

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-16/0067
of 29 March 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

Sheh Kai Concrete Screw SK 6

Product family
to which the construction product belongs

Concrete screw for multiple use for non-structural
applications

Manufacturer

SHEH KAI PRECISION CO., LTD
No. 1, Ben Gong 1st Rd., Ben Chou Industrial Park,
KAOHSIUNG 82059
TAIWAN R.O.C

Manufacturing plant

SHEH KAI PRECISION CO., LTD
No. 1, Ben Gong 1st Rd., Ben Chou Industrial Park,
KAOHSIUNG 82059
TAIWAN R.O.C

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

ETAG 001 Part 6: "Anchors for multiple use for
non-structural applications", April 2013,
used as EAD according to Article 66 Paragraph 3 of
Regulation (EU) No 305/2011.

This version replaces

ETA-16/0067 issued on 21 April 2016

European Technical Assessment

ETA-16/0067

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Page 2 of 14 | 29 March 2018

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Specific Part

1 Technical description of the product

The Sheh Kai concrete screw of sizes SK 6 and SK 8 is an anchor 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 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	Anchorage satisfies requirements for Class A1
Resistance to fire	See Annex C3 and C4

3.3 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 guideline for European technical approval ETAG 001-6, 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: [97/161/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

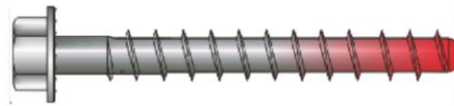
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 29 March 2018 by Deutsches Institut für Bautechnik

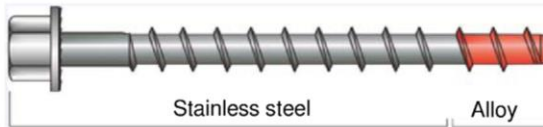
Dr.-Ing. Lars Eckfeldt
p. p. Head of Department

beglaubigt:
Lange

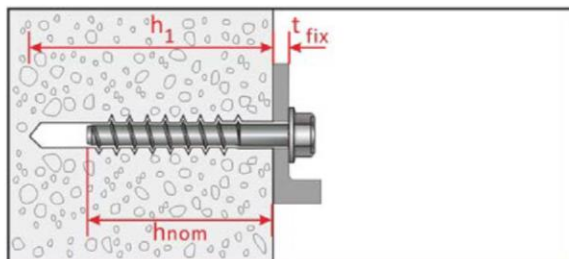
Product in the installed condition



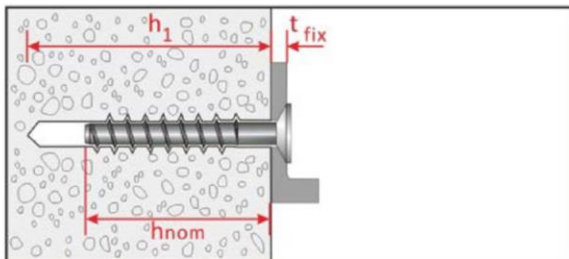
Steel 10B21



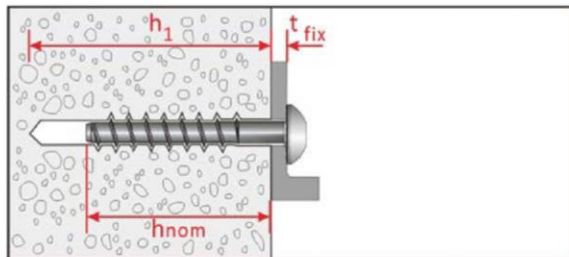
Stainless steel A2 /A4



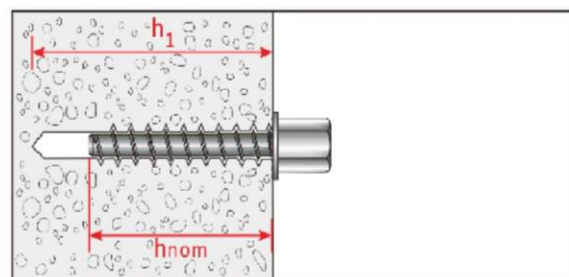
Hexagon Head : SK-H,-HF
10B21 (SK6)
A4 (SK6, SK8)
A2 (SK8)



Countersunk Head : SK-C
10B21 (Sk6)
A4 (SK6)



Pan Head : SK-P
10B21 (SK6)
A4 (SK6)



Internal Thread : SK-I
10B21 (SK6-M8, SK6-M10,
SK6-M8/M10)














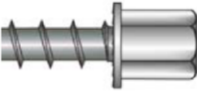


Sheh Kai Concrete Screw SK

Product description
Installed condition

Annex A1

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		Stainless steel 1.4401, 1.4404 (both A4)					
	SK A2		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/mm ²	780	640	432	640	640
Nominal value of the characteristic teisile strength		f_{uk}	N/mm ²	870	800	540	800	800
Elongation at rupture		A_s	[%]	≤ 8				

