

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0858
of 13 April 2017

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

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

Product family
to which the construction product belongs

Bonded anchor for multiple use for non-structural
applications in concrete

Manufacturer

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

Manufacturing plant

Kalm Befestigungssysteme GmbH
Marie-Curie-Str. 5
67661 Kaiserslautern

This European Technical Assessment
contains

12 pages including 3 annexes

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

Guideline for European technical approval of "Metal
anchors for use in concrete", ETAG 001 Part 6: "Anchors
for multiple use for non-structural applications",
August 2010,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

European Technical Assessment

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Specific Part

1 Technical description of the product

The "K-A-L-M bonded anchor VMK-SF" consists of a cartridge with injection mortar VMK-SF and a threaded rod for VMK-SF with washer and hexagon nut in the range of M10 to M20.

The threaded rod is placed into a drilled hole filled with injection mortar and is anchored via bond between threaded rod, injection mortar and concrete.

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 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)

The essential characteristic 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	Anchorage satisfy requirements for 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)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loads	See Annex C 1

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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 001, 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: [96/161/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 EAD

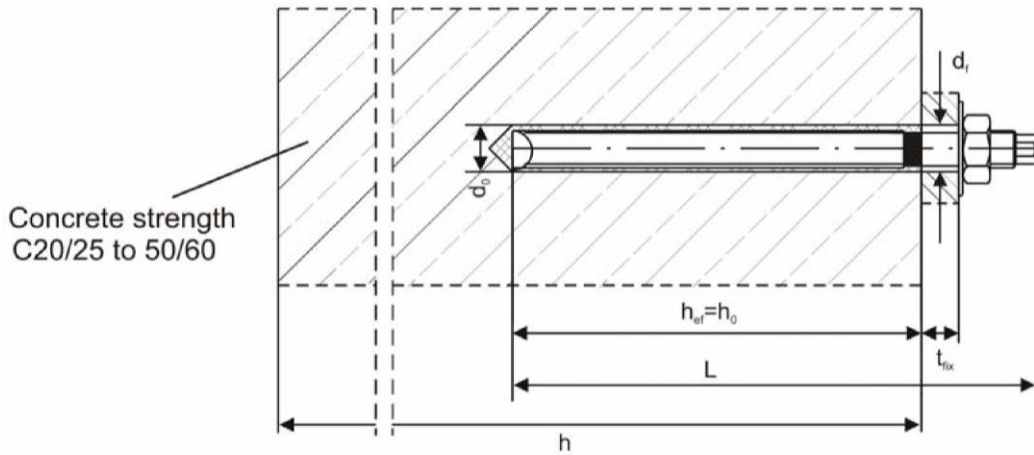
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 13 April 2017 by Deutsches Institut für Bautechnik

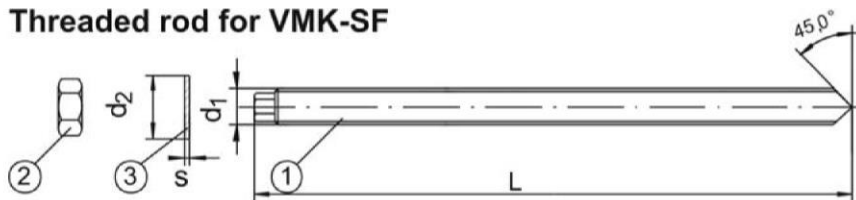
Andreas Kummerow
p. p. Head of Department

beglaubigt:
Lange

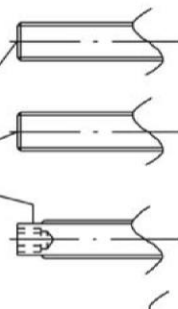
Installation conditions



Threaded rod for VMK-SF

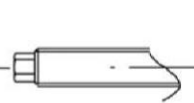



Marking 1



Marking1: Identifying mark of manufacturing plant K
Size of thread M...
Example KM10, for stainless steel plus E,
for high corrosion plus H

