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-18/1126 of 28 January 2019

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	KINFIX
Product family to which the construction product belongs	Mechanical fastener for redundant non-structural systems
Manufacturer	Kinex Oy Volttikatu 6 70700 KUOPIO FINLAND FINNLAND
Manufacturing plant	Sheh Kai Prcision Co. Ltd.
This European Technical Assessment contains	14 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	EAD 330747-00-0601

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Specific Part

1 Technical description of the product

KINFIX SK 6 and SK 8 is a concrete screw made of galvanized steel. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C3 and C4

3.2 Safety in use (BWR 4)

Wesentliches Merkmal	Leistung
Characteristic resistance under static and quasi-static loading, displacements	See Annex C1 and C2

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

In accordance with EAD 330747-00-0601 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.

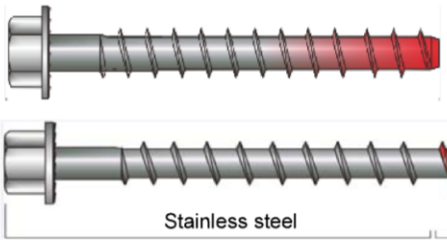
Issued in Berlin on 28 January 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Lange

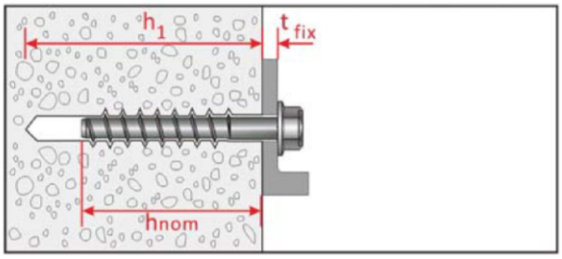
Deutsches Institut für Bautechnik DIBt

Product in the installed condition

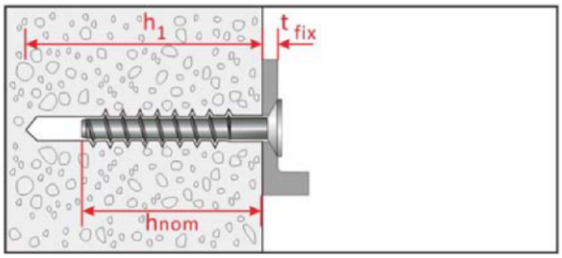


Steel 10B21

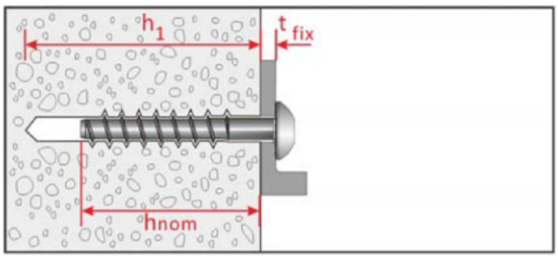
Stainless steel A2 /A4



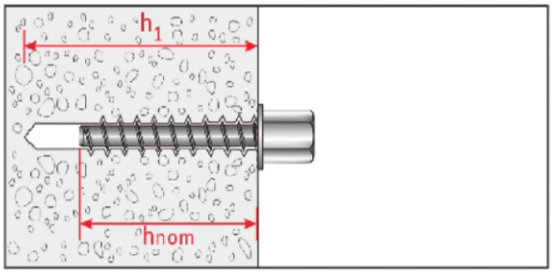
Hexagon Head: SK -H,-HF
10B21 (SK 6)
A4 (SK 6, SK 8)
A2 (SK 8)



Countersunk Head: SK -C
10B21 (SK 6)
A4 (SK 6)



Pan Head: SK -P
10B21 (SK 6)
A4 (SK 6)



Internal Thread: SK -I
10B21 (SK 6-M8, SK 6-M10,
SK 6-M8/M10)

KINFIX	Annex A1
Product description Installed condition	

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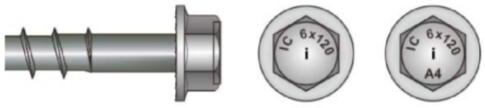
Table A1: Materials and screw types