				<p>Hexagon washer head</p> <p>1) SK-H size 6 (10B21 steel) 2) SK-H A4 size 6,8 (stainless A4) 3) SK-H A2 size 8 (stainless A2)</p>
				<p>Hexagon washer head</p> <p>3) SK-HF size 6 (10B21 steel) 4) SK-HF A4 size 6 (stainless A4)</p>
				<p>Countersunk head</p> <p>5) SK-C size 6 (10B21 steel) 6) SK-C A4 size 6 (stainless A4)</p>
				<p>Pan head</p> <p>7) SK-P size 6 (10B21 steel) 8) SK-P A4 size 6 (stainless A4)</p>
				<p>Internal thread head (10B21 steel)</p> <p>9) SK-I size 6 with internal thread M8 or M10 10) SK-I size 6 with internal thread M8 and M10</p>

Sheh Kai Concrete Screw SK

Product description
Materials and screw types

Annex A2

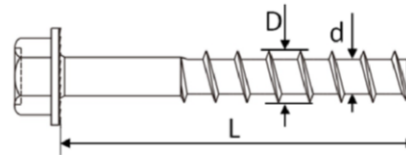
Table A2: Dimensions and markings

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



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

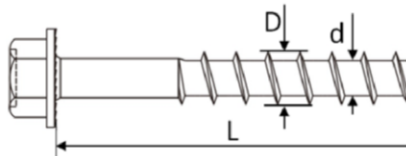


Reverse Locking
Serrations

Stainless Steel
A4



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

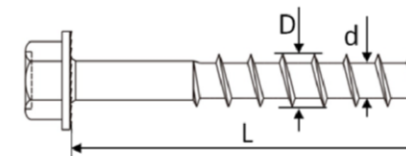


Reverse Locking
Serrations

Stainless Steel
A2



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



Reverse Locking
Serrations

Sheh Kai Concrete Screw SK

Product description
Dimensions and markings

Annex A3

Intended use

Anchorage subject to:

- Static and quasi-static loads:
- Used only for multiple use for non-structural application according to ETAG 001, part 6.
- Fire exposure: only for concrete C20/25 to C50/60.

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 or cracked concrete: all sizes.

Use conditions (Environmental conditions)

- Anchorages subject to dry internal conditions. All screw types.
- Anchorages subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist. Screw types made of stainless steel with marking A4.

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 under static or quasi-static actions are designed for design method A and under fire exposure in accordance with:
FprEN 1992-4:2016 and EOTA Technical Report TR 055, 12/2016

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.

Sheh Kai Concrete Screw SK

**Intended use
Specifications**

Annex B1

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 ≥	[mm]	64			80			65		
Effective anchorage 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} ≤	[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

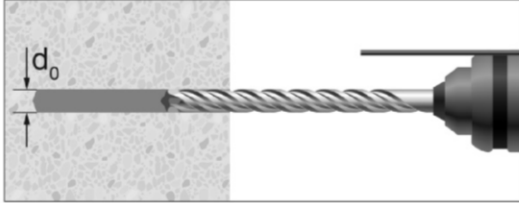
Anchor size			SK 6				SK 8		
			H, HF, C, P, I			H, HF, C, P		H	H
Material			Steel 10B21			Stainless A4		Stainless A2	Stainless A4
Minimum member thickness	h _{min}	[mm]	100			110		100	
Minimum edge distance	c _{min}	[mm]	40			40		55	
Minimum spacing	s _{min}	[mm]	40			40		55	

Sheh Kai Concrete Screw SK

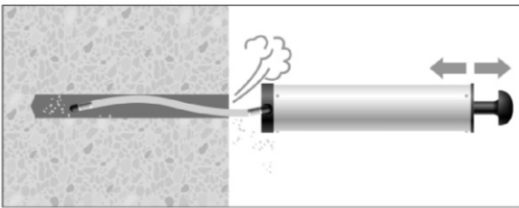
Intended use
Installation parameters

Annex B2

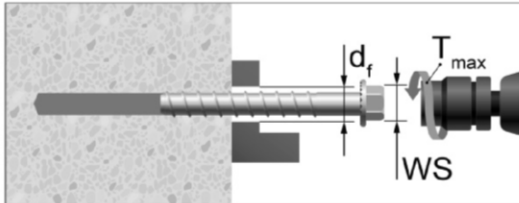
Installation instruction



Drill the hole to the depth h_1 .