Marking 2



Marking2: Example: , for stainless steel plus E,
for high corrosion plus H

Dimensions

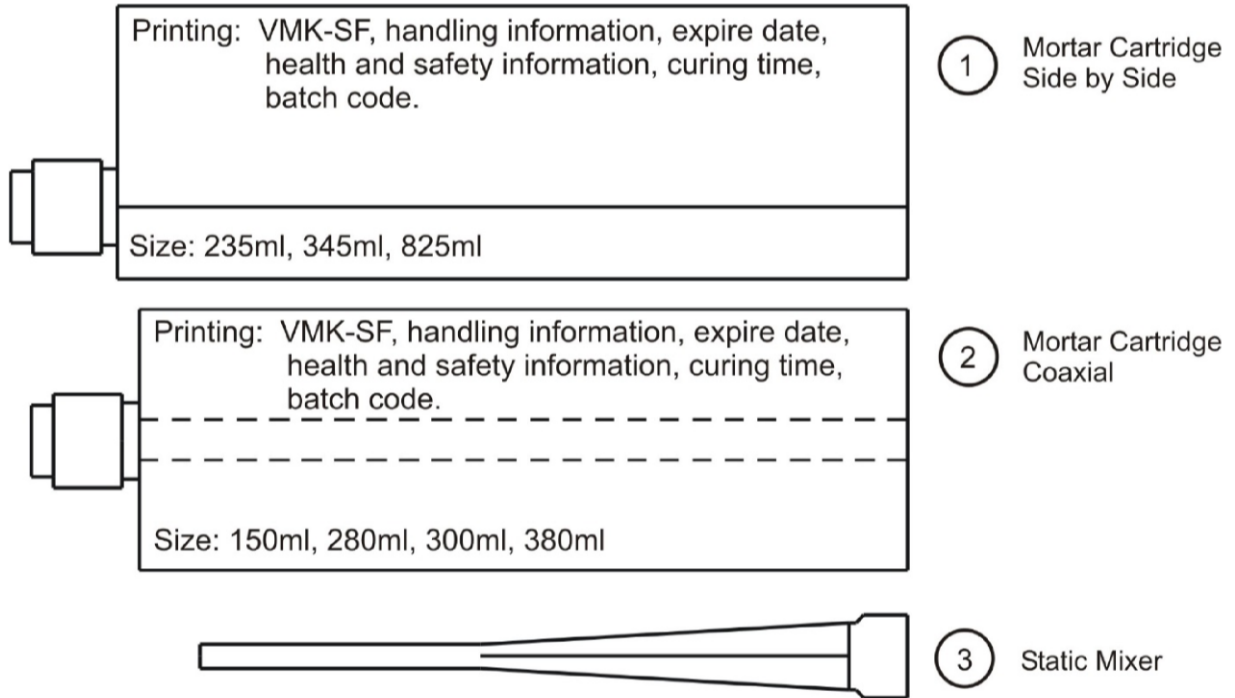
Anchor size			M10	M12	M16	M20
Threaded rod	$\varnothing d_1$	[mm]	M10	M12	M16	M20
	$L \geq$	[mm]	130	160	165	220

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

Product description
Installation conditions, threaded rod ASK

Annex A 1

Cartridges



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

Product description
Cartridges / Static mixer

Annex A 2

Materials

Part	Designation	Steel, zinc plated ≥ 5 µm plated acc. to DIN EN ISO 4042	Steel, hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461
1	Threaded rod	Steel acc. to EN 10087:1998 or EN 10263:2001, Property class 4.6, 5.8, 8.8, acc. to EN 1993-1-8:2005	Steel acc. to EN 10087:1998 or EN 10263:2001, Property class 4.6, 5.8, 8.8, acc. to EN 1993-1-8:2005
2	Hexagon nut acc. to EN ISO 4032:2012	Steel acc. to EN10087:1998 or EN 10263:2001 Property class 4,5,8 acc. to EN ISO 898-2:2012	Steel acc. to EN10087:1998 or EN 10263:2001 Property class 4,5,8 acc. to EN ISO 898-2:2012
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 10088-1:2005	High corrosion resistant steel 1.4529, 1.4565 acc. to EN 10088-1:2005
2	Hexagon nut acc. to EN ISO 4032:2012	Stainless steel, 1.4401, 1.4404, 1.4571 acc. to EN 10088-1:2005	High corrosion resistant steel 1.4529, 1.4565 acc. to EN 10088-1:2005
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 10088-1:2005	High corrosion resistant steel 1.4529, 1.4565 acc. to EN 10088-1:2005

