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

UK Technical Assessment	UKTA-0836-23/6688 of 11/04/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Hilti Safety Anchor HSC-A(R) and HSC-I(R)
Product family to which the construction product belongs:	Self-cutting undercut anchor, made of galvanized steel or stainless steel, for use in concrete: sizes M6, M8, M10 and M12.
Manufacturer:	Hilti Corporation Feldkircherstrasse 100 FL-9494 Schaan Principality of Liechtenstein
Manufacturing plant(s):	Hilti plants
This UK Technical Assessment contains:	21 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 Safety Anchor HSC-A(R) and HSC-I(R) anchors in the range of M6 to M12 are self-cutting undercut anchors made of galvanized steel or stainless steel. The Hilti HSC anchor is available in four versions: an externally threaded carbon steel version (HSC-A), an internally threaded carbon steel version (HSC-I), an externally threaded stainless-steel version (HSC-AR), and an internally threaded stainless-steel version (HSC-IR). It is placed into a hole drilled with a special stop drill bit and self-cutting undercut using a special setting tool. The nut is torque tightened to complete the fastening of the fixture. In the cases of HSC-I and HSC-IR versions, the fixture shall be anchored with a fastening screw or a threaded rod.

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 provisions made in this UK technical assessment are based on an assumed working life of the anchor of 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 tension resistance in case of static and quasi-static loading	See Annex C1
Characteristic shear resistance in case of static and quasi-static loading	See Annexes C2 and C3
Displacements under tension loads in case of static and quasi-static loading	See Annex C4
Displacements under shear loads in case of static and quasi-static loading	See Annex C5
Characteristic resistance under tension and shear loads for seismic performance category C2	See Annex C6
Displacements under tension and shear loads for seismic performance category C2	See Annex C7

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	See Annex C8

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

Regarding dangerous substances contained in this UK technical assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed UK legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3.4. Safety and accessibility in use (BWR 4)

For Basic Works Requirement 4: Safety and accessibility in use, the same criteria are valid as for Basic Works Requirement 1: Mechanical resistance and stability.

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.

3.8. General aspects relating to fitness for use.

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

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: 11 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:

Figure A1:
HSC-A(R) safety anchor (externally threaded version)

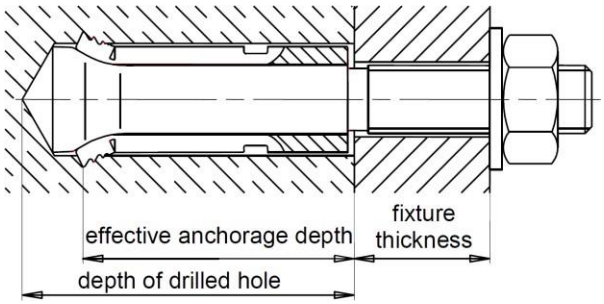
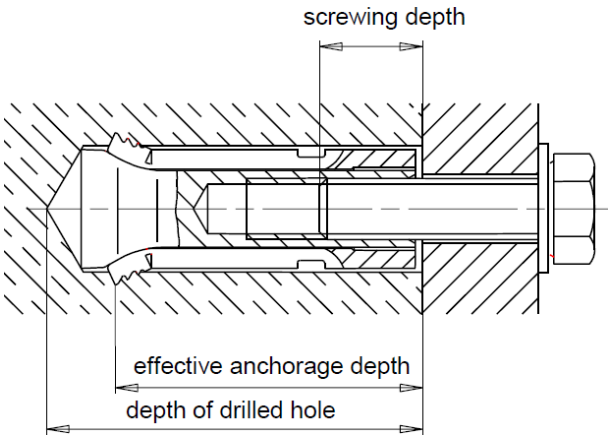


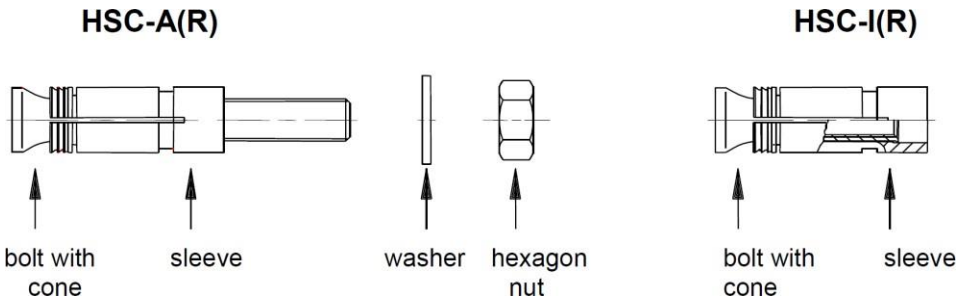
Figure A2:
HSC-I(R) safety anchor (internally threaded version)



