



Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-23/6690 of 04/05/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Hilti metal expansion anchor HSA
Product family to which the construction product belongs:	Mechanical fastener for use in uncracked concrete
Manufacturer:	Hilti Aktiengesellschaft Business Unit Anchors Feldkircherstrasse 100 9494 Schaan Principality of Liechtenstein
Manufacturing plant(s):	Hilti Plants
This UK Technical Assessment contains:	19 pages including 3 Annexes which form an integral part of this assessment.
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330232-00-0601 Mechanical fasteners for use in concrete

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1. Technical description of the product

The Hilti metal expansion anchor HSA is a torque-controlled expansion fastener which is placed into a drilled hole and anchored by torque-controlled expansion.

The product description is given in Annex A.

2. Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

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 UK 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 action) Method A	See Annexes B3 and C1
Characteristic resistance to shear load (static and quasi static action)	See Annex C2
Displacements and Durability	See Annexes C3 and B1
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed.

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.3. Health, hygiene and the environment (BWR 3)

Not relevant.

3.4. Safety and accessibility in use (BWR 4)

Not relevant.

3.5. Protection against noise (BWR 5)

Not relevant.

3.6. Energy economy and heat retention (BWR 6)

Not relevant.

3.7. Sustainable use of natural resources (BWR 7)

No performance assessed.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied.

4.1. System of assessment and verification of constancy of performance

According to UKAD No. 330232-00-0601 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011) as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD.

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1. UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance (where applicable)
- UKTA number.

On behalf of the British Board of Agrément



Date of Issue: 4 April 2023

Hardy Giesler
Chief Executive Officer

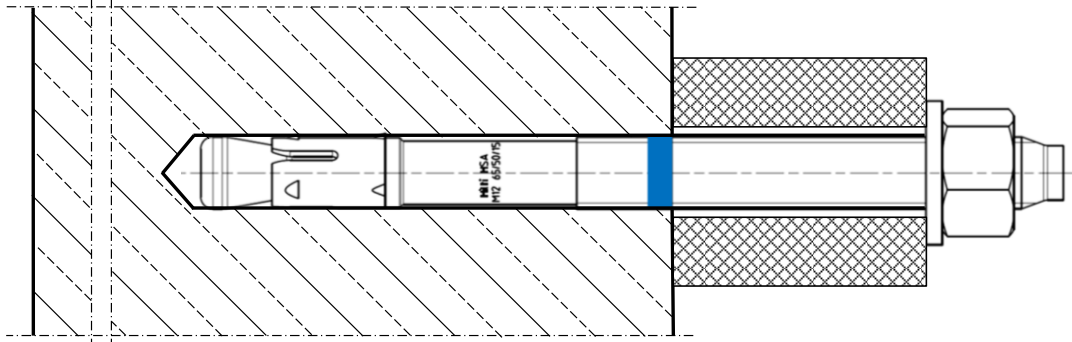


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ANNEX A1
Product description.
Installed condition.

This annex applies to the product described in the main body of the UK Technical Assessment.

Installed condition.



ANNEX A2

Product description

Product marking and material code for identification of metal expansion anchor

This annex applies to the product described in the main body of the UK Technical Assessment.

Product description: Hilti metal expansion anchor HSA, HSA-BW, HSA-F, HSA-R2 and HSA-R

