



FI

# SUORITUSTASOILMOITUS

Nro HAC-C\_2451-CPR-EAD-2017.0003

**1. Tuotetyypin yksilöllinen tunniste:**

Hilti HAC-C

**2. Käyttötarkoitus/käyttötarkoitukset:**

Tuote	Käyttötarkoitus
Ankkurikisko	Kiinnitykseen ja/tai tueksi betoniin, rakenne-elementteihin (jotka auttavat säilyttämään rakenteiden vakauden) tai painaviin yksikköihin.

**3. Valmistaja:**

Hilti Corporation, Business Unit Anchors, 9494 Schaan, Liechtensteinin ruhtinaskunta

**4. AVCP-järjestelmä(t):** Järjestelmä 1**5. Eurooppalainen arviointiasiakirja:**

EAD 330008-02-0601 (julkaisu 02-2016)

**Eurooppalainen tekninen arviointi:**

ETA-17/0336 (11.7.2017)

**Teknisestä arvioinnista vastaava laitos:**

DIBt - Deutsches Institut für Bautechnik

**Ilmoitettu laitos/ilmoitetut laitokset:** NB 2451 -

DVS Zert GmbH

**6. Ilmoitettu suoritustaso/ilmoitetut suoritustasot:****Mekaaninen kestävyys ja lujuus (BWR 1)**

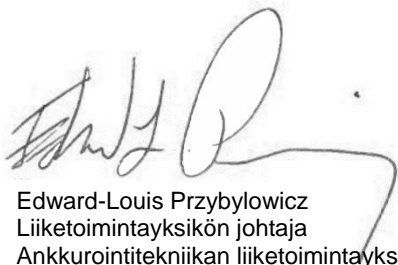
Oleellinen ominaisuus	Suorituskyky
Staattisten ja kvasistaattisten kuormitusten ominaisarvo, siirtymät	Katso liite C1 - C6

**Turvallisuus tulipalon sattuessa (BWR 2)**

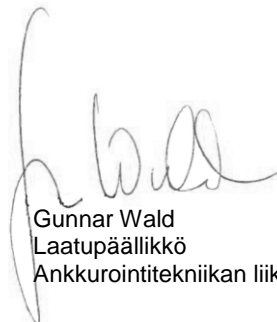
Oleellinen ominaisuus	Suorituskyky
Reaktio paloon	Ankkuroinnit täyttävät luokan A1 vaatimukset
Palonkestävyys	Katso liite C7

Edellä yksilöidyn tuotteen suoritustaso on ilmoitettujen suoritustasojen joukon mukainen. Tämä suoritustasoilmoitus on asetuksen (EU) N:o 305/2011 mukaisesti annettu edellä ilmoitetun valmistajan yksinomaisella vastuulla.

Valmistajan puolesta allekirjoittanut:



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Liiketoimintayksikön johtaja  
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Hilti Corporation  
Schaan, 28.7.2017



**Table 10: Characteristic resistances under tension load – steel failure of anchor channel**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
<b>Steel failure: Failure of anchor</b>										
Characteristic resistance	$N_{Rk,s,a}$	[kN]	9	18	20		31		55	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,8							
<b>Steel failure: Failure of connection between anchor and channel</b>										
Characteristic resistance	$N_{Rk,s,c}$	[kN]	9	18	20		31		55	
Partial safety factor	$\gamma_{Ms,ca}^{1)}$	[-]	1,8							
<b>Steel failure: Local failure by flexure of channel lips</b>										
Characteristic spacing of the channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	56	76	80	79	100	98	107	105
Characteristic resistance	$N_{Rk,s,l}^0$	[kN]	9	18	20	35	31	36	55	65
Partial safety factor	$\gamma_{Ms,l}^{1)}$	[-]	1,8							

<sup>1)</sup> In absence of other national regulations

**Table 11: Characteristic flexural resistance of channel under tension load**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34	
<b>Steel failure: Failure by flexure of channel</b>											
Characteristic flexural resistance of channel	carbon steel	$M_{Rk,s,flex}$	[Nm]	316	538	979	1013	1669	2084	2929	3435
	stainless steel				527			1702		2832	
Partial safety factor	$\gamma_{Ms,flex}^{1)}$	[-]	1,15								