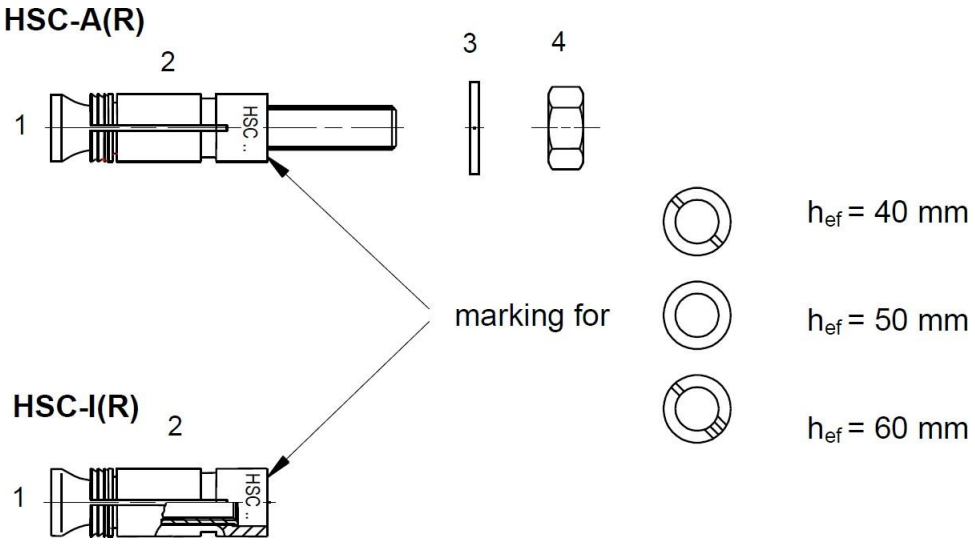
ANNEX A2
Product description

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

Product description :



HSC(-R) safety anchor (externally and internally threaded version)



ANNEX A3
Product description
Materials

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

Table A1 : Materials

Designation	**Material**
HSC made of zinc coated steel	
Cone bolt with external thread	Strength class 8.8, electroplated zinc coated ≥ 5µm, Rupture elongation (l_0 = 5d) > 8%
Cone bolt with internal thread	Strength class 8.8, electroplated zinc coated ≥ 5µm Rupture elongation (l_0 = 5d) > 8%
Expansion sleeve	Electroplated zinc coated ≥ 5µm
Washer	Electroplated zinc coated ≥ 5µm
Hexagon nut	Strength class 8, electroplated zinc coated ≥ 5µm
HSC-R made of stainless steel	
Cone bolt with external thread	A4-70, Stainless steel 1.4401, 1.4571 EN 10088-1:2014 Rupture elongation (l_0 = 5d) > 8%
Cone bolt with internal thread	A4-70, Stainless steel 1.4401, 1.4571 EN 10088-1:2014 Rupture elongation (l_0 = 5d) > 8%
Expansion sleeve	Stainless steel 1.4401, 1.4571 EN 10088-1:2014
Washer	Stainless steel 1.4401, 1.4571 EN 10088-1:2014
Hexagon nut	A4-70, Stainless steel 1.4401, 1.4571 EN 10088-1:2014

ANNEX A4
Product description
Dimensions

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

Table A2: Dimensions externally threaded version HSC-A(R)

Size			**M8 x 40**	**M10 x 40**	**M8 x 50**	**M12 x 60**
Thread size			M8	M10	M8	M12
Diameter of cone bolt	b	[mm]	13.5	15.5	13.5	17.5
Length of expansion sleeve	l_s	[mm]	40.8	40.8	50.8	60.8
Diameter of expansion sleeve	d	[mm]	13.5	15.5	13.5	17.5
Diameter of washer	e	[mm]	16	20	16	24

