Deutsches Institut für Bautechnik

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

European Technical Assessment Body for construction products

Member of EOTA
www.eota.eu

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-17/0336 of 29 August 2025

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	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 Manufacturing Plants
This European Technical Assessment contains	53 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 330008-04-0601, Edition 07/2024
This version replaces	ETA-17/0336 issued on 18 July 2024

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

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 loading)	
- Resistance to steel failure of anchors	$N_{Rk,s,a}$ see Annex C1 and C2
- Resistance to steel failure of the connection between anchors and channel	$N_{Rk,s,c}$ see Annex C1 and C2
- Resistance to steel failure of channel lips and subsequently pull-out of channel bolt	$N^{0}_{Rk,s,l}$; $s_{l,N}$ see Annex C1 and C2
- Resistance to steel failure of channel bolt	$N_{Rk,s}$ see Annex C14
- Resistance to steel failure by exceeding the bending strength of the channel	s_{max} see Annex B3 and B4 $M_{Rk,s,flex}$ see Annex C3
- Maximum installation torque to avoid damage during installation	$T_{inst,g}$; $T_{inst,s}$ see Annex B5
- Resistance to pull-out failure of the anchor	$N_{Rk,p}$ see Annex C4 to C6
- Resistance to concrete cone failure	h_{ef} see Annex B3 and B4 $k_{cr,N}$; $k_{ucr,N}$ see Annex C4 to C6
- Minimum edge distances, spacing and member thickness to avoid concrete splitting during installation	s_{min} see Annex B3 and B4 c_{min} ; h_{min} see Annex B3 and B4
- Characteristic edge distance and spacing to avoid splitting of concrete under load	$s_{cr,sp}$; $c_{cr,sp}$ see Annex C4 to C6
- Resistance to blowout failure - bearing area of anchor head	A_h see Annex A6

Essential characteristic	**Performance**
Characteristic resistance under shear load (static and quasi-static loading)	
- Resistance to steel failure of channel bolt under shear loading without lever arm	$V_{Rk,s}$ see Annex C15
- Resistance to steel failure by bending of the channel bolt under shear load with lever arm	$M^0_{Rk,s}$ see Annex C16
- Resistance to steel failure of channel lips, steel failure of connection between anchor and channel or steel failure of anchor (shear load in transverse direction)	$V^0_{Rk,s,l,y}$; $s_{l,V}$; $V_{Rk,s,c,y}$; $V_{Rk,s,a,y}$ see Annex C8 and C9
- Resistance to steel failure of connection between channel lips and channel bolt (longitudinal shear)	$V_{Rk,s,l,x}$ see Annex C10
- Factor for sensitivity to installation (longitudinal shear)	γ_{inst} see Annex C10
- Resistance to steel failure of the anchor (longitudinal shear)	$V_{Rk,s,a,x}$ see Annex C8 and C9
- Resistance to steel failure of connection between anchor and channel (longitudinal shear)	$V_{Rk,s,c,x}$ see Annex C8 and C9
- Resistance to concrete pry-out failure	k_8 see Annex C11
- Resistance to concrete edge failure	$k_{cr,V}$; $k_{ucr,V}$ see Annex C11
Characteristic resistance under combined tension and shear load (static and quasi-static load)	
- Resistance to steel failure of the anchor channel	k_{13} ; k_{14} see Annex C13
Characteristic resistance under fatigue tension loading	
- Fatigue resistance to steel failure of the whole system (continuous or tri-linear function, assessment method A1, A2)	$\Delta N_{Rk,s,0,n}$ $(n = 1\ to\ n = \infty)$ see Annex C18
- Fatigue limit resistance to steel failure of the whole system (assessment method B)	$\Delta N_{Rk,s,0,\infty}$ see Annex C20
- Fatigue resistance to steel failure of the whole system (linearized function, assessment method C)	No performance assessed
- Fatigue resistance to concrete related failure (exponential function, assessment method A1, A2)	$\Delta N_{Rk,c,0,n}$ $\Delta N_{Rk,p,0,n}$$(n = 1\ to\ n = \infty)$ see Annex C19
- Fatigue limit resistance to concrete related failure (assessment method B)	$\Delta N_{Rk,c,0,\infty}$ $\Delta N_{Rk,p,0,\infty}$ see Annex C 20
- Fatigue resistance to concrete related failure (linearized function, assessment method C)	No performance assessed

Essential characteristic	Performance
Characteristic resistance under seismic loading (seismic performance category C1)	
- Resistance to steel failure under seismic tension loading (seismic performance category C1)	$N_{Rk,s,a.eq}$; $N_{Rk,s,c.eq}$; $N^0{}_{Rk,s,l.eq}$ see Annex C21 $M_{Rk,s,flex.eq}$ see Annex C22 $N_{Rk,s.eq}$ see Annex C24
- Resistance to steel failure under seismic shear loading for shear load in transverse direction (seismic performance category C1)	$V_{Rk,s.eq}$ see Annex C24 $V^0{}_{Rk,s,l,y.eq}$; $V_{Rk,s,c,y.eq}$; $V_{Rk,s,a,y.eq}$ see Annex C22
- Resistance to steel failure under seismic shear loading for shear load in longitudinal channel axis (seismic performance category C1)	$V_{Rk,s,l,x.eq}$ see Annex C23 $V_{Rk,s,a,x.eq}$; $V_{Rk,s,c,x.eq}$ see Annex C22
Characteristic resistance under static and quasi-static tension and/or shear loading	
- Displacements	δ_{N0} ; $\delta_{N\infty}$ see Annex C7 $\delta_{V,y,0}$; $\delta_{V,y,\infty}$; $\delta_{V,x,0}$; $\delta_{V,x,\infty}$ see Annex C12 and C13

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	$N_{Rk,s,fi}$;$V_{Rk,s,y,fi}$ see Annex C25 and C26

3.3 Aspects of durability linked with the Basic Works Requirements

Essential characteristic	Performance
Durability	See Annex B1

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

In accordance with EAD No. 330008-04-0601, 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.

The following standards are referred to in this European Technical Assessment:

EN 10025-1:2004	Hot rolled products of structural steels - Part 1: General technical delivery conditions
EN 10149-1:2013	Hot rolled flat products made of high yield strength steels for cold forming - Part 1: General technical delivery conditions
EN 10263-1:2017	Steel rod, bars and wire for cold heading and cold extrusion - Part 1: General technical delivery conditions
EN ISO 898-1:2013	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes – Coarse thread and fine pitch thread (ISO 898-1:2013)
EN ISO 898-2:2022	Fasteners - Mechanical properties of fasteners made of carbon steel and alloy steel – Part 2: Nuts with specified property classes (ISO 898-2:2022)
EN ISO 7089:2000	Plain washers – Normal series, Product grade A (ISO 7089:2000)
EN ISO 7093-1:2000	Plain washers - Large series - Part 1: Product grade A (ISO 7093-1:2000)
EN ISO 4032:2023	Fasteners – Hexagon regular nuts (style 1) (ISO 4032:2023)
DIN 934:1987-10	Hexagon nuts with metric coarse and fine pitch thread; product grades A and B
EN ISO 1461:2022	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:2022)
EN ISO 4042:2022	Fasteners - Electroplated coating systems (ISO 4042:2022)
EN ISO 10684:2004 + AC:2009	Fasteners - Hot dip galvanized coatings (ISO 10684:2004 + Cor. 1:2008)
EN 10088-1:2023	Stainless steels - Part 1: List of stainless steels
EN ISO 3506-1:2020	Fasteners - Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs with specified grades and property classes (ISO 3506-1:2020)
EN 206:2013 + A2:2021	Concrete - Specification, performance, production and conformity
EN 1993-1-4:2006 + A1:2015 + A2:2020	Eurocode 3: Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels
EN 1992-4:2018	Eurocode 3: Design of steel structures - Part 4: General rules - Supplementary rules for stainless steels
EOTA TR047:2021-05	Design of anchor channels in addition to EN 1992-4
EOTA TR050:2023-10	Calculation method for the performance of Anchor channels under Fatigue Cyclic Loading

EN 1992-1-1:2023	Eurocode 2: Design of concrete structures - Part 1-1: General rules - Rules for buildings, bridges and civil engineering structures

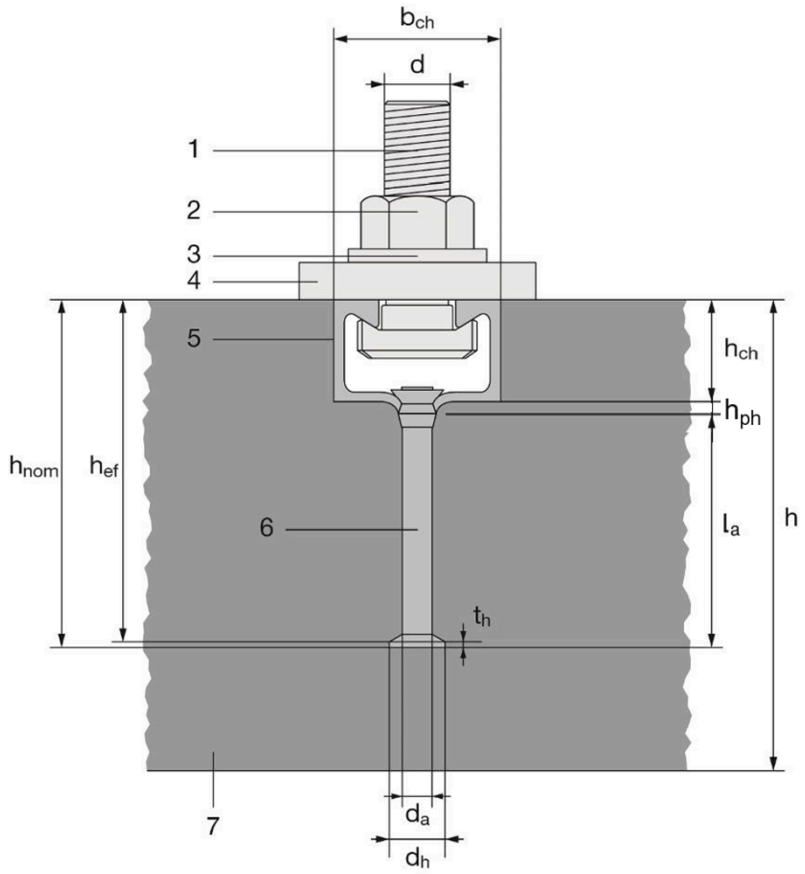
Issued in Berlin on 29 August 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Müller

Deutsches Institut für Bautechnik DIBt

Product and installed condition
(e.g. hot-rolled channel profile with a round anchor)



Key

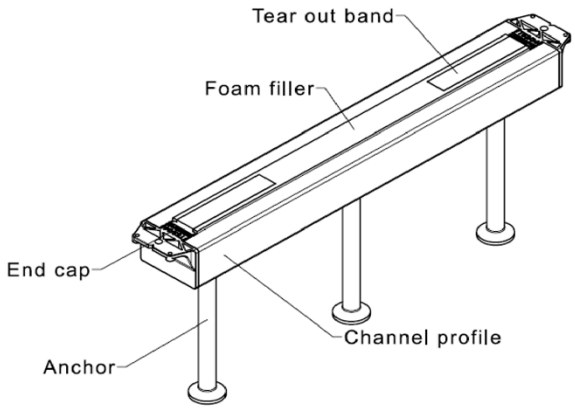
1 channel bolt
2 hexagonal nut
3 washer
4 fixture
5 channel profile
6 anchor
7 concrete member

Hilti anchor channels (HAC-C) with channel bolts (HBC)	Annex A1
Product Description Installed condition	

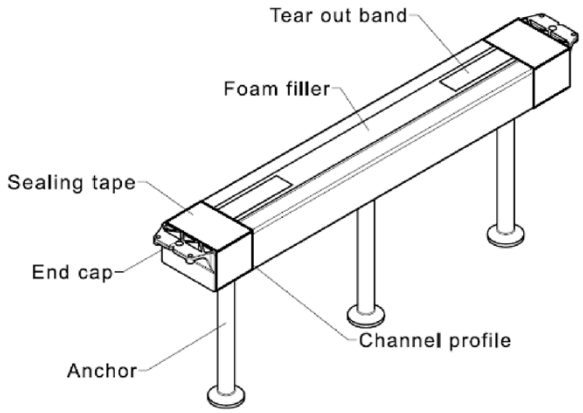
Deutsches Institut für Bautechnik DIBt

Channel profiles sealing

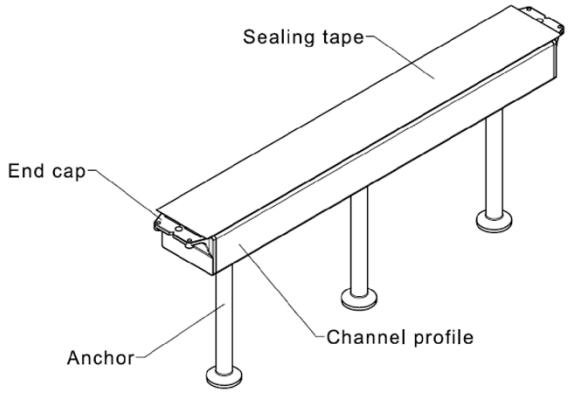
Channel without additional sealing



Channel with additional sealing (side sealing)



