

Hilti Anchor Channel HAC-C

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Anchor channel HAC-C

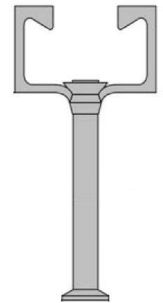


APPLICATIONS

- Fastening of curtain wall, external cladding bracket e.g wet zones, etc.
- Fastening of M&E services in outdoor or corrosive conditions

ADVANTAGES

- Special end caps with nail holes to ease installation of T-head bolts
- Dustless and noiseless fastening method
- Flexibility of use throughout the whole building life cycle



Technical data

Base material	Concrete
Environmental conditions	Outdoor
Material composition	Steel, A4 stainless steel/ hot-dip galvanized

HAC-C (A4 stainless steel)

Ordering designation	T-head bolt size	Length, lch	Number of anchors	Anchor distance	Standard embedment depth, hef	Sales pack quantity	Item number
HAC-C 40/22-300-A4	40/22	300	3	100 mm	79 mm	1 pc	2170266 ¹⁾
HAC-C 40/22-350-A4	40/22	350	3	150 mm	79 mm	1 pc	2170267
HAC-C 40/22-550-A4	40/22	550	3	250 mm	79 mm	1 pc	2170360 ¹⁾
HAC-C 40/22-1550-A4	40/22	1550	7	250 mm	79 mm	1 pc	2170364 ¹⁾
HAC-C 50/30-350-A4	50/30	350	3	150 mm	94 mm	1 pc	2170396
HAC-C 52/34-350-A4	50/30	350	3	150 mm	155 mm	1 pc	2170257

¹⁾ This is non-stock item. For detailed leadtime information, please contact your Hilti representative.

Please visit Hilti website for the latest item numbers and related products

HAC-C (Hot-dip galvanized)

Ordering designation	T-head bolt size	Length, lch	Number of anchors	Anchor distance	Standard embedment depth, hef	Sales pack quantity	Item number
HAC-C 40/22-300-F	40/22	300	3	100 mm	79 mm	1 pc	2168472 ¹⁾
HAC-C 40/22-350-F	40/22	350	3	150 mm	79 mm	1 pc	2168473
HAC-C 40/22-550-F	40/22	550	3	250 mm	79 mm	1 pc	2168476 ¹⁾
HAC-C 40/22-1550-F	40/22	1550	7	250 mm	79 mm	1 pc	2168480 ¹⁾
HAC-C 50/30-350-F	50/30	350	3	150 mm	94 mm	1 pc	2168525
HAC-C 52/34-350-F	50/30	350	3	150 mm	155 mm	1 pc	2168543

¹⁾ This is non-stock item. For detailed leadtime information, please contact your Hilti representative.

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T-head bolt HBC



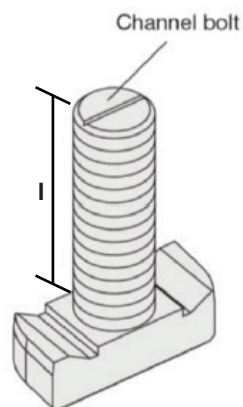
APPLICATIONS

- For use with HAC-C anchor channels

ADVANTAGES

- European approval according to latest technical specifications
- Dustless and noiseless fastening method

Technical data	
Environmental conditions	Outdoor
Material composition	A4-70 stainless steel/ Hot-dip galvanized



HBC (A4 stainless steel)

Ordering designation	Anchor size	Usable thread length	Bolt length, l	Sales pack quantity	Item number
HBC 40/22-M12x60 A4-70	M12	36.7 mm	60 mm	50 pc	2169081
HBC 40/22-M12x80 A4-70	M12	56.7 mm	80 mm	25 pc	2169082 ¹⁾
HBC 40/22-M16x60 A4-70	M16	32.2 mm	60 mm	25 pc	2169084
HBC 40/22-M16x80 A4-70	M16	52.2 mm	80 mm	25 pc	2169085
HBC 50/30-M16x60 A4-70	M16	30.2 mm / 26.7 mm	60 mm	50 pc	2168809
HBC 50/30-M16x80 A4-70	M16	50.2 mm / 46.7 mm	80 mm	50 pc	2168810
HBC 50/30-M20x60 A4-70	M20	45 mm / 41.5 mm	80 mm	50 pc	2168814 ¹⁾

¹⁾ This is non-stock item. For detailed leadtime information, please contact your Hilti representative.

*Usable thread length measures the bolt length protruded after inserted the HBC into the HAC channel.

Please visit Hilti website for the latest item numbers and related products

HBC (Grade 8.8, hot-dip galvanized)

Ordering designation	Anchor size	Usable thread length	Bolt length, l	Sales pack quantity	Item number
HBC 40/22-M12x60 8.8F	M12	36.7 mm	60 mm	50 pc	2169074
HBC 40/22-M12x80 8.8F	M12	56.7 mm	80 mm	25 pc	2169075
HBC 40/22-M16x60 8.8F	M16	32.2 mm	60 mm	25 pc	2169077
HBC 40/22-M16x80 8.8F	M16	52.2 mm	80 mm	25 pc	2169078
HBC 50/30-M16x60 8.8F	M16	30.2 mm / 26.7 mm	60 mm	50 pc	2168746
HBC 50/30-M16x80 8.8F	M16	50.2 mm / 46.7 mm	80 mm	50 pc	2168747
HBC 50/30-M20x60 8.8F	M20	45 mm / 41.5 mm	80 mm	50 pc	2168800 ¹⁾

¹⁾ This is non-stock item. For detailed leadtime information, please contact your Hilti representative.

*Usable thread length measures the bolt length protruded after inserted the HBC into the HAC channel.

Please visit Hilti website for the latest item numbers and related products

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-17/0336
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

Anchor channels (HAC-C) with channel bolts (HBC)

Product family
to which the construction product belongs

Anchor channels

Manufacturer

Hilti AG
Feldkircherstraße 100
9494 Schaan
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

Hilti Werke

This European Technical Assessment
contains

31 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 330008-03-0601

This version replaces

ETA-17/0336 issued on 19 May 2020

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Specific Part

1 Technical description of the product

The anchor channels (HAC-C) with channel bolts (HBC) are a system consisting of C-shaped channel profile of carbon steel or stainless steel and at least two metal anchors non-detachably fixed to the channel back and channel bolts.

The anchor channel is embedded surface-flush in the concrete. Channel bolts (HBC) with appropriate hexagon nuts and washers are fixed to the channel.

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 channel 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 channel 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 under tension load (static and quasi-static load)	
- Resistance to steel failure of anchors, connection and channel lips	See Annex C1
- Resistance to steel failure of channel bolt	See Annex C9
- Resistance to steel failure by exceeding the bending strength of the channel	See Annex B5 and C2
- Max. installation torque	See Annex B5
- Resistance to pull-out failure of the anchor and to concrete cone failure	See Annex C3 and C4
- Min. edge distance, spacing and member thickness	See Annex B3
- Characteristic edge distance and spacing to avoid splitting of concrete under load	See Annex C3 and C4
- Resistance to blow-out failure – bearing area of anchor head	See Annex A4

Characteristic resistance under shear load (static and quasi-static load)	
- Resistance to steel failure of channel bolt	See Annex C9 und C10
- Resistance to steel failure of channel lips, connection and anchor (shear load perpendicular to longitudinal axis of channel)	See Annex C5 und C6
- Resistance to steel failure of channel lips, anchor and connection (shear load in direction of longitudinal axis of channel)	See Annex C5 und C6
- Resistance to concrete failure	See Annex C7
Characteristic resistance under combined tension and shear load (static and quasi-static load)	See Annex C8
Characteristic resistances under cyclic fatigue tension load	See Annex C12 to C13
Displacements (static and quasi-static load)	See Annex C5 and C7 to C8
Durability	See Annex B1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Characteristic resistance to fire	See Annex C11

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

In accordance with EAD No. 330008-03-0601, the applicable European legal act is: [2000/273/EC].

The system to be applied is: 1

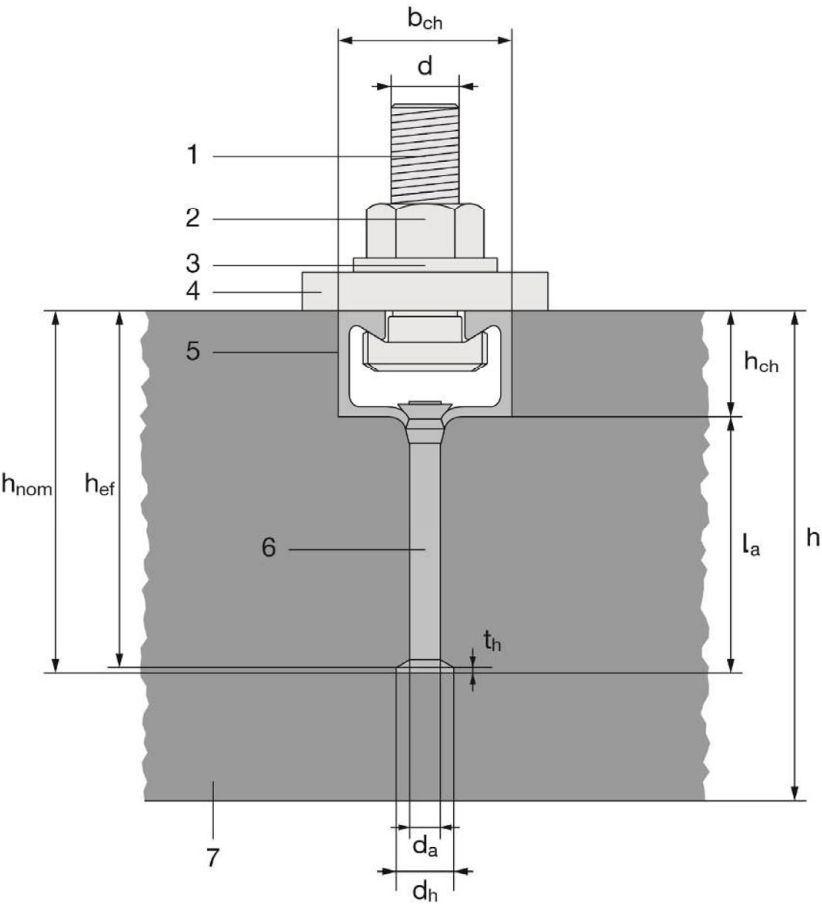
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

