

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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## 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+

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**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

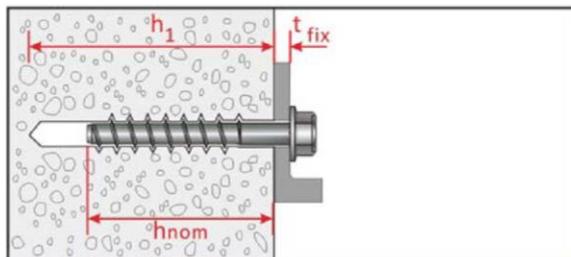
**Product in the installed condition**



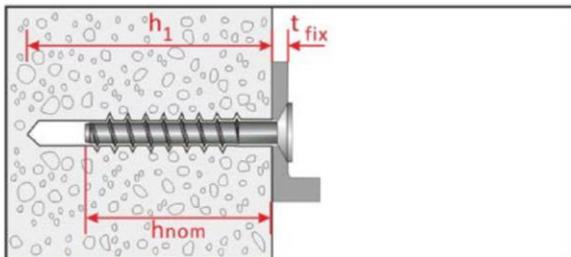
Steel 10B21



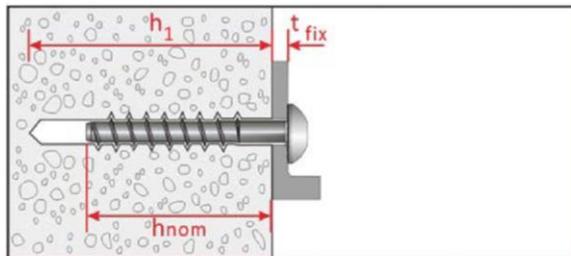
Stainless steel A2 /A4



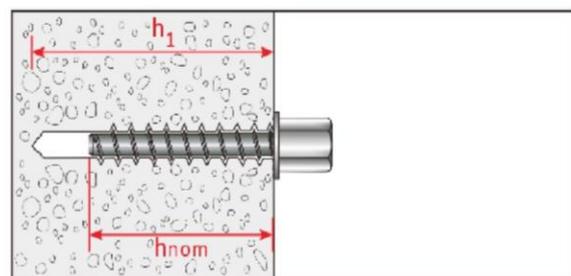
Hexagon Head : SK-H,-HF  
10B21 (SK6)  
A4 (SK6, SK8)  
A2 (SK8)



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



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



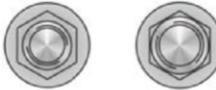
Internal Thread : SK-I  
10B21 (SK6-M8, SK6-M10,  
SK6-M8/M10)

**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 <sub>yk</sub>	N/mm <sup>2</sup>	780	640	432	640
Nominal value of the characteristic teisile strength		f <sub>uk</sub>	N/mm <sup>2</sup>	870	800	540	800	800
Elongation at rupture		A <sub>s</sub>	[%]	≤ 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					

**Sheh Kai Concrete Screw SK**

**Product description**  
Materials and screw types

**Annex A2**

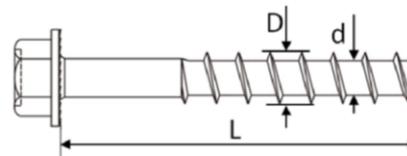
**Table A2: Dimensions and markings**

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

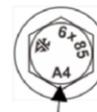


Head marking:  
Identifying mark of producer: SK  
Nominal size: e.g. 6mm  
Length L: 70mm

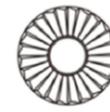
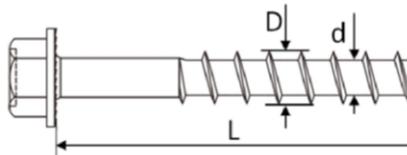


Reverse Locking  
Serrations

Stainless Steel  
A4



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

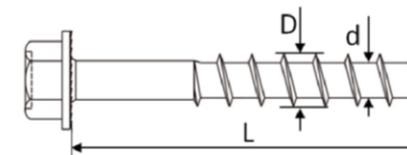


Reverse Locking  
Serrations

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	$h_1 \geq$	[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 <sup>1)</sup>	$T_{inst}$	[Nm]	20	- <sup>1)</sup>	20	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>	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**

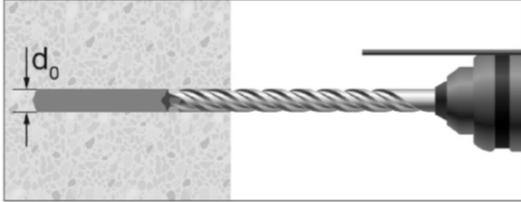
Anchor size			SK 6				SK 8		
			H, HF, C, P, I			H, HF, C, P		H	H
Material			Steel 10B21			Stainless A4		Stainless A2	Stainless A4
Minimum member thickness	$h_{min}$	[mm]	100			110		100	
Minimum edge distance	$c_{min}$	[mm]	40			40		55	
Minimum spacing	$s_{min}$	[mm]	40			40		55	