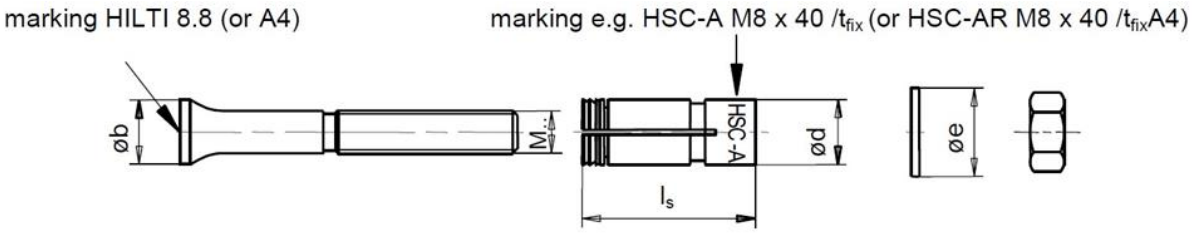
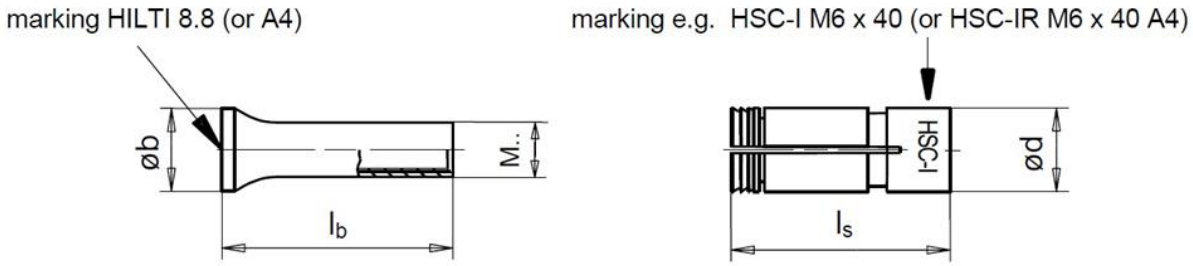


Table A3: Dimensions internally threaded version HSC-I(R)

Size			**M6 x 40**	**M8 x 40**	**M10 x 50**	**M10 x 60**	**M12 x 60**
Thread size			M6	M8	M10	M10	M12
Length of cone bolt	l_b	[mm]	43.3	43.3	54.8	64.8	64.8
Diameter of cone bolt	b	[mm]	13.5	15.5	17.5	17.5	19.5
Length of expansion sleeve	l_s	[mm]	40.8	40.8	50.8	60.8	60.8
Diameter of expansion sleeve	d	[mm]	13.5	15.5	17.5	17.5	19.5



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

Anchorages subject to:

- Static and quasi-static loading.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked concrete and non-cracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- Structures subject to subject to external atmospheric exposure (including industrial and marine environment), and to permanently damp internal conditions, if no particularly aggressive conditions exist (stainless steel).

  Note: Such particularly aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing products 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 under static or quasi-static loading are designed in accordance with: Technical Report TR 055 “Design of fastenings based on UKAD 330232-00-0601” and EN 1992-4.
- Anchorages under seismic actions (cracked concrete) are designed in accordance with: Technical Report TR 055 “Design of fastenings based on UKAD 330232-00-0601”, EN 1992-4 and Technical Report TR 045 “Design of metal anchors for use in concrete under seismic actions”
- Anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure. Fastenings where shear loads act on anchors with a lever arm, such as e.g. stand-off installation or with a grout layer, are not covered.
- Anchorages under fire exposure are designed in accordance with: Technical Report TR 055 “Design of fastenings based on UKAD 330232-00-0601”, EN 1992-4 and Technical Report TR 020 “Evaluation of anchorages in concrete concerning resistance to fire”
- In case of requirements to resistance to fire local spalling of the concrete cover must be prevented.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer’s specifications given in Annexes B1 to B4.
- In the case of an aborted hole, the drilling of a new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance, provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

ANNEX B2
Intended use.
Installation parameters

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

Table B1: Installation parameters HSC-A(R)

