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-04/0026 of 25 April 2018

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	Kunkel anchor K6, K6+, K6L and K8
Product family to which the construction product belongs	Deformation-controlled expansion anchor for multiple use for non-structural applications in concrete
Manufacturer	Kunkel GmbH Befestigungssysteme Jakobstraße 24 66115 Saarbrücken DEUTSCHLAND
Manufacturing plant	Kunkel GmbH Befestigungssysteme
This European Technical Assessment contains	16 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	ETAG 001 Part 6: "Anchors for multiple use for non-structural applications", Januar 2011, used as 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 Kunkel anchor K6, K6+, K6L and K8 is an anchor made of galvanised steel, stainless or high corrosion resistant steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

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 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 A1
Resistance to fire	See Annex C 3

3.3 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance for all load directions	See Annex C 1 und C 2

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, January 2011, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [97/161/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 European Assessment Document

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 25 April 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Baderschneider

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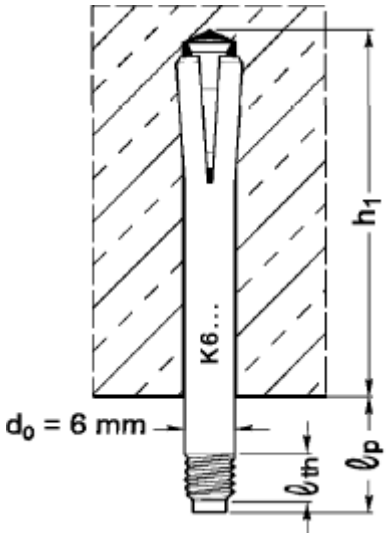
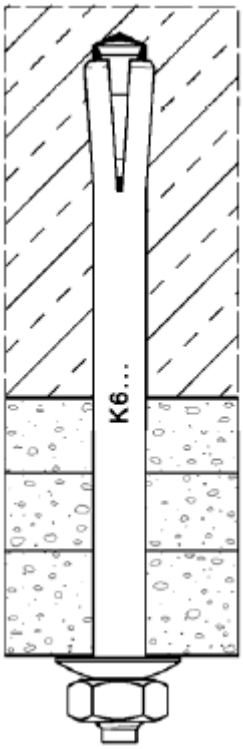
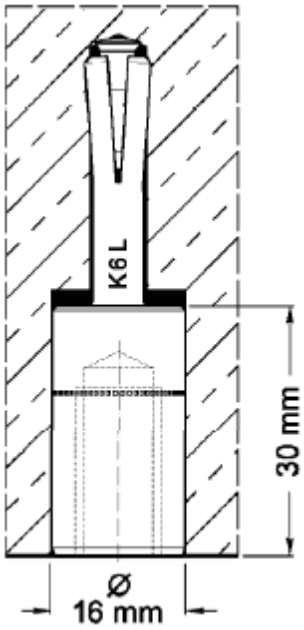
Multiple use for non-structural applications only

Different Installations with different head forms of the anchor

Pre-positioned Installation	In-place Installation	Counter-sunk Installation







l_{th} – Length of connection thread
l_p – Length of protrusion

Kunkel anchor K6, K6+, K6L and K8	**Annex A1**
Product description Installation condition	

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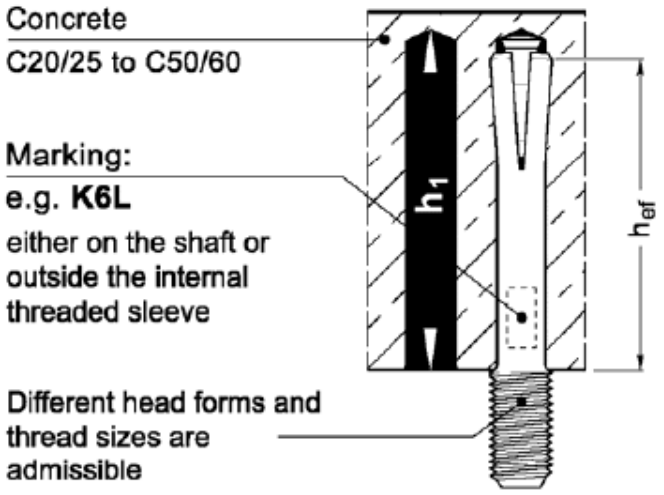
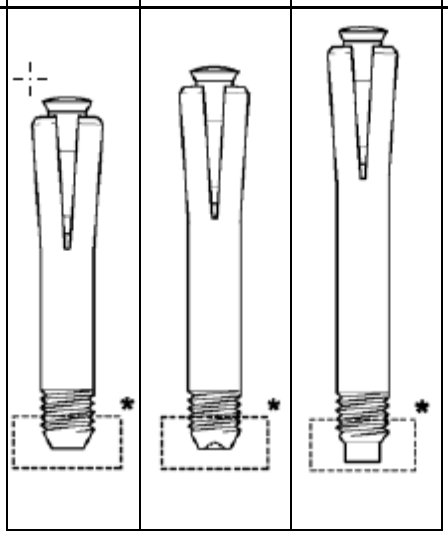
Table A1: Materials