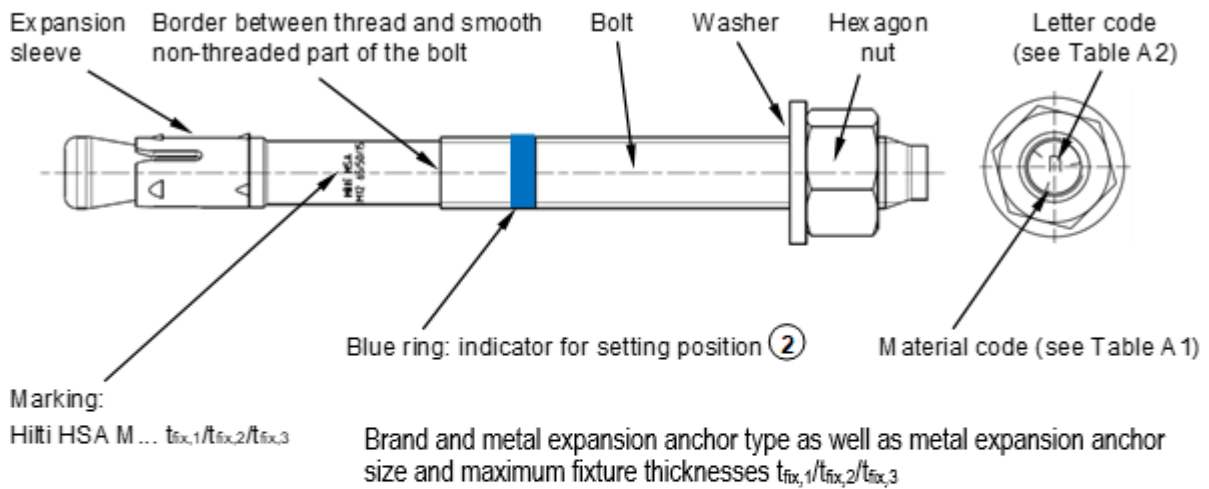





Table A1: Material code for identification of different materials

	HSA, HSA-BW, HSA-F	HSA-R2	HSA-R
Material code	 <p>Letter code without mark</p>	 <p>Letter code with two marks</p>	 <p>Letter code with three marks</p>

ANNEX A3

Product description

Letter code for identification of metal expansion anchor

This annex applies to the product described in the main body of the UK Technical Assessment.

Table A2: Letter code for identification of maximum fixture thickness ⁽¹⁾

Size	M6	M8	M10	M12	M16	M20
	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$	$t_{fix,1}/t_{fix,2}/t_{fix,3}$
	[mm]/[mm]/[mm]	[mm]/[mm]/[mm]	[mm]/[mm]/[mm]	[mm]/[mm]/[mm]	[mm]/[mm]/[mm]	[mm]/[mm]/[mm]
z	5/-/-	5/-/-	5/-/-	5/ -/-	5/-/-	5/-/-
y	10/-/-	10/-/-	10/-/-	10/-/-	10/-/-	10/-/-
x	15/5/-	15/5/-	15/5/-	15/-/-	15/-/-	15/-/-
w	20/10/-	20/10/-	20/10/-	20/5/-	20/5/-	20/-/-
v	25/15/-	25/15/-	25/15	25/10/-	25/10/-	25/-/-
u	30/20/-	30/20/-	30/20/-	30/15/-	30/15/-	30/5/-
t	35/25/5	35/25/-	35/25/-	35/20/-	35/20/-	35/10/-
s	40/30/10	40/30/-	40/30/-	40/25/-	40/25/-	40/15/-
r	45/35/15	45/35/5	45/35/5	45/30/-	45/30/-	45/20/5
q	50/40/20	50/40/10	50/40/10	50/35/-	50/35/-	50/25/10
p	55/45/25	55/45/15	55/45/15	55/40/5	55/40/-	55/30/15
o	60/50/30	60/50/20	60/50/20	60/45/10	60/45/5	60/35/20
n	65/55/35	65/55/25	65/55/25	65/50/15	65/50/10	65/40/25
m	70/60/40	70/60/30	70/60/30	70/55/20	70/55/15	70/45/30
l	75/65/45	75/65/35	75/65/35	75/60/25	75/60/20	75/50/35
k	80/70/50	80/70/40	80/70/40	80/65/30	80/65/25	80/55/40
j	85/75/55	85/75/45	85/75/45	85/70/35	85/70/30	85/60/45
i	90/80/60	90/80/50	90/80/50	90/75/40	90/75/35	90/65/50
h	95/85/65	95/85/55	95/85/55	95/80/45	95/80/40	95/70/55
g	100/90/70	100/90/60	100/90/60	100/85/50	100/85/45	100/75/60
f	105/95/75	105/95/65	105/95/65	105/90/55	105/90/50	105/80/65
e	110/100/80	110/100/70	110/100/70	110/95/60	110/95/55	110/85/70
d	115/105/85	115/105/75	115/105/75	115/100/65	115/100/60	115/90/75
c	120/110/90	120/110/80	120/110/80	125/110/75	120/105/65	120/95/80
b	125/115/95	125/115/85	125/115/85	135/120/85	125/110/70	125/100/85
a	130/120/100	130/120/90	130/120/90	145/130/95	135/120/80	130/105/90
aa	-	-	-	155/140/105	145/130/90	-
ab	-	-	-	165/150/115	155/140/100	-
ac	-	-	-	175/160/125	165/150/110	-
ad	-	-	-	180/165/130	190/175/135	-
ae	-	-	-	230/215/180	240/225/185	-
af	-	-	-	280/265/230	290/275/235	-
ag	-	-	-	330/315/280	340/325/285	-

⁽¹⁾ Anchor length in bold is standard item. For selection of other anchor lengths, check availability of the items.

ANNEX A4
Product description
Materials

This annex applies to the product described in the main body of the UK Technical Assessment.

