Deutsches Institut für Bautechnik

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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-17/0125 of 26 May 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	KALM universal frame anchor RDK
Product family to which the construction product belongs	Plastic anchor for multiple use in concrete and masonry for non-structural applications
Manufacturer	KALM Befestigungssysteme GmbH Marie-Curie-Straße 5 67661 Kaiserslautern DEUTSCHLAND
Manufacturing plant	Werk 1
This European Technical Assessment contains	12 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Plastic anchors for multiple use in concrete and masonry for non - structural applications", version march 2012 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The KALM universal frame anchor RDK is a plastic anchor consisting of a plastic sleeve made of polyamide and an accompanying specific screw of galvanised steel.

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

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchors of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

3.1 Mechanical resistance and stability (BWR 1)

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

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A 1
Resistance to fire	No performance assessed

3.3 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annexes C 1, C 2
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 2, B 3

3.4 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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+

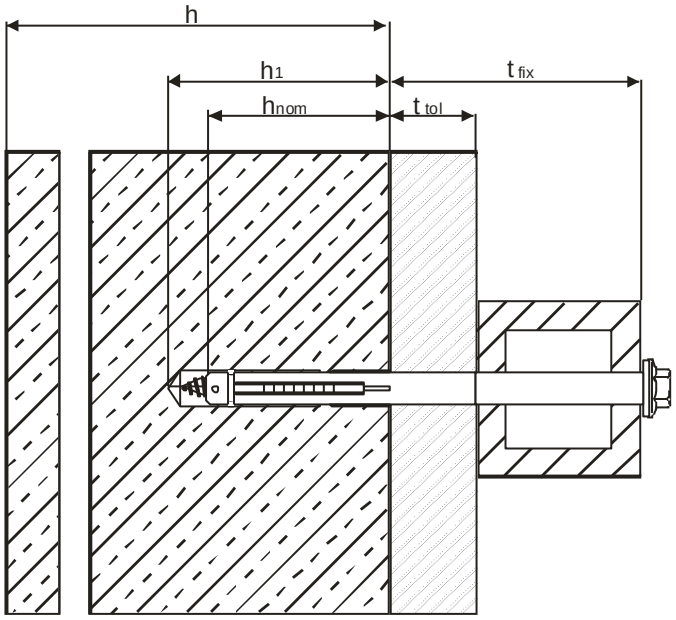
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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 26 May 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Abteilungsleiter

Beglaubigt



Legend

h_{nom} = overall plastic anchor embedment depth in base material

h_1 = depth of drill hole to deepest point

h = thickness of member (wall)

t_{fix} = thickness of fixture

t_{tol} = thickness of layer or non-load bearing coating

KALM universal frame anchor RDK	Annex A 1
Product description Installed condition	

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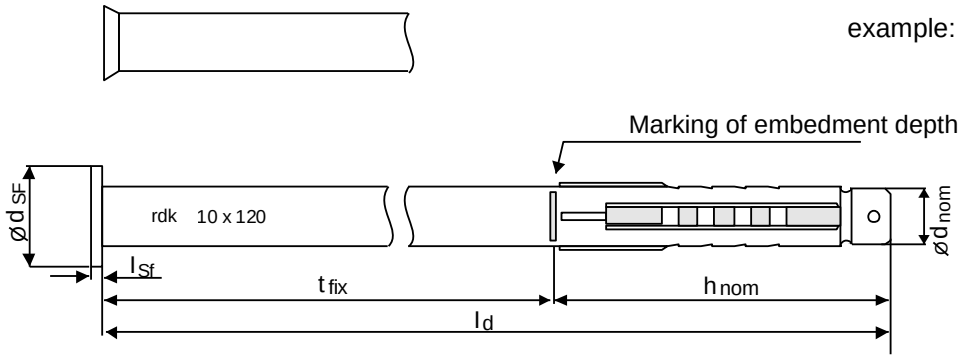
RDK 10