HSC-A(R)			**M8x40/t_{fix}**	**M10x40/t_{fix}**	**M8x50/t_{fix}**	**M12x60/t_{fix}**
Nominal diameter of drill bit	d_0	[mm]	14	16	14	18
Torque moment	T_{inst}	[Nm]	10	20	10	30
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	9	14
Minimum thickness of concrete member	h_{min}	[mm]	100	100	100	130
Minimum spacing	s_{min}	[mm]	40	40	50	60
Minimum edge distance	c_{min}	[mm]	40	40	50	60

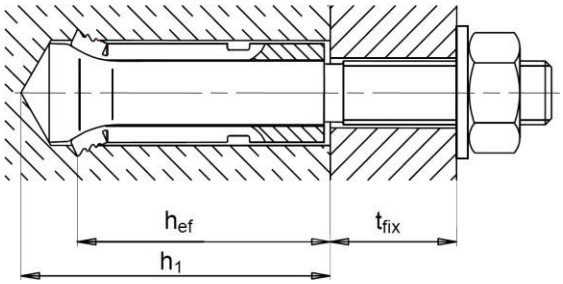
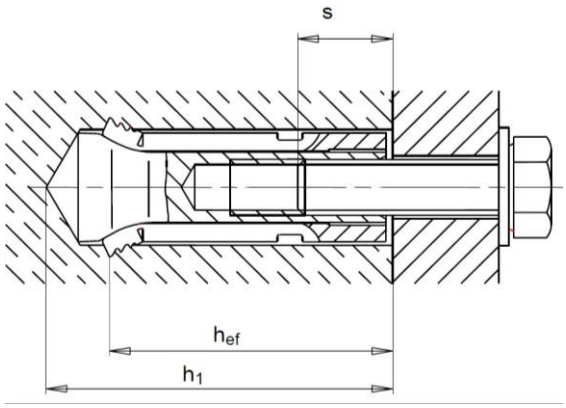


Table B2: Installation parameters HSC-I(R)

HSC-I(R)			**M6x40**	**M8x40**	**M10x50**	**M10x60**	**M12x60**
Nominal diameter of drill bit	d_0	[mm]	14	16	18	18	20
Torque moment	T_{inst}	[Nm]	10	10	20	30	30
Diameter of clearance hole in the fixture	d_f	[mm]	7	9	12	12	14
Screwing depth	min s	[mm]	6	8	10	10	12
	max s	[mm]	16	22	28	28	30
Minimum thickness of concrete member	h_{min}	[mm]	100	100	110	130	130
Minimum spacing	s_{min}	[mm]	40	40	50	60	60
Minimum edge distance	c_{min}	[mm]	40	40	50	60	60

Fastening carbon steel screw or threaded rod for the HSC-I : Strength class 8.8 according to EN ISO 898-1
Fastening stainless steel screw or threaded rod for the HSC-IR: Strength class A4-70 according to EN ISO 3506;
Minimum screw depth min s; the length of the fastening shall be determined depending on thickness of fixture tfix, admissible tolerances and available thread length.



ANNEX B3
Intended use.
Drilling and setting tools

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

Table B3: Parameters of drilling and setting tools HSC-A(R)

HSC-A(R)	**M8x40/t_{fix}**	**M10x40/t_{fix}**	**M8x50/t_{fix}**	**M12x60/t_{fix}**
Nominal diameter of drill bit d_0 [mm]	14	16	14	18
Drill bit length t [mm]	46	46.5	56	68
Stop drill bit HSC-B	B14 x 40	B16 x 40	B14 x 50	B18 x 60
Setting tool HSC-MW	HSC-MW14	HSC-MW16	HSC-MW14	HSC-MW18

Table B4: Parameters of drilling and setting tools HSC-I(R)

HSC-I(R)	**M6x40**	**M8x40**	**M10x50**	**M10x60**	**M12x60**
Nominal diameter of drill bit d_0 [mm]	14	16	18	18	20
Drill bit length t [mm]	46	46.5	56	68	68.5
Stop drill bit HSC-B	B14 x 40	B16 x 40	B18 x 50	B18 x 60	B20 x 60
Setting tool HSC-MW	HSC-MW14	HSC-MW16	HSC-MW18	HSC-MW18	HSC-MW20
Insert tool HSC-EW	HSC-EW14	HSC-EW16	HSC-EW18	HSC-EW18	HSC-EW20

Drilling and setting tools

Stop drill bit HSC-B

Setting tools

HSC-A(R)

Setting tool HSC-MW

HSC-I(R)

Insert tool HSC-EW

Setting tool HSC-MW

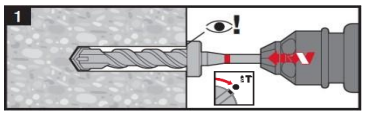
ANNEX B4
Intended use.
Installation instructions

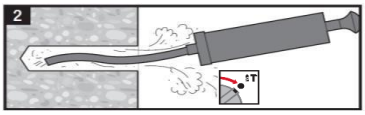
This annex applies to the product described in the main body of the UK Technical Assessment.