Table A1: Materials

Designation	Material
HSA, HSA-BW	
Expansion sleeve	M6: Stainless steel A2 according to EN 10088-1:2014 M8 – M20: Carbon steel, galvanized
Bolt	Carbon steel, galvanized, rupture elongation ($l_0 = 5d$) > 8 %
Washer	Carbon steel, galvanized
Hexagon nut	Carbon steel, galvanized
HSA-F	
Expansion sleeve	Stainless steel A2 according to EN 10088-1:2014
Bolt	Hot-dip galvanized, rupture elongation ($l_0 = 5d$) > 8%
Washer	Hot-dip galvanized
Hexagon nut	Hot-dip galvanized
HSA-R2 (stainless steel) Corrosion resistance class II according to EN 1993-1-4:2006+A1:2015	
Expansion sleeve	Stainless steel A2 according to EN 10088-1:2014
Bolt	Stainless steel according to EN 10088-1:2014, coated, rupture elongation ($l_0 = 5d$) > 8%
Washer	Stainless steel A2
Hexagon nut	Stainless steel A2, coated
HSA-R (stainless steel) Corrosion resistance class III according to EN 1993-1-4:2006+A1:2015	
Expansion sleeve	Stainless steel A2 according to EN 10088-1:2014
Bolt	Stainless steel according to EN 10088-1:2014, coated, rupture elongation ($l_0 = 5d$) > 8%
Washer	Stainless steel A4
Hexagon nut	Stainless steel A4, coated

ANNEX A5
Product description
Dimensions

This annex applies to the product described in the main body of the UK Technical Assessment.

Table A2: Dimensions of Hilti metal expansion anchor HSA, HSA-BW, HSA-F, HSA-R2 and HSA-R

Size		M6	M8	M10	M12	M16	M20
Minimum inner diameter of washer	d_1 [mm]	6.4	8.4	10.5	13	17	21
Minimum outer diameter of washer	d_w [mm]	12	16	20	24	30	37
Minimum thickness of washer	h [mm]	1.6	1.6	2	2.5	3	3

Figure A1: Hilti metal expansion anchor HSA, HSA-F, HSA-R2, HSA-R

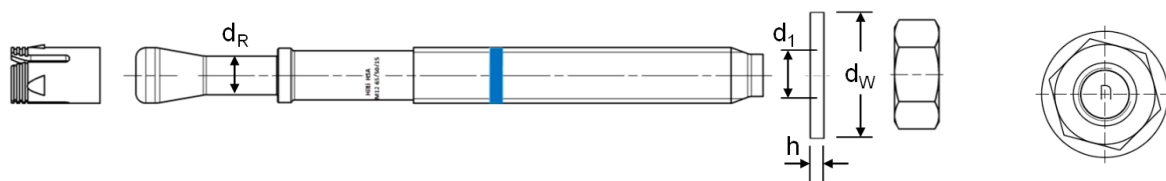
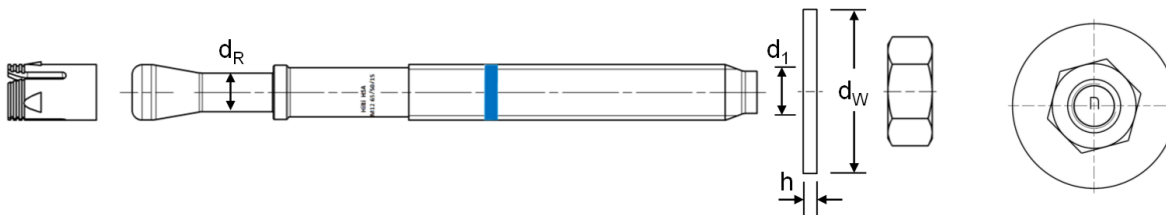


Figure A2: Hilti metal expansion anchor HSA-BW



ANNEX B1
Intended use.
Specifications

This annex applies to the product described in the main body of the UK Technical Assessment.

Specifications of intended use

Anchorage subject to:

- Static and quasi static loading.

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013+A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016.
- Non-cracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according EN 1993-1-4:2006+A1:2015-06 corresponding to corrosion resistance classes Annex A, Table A3 (stainless steel).

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 metal expansion anchor is indicated on the design drawings (e. g. position of the metal expansion anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi static loading are designed in accordance with: EN 1992-4:2018 and EOTA Technical Report TR 055.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- The metal expansion anchor may only be set once.

ANNEX B2
Intended use.
Installation methods

This annex applies to the product described in the main body of the UK Technical Assessment.