Anchor sleeve

Marking:
type and dimension

example: **rdk** 10x120



Special screw

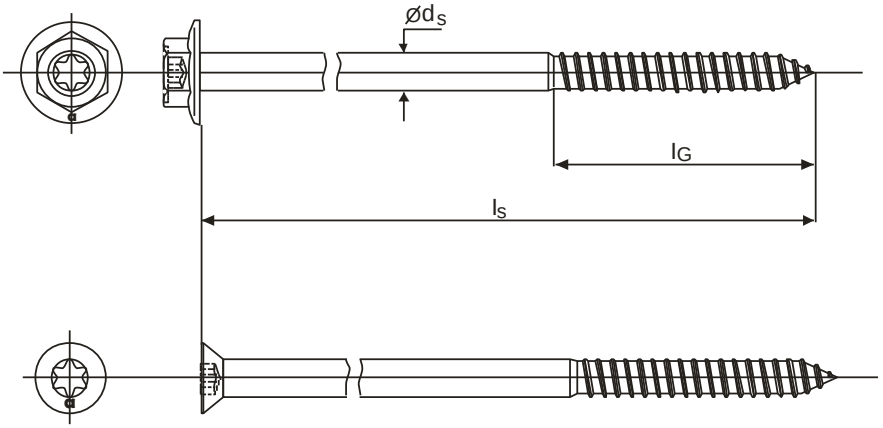


Table 1: Dimensions [mm]

	Anchor sleeve						Special screw		
	h_{nom} [mm]	Ø d_{nom} [mm]	t_{fix} [mm]	l_d [mm]	l_{Sf} [mm]	Ø d_{Sf} [mm]	Ø d_s [mm]	l_G [mm]	l_s [1)] [mm]
rdk 10	**60**	**10**	**10-200**	**80-260**	**2**	**18**	**7**	**50**	**90 -270**

[1)] To insure that the screw penetrates the anchor sleeve, $l_s = l_d + l_{Sf}$ [2)] + 7 mm
[2)] Only valid for flat collar version

Table 2: Materials

Name	Material
Anchor sleeve	Polyamid PA6, colour: grey
Special screw	carbon steel strength class 4.8 ($f_{yk} \geq 320$ N/mm², $f_{uk} \geq 400$ N/mm²), zinc coated 5 µm

KALM universal frame anchor RDK	Annex A 2
Product description Anchor sleeve, special screw – marking 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, Annex C 1.
- Solid brick masonry (use category b) according to Annex C 1.
  Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength of the masonry unit.
- Hollow brick masonry (use category c) according to Annex C 2.
- Mortar strength class of the masonry ≥ M2,5 according to EN 998-2:2010.
- For other base materials of the use categories a, b or c the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B, Edition March 2012.

Temperature Range:

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

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel)
- The specific screw made of galvanised steel may also be used in structures 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 to be designed in accordance with the ETAG 020, Annex C under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- Fasteners are only to be used for multiple use for non-structural application according to ETAG 020, Edition March 2012.

Installation:

- Hole drilling by the drill modes according to Annex C1 and C 2 for use category a, b and c
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Installation temperature from 0°C to + 50°C
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks

KALM universal frame anchor RDK	Annex B 1
Intended use Specifications	

Table 3: Installation parameters

Anchor type		
Drill hole diameter	d_0 [mm]	10
Cutting diameter of drill bit	d_{cut} [mm]	10,45
Depth of drill hole to deepest point[1)]	h_1 [mm]	70
Overall plastic anchor embedment depth [1) 2)]	h_{nom} [mm]	60
Diameter of clearance hole in the fixture	d_f [mm]	10,5

1) See Annex A 1

2) For hollow and perforated masonry the influence of h nom ≥ 60 mm has to be detected by job site tests according ETAG 020, Annex B.

Table 4: Minimum thickness of member, edge distance and spacing in concrete

Fixing points with a spacing a ≤ $s_{cr,N}$ are considered as a group with a maximum characteristic resistance $N_{Rk,p}$ acc. to Table 8. For a > $s_{cr,N}$, the anchors are considered as single anchors, each with a characteristic resistance $N_{Rk,p}$ according to Table 8.

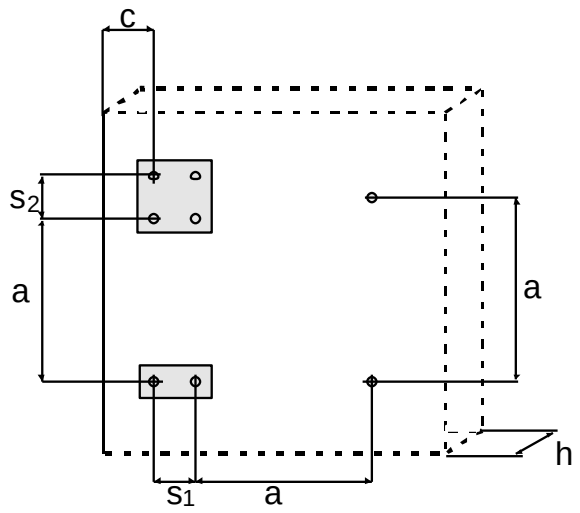
	h_{min} [mm]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	c_{min} [mm]	s_{min} [mm]
Concrete ≥ C16/20	100	100	85	100	80
Concrete C12/15		140	120	140	110

