

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-20/0727**  
**of 9 November 2020**

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

Hexstone screw anchor Ankerbolt

Product family  
to which the construction product belongs

Fasteners for use in concrete for  
redundant non-structural systems

Manufacturer

Hexstone Limited  
Opal Way  
Stone Business Park, Stone  
STAFFORDSHIRE ST 15 OSW  
GROSSBRITANNIEN

Manufacturing plant

JCP Plant Taiwan

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, Edition 6/2018

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## Specific Part

### 1 Technical description of the product

The Hexstone screw anchor Ankerbolt is an anchor made of galvanised or stainless steel of size 6. 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 C 3 and C 4

#### 3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B 2 and C 1
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 2
Durability	See Annex B 1

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

In accordance with European Assessment Document EAD No. 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 9 November 2020 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock  
Head of Section

*beglaubigt:*  
Baderschneider

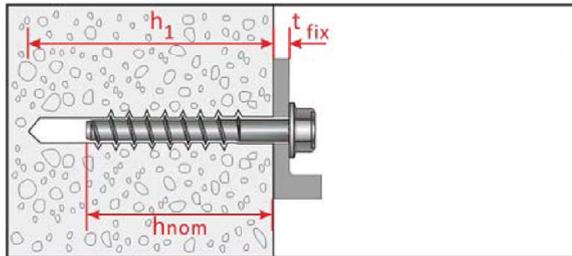
**Product in the installed condition**



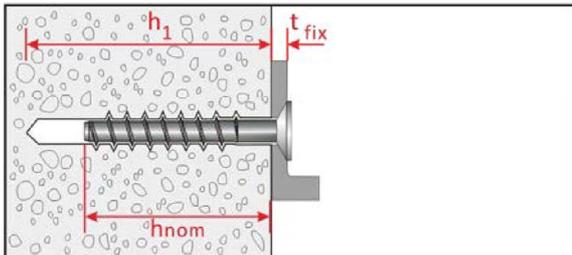
Steel 10B21



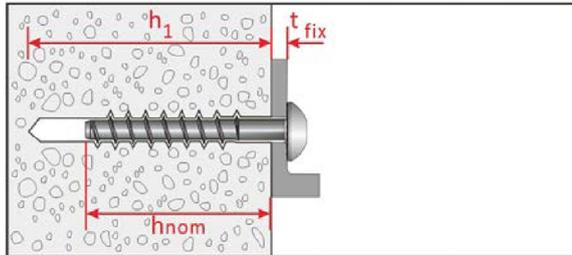
Stainless steel A2 /A4



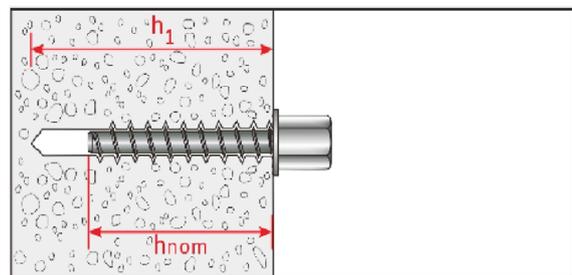
Hexagon Head : SK-H, SK -HF  
10B21 (SK6)  
A4 (SK6, SK8)  
A2 (SK8)



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



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



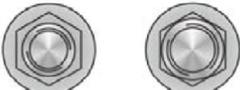
Internal Thread : SK-I  
10B21 (SK6-M8, SK6-M10,  
SK6-M8/M10)

**Hexstone screw anchor Ankerbolt**

**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	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						

**Hexstone screw anchor Ankerbolt**

**Product description**  
Materials and screw types

**Annex A2**

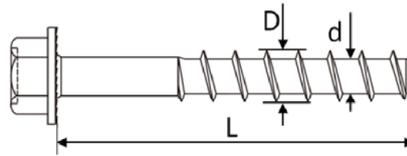
**Table A2: Dimensions and markings**

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

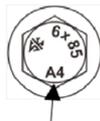


Head marking:  
Identifying mark of producer: SK  
Nominal size: e.g. 6mm  
Length L: 70mm

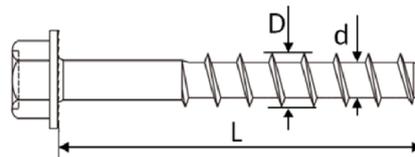


Reverse Locking  
Serrations

Stainless Steel  
A4



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

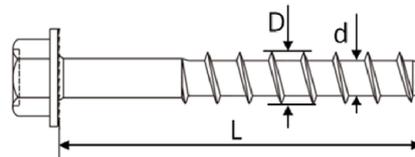


Reverse Locking  
Serrations

Stainless Steel  
A2



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



Reverse Locking  
Serrations

**Hexstone screw anchor Ankerbolt**

**Product description**  
Dimensions and markings

**Annex A3**

### Specifications of Intended use

#### Anchorage subject to:

- Static and quasi-static loads:
- Used only for multiple use for non-structural application.
- 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 Technical Report TR 055