Table B1: Drilling technique




Size	M6	M8	M10	M12	M16	M20
Hammer drilling (HD) 	✓					
Hammer drilling with Hilti hollow drill bit TE-CD/YD ... drilling system (HDB) 	-	-	-	✓		
Diamond coring (DD) with DD 30-W coring tool and C+ ... SPX-T (abrasive) core bits 	-	-	✓			

Table B2: Drill hole cleaning



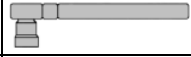


Manual cleaning (MC): Hilti hand pump for blowing out drill holes. 
Automatic cleaning (AC): Cleaning is performed during drilling with Hilti TE-CD and TE-YD drilling system including vacuum cleaner. 

Table B3: Setting alternatives.

Size	M6	M8	M10	M12	M16	M20
Hammer setting	✓					
Machine setting (impact screwdriver with setting tool)	-		✓			-

Table B4: Methods for application of torque moment

Size	M6	M8	M10	M12	M16	M20
Torque wrench 	✓					
Setting tool S-TB HSA ...with impact screwdriver Hilti SIW ... ⁽¹⁾ 	-		✓			-
	-	14-A / 22-A / 6AT-A22			22T-A	-
Setting speed	HSA, HSA-BW, HSA-F	I	I	III	- ⁽²⁾	
	HSA-R2, HSA-R	-	III			-
Setting time t_{set} [sec.]	-	4				-
Hilti SIW 6AT-A22 impact screwdriver with SI-AT-A22 module 	-		✓			-

⁽¹⁾ See Table B5 for battery state of charge depending on the ambient temperature.

⁽²⁾ Impact screwdriver operates with fixed speed.

Table B5: Battery state of charge of impact screwdriver

Ambient temperature		≤ +5 °C	+5 to +10 °C	≥ +10 °C
Battery state of charge	Low	-	-	-
	Middle	-	-	✓
	High	-	✓	✓

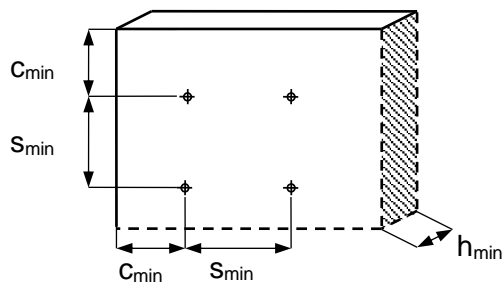
ANNEX B3
Intended use.
Installation parameters

This annex applies to the product described in the main body of the UK Technical Assessment.

Table B6: Installation parameters

Size	M6	M8	M10	M12	M16	M20												
Nominal diameter of drill bit d_0 [mm]	6	8	10	12	16	20												
Maximum cutting diameter of drill bit d_{cut} [mm]	6.4	8.45	10.45	12.5	16.5	20.55												
Diameter of clearance hole in the fixture d_f [mm]	7	9	12	14	18	22												
Width across flats SW [mm]	10	13	17	19	24	30												
Setting position	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③	① ② ③												
Minimum thickness of concrete member h_{min} [mm]	100	120	100	120	100	120	160	100	140	180	140	160	180	160	220			
Nominal anchorage depth h_{nom} [mm]	37	47	67	39	49	79	50	60	90	64	79	114	77	92	132	90	115	130
Effective anchorage depth h_{ef} [mm]	30	40	60	30	40	70	40	50	80	50	65	100	65	80	120	75	100	115
Minimum drill hole depth (HD, HDB) h_1 [mm]	42	52	72	44	54	84	55	65	95	72	87	122	85	100	140	98	123	138
Minimum drill hole depth (DD) h_1 [mm]	-			-			58	68	98	72	87	122	85	100	140	98	123	138
Standard installation torque moment																		
Installation torque moment T_{inst} [Nm]	5	15 ⁽¹⁾⁽²⁾		25 ⁽¹⁾⁽²⁾		50 ⁽¹⁾⁽²⁾		80 ⁽¹⁾⁽²⁾			200							
Minimum spacing s_{min} [mm]	35		35		50		70			90		195	175					
Minimum edge distance c_{min} [mm]	35		40	35		50	40		70	65	55	80	75	70	130	120		
Maximum installation torque moment																		
Maximum installation torque moment T_{max} [Nm]	-		20		35		80			150		250						
Minimum spacing s_{min} [mm]	-		35		40		50			80		120						
Minimum edge distance c_{min} [mm]	-		100		150		190			200		225						

