Minimum curing time in dry concrete [min]
-5 – 0	45	360
0 – 5	25	180
5 – 20	12	90
20 – 30	4	45
30 – 40	3	25
>40	2	15

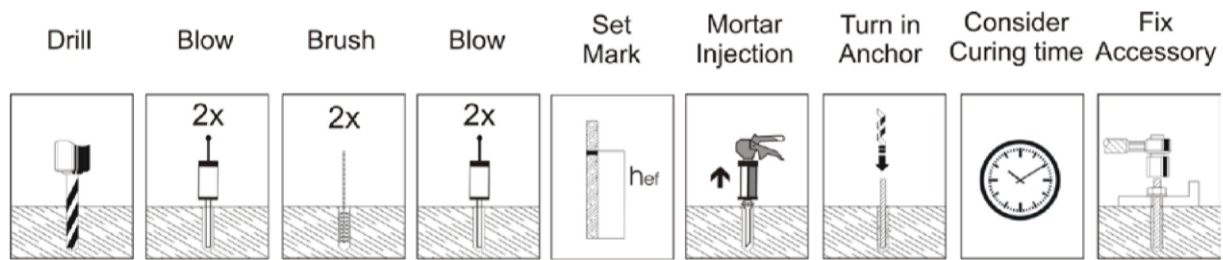
K-A-L-M bonded anchor VMK-SF / Masonry

Intended Use

Cleaning and setting tools / Processing time / Curing time

Annex B7

Installation Instructions



Step

1	2	3	4	5	6	7	8
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Step	Installation Instruction
1	Drill the hole: method acc. to Annex B5, drill diameter and depth acc. to Annex B6, If no significant resistance is felt over the entire depth of the hole when drilling or the drilling machine is warping more than usual while drilling the anchor should not be set at this position. If the drilling resistance is significant different along the drilling depth, it is assumed that a hollow (e.g. a hand hole) has been hit. In this case a sieve sleeve has to be used.
2	Clean the drill hole: Blow out the drill hole two times, using a hand pump
3	Check brush diameter (Annex B 3) Brush the drill hole a minimum of two times.
4	Clean the drill hole: Blow out the drill hole two times, using a hand pump.
5	Twist off the sealing cap Twist on the static mixer (the spiral in the static mixer must be clearly visible) Load the cartridge into the dispenser The first swings of mortar (appr. 10 cm strand) shall be discarded until the color of the mortar has turned into a uniform grey. The hole shall be uniformly filled starting from the hole bottom, in order to avoid entrapment of air. During pressing-out the mixer shall be slowly removed bit by bit. The drill hole shall be filled with the minimum quantity of the injection mortar given in the manufacturer's installation instruction (approximately 2/3 of the drill hole). Use with sleeve: filling starting from the bottom of the hole. The hole must be completely filled with mortar.
6	The anchor rod shall be pressed by manual turning into the mortar-filled hole up to the marked anchorage depth. If work is interrupted for a time exceeding the indicated processing time of the cartridge, the static mixer has to be replaced.
7	Wait for the specified curing time (see Annex B 3)
8	Mounting the fixture, T_{inst} , (see Annex B 3)

K-A-L-M bonded anchor VMK-SF / Masonry

Intended Use
Installation instruction

Annex B8

Characteristic values for tension and shear

Masonry	Sleeve SHK	Size	Temperature Range I 24°C / 40°C		Temperature Range II 50°C / 80°C	
			Tension $N_{Rk,p} = N_{Rk,b}$	Shear $V_{Rk,b}$	Tension $N_{Rk,p} = N_{Rk,b}$	Shear $V_{Rk,b}$
			[kN]			
Solid clay brick Mz-NF (DIN 771-1) $f_b \geq 50\text{N/mm}^2$	without	M 8	7,5	7,0	4,5	7,0
		M 10	7,5	8,0	4,5	8,0
		M 12	9,5	12	6,0	12
	15x85	M 8	6,0	7,0	4,0	7,0
	15x85	M 10	6,0	8,0	4,0	8,0
	20x85	M 12	8,0	12	5,5	12
Solid calcium silicate brick KS-NF (DIN 771-2) $f_b \geq 28\text{N/mm}^2$	without	M 8	8,0	5,5	5,5	5,5
		M 10	8,0	6,0	5,5	6,0
		M 12	8,0	9,0	5,5	9,0
	15x85	M 8	8,0	6,0	5,5	6,0
	15x85	M 10	8,0	6,0	5,5	6,0
	20x85	M 12	8,0	9,0	5,5	9,0
Hollow clay brick HLZ-12DF (DIN 771-1) $f_b = 20\text{N/mm}^2$	15x85	M 8	0,8	7,0	0,5	7,0
	15x85	M 10	1,2	7,0	0,75	7,0
	20x85	M 12	1,5	10,0	1,2	10,0
Hollow calcium silicate brick KSL-R (P)-12DF (DIN 771-2) $f_b = 12\text{ N/mm}^2$	15x85	M 8	3,0	6,0	2,0	6,0
	15x85	M 10	3,0	6,0	2,0	6,0
	20x85	M 12	6,0	6,0	4,0	6,0

K-A-L-M bonded anchor VMK-SF / Masonry

Performances

Characteristic Resistance for tension and shear loads

Annex C1

Displacement under tension load

	h_{ef} / mm	N / kN	δ_{N0} / mm	$\delta_{\infty} = 2 \cdot \delta_{N0}$ / mm
MZ-NF	80	2,1	0,2	0,4
KS-NF	80	2,3	0,2	0,4
HLZ-12DF	80	0,4	0,2	0,4
KSL-R (P)-12DF	80	0,9	0,2	0,4

Displacement under shear load

	h_{ef} / mm	V / kN	δ_{V0} / mm	$\delta_{\infty} = 1,5 \cdot \delta_{V0}$ / mm
MZ-NF	80	2,3	2,0	3,0
KS-NF	80	2,1	2,0	3,0
HLZ-12DF	80	1,8	1,5	2,25
KSL-R (P)-12DF	80	1,7	2,0	4,0

K-A-L-M bonded anchor VMK-SF / Masonry

Performance

Displacement under tension and shear load

Annex C2