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1.	Unique identification code of the product-type	**HALFEN Anchor channel HTA 28/15, HTA 38/17, HTA 41/22, HTA 40/22, HTA 40/22P, HTA 40/25, HTA 49/30, HTA 50/30, HTA 50/30P, HTA 52/34, HTA 54/33, HTA 55/42, HTA 72/48 and HTA 72/49**
2.	Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4)	**See ETA-09/0339, 30.05.2024, Annex A1, A2 and A4**
3.	Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:	
	Generic type and use	Cast-in, C-shaped, hot-rolled or cold-formed anchor channel with at least 2 metal anchors fixed on the profile back in combination with hammer-head bolts (HTA 28/15, HTA 38/17 and HTA 41/22) and hook-head bolts (HTA 40/22 – HTA 72/49)
	Product size covered (anchor channels and corresponding screws)	HTA 28/15 with channel bolt HS 28/15 M6 – M12, HTA 38/17 with channel bolt HS 38/17 M10 – M16, HTA 41/22 with channel bolts HZS 41/22 M12 – M16 HTA 40/22 with channel bolt HS 40/22 M10 – M16, HTA 40/22P with channel bolt HS 40/22 M10 – M16, HTA 40/22P with channel bolt HSR 40/22 M16, HTA 40/25 with channel bolt HS 40/22 M10 – M16, HTA 49/30 with channel bolt HS 50/30 M10 – M20, HTA 50/30 with channel bolt HS 50/30 M10 – M20, HTA 50/30P with channel bolt HS 50/30 M10 – M20, HTA 52/34 with channel bolt HS 50/30 M10 – M20, HTA 54/33 with channel bolt HS 50/30 M10 – M20, HTA 55/42 with channel bolt HS 50/30 M10 – M24, HTA 72/48 with channel bolt HS 72/48 M20 – M30, HTA 72/49 with channel bolt HS 72/48 M20 – M30
	For use in	Cracked and non-cracked concrete C12/15 to C90/105 according to EN 206-1:2000-12
	Anchor material / Screw material and intended use	• Hot-dip galv. steel / electropl. steel for dry internal conditions • Hot-dip galv. steel / hot-dip galv. steel or electroplated steel with special coating also for internal conditions with normal humidity • Stainless steel / stainless steel also for medium corrosion exposure • High corrosion resistant steel / high corrosion resistant steel also for high corrosion exposure
	Loading	Static & quasi static tension and shear loads perpendicular as well as parallel (with HSR bolt) to the longitudinal channel axis, fatigue tension loads, seismic tension and shear loads perpendicular and parallel to the longitudinal channel axis (for HSR bolts), and fire exposure
4.	Name, registered trade name or registered trademark and contact address of the manufacturer as required pursuant to Article 11(5)	Leviat GmbH, Liebigstraße 14, 40764 Langenfeld, Germany
5.	Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2)	-

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6.	System or systems of assessment and verification of constancy of performance of the construction product as set out in Annex V		System 1	
7.	In case of the declaration of performance concerning a construction product covered by a harmonised standard		-	
8.	In case of the declaration of performance concerning a construction product for which a European Technical Assessment has been issued		Deutsches Institut für Bautechnik (DIBt) issued ETA-09/0339 on the basis of EAD 330008-04-0601, the notified body 2323 performed under system 1 (ii) Initial inspection of the manufacturing plant and of factory production control; (iii) Continuous surveillance, assessment and evaluation of factory production control under system 1.	
9.	Declared performance			
	Essential Characteristics	Design Method	Performance	Harmonized Technical Specification
	Characteristic resistance for tension	EOTA TR 047, EOTA TR 050, EN 1992-4	ETA-09/0339, Annex C1-C3	EAD 330008-04-0601
	Characteristic resistance for shear (without reinforcement)		ETA-09/0339, Annex C4-C6	
	Characteristic resistance for combined tension and shear		ETA-09/0339, Annex C7	
	Displacement for serviceability limit state		ETA-09/0339, Annex C7	
	Characteristic resistance for fatigue loading		ETA-09/0339, Annex C8-C9	
	Characteristic resistance for seismic loading		ETA-09/0339, Annex C10-C11	
	Characteristic resistance for fire exposure		ETA-09/0339, Annex C12-C13	
	Where pursuant to Article 37 or 38 in the Specific Technical Documentation has been used, the requirements with which the product complies:		-	
10.	The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9.			
This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.				