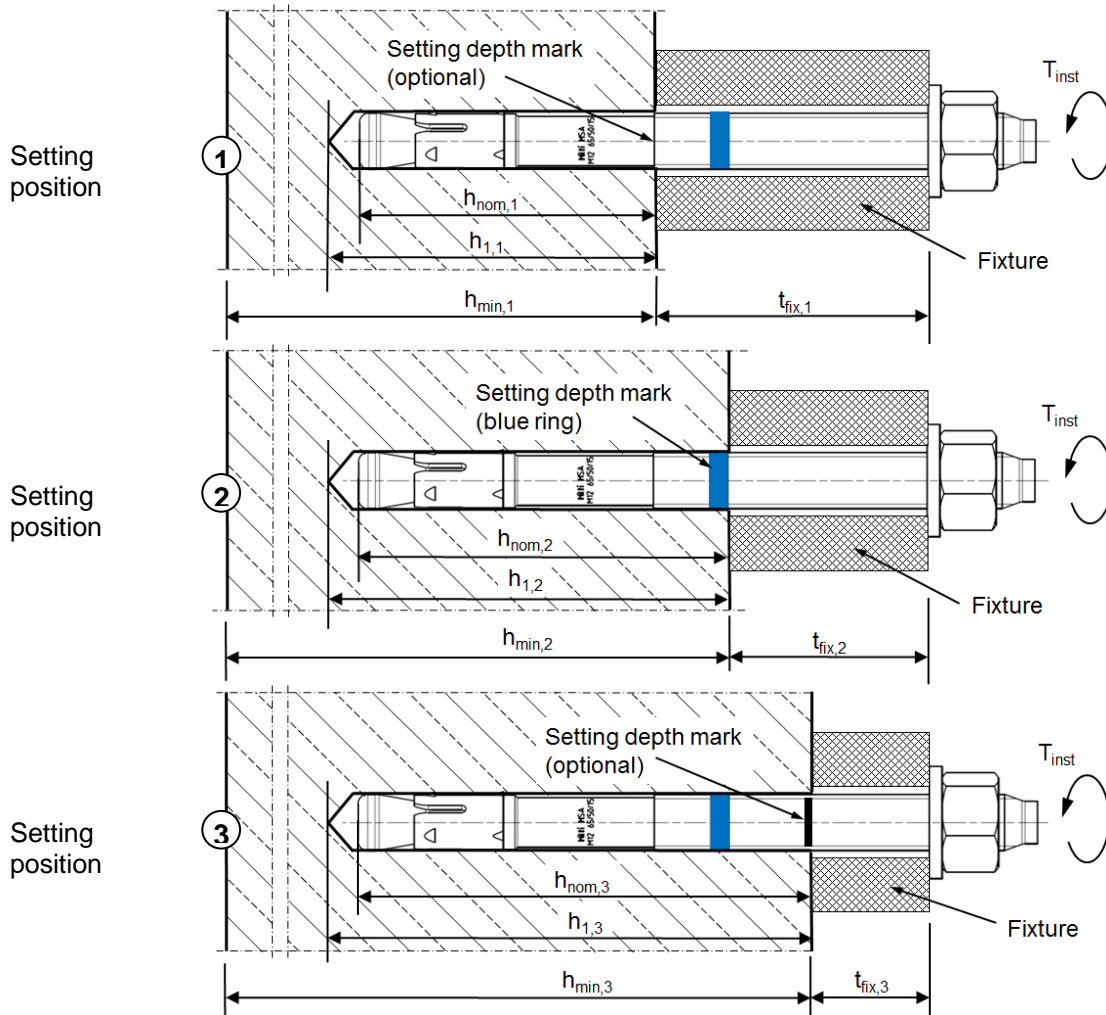
- (1) Alternatively, the metal expansion anchor can be tightened with an impact screwdriver in combination with a setting tool with the required setting time (see Annex B2).
- (2) Alternatively, the metal expansion anchor can be tightened with an impact screwdriver in combination with module (see Annex B2).



ANNEX B4
Intended use.
Installation parameters

This annex applies to the product described in the main body of the UK Technical Assessment.

Figure B1: Constant anchor length with various fixture thicknesses t_{fix} and corresponding setting position



ANNEX B5
Intended use.
Installation parameters

This annex applies to the product described in the main body of the UK Technical Assessment.