Name	Material
Screw anchor	

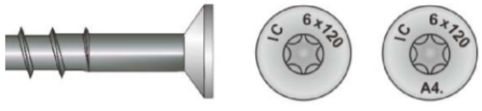
Head marking	material
SK	Steel 10B21 acc. To SAE-J403 zinc coating: electro plated (> 5 µm) or mechanical plated (> 30 µm)
SK A4 SK A2	Stainless steel 1.4401, 1.4404 (both A4) Stainless steel 1.4301

Anchor size / head types			SK 6			SK 8	
			-H -HF -C -P -I	-H -HF	-C -P	-H	-H
material			10B21	A4		A2	A4
Nominal value of the characteristic yield strength	f_{yk}	N/mm²	780	640	432	640	640
Nominal value of the characteristic teisile strength	f_{uk}	N/mm²	870	800	540	800	800
Elongation at rupture	As	[%]	≤ 8				

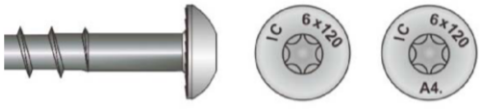
Hexagon washer head
1) SK -H size 6 (10B21 steel)
2) SK -H A4 size 6,8 (stainless A4)
3) SK -H A2 size 8 (stainless A2)



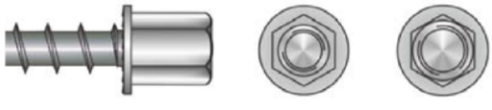
Hexagon washer head
3) SK -HF size 6 (10B21 steel)
4) SK -HF A4 size 6 (stainless A4)



Countersunk head
5) SK -C size 6 (10B21 steel)
6) SK -C A4 size 6 (stainless A4)



Pan head
7) SK -P size 6 (10B21 steel)
8) SK -P A4 size 6 (stainless A4)



Internal thread head (10B21 steel)
9) SK -I size 6 with internal thread M8 or M10
10) SK -I size 6 with internal thread M8 and M10

KINFIX

Product description
Materials and screw types

Annex A2

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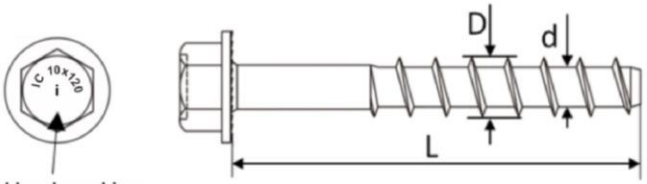
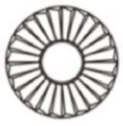
Table A2: Dimensions and markings

Anchor size			SK 6					SK 8	
Head type			H, HF, P	C	H, HF, P	C	I	H	H
Material			Steel 10B21		Stainless A4		Steel 10B21	Stainless A2	Stainless A4
Nominal Embedment depth	h_{nom}	[mm]	55		70		55	52	52
Length of anchor	min L	[mm]	60	65	75	80	57	55	55
	max L	[mm]	140				57	150	
Thread diameter	D	[mm]	7,5					9,9	
Shaft diameter	d	[mm]	5,5					7,4	
Thread pitch	p	[mm]	4,45					5,8	

Steel 10B21

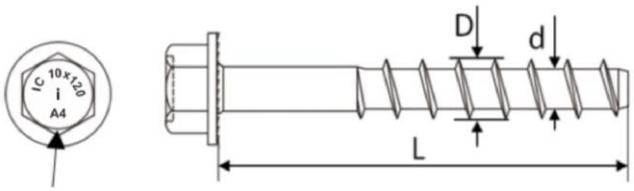


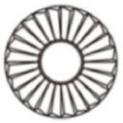


Reverse Locking Serrations

Head marking:
Identifying mark of producer: IC
Nominal size: e.g. 6mm
Length L: 70mm

Stainless Steel A4

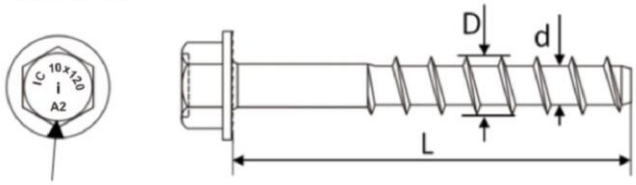




Reverse Locking Serrations

Head marking:
Identifying mark of producer: IC
Nominal size: e.g. 6mm
Length L: 85mm
Material: A4