Channel with additional sealing (top sealing)



Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Sealing of the channel profile

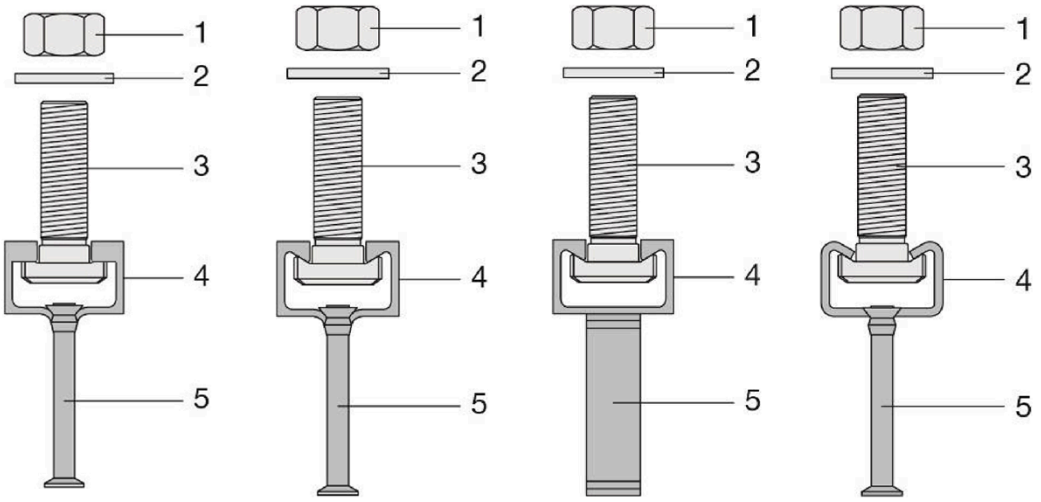
Annex A2

Deutsches Institut für Bautechnik DIBt

Anchor channel types

Hot-rolled smooth and serrated (-T) channel profiles

Cold-formed smooth channel profiles



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

Round anchor	with **Round anchor**	or **Welded I-anchor**	**Round anchor**
HAC-C-T 29/20, HAC-C-T 40/22, HAC-C-T 40L, HAC-C-T 50/30, HAC-C-T 50L, HAC-C-T 53/34	HAC-C(-P) 40/22, HAC-C-P 40L, HAC-C(-P) 50/30, HAC-C-P 50L, HAC-C 52/34		HAC-C 28/15, HAC-C 38/17, HAC-C 40/25, HAC-C 49/30, HAC-C 54/33

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Anchor channel types

Annex A3

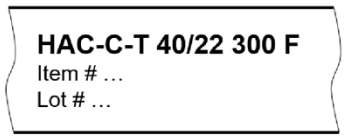
Deutsches Institut für Bautechnik DIBt

Marking of the Hilti anchor channel:

HAC-C(-T)(-P)(-I) X W Z

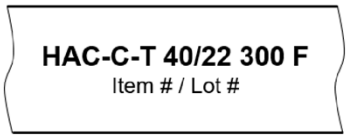
HAC	= Identifying mark of the manufacturer (**H**ilti **A**nchor **C**hannel)
T	= Additional marking for serrated channels
P	= Additional marking for premium line
I	= Additional marking for I-anchors (no marking in case of round anchors)
X	= Size of the channel
W	= Channel length
Z	= Corrosion protection/material (e.g. F for Hot dip galvanized, A4 or A2 for Stainless steel)

a)



(sticker and/or ink printed mark e.g. on the back side of the channel e.g. HAC-C-T 40/22 300 F)

b)



(stamp mark inside of the channel, e.g. HAC-C-T 40/22 F)

HAC-C-T	= Serrated anchor channel
40/22 [1)]	= Anchor channel size 40/22
F	= Hot dip galvanized
300	= 300 mm channel length (l_{ch})

Note : [1)] Anchor channel HAC-C-T 40/22 can be produced as well with marking "38/23" without changes in the sizes of the product. The same performance parameters are applicable to 38/23 as they are for 40/22.

Marking of the Hilti channel bolt:

HBC(-T) X (-N) Y Z

HBC	= Identifying mark of the manufacturer (**H**ilti **B**olt **C**hannel)
T	= Additional marking for serrated bolt
X	= Size of the bolt
N	= Additional marking for notching bolt
Y	= Steel grade/strength class
Z	= Corrosion protection/material (e.g. F)

(stamp mark on the back side of the bolt, e.g. HBC-T40 8.8F)

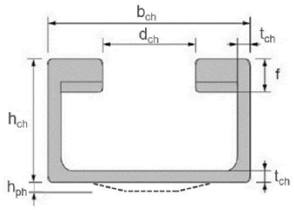
HBC-T	= Serrated bolt (for serrated anchor channel HAC-C-T)
40	= Size of the channel bolt (see Table 3)
8.8	= Strength class 8.8
F	= Hot dip galvanized

Hilti anchor channels (HAC-C) with channel bolts (HBC)	Annex A4
Product Description Marking of anchor channel and channel bolts	

Deutsches Institut für Bautechnik DIBt

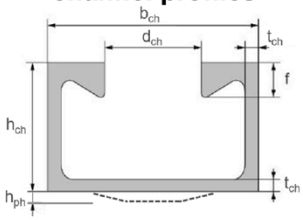
Channel profiles

Hot-rolled serrated channel profiles



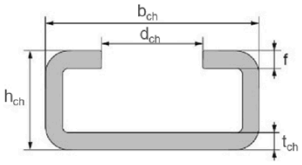
HAC-C-T 29/20,
HAC-C-T 40/22,
HAC-C-T 40L,
HAC-C-T 50/30,
HAC-C-T 50L,
HAC-C-T 53/34

Hot-rolled smooth channel profiles

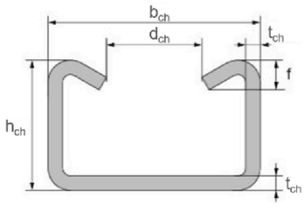


HAC-C(-P) 40/22,
HAC-C-P 40L,
HAC-C(-P) 50/30,
HAC-C-P 50L,
HAC-C 52/34

Cold-formed smooth channel profiles



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



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

Table 1: Dimensions of channel profile

Anchor channel	b_{ch}	h_{ch} [1]	h_{ph} [1]	t_{ch}	d_{ch}	f [2]	I_y
	[mm]						[mm^4]
HAC-C-T (hot-rolled serrated) channel profiles							
HAC-C-T 29/20	30,4	20,0	1,6	3,2	14,0	5,35	11.832
HAC-C-T 40/22 HAC-C-T 40L	38,0	23,0	2,0	3,25	18,0	6,35	21.570
HAC-C-T 50/30 HAC-C-T 50L	50,0	30,0	2,5	3,4	22,5	7,3	58.546
HAC-C-T 53/34	53,5	34,0	4,0	4,5	22,5	8,50	100.900
HAC-C(-P) (hot-rolled) channel profiles							
HAC-C(-P) 40/22 HAC-C-P 40L	40,1	23,0	1,95	2,7	18,0	6,0	21.504
HAC-C(-P) 50/30 HAC-C-P 50L	49,6	30,0	2,5	3,2	22,5	8,1	57.781
HAC-C 52/34	52,5	34,0	-	4,0	22,5	11,5	97.606
HAC-C (cold-formed) channel profiles							
HAC-C 28/15	28,0	15,5	-	2,3	12,0	2,3	4.277
HAC-C 38/17	38,0	17,25	-	3,0	18,0	3,0	8.224
HAC-C 40/25	40,0	25,0	-	2,75	18,0	5,6	20.122
HAC-C 49/30	50,0	30,0	-	3,25	22,0	7,4	43.105
HAC-C 54/33	53,5	33,0	-	5,0	21,5	8,0	74.706

[1] For hot-rolled serrated and smooth anchor channels – local increase of the channel height (height of the punched hole) in the area where the anchor is connected is not taken into account in the calculation of the h_{ch};
[2] For hot-rolled serrated channels (HAC-C-T) height of channel lips includes height of the teeth;

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Channel profiles (HAC-C)

Annex A5

Deutsches Institut für Bautechnik DIBt

Anchors

Round anchor **Welded I-anchor**

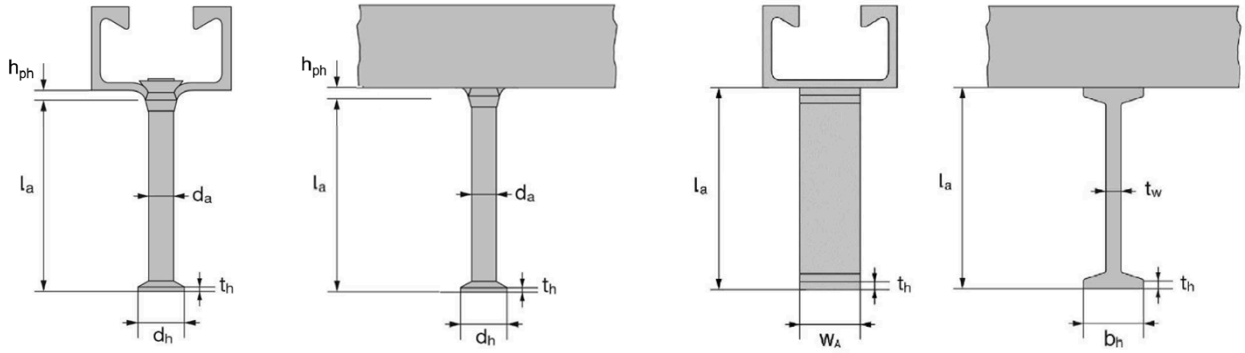


Table 2: Dimensions of anchor (welded I-anchor or round anchor) [1)]

Anchor channel	Round anchor					Welded I-anchor					
	min l_a	d_a	d_h	t_h	A_h	min l_a	t_w	b_h	t_h	w_A	A_h
	[mm]				[mm²]	[mm]					[mm²]
HAC-C-T (hot-rolled serrated)											
HAC-C-T 29/20	62,4	9,0	18,0	2,0	190,8	-[2)]					
HAC-C-T 40/22	71,2	10,0	21,5	2,2	284,4	-[2)]					
HAC-C-T 40L	87,2	10,0	21,5	2,2	284,4	-[2)]					
HAC-C-T 50/30	101,5	11,0	26,0	2,5	435,9	-[2)]					
HAC-C-T 50L	141,8	11,0	26,0	2,5	435,9	-[2)]					
HAC-C-T 53/34	119,5	12,0	26,0	2,5	417,8	-[2)]					
HAC-C(-P) (hot-rolled smooth)											
HAC-C 40/22	58,0	8,0	16,0	2,0	151,0	62,0	5,0	20,0	5,0	20,0	300,0
HAC-C-P 40/22	70,0	10,0	21,5	2,2	285,0	125,0	6,0	25,0	5,0	20,0	380,0
HAC-C-P 40L	83,2	10,0	21,5	2,2	285,0	-[2)]					
HAC-C 50/30	66,0	10,0	20,0	2,2	236,0	69,0	5,0	20,0	5,0	25,0	375,0
HAC-C-P 50/30	78,0	11,0	26,0	2,5	436,0	125,0	6,0	25,0	5,0	25,0	475,0
HAC-C-P 50L	118,3	11,0	26,0	2,5	436,0	-[2)]					
HAC-C 52/34	123,5	11,0	24,3	2,5	369,0	125,0	6,0	25,0	5,0	40,0	760,0
HAC-C (cold-formed smooth)											
HAC-C 28/15	31,0	6,0	12,0	1,3	85,0	-[2)]					
HAC-C 38/17	60,8	8,0	16,0	2,0	151,0	-[2)]					
HAC-C 40/25	56,0	8,0	16,0	2,0	151,0	-[2)]					
HAC-C 49/30	66,0	10,0	20,0	2,2	236,0	-[2)]					
HAC-C 54/33	124,5	11,0	24,3	2,5	369,0	-[2)]					

[1)] For cold-formed channel profiles (and for HAC-C 52/34) – h_{ph} = 0 and length of the anchor calculated similar to a Welded I-anchor;
[2)] Product not available;