Table 5: Minimum member thickness, edge distance and spacing in masonry

Base material		Mz, HLz, KS, V,Hbl	KS
Minimum member thickness	h_{min} = [mm]	100	100
Single anchor			
Minimum spacing	a_{min} = [mm]	250	250
Minimum edge distance	c_{min} = [mm]	100	150
Anchor group			
Minimum spacing perpendicular to the free edge	$s_{1,min}$ = [mm]	200	300
Minimum spacing parallel to the free edge	$s_{2,min}$ = [mm]	400	600
Minimum edge distance	c_{min} = [mm]	100	150

$a \geq max\ (a_{min}, s_{1,min}, s_{2,min})$

Scheme of distance and spacing in concrete and masonry



KALM universal frame anchor RDK

Intended use
Installation parameters, edge distances and spacing in masonry

Annex B 3

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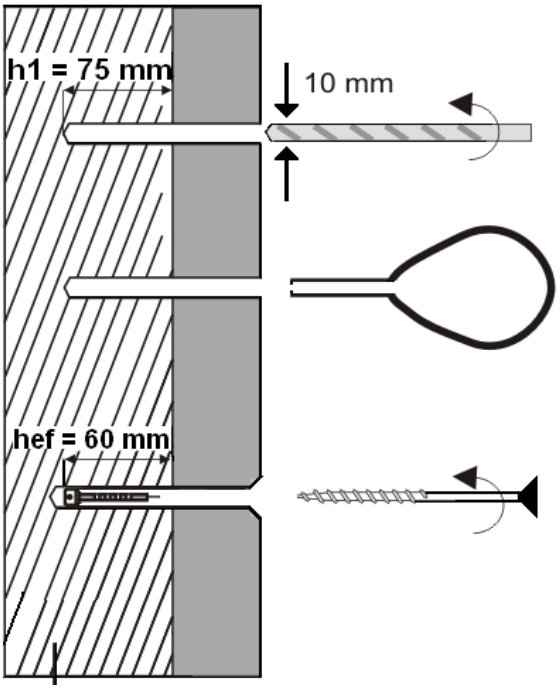
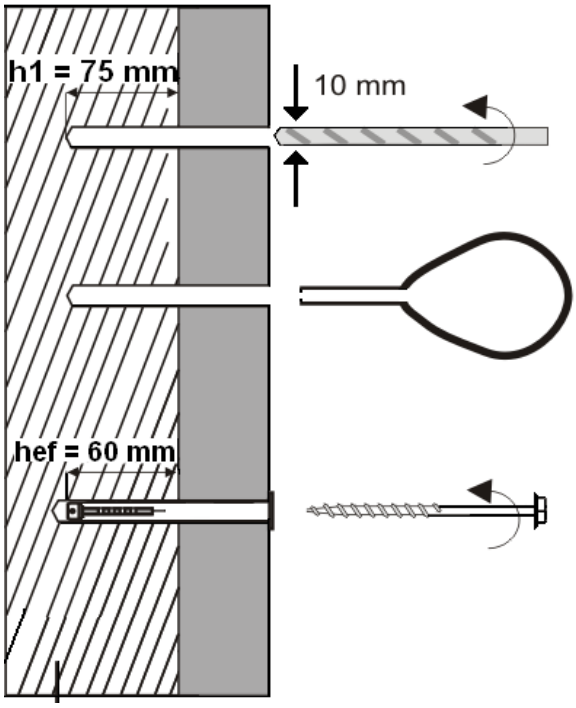
Installation instructions



Drill the bore hole perpendicular to the surface of the base material considering the drill method given in Table 9 and 10

Remove dust from the bore hole

Insert the anchor sleeve until the collar is flush with the surface, screw in the special screw (shown with countersunk version)



Drill the bore hole perpendicular to the surface of the base material considering the drill method given in Table 9 and 10

Remove dust from the bore hole

Insert the anchor sleeve until the collar is flush with the surface, screw in the special screw (shown with cylindrical head)