Material	**Anchor type / Marking**			
Steel galvanized according to EN ISO 4042	**K6**	**K6+**	**K6L**	**K8**
Stainless steel 1.4401 according to EN 10088	**K6E**	**K6+E**	**K6LE**	**K8E**
Stainless steel 1.4404 according to EN 10088	**K6E**	**K6+E**	**K6LE**	**K8E**
Stainless steel 1.4571 according to EN 10088	**K6X**	**K6+X**	**K6LX**	**K8X**
High corrosion resistant steel 1.4529 acc. to EN 10088	**K6C**	**K6+C**	**K6LC**	**K8C**
High corrosion resistant steel 1.4565 acc. to EN 10088	**K6C**	**K6+C**	**K6LC**	**K8C**
Drill hole depth h_1	32 mm	37 mm	42 mm	43 mm
Effective embedment depth h_{ef}	26 mm	31 mm	36 mm	36 mm





* Length Indicator

The anchor may only be set with appropriate stop drills and setting tools.

Kunkel anchor K6, K6+, K6L and K8	**Annex A2**
Product description Materials and anchor types	

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Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads
- Only to be used for multiple use for non-structural application
- Fire exposure

Base material:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000
- Strength class C20/25 to C50/60 according to EN 206-1:2000
- Cracked and non-cracked concrete

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc plated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) or exposure 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. (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 pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used.)

Design:

- Anchorages are 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.).
- The strength class and the length of the fastening screw or threaded rod shall be defined by the designing engineer
- Anchorages under static or quasi-static actions for multiple use for non-structural applications are designed in accordance with:
  - ETAG 001, Annex C, design method C, Edition August 2010 or
  - CEN/TS 1992-4:2009, design method C
- Anchorages under fire exposure are designed in accordance with:
  - ETAG 001, Annex C, design method C, Edition August 2010 and EOTA Technical Report TR 020, Edition May 2004 or
  - CEN/TS 1992-4:2009, Annex D
  - It must be ensured that local spalling of the concrete cover does not occur.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools,
- Drill hole by hammer drilling only,
- Positioning of the drill holes without damaging the reinforcement.
- The anchor with external thread for pre-set installation or anchor internal thread is properly expanded if the setting tool rests on the concrete surface. The anchor for through-set installation is properly expanded if the setting tool rests on the surface of the fixture.
- The screw-in depth of fastening screw or threaded rod for anchors with internal thread must be at least the nominal thread size.