Dipl.-Ing. Beatrix Wittstock
Head of Section

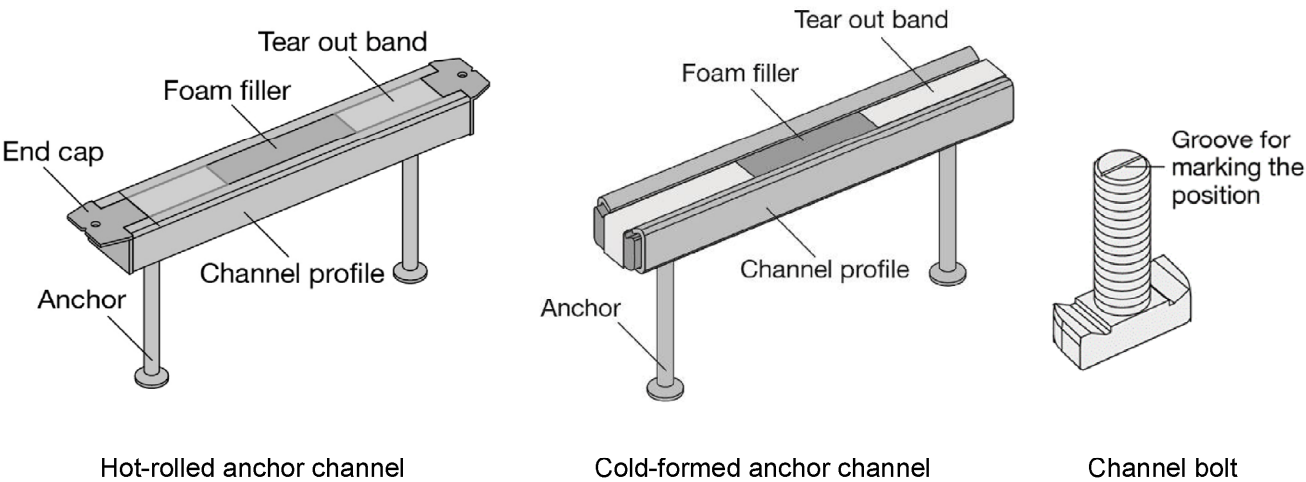
beglaubigt:
Müller

Product and installation condition



Key

- 1 channel bolt
- 2 hexagonal nut
- 3 washer
- 4 fixture
- 5 channel profile
- 6 anchor
- 7 concrete member



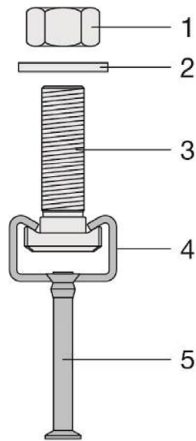
Anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Installed condition

Annex A1

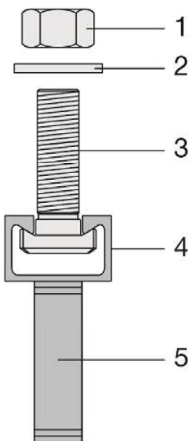
Anchor channel types

Cold-formed anchor channel

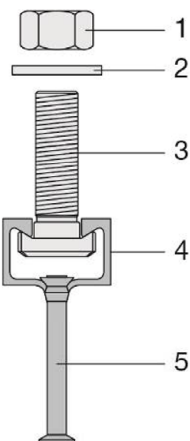


Round anchor

Hot-rolled anchor channel



I-anchor

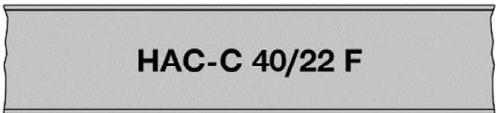


Round anchor

- Key**
- 1 hexagonal nut
 - 2 washer
 - 3 channel bolt
 - 4 channel profile
 - 5 anchor

Marking of the anchor channels:

HAC-C(-P)(-I) XZ



- HAC-C = Identifying mark of the manufacturer
- P = Additional marking for premium line
- I = Additional marking for I-anchors (no marking in the case of round anchors)
- X = Size of the channel
- Z = Corrosion class / Material
 - F = Hot-dip galvanized
 - A4 = Stainless steel

- (e.g. HAC-C 40/22 F)
- 40/22 = Anchor channel size 40/22
- F = Hot-dip galvanized

Marking of the channel bolt:

HBC-X(-N) YZ



- HBC = Identifying mark of the manufacturer
- X = Channel bolt
- N = Additional marking for notching bolt
- Y = Steel grade (4.6, 8.8, 70)
- Z = Corrosion class / Material
 - F = Hot-dip galvanized
 - R = Stainless steel

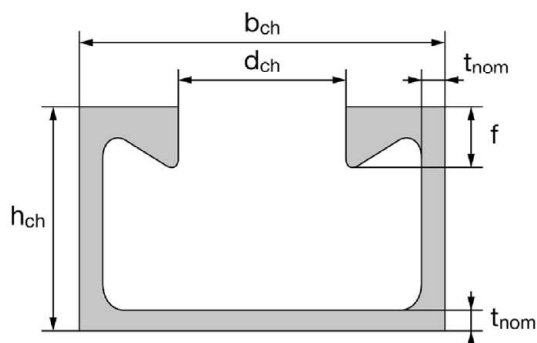
- (e.g. HBC-40/22 8.8F)
- 40 = Channel bolt in combination with HAC-C 40/22F
- 8.8 = Steel grade
- F = Hot-dip galvanized

Anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Anchor channel types and marking

Annex A2

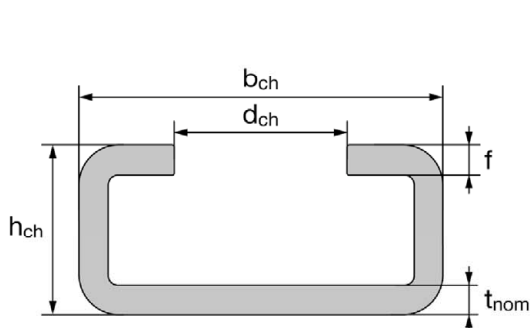
Channel profiles



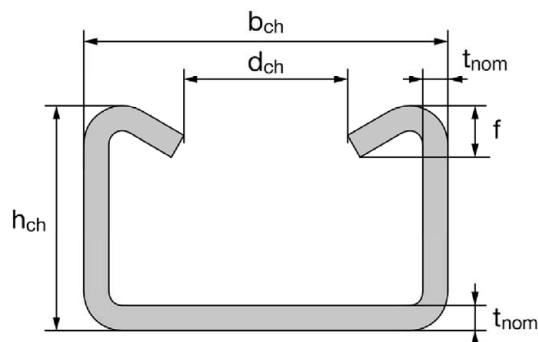
HAC-C(-P) 40/22, HAC-C-P 40L, HAC-C(-P) 50/30, HAC-C-P 50L, HAC-C 52/34

Table 1: Dimensions of hot-rolled channel profile

Anchor channel	b_{ch}	h_{ch}	t_{nom}	d_{ch}	f	I_y
	[mm]					[mm ⁴]
HAC-C(-P) 40/22	40,1	23,0	2,7	18,0	6,0	21504
HAC-C-P 40L	40,1	23,0	2,7	18,0	6,0	21504
HAC-C(-P) 50/30	49,6	30,0	3,2	22,5	8,1	57781
HAC-C-P 50L	49,6	30,0	3,2	22,5	8,1	57781
HAC-C 52/34	52,5	34,0	4,0	22,5	11,5	97606