<sup>1)</sup> 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 12: Characteristic resistances under tension load – concrete failure**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34		
Type of anchor			R	R	R	I	R	I	R	I	R	
<b>Pullout failure</b>												
Characteristic resistance in cracked concrete C12/15	N <sub>Rk,p</sub>	[kN]	7,6	13,6	27,0	13,6	21,2	33,8	21,2	33,2	68,4	33,2
Characteristic resistance in uncracked concrete C12/15			10,7	19,0	37,8	19,0	29,7	47,3	29,7	46,5	95,8	46,5
Amplification factor of N <sub>Rk,p</sub>	C16/20	ψ <sub>c</sub> [-]	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									
	≥ C60/75		5,00									
Partial safety factor	γ <sub>Mp</sub> = γ <sub>Mc</sub> <sup>1)</sup>	[-]	1,5									
<b>Concrete cone failure</b>												
Product factor k <sub>1</sub>	cracked concrete	k <sub>cr,N</sub>	[-]	7,2	7,8	7,9	8,1		8,7			
	uncracked concrete	k <sub>ucr,N</sub>	[-]	10,3	11,2	11,2	11,6		12,4			
Partial safety factor	γ <sub>Mc</sub> <sup>1)</sup>	[-]	1,5									
<b>Splitting</b>												
Characteristic edge distance	C <sub>cr,sp</sub>	[mm]	135	228	237	282		465				
Partial safety factor	γ <sub>Msp</sub> = γ <sub>Mc</sub> <sup>1)</sup>	[-]	1,5									

<sup>1)</sup> In absence of other national regulations

**Table 13: Displacements under tension load**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
Tension load	N	[kN]	3,6	7,1	7,9	13,9	12,3	14,3	21,8	25,8
Short-term displacement <sup>1)</sup>	δ <sub>N0</sub>	[mm]	0,6	1,3	1,4	2,3	1,4	2,2	1,6	1,4
Long-term displacement <sup>1)</sup>	δ <sub>N∞</sub>	[mm]	1,2	2,6	2,8	4,6	2,8	4,4	3,2	2,8

<sup>1)</sup> 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

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

**Performance Data**

Characteristic resistances of anchor channels and displacements under tension load

Annex C2

**Table 14: Characteristic resistances under shear load – steel failure of anchor channel**

<b>Anchor channel HAC-C</b>			<b>28/15</b>	<b>38/17</b>	<b>40/25</b>	<b>40/22</b>	<b>49/30</b>	<b>50/30</b>	<b>54/33</b>	<b>52/34</b>
<b>Steel failure: Failure of anchor</b>										
Characteristic resistance	$V_{Rk,s,a}$	[kN]	9,0	18,0	20,0	26,0	31,0	40,3	55,0	71,5
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5							
<b>Steel failure: Failure of connection between anchor and channel</b>										
Characteristic resistance	$V_{Rk,s,c}$	[kN]	9,0	18,0	20,0	26,0	31,0	40,3	55,0	71,5
Partial safety factor	$\gamma_{Ms,ca}^{1)}$	[-]	1,8							
<b>Steel failure: Local failure by flexure of channel lips</b>										
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,v}$	[mm]	56	76	80	79	100	98	107	105
Characteristic resistance	$V_{Rk,s,l}^0$	[kN]	9,0	18,0	20,0	26,0	31,0	40,3	55,0	71,5
Partial safety factor	$\gamma_{Ms,l}^{1)}$	[-]	1,8							

<sup>1)</sup> 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 C3

**Table 15: Characteristic resistances under shear load – concrete failure**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
<b>Pry out failure</b>										
Product factor	$k_8$	[-]	1,0	2,0						
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5							
<b>Concrete edge failure</b>										
Product factor $k_{12}$	cracked concrete	$k_{cr,V}$	[-]	6,9	7,5					
	uncracked concrete	$k_{ucr,V}$	[-]	9,6	10,5					
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5							

<sup>1)</sup> In absence of other national regulations

**Table 16: Displacements under shear load**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
Shear load	V	[kN]	3,6	7,1	7,9	10,3	12,3	16,0	21,8	28,4
Short-term displacement <sup>1)</sup>	$\delta_{V0}$	[mm]	0,6	1,3	1,4	2,1	1,4	2,6	1,6	3,7
Long-term displacement <sup>1)</sup>	$\delta_{V\infty}$	[mm]	0,9	2,0	2,1	3,1	2,1	3,9	2,4	5,5

<sup>1)</sup> 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 17: Characteristic resistances under combined tension and shear load**

