Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

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European Technical Assessment ETA-15/0040 of 3 June 2025

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 Thunderbolt / Ankerbolt
Product family to which the construction product belongs	Mechanical fasteners for use in concrete
Manufacturer	Hexstone Limited Opal Way Stone Business Park, Stone Staffordshire ST 15 0SW . GROSSBRITANNIEN
Manufacturing plant	Factory 516 Taiwan
This European Technical Assessment contains	15 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 330232-01-0601
This version replaces	ETA-15/0040 issued on 14 April 2015

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Specific Part

1 Technical description of the product

The Hexstone screw anchor Thunderbolt / Ankerbolt is an anchor of size 8, 10, 12, 14 and 16 mm 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.

Product and product description are 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)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B2, C1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C3
Displacements (static and quasi-static loading)	See Annex C6
Characteristic resistance for seismic performance categorie C1	No performance assessed
Characteristic resistance and displacements for seismic performance categorie C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C4 and C5

3.3 Aspects of durability linked with the Basic Works Requirements

Essential characteristic	Performance
Durability	See Annex B1

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. 330232-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

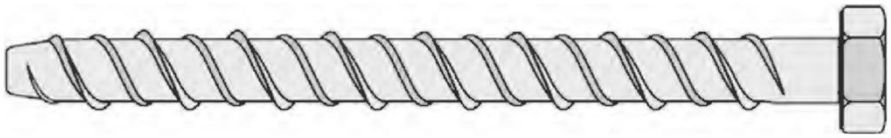
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 3 June 2025 by Deutsches Institut für Bautechnik

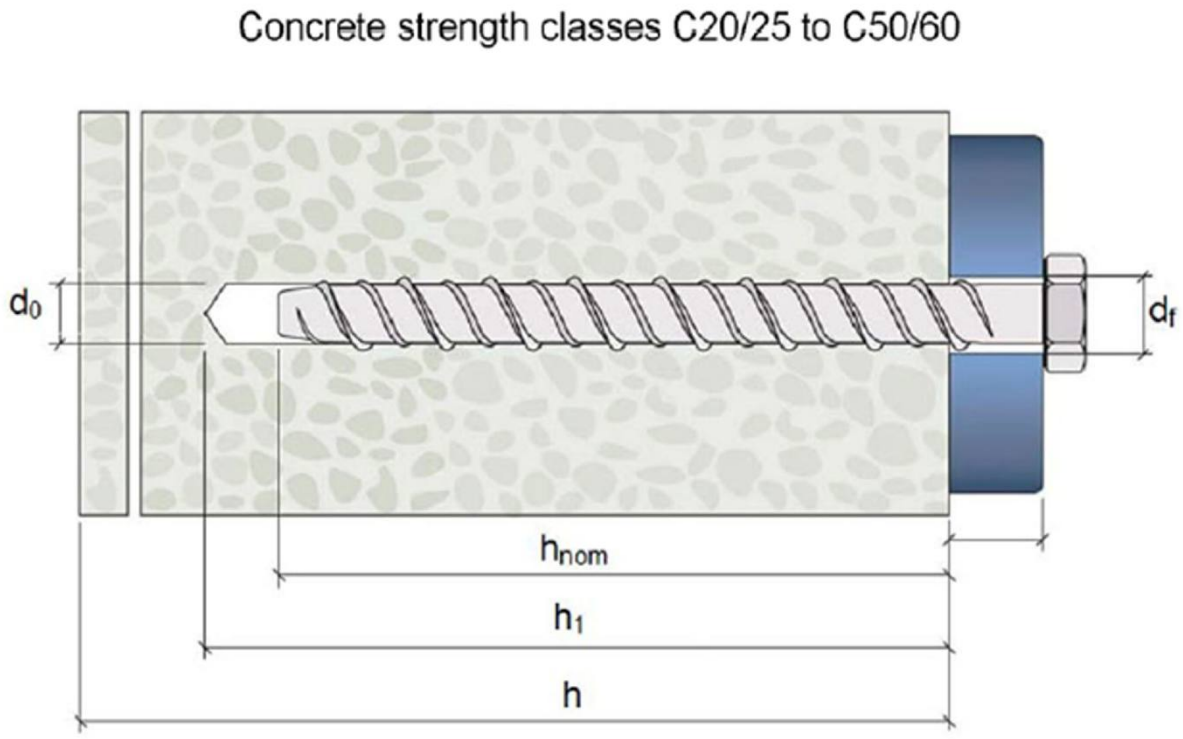
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Tempel