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

Product description
Materials

Annex A 3

Specifications of intended use (part 1)

Anchorage subject to:

- Static and quasi-static loads: M10 to M20
- Anchor for multiple use for non-structural applications according to ETAG 001, part 6.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Non-cracked and cracked concrete

Temperature Range:

- I: -40°C to +40°C
(max long term temperature +24 °C and max short term temperature +40 °C)
- II: -40°C to +60°C
(max long term temperature +43 °C and max short term temperature +60 °C)
- III: -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).
- 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 or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist
(high corrosion resistant 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).

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

Intended Use
Specifications (Part 1)

Annex B 1

Specifications of intended use (part 2)

Design:

- Anchorages have to be designed under the responsibility of an engineer experienced in anchorages and concrete 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 relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static actions are designed in accordance with
 - ETAG 001, Annex C (Edition August 2010), design method B and ETAG 001, Part 6, Annex 1 (January 2011)

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the of the person responsible for technical matters of the site.
- Use category 1: dry or wet concrete (not in flooded holes)
- Sizes M10 to M20
- Hole drilling by hammer drilling.
- In case of aborted hole: The hole shall be filled with mortar.
- Marking and keeping the effective anchorage depth
- Overhead installation is allowed.

Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:

- Material and mechanical properties acc. to Annex A 3
- 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

Intended Use
Specifications (Part 2)

Annex B 2

Installation parameters

Anchor size			M10	M12	M16	M20
Nominal diameter of drill hole	d_0	[mm]	12	14	18	24
Effective embedment depth for threaded rod according to Annex A1	h_{ef}	[mm]	90	110	125	170
Effective embedment depth for commercial standard threaded rod	$h_{ef,min}$	[mm]	60	70	80	90
	$h_{ef,max}$	[mm]	100	120	160	200
Diameter of clearance hole in fixture	d_f	[mm]	12	14	18	22
Diameter of steel brush	d	[mm]	13	16	20	27
Installation torque	T_{inst}	[Nm]	20	30	50	80
Minimum member thickness	h_{min}	[mm]	$(h_{ef}+40)$ mm			
Minimum edge distance	c_{min}	[mm]	100	100	100	100
Minimum spacing	s_{min}	[mm]	120	140	160	200

Steel brush



Blow Pump ABK (Standard Cleaning)



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]	Minimum curing time in wet concrete [min]
-5 – 0	45	360	720
0 – 5	25	180	360
5 – 20	12	90	180
20 – 30	4	45	90
30 - 40	3	25	50
>40	2	15	30