Kunkel anchor K6, K6+, K6L and K8	**Annex B1**
Intended Use Specifications	

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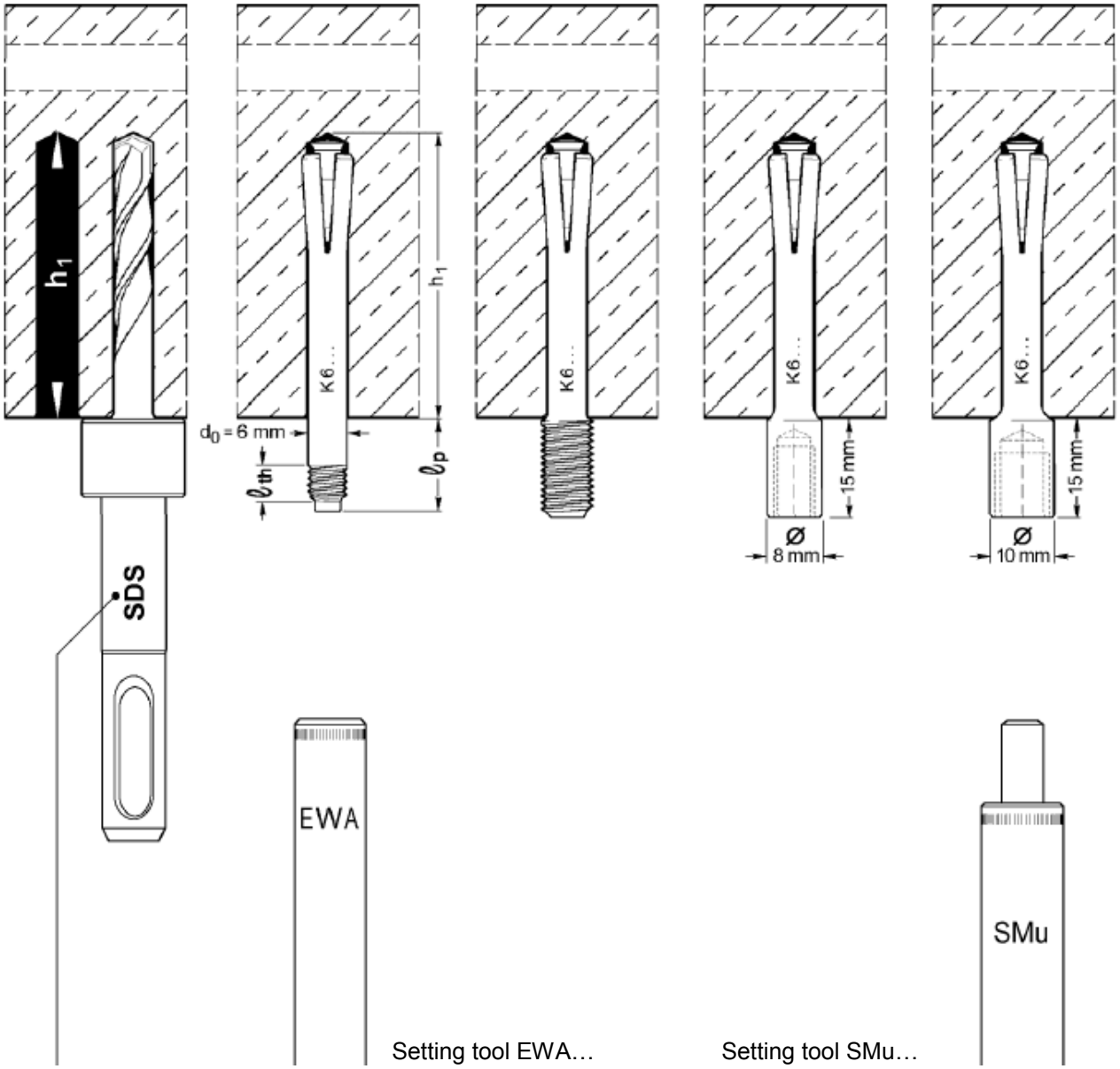
Table B1: Information's for pre-positioned installation (K6, K6+, K6L (…E, …X, …C))

Anchor type		**K6 x lp**	**K6-8 x lp**	**KMu 6**	**KMu 8**
Thread size		External thread M6	External thread M8	Internal thread M6	Internal thread M8
Setting tool		EWA 6 x ℓ_p	EWA 8 x ℓ_p	SMu 6	SMu 8
Length of thread ℓ_{th}	[mm]	$5 \le \ell_{th} \le 50$		-	-
Length of protrusion ℓ_p	[mm]	$5 \le \ell_p \le 300$		-	-
Screw-in depth	[mm]	-		6 bis 12	8 bis 12



Setting tool EWA… Setting tool SMu…

Anchor type	**K6**	**K6+**	**K6L**
Appropriate stop drill	**SDS 1**	**SDS +**	**SDS 2**