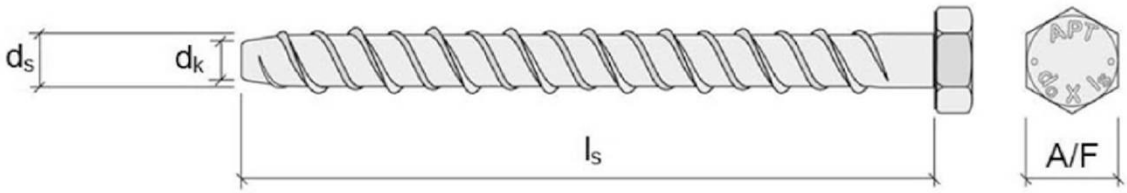
Hexstone screw anchor THUNDERBOLT/ ANKERBOLT:



Intended use



Hexstone screw anchor Thunderbolt / Ankerbolt	Annex A1
Product description Product and intended use	



Marking

- Identifying mark of producer
- Nominal drill hole diameter
- Nominal anchor length

Table A1: Materials

Designation	Material
Concrete Screw	Carbon steel, heat treated and zinc plated

Table A2: Dimensions

Anchor size			8	10	12	14	16
Nominal anchor length	l_s	[mm]	80 ...150	100 ...150	100 ...200	130 ...200	150 ...200
Outside diameter of thread	d_s	[mm]	9,8	11,9	14,1	16,3	18,7
Core diameter	d_k	[mm]	7,5	9,5	11,4	13,4	15,3
Width across flats	A/F	[mm]	15	17	19	24	27

Hexstone screw anchor Thunderbolt / Ankerbolt

Product description
Product and intended use

Annex A2

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Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads: all sizes.
- Fire exposure: all sizes.

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.
- Uncracked concrete and cracked concrete.

Use conditions (Environmental conditions:
- Structures subject to dry internal conditions.

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 of fire exposure are designed in accordance with EN 1992-4:2018 in conjunction with technical report TR055, Edition February 2018.
- It must be ensured that local spalling of the concrete cover does not occur.

Installation:
- Hole drilling by rotary hammer drilling mode.
- 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 must not be possible.
- The head of the anchor must be supported on the fixture and not be damaged.

Hexstone screw anchor Thunderbolt / Ankerbolt	Annex B1
Intended Use Specifications	

Table B1: Installation parameters

Anchor size			8	10	12	14	16
Overall anchor embedment depth	h_{nom}	[mm]	75	85	95	110	120
Effective anchorage depth	h_{ef}	[mm]	55	62	69	79	86
Nominal drill hole diameter	d_0	[mm]	8	10	12	14	16
Drill hole depth	h_0	[mm]	90	100	110	130	145
Outside diameter of the anchor	d_{nom}	[mm]	10	12	14	16	18
Clearance hole in the fixture	d_f	[mm]	12	14	16	18	20
Setting torque	T_{inst}	[Nm]	40	60	80	90	100

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

Anchor size			8	10	12	14	16
Minimum thickness of concrete member	h_{min}	[mm]	120	125	140	170	190
Minimum spacing	S_{min}	[mm]	50	60	70	80	90
Minimum edge distance	C_{min}	[mm]	50	60	70	80	90

In case of fire attack from more than one side: $c_{min} \geq 300$ mm

Hexstone screw anchor Thunderbolt / Ankerbolt

Intended Use
Installation parameters, minimum thickness of concrete member, minimum spacing and edge distance