Anchor channel HAC-C			28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
<b>Steel failure: Local failure by flexure of channel lips and failure by flexure of channel</b>										
Product factor	$k_{13}$	[-]	1,0 <sup>1)</sup>							
<b>Steel failure: Failure of anchor and connection between anchor and channel</b>										
Product factor	$k_{14}$	[-]	1,0 <sup>2)</sup>							

<sup>1)</sup>  $k_{13}$  can be taken as 2,0 if  $V_{Rd,s,l}$  is limited to  $N_{Rd,s,l}$

<sup>2)</sup>  $k_{14}$  can be taken as 2,0 if  $\max(V_{Rd,s,a}; V_{Rd,s,c})$  is limited to  $\min(N_{Rd,s,a}; N_{Rd,s,c})$

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

**Performance Data**

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

Annex C4

**Table 18: Characteristic resistances under tension and shear load – steel failure of channel bolts**

Channel bolt					M8	M10	M12	M16	M20			
<b>Steel failure</b>												
Characteristic tension resistance	$N_{Rk,s}^{1)}$	[kN]	HBC-28/15	4.6	-							
				8.8	22,4	35,4	44,3	-				
				A4-50 <sup>2)</sup>	17,2	-						
			HBC-38/17	A4-70 <sup>2)</sup>	25,6	38,9	51,3	-				
				4.6	-		23,2	-				
				8.8	-		-	35,4	55,8	-		
			HBC-40/22	A4-70 <sup>2)</sup>	20,5	47,2	53,0	-				
				4.6	-		23,2	-				
				8.8	-		-	35,4	55,8	-		
			HBC-50/30	A4-70 <sup>2)</sup>	20,5	58,6	91,0	-				
				4.6	-		-	-				
				8.8	-		-	35,4	55,8	183,1		
							A4-70 <sup>2)</sup>	-	58,6	109,0	129,0	
			Partial safety factor	$\gamma_{Ms}^{3)}$	[-]	HBC-28/15	4.6	2,00				
						HBC-38/17	8.8	1,50				
HBC-40/22	A4-50 <sup>2)</sup>	2,86										
HBC-50/30	A4-70 <sup>2)</sup>	1,87										
Characteristic shear resistance	$V_{Rk,s}^{1)}$	[kN]	HBC-28/15	4.6	-							
				8.8	14,6	23,2	33,7	-				
				A4-50 <sup>2)</sup>	11,0	-						
			HBC-38/17	A4-70	15,4	24,4	35,4	-				
				4.6	-		13,9	-				
				8.8	-		-	33,7	62,8	-		
			HBC-40/22	A4-70 <sup>2)</sup>	24,4	35,4	65,9	-				
				4.6	-		13,9	-				
				8.8	-		-	33,7	62,8	-		
			HBC-50/30	A4-70 <sup>2)</sup>	24,4	35,4	65,9	-				
4.6	-			-	-							
8.8	-			-	33,7	62,8	98,0					
				A4-70 <sup>2)</sup>	-	35,4	65,9	102,9				
Partial safety factor	$\gamma_{Ms}^{3)}$	[-]	HBC-28/15	4.6	1,67							
			HBC-38/17	8.8	1,25							
			HBC-40/22	A4-50 <sup>2)</sup>	2,38							
			HBC-50/30	A4-70	1,56							

<sup>1)</sup> In conformity to EN ISO 898-1:1999

<sup>2)</sup> Materials according to Table 6, Annex A6

<sup>3)</sup> In absence of other national regulations

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

**Performance Data**

Characteristic resistances of channel bolts under tension and shear load

Annex C5

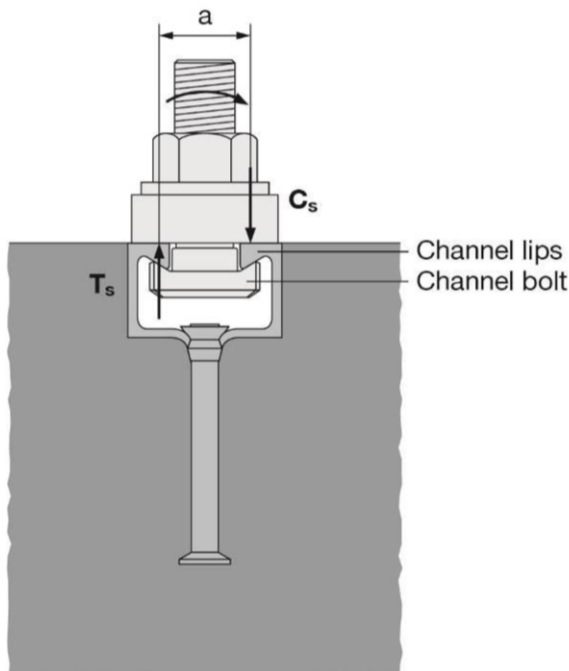
**Table 19: Characteristic resistances under shear load with lever arm – steel failure of channel bolts**