Kunkel anchor K6, K6+, K6L and K8

Intended Use
Information's for pre-positioned installation
K6, K6+ and K6L

Annex B2

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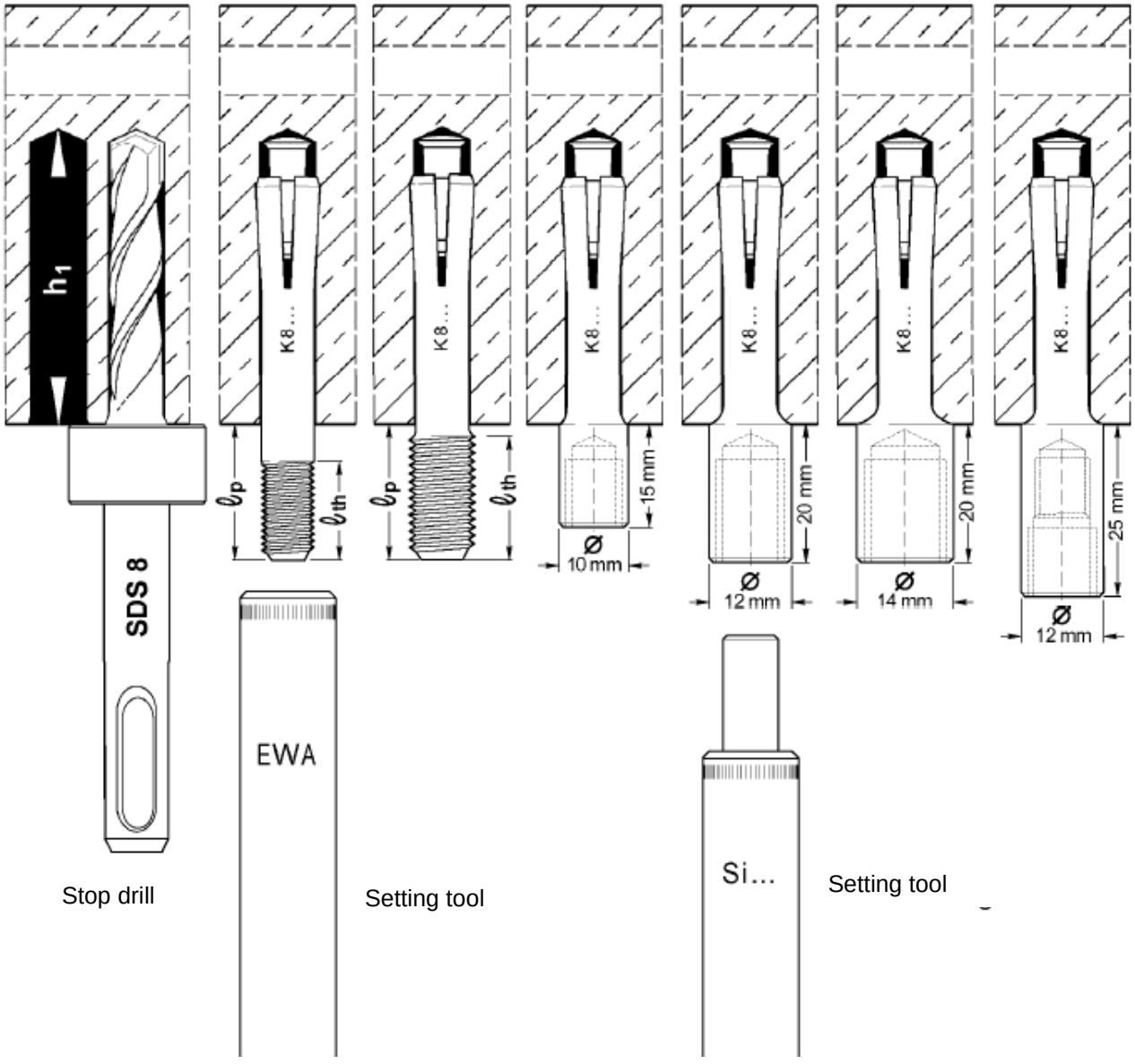
Table B2: Information's for pre-positioned installation (K8 (…E, …X, …C))

Anchor type	**K8 x ℓ_p**	**K8 - 10 x ℓ_p**	**K8 – M8i**	**K8 – M10i**	**K8 – M12i**	**K8–M8i/M10i**
Thread size	External thread M8	External thread M10	Internal thread M8	Internal thread M10	Internal thread M12	Internal thread M8/M10
Setting tool	EWA 8x ℓ_p	EWA 10 x ℓ_p	Si 8 - SM	Si 10 - SM	Si 12 - SM	Si 8 - SM
Length of thread ℓ_{th} [mm]	$5 \le \ell_{th} \le 50$	$5 \le \ell_{th} \le 50$	-			
Length of protrusion ℓ_p [mm]	$5 \le \ell_p \le 300$	$5 \le \ell_p \le 300$	-			
Screw-in depth [mm]	-	-	8 to 10	10 to 15	12 to 15	M8: 8 to 10 M10: 10
Stop drill	SDS 8 x 43					