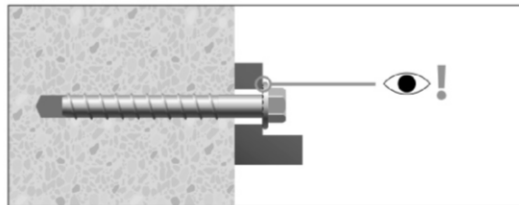
Clean the hole.



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.

Sheh Kai Concrete Screw SK

Intended Use
Installation Instruction

Annex B3

Table C1: Characteristic resistance under tension loading, Design method A

Anchor size			SK 6					SK 8		
			H, HF, I	C	P	H, HF	C	P	H	H
Material			Steel 10B21			Stainless A4		Stainless A2	Stainless A4	
Steel failure										
Characteristic resistance	$N_{Rk,s}^{1)}$	[kN]	19,7			18,1	12,2	12,2	33,0	33,0
Partial safety factor	$\gamma_{Ms}^{2)}$	[-]	1,4			1,5		1,5		
Pull-out failure										
Characteristic resistance in cracked and uncracked concrete C20/25	$N_{Rk,p}^{1)}$	[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 safety factor	$\gamma_{inst}^{2)}$	[-]	1,0			1,0		1,0		
Concrete cone failure										
Effective anchorage depth	h_{ef}	[mm]	42,6			43,1		22,2		
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					1,5 h_{ef}		
Characteristic spacing	$s_{cr,N}$	[mm]	3,0 h_{ef}					3,0 h_{ef}		
Installation safety factor	$\gamma_{inst}^{2)}$	[-]	1,0			1,0		1,0		
Factor for cracked concrete	$k_{cr}^{3)}$	[-]	7,7					7,7		
Factor for uncracked concrete	$k_{ucr}^{3)}$	[-]	11,0					11,0		
Splitting failure										
Proof of splitting is required	-	[-]	Yes			Yes		Yes		
Characteristic edge distance for splitting	$c_{cr,sp}$	[mm]	1,5 h_{ef}			1,5 h_{ef}		2,5 h_{ef}		
Characteristic anchor spacing for splitting	$s_{cr,sp}$	[mm]	3,0 h_{ef}			3,0 h_{ef}		5,0 h_{ef}		
Installation safety factor	$\gamma_{inst}^{2)}$	[-]	1,0			1,0		1,0		
Factor for cracked concrete	$k_{cr}^{3)}$	[-]	7,7					7,7		
Factor for uncracked concrete	$k_{ucr}^{3)}$	[-]	11,0					11,0		

1) The design value $N_{Rd,s}$ has to be limited according to ETAG001, part 6, Annex 1.

2) In absence of other national regulations.

3) Based on concrete strength measured on cylinders.

Sheh Kai Concrete Screw SK

Performance
Characteristic values under tension loading

Annex C1

Table C2: Characteristic resistance under shear loading, Design method A

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	$V_{Rk,s}^{1)}$	[kN]	7,9			9,0	6,1	6,1	13,2	
Factor for groups	k_7	[-]	0,8							
Partial safety factor	$\gamma_{Ms}^{2)}$	[-]	1,5			1,25			1,25	
Steel failure with lever arm										
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	15,9			14,6	9,9	9,9	35,9	
Partial safety factor	$\gamma_{Ms}^{2)}$	[-]	1,5			1,25			1,25	
Concrete pryout failure										
k-factor	k_8	[-]	1,0			1,0			1,0	
Partial safety factor	$\gamma_{Mcp}^{2)}$	[-]	1,5							
Concrete edge failure										
Effective length of anchor in shear loading	λ_f	[mm]	42,6			43,1			22,2	
Effective diameter of anchor	d_{nom}	[mm]	5,37						7,4	
Partial safety factor	$\gamma_{Mc}^{2)}$	[-]	1,5							

1) The design value $V_{Rd,s}$ has to be limited according to ETAG001, part 6, Annex 1.

2) In absence of other national regulations

Sheh Kai Concrete Screw SK

Performance
Characteristic values under shear loading

Annex C2

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 safety factor		$\gamma_{M,fi}$ ¹⁾	[-]	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 \geq 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 \geq 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]	4 h_{ef}														
		s_{min}	[mm]	40						55								
Edge distance		$c_{cr,N,fi}$	[mm]	2 h_{ef}														
Fire exposure from one side only		c_{min}	[mm]	40						55								
Fire exposure from more than one side				≥ 300 mm														

1) In absence of other national regulations.

Sheh Kai Concrete Screw SK

Performance
Characteristic values for resistance to fire

Annex C3

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 safety factor		$\gamma_{M,fi}^{1)}$	[-]	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]	$V^0_{Rk,c,fi} = 0,20 * V^0_{Rk,c}$							

1) In absence of other national regulations.

Sheh Kai Concrete Screw SK

Performance
Characteristic values for resistance to fire

Annex C4