HAC-C 28/15, HAC-C 38/17



HAC-C 40/25, HAC-C 49/30, HAC-C 54/33

Table 2: Dimensions of cold-formed channel profile

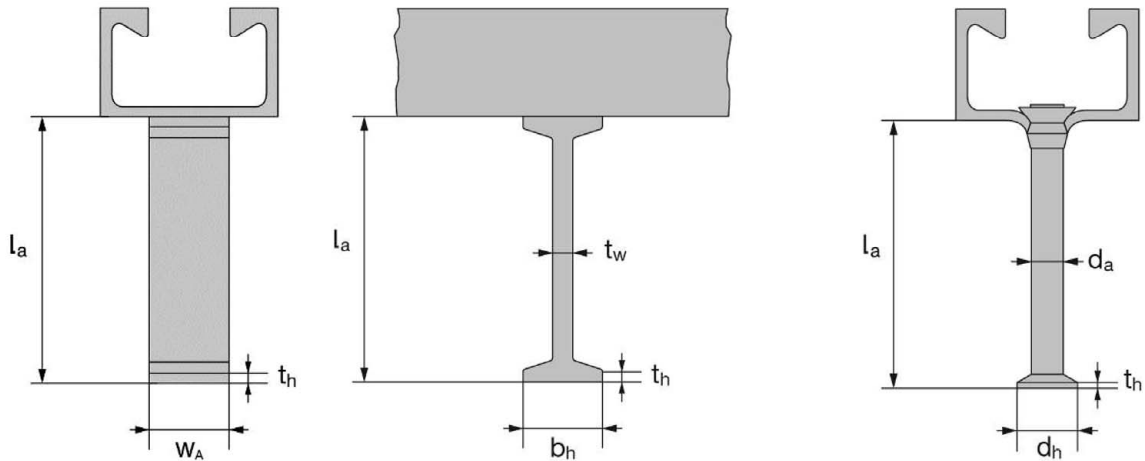
Anchor channel	b_{ch}	h_{ch}	t_{nom}	d_{ch}	f	I_y
	[mm]					[mm ⁴]
HAC-C 28/15	28,0	15,5	2,3	12,0	2,3	4277
HAC-C 38/17	38,0	17,3	3,0	18,0	3,0	8224
HAC-C 40/25	40,0	25,0	2,75	18,0	5,6	20122
HAC-C 49/30	50,0	30,0	3,25	22,0	7,4	43105
HAC-C 54/33	53,5	33,0	5,0	21,5	8,0	74706

Anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Channel profiles (HAC-C)

Annex A3

Anchors



**Table 3: Dimensions of anchor
(welded I-anchor or round anchor)**

Anchor channel	I-anchor						Round anchor				
	min l _a	t _w	b _h	t _h	w _A	A _h	min l _a	d _a	d _h	t _h	A _h
	[mm]					[mm ²]	[mm]				[mm ²]
HAC-C 28/15	1)						31,0	6,0	12,0	1,3	85
HAC-C 38/17	1)						60,8	8,0	16,0	2,0	151
HAC-C 40/25	1)						56,0				
HAC-C 40/22	62,0	5,0	20,0	5,0	20,0	300	58,0	10,0	21,5	2,2	285
HAC-C-P 40/22	125,0	6,0	25,0	5,0	20,0	380	70,0				
HAC-C-P 40L	1)						83,2	10,0	21,5	2,2	285
HAC-C 49/30	1)						66,0	10,0	20,0	2,2	236
HAC-C 50/30	69,0	5,0	20,0	5,0	25,0	375					
HAC-C-P 50/30	125,0	6,0	25,0	5,0	25,0	475	78,0	11,0	26,0	2,5	436
HAC-C-P 50L	1)						118,3	11,0	26,0	2,5	436
HAC-C 54/33	1)						124,5				
HAC-C 52/34	125,0	6,0	25,0	5,0	40,0	760	123,5				

1) Product not available

Anchor channels (HAC-C) with channel bolts (HBC)

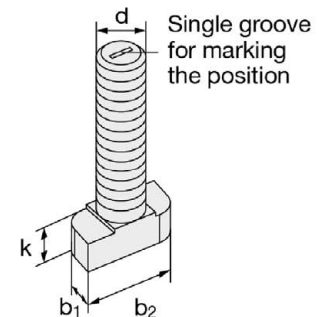
Product Description
Anchors

Annex A4

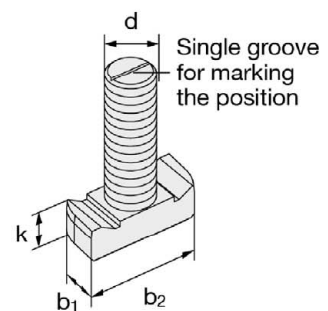
Channel bolts

Table 4: Dimensions of channel bolt

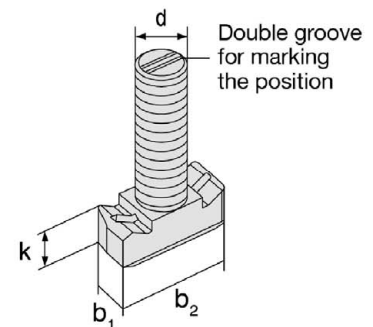
Appropriate anchor channel	Channel bolt	Dimensions			
		b ₁	b ₂	k	d
		[mm]			
HAC-C 28/15	HBC-28/15	10,1	22,2	5,0	8
		11,0		6,0	10
HAC-C 38/17	HBC-38/17	13,0	30,5	6,0	10
		16,0		7,0	12
HAC-C(-P) 40/22 HAC-C-P 40L HAC-C 40/25	HBC-40/22	14,0	33,0	10,5	10
		17,0		11,5	12
HAC-C-P 40/22 HAC-C-P 40L	HBC-40/22-N	17,0	33,0	11,5	16
HAC-C 49/30 HAC-C(-P) 50/30 HAC-C-P 50L HAC-C 52/34 HAC-C 54/33	HBC-50/30	17,0	42,0	14,5	12
		21,0		15,5	16
HAC-C-P 50/30 HAC-C-P 50L HAC-C 52/34	HBC-50/30-N	21,0	42,0	15,5	20



HBC-28/15, HBC-38/17



HBC-40/22, HBC-50/30



HBC-40/22-N, HBC-50/30-N

Table 5: Steel grade and corrosion class

Channel Bolt	Carbon steel ¹⁾		Stainless steel ¹⁾	
Steel grade	4.6	8.8	A4-50	A4-70
f _{uk} [N/mm ²]	400	800 / 830 ²⁾	500	700
f _{yk} [N/mm ²]	240	640 / 660 ²⁾	210	450
Corrosion class	G ³⁾ F ⁴⁾		R ⁵⁾	

¹⁾ Material properties according to Annex A6

²⁾ Material properties according to EN ISO 898-1: 2013

³⁾ Electroplated

⁴⁾ Hot-dip galvanized

⁵⁾ Stainless steel

Anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Channel bolts (HBC)

Annex A5

Table 6: Materials

Component	Carbon steel			Stainless steel
	Mechanical properties	Coating		Mechanical properties
1	2a	2b	2c	3
Channel Profile	1.0038, 1.0044, 1.0045 according to EN 10025: 2005 1.0976, 1.0979 according to EN 10149: 2013	Hot dip galvanized $\geq 50 \mu\text{m}$ according to EN ISO 10684: 2004/AC: 2009		1.4362, 1.4401 1.4404, 1.4571, 1.4578 according to EN 10088: 2005
Anchor	1.0038, 1.0213, 1.0214 according to EN 10025: 2005 1.5523, 1.5535 according to EN 10263: 2002-02	-	Hot dip galvanized $\geq 50 \mu\text{m}$ according to EN ISO 10684: 2004/AC: 2009	1.4362, 1.4401 1.4404, 1.4571, 1.4578 according to EN 10088: 2005 ³⁾
Channel bolt	Steel grade 4.6 and 8.8 according to EN ISO 898-1: 2013	Electroplated according to EN ISO 4042: 1999	Hot dip galvanized $\geq 50 \mu\text{m}$ according to EN ISO 10684: 2004/AC: 2009	Grade 50 or 70 according to EN ISO 3506: 2009
Plain washer ¹⁾ according to ISO 7089: 2000 and ISO 7093-1: 2000	Hardness class A $\geq 200 \text{ HV}$	Electroplated according to EN ISO 4042: 1999	Hot dip galvanized $\geq 50 \mu\text{m}$ according to EN ISO 10684: 2004/AC: 2009	1.4401, 1.4404 1.4571, 1.4578 according to EN 10088: 2005
Hexagonal nut according to ISO 4032: 2012 or DIN 934: 1987-10 ²⁾	Property class 5 or 8 according to EN ISO 898-2: 2012	Electroplated according to EN ISO 4042: 1999	Hot dip galvanized $\geq 50 \mu\text{m}$ according to EN ISO 10684: 2004/AC: 2009	Property class 50, 70 or 80 according to EN ISO 3506: 2009

¹⁾ In scope of delivery only for notched bolts

²⁾ Hexagonal nuts according to DIN 934: 1987-10 for channel bolts made from carbon steel (4.6) and stainless steel

³⁾ Anchors made of carbon steel according column 2a may also be used if they are welded and their concrete cover is more than 50mm and the tempering colors are removed

Anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Materials

Annex A6

Specifications of intended use

Anchor channels and channel bolts subject to:

- Static and quasi-static loads in tension, shear perpendicular to the longitudinal axis of the channel and shear in the direction of the longitudinal axis.
- Fire exposure: only for concrete class C20/25 to C50/60.
- Fatigue cycling tension loads.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1: 2000.
- Strength classes C12/15 to C90/105 according to EN 206-1: 2000.
- Cracked or uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (anchor channels and channel bolts according to Annex A6, Table 6, column 2 and 3).
- Structures subject to internal conditions with usual humidity (e.g. kitchen, bath and laundry in residential buildings, exceptional permanent damp conditions and application under water) (anchor channels and channel bolts according to Annex A6, Table 6, column 2c and 3).
- According to EN 1993-1-4: 2006 + A2: 2015 relating to corrosion resistance class CRC III (anchor channels, channel bolts according to Annex A6, Table 6, column 3)

Design:

- Anchor channels 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 channel and channel bolts are indicated on the design drawings (e.g. position of the anchor channel relative to the reinforcement or to supports).
- For static and quasi-static loading as well as fire exposure the anchor channels are designed in accordance with EOTA TR 047 "Calculation Method for the Performance of Anchor Channels", March 2018 or EN 1992-4: 2018.
- For fatigue loading the anchor channels are designed in accordance with EOTA TR 050 "Calculation Method for the Performance of Anchor Channels under Fatigue Loading", November 2015.
- The characteristic resistances are calculated with the minimum effective embedment depth.

Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Specifications

Annex B1

Installation:

- The installation of anchor channels is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the anchor channels only as supplied by the manufacturer - without any manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex B3, Table 7 and Table 8 are generated including end spacing and minimum channel length and in case of hot-dip galvanised anchor channels only to be used in dry internal conditions.
- Installation in accordance with the manufacturer's specifications given in Annexes B6, B7 and B8
- The anchor channels are fixed on the formwork, reinforcement or auxiliary construction such that no movement of the channels will occur during the time of laying the reinforcement and of placing and compacting the concrete.
- The concrete around the head of the anchors are properly compacted. The channels are protected from penetration of concrete into the internal space of the channels.
- Washer may be chosen according to Annex A6 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex B7 and Annex B8) rectangular to the channel axis.
- The required installation torques given in Annex B5 must be applied and must not be exceeded.

Anchor channels (HAC-C) with channel bolts (HBC)

**Intended Use
Specifications**

Annex B2

Table 7: Installation parameters for hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Minimum effective embedment depth	$h_{ef,min}$	[mm]	79	91	106	94	106	148	155
Minimum spacing	s_{min}		100	50	50	100	50 ¹⁾	50	100
Maximum spacing	s_{max}		250						
End spacing	x		25 ²⁾						35 ³⁾
Minimum channel length	l_{min}		150	100	100	150	100	100	170 ⁴⁾
Minimum edge distance	c_{min}		50			75			75
Minimum thickness of concrete member	h_{min}		100	100	120	105	120	162	165

1) s_{min} = 100 mm when used in combination with notched bolts

2) The end spacing may be increased from 25 mm to 35 mm

3) x = 25 mm for welded I-anchors

4) l_{min} = 150 mm for welded I-anchors

Table 8: Installation parameters for cold-formed anchor channel

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Minimum effective embedment depth	$h_{ef,min}$	[mm]	45	76	79	94	155
Minimum spacing	s_{min}		50	100			
Maximum spacing	s_{max}		200		250		
End spacing	x		25 ¹⁾				
Minimum channel length	l_{min}		100	150			
Minimum edge distance	c_{min}		40	50		75	100
Minimum thickness of concrete member	h_{min}		70	100		120	180

1) The end spacing may be increased from 25 mm to 35 mm

Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for anchor channels (HAC-C)

Annex B3

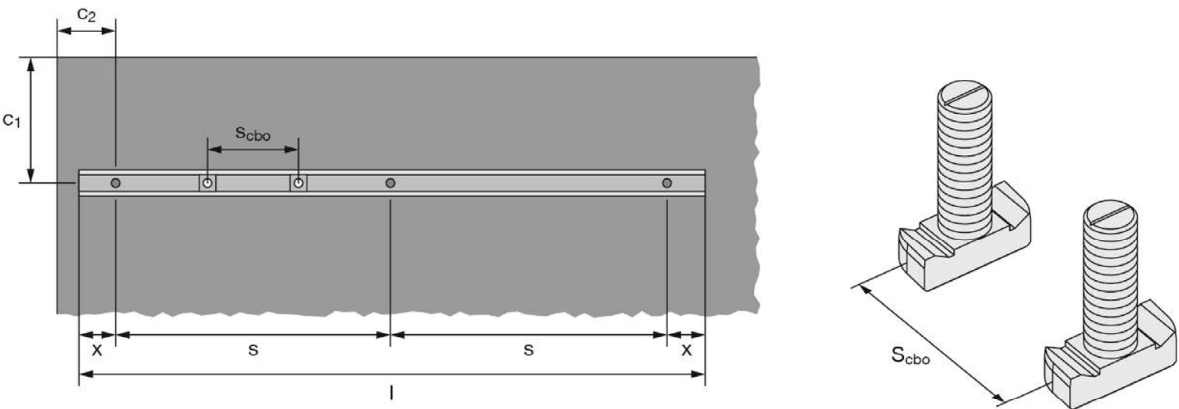


Table 9: Minimum spacing for channel bolts

Channel bolt			M8	M10	M12	M16	M20
Minimum spacing between channel bolts	S _{cbo,min}	[mm]	40	50	60	80	100

s_{cbo} = spacing between channel bolts

Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for anchor channels (HAC-C)

Annex B4

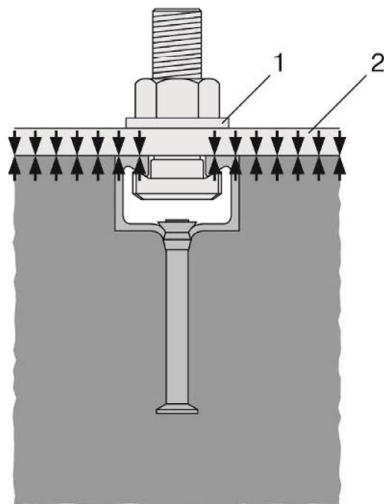
Table 10: Required installation torque T_{inst}

Channel bolt		T _{inst} ¹⁾ [Nm]				
		General: T _{inst,g}	Steel - steel contact: T _{inst,s}			
		4.6, 8.8, A4-50, A4-70	4.6	8.8	A4-50	A4-70
HBC-28/15	M8	7	2)	20	7	15
	M10	10		40	2)	30
	M12	13		60		50
HBC-38/17	M10	15	13	2)		22
	M12	25	2)	45		50
	M16	40		100		90
HBC-40/22	M10	15	13	2)		22
	M12	25	2)	45		50
	M16	30		100		90
HBC-40/22-N	M16	160		160		2)
HBC-50/30	M12	25		2)		45
	M16	55			100	130
	M20	55			360	250
HBC-50/30-N	M16	185			2)	185
	M20	320	320			

1) T_{inst} must not be exceeded

2) Product not available

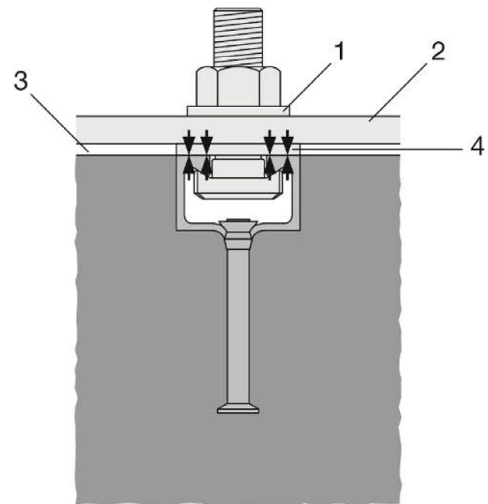
General: The fixture is in contact with the channel profile and the concrete surface



Key

- 1 washer
- 2 fixture
- 3 gap
- 4 suitable steel part

Steel-steel contact: Fixture is not in contact with the concrete surface. The fixture is fastened to the anchor channel by suitable steel part (e.g. washer)



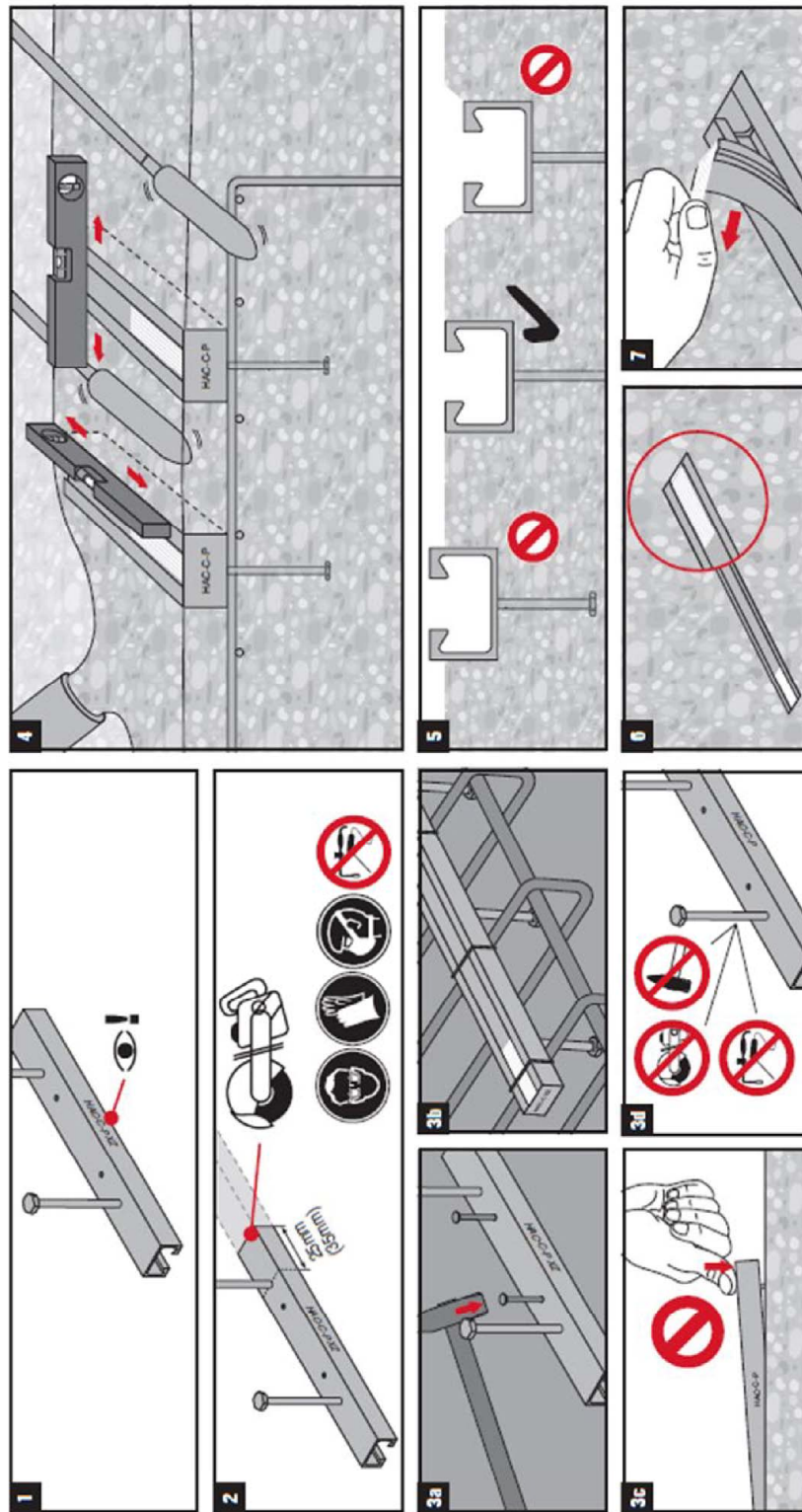
Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for channel bolts (HBC)