Kunkel anchor K6, K6+, K6L and K8

Intended Use
Information's for pre-positioned installation
K8

Annex B3

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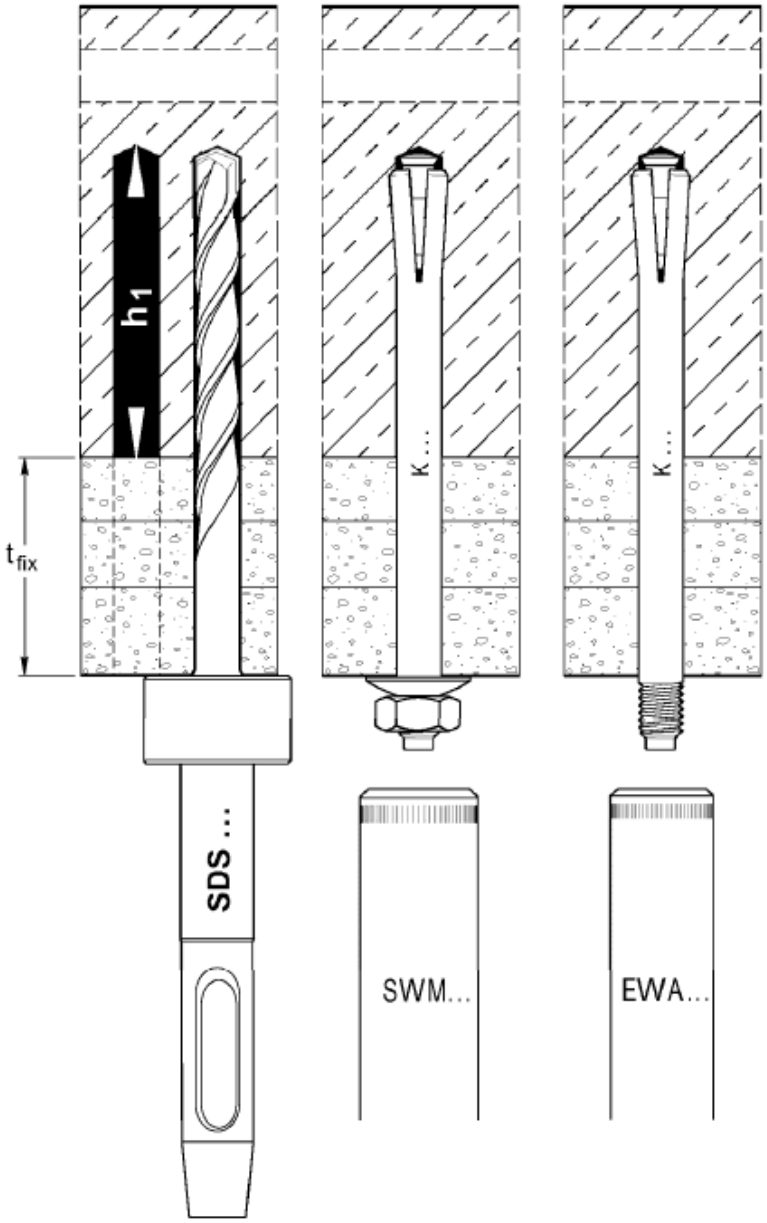
Table B3: Information's for in-place installation (K6, K6+, K6L, K8 (…E, …X, …C))

Anchor type		**KDM 6 x t_{fix} / …N KDM 8 x t_{fix} / …N with washer and hexagon nut**	**K 6 x t_{fix} / …N K 8 x t_{fix} / …N**
Thread size		M6 / M8	M6 / M8
Setting tool		SWM …	EWA …
Length of thread ℓ_{th}	[mm]	-	≥ 5
Thickness of the fixture t_{fix}	[mm]	≤ 300	
Stop drill		SDS …	

The type of stop drill depends on the required thickness of the fixture t_{fix}



Kunkel anchor K6, K6+, K6L and K8

Intended Use
Information's for in-place installation
K6, K6+, K6L and K8

Annex B4

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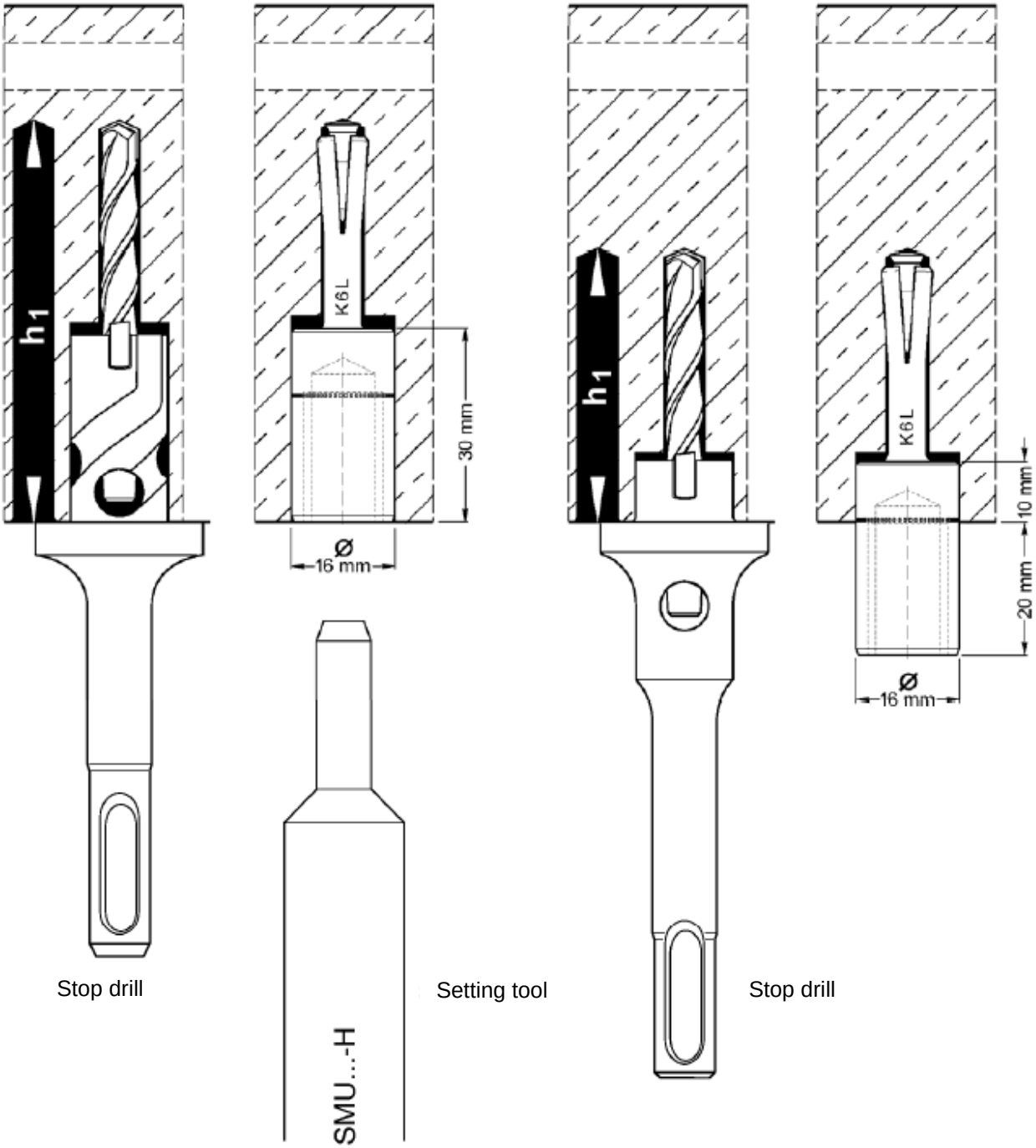
Table B4: Informations for counter-sunk installation (K6L)