Installation instruction

Hole drilling and cleaning

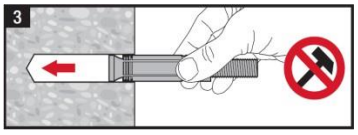
HSC-A(R) and HSC-I(R): Hole drilling with stop drill bit HSC-B, manual cleaning.

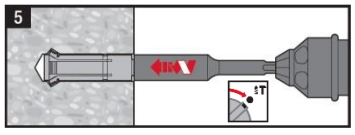




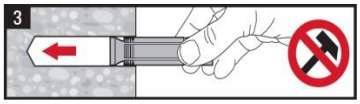
Anchor setting

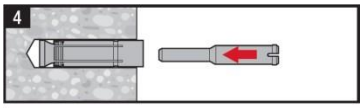
a) HSC-A(R)

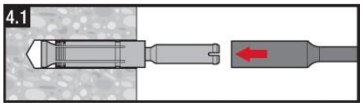


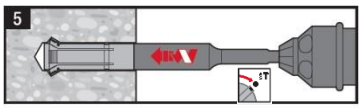


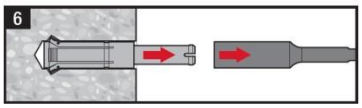
b) HSC-I(R)



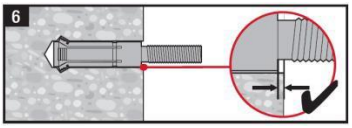


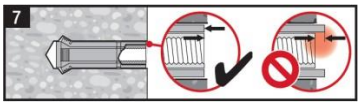


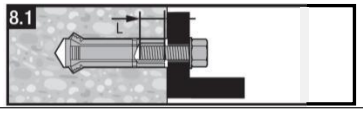




Check setting







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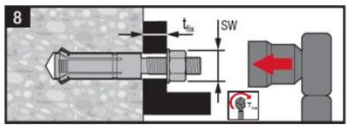

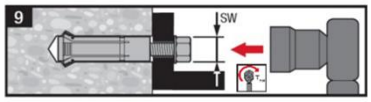

ANNEX C1
Performances
Characteristic resistance under tension load in concrete

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

Table C1: Characteristic resistance for HSC-A(R) under tension load in concrete

				M8x40	M10x40	M8x50	M12x60
Steel failure HSC-A							
Characteristic resistance		$N_{Rk,s}$	[kN]	29.3	46.4	29.3	67.4
Partial safety factor		γ_{Ms} [1)]	[-]	1.50			
Steel failure HSC-AR							
Characteristic resistance		$N_{Rk,s}$	[kN]	25.6	40.6	25.6	59.0
Partial safety factor		γ_{Ms} [1)]	[-]	1.87			
Pull-out failure				Not governing			
Concrete cone and splitting failure							
Effective anchorage depth		h_{ef}	[mm]	40	40	50	60
Factor for	Cracked	$k_1 = k_{ucr}$	[-]	7.7 [2)] / 7.2 [3)]			
	Non-cracked	$k_1 = k_{ucr}$	[-]	11.0 [2)] / 10.2 [3)]			
Spacing		$s_{cr,N}$	[mm]	120	120	150	180
Edge distance		$c_{cr,N}$	[mm]	60	60	75	90
Spacing		$s_{cr,sp}$	[mm]	130	120	170	180
Edge distance		$c_{cr,sp}$	[mm]	65	60	85	90
Partial safety factor		γ_2 [3)] $= \gamma_{inst}$	[-]	1.00			

1) In absence of national regulations.
2) Parameter according to EN 1992-4
3) Parameter according to UKAD 330232-00-0601.