Annex B5

HAC-C(-P)

2181129 A1-05.2017



Anchor channels (HAC-C) with channel bolts (HBC)

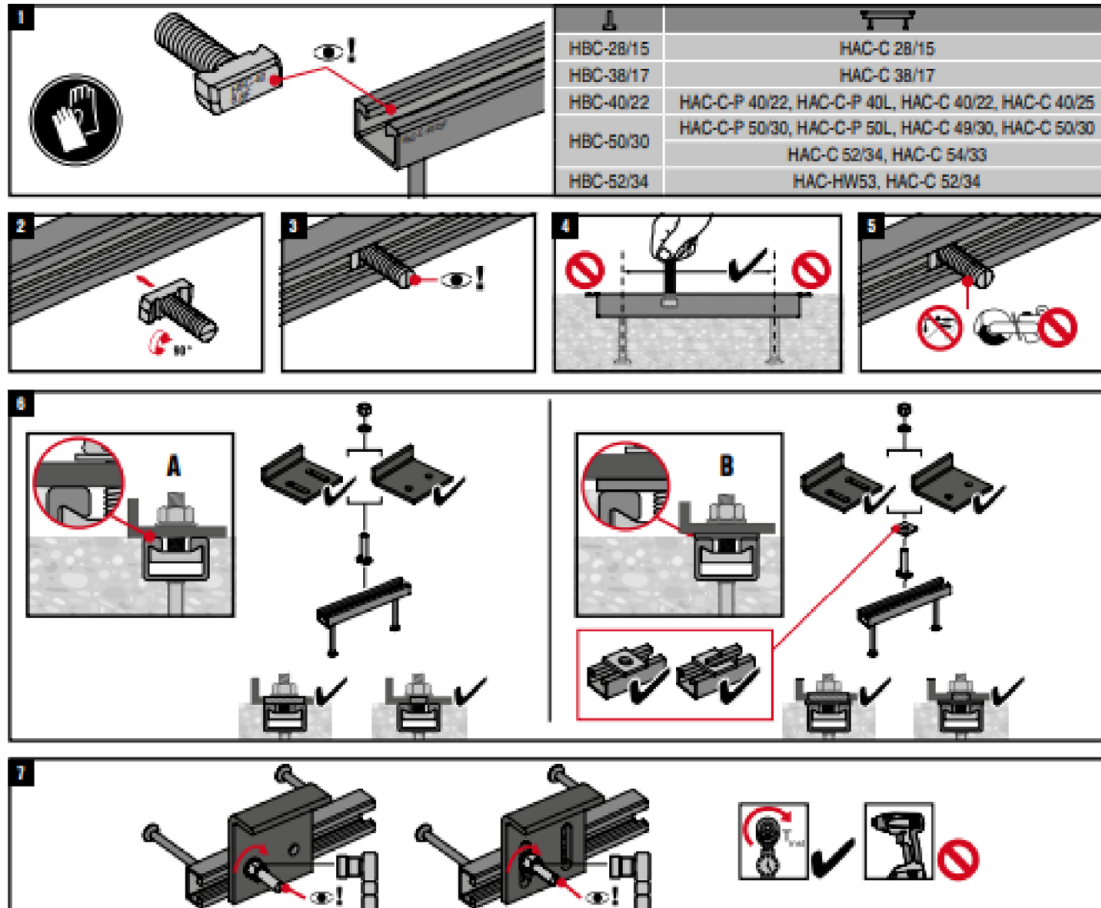
Intended Use
Installation instructions for anchor channels (HAC-C)

Annex B6



HBC

2194125 A3-08.2020



Channel bolt		T _{inst} [Nm]			
		4.6, 8.8, A4-50, A4-70	T _{inst} [Nm]		
			4.6	8.8	A4-50, A4-70
HBC-28/15	M8	7	-	20	15
	M10	10		40	30
	M12	13		60	50
HBC-38/17	M10	15	13	15	22
	M12	25	-	45	50
	M16	40		100	90
HBC-40/22	M10	15	13	15	22
	M12	25	-	45	50
	M16	30		100	90
HBC-50/30	M12	25	-	45	50
	M16	55		100	130
	M20	55		360	250
HBC-52/34	M20	55		360	-

Anchor channels (HAC-C) with channel bolts (HBC)

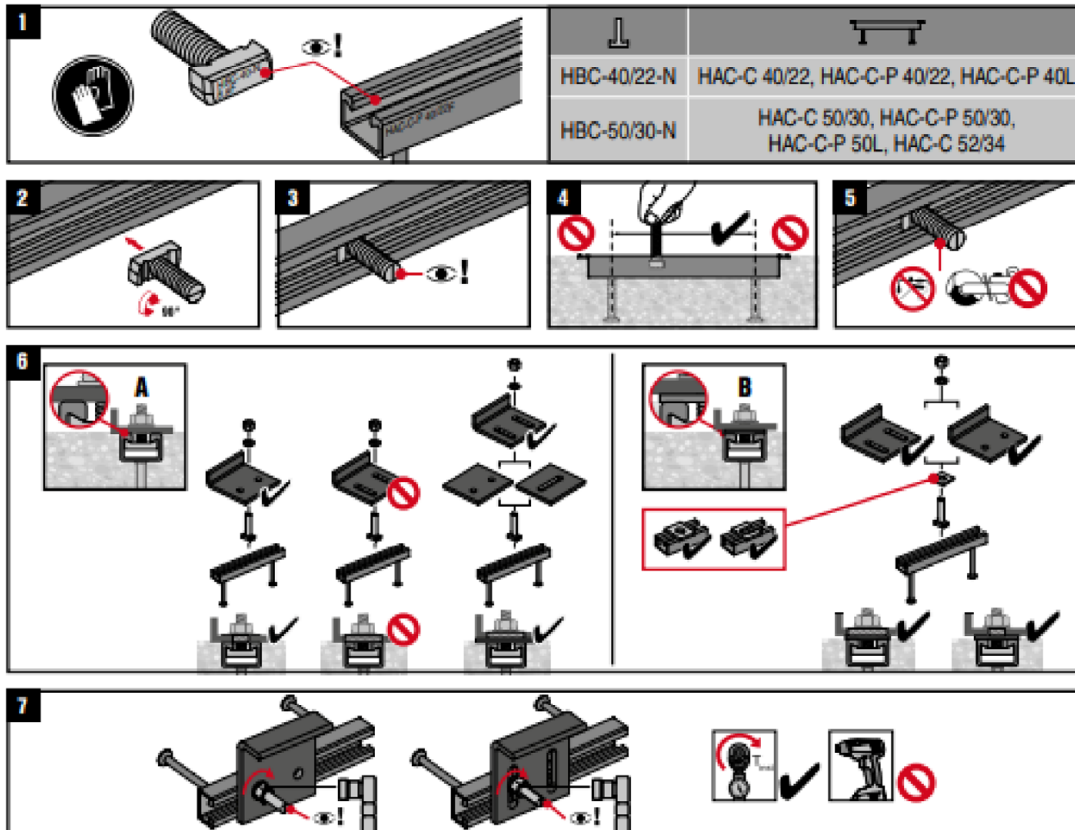
Intended Use
Installation instructions for channel bolts (HBC)

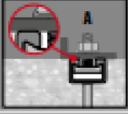

Annex B7



HBC-N

2257118 A1-08.2020



Anchor Channel	Channel Bolt	T _{inst} [Nm]	
			
HAC-C-P 40/22	HBC-40/22-N M16	8.8	8.8
HAC-C-P 40L		160	160
HAC-C 40/22		60	160
HAC-C-P 50/30	HBC-50/30-N M16	185	185
HAC-C-P 50L		185	185
HAC-C 50/30		185	185
HAC-C 52/34	HBC-50/30-N M20	320	320
HAC-C-P 50/30		320	320
HAC-C-P 50L		320	320
HAC-C 50/30			
HAC-C 52/34			

Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation instructions for channel bolts (HBC)

Annex B8

Table 11: Characteristic resistances under tension load – steel failure of hot-rolled anchor channels