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Anchors

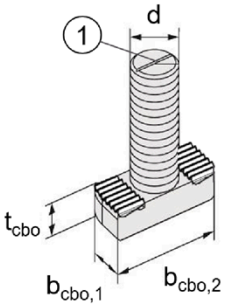
Annex A6

Channel bolts

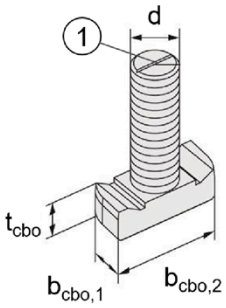
Table 3: Dimensions of channel bolt

Anchor channel	Channel bolt	Steel grade [1]	Dimensions			
			d	$b_{cbo,1}$	$b_{cbo,2}$	t_{cbo}
			[mm]			
For hot-rolled serrated (HAC-C-T) channels						
HAC-C-T 29/20	HBC-T 29/20	8.8, A4-70	10	13,5	22,8	8,0
			12	13,5	22,8	8,0
HAC-C-T 40/22	HBC-T 40/22	8.8, A4-70	10	17,1	30,3	9,5
			12	17,1	30,3	9,5
			16	17,1	30,3	9,5
HAC-C-T 50/30 HAC-C-T 53/34	HBC-T 50/30	8.8, A4-70	16	21,0	42,0	13,8
			20	21,0	42,0	13,8
For hot-rolled and/or cold-formed smooth (HAC-C) channels						
HAC-C(-P) 40/22 HAC-C-P 40L HAC-C 40/25	HBC-40/22	8.8, A4-70	10	14,0	33,0	10,5
			12	14,0	33,0	11,5
			16	17,0	33,0	11,5
HAC-C-P 40/22 HAC-C-P 40L	HBC-40/22-N	8.8, A4-70	16	17,0	33,0	11,5
HAC-C 49/30 HAC-C(-P) 50/30 HAC-C-P 50L HAC-C 52/34 HAC-C 54/33	HBC-50/30	8.8, A4-70	12	17,0	42,0	14,5
			16	17,0	42,0	15,5
			20	21,0	42,0	15,5
HAC-C-P 50/30 HAC-C-P 50L HAC-C 52/34	HBC-50/30-N	8.8, A4-70	16	21,0	42,0	15,5
			20	21,0	42,0	15,5
For cold-formed smooth (HAC-C) channels						
HAC-C 38/17	HBC-38/17	8.8, A4-70	10	13,0	30,5	6,0
			12	13,0	30,5	7,0
			16	16,0	30,5	7,0
HAC-C 28/15	HBC-28/15	8.8, A4-70	8	10,1	22,2	5,0
			10	10,1	22,2	5,0
			12	11,0	22,2	8,0

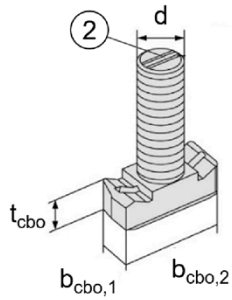
[1] Material properties according to Annex A6



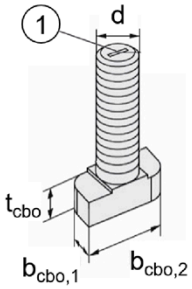
HBC-T 29/20,
HBC-T 40/22,
HBC-T 50/30



HBC-40/22;
HBC-50/30



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



HBC-28/15,
HBC-38/17

Note:
Marking of the bolt's position:
① - Single groove;
② - Double groove

Table 4: Steel grade and corrosion protection

Channel Bolt	Carbon steel [1] [2]	Stainless steel [1] [3]
Steel grade	8.8	A4-70
f_{uk} [N/mm²]	800 / 830	700
f_{yk} [N/mm²]	640 / 660	450
Corrosion protection	G [4] ; F [5]	R

[1] Material properties according to Annex A8
[2] Material properties according to EN ISO 898-1
[3] Material properties according to EN ISO 3506-1
[4] Electroplated
[5] Hot dip galvanized

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Channel bolts (HBC)

Annex A7

Deutsches Institut für Bautechnik DIBt

Table 5: Materials

Component	Carbon steel			Stainless steel	
	Material properties	Coating		Material properties	
1	2a	2b	2c	3	4
Channel Profile	1.0038, 1.0044, 1.0045 according to EN 10025-1 1.0976, 1.0979 according to EN 10149-1	Hot dip-galvanized ≥ 55 µm [3] Hot dip galvanized ≥ 70 µm [4] according to EN ISO 1461, Table 3		1.4301 according to EN 10088-1 [3]	1.4362, 1.4401 1.4404, 1.4571, 1.4578 according to EN 10088-1 [3]
Anchor	1.0038, 1.0213, 1.0214 according to EN 10025-1 1.5523, 1.5535 according to EN 10263-1				
Channel bolt	Steel grade 8.8 according to EN ISO 898-1	Electroplated according to EN ISO 4042	Hot dip galvanized ≥ 50 µm according to EN ISO 10684	Grade 70 according to EN ISO 3506-1	
Plain washer [1] according to EN ISO 7089 and EN ISO 7093-1	Hardness class A ≥ 200 HV	Electroplated according to EN ISO 4042	Hot dip galvanized ≥ 50 µm according to EN ISO 10684	1.4401, 1.4404 1.4571, 1.4578 according to EN 10088-1	
Hexagonal nut according to EN ISO 4032 or DIN 934	Property class 8 according to EN ISO 898-2	Electroplated according to EN ISO 4042	Hot dip galvanized ≥ 50 µm according to EN ISO 10684	Property class 50, 70 or 80 according to EN ISO 3506-1	

[1] In scope of delivery only for notched bolts
[2] Anchors made of carbon steel according to column 2a may also be used if they are welded and their concrete cover is more than 50 mm and tempering colors are removed;
[3] Anchor channels according to the Table 5 column 3 have marking “A2” and according to the column 4 marking “A4”;
[3] For HAC-C-T 29/20; HAC-C(-P) 40/22, 40L; HAC-C 28/15, 38/17, 40/25, 49/30, 54/33;
[4] For HAC-C-T 53/34, 50/30, 50L, 40/22, 40L; HAC-C(-P) 50/30, 50L, 53/34.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Product Description
Materials

Annex A8

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Working life:

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of anchor channel of at least:

- 50 years
  (anchor channels and channel bolts made of Carbon steel – according to Annex A8, columns 2a-2c)
- 100 years
  (anchor channels and channel bolts made of Stainless steel A4 – according to Annex A8, column 4)

Anchor channels and channel bolts subject to:

- Static and quasi-static tension and shear perpendicular to the longitudinal axis of the channel
- Static and quasi-static shear in the direction of longitudinal axis
  (anchor channels HAC-C-P 40/22 and HAC-P 40L with notching channel bolts HBC 40/22-N; anchor channels HAC-C-P 50/30 and HAC-C-P 50L with notching channel bolts HBC 50/30-N and serrated anchor channels HAC-C-T with serrated channel bolts HBC-T)
- Fatigue cyclic tension loads
  (anchor channels and channel bolts according to Annex C17)
- Seismic tension, seismic shear perpendicular to the longitudinal axis of the channel and shear in the direction of the longitudinal axis of the channel (seismic performance category C1)
  (anchor channels with channel bolts according to Annex C19);
- Fire exposure only for concrete class C20/25 to C50/60 for tension and shear perpendicular to the longitudinal axis of the channel
  (anchor channels and channel bolts according to Annexes C23-C25)

Base materials:

- Reinforced or unreinforced compacted normal weight concrete without fibers according to EN 206.
- Strength classes C12/15 to C90/105 according to EN 206.
- Cracked or uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (anchor channels and channel bolts according to Annex A8, Table 5, 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 A8, Table 5, column 2c and 3).
- According to EN 1993-1-4 relating to corrosion resistance class CRC II
  (anchor channels and channel bolts made of stainless-steel number 1.4301, washers and nuts made of stainless-steel number 1.4401, 1.4404, 1.4571, 1.4362 and 1.4578 according to Annex A8, Table 5, column 3).
- According to EN 1993-1-4 relating to corrosion resistance class CRC III
  (anchor channels and channel bolts, washers and nuts made of stainless-steel number 1.4401, 1.4404, 1.4571, 1.4362 and 1.4578 according to Annex A8, Table 5, column 4).

Hilti anchor channels (HAC-C) with channel bolts (HBC)	Annex B1
Intended Use Specifications	

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 and fire exposure the anchor channels are designed in accordance with EN 1992-4 and EOTA TR 047.
- For fatigue loading the anchor channels are designed in accordance with TR 050.
- The characteristic resistances are calculated with the minimum effective embedment depth.

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 6 and 7 as well as Annex B4, Table 8 are generated including end-spacing and minimum channel length and only to be used in dry internal conditions.
- Installation in accordance with the installation instructions given in Annexes B7-B11.
- 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 under the head of the anchors is 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 B8, B9 and B10) rectangular to the channel axis.
- Hexagonal nut must be fastened by a calibrated torque wrench. The required installation torques given in Annex B5 must be applied and must not be exceeded.

Hilti anchor channels (HAC-C) with channel bolts (HBC)	Annex B2
Intended Use Specifications	

Deutsches Institut für Bautechnik DIBt

Table 6: Installation parameters for HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel			**HAC-C-T 29/20**			**HAC-C-T 40/22**		**HAC-C-T 40L**	**HAC-C-T 50/30**	**HAC-C-T 50L**	**HAC-C-T 53/34**
Minimum effective embedment depth	$h_{ef,min}$	[mm]	82			94		110	108	148	155
Minimum spacing	s_{min}		100	100	50	80	100	80	80	80	80
Maximum spacing	s_{max}		200			250			250		250
End spacing	x		25 [2]			25 [2]			30 [2]		35
Minimum channel length	l_{min}		150	150	100	130	150	130	140	140	170
Minimum edge distance	c_{min}		75	50	75	75	50	75	75	75	75
Minimum thickness of concrete member	h_{min}		100	125	125	100	125	125	120	162	178
			$h_{ef} + t_h + c_{nom}$ [1]								

[1] c_{nom} according to EN 1992-1-1
[2] the end spacing may be increased from 25 mm to 35 mm

Table 7: Installation parameters for HAC-C(-P) (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**
Minimum effective embedment depth	$h_{ef,min}$	[mm]	79	91	106	94	106	148	155
Minimum spacing	s_{min}		100	50	50	100	50 [3]	50	100
Maximum spacing	s_{max}		250						
End spacing	x		25 [2]						35 [4]
Minimum channel length	l_{min}		150	100	100	150	100	100	170 [5]
Minimum edge distance	c_{min}		50			75			75
Minimum thickness of concrete member	h_{min}		100	100	120	105	120	162	165
			$h_{ef} + t_h + c_{nom}$ [1]						

[1] c_{nom} according to EN 1992-1-1
[2] the end spacing may be increased from 25 mm to 35 mm
[3] s_{min} = 100 mm when used in combination with notching bolts
[4] x = 25 mm for welded I-anchors
[5] l_{min} = 150 mm for welded I-anchors

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for anchor channels (HAC-C) and channel bolts (HBC)

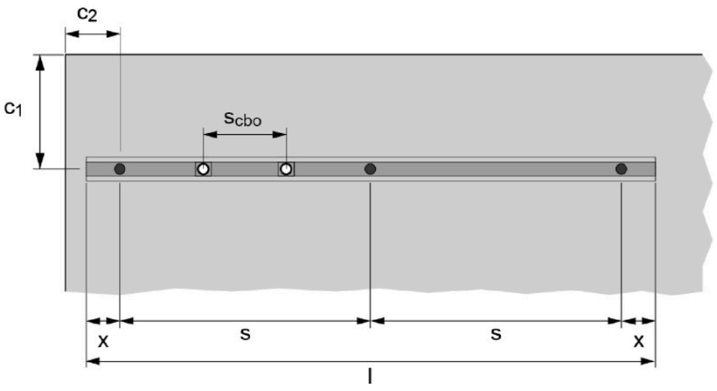
Annex B3

Deutsches Institut für Bautechnik DIBt

Table 8: Installation parameters for HAC-C (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**
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 [2]				
Minimum channel length	l_{min}		100	150			
Minimum edge distance	c_{min}		40	50	50	75	100
Minimum thickness of concrete member	h_{min}		70	100	100	120	180
			$h_{ef} + t_h + c_{nom}$ [1]				

[1] c_{nom} according to EN 1992-1-1
[2] the end spacing may be increased from 25 mm to 35 mm



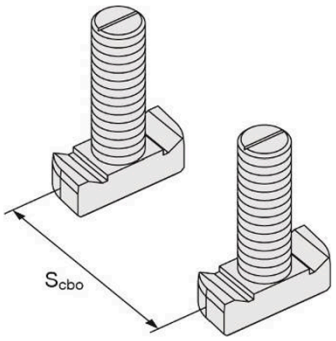


Table 9: Minimum spacing for channel bolts

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

s_{cbo} = center to center spacing between channel bolts ($s_{cbo,min}$ = 5d)

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for anchor channels (HAC-C) and channel bolts (HBC)

Annex B4

Deutsches Institut für Bautechnik DIBt

Table 10: Required installation torque T_{inst}

Channel bolt		Installation torque T_{inst} [Nm] [1]		
		General $T_{inst,g}$ [Nm]	Steel - steel contact $T_{inst,s}$ [Nm]	
		8.8, A4-70	8.8	A4-70
Bolts for hot-rolled serrated (HAC-C-T) anchor channels [2]				
HBC-T 29/20	M10	40	40	40
	M12	60	60	60
HBC-T 40/22	M10	40	40	40
	M12	60	60	60
	M16	100	100	100
HBC-T 50/30	M16	100	100	100
	M20	120	120	120
Bolts for hot-rolled and/or cold-formed smooth (HAC-C) anchor channels [2]				
HBC 40/22	M10	15	-[3]	22
	M12	25	45	50
	M16	30	100	90
HBC 40/22-N	M16	30	160	-[3]
HBC 50/30	M12	25	45	50
	M16	60	100	130
	M20	75	360	250
HBC 50/30-N	M16	60	185	-[3]
	M20	75	320	-[3]
Bolts for cold-formed smooth (HAC-C) anchor channels [2]				
HBC 28/15	M8	7	20	15
	M10	10	40	30
	M12	13	60	50
HBC 38/17	M10	15	-[3]	22
	M12	25	45	50
	M16	40	100	90