Anchor type		**KMu F 10**	**KMu F 12**
Thread size		M 10	M 12
Setting tool		SMu 10 H	SMu 12 H
Scre-in depth	[mm]	10 bis 18	12 bis 18
Stop drill		SDS DUO HV …	
Material		Galvanised steel ≥ 5µm acc. to EN ISO 4042	



Stop drill | Setting tool | Stop drill

Kunkel anchor K6, K6+, K6L and K8

Intended Use
Information's for counter-sunk installation
K6L

Annex B5

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Table B5: Installation Parameters for anchors made of galvanized steel

Anchor type			**K6**	**K6+**	**K6L**		**K8**
Diameter off drill hole	d_0	[mm]	6	6	6		8
Depth of drill hole	$h_1 \geq$	[mm]	32	37	42	62	43
Minimum thickness of fixture	h_{min}	[mm]	80	80	80	100	80
Effective anchorage depth	$h_{ef} \geq$	[mm]	26	31	36	56	36
Maximum torque moment	T_{inst}	[mm]	5	5	5	5	10
Spacing	$s_{cr} \geq$	[mm]	200				
Edge distance	$c_{cr} \geq$	[mm]	150				

Table B6: Installation Parameters for anchors made of stainless and high corrosion resistant steel

Anchor type			**K6 E,X,C**	**K6+ E,X,C**	**K6L E,X,C**	**K8 E,X,C**
Diameter off drill hole	d_0	[mm]	6	6	6	6
Depth of drill hole	$h_1 \geq$	[mm]	32	37	42	3
Minimum thickness of fixture	h_{min}	[mm]	80			
Effective anchorage depth	$h_{ef} \geq$	[mm]	26	31	36	36
Maximum torque moment	T_{inst}	[mm]	5	5	5	10
Spacing	$s_{cr} \geq$	[mm]	200			
Edge distance	$c_{cr} \geq$	[mm]	150			

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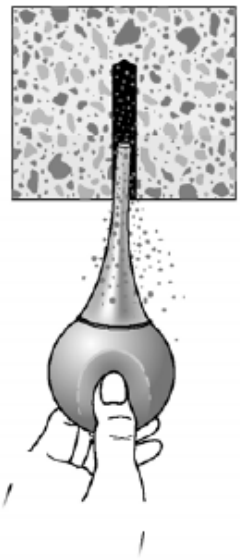
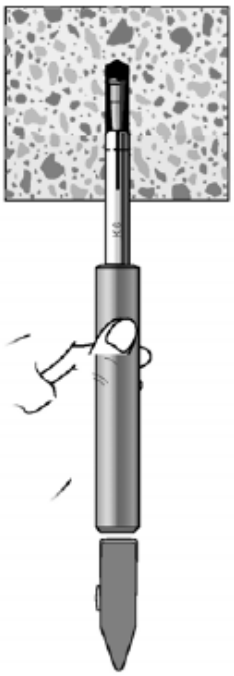
Installation Instructions (examples)