Stainless Steel A4



Reverse Locking Serrations

Head marking:
Identifying mark of producer: IC
Nominal size: e.g. 8mm
Length L: 65mm
Material: A2

KINFIX

Product description
Dimensions and markings

Annex A3

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Specifications of Intended use

Anchorages subject to:

- Static and quasi-static loads:
- Used only for redundant non-structural systems.
- Fire exposure: only for concrete C20/25 to C50/60.

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013,
- Strength classes C20/25 to C50/60 according to EN 206:2013,
- Non-cracked or cracked concrete: all sizes.

Use conditions (Environmental conditions)

- Anchorages subject to dry internal conditions. (zinc plated steel and stainless steel)
- Anchorages subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist. (only stainless steel with marking A4)

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere or indoor swimming 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.).
- Anchorages are designed in accordance with EN 1992-4:2018 Design method A and TR 055, Edition December 2016

Installation:

- Hammer drilling only: all sizes and all embedment depths.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- After installation further turning of the anchor shall not be possible.
- The head of the anchor must be fully engaged on the fixture and show no signs of damage.

KINFIX	Annex B1
Intended use Specifications	

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Table B1: Installation parameters

Anchor size			**SK 6**							**SK 8**	
Head type			**H, HF**	**P**	**I**	**C**	**H, HF**	**P**	**C**	**H**	**H**
Material			**Steel 10B21**				**Stainless A4**			**Stainless A2**	**Stainless A4**
Nominal diameter of drill bit	d_0	[mm]	6							8	
Nominal embedment depth	h_{nom}	[mm]	55				70			52	
Min. hole depth in concrete	$h_1 \geq$	[mm]	64				80			65	
Effective embedment depth	h_{ef}	[mm]	42,6				43,1			22,2	
Clearance hole	d_f	[mm]	9							11	
Thickness of fixture	t_{fix}	[mm]	5-85		-	10-85	5-70		10-70	3-98	
Installation torque[1)]	T_{inst}	[Nm]	20	-[1)]	20	-[1)]	-[1)]		-[1)]	31	
Wrench size	WS	[mm]	10	-	12,7	-	-		-	13	
Torx size	TX	-	-	40	-	40	-	40	40	-	
Max. power output, machine setting	$T_{max} \leq$	[Nm]	80				120	80	80	185	

1) Screws can only be set using a impact screw driver.

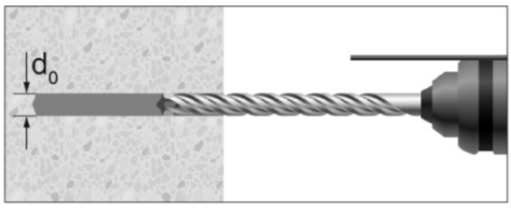
Table B2: Minimum thickness of member, minimum spacing and edge distance

Anchor size			**SK 6**		**SK 8**	
			H, HF, C, P, I	**H, HF, C, P**	**H**	**H**
Material			**Steel 10B21**	**Stainless A4**	**Stainless A2**	**Stainless A4**
Minimum member thickness	h_{min}	[mm]	100	110	100	
Minimum edge distance	c_{min}	[mm]	40	40	55	
Minimum spacing	s_{min}	[mm]	40	40	55	

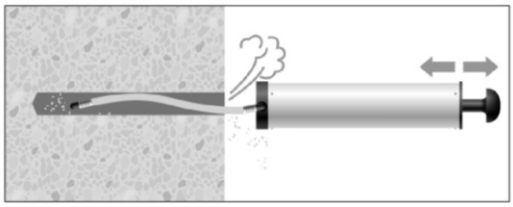
KINFIX	**Annex B2**
Intended use Installation parameters	