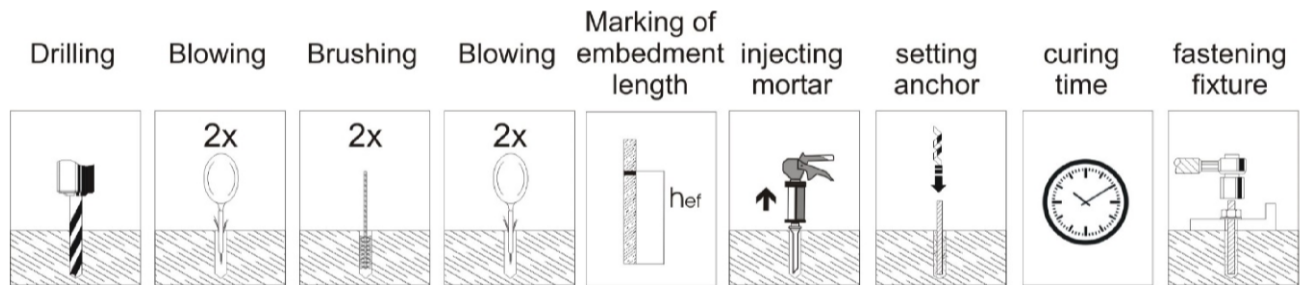
K-A-L-M bonded anchor VMK-SF

Intended Use

Installation parameters / Cleaning and setting tools / Processing time / Curing time

Annex B 3

Installation instructions



Step

1	2	3	4	5	6	7	8	9
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Step	Installation instructions
1	Drill the hole. Drill hole diameter and drill hole depth, see Annex B 3
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. For drill hole diameter ≥ 24 mm (M20) attach the brush to a drilling machine or a battery screwdriver. If the bore hole ground is not reached with the brush use an extension.
4	Clean the drill hole: Blow out the drill hole two times, using a hand pump
5	Marking of the embedment depth.
6	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). Overhead installation: Insert the static mixer to the back of the hole and inject adhesive. It is required that the bore hole is completely filled with adhesive approximately 2/3 of the drill hole.
7	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. Overhead installation: It is required that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length. Afterwards fix the anchor rod with e.g. wedges.
8	Wait for the specified curing time (see Annex B 3)
9	Mounting the fixture, T_{inst} , see Annex B 3

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

Intended Use
Installation instructions

Annex B 4

Characteristic resistances¹⁾ to all load directions

Steel Failure			M10	M12	M16	M20
Bending Moment of Steel, strength class 4.6	$M_{Rk,s}^0$	[Nm]	25,6	45,0	117,2	228,6
	γ_{Ms}	[-]	1,67			
Bending Moment of Steel, strength class 5.8	$M_{Rk,s}^0$	[Nm]	32,0	56,3	146,5	285,7
	γ_{Ms}	[-]	1,25			
Bending Moment of Steel, strength class 8.8	$M_{Rk,s}^0$	[Nm]	51,2	90,0	234,4	457,1
	γ_{Ms}	[-]	1,25			
Bending Moment of Stainless Steel, class 70	$M_{Rk,s}^0$	[Nm]	44,8	78,8	205,1	400,0
	γ_{Ms}	[-]	1,56			
Characteristic resistance for all load directions, C20/25			M10	M12	M16	M20
Temperature Range I: 40/24°C, Dry and Wet Concrete	τ_{Rk}	[N/mm ²]	2,0	1,75	1,25	1,0
Temperature Range II: 60/43°C, Dry and Wet Concrete	τ_{Rk}	[N/mm ²]	2,0	1,75	1,25	1,0
Temperature Range III: 80/50°C, Dry and Wet Concrete	τ_{Rk}	[N/mm ²]	1,8	1,6	1,1	0,9
Installation safety factor	γ_2	[-]	1,4			
Calculation of $N_{Rk}^0 = F_{Rk} = \tau_{Rk} \cdot \pi \cdot d \cdot h_{ef}$						
Edge distances and spacing						
with edge reinforcement $\geq 8\text{mm}$						
Edge Distance	c_{cr}	[mm]	$0,9 \cdot h_{ef}$			
Spacing	s_{cr}	[mm]	$2 \cdot c_{cr}$			
Installation safety factor	γ_2	[-]	1,4			
without edge reinforcement						
Edge Distance	c_{cr}	[mm]	$1,2 \cdot h_{ef}$			
Spacing	s_{cr}	[mm]	$2 \cdot c_{cr}$			
Installation safety factor	γ_2	[-]	1,4			

¹⁾ The loads at fixing points shall be limited to $F_{Ed,lim} = F_{Rk} / \gamma_M$. Recommended values are shown in ETAG 001, Part 6, Annex 1.

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

Performances

Characteristic values of resistance for all load directions

Annex C 1