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure: Anchor									
Characteristic resistance	N _{Rk,s,a}	[kN]	20,0	40,0	40,0	31,0	57,0	57,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8						
Steel failure: Connection between anchor and channel									
Characteristic resistance	N _{Rk,s,c}	[kN]	20,0	39,6	39,6	31,0	50,6	50,6	55
Partial factor	γ _{Ms,ca} ¹⁾	[-]	1,8						
Steel failure: Local flexure of channel lips									
Characteristic spacing of the channel bolts for N _{Rk,s,l}	s _{l,N}	[mm]	79	79	79	98	98	98	105
Characteristic resistance	N ⁰ _{Rk,s,l}	[kN]	47,9	47,9	47,9	50,5	50,5	50,5	65,0
Partial factor	γ _{Ms,l} ¹⁾	[-]	1,8						

¹⁾ In absence of other national regulations

Table 12: Characteristic resistances under tension load – steel failure of cold-formed anchor channels

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Steel failure: Anchor							
Characteristic resistance	N _{Rk,s,a}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				
Steel failure: Connection between anchor and channel							
Characteristic resistance	N _{Rk,s,c}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms,ca} ¹⁾	[-]	1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of the channel bolts for N _{Rk,s,l}	s _{l,N}	[mm]	56	76	80	100	107
Characteristic resistance	N ⁰ _{Rk,s,l}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms,l} ¹⁾	[-]	1,8				

¹⁾ In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels under tension load

Annex C1

Table 13: Characteristic flexural resistance of hot-rolled anchor channels under tension load

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure: Flexure of channel									
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$	[Nm]	1013	1704	1704	2084	3448	3448	3435
Partial factor	$\gamma_{Ms,flex}$	¹⁾ [-]	1,15						

¹⁾ In absence of other national regulations

Table 14: Characteristic flexural resistance of cold-formed anchor channels under tension load

Anchor channel				HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Steel failure: Flexure of channel								
Characteristic flexural resistance of channel	carbon steel	M _{RK,s,flex}	[Nm]	316	538	979	1669	2929
	stainless steel				527		1702	2832
Partial factor		γ _{Ms,flex} ¹⁾	[-]	1,15				

¹⁾ In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels under tension load

Annex C2

Table 15: Characteristic resistances under tension load – concrete failure of hot-rolled anchor channels

Anchor channel			HAC-C 40/22		HAC-C-P 40/22		HAC-C-P 40L		HAC-C 50/30		HAC-C-P 50/30		HAC-C-P 50L		HAC-C 52/34	
Type of anchor			I	R	I	R	I	R	I	R	I	R	I	R	I	R
Concrete failure: Pull-out																
Characteristic resistance in cracked concrete C12/15	N _{Rk,p}	[kN]	27,0	13,6	34,2	25,6	1) ¹⁾	25,6	33,8	21,2	42,8	39,2	1) ¹⁾	39,2	68,4	33,2
Characteristic resistance in uncracked concrete C12/15			37,8	19,0	47,9	35,8	1) ¹⁾	35,8	47,3	29,7	59,9	54,9	1) ¹⁾	54,9	95,8	46,5
Factor for N _{Rk,p} N _{Rk,p} = N _{Rk,p} (C12/15) · ψ _c	C16/20	ψ _c [-]	1,33													
	C20/25		1,67													
	C25/30		2,08													
	C30/37		2,50													
	C35/45		2,92													
	C40/50		3,33													
	C45/55		3,75													
	C50/60		4,17													
	C55/67		4,58													
	≥ C60/75		5,00													
Partial factor	γ _{Mp} = γ _{Mc} ²⁾	[-]	1,5													
Concrete failure: Concrete cone																
Product factor k ₁	cracked concrete	k _{cr,N}	[-]	7,9	8,0	8,2	8,1	8,2	8,6	8,7						
	uncracked concrete	k _{ucr,N}	[-]	11,2	11,5	11,7	11,6	11,7	12,3	12,4						
Partial factor	γ _{Mc} ²⁾	[-]	1,5													
Concrete failure: Splitting																
Characteristic edge distance	C _{cr,sp}	[mm]	237	273	318	282	318	444	465							
Characteristic spacing	S _{cr,sp}	[mm]	474	546	636	564	636	888	930							
Partial factor	γ _{Msp} = γ _{Mc} ²⁾	[-]	1,5													

1) Product not available

2) In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels under tension load

Annex C3

Table 16: Characteristic resistances under tension load – concrete failure of cold-formed anchor channels

Anchor channel				HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Type of anchor				R	R	R	R	R
Concrete failure: Pull-out								
Characteristic resistance in cracked concrete C12/15		N _{Rk,p}	[kN]	7,6	13,6	13,6	21,2	33,2
Characteristic resistance in uncracked concrete C12/15				10,7	19,0	19,0	29,7	46,5
Factor for N _{Rk,p} N _{Rk,p} = N _{Rk,p (C12/15)} · ψ _c		C16/20	ψ _c [-]	1,33				
		C20/25		1,67				
		C25/30		2,08				
		C30/37		2,50				
		C35/45		2,92				
		C40/50		3,33				
		C45/55		3,75				
		C50/60		4,17				
		C55/67		4,58				
		≥ C60/75		5,00				
Partial factor		γ _{Mp} = γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete cone								
Product factor k ₁	cracked concrete	k _{cr,N}	[-]	7,2	7,8	7,9	8,1	8,7
	uncracked concrete	k _{ucr,N}	[-]	10,3	11,2	11,2	11,6	12,4
Partial factor		γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Splitting								
Characteristic edge distance		c _{cr,sp}	[mm]	135	228	237	282	465
Characteristic spacing		s _{cr,sp}	[mm]	270	456	474	564	930
Partial factor		γ _{Msp} = γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels under tension load

Annex C4

Table 17: Displacements of hot-rolled anchor channels under tension load

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Tension load	N	[kN]	13,9	15,3	15,3	14,3	25,8	25,8	25,8
Short-term displacement ¹⁾	δ_{N0}	[mm]	2,3	1,1	1,1	2,2	1,4	1,4	1,4
Long-term displacement ¹⁾	$\delta_{N\infty}$	[mm]	4,6	2,2	2,2	4,4	2,8	2,8	2,8

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips, bending of the channel and slip of the anchor channel in concrete

Table 18: Displacements of cold-formed anchor channels under tension load

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Tension load	N	[kN]	3,6	7,1	7,9	12,3	21,8
Short-term displacement ¹⁾	δ_{N0}	[mm]	0,6	1,3	1,4	1,4	1,6
Long-term displacement ¹⁾	$\delta_{N\infty}$	[mm]	1,2	2,6	2,8	2,8	3,2

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips, bending of the channel and slip of the anchor channel in concrete

Table 19: Characteristic resistances under shear load – steel failure of hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure: Anchor									
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	26,0	58,1	58,1	40,3	100,0	100,0	121,5
Characteristic resistance	$V_{Rk,s,a,x}$	[kN]	2) ²⁾	24,0	24,0	2) ²⁾	34,2	34,2	33,1
Partial factor	γ_{Ms} ¹⁾	[-]	1,5						
Steel failure: Connection between anchor and channel									
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	26,0	58,1	58,1	40,3	100,0	100,0	121,5
Characteristic resistance	$V_{Rk,s,c,x}$	[kN]	2) ²⁾	23,8	23,8	2) ²⁾	30,4	30,4	28,1
Partial factor	$\gamma_{Ms,ca}$ ¹⁾	[-]	1,8						
Steel failure: Local flexure of channel lips under shear load perpendicular to the longitudinal axis of the channel									
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,v}$	[mm]	80	80	80	99	99	99	105
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	55,0	55,0	55,0	91,7	91,7	91,7	71,5
Partial factor	$\gamma_{Ms,l}$ ¹⁾	[-]	1,8						

¹⁾ In absence of other national regulations

²⁾ No performance assessed

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Displacements under tension load.

Characteristic resistances of anchor channels under shear load

Annex C5

Table 20: Characteristic resistances under shear load in direction of the longitudinal axis of the channel – steel failure of hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure: Connection between channel lips and channel bolt									
Characteristic resistance	$V^0_{Rk,sl,x}$ [kN]	HBC-40/22-N M16 8.8F	2)	12,5	12,5	2)	1)		
		2)		8,3	8,3		8,3		
		2)		8,3	8,3		8,3		
Installation factor	γ_{inst}	[-]		1,4			1,0		

1) Product not available

2) No performance assessed

Table 21: Characteristic resistances under shear load – steel failure of cold-formed anchor channel

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Steel failure: Anchor							
Characteristic resistance	V _{Rk,s,a,y}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,5				
Steel failure: Connection between anchor and channel							
Characteristic resistance	V _{Rk,s,c,y}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms,ca} ¹⁾	[-]	1,8				
Steel failure: Local flexure of channel lips under shear load perpendicular to the longitudinal axis of the channel							
Characteristic spacing of channel bolts for V _{Rk,s,l}	s _{l,v}	[mm]	56	76	80	100	107
Characteristic resistance	V ⁰ _{Rk,s,l,y}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms,l} ¹⁾	[-]	1,8				

1) In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels under shear load

Annex C6

Table 22: Characteristic resistances under shear load – concrete failure of hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Concrete failure: Pry out									
Product factor		k ₈	[-]	2,0					
Partial factor		γ _{Mc} ¹⁾	[-]	1,5					
Concrete failure: Concrete edge									
Product	cracked concrete	k _{cr,V}	[-]	7,5					
factor k ₁₂	uncracked concrete	k _{ucr,V}	[-]	10,5					
Partial factor		γ _{Mc} ¹⁾	[-]	1,5					