Deutsches Institut für Bautechnik DIBt

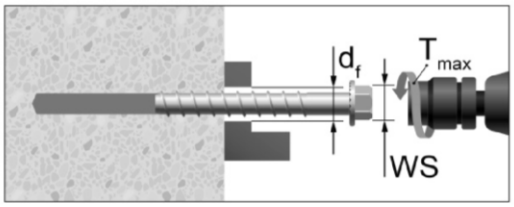
Installation instruction



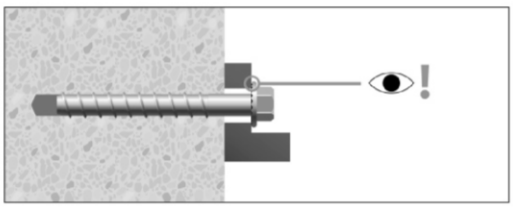
Drill the hole to the depth $\mathbf{h_1}$.



Clean the hole.



Screw in the anchor by using a torque wrench or an impact screw driver.
In case of using torque wrench: T_{inst} acc. to Table B1.
In case of using impact screw driver: T_{max} acc. to Table B1.
WS= Wrench Size



Control of complete setting, full contact of screw head with fixture part.

KINFIX	Annex B3
Intended Use Installation Instruction	

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Table C1: Characteristic resistance under tension loading

Anchor size			**SK 6**						**SK 8**	
Head type			**H,HF,I**	**C**	**P**	**H,HF**	**C**	**P**	**H**	**H**
Material			**Steel 10B21**			**Stainless A4**			**Stainless A2**	**Stainless A4**
Steel failure										
Characteristic resistance	$N_{Rk,s}$	[kN]	19,7			18,1	12,2	12,2	33,0	33,0
Partial factor	γ_{Ms}	[-]	1,4			1,5			1,5	
Pull-out failure										
Characteristic resistance in cracked and uncracked concrete C20/25	$N_{Rk,p}$	[kN]	5,0	5,0	4,0	5,0	3,5	2,5	2,0	
Increasing factors for $N_{Rk,p}$ in cracked or non-cracked concrete	ψ_c	C30/37	1,22						1,20	
		C40/50	1,41						1,37	
		C50/60	1,58						1,51	
Installation factor	γ_{inst}	[-]	1,0			1,0			1,0	
Concrete cone failure										
Effective embedment depth	h_{ef}	[mm]	42,6			43,1			22,2	
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}							
Characteristic spacing	$s_{cr,N}$	[mm]	3,0 h_{ef}							
Installation factor	γ_{inst}	[-]	1,0			1,0			1,0	
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7							
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0							
Splitting failure										
Characteristic resistance in cracked and uncracked concrete C20/25	$N^0_{Rk,sp}$	[kN]	$N^0_{Rk,sp} = N_{Rk,p}$							
Characteristic edge distance for splitting	$c_{cr,sv\,p}$	[mm]	1,5h_{ef}			1,5h_{ef}			2,5h_{ef}	
Characteristic anchor spacing for splitting	$s_{cr,sp}$	[mm]	3,0h_{ef}			3,0h_{ef}			5,0h_{ef}	
Installation factor	γ_{inst}	[-]	1,0			1,0			1,0	
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7							
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0							

KINFIX

Performance
Characteristic values under tension loading

Annex C1

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Table C2: Characteristic resistance under shear loading

Anchor size			**SK 6**						**SK 8**	
Head type			**H,HF,I**	**C**	**P**	**H,HF**	**C**	**P**	**H**	**H**
Material			**Steel 10B21**			**Stainless A4**			**Stainless A2**	**Stainless A4**
Setting depth	h_{nom}	[mm]	55			70			52	
Effective embedment depth	h_{ef}	[mm]	42,6			43,1			22,2	
Steel failure without lever arm										
Characteristic resistance	$V_{Rk,s}$	[kN]	7,9			9,0	6,1	6,1	13,2	
Ductility factor	k_7	[-]	0,8							
Partial factor	γ_{Ms}	[-]	1,5			1,25			1,25	
Steel failure with lever arm										
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	15,9			14,6	9,9	9,9	35,9	
Partial factor	γ_{Ms}	[-]	1,5			1,25			1,25	
Concrete pryout failure										
k-factor	k_8	[-]	1,0			1,0			1,0	
Partial factor	γ_{Mcp}	[-]	1,5							
Concrete edge failure										
Effective length of anchor in shear loading	ℓ_f	[mm]	42,6			43,1			22,2	
Effective diameter of anchor	d_{nom}	[mm]	5,37						7,4	
Partial factor	γ_{Mc}	[-]	1,5							