[1] T_{inst} must not be exceeded
[2] According to the Table 3
[3] Product not available

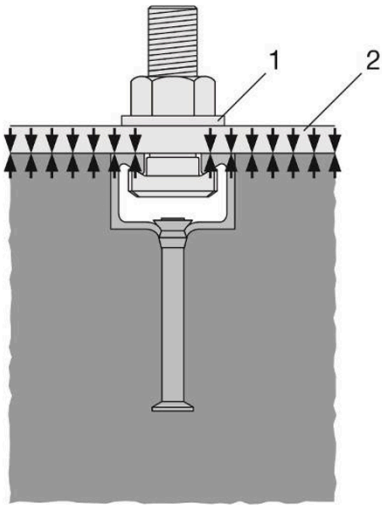
Anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation parameters for channel bolts (HBC)

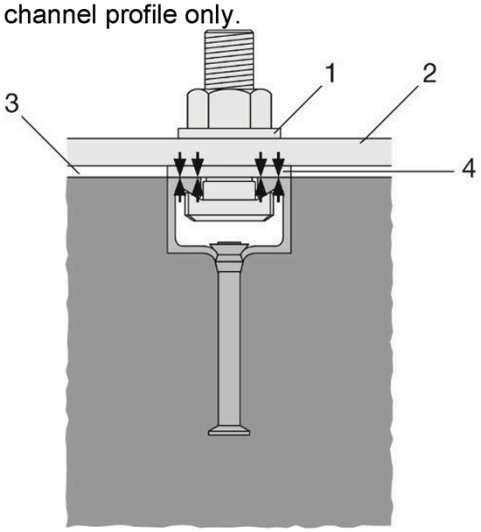
Annex B5

Deutsches Institut für Bautechnik DIBt

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



Steel-steel contact: The fixture is fastened to the anchor channel by suitable steel part (e.g. washer). Fixture is in contact with the channel profile only.



Key

1 washer

2 fixture

3 gap

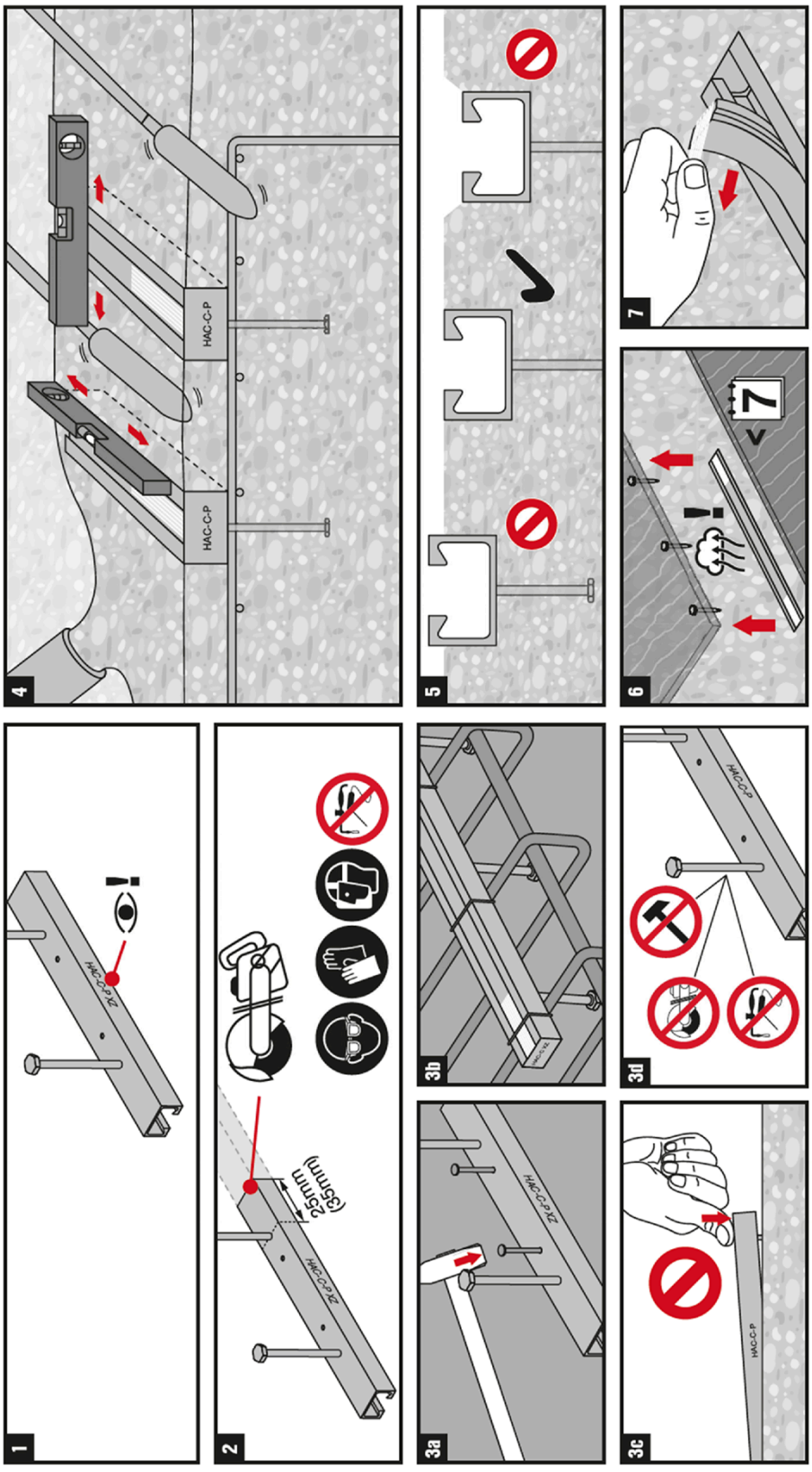
4 suitable steel part

Anchor channels (HAC-C) with channel bolts (HBC)	Annex B6
Intended Use Position of the fixture	

Deutsches Institut für Bautechnik DIBt

HAC-C(-P)

2443751-11.2024



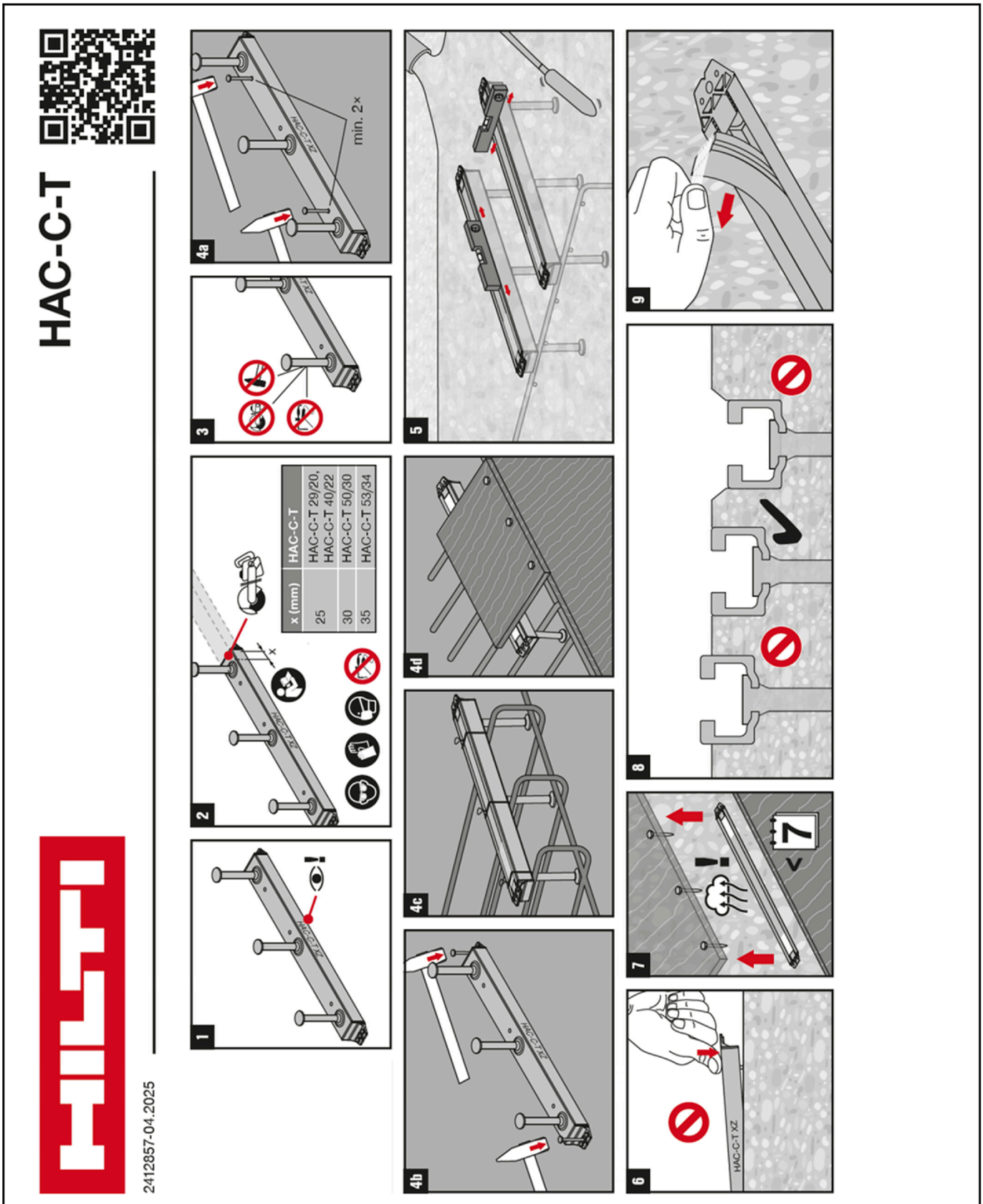
Hilti anchor channels (HAC-C) with channel bolts (HBC)

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

Annex B7

Deutsches Institut für Bautechnik

DIBt



Hilti anchor channels (HAC-C) with channel bolts (HBC)

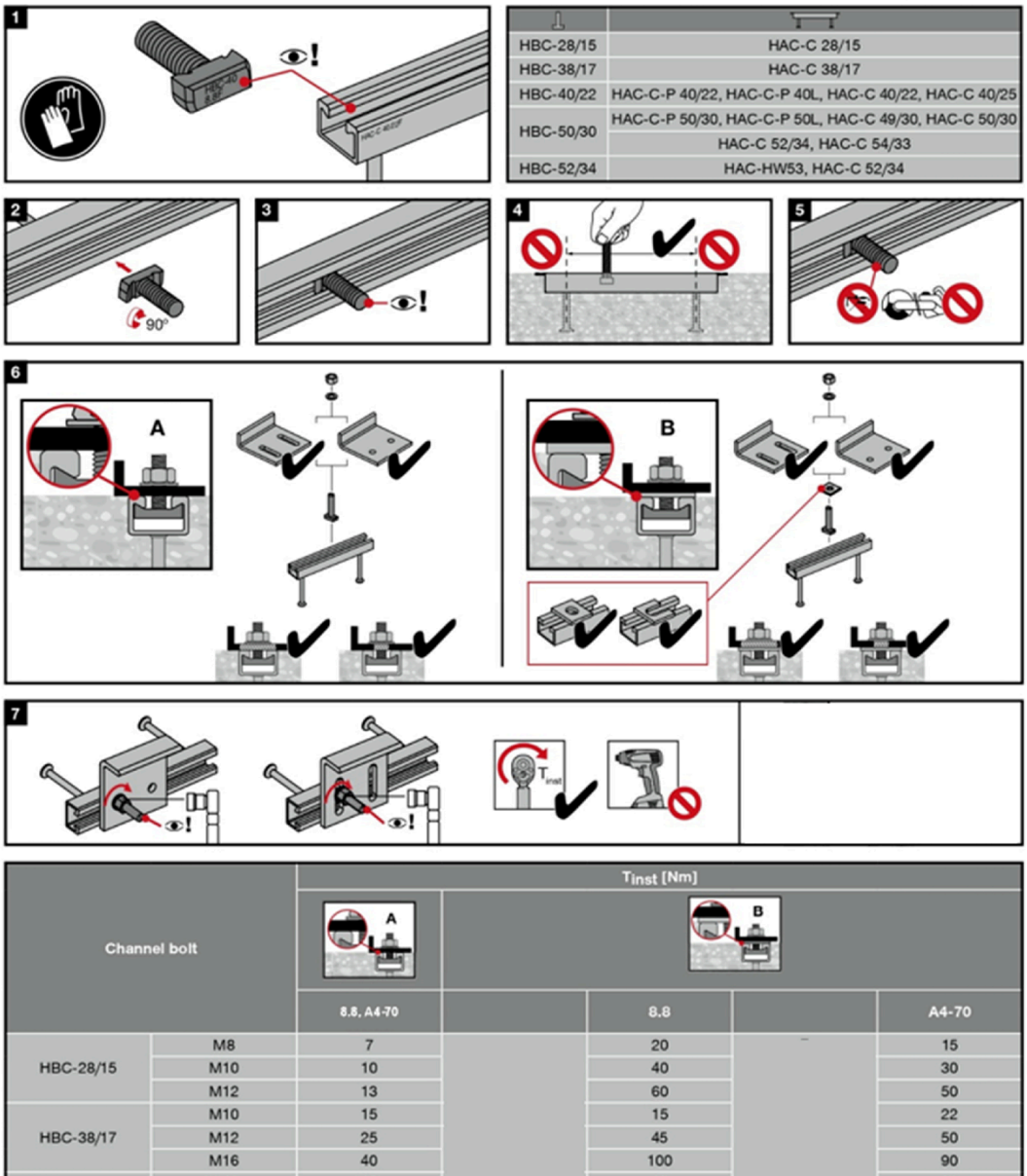
Intended Use
Installation instructions for anchor channels (HAC-C-T)