¹⁾ In absence of other national regulations

Table 23: Characteristic resistances under shear load – concrete failure of cold-formed anchor channel

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Concrete failure: Pry out							
Product factor	k ₈	[-]	1,0	2,0			
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete edge							
Product factor k ₁₂	cracked concrete	k _{cr,V}	[-]	6,9	6,9	7,5	
	uncracked concrete	k _{ucr,V}	[-]	9,6	9,6	10,5	
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations

Table 24: Displacements under shear load of hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Shear load	V_y	[kN]	10,3	29,0	29,0	16,0	39,7	28,4	28,4
Short-term displacement ¹⁾	$\delta_{V0,y}$	[mm]	2,1	2,0	2,0	2,6	2,7	3,7	3,7
Long-term displacement ¹⁾	$\delta_{V\infty,y}$	[mm]	3,1	3,5	3,5	3,9	4,0	5,5	5,5
Shear load	V_x	[kN]	²⁾	5,2	5,2	²⁾	3,3	3,3	7,9
Short-term displacement ¹⁾	$\delta_{V0,x}$	[mm]	²⁾	0,1	0,1	²⁾	0,1	0,1	1,4
Long-term displacement ¹⁾	$\delta_{V\infty,x}$	[mm]	²⁾	0,2	0,2	²⁾	0,2	0,2	2,0

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete

²⁾ No performance assessed

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances and displacements of anchor channels under shear load

Annex C7

Table 25: Displacements under shear load of cold-formed anchor channel

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Shear load	V_y	[kN]	3,6	7,1	7,9	12,3	21,8
Short-term displacement ¹⁾	$\delta_{V0,y}$	[mm]	0,6	1,3	1,4	1,4	1,6
Long-term displacement ¹⁾	$\delta_{V\infty,y}$	[mm]	0,9	2,0	2,1	2,1	2,4

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete

Table 26: Characteristic resistances under combined tension and shear load of hot-rolled anchor channel

Anchor channel			HAC-C 40/22	HAC-C-P 40/22	HAC-C-P 40L	HAC-C 50/30	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure: Local flexure of channel lips and flexure of channel									
Product factor	k ₁₃	[-]	Values according to EN 1992-4:2018, Section 7.4.3.1						
Steel failure: Anchor and connection between anchor and channel									
Product factor	k ₁₄	[-]	Values according to EN 1992-4:2018, Section 7.4.3.1						

Table 27: Characteristic resistances under combined tension and shear load of cold-formed anchor channel

Anchor channel			HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C 49/30	HAC-C 54/33
Steel failure: Local flexure of channel lips and flexure of channel							
Product factor	k ₁₃	[-]	Values according to EN 1992-4:2018, Section 7.4.3.1				
Steel failure: Anchor and connection between anchor and channel							
Product factor	k ₁₄	[-]	Values according to EN 1992-4:2018, Section 7.4.3.1				

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Displacements of anchor channels under shear load
Characteristic resistances under combined tension and shear load

Annex C8

Table 28: Characteristic resistances under tension and shear load – steel failure of channel bolts

Channel bolt					M8	M10	M12	M16	M20		
Steel failure											
Characteristic resistance (tension load)	N _{Rk,s}	[kN]	HBC-28/15	4.6	1)						
				8.8	22,4	35,4	44,3	1)			
				A4-50 ²⁾	17,2	1)					
				A4-70 ²⁾	25,6	38,9	51,3	1)			
			HBC-38/17	4.6	1)	23,2	1)				
				8.8		1)	35,4	55,8	1)		
				A4-70 ²⁾		20,5	47,2	53,0			
			HBC-40/22	4.6		23,2	1)				
				8.8		1)	67,4	125,6	1)		
				A4-70 ²⁾		20,5	59,0	91,0			
			HBC-40/22-N	8.8		1)		125,6	1)		
			HBC-50/30	4.6		1)					
				8.8		1)	67,4	125,6	147,1		
				A4-70 ²⁾			59,0	109,9	121,2		
			HBC-50/30-N	8.8		1)		125,6	186,6		
			HBC-52/34	8.8		1)				203,4	
Partial factor	γ _{Ms} ³⁾	[-]	HBC-28/15	4.6		2,00					
			HBC-38/17	8.8		1,50					
			HBC-40/22	A4-50 ²⁾		2,86					
			HBC-50/30	A4-70 ²⁾		1,87					
Characteristic resistance (shear load)	V _{Rk,s}	[kN]	HBC-28/15	4.6	1)						
				8.8	14,6	23,2	33,7	1)			
				A4-50 ²⁾	11,0	1)					
				A4-70	15,4	24,4	35,4	1)			
			HBC-38/17	4.6	1)	13,9	1)				
				8.8		1)	33,7	62,8	1)		
				A4-70 ²⁾		24,4	35,4	65,9			
			HBC-40/22	4.6		13,9	1)				
				8.8		23,2	33,7	62,8	1)		
				A4-70 ²⁾		24,4	35,4	65,9			
			HBC-40/22-N	8.8		1)		62,8	1)		
			HBC-50/30	4.6		1)					
				8.8		1)	33,7	62,8	101,7		
				A4-70 ²⁾			35,4	65,9	102,9		
			HBC-50/30-N	8.8		1)		62,8	101,7		
			HBC-52/34	8.8		1)				101,7	
Partial factor	γ _{Ms} ³⁾	[-]	HBC-28/15	4.6		1,67					
			HBC-38/17	8.8		1,25					
			HBC-40/22	A4-50 ²⁾		2,38					
			HBC-50/30	A4-70		1,56					

¹⁾ Product not available

²⁾ Materials according to Table 6, Annex A6

³⁾ In absence of other national regulations

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistance of channel bolts under tension and shear load

Annex C9

Table 29: Characteristic resistances under shear load with lever arm – steel failure of channel bolts

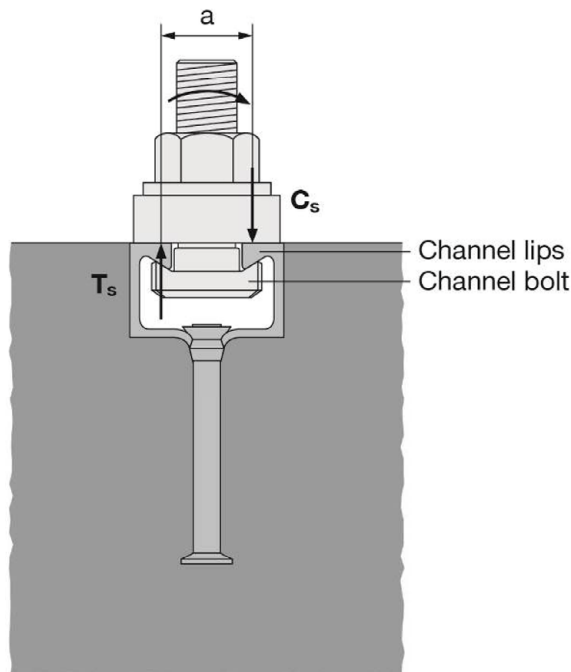
Channel bolt				M8	M10	M12	M16	M20
Steel failure								
Characteristic flexural resistance	$M_{Rk,s}^{0,5)}$	[Nm]	HBC-28/15	4.6	4)	29,9 ³⁾	4)	
			HBC-38/17	8.8	30,0	59,8	104,8	266,4
			HBC-40/22(-N)	A4-50 ²⁾	18,7	4)		
			HBC-50/30(-N)					
			HBC-52/34	A4-70 ²⁾	26,2	52,3	91,7	233,1
Partial factor	$\gamma_{Ms}^{1)}$	[-]	HBC-28/15	4.6	1,67			
			HBC-38/17	8.8	1,25			
			HBC-40/22(-N)	A4-50 ²⁾		2,38		
			HBC-50/30(-N)					
			HBC-52/34	A4-70 ²⁾		1,56		
Internal lever arm	a	[mm]	HBC-28/15	28/15	17,3	18,7	20,0	4)
			HBC-38/17	38/17	4)	23,0	24,3	26,3
			HBC-40/22(-N)	40/22		24,3	25,7	27,3
			HBC-50/30(-N)	50/30		4)	29,9	31,7
			HBC-52/34	52/34		4)		33,9

¹⁾ In absence of other national regulations

²⁾ Materials according to Table 6, Annex A6

³⁾ Not applicable for HBC-28/15 and HBC-50/30

⁴⁾ Product not available



⁵⁾ The characteristic flexure resistance according to Table 29 is limited as follows:

$$M_{Rk,s}^0 \leq 0,5 \cdot N_{Rk,s,l} \cdot a \quad (N_{Rk,s,l} \text{ according to Table 11 and Table 12})$$

$$M_{Rk,s}^0 \leq 0,5 \cdot N_{Rk,s} \cdot a \quad (N_{Rk,s} \text{ according to Table 29})$$

a = internal lever arm according to Table 29

T_s = tension force acting on the channel lip

C_s = compression force acting on the channel lip

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic flexural resistances of channel bolts under shear load with lever arm

Annex C10

Table 30: Characteristic resistance $F_{Rd,s,fi}$ [kN] of anchor channels under fire exposure