Figure B2:

Various anchor lengths for different setting positions and corresponding fixture thickness t_{fix}

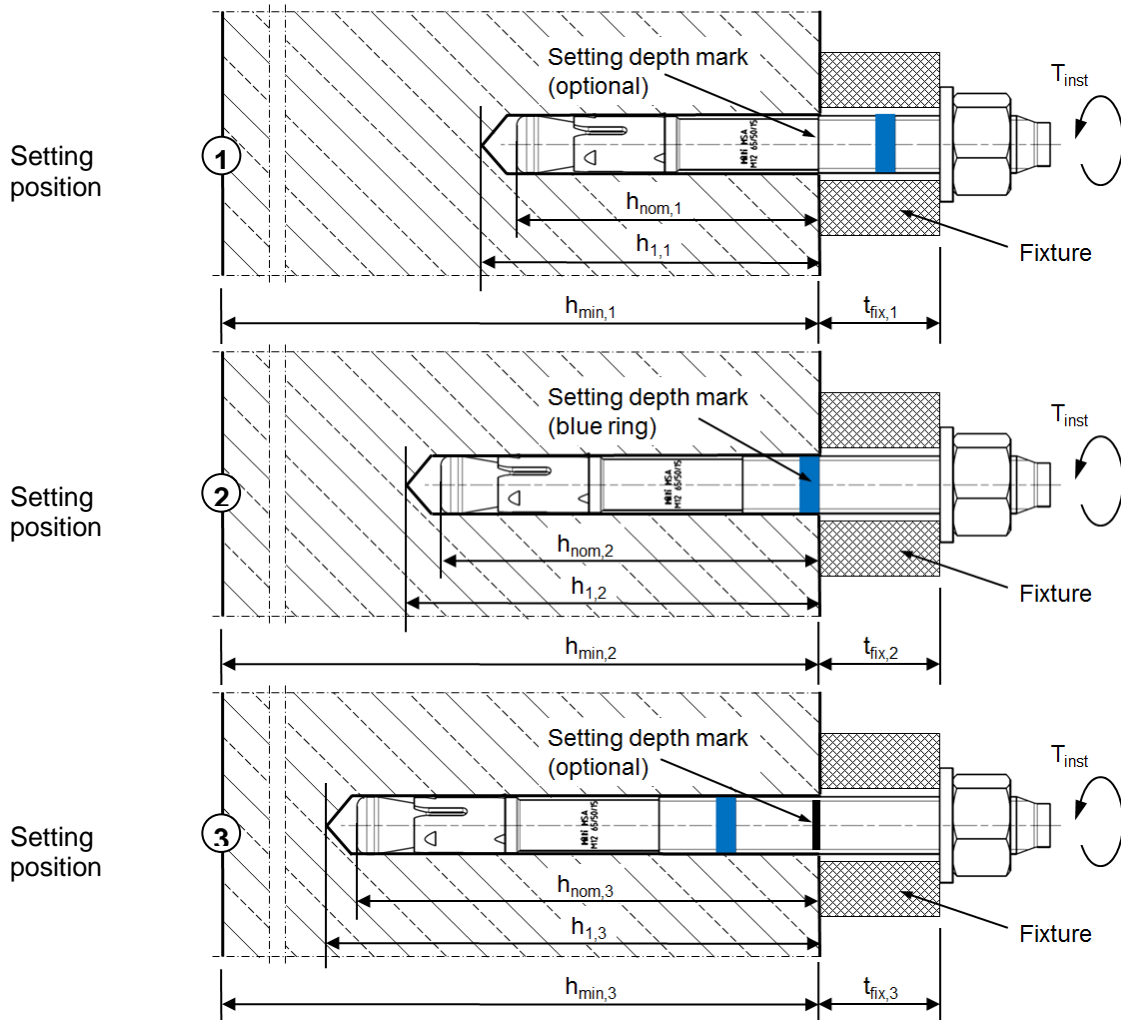


Table B7: Checking setting position.

Setting position	Pre-setting	Through setting
①	$h_{nom,1}$ is reached when the non-threaded part of the bolt is completely below the concrete surface. For metal expansion anchor HSA with letter code "aa" to "ag" (see Table A2) $h_{nom,1}$ must be measured and marked by the installer.	$h_{nom,1}$, $h_{nom,2}$ or $h_{nom,3}$ is reached when the present thickness of the fixture t_{fix} and the maximum thickness of the fixture $t_{fix,1}/t_{fix,2}/t_{fix,3}$ given by the metal expansion anchor HSA (see Table A2) is identical. If the present thickness of the fixture t_{fix} is smaller than the maximum thickness of the fixture $t_{fix,1}/t_{fix,2}/t_{fix,3}$ given by the metal expansion anchor HSA
②	$h_{nom,2}$ is reached when the blue ring is completely below the concrete surface.	<ul style="list-style-type: none"> position of washer and hexagon nut must be adjusted or drill hole depth h_1 must be increased.
③	$h_{nom,3}$ must be measured and marked by the installer.	