Table C2: Characteristic resistance for HSC-I(R) under tension load in concrete

				M6x40	M8x40	M10x50	M10x60	M12x60
Steel failure HSC-I								
Characteristic resistance		$N_{Rk,s}$	[kN]	16.1	24.4	30.3	30.3	36.5
Partial safety factor		γ_{Ms} [1)]	[-]	1.50				
Steel failure HSC-I(R)								
Characteristic resistance		$N_{Rk,s}$	[kN]	14.1	21.4	26.5	26.5	31.9
Partial safety factor		γ_{Ms} [1)]	[-]	1.87				
Pull-out failure				Not governing				
Concrete cone and splitting failure								
Effective anchorage depth		h_{ef}	[mm]	40	40	50	60	60
Factor for	Cracked	$k_1 = k_{cr}$	[-]	7.7 [2)] / 7.2 [3)]				
	Non-cracked	$k_1 = k_{ucr}$	[-]	11.0 [2)] / 10.2 [3)]				
Spacing		$s_{cr,N}$	[mm]	120	120	150	180	180
Edge distance		$c_{cr,N}$	[mm]	60	60	75	90	90
Spacing		$s_{cr,sp}$	[mm]	130	120	170	180	180
Edge distance		$c_{cr,sp}$	[mm]	65	60	85	90	90
Partial safety factor		γ_2 [3)] $= \gamma_{inst}$	[-]	1.00				

1) In absence of national regulations.
2) Parameter according to EN 1992-4
3) Parameter according to UKAD 330232-00-0601.

ANNEX C2
Performances
Characteristic resistance under shear load in concrete

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

Table C3: Characteristic resistance for HSC-A(R) under shear load in concrete

			M8x40	M10x40	M8x50	M12x60
Steel failure without lever arm						
Characteristic resistance HSC-A	$V_{Rk,s}$	[kN]	14.6	23.2	14.6	33.7
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.25			
Characteristic resistance HSC-AR	$V_{Rk,s}$	[kN]	12.8	20.3	12.8	29.5
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.56			
Ductility factor	$k_2 = k_7$	[-]	1.0			
Steel failure with lever arm						
Characteristic resistance HSC-A	$M^0_{Rk,s}$	[Nm]	30	60	30	105
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.25			
Characteristic resistance HSC-AR	$M^0_{Rk,s}$	[Nm]	26	52	26	92
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.56			
Concrete pry-out failure						
Pry-out factor	$k_8 = k$ [2)]	[-]	2	2	2	2
Installation safety factor	γ_2 [2)] $= \gamma_{inst}$	[-]	1.00			
Concrete edge failure						
Effective length of anchor in shear loading	l_f	[mm]	40	40	50	60
External diameter of anchor	d_{nom}	[mm]	14	16	14	18
Installation safety factor	γ_2 [2)] $= \gamma_{inst}$	[-]	1.00			

[1)] In absence of national regulations.
[2)] Parameter according to UKAD 330232-00-0601.

ANNEX C3
Performances
Characteristic resistance under shear load in concrete

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

Table C4: Characteristic resistance for HSC-I(R) under shear load in concrete

			M6x40	M8x40	M10x50	M10x60	M12x60
Steel failure without lever arm							
Characteristic resistance HSC-I	$V_{Rk,s}$	[kN]	8.0	12.2	15.2	15.2	18.2
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.25				
Characteristic resistance HSC-IR	$V_{Rk,s}$	[kN]	7.0	10.7	13.3	13.3	16.0
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.56				
Ductility factor	$k_2 = k_7$	[-]	1.00				
Steel failure with lever arm							
Characteristic resistance HSC-I	$M^0_{Rk,s}$	[Nm]	12	30	60	60	105
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.25				
Characteristic resistance HSC-IR	$M^0_{Rk,s}$	[Nm]	11	26	52	52	92
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1.56				
Concrete pry-out failure							
Pry-out factor	$k_3 = k_8 = k$ [2)]		2	2	2	2	2
Installation safety factor	γ_2 [2)] $= \gamma_{inst}$	[-]	1.00				
Concrete edge failure							
Effective length of anchor in shear loading	l_f	[mm]	40	40	50	60	60
External diameter of anchor	d_{nom}	[mm]	14	16	18	18	20
Installation safety factor	γ_2 [2)] $= \gamma_{inst}$	[-]	1.00				

1) In absence of national regulations.
2) Parameter according to UKAD 330232-00-0601.