Annex B8

Deutsches Institut für Bautechnik DIBt

HILTI / HBC

2194125-09.2022



HBC-28/15	HAC-C 28/15
HBC-38/17	HAC-C 38/17
HBC-40/22	HAC-C-P 40/22, HAC-C-P 40L, HAC-C 40/22, HAC-C 40/25
HBC-50/30	HAC-C-P 50/30, HAC-C-P 50L, HAC-C 49/30, HAC-C 50/30 HAC-C 52/34, HAC-C 54/33
HBC-52/34	HAC-HW53, HAC-C 52/34

Channel bolt		T_{inst} [Nm] A		T_{inst} [Nm] B		
		8.8, A4-70		8.8		A4-70
HBC-28/15	M8	7		20		15
	M10	10		40		30
	M12	13		60		50
HBC-38/17	M10	15		15		22
	M12	25		45		50
	M16	40		100		90
HBC-40/22	M10	15		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		-

T_{inst} is the installation torque that shall be applied with a torque wrench and must not be exceeded.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation instructions for channel bolts (HBC)

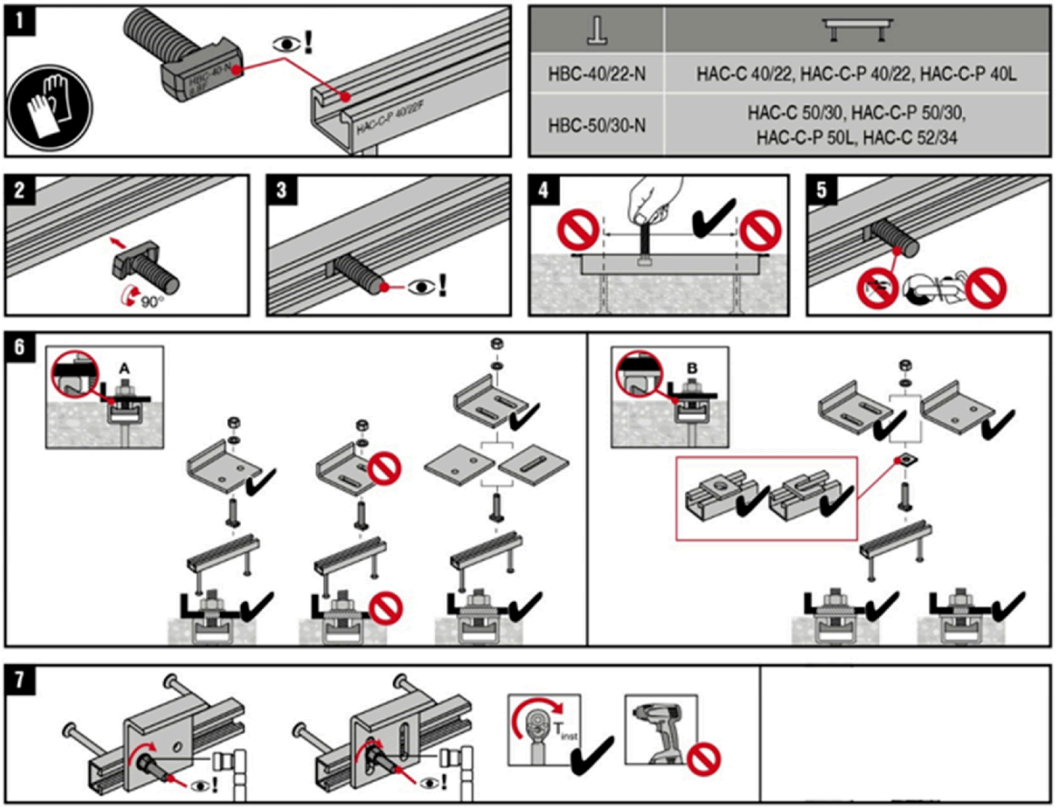
Annex B9

Deutsches Institut für Bautechnik DIBt

HILTI

HBC-N

2257118-09.2022



HBC-40/22-N	HAC-C 40/22, HAC-C-P 40/22, HAC-C-P 40L
HBC-50/30-N	HAC-C 50/30, HAC-C-P 50/30, HAC-C-P 50L, HAC-C 52/34

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

T_{inst} is the installation torque that shall be applied with a torque wrench and must not be exceeded.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

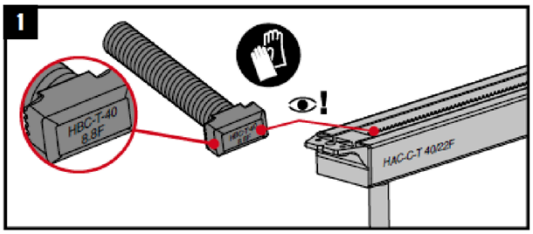
Intended Use
Installation instructions for notching channel bolts (HBC-N)

Annex B10

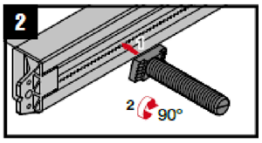
Deutsches Institut für Bautechnik DIBt

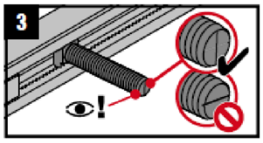
HBC-T

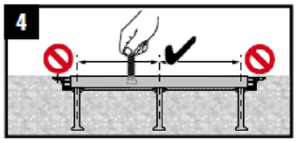
2412973-05.2025

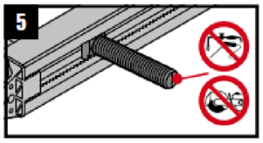


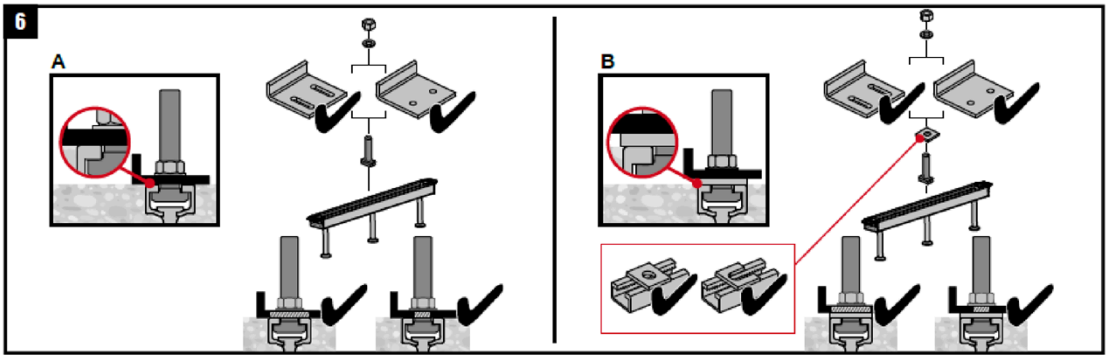
T-bolt	Channel
HBC-T-29/20	HAC-C-T 29/20
HBC-T-40/22	HAC-C-T 40/22
HBC-T-50/30	HAC-C-T 50/30
	HAC-C-T 53/34

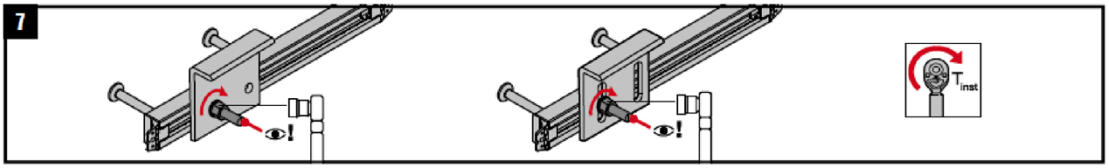












Channel bolt		A / B T_{inst} [Nm] 8.8 / A4-70
HBC-T-29/20	M10	40
	M12	60
HBC-T-40/22	M10	40
	M12	60
	M16	100
HBC-T-50/30	M16	100
	M20	120

T_{inst} is the installation torque that shall be applied with a torque wrench and must not be exceeded

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Intended Use
Installation instructions for serrated channel bolts (HBC-T)

Annex B11

Table 11: Characteristic resistances under tension load – steel failure of HAC-C-T (serrated hot-rolled) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Anchor									
Characteristic resistance	Carbon steel	$N_{Rk,s,a}$	[kN]	35,0	41,0		57,0		73,5
	Stainless steel				45,0				
Partial factor		γ_{Ms} [1)]	[-]	1,8					
Steel failure: Connection between anchor and channel									
Characteristic resistance	Carbon steel	$N_{Rk,s,c}$	[kN]	33,0	40,0		55,0		73,5
	Stainless steel			35,0	42,0		60,0		
Partial factor		$\gamma_{Ms,ca}$ [1)]	[-]	1,8					
Steel failure: Local flexure of channel lips									
Characteristic spacing of channel bolts for $N_{Rk,s,l}$		$s_{l,N}$	[mm]	61	76		100		107
Characteristic resistance	Carbon steel	$N^0_{Rk,s,l}$	[kN]	35,0	45,0		64,0		85,0
	Stainless steel				42,0				
Partial factor		$\gamma_{Ms,l}$ [1)]	[-]	1,8					

[1)] In absence of other national regulations.

Table 12: Characteristic resistances under tension load – steel failure of HAC-C(-P) (smooth 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	$\gamma_{Ms,ca}$ [1)]	[-]	1,8						
Steel failure: Local flexure of channel lips									
Characteristic spacing of 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	$\gamma_{Ms,l}$ [1)]	[-]	1,8						

[1)] In absence of other national regulations.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under tension load – steel failure

Annex C1

Deutsches Institut für Bautechnik DIBt

Table 13: Characteristic resistances under tension load – steel failure of HAC-C (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: Failure of anchor							
Characteristic resistance	$N_{Rk,s,a}$	[kN]	9,0	18,0	20,0	31,0	55,0
Partial safety factor	γ_{Ms} [1)]	[-]	1,8				
Steel failure: Failure of connection between anchor and channel							
Characteristic resistance	$N_{Rk,s,c}$	[kN]	9,0	18,0	20,0	31,0	55,0
Partial safety factor	$\gamma_{Ms,ca}$ [1)]	[-]	1,8				
Steel failure: Local failure by flexure of channel lips							
Characteristic spacing of 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 safety factor	$\gamma_{Ms,l}$ [1)]	[-]	1,8				

[1)] In absence of other national regulations.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under tension load – steel failure

Annex C2

Table 14: Characteristic flexural resistance of HAC-C-T (serrated hot-rolled) channels under tension load

Anchor channel				**HAC-C-T 29/20**	**HAC-C-T 40/22**	**HAC-C-T 40 L**	**HAC-C-T 50/30**	**HAC-C-T 50L**	**HAC-C-T 53/34**
Steel failure: Failure by flexure of channel									
Characteristic flexural resistance of channel	Carbon steel	$M_{Rk,s,flex}$	[Nm]	977	1557		3256		4870
	Stainless steel			1100	1754		3366		4626
Partial factor		$\gamma_{Ms,flex}$ [1)]	[-]	1,15					

[1)] In absence of other national regulations.

Table 15: Characteristic flexural resistance of HAC-C(-P) (hot-rolled) 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: Failure by flexure of channel										
Characteristic flexural resistance of channel	Carbon steel	$M_{Rk,s,flex}$	[Nm]	1013	1704	1704	2084	3448	3448	3435
	Stainless steel									
Partial factor		$\gamma_{Ms,flex}$ [1)]	[-]	1,15						

[1)] In absence of other national regulations.

Table 16: Characteristic flexural resistance of HAC-C (cold-formed) 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: Failure by 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		$\gamma_{Ms,flex}$ [1)]	[-]	1,15				

[1)] In absence of other national regulations.