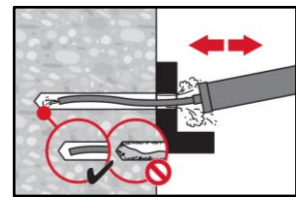
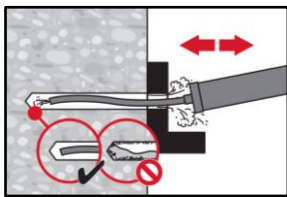
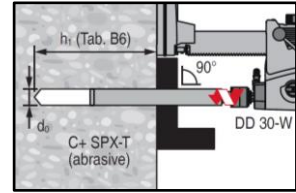
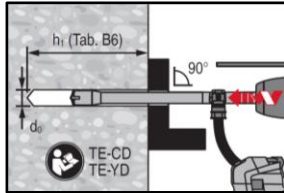
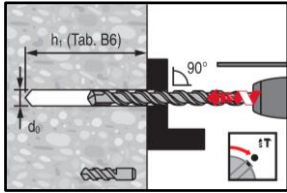
ANNEX B6
Intended use.
Installation instructions

This annex applies to the product described in the main body of the UK Technical Assessment.

Installation instruction

Hole drilling and cleaning (see Table B1 and Table B2)

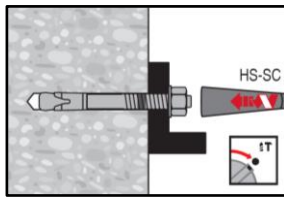
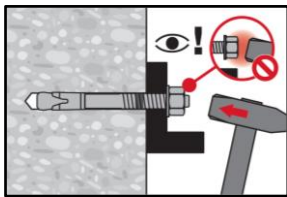
- a) Hammer drilling (HD) with manual cleaning (MC) b) Hammer drilling with Hilti hollow drill bit (HDB) with automatic cleaning (AC) c) Diamond coring (DD) with manual cleaning (MC)



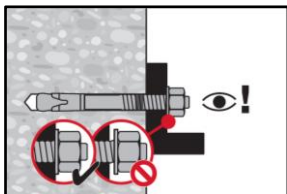
Anchor setting (see Table B3)

Hammer setting

Machine setting (impact screwdriver with setting tool)



Check setting (see also Table B7)

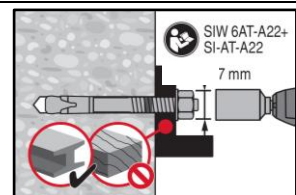
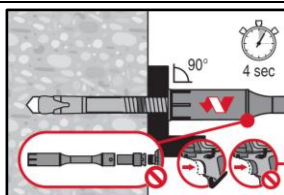
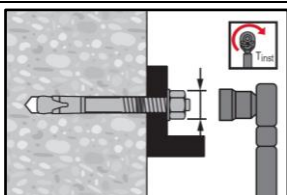


Anchor torquing (see Table B4 and Table B5)

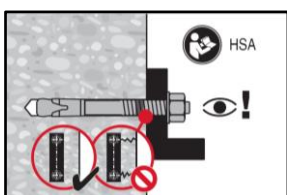
Torque wrench

Impact screwdriver with setting tool

Impact screwdriver with module



Check installation



ANNEX C1
Performance
Characteristic resistance under tension load in non-cracked concrete

This annex applies to the product described in the main body of the UK Technical Assessment.

Table C1: Characteristic resistance under tension load in non-cracked concrete

Size	M6			M8			M10			M12			M16			M20		
Setting position	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③
Effective anchorage depth h_{ef} [mm]	30 ⁽¹⁾	40	60	30 ⁽¹⁾	40	70	40	50	80	50	65	100	65	80	120	75	100	115
Steel failure																		
Partial safety factor γ_{Ms} ⁽²⁾ [-]	1.4																	
HSA, HSA-BW																		
Characteristic resistance $N_{Rk,s}$ [kN]	9.0			16.5			28.0			41.4			82.6			124		
HSA-F																		
Characteristic resistance $N_{Rk,s}$ [kN]	9.5			15.9			27.0			40.4			80.1			⁽³⁾		
HSA-R2, HSA-R																		
Characteristic resistance $N_{Rk,s}$ [kN]	12.2			18.3			35.6			44.6			90.5			97.6		
Pullout failure																		
Installation safety factor γ_{inst} [-]	1.0																	
Characteristic resistance $N_{Rk,p}$ [kN]	6	7.5	9	8.1	12.4	16	12.4	17.4	25	17.4	25.8	35	25.8	35.2	50	32	49.2	60.7
Increasing factor ψ_c	C20/25 [-]	1.00																
	C30/37 [-]	1.22																
	C40/50 [-]	1.41																
	C50/60 [-]	1.55																
Concrete cone and splitting failure																		
Installation safety factor γ_{inst} [-]	1,0																	
Factor for non-cracked concrete $k_{ucr,N}$ [-]	11,0																	
Factor for cracked concrete $k_{cr,N}$ [-]	⁽³⁾																	
Spacing	$s_{cr,N}$ [mm]	3 x hef																
	$s_{cr,sp}$ [mm]	100	120	130	130	180	200	190	210	290	200	250	310	230	280	380	260	370
Edge distance	$c_{cr,N}$ [mm]	1.5 x hef																
	$c_{cr,sp}$ [mm]	50	60	65	65	90	100	95	105	145	100	125	155	115	140	190	130	185
Characteristic resistance $N^0_{Rk,sp}$ [kN]	6	7.5	9	8.1	12.4	16	12.4	17.4	25	17.4	25.8	35	25.8	35.2	50	32	49.2	60.7