KINFIX

Performance
Characteristic values under shear loading

Annex C2

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic values for resistance to fire (Tension)

Anchor size				SK 6						SK 8	
Head type				H,HF,I	C	P	H,HF	C	P	H	H
Material				Steel 10B21			Stainless A4			Stainless A2	Stainless A4
Partial factor		$\gamma_{M,fi}$	[-]	1,0			1,0			1,0	
Steel failure											
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,23			0,23			0,8	
	R60	$N_{Rk,s,fi}$	[kN]	0,20			0,20			0,7	
	R90	$N_{Rk,s,fi}$	[kN]	0,16			0,16			0,5	
	R120	$N_{Rk,s,fi}$	[kN]	0,11			0,11			0,4	
Pull-out failure											
Characteristic resistance in concrete >= C20/25	R30	$N_{Rk,p,fi}$	[kN]	1,3		1,0	1,3	0,9	0,6	0,5	
	R60										
	R90										
	R120	$N_{Rk,p,fi}$	[kN]	1,0		0,8	1,0	0,7	0,5	0,4	
Concrete cone failure											
Characteristic resistance in concrete >= C20/25	R30	$N^0_{Rk,c,fi}$	[kN]	2,0			2,1			0,4	
	R60										
	R90										
	R120	$N^0_{Rk,c,fi}$	[kN]	1,6			1,7			0,3	
Effective embedment depth		h_{ef}	[mm]	42,6			43,1			22,2	
Minimum member thickness		h_{min}	[mm]	100			110			100	
Spacing		$s_{cr,N,fi}$	[mm]	$4h_{ef}$							
		s_{min}	[mm]	40						55	
Edge distance		$c_{cr,N,fi}$	[mm]	$2h_{ef}$							
Fire exposure from one side only		c_{min}	[mm]	40						55	
Fire exposure from more than one side				≥ 300 mm							

KINFIX	Annex C3
Performance Characteristic values for resistance to fire	

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Table C4: Characteristic values for resistance to fire (Shear)

Anchor size				SK 6						SK 8	
Head type				H, HF, I	C	P	H, HF	C	P	H	H
Material				Steel 10B21			Stainless A4			Stainless A2	Stainless A4
Partial factor		$\gamma_{M,fi}$	[-]	1.0							
Steel failure without level arm											
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	0,23			0,23			0,8	
	R60	$V_{Rk,s,fi}$	[kN]	0,20			0,20			0,7	
	R90	$V_{Rk,s,fi}$	[kN]	0,16			0,16			0,5	
	R120	$V_{Rk,s,fi}$	[kN]	0,11			0,11			0,4	
Steel failure with level arm											
Characteristic resistance	R30	$M^0_{Rk,p,fi}$	[Nm]	0,18			0,18			0,9	
	R60	$M^0_{Rk,p,fi}$	[Nm]	0,16			0,16			0,7	
	R90	$M^0_{Rk,p,fi}$	[Nm]	0,13			0,13			0,5	
	R120	$M^0_{Rk,p,fi}$	[Nm]	0,09			0,09			0,4	
Pry-out failure											
k_8			[-]	1,0			1,0			1,0	
Characteristic resistance	R30	$V_{Rk,cp,fi}$	[kN]	2,0			2,1			0,4	
	R60										
	R90										
	R120	$V_{Rk,cp,fi}$	[kN]	1,6			1,7			0,3	
Concrete edge failure											
Characteristic resistance	≤ R90	$V_{Rk,c,fi}$	[kN]	$V^0_{Rk,c,fi} = 0,25 * V^0_{Rk,c}$							
	R120	$V_{Rk,c,fi}$	[kN]	$V^0_{Rk,c,fi} = 0,20 * V^0_{Rk,c}$							

KINFIX

Performance
Characteristic values for resistance to fire

Annex C4