**Sheh Kai Concrete Screw SK**

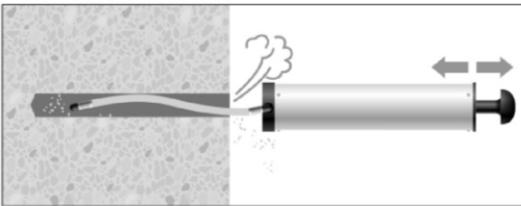
**Intended use**  
Installation parameters

**Annex B2**

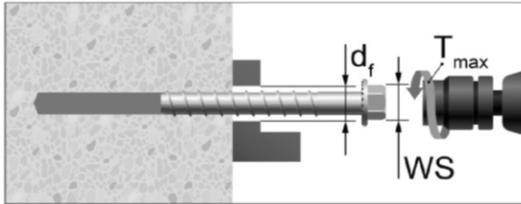
## Installation instruction



Drill the hole to the depth  $h_1$ .



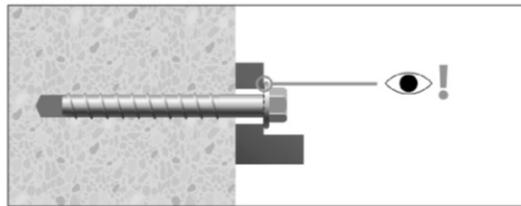
Clean the hole.



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
Material			Steel 10B21		Stainless A4			Stainless A2	Stainless A4
<b>Steel failure</b>									
Characteristic resistance	$N_{Rk,s}^{1)}$	[kN]	19,7		18,1	12,2	12,2	33,0	33,0
Partial safety factor	$\gamma_{Ms}^{2)}$ [-]	[kN]	1,4		1,5			1,5	
<b>Pull-out failure</b>									
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	$\psi_c$	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	
<b>Concrete cone failure</b>									
Effective anchorage depth	$h_{ef}$	[mm]	42,6		43,1			22,2	
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$					2,5 $h_{ef}$	
Characteristic spacing	$s_{cr,N}$	[mm]	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					11,0	
Factor for uncracked concrete	$k_{ucr}^{3)}$	[-]	11,0						
<b>Splitting failure</b>									
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					11,0	
Factor for uncracked concrete	$k_{ucr}^{3)}$	[-]	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		
<b>Steel failure without lever arm</b>										
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		
<b>Steel failure with lever arm</b>										
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		
<b>Concrete pryout failure</b>										
k-factor	$k_8$	[-]	1,0			1,0		1,0		
Partial safety factor	$\gamma_{Mcp}^{2)}$	[-]	1,5							
<b>Concrete edge failure</b>										
Effective length of anchor in shear loading	$\lambda_f$	[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		$\gamma_{M,fi}$ <sup>1)</sup>	[-]	1,0			1,0			1,0		
<b>Steel failure</b>												
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		
<b>Pull-out failure</b>												
Characteristic resistance in concrete $\geq$ C20/25	R30	$N_{RK,p,fi}$	[kN]	1,3			1,0			1,3		
	R60											
	R90											
	R120	$N_{RK,p,fi}$	[kN]	1,0			0,8			1,0		
<b>Concrete cone failure</b>												
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				$\geq 300$ 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							
<b>Steel failure without level arm</b>											
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	
<b>Steel failure with level arm</b>											
Characteristic resistance	R30	$M_{Rk,p,fi}^0$	[Nm]	0,18			0,18			0,9	
	R60	$M_{Rk,p,fi}^0$	[Nm]	0,16			0,16			0,7	
	R90	$M_{Rk,p,fi}^0$	[Nm]	0,13			0,13			0,5	
	R120	$M_{Rk,p,fi}^0$	[Nm]	0,09			0,09			0,4	
<b>Pry-out failure</b>											
$k_8$			[-]	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	
<b>Concrete edge failure</b>											
Characteristic resistance	≤ R90	$V_{Rk,c,fi}$	[kN]	$V_{Rk,c,fi}^0 = 0,25 * V_{Rk,c}^0$							
	R120	$V_{Rk,c,fi}$	[kN]	$V_{Rk,c,fi}^0 = 0,20 * V_{Rk,c}^0$							

1) In absence of other national regulations.

**Sheh Kai Concrete Screw SK**

**Performance**  
Characteristic values for resistance to fire

**Annex C4**