KALM universal frame anchor RDK	Annex B 4
Intended use Installation instructions	

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Table 6: Characteristic resistance of the screw

Failure of expansion element (special screw)			Galvanized steel
Characteristic tension resistance	$N_{Rk,s}$	[kN]	10,6
Characteristic shear resistance	$V_{Rk,s}$	[kN]	5,3
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	9,2

Table 7: Displacements under tension and shear loading in concrete[1)] and masonry

Tension load			Shear load		
F [2)] [kN]	δ_{NO} [mm]	$\delta_{N\infty}$ [mm]	F [2)] [kN]	δ_{VO} [mm]	$\delta_{V\infty}$ [mm]
1,8	0,86	1,71	1,8	3,36	5,04

[1)] valid for all temperature ranges
[2)] intermediate values by linear interpolation

Table 8: Characteristic resistance for pull-out failure for use in concrete

Pull-out failure of the anchor sleeve			**ϑ = 24/40 °C**	**ϑ = 50/80 °C**
• **Concrete ≥ C16/20**				
Characteristic resistance	$N_{Rk,p}$	[kN]	3,0	3,0
• **Concrete C12/15**				
Characteristic resistance	$N_{Rk,p}$	[kN]	2,0	2,0

Table 9: Characteristic resistance in solid masonry

Base material	Min DF or min size (L x W xH) [mm]	Bulk density class ρ [kg/dm³]	Minimum compressive strength f_b [N/mm²]	Drill method	Characteristic resistance F_{Rk} [1)] [kN] 24/40°C	50/80°C
Clay brick Mz according to EN 771-1:2011+A1:2015	3 DF (240 x 175 x 113)	≥1,8	20	H [2)]	3,5	3,5
			10		2,5	2,5
Solid sand/lime bricks KS according to EN 771-2:2011+A1:2015	NF (240 x 115 x 71)	≥2,0	28	D [2)]	2,0	2,0
			20		1,5	1,5
			10		1,2	1,2
Lightweight concrete solid blocks V according to EN 771-3:2011+A1:2015	3DF (240 x 175 x 113)	≥1,2	6	D [2)]	2,0	2,0
			4		1,5	1,5

[1)] characteristic resistance F_{RK} for tension, shear or tension and shear
[2)] H = Hammerdrilling, D = Rotary drilling

KALM universal frame anchor RDK	Annex C 1
Performances Characteristic resistance of the screw, displacements Characteristic resistance in concrete and solid masonry	

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Table 10: Characteristic resistance in hollow masonry

Base material	Min DF or min size (L x W xH) [mm]	Minimum outer web thickness [mm]	Bulk density class ρ [kg/dm³]	Minimum compressive strength f_b [N/mm²]	Drill method	Characteristic resistance F_{Rk} [1)] [kN] 24/40°C / 50/80°C
Hollow clay brick HLz according to EN 771-1:2011+A1:2015 e.g. Eder Poro	10 DF (249 x 298 x 238)	9,2	≥0,72	10	D [2)]	0,4
Hollow clay brick HLz according to EN 771-1:2011+A1:2015 e.g. Danreiter	12 DF (376 x 249 x 234)	8,2	≥0,76	10	D [2)]	0,6
Hollow clay brick HLz according to EN 771-1:2011+A1:2015 e.g. Eder	(246 x 117 x 139)	14,0	≥1,09	20	D [2)]	0,9
Hollow clay brick HLz according to EN 771-1:2011+A1:2015	12 DF (300 x 240 x 238)	8,4	≥0,7	6	D [2)]	0,3
Hollow clay brick HLz according to EN 771-1:2011+A1:2015	NF (240 x 115 x 71)	11,0	≥0,9	12	D [2)]	0,6
				10		0,5
				8		0,4
Hollow sand/lime brick KSL According to EN 771-2:2011+A1:2015	4DF (240 x 115 x 238)	34,0	≥1,4	12	D [2)]	1,5
				10		1,2
				8		0,9
Lightweight concrete hollow blocks Hbl EN 771-3:2011+A1:2015	12 DF (495 x 175 x 238)	37,0	≥1,2	4	D [2)]	1,2

[1)] characteristic resistance F_{RK} for tension, shear or tension and shear
[2)] H = Hammerdrilling, D = Rotary drilling

KALM universal frame anchor RDK	Annex C 2
Performances Characteristic resistance in hollow masonry	