Channel bolt <sup>1)</sup>				M8	M10	M12	M16	M20		
<b>Steel failure</b>										
Characteristic flexural resistance	$M^{0}_{Rk,s}$	[Nm]	HBC-28/15	4.6	-	29,9 <sup>3)</sup>	-			
			HBC-38/17	8.8	30,0	59,8	104,8	266,4	519,3	
			HBC-40/22	A4-50 <sup>2)</sup>	18,7	-				
			HBC-50/30	A4-70 <sup>2)</sup>	26,2	52,3	91,7	233,1	454,4	
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>	[-]	HBC-28/15	4.6	1,67					
			HBC-38/17	8.8	1,25					
			HBC-40/22	A4-50 <sup>2)</sup>	2,38					
			HBC-50/30	A4-70 <sup>2)</sup>	1,56					
Internal lever arm	a	[mm]	HBC-28/15	28/15	17,3	18,7	20,0	-		
			HBC-38/17	38/17	-	23,0	24,3	26,3	-	
			HBC-40/22	40/22		24,3	25,7	27,3		
			HBC-50/30	50/30	-	-	29,9	31,7	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



3) The characteristic flexure resistance according to Table 19 is limited as follows:

$$M^{0}_{Rk,s} \leq 0,5 \cdot N_{Rk,s,l} \cdot a \quad (N_{Rk,s,l} \text{ according to Table 10})$$

$$M^{0}_{Rk,s} \leq 0,5 \cdot N_{Rk,s} \cdot a \quad (N_{Rk,s} \text{ according to Table 18})$$

a = internal lever arm according to Table 19

$T_s$  = tension force acting on the channel lips

$C_s$  = compression force acting on the channel lips

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

**Performance Data**

Characteristic flexural resistances of channel bolts under shear load

Annex C6



**Table 20: Characteristic resistance  $F_{Rd,s,fi}$  [kN] of anchor channels under fire exposure**

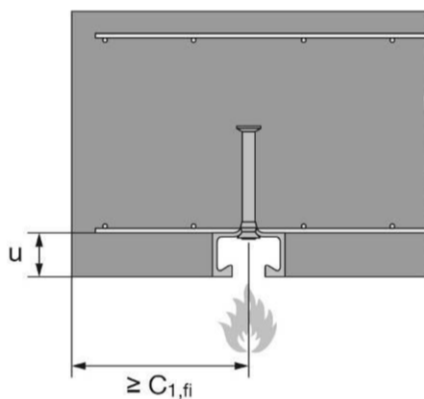
Channel bolt				M10	M12	≥ M16			
<b>Steel failure of anchor, connection between anchor and channel, local flexure of channel lip</b>									
Characteristic resistance in cracked concrete C20/25	HAC-C 28/15	R60	$N_{Rk,s,fi}$ = $V_{Rk,s,fi}$	[kN]	0,8		-		
		R90			0,6				
		R120			0,5				
	HAC-C 38/17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

<sup>1)</sup> In absence of other national regulations

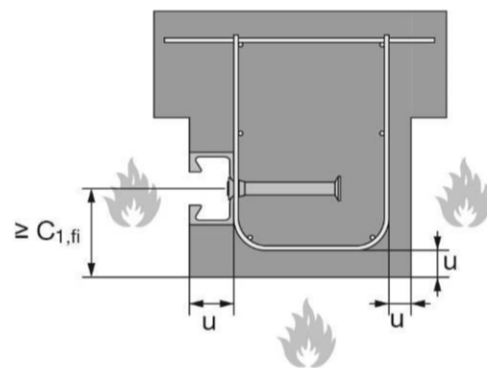
**Table 21: Minimum concrete cover**

Anchor channel HAC-C				28/15	38/17	40/25	40/22	49/30	50/30	54/33	52/34
Concrete cover	R60	u	[mm]	35				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 C7