ANNEX C4
Performances
Displacements under tension loads

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

Table C5: Displacements for HSC-A(R) under tension loads in case of static and quasi-static loading.

HSC-A carbon steel			**M8x40**	**M10x40**	**M8x50**	**M12x60**
Tension load in non-cracked concrete	N	[kN]	5.1	5.1	7.1	9.3
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.1
	$\delta_{N\infty}$	[mm]	0.2	0.2	0.2	0.2
Tension load in cracked concrete	N	[kN]	3.6	3.6	5.1	6.6
Displacement	δ_{N0}	[mm]	0.2	0.2	0.3	0.4
	$\delta_{N\infty}$	[mm]	0.7	0.7	0.6	0.4
HSC-AR stainless steel						
Tension load in non-cracked concrete	N	[kN]	5.1	5.1	7.1	9.3
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.2
	$\delta_{N\infty}$	[mm]	0.3	0.3	0.3	0.3
Tension load in cracked concrete	N	[kN]	3.6	3.6	5.1	6.6
Displacement	δ_{N0}	[mm]	0.4	0.4	0.4	1.0
	$\delta_{N\infty}$	[mm]	0.9	1.0	0.9	1.0

Table C6: Displacements for HSC-I(R) under tension loads in case of static and quasi-static loading.

HSC-I carbon steel			**M6x40**	**M8x40**	**M10x50**	**M10x60**	**M12x60**
Tension load in non-cracked concrete	N	[kN]	5.1	5.1	7.1	9.3	9.3
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.1	0.1
	$\delta_{N\infty}$	[mm]	0.2	0.2	0.2	0.2	0.2
Tension load in cracked concrete	N	[kN]	3.6	3.6	5.1	6.6	6.6
Displacement	δ_{N0}	[mm]	0.2	0.2	0.3	0.4	0.2
	$\delta_{N\infty}$	[mm]	0.7	0.7	0.6	0.4	0.7
HSC-IR stainless steel							
Tension load in non-cracked concrete	N	[kN]	5.1	5.1	7.1	9.3	9.3
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.2	0.2
	$\delta_{N\infty}$	[mm]	0.3	0.3	0.3	0.3	0.3
Tension load in cracked concrete	N	[kN]	3.6	3.6	5.1	6.6	6.6
Displacement	δ_{N0}	[mm]	0.4	0.4	0.5	0.5	1.0
	$\delta_{N\infty}$	[mm]	0.9	1.0	1.2	0.9	1.0

ANNEX C5
Performances
Displacements under shear loads

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

Table C7: Displacements for HSC-A(R) under shear loads in case of static and quasi-static loading.

HSC-A(R) carbon steel and stainless steel			**M8x40/15**	**M10x40/20**	**M8x50/15**	**M12x60/20**
Shear load in cracked and non-cracked concrete		[kN]	8.4	13.3	8.4	19.3
Displacement[1)]	δ_{V0}	[mm]	3.0	3.0	2.8	3.0
	$\delta_{V\infty}$	[mm]	4.5	4.5	4.3	4.5

[1)] Additional displacement due to annular gap between anchor and fixture is to be taken into account.

Table C8: Displacements for HSC-I(R) under shear loads in case of static and quasi- static loading.

HSC-I(R) carbon steel and stainless steel			**M6x40**	**M8x40**	**M10x50**	**M10x60**	**M12x60**
Shear load in cracked and non-cracked concrete		[kN]	4,6	7,0	8,7	8,7	10,4
Displacement[1)]	δ_{V0}	[mm]	3,0	3,0	2,8	3,0	3,0
	$\delta_{V\infty}$	[mm]	4,5	4,5	4,3	4,5	4,5

[1)] Additional displacement due to annular gap between anchor and fixture is to be taken into account.