#### 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.

**Hexstone screw anchor Ankerbolt**

**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 <sub>0</sub>	[mm]	6						8		
Nominal embedment depth	h <sub>nom</sub>	[mm]	55			70			52		
Min. hole depth in concrete	h <sub>1</sub> ≥	[mm]	64			80			65		
Effective anchorage depth	h <sub>ef</sub>	[mm]	42,6			43,1			22,2		
Clearance hole	d <sub>f</sub>	[mm]	9						11		
Thickness of fixture	t <sub>fix</sub>	[mm]	5-85	-	10-85	5-70	10-70	3-98			
Installation torque <sup>1)</sup>	T <sub>inst</sub>	[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 <sub>max</sub> ≤	[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**

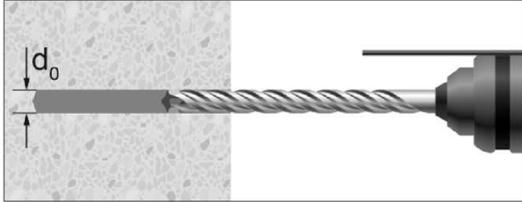
Anchor size			SK 6				SK 8		
			H, HF, C, P, I			H, HF, C, P		H	H
Material			Steel 10B21			Stainless A4		Stainless A2	Stainless A4
Minimum member thickness	h <sub>min</sub>	[mm]	100			110		100	
Minimum edge distance	c <sub>min</sub>	[mm]	40			40		55	
Minimum spacing	s <sub>min</sub>	[mm]	40			40		55	

**Hexstone screw anchor Ankerbolt**

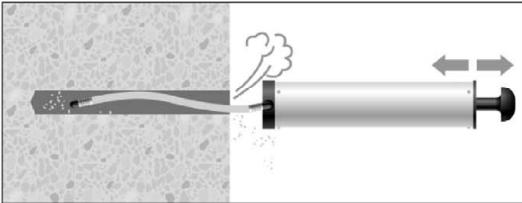
**Intended use**  
Installation parameters

**Annex B2**

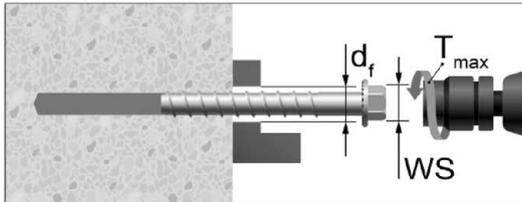
## Installation instruction



Drill the hole to the depth  $h_1$ .



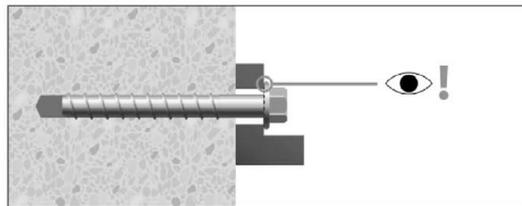
Clean the hole.



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.

**Hexstone screw anchor Ankerbolt**

**Intended Use**  
Installation Instruction

**Annex B3**

**Table C1: Characteristic resistance under tension loading**

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	
<b>Steel failure</b>										
Characteristic resistance	$N_{Rk,s}$	[kN]	19,7			18,1	12,2	12,2	33,0	33,0
Partial factor	$\gamma_{Ms}$	[-]	1,4			1,5		1,5		
<b>Pull-out failure</b>										
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	$\psi_c$	C30/37	1,22					1,20		
		C40/50	1,41					1,37		
		C50/60	1,58					1,51		
Installation factor	$\gamma_{inst}$	[-]	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 $h_{ef}$							
Characteristic spacing	$s_{cr,N}$	[mm]	3,0 $h_{ef}$							
Installation factor	$\gamma_{inst}$	[-]	1,0			1,0		1,0		
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7							
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0							
<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 factor	$\gamma_{inst}$	[-]	1,0			1,0		1,0		
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7							
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0							

**Hexstone screw anchor Ankerbolt**

**Performance**  
Characteristic values under tension loading

**Annex C1**

**Table C2: Characteristic resistance under shear loading**

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

**Hexstone screw anchor Ankerbolt**

**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 factor		$\gamma_{M,fi}$	[-]	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		0,9		0,6	
	R60												
	R90												
	R120	$N_{Rk,p,fi}$	[kN]	1,0		0,8		1,0		0,7		0,5	
<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									

**Hexstone screw anchor Ankerbolt**

**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 factor			$\gamma_{M,fi}$	[-]		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	$M^0_{Rk,p,fi}$	[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	
<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]	$V^0_{Rk,c,fi} = 0,25 * V^0_{Rk,c}$							
	R120	$V_{Rk,c,fi}$	[kN]	$V^0_{Rk,c,fi} = 0,20 * V^0_{Rk,c}$							

**Hexstone screw anchor Ankerbolt**

**Performance**  
Characteristic values for resistance to fire

**Annex C4**