Channel bolt				M10	M12	≥ M16		
Steel failure: Anchor, connection between anchor and channel, local flexure of channel lip								
Characteristic resistance in cracked concrete C20/25	HAC-C 28/15	R60	$N_{Rk,s,fi}$ = $V_{Rk,s,fi}$	[kN]	0,8		2)	
		R90			0,6			
		R120			0,5			
	HAC-C 38/17	R60			2)	1,9		
		R90			2)	1,3		
		R120			2)	1,0		
	HAC-C 40/25 HAC-C(-P) 40/22 HAC-C-P 40L	R60			1,7	3,5		
		R90			1,2	2,2		
		R120			0,9	1,5		
	HAC-C 49/30 HAC-C(-P) 50/30 HAC-C 52/34 HAC-C-P 50L	R60			2)		3,8	3,9
		R90					2,5	2,9
		R120					1,9	2,4
Partial factor			$\gamma_{Ms,fi}$ 1)	[-]	1,0			

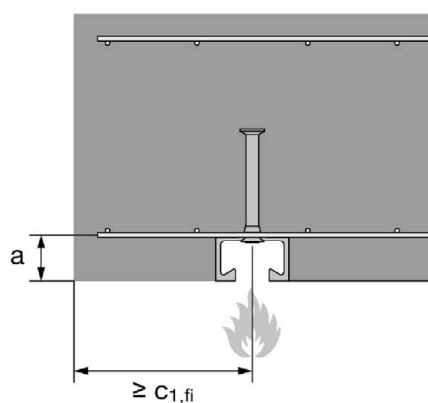
1) In absence of other national regulations

2) No performance assessed

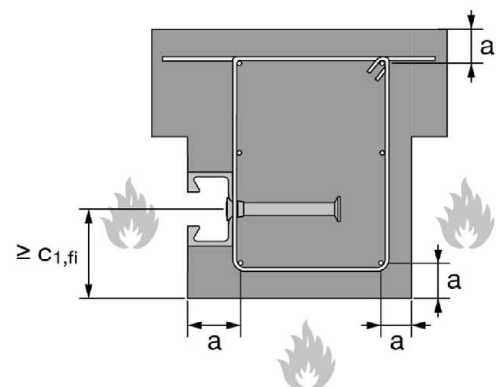
Table 31: Minimum axis distance of reinforcement

Anchor channel				HAC-C 28/15	HAC-C 38/17	HAC-C 40/25	HAC-C(-P) 40/22	HAC-C-P 40L	HAC-C 49/30	HAC-C(-P) 50/30	HAC-C-P 50L	HAC-C 54/33	HAC-C 52/34
Min. axis distance	R60	a [mm]		35					50	50	50	50	50
	R90			45									
	R120			55									

Fire exposure from one side only



Fire exposure from more than one side



Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances of anchor channels and channel bolts under fire exposure

Annex C11

Table 32: Combination of anchor channels and channel bolts under fatigue tension load

Anchor channel			Channel bolt			
Channel profile	Anchor type	Corrosion protection	Channel bolt	Diameter	Steel grade	Corrosion protection
HAC-C-P 40/22 HAC-C-P 40L	R	F	HBC-40/22	M12	8.8	G F
				M16		
HAC-C-P 50/30 HAC-C-P 50L			HBC-50/30	M16		
				M20		
HAC-C 52/34			HBC-50/30	M16		
				M20		

Table 33: Characteristic resistances under fatigue tension load – steel failure after n load cycles without static preload ($N_{Ed} = 0$) (Design method I according to EOTA TR 050)

Anchor channel		HAC-C-P 40/22	HAC-C-P 40L	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure	n	$\Delta N_{Rk,s,0,n}$ [kN]				
Characteristic resistance under fatigue tension load after n load cycles without static preload ($N_{Ed} = 0$)	$\leq 10^4$	16,4		20,9		24,3
	$\leq 10^5$	7,7		9,0		12,5
	$\leq 10^6$	3,2		4,2		7,1
	$\leq 2 \cdot 10^6$	2,6		3,7		6,4
	$\leq 5 \cdot 10^6$	2,2		3,4		5,9
	$\leq 10^8$	2,0		3,3		5,7
	$> 10^8$	1,8		3,2		5,5

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data
Characteristic resistances under fatigue tension load

Annex C12

Table 34: Reduction factor $\eta_{c,fat}$ of characteristic fatigue resistance - concrete failure after n load cycles without static preload ($N_{Ed} = 0$) (Design method I according to EOTA TR 050)

Anchor channel		HAC-C-P 40/22	HAC-C-P 40L	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Pull-out and Concrete cone failure	n	$\eta_{c,fat} [-]$				
Reduction factor after n load cycles without static preload ($N_{Ed} = 0$) for: $\Delta N_{Rk,p,0,n} = \eta_{c,fat} \cdot N_{Rk,p}$ $\Delta N_{Rk,c,0,n} = \eta_{c,fat} \cdot N_{Rk,c}$ with $N_{Rk,p}$ calculated according to Annex C3 and $N_{Rk,c}$ calculated according to EOTA TR047, March 2018 or EN 1992-4: 2018	$\leq 10^4$	0,736				
	$\leq 10^5$	0,665				
	$\leq 10^6$	0,600				
	$\leq 2 \cdot 10^6$	0,582				
	$\leq 5 \cdot 10^6$	0,559				
	$\leq 6 \cdot 10^7$	0,500				
	$> 6 \cdot 10^7$	0,500				

Table 35: Characteristic resistances under fatigue tension load – steel failure with $n \rightarrow \infty$ load cycles without static preload ($N_{Ed} = 0$) (Design method II according to EOTA TR 050)

Anchor channel	HAC-C-P 40/22	HAC-C-P 40L	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Steel failure	$\Delta N_{Rk,s,0,\infty} [kN]$				
Characteristic fatigue limit resistance ($n \rightarrow \infty$) without static preload ($N_{Ed} = 0$)	1,8		3,2		5,5

Table 36: Reduction factor $\eta_{c,fat}$ of characteristic fatigue limit resistance - concrete failure with $n \rightarrow \infty$ load cycles without static preload ($N_{Ed} = 0$) (Design method II according to EOTA TR 050)

Anchor channel		HAC-C-P 40/22	HAC-C-P 40L	HAC-C-P 50/30	HAC-C-P 50L	HAC-C 52/34
Pull-out and Concrete cone failure		$\eta_{c,fat} [-]$				
Reduction factor for fatigue limit resistance ($n \rightarrow \infty$) without static preload ($N_{Ed} = 0$) for: $\Delta N_{Rk,p,0,n} = \eta_{c,fat} \cdot N_{Rk,p}$ $\Delta N_{Rk,c,0,n} = \eta_{c,fat} \cdot N_{Rk,c}$ with $N_{Rk,p}$ calculated according to Annex C3 and $N_{Rk,c}$ calculated according to EOTA TR047, March 2018 or EN 1992-4: 2018		0,5				

Anchor channels (HAC-C) with channel bolts (HBC)

Performance Data

Characteristic resistances under fatigue tension load

Annex C13

Attention: To whom it may concern

Date: 18 May 2017

Ref: 048/AI/TT/17

Subject: Country of Origin – Hilti HBC t-head bolt

Dear Sir / Madam,

Enclosed please find the information of Hilti HBC t-head bolt

Brand Name	: Hilti
Model Name	: Hilti HBC / HBC-C / HBC-C-N
Manufacturer	: Hilti Corporation
Address of Manufacturer	: FL-9494, Principality of Liechtenstein
Country of Origin	: Taiwan
Supplier	: Hilti (Hong Kong) Ltd.
Address of Supplier	: 701-704 & 708B, 7/F, Tower A, Manulife Finance Centre, 233 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

Should you have further questions, please do not hesitate to contact our Technical Representatives or Customer Service Hotline at 8228-8118.

Yours sincerely,



Terry Tsang
Product Manager

Attention: To whom it may concern

Date: 18 May 2017

Ref: 049/AI/TT/17

Subject: Country of Origin – Hilti HAC-C anchor channel

Dear Sir / Madam,

Enclosed please find the information of Hilti HAC-C anchor channel

Brand Name	: Hilti
Model Name	: Hilti HAC-C / HAC-C A4
Manufacturer	: Hilti Corporation
Address of Manufacturer	: FL-9494, Principality of Liechtenstein
Country of Origin	: China
Supplier	: Hilti (Hong Kong) Ltd.
Address of Supplier	: 701-704 & 708B, 7/F, Tower A, Manulife Finance Centre, 233 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

Should you have further questions, please do not hesitate to contact our Technical Representatives or Customer Service Hotline at 8228-8118.

Yours sincerely,



Terry Tsang
Product Manager

<u>Date</u>	<u>Project Name</u>	<u>Contractor</u>	<u>Application</u>
2018	18 ON LAI STREET	HARVEST TIME FACADE LIMITED	Curtain Wall
2019	10 SHING YIP STREET	CHAMPION TIME ENGINEERING LIMITED	Curtain Wall
2019	26-38 KWAI CHEONG ROAD,	ALAN MARBLE ENGINEERING COMPANY	Curtain Wall
2019	38 TAI KOK TSUI ROAD	UNIVERSAL ALUMINIUM ENGINEERING	Curtain Wall
2019	TKO GLOBAL SWITCH PH1&2	REX ENGINEERING LIMITED	Curtain Wall
2019	NO. 8-10A MOSQUE STREET	UNIVERSAL ALUMINIUM ENGINEERING	Curtain Wall
2019	388 KWUN TONG RD	CR CONSTRUCTION COMPANY LIMITED	Curtain Wall
2019	FUK TO STREET	LEIGHTON CONTRACTORS (ASIA) LTD	Curtain Wall