ANNEX C6
Performances
Characteristic tension and shear resistance for seismic performance category C2

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

Table C9: Characteristic tension resistance for HSC-A under seismic loading for performance category C2

			M8x40	M10x40	M8x50	M12x60
Steel failure						
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	29.3	46.4	29.3	-
Partial safety factor	$\gamma_{Ms,seis}$ [1)]	[-]	1.50			
Pull-out failure						
Characteristic resistance	$N_{Rk,p,seis}$	[kN]	2.4	4.5	2.4	-
Partial safety factor	γ_2 [3)] = γ_{inst}	[-]	1.00			
Concrete cone and splitting failure [4)]						
Effective anchorage depth	h_{ef}	[mm]	40	40	50	60
Partial safety factor	γ_2 [3)] = γ_{inst}	[-]	1.00			

[1)] In absence of national regulations.
[2)] Parameter according to EN 1992-4
[3)] Parameter according to UKAD 330232-00-0601.
[4)] For concrete cone and splitting failure see TR 045.

Table C10: Characteristic shear resistance for HSC-A under seismic loading for performance category C2

			M8x40	M10x40	M8x50	M12x60
Steel failure						
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	12.4	19.7	12.4	-
Partial safety factor	$\gamma_{Ms,seis,V}$ [1)]	[-]	1.25			
Concrete pry-out failure [3)]						
Installation safety factor	γ_2 [2)] = γ_{inst}	[-]	1.00			
Concrete edge failure [3)]						
Installation safety factor	γ_2 [2)] = γ_{inst}	[-]	1.00			

[1)] In absence of national regulations.
[2)] Parameter according to UKAD 330232-00-0601.
[3)] For concrete cone and splitting failure see TR 045.

ANNEX C7
Performances
Displacements under tension and shear loads for seismic performance category C2.

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

Table C11: Displacements for HSC-A under seismic tension loading for performance category C2.

			M8x40	M10x40	M8x50	M12x60
Displacement DLS	$\delta_{N,seis}$	[mm]	1.9	2.2	1.9	-
Displacement ULS	$\delta_{N,seis}$	[mm]	8.1	7.1	8.1	-

Table C12: Displacements for HSC-A under seismic shear loading for performance category C2.

			M8x40	M10x40	M8x50	M12x60
Displacement DLS	$\delta_{V,seis}$	[mm]	3.4	4.7	3.4	-
Displacement ULS	$\delta_{V,seis}$	[mm]	8.2	8.3	8.2	-

ANNEX C8
Performances
Characteristic resistance under fire exposure

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

Table C13: Characteristic resistance under fire exposure for HSC-A(R) in cracked and uncracked concrete

				M8x40	M10x40	M8x50	M12x60
HSC-A							
Characteristic resistance	R30	$F_{Rk,fi}$	[kN]	0.4	0.9	0.4	1.7
	R60	$F_{Rk,fi}$	[kN]	0.3	0.8	0.3	1.3
	R90	$F_{Rk,fi}$	[kN]	0.3	0.6	0.3	1.1
	R120	$F_{Rk,fi}$	[kN]	0.2	0.5	0.2	0.8
HSC-AR							
Characteristic resistance	R30	$F_{Rk,fi}$	[kN]	0.7	1.5	0.7	2.5
	R60	$F_{Rk,fi}$	[kN]	0.6	1.2	0.6	2.1
	R90	$F_{Rk,fi}$	[kN]	0.4	0.9	0.4	1.7
	R120	$F_{Rk,fi}$	[kN]	0.4	0.8	0.4	1.3

Table C14: Characteristic resistance under fire exposure for HSC-I(R) in cracked and uncracked concrete

				M6x40	M8x40	M10x50	M10x60	M12x60
HSC-I								
Characteristic resistance	R30	$F_{Rk,fi}$	[kN]	0.2	0.4	0.9	0.4	1.7
	R60	$F_{Rk,fi}$	[kN]	0.2	0.3	0.8	0.3	1.3
	R90	$F_{Rk,fi}$	[kN]	0.1	0.3	0.6	0.3	1.1
	R120	$F_{Rk,fi}$	[kN]	0.1	0.2	0.5	0.2	0.8
HSC-IR								
Characteristic resistance	R30	$F_{Rk,fi}$	[kN]	0.2	0.7	1.5	0.7	2.5
	R60	$F_{Rk,fi}$	[kN]	0.2	0.6	1.2	0.6	2.1
	R90	$F_{Rk,fi}$	[kN]	0.1	0.4	0.9	0.4	1.7
	R120	$F_{Rk,fi}$	[kN]	0.1	0.4	0.8	0.4	1.3

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