Annex B2

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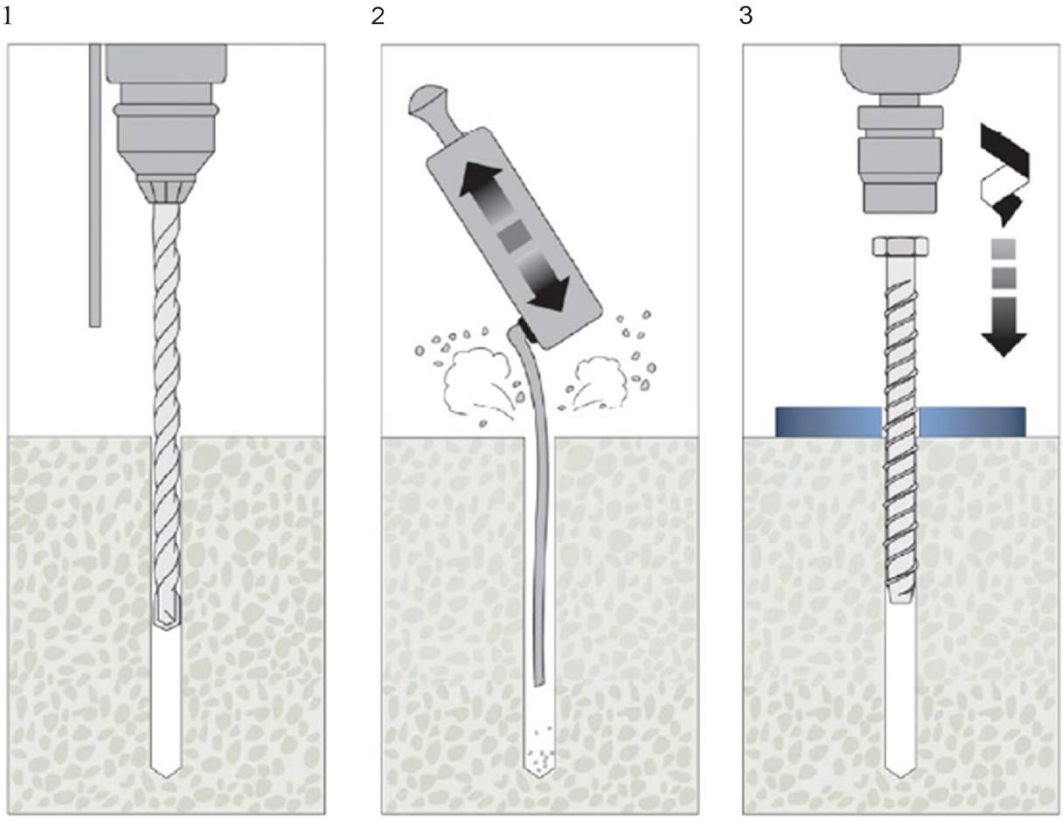
Installation instructions



1. Drill hole to correct diameter and depth using rotary hammer drilling machine
2. Remove dust from hole by blowing 3 times
3. Install anchor using electrical impact screwdriver Bosch GDS18E or Makita 6905H. Other electrical screwdrivers of equivalent force and performance may be used.

Hexstone screw anchor Thunderbolt / Ankerbolt	**Annex B3**
Intended Use Installation instructions	

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Table C1: Characteristic values of resistance under tension loads in uncracked concrete

Anchor size			8	10	12	14	16
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	44,2	70,1	101,2	140,0	183,9
Partial safety factor	γ_{MS}[1]	[-]	1,4				
Pullout failure							
Characteristic resistance	$N_{Rk,p}$	[kN]	12	16	20	35	40
Increasing factor for $N_{Rk,p} = N_{Rk,p(C20/25)} * \psi_C$	ψ_C	C30/37	1,17			1,22	
		C40/50	1,32			1,41	
		C50/60	1,42			1,55	
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0				
Concrete cone failure							
Effective anchoring depth	h_{ef}	[mm]	55	62	69	79	86
Spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$				
Edge distance	$c_{cr,N}$	[mm]	$1,5\ h_{ef}$				
Splitting failure							
Spacing	$s_{cr,sp}$	[mm]	176	190	214	250	260
Edge distance	$c_{cr,sp}$	[mm]	88	95	107	125	130
Installation factor	γ_{inst}	[-]	1,2				

[1] In absence of other national regulations.

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances
Characteristic values of resistance under tension loads in uncracked concrete

Annex C1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic values of resistance under tension loads in cracked concrete

Anchor size			8	10	12	14	16
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	44,2	70,1	101,2	140,0	183,9
Partial safety factor	γ_{Ms}[1]	[-]	1,4				
Pullout failure							
Characteristic resistance	$N_{Rk,p}$	[kN]	7,5	12	16	20	25
Increasing factor for $N_{Rk,p} = N_{Rk,p(C20/25)} * \psi_c$	ψ_c	C30/37	1,17			1,22	
		C40/50	1,32			1,41	
		C50/60	1,42			1,55	
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7				
Concrete cone failure							
Effective anchoring depth	h_{ef}	[mm]	55	62	69	79	86
Spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$				
Edge distance	$c_{cr,N}$	[mm]	$1,5\ h_{ef}$				
Splitting failure							
Spacing	$s_{cr,sp}$	[mm]	176	190	214	250	260
Edge distance	$c_{cr,sp}$	[mm]	88	95	107	125	130
Installation factor	γ_{inst}	[-]	1,2				

[1] In absence of other national regulations.