Table 17: Characteristic resistances under tension load – concrete failure of HAC-C-T (serrated hot-rolled) anchor channels

Anchor channel				**HAC-C-T 29/20**	**HAC-C-T 40/22**	**HAC-C-T 40L**	**HAC-C-T 50/30**	**HAC-C-T 50L**	**HAC-C-T 53/34**
Type of anchor [2]				**R**	**R**	**R**	**R**	**R**	**R**
Concrete failure: Pull-out									
Characteristic resistance in cracked concrete C12/15		$N_{Rk,p}$	[kN]	17,2	25,6		39,2		37,6
Characteristic resistance in uncracked concrete C12/15		$N_{Rk,p}$	[kN]	24,0	35,8		54,9		52,6
Factor for $N_{Rk,p} = N_{Rk,p(C12/15)} \cdot \Psi_c$	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		$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	1,5					
Concrete failure: Concrete cone									
Product factor k_1	Cracked concrete	$k_{cr,N}$	[-]	7,9	8,1	8,3	8,2	8,6	8,7
	Uncracked concrete	$k_{ucr,N}$	[-]	11,3	11,5	11,8	11,8	12,3	12,4
Partial factor		γ_{Mc} [1]	[-]	1,5					
Concrete failure: Splitting									
Characteristic edge distance		$c_{cr,sp}$	[mm]	246	282	330	324	444	465
Characteristic spacing		$s_{cr,sp}$	[mm]	492	564	660	648	888	930
Partial factor		$\gamma_{Msp} = \gamma_{Mc}$ [1]	[-]	1,5					

[1] In absence of other national regulations
[2] Type of anchor according Annexes A3 and A6

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under tension load – concrete failure

Annex C4

Deutsches Institut für Bautechnik DIBt

Table 18: Characteristic resistances under tension load – concrete failure of HAC-C(-P) (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 [3]				**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]	25,6	33,8	21,2	42,8	39,2	-[1]	39,2	68,4	33,2
Characteristic resistance in uncracked concrete C12/15				37,8	19,0	47,9	35,8	-[1]	35,8	47,3	29,7	59,9	54,9	-[1]	54,9	95,8	46,5
Factor for $N_{Rk,p} = N_{Rk,p(C12/15)} \cdot \Psi_c$	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		$\gamma_{Mp} = \gamma_{Mc}$ [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		$\gamma_{Mp} = \gamma_{Mc}$ [2]	[-]	1,5													

[1] Product not available
[2] In absence of other national regulations
[3] Type of anchor according Annexes A3 and A6

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under tension load – concrete failure

Annex C5

Deutsches Institut für Bautechnik DIBt

Table 19: Characteristic resistances under tension load – concrete failure of HAC-C (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 [2]				**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		$N_{Rk,p}$	[kN]	10,7	19,0	19,0	29,7	46,5
Factor for $N_{Rk,p} = N_{Rk,p(C12/15)} \cdot \Psi_c$	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		$\gamma_{Mp} = \gamma_{Mc}$ [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		$\gamma_{Msp} = \gamma_{Mc}$ [1]	[-]	1,5				

[1] In absence of other national regulations;
[2] Type of anchor according Annexes A3 and A6

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under tension load – concrete failure

Annex C6

Table 20: Displacements of HAC-C-T (hot-rolled serrated) anchor channels under tension load

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Tension load	Carbon steel	N	[kN]	14,8	20,1	20,1	34,6	34,6	50,8
	Stainless steel			17,3	21,0	21,0	37,3	37,3	50,2
Short-term displacement [1]	Carbon steel	δ_{N0}	[mm]	0,9	1,5	1,5	1,2	1,2	1,8
	Stainless steel			0,9	1,5	1,5	1,7	1,7	1,6
Long-term displacement [1]	Carbon steel	$\delta_{N\infty}$	[mm]	1,8	3,0	3,0	2,4	2,4	3,6
	Stainless steel			1,8	3,0	3,0	3,4	3,4	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 21: Displacements of HAC-C(-P) (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 22: Displacements of HAC-C (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.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Displacements under tension load

Annex C7

Table 23: Characteristic resistances under shear load – steel failure of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				**HAC-C-T 29/20**	**HAC-C-T 40/22**	**HAC-C-T 40L**	**HAC-C-T 50/30**	**HAC-C-T 50L**	**HAC-C-T 53/34**
Steel failure: Anchor									
Characteristic resistance	Carbon steel	$V_{Rk,s,a,y}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Characteristic resistance	Carbon steel	$V_{Rk,s,a,x}$	[kN]	22,9	24,7		37,1		44,1
	Stainless steel				28,3				
Partial factor	Carbon steel	γ_{Ms} [1)]	[-]	1,5					
	Stainless steel								
Steel failure: Connection between anchor and channel									
Characteristic resistance	Carbon steel	$V_{Rk,s,c,y}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Characteristic resistance	Carbon steel	$V_{Rk,s,c,x}$	[kN]	19,8	24,0		33,0		44,1
	Stainless steel			21,0	25,2		36,0		
Partial factor		γ_{Ms} [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]	61,0	76,0		100,0		107,0
Characteristic resistance	Carbon steel	$V^0_{Rk,s,l,y}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Partial factor		$\gamma_{Ms,l}$ [1)]	[-]	1,8					

[1)] In absence of other national regulations

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under shear load – steel failure

Annex C8

Table 24: Characteristic resistances under shear load – steel failure of HAC-C(-P) (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	$V_{Rk,s,a,y}$	[kN]	26,0	58,1	58,1	40,3	100,0	100,0	121,5
Characteristic resistance	$V_{Rk,s,a,x}$	[kN]	-[2]	24,0	24,0	-[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]	23,8	23,8	-[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

Table 25: Characteristic resistances under shear load – steel failure of HAC-C (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	$V_{Rk,s,a,y}$	[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	$\gamma_{Ms,ca}$ [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]	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	$\gamma_{Ms,l}$ [1]	[-]	1,8				

[1] In absence of other national regulations.

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under shear load – steel failure

Annex C9

Table 26: Characteristic resistances under shear load in direction of longitudinal axis of the channel – steel failure of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel					HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Connection between channel lips and channel bolt										
Characteristic resistance	HBC-T 29/20 M10	Carbon steel	$V_{Rk,s,l,x}$	[kN]	20,0	- [1]				
		Stainless steel								
	HBC-T 29/20 M12	Carbon steel			24,0	- [1]				
		Stainless steel								
	HBC-T 40/22 M10	Carbon steel			- [1]	28,0		- [1]		
		Stainless steel								
	HBC-T 40/22 M12	Carbon steel			- [1]	28,0		- [1]		
		Stainless steel								
	HBC-T 40/22 M16	Carbon steel			- [1]	40,0		- [1]		
		Stainless steel								
	HBC-T 50/30 M16	Carbon steel			- [1]			50,0		50,0
		Stainless steel						71,4		51,0
	HBC-T 50/30 M20	Carbon steel			- [1]			55,0		55,0
		Stainless steel						71,4		51,0
Installation factor		Carbon steel	γ_{inst}	[-]	1,2	1,2		1,4		1,4
		Stainless steel			1,0	1,2		1,4		1,0

[1] No performance assessed

Table 27: Characteristic resistances under shear load in direction of longitudinal axis of the channel – steel failure HAC-C(-P) (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: Connection between channel lips and channel bolt											
Characteristic resistance	HBC-40/22-N M16 8.8F	$V_{Rk,s,l,x}$	[kN]	- [2]	12,5	12,5	- [2]	- [1]			
	HBC-50/30-N M16 8.8F				- [2]			8,3	8,3	8,3	
	HBC-50/30-N M20 8.8F							8,3	8,3	8,3	
Installation factor		γ_{inst}	[-]	- [2]	1,4		- [2]	1,0			

[1] Product not available
[2] No performance assessed

Hilti anchor channels (HAC) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under shear load – steel failure

Annex C10

Table 28: Characteristic resistances under shear load – concrete failure of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Concrete failure: Pry out									
Product factor		k_8	[-]	2,0					
Partial factor		γ_{Mc} [1)]	[-]	1,5					
Concrete failure: Concrete edge									
Product factor k_{12}	Cracked concrete	$k_{cr,V}$	[-]	7,5					
	Uncracked concrete	$k_{ucr,V}$	[-]	10,5					
Partial factor		γ_{Mc} [1)]	[-]	1,5					

[1)] In absence of other national regulations

Table 29: Characteristic resistances under shear load – concrete failure of HAC-C(-P) (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
Concrete failure: Pry out										
Product factor		k_8	[-]	2,0						
Partial factor		γ_{Mc} [1)]	[-]	1,5						
Concrete failure: Concrete edge										
Product factor k_{12}	Cracked concrete	$k_{cr,V}$	[-]	7,5						
	Uncracked concrete	$k_{ucr,V}$	[-]	10,5						
Partial factor		γ_{Mc} [1)]	[-]	1,5						

1) In absence of other national regulations

Table 30: Characteristic resistances under shear load – concrete failure of HAC-C (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
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

Hilti anchor channels (HAC) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels (HAC-C) under shear load – steel failure

Annex C11

Deutsches Institut für Bautechnik DIBt

Table 31: Displacements under shear load of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel			HAC-C-T 29/20		HAC-C-T 40/22; HAC-C-T 40L			HAC-C-T 50/30; HAC-C-T 50L		HAC-C-T 53/34	
Bolt diameter			**M10**	**M12**	**M10**	**M12**	**M16**	**M16**	**M20**	**M16**	**M20**
Carbon steel											
Perpendicular shear load	V_y	[kN]	23,3		32,8			51,9		69,0	
Short-term displacement [1]	$\delta_{V0,y}$	[mm]	1,6		2,1			2,0		2,8	
Long-term displacement [1]	$\delta_{V\infty,y}$	[mm]	2,4		3,2			3,0		4,2	
Longitudinal shear load	V_x	[kN]	13,2	15,7	14,5	19,1	25,1	35,4	49,6	33,1	40,6
Short-term displacement [1]	$\delta_{V0,x}$	[mm]	1,1	0,7	0,9	1,0	1,2	1,4	1,5	1,4	1,5
Long-term displacement [1]	$\delta_{V\infty,x}$	[mm]	1,7	1,1	1,4	1,5	1,8	2,1	2,3	2,1	2,3
Stainless steel											
Perpendicular shear load	V_y	[kN]	25,0		34,7			61,8		66,8	
Short-term displacement [1]	$\delta_{V0,y}$	[mm]	1,7		2,5			2,5		2,5	
Long-term displacement [1]	$\delta_{V\infty,y}$	[mm]	2,6		3,8			3,8		3,8	
Longitudinal shear load	V_x	[kN]	14,5	17,1	16,9	20,4	26,5	42,1	53,8	38,4	
Short-term displacement [1]	$\delta_{V0,x}$	[mm]	1,1	2,4	0,7	2,1	0,9	1,4	1,6	1,3	
Long-term displacement [1]	$\delta_{V\infty,x}$	[mm]	1,6	3,6	1,1	3,2	1,4	2,1	2,4	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

Table 32: Displacements under shear load of HAC-C(-P) (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
Perpendicular 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
Longitudinal 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

Hilti anchor channels (HAC) with channel bolts (HBC)

Performance
Displacements under shear load

Annex C12

Deutsches Institut für Bautechnik DIBt

Table 33: Displacements under shear load perpendicular to longitudinal axis of HAC-C (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
Perpendicular 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 34: Characteristic resistances under combined tension and shear load of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel			HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Local flexure of channel lips and flexure of channel								
Product factor	k_{13}	[-]	Values according to EN 1992-4, Section 7.4.3.1					
Steel failure: Anchor and connection between anchor and channel								
Product factor	k_{14}	[-]	Values according to EN 1992-4, Section 7.4.3.1					

Table 35: Characteristic resistances under combined tension and shear load of HAC-C(-P) (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: Local flexure of channel lips and flexure of channel									
Product factor	k_{13}	[-]	Values according to EN 1992-4, Section 7.4.3.1						
Steel failure: Anchor and connection between anchor and channel									
Product factor	k_{14}	[-]	Values according to EN 1992-4, Section 7.4.3.1						

Table 36: Characteristic resistances under combined tension and shear load of HAC-C (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: Local flexure of channel lips and flexure of channel							
Product factor	k_{13}	[-]	Values according to EN 1992-4, Section 7.4.3.1				
Steel failure: Anchor and connection between anchor and channel							
Product factor	k_{14}	[-]	Values according to EN 1992-4, Section 7.4.3.1				

Hilti anchor channels (HAC) with channel bolts (HBC)

Performance
Displacements under shear load
Characteristic resistance under combined tension and shear load

Annex C13

Table 37: Characteristic resistances under tension load – steel failure of channel bolts (HBC)

Channel bolt					**M8**	**M10**	**M12**	**M16**	**M20**
Steel failure									
Characteristic resistance (tension load)	$N_{Rk,s}$ [1]	[kN]	Bolts for hot-rolled serrated (HAC-C-T) anchor channels						
			HBC-T 29/20	8.8	- [3]	46,4	67,4	- [3]	
				A4-70 [1]	- [3]	40,6	59,0	- [3]	
			HBC-T 40/22	8.8	- [3]	46,4	67,4	125,6	- [3]
				A4-70 [1]	- [3]	40,6	59,0	109,9	- [3]
			HBC-T 50/30	8.8	- [3]			125,6	203,4
				A4-70 [1]	- [3]			109,9	171,5
			Bolts for hot-rolled and/or cold-formed smooth (HAC-C) anchor channels						
			HBC-40/22	8.8	- [3]	- [3]	67,4	125,6	- [3]
				A4-70 [1]	- [3]	20,5	59,0	91,0	- [3]
			HBC-40/22-N	8.8	- [3]			125,6	- [3]
				A4-70 [1]	- [3]				
			HBC-50/30	8.8	- [3]		67,4	125,6	147,1
				A4-70 [1]	- [3]		59,0	109,9	121,2
			HBC-50/30-N	8.8	- [3]			125,6	186,6
				A4-70 [1]	- [3]				
			Bolts for cold-formed smooth (HAC-C) anchor channels						
			HBC-28/15	8.8	22,4	35,4	44,3	- [3]	
				A4-70 [1]	25,6	38,9	51,3	- [3]	
			HBC-38/17	8.8	- [3]	35,4	35,4	55,8	- [3]
				A4-70 [1]	- [3]	20,5	47,2	53,0	- [3]
Partial factor	γ_{Ms} [2]	[-]	HBC-T 29/20 HBC-T 40/22 HBC-T 50/30 HBC-40/22(-N) HBC-50/30(-N) HBC-28/15 HBC-38/17	8.8	1,50 and 1,51[4]				
				A4-70 [1]	1,87				