⁽¹⁾ Use is restricted to anchoring of statically indeterminate structural components and dry internal conditions.

⁽²⁾ In absence of other national regulations.

⁽³⁾ No performance assessed.

ANNEX C2

Performance

Characteristic resistance under shear load in non-cracked concrete

This annex applies to the product described in the main body of the UK Technical Assessment.

Table C2: Characteristic resistance under shear load in non-cracked concrete

Size	M6			M8			M10			M12			M16			M20		
Setting position	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③
Effective anchorage depth h_{ef} [mm]	30 ⁽¹⁾	40	60	30 ⁽¹⁾	40	70	40	50	80	50	65	100	65	80	120	75	100	115
Steel failure without lever arm																		
Partial safety factor $\gamma_{Ms}^{(2)}$ [-]	1.25																	
Ductility factor k_7 [-]	1.0																	
HSA, HSA-BW																		
Characteristic resistance $V_{Rk,s}^0$ [kN]	6.5			10.6			18.9			29.5			51.0			85.8		
HSA-F																		
Characteristic resistance $V_{Rk,s}^0$ [kN]	6.5			10.6			18.9			29.5			51.0			(3)		
HSA-R2, HSA-R																		
Characteristic resistance $V_{Rk,s}^0$ [kN]	7.2			12.3			22.6			29.3			56.5			91.9		
Steel failure with lever arm																		
Partial safety factor $\gamma_{Ms}^{(2)}$ [-]	1.25																	
Ductility factor k_7 [-]	1,0																	
HSA, HSA-BW																		
Characteristic resistance $M_{Rk,s}^0$ [Nm]	9.9			21.7			48.6			91.7			216			454		
HSA-F																		
Characteristic resistance $M_{Rk,s}^0$ [Nm]	9.9			21.7			48.6			91.7			216			(3)		
HSA-R2, HSA-R																		
Characteristic resistance $M_{Rk,s}^0$ [Nm]	9.9			21.0			48.6			76.0			200			406		
Concrete pry-out failure																		
Installation safety factor γ_{inst} [-]	1.0																	
Pry-out factor k_8 [-]	1	2	1	1.5	2	2.4	2	2.9	2	3.5								
Concrete edge failure																		
Installation safety factor γ_{inst} [-]	1.0																	
Effective length of anchor l_f [mm]	30	40	60	30	40	70	40	50	80	50	65	100	65	80	120	75	100	115
Effective outside diameter of anchor d_{nom} [mm]	6			8			10			12			16			20		

ANNEX C3

Performance

Displacement under tension and shear loads in non-cracked concrete.

This annex applies to the product described in the main body of the UK Technical Assessment.

Table C3: Displacements under tension and shear loads in non-cracked concrete.

Size	M6			M8			M10			M12			M16			M20		
Setting position	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③	①	②	③
Effective anchorage depth h_{ef} [mm]	30	40	60	30	40	70	40	50	80	50	65	100	65	80	120	75	100	115
Displacements under tension loads																		
Tension force N [kN]	2,9	3,6	4,3	4,0	6,1	7,6	6,1	8,5	11,9	8,5	12,6	16,7	12,6	17,2	23,8	16,6	25,1	30,8
Corresponding displacement δ_{N0} [mm]	0,2	0,6	1,0	0,2	1,2	1,8	0,4	1,1	2,0	0,3	1,4	2,3	0,4	1,3	2,1	0,1	0,8	1,9
$\delta_{N\infty}$ [mm]	0,6	1,0	1,4	0,6	1,6	2,2	0,8	1,5	2,4	0,7	1,8	2,7	0,8	1,7	2,5	0,5	1,2	2,3
Displacements under shear loads																		
Shear force V [kN]	3,7			6,1			10,8			16,7			29,1			49,0		
Corresponding displacement δ_{V0} [mm]	1,6			1,9			2,0			2,1			2,2			2,3		
$\delta_{V\infty}$ [mm]	2,4			2,9			3,0			3,2			3,3			3,5		



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