External thread anchor K6, K6L und K8

Hand setting tool



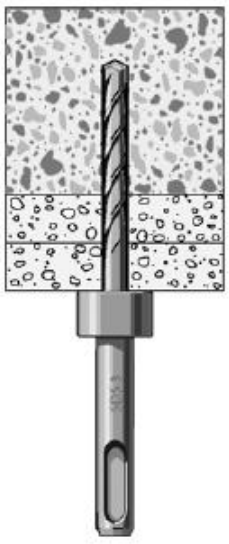


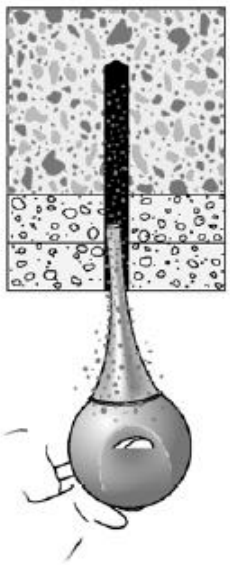
The anchor is duly spread if the setting tool butt against concrete

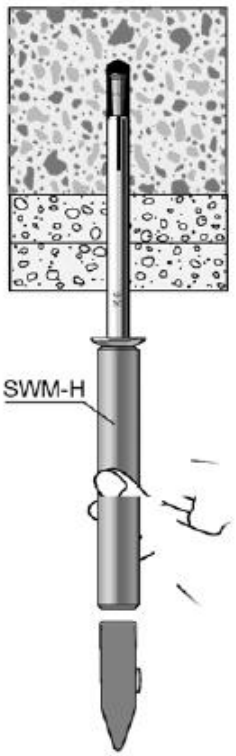
Technical information see label

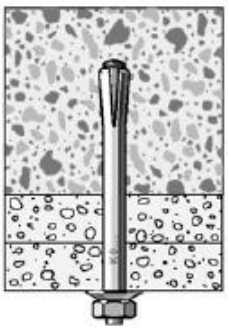
Fire protection anchor KDM 6 x … /N

Hand setting tool for all KDM 6 x …/N









The anchor is duly spread, if the washer butt against attached part

All Inplementations KDM 6x …/N can be driven in without a setting tool, only with a hammer

Kunkel anchor K6, K6+, K6L and K8	**Annex B7**
Intended Use Installation instructions	

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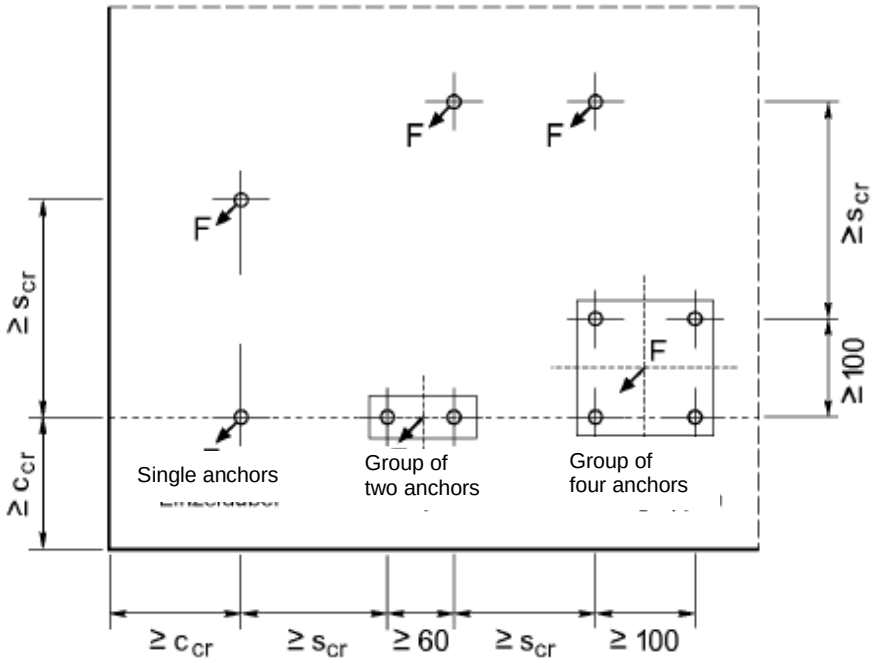
Table C1: Characteristic values of resistance for all load directions for anchors made of galvanised steel

Anchor type			**K6**	**K6+**	**K6L**	**K8**
Any load direction						
Characteristic resistance in C20/25 to C50/60	F^0_{Rk}	[kN]	2	2,5	5	5
Partial safety factor[2)]	γ_m	[-]	1,5	1,5	2,1	2,1
Shear load with lever arm						
Characteristic bending moment	$M^0_{Rk,s}$ [1)]	[Nm]	3,6	7,7		18
Partial safety factor	γ_{ms}	[-]	1,25			

[1)] Characteristic bending moment $M^0_{Rk,s}$ for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4
[2)] The Installation safety factor γ_2 is included



The values given in table C1 are valid for one fixing point.