[1] Materials according to Table 5, Annex A8
[2] In absence of other national regulations
[3] Product not available
[4] Partial factor 1,51 for the bolt HBC-T 50/30 M20 and 1,5 for the other bolts

Hilti anchor channels (HAC) with channel bolts (HBC)

Performance
Characteristic resistances of channel bolts under tension load

Annex C14

Deutsches Institut für Bautechnik DIBt

Table 38: Characteristic resistances under shear load – steel failure of channel bolts (HBC)

Channel bolt					**M8**	**M10**	**M12**	**M16**	**M20**
Steel failure									
Characteristic resistance (shear load)	$V_{Rk,s}$ [1]	[kN]	Bolts for hot-rolled serrated (HAC-C-T) anchor channels						
			HBC-T 29/20	8.8	- [3]	23,2	33,7	- [3]	
				A4-70 [1]	- [3]	24,4	35,4	- [3]	
			HBC-T 40/22	8.8	- [3]	23,2	33,7	62,8	- [3]
				A4-70 [1]	- [3]	24,4	35,4	65,9	- [3]
			HBC-T 50/30	8.8	- [3]			62,8	101,7
				A4-70 [1]	- [3]			65,9	102,9
			Bolts for hot-rolled and/or cold-formed smooth (HAC-C) anchor channels						
			HBC-40/22	8.8	- [3]	23,2	33,7	62,8	- [3]
				A4-70 [1]	- [3]	24,4	35,4	65,9	- [3]
			HBC-40/22-N	8.8	- [3]			62,8	- [3]
				A4-70 [1]	- [3]				
			HBC-50/30	8.8	- [3]		33,7	62,8	101,7
				A4-70 [1]	- [3]		35,4	65,9	102,9
			HBC-50/30-N	8.8	- [3]			62,8	101,7
				A4-70	- [3]				
			Bolts for cold-formed smooth (HAC-C) anchor channels						
			HBC-28/15	8.8	14,6	23,2	33,7	- [3]	
				A4-70	15,4	24,4	35,4	- [3]	
			HBC-38/17	8.8	- [3]	23,2	33,7	62,8	- [3]
				A4-70 [1]	- [3]	24,4	35,4	65,9	- [3]
Partial factor	γ_{Ms} [2]	[-]	HBC-T 29/20 HBC-T 40/22 HBC-T 50/30 HBC-40/22(-N) HBC-50/30(-N) HBC-28/15 HBC-38/17	8.8	1,25 and 1,26[4]				
				A4-70	1,56				

[1] Materials according to Table 5, Annex A8
[2] In absence of other national regulations
[3] Product not available
[4] Partial factor 1,26 for the bolt HBC-T 50/30 M20 and 1,25 for the other bolts

Hilti anchor channels (HAC) with channel bolts (HBC)

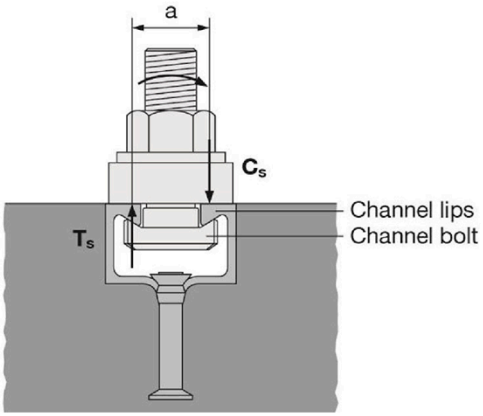
Performance
Characteristic resistances of channel bolts under shear load

Annex C15

Table 39: Characteristic resistances under shear load with lever arm – steel failure of channel bolts (HBC)

Channel bolt					**M8**	**M10**	**M12**	**M16**	**M20**
Steel failure									
Characteristic flexural resistance	$M^0_{Rk,s}$ [5]	[Nm]	HBC-T 29/20	8.8	- [3]	59,8	104,8	- [3]	
				A4-70 [2]	- [3]	52,3	91,7	- [3]	
			HBC-T 40/22	8.8	- [3]	59,8	104,8	266,4	- [3]
				A4-70 [2]	- [3]	52,3	91,7	233,1	- [3]
			HBC-T 50/30	8.8	- [3]			266,4	538,7
				A4-70 [2]	- [3]			233,1	454,4
			HBC-50/30(-N) HBC-40/22(-N) HBC-38/17 HBC-28/15	8.8	30,0	59,8	104,8	266,4	538,7
				A4-70 [2]	26,2	52,3	91,7	233,1	454,4
Partial factor	γ_{Ms} [1]	[-]	HBC-T 29/20 HBC-T 40/22 HBC-T 50/30 HBC-40/22(-N) HBC-50/30(-N) HBC-28/15 HBC-38/17	8.8	1,25 and 1,26 [4]				
				A4-70 [2]	1,56				
Internal lever arm	a	[mm]	HBC-T 29/20	29/20	- [3]	19,0	20,0	- [3]	
			HBC-T 40/22	40/22	- [3]	23,0	24,0	26,0	- [3]
			HBC-T 50/30	50/30 53/34	- [3]			32,0	34,0
			HBC-40/22(-N)	40/22	- [3]	24,3	25,7	27,3	- [3]
			HBC-50/30(-N)	50/30	- [3]		29,9	31,7	33,9
			HBC-28/15	28/15	17,3	18,7	20,0	- [3]	
			HBC-38/17	38/17	- [3]	23,0	24,3	26,3	- [3]

[1] In absence of other national regulations;
[2] Materials according to Table 5, Annex A8;
[3] Product not available;
[4] Partial factor 1,26 for the bolt HBC-T 50/30 M20 and 1,25 for the other bolts



[5] The characteristic flexure resistance according to Table 39 is limited as follows:

$M^0_{Rk,s} \le 0{,}5 \cdot N_{Rk,s,l} \cdot a$ ($N_{Rk,s,l}$ according to Table 11, 12 and 13) and

$M^0_{Rk,s} \le 0{,}5 \cdot N_{Rk,s} \cdot a$ ($N_{Rk,s}$ according to Table 37)

a = internal lever arm according Table 39

T_s = tension force acting on the channel lips

C_s = compression force acting on the channel lips

Hilti anchor channels (HAC-C) with channel bolts (HBC)

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

Annex C16

Deutsches Institut für Bautechnik DIBt

Table 40: Combination of anchor channels and channel bolts under fatigue tension load (Design method I or II for assessment method A1, A2 and B according to EOTA TR050)

Anchor channel			Channel bolt			
Channel profile	**Anchor type [1)]**	**Corrosion protection**	**Channel bolt**	**Diameter**	**Steel grade**	**Corrosion protection**
HAC-C-T 29/20	R	F	HBC-T 29/20	M10	8.8	G F
				M12		
HAC-C-T 40/22 HAC-C-T 40L			HBC-T 40/22	M12		
				M16		
HAC-C-T 50/30 HAC-C-T 50L HAC-C-T 53/34			HBC-T 50/30	M16		
				M20		
HAC-C-P 40/22 HAC-C-P 40L			HBC-40/22	M12		
				M16		
HAC-C-P 50/30 HAC-C-P 50L			HBC-50/30	M16		
				M20		
HAC-C 52/34			HBC-50/30	M16		
				M20		

[1)] R – Round anchor according Annexes A3 and A6

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances under fatigue tension load according to assessment method A1, A2 and B

Annex C17

Table 41: Characteristic resistances under fatigue tension load - steel failure with n load cycles without static preload (N_{Ed} = 0) (Design method I according to EOTA TR050) for HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure									
Characteristic resistance under fatigue tension load after n load cycles without static preload (N_{Ed} = 0)	$\Delta N_{Rk,s,0,n}$	[kN]	$\leq 10^4$	15,4	20,4		20,3		33,5
			$\leq 10^5$	8,4	10,8		8,5		18,2
			$\leq 10^6$	4,4	4,9		4,5		9,0
			$\leq 2 \cdot 10^6$	3,9	4,1		4,2		7,5
			$\leq 5 \cdot 10^6$	3,4	3,4		4,0		6,1
			$\leq 10^8$	3,0	2,8		3,9		4,6
			$> 10^8$	3,0	2,8		3,9		4,5

Table 42: Characteristic resistances under fatigue tension load - steel failure with n load cycles without static preload (N_{Ed} = 0) (Design method I according to EOTA TR050) for HAC-C(-P) (hot-rolled) anchor channels

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								
Characteristic resistance under fatigue tension load after n load cycles without static preload (N_{Ed} = 0)	$\Delta N_{Rk,s,0,n}$	[kN]	$\leq 10^4$	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

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances under fatigue tension load according to assessment method A1, A2 and B

Annex C18

Deutsches Institut für Bautechnik DIBt

Table 43: Reduction factor $\eta_{c,fat}$ under fatigue tension load – concrete failure with n load cycles without static preload (N_{Ed} = 0) for HAC-C-T (hot-rolled serrated) anchor channels (Design method I or II for assessment method A1, A2 and B according to EOTA TR050)

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Pull-out failure; Concrete cone failure									
Reduction factor 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 $N_{Rk,p}$ according to Annex C4 and $N_{Rk,c}$ calculated according to EN 1992-4 and EOTA TR 047	$\eta_{c,fat}$	[-]	$\leq 10^4$	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					
			$> 6 \cdot 10^7$ [1)]	0,500					

[1)] for $\Delta N_{Rk,p;0;\infty}$, $\Delta N_{Rk,c;0;\infty}$

Table 44: Reduction factor $\eta_{c,fat}$ under fatigue tension load – concrete failure with n load cycles without static preload (N_{Ed} = 0) for HAC-C (hot-rolled) anchor channels (Design method I or II for assessment method A1, A2 and B according to EOTA TR050)

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 failure; Concrete cone failure								
Reduction factor 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 $N_{Rk,p}$ according to Annex C5 and $N_{Rk,c}$ calculated according to EN 1992-4 and EOTA TR 047	$\eta_{c,fat}$	[-]	$\leq 10^4$	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				
			$> 6 \cdot 10^7$ [1)]	0,500				

[1)] for $\Delta N_{Rk,p;0;\infty}$, $\Delta N_{Rk,c;0;\infty}$

Table 45: Characteristic resistances under fatigue tension load – steel failure with n → ∞ load cycles without static preload (N_{Ed} = 0) (Design method II for assessment method B according to EOTA TR050) for HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				**HAC-C-T 29/20**	**HAC-C-T 40/22**	**HAC-C-T 40L**	**HAC-C-T 50/30**	**HAC-C-T 50L**	**HAC-C-T 53/34**
Steel failure									
Characteristic fatigue limit resistance (n → ∞) for any steel failure without static preload (N_{Ed} = 0)	$\Delta N_{Rk,s;0;\infty}$	[kN]	n → ∞	3,0	2,8		3,9		4,5
Concrete cone and pull-out failure									
Reduction factor for fatigue limit resistance (n → ∞) for concrete cone/pullout failure without static preload (N_{Ed} = 0)	$\eta_{c,fat}$	[-]	n → ∞	0,5					

Table 46: Characteristic resistances under fatigue tension load – steel failure with n → ∞ load cycles without static preload (N_{Ed} = 0) (Design method II for assessment method B according to EOTA TR050) for HAC-C (hot-rolled) anchor channels

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								
Characteristic fatigue limit resistance (n → ∞) for any steel failure without static preload (N_{Ed} = 0)	$\Delta N_{Rk,s;0;\infty}$	[kN]	n → ∞	1,8		3,2		5,5
Concrete cone and pull-out failure								
Reduction factor for fatigue limit resistance (n → ∞) for concrete cone/pullout failure without static preload (N_{Ed} = 0)	$\eta_{c,fat}$	[-]	n → ∞	0,5				

For the reduction of the characteristic resistances given in Tables 41, 42, 45 and 46 in the transition zone from the static resistance to the fatigue limit resistance the partial factors are calculated as follows:

$$\gamma_{M,fat,n} = \gamma_{M,fat} + (\gamma_M - \gamma_{M,fat}) \cdot (\Delta N_{Rk,n} - \Delta N_{Rk,\infty}) / (N_{Rk} - \Delta N_{Rk,\infty})$$

In absence of other national regulations, the following partial factors γ_M and $\gamma_{M,fat}$ are recommended for design method I according to EOTA TR 050:

γ_M according to Annex C1

$\gamma_{M,fat}$ = 1,35

In absence of other national regulations, the following safety factor $\gamma_{M,fat}$ is recommended for design method II (Table 34) according to EOTA TR 050:

$\gamma_{M,fat}$ = 1,35

Deutsches Institut für Bautechnik DIBt

Table 47: Combination of anchor channels and channel bolts under seismic load (seismic performance category C1)

Anchor channel	Channel bolt			
Channel profile	**Channel bolt**	**Diameter**	**Steel grade**	**Corrosion protection**
HAC-C-T 29/20	HBC-T 29/20	M10	8.8 A4	F [1] R [2]
		M12		
HAC-C-T 40/22 HAC-C-T 40L	HBC-T 40/22	M12		
		M16		
HAC-C-T 50/30 HAC-C-T 50L HAC-C-T 53/34	HBC-T 50/30	M16		
		M20		

[1] Hot dip galvanized;
[2] Stainless steel

Table 48: Characteristic resistances under seismic tension load – steel failure of HAC-C-T (serrated hot-rolled) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Anchor									
Characteristic resistance	Carbon steel	$N_{Rk,s,a,eq}$	[kN]	35,0	41,0		57,0		73,5
	Stainless steel				45,0				
Partial factor		$\gamma_{Ms,eq}$ [1]	[-]	1,8					
Steel failure: Connection between anchor and channel									
Characteristic resistance	Carbon steel	$N_{Rk,s,c,eq}$	[kN]	33,0	40,0		55,0		73,5
	Stainless steel			35,0	42,0		60,0		
Partial factor		$\gamma_{Ms,ca,eq}$ [1]	[-]	1,8					
Steel failure: Local flexure of channel lips									
Characteristic spacing of channel bolts for $N_{Rk,s,l}$		$s_{l,N,eq}$	[mm]	61	76		100		107
Characteristic resistance	Carbon steel	$N^0_{Rk,s,l,eq}$	[kN]	35,0	45,0		64,0		85,0
	Stainless steel				42,0				
Partial factor		$\gamma_{Ms,l,eq}$ [1]	[-]	1,8					

[1] In absence of other national regulations

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels and channel bolts under seismic load (Seismic performance category C1)

Annex C21

Table 49: Characteristic flexural resistance of HAC-C-T (hot-rolled serrated) channels under seismic tension load

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40 L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Failure by flexure of channel									
Characteristic flexural resistance of channel	Carbon steel	$M_{Rk,s,flex,\ eq}$	[Nm]	977	1557		3256		4870
	Stainless steel			1100	1754		3366		4626
Partial factor		$\gamma_{Ms,flex}$ [1]	[-]	1,15					

[1] In absence of other national regulations.

Table 50: Characteristic resistances under seismic shear load – steel failure of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Anchor									
Characteristic resistance	Carbon steel	$V_{Rk,s,a,y,eq}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Characteristic resistance	Carbon steel	$V_{Rk,s,a,x,eq}$	[kN]	22,9	24,7		35,2		44,1
	Stainless steel				28,3		37,1		
Partial factor	Carbon steel	$\gamma_{Ms,eq}$ [1]	[-]	1,5					
	Stainless steel								
Steel failure: Connection between anchor and channel									
Characteristic resistance	Carbon steel	$V_{Rk,s,c,y,eq}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Characteristic resistance	Carbon steel	$V_{Rk,s,c,x,eq}$	[kN]	19,8	24,0		31,4		44,1
	Stainless steel			21,0	25,2		36,0		
Partial factor		$\gamma_{Ms,eq}$ [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 $V_{Rk,s,l}$		$s_{l,V,eq}$	[mm]	61,0	76,0		100,0		107,0
Characteristic resistance	Carbon steel	$V^0_{Rk,s,l,y,eq}$	[kN]	37,0	52,0		80,0		120,0
	Stainless steel				49,5		100,0		
Partial factor		$\gamma_{Ms,l,eq}$ [1]	[-]	1,8					

[1] In absence of other national regulations;

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels under seismic load
(Seismic performance category C1)

Annex C22

Table 51: Characteristic resistances under seismic shear load in direction of the longitudinal axis of the channel – steel failure of HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel					HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Steel failure: Connection between channel lips and channel bolt										
Characteristic resistance	HBC-T 29/20 M10	Carbon steel	$V_{Rk,s,l,x,eq}$	[kN]	20,0	- [1]				
		Stainless steel								
	HBC-T 29/20 M12	Carbon steel			24,0	- [1]				
		Stainless steel								
	HBC-T 40/22 M10	Carbon steel			- [1]	- [1]		- [1]		
		Stainless steel								
	HBC-T 40/22 M12	Carbon steel			- [1]	28,0		- [1]		
		Stainless steel								
	HBC-T 40/22 M16	Carbon steel			- [1]	40,0		- [1]		
		Stainless steel								
	HBC-T 50/30 M16	Carbon steel			- [1]			50,0		50,0
		Stainless steel						71,4		51,0
	HBC-T 50/30 M20	Carbon steel			- [1]			52,3		55,0
		Stainless steel						71,4		51,0
Installation factor		Carbon steel	$\gamma_{inst,eq}$	[-]	1,2	1,2		1,4		1,4
		Stainless steel			1,0	1,2		1,4		1,0

[1] No performance assessed

Table 52: Characteristic resistances under seismic tension and seismic shear load – steel failure of channel bolts (HBC)

Channel bolt					**M10**	**M12**	**M16**	**M20**
Steel failure								
Characteristic resistance (tension load)	$N_{Rk,s,eq}$ [1]	[kN]	HBC-T 29/20	8.8	46,4	67,4	- [3]	
				A4-70 [1]	40,6	59,0	- [3]	
			HBC-T 40/22	8.8	- [4]	67,4	125,6	- [3]
				A4-70 [1]	- [4]	59,0	109,9	- [3]
			HBC-T 50/30	8.8	- [3]		125,6	203,4
				A4-70 [1]	- [3]		109,9	171,5
Partial factor	$\gamma_{Ms,eq}$ [2]	[-]	HBC-T 50/30 HBC-T 40/22 HBC-T 29/20	8.8	1,50 and 1,51 [5]			
				A4-70 [1]	1,87			
Characteristic resistance (shear load)	$V_{Rk,s,eq}$ [1]	[kN]	HBC-T 29/20	8.8	23,2	33,7	- [3]	
				A4-70 [1]	24,4	35,4	- [3]	
			HBC-T 40/22	8.8	- [5]	33,7	62,8	- [3]
				A4-70 [1]	- [5]	35,4	65,9	- [3]
			HBC-T 50/30	8.8	- [3]		62,8	101,7
				A4-70 [1]	- [3]		65,9	102,9
Partial factor	$\gamma_{Ms,eq}$ [2]	[-]	HBC-T 50/30 HBC-T 40/22 HBC-T 29/20	8.8	1,25 and 1,26 [5]			
				A4-70	1,56			

[1] Materials according to Table 5, Annex A8
[2] In absence of other national regulations
[3] Product not available
[4] Performance not assessed
[5] Partial factors 1,51 and 1,26 for the bolt HBC-T 50/30 M20; 1,5 and 1,25 for the other bolts

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of channel bolts under seismic load
(Seismic performance category C1)

Annex C24

Deutsches Institut für Bautechnik DIBt

Table 53: Characteristic resistance under fire exposure – steel failure for HAC-C(-T) (serrated hot-rolled) anchor channels

Channel bolt					**M10**	**M12**	**M16**	**M20**
Steel failure: Anchor, connection between anchor and channel, local flexure of channel lip								
Carbon steel, Stainless steel A2								
Characteristic resistance under fire exposure	HAC-C-T 29/20	R30	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	1,2	1,2	- [2]	- [2]
		R60			0,9	0,9		
		R90			0,6	0,6		
		R120			0,5	0,5		
	HAC-C-T 40/22	R30			1,2	1,2	6,2	- [2]
		R60			0,9	0,9	4,6	
		R90			0,6	0,6	2,9	
		R120			0,5	0,5	2,1	
	HAC-C-T 50/30	R30			- [2]	- [2]	6,4	10,7
		R60					4,8	8,0
		R90					3,2	5,2
		R120					2,3	3,8
	HAC-C-T 53/34	R30			- [2]	- [2]	6,5	9,0
		R60					5,0	6,7
		R90					3,4	4,5
		R120					2,7	3,4
Stainless steel A4								
Characteristic resistance under fire exposure	HAC-C-T A4 29/20	R30	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	9,9	11,1	- [2]	- [2]
		R60			6,1	7,2		
		R90			2,2	3,4		
		R120			0,3	1,4		
	HAC-C-T A4 40/22	R30			9,9	11,1	20,0	- [2]
		R60			6,1	7,2	17,7	
		R90			2,2	3,4	8,2	
		R120			0,3	1,4	3,5	
	HAC-C-T A4 50/30	R30			- [2]	- [2]	20,0	20,0
		R60					17,7	17,7
		R90					8,2	8,2
		R120					3,5	3,5
	HAC-C-T A4 53/34	R30			- [2]	- [2]	20,0	20,0
		R60					17,7	17,7
		R90					8,2	8,2
		R120					3,5	3,5
Partial safety factor			$\gamma_{Ms,fi}$ [1]	[-]	1,0			

[1] In absence of other national regulations
[2] Product not available

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels and channel bolts under fire exposure

Annex C25

Table 54: Characteristic resistance under fire exposure – steel failure for HAC-C(-P) (hot-rolled) anchor channels

Channel bolt					**M10**	**M12**	**M16**	**M20**
Steel failure: Anchor, connection between anchor and channel, local flexure of channel lip								
Carbon steel and Stainless steel (A4)								
Characteristic resistance under fire exposure	HAC-C(-P) 40/22 HAC-C-P 40L	R60	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	- [3]	- [3]	3,5	- [2]
		R90					2,2	
		R120					1,5	
	HAC-C(-P) 50/30 HAC-C-P 50L HAC-C 52/34	R60			- [2]	3,8	3,9	
		R90				2,5	2,9	
		R120				1,9	2,4	
Partial safety factor			$\gamma_{Ms,fi}$ [1]	[-]	1,0			

[1] In absence of other national regulations
[2] Product not available
[3] Performance not assessed

Table 55: Characteristic resistance under fire exposure – steel failure for HAC-C (cold-formed) anchor channels

Channel bolt					**M10**	**M12**	**M16**	**M20**
Steel failure of anchor, connection between anchor and channel, local flexure of channel lip								
Carbon steel and Stainless steel (A4)								
Characteristic resistance under fire exposure	HAC-C 28/15	R60	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	0,8		- [2]	- [2]
		R90			0,6			
		R120			0,5			
	HAC-C 38/17	R60			- [3]	- [3]	1,9	- [2]
		R90					1,3	
		R120					1,0	
	HAC-C 40/25	R60			1,7	3,5		- [2]
		R90			1,2	2,2		
		R120			0,9	1,5		
	HAC-C 49/30	R60			- [2]	3,8	3,9	
		R90				2,5	2,9	
		R120				1,9	2,4	
Partial safety factor			$\gamma_{Ms,fi}$ [1]	[-]	1,0			

[1] In absence of other national regulations
[2] Product not available
[3] Performance not assessed

Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels and channel bolts under fire exposure

Annex C26

Deutsches Institut für Bautechnik DIBt

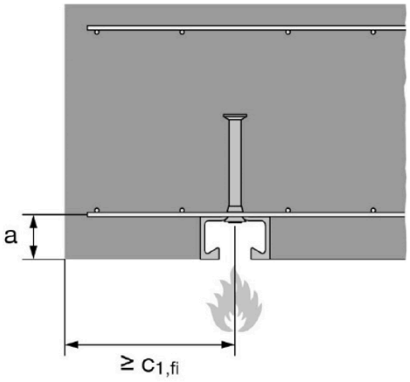
Table 56: Minimum axis distance of reinforcement – for HAC-C-T (hot-rolled serrated) anchor channels

Anchor channel				HAC-C-T 29/20	HAC-C-T 40/22	HAC-C-T 40L	HAC-C-T 50/30	HAC-C-T 50L	HAC-C-T 53/34
Minimum axis distance	R30	a	[mm]	35			50		
	R60			35			50		
	R90			45			50		
	R120			55			55		

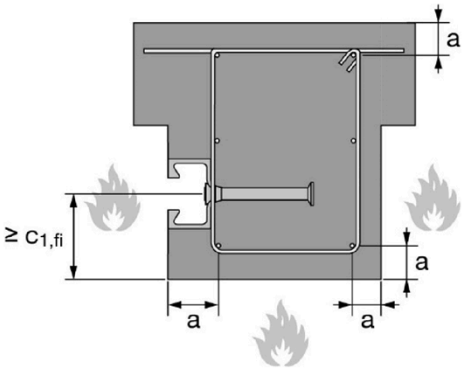
Table 57: Minimum axis distance of reinforcement – for HAC-C (cold-formed) and HAC-C(-P) (hot-rolled) anchor channels

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
Minimum axis distance	R60	a	[mm]	35					50				
	R90			45					50				
	R120			55					55				

Fire exposure from one side only



Fire exposure from more than one side



Hilti anchor channels (HAC-C) with channel bolts (HBC)

Performance
Characteristic resistances of anchor channels and channel bolts under fire exposure

Annex C27