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances
Characteristic values of resistance under tension loads in cracked concrete

Annex C2

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic values of resistance under shear loads in cracked or uncracked concrete

Anchor size			8	10	12	14	16
Steel failure without level arm							
Characteristic resistance	$V_{Rk,s}$	[kN]	28,5	46,4	57,2	80,4	84,4
Partial safety factor	γ_{MS}[1]	[-]	1,5				
Ductility factor	k_7	[-]	0,8				
Steel failure with level arm							
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	40	80	138	224	338
Partial safety factor	γ_{MS}[1]	[-]	1.5				
Concrete pry out failure							
K factor	k_8	[mm]	1,0	2,0			
Concrete edge failure							
Effective length of anchor in shear loading	l_f	[mm]	55	62	69	79	86
Effective external diameter of anchor	d_{nom}	[mm]	10	12	14	16	18

[1] In absence of other national regulations.

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances
Characteristic values of resistance under shear loads in cracked or uncracked concrete

Annex C3

Deutsches Institut für Bautechnik DIBt

Table C4: Characteristic values for tension load under fire exposure in cracked or uncracked concrete C20/25 to C50/60

Anchor size				8	10	12	14	16
Steel failure								
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,4	1,1	2,0	2,8	3,7
	R60	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,5	2,1	2,8
	R90	$N_{Rk,s,fi}$	[kN]	0,3	0,7	1,3	1,8	2,4
	R120	$N_{Rk,s,fi}$	[kN]	0,2	0,6	1,0	1,4	1,8
Pullout failure								
Characteristic resistance	R30 R60 R90	$N_{Rk,p,fi}$	[kN]	1,9	3,0	4,0	5,0	6,3
	R120	$N_{Rk,p,fi}$	[kN]	1,5	2,4	3,2	4,0	5,0
Concrete cone failure								
Characteristic resistance	R30 R60 R90	$N^0_{Rk,c,fi}$	[kN]	4,0	5,4	7,1	10,0	12,3
	R120	$N^0_{Rk,c,fi}$	[kN]	3,2	4,4	5,7	8,0	9,9
Characteristic spacing		$s_{cr,N}$	[mm]	$4\ h_{ef}$				
Edge distance		$c_{cr,N}$	[mm]	$2\ h_{ef}$				

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances

Characteristic values for tension load under fire exposure in cracked and uncracked concrete C20/25 to C50/60

Annex C4

Deutsches Institut für Bautechnik DIBt

Table C5: Characteristic values for shear load under fire exposure in cracked or uncracked concrete C20/25 to C50/60

Anchor size				8	10	12	14	16
Steel failure without level arm								
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	0,4	1,1	2,0	2,8	3,7
	R60	$V_{Rk,s,fi}$	[kN]	0,4	0,9	1,5	2,1	2,8
	R90	$V_{Rk,s,fi}$	[kN]	0,3	0,7	1,3	1,8	2,4
	R120	$V_{Rk,s,fi}$	[kN]	0,2	0,6	1,0	1,4	1,8
Steel failure with level arm								
Characteristic resistance	R30	$M_{Rk,s,fi}$	[Nm]	0,5	1,5	3,4	5,6	8,4
	R60	$M_{Rk,s,fi}$	[Nm]	0,4	1,3	2,6	4,2	6,3
	R90	$M_{Rk,s,fi}$	[Nm]	0,3	1,0	2,2	3,6	5,5
	R120	$M_{Rk,s,fi}$	[Nm]	0,2	0,8	1,7	2,8	4,2
Concrete Pryout failure								
k-Factor	k_8		[-]	1,0	2,0			
Characteristic resistance	R30 R60 R90	$V_{Rk,cp,fi}$	[kN]	4,0	10,9	14,2	20,0	24,7
	R120	$V_{Rk,cp,fi}$	[kN]	3,2	8,7	11,4	16,0	19,8

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances

Characteristic values for shear load under fire exposure in cracked and uncracked concrete C20/25 to C50/60

Annex C5

Deutsches Institut für Bautechnik DIBt

Table C6: Displacements under tension load

Anchor size			8	10	12	14	16
Tension load	N	[kN]	4,8	6,3	7,9	13,9	15,9
Displacement	δ_{N0}	[mm]	0,17	0,21	0,23	0,73	0,46
	$\delta_{N\infty}$	[mm]	1,75	1,88	1,82	1,54	0,96

Table C7: Displacements under shear load

Anchor size			8	10	12	14	16
Shear load	V	[kN]	11,3	18,4	22,7	31,9	33,5
Displacement	δ_{V0}	[mm]	1,61	1,53	1,94	2,74	2,66
	$\delta_{V\infty}$	[mm]	2,42	2,30	2,92	4,10	3,99

Hexstone screw anchor Thunderbolt / Ankerbolt

Performances
Displacements

Annex C6