Fixing points can be:
- **Single anchors**,
- **Groups of two anchors** with $s_1 \geq 60$mm or
- **Groups of four anchors** with $s_1 = s_2 \geq 100$mm

Kunkel anchor K6, K6+, K6L and K8	**Annex C1**
Performance Characteristic values of resistance for all load directions for anchors made of galvanised steel	

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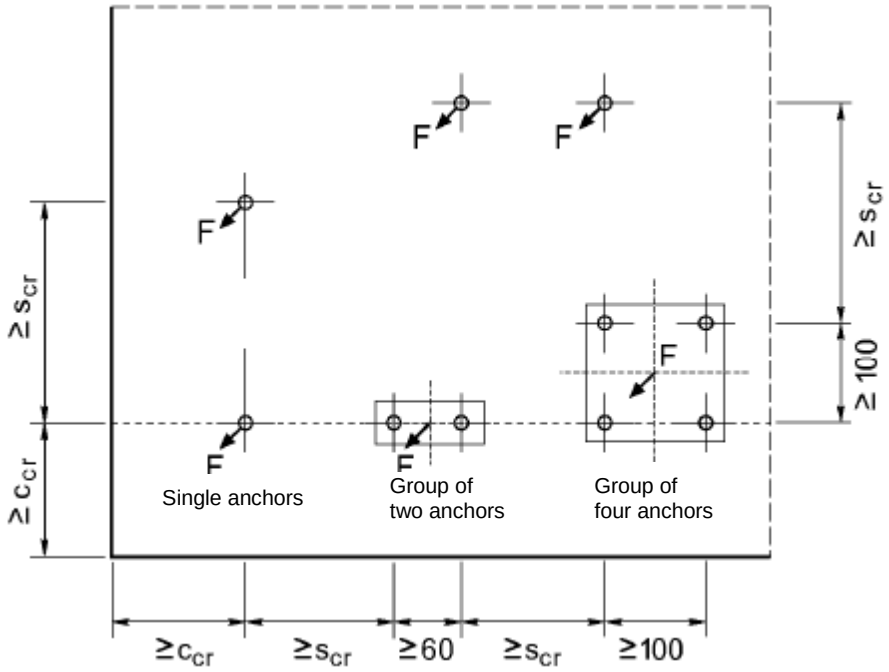
Table C2: Characteristic values of resistance for all load directions for anchors made of stainless and high corrosion resistant steel

Anchor type			K6 E,X,C	K6+ E,X,C	K6L E,X,C	K8 E,X,C
Any load direction						
Characteristic resistance in C20/25 to C50/60	F^0_{Rk}	[kN]	1,5	2,5	3	5
Partial safety factor	γ_m	[-]	2,1	1,8	2,1	1,8
Shear load with lever arm						
Characteristic bending moment	$M^0_{Rk,s}$ [1)]	[Nm]	4,0	8,4		20,6
Partial safety factor	γ_{ms}	[-]	1,5			

1) Characteristic bending moment $M^0_{Rk,s}$ for equation (5.5) in ETAG 001, Annex C or for equation (14) in CEN/TS 1992-4-4
2) The Installation safety factor γ_2 is included



The values given in table C2 are valid for one fixing point.

Fixing points can be:
- **Single anchors**,
- **Groups of two anchors** with $s_1 \geq 60$mm or
- **Groups of four anchors** with $s_1 = s_2 \geq 100$mm
-

Kunkel anchor K6, K6+, K6L and K8	**Annex C2**
Performance Characteristic values of resistance for all load directions for anchors made of stainless and high corrosion resistant steel	

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Table C3: Characteristic values under fire exposure in all load directions in concrete C20/25 to C50/60

Fire resistance class	Anchor type			K6 (..E,..X,..C)	K6+, K6L (..E,..X,..C)	K8 (..E,..X,..C)
R30	Characteristic resistance	$F_{Rk,s(30)}$	[kN]	0,3	0,6	1,2
R60	Characteristic resistance	$F_{Rk,s(60)}$	[kN]	0,3	0,5	1,0
R90	Characteristic resistance	$F_{Rk,s(90)}$	[kN]	0,3	0,3	0,6
R120	Characteristic resistance	$F_{Rk,s(120)}$	[kN]	0,2	0,2	0,4
R30 to R120	Spacing	$s_{cr} = s_{min}$	[mm]	200	200	200
	Edge distance for fire attack from one side only	$c_{cr} = c_{min}$	[mm]	150	150	150
	Edge distance for fire attack from more than one side	$c_{cr} = c_{min}$	[mm]	300	300	300

Kunkel anchor K6, K6+, K6L and K8

Performance
Characteristic values under fire exposure in all load directions in concrete C20/25 to C50/60

Annex C3