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Langenfeld, 27.06.2024

Signed for and on behalf of the manufacturer by

Stephan Bauerdick
(Operations Director | Central Operations)

Dr. Ing. Dirk Albartus
(Prokurist)

ID-900-06/24-E

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Annex 1:

Table C1: Characteristic Resistances under tension load – steel failure anchor channel

Anchor channel			steel	28/15	38/17	41/22 / 40/25	40/22 / 40/22P	49/30	50/30 / 50/30P	54/33	52/34	55/42	72/49 / 72/48
Steel failure: Anchor													
Characteristic resistance	$N_{Rk,s,a}$	[kN]	carbon	9	18	18 / 20	20 / 31	31	31 / 56	56	56	80	102
			stainless [3]	12,7	22,6	22,6	20 / 31	35,3	31 / 56	56,5	56	- [2]	102
			stainless D4	15,3	27,2	22,6	- [2]	35,3	- [2]	56,5	- [2]	- [2]	- [2]
Partial factor	γ_{Ms} [1]			1,8									
Steel failure: Connection channel/anchor													
Characteristic resistance	$N_{Rk,s,c}$	[kN]	carbon	9	18	18 / 20	20 / 29	31	31 / 39	55	55	80	100
			stainless [3]	12,7	22,6	22,6	20 / 29	35,3	31 / 39	56,5	55	- [2]	100
			stainless D4	15,3	27,2	22,6	- [2]	35,3	- [2]	56,5	- [2]	- [2]	- [2]
Partial factor	$\gamma_{Ms,ca}$ [1]			1,8									
Steel failure: Local flexure of the channel lips													
Spacing of channel bolts for $N^0_{Rk,s,l}$	$s_{l,N}$	[mm]	all materials	56	76	83 / 80	79	100	98	107	105	109	144
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	carbon	9	18	20	38	31	43	55	72	110	100 / 120
			stainless [3]	12,7	22,6	26 / 22,6	38	35,3	43	56,5	72	- [2]	100 / 120
			stainless D4	16,1	35,4	26 / 22,6	- [2]	35,3	- [2]	56,5	- [2]	- [2]	- [2]
Partial factor	$\gamma_{Ms,l}$ [1]			1,8									

[1] In absence of other national regulations
[2] No performance assessed
[3] Valid for all stainless steel materials except D4, see Annex A4

Table C2: Characteristic flexural resistance of channel

Anchor channel			steel	28/15	38/17	41/22 40/25	40/22 40/22P	49/30	50/30 50/30P	54/33	52/34	55/42	72/49	72/48
Char. flexure resistance of channel	$M_{Rk,s,flex}$	[Nm]	carbon, stainless [3]	317	580	733 / 1071	1389	1673	2803	2984	3373	6447	8617	8593
			stainless D4	432	836	749 / 1262	- [2]	2528	- [2]	2984	- [2]	- [2]	- [2]	- [2]
Partial factor	$\gamma_{Ms,flex}$ [1]			1,15										

[1] In absence of other national regulations [2] No performance assessed
[3] Valid for all stainless steel materials except D4, see Annex A4

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Annex 2:

Table C3: Characteristic resistances under tension load – steel failure of HALFEN channel bolts

HALFEN Channel bolts Ø				M6	M8	M10	M12 [3]	M16 [3]	M20	M24	M27	M30
Steel failure												
Characteristic resistance	$N_{Rk,s}$	[kN]	4.6	8,0	14,6	23,2	33,7	62,8	98,0	141,2	183,6	224,4
			8.8	16,1	29,3	46,4	67,4 [4] (48,5)	125,6 (96,3)	196,0	282,4	367,2	448,8
			50 [1]	10,1	18,3	29,0	42,2 (40,3)	78,5 (64,0)	122,5	176,5	229,5	280,5
			70 [1]	14,1	25,6	40,6	59,0	109,9	171,5	247,1	321,3	392,7
Partial factor	γ_{Ms} [2]		4.6	2,00								
			8.8	1,50								
			50 [1]	2,86								
			70 [1]	1,87								

[1] Materials according Annex A2 and A3
[2] In absence of other national regulations
[3] values in brackets for HZS 41/22
[4] 50,7 kN for HS 30

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Annex 3:

Table C4: Characteristic resistances under tension load – concrete failure

Anchor channel				28/15	38/17	41/22 40/22 40/25	40/22P	49/30 50/30	50/30P	54/33 52/34	55/42	72/49 72/48
Concrete failure: Pull-out												
Characteristic resistance in cracked concrete C12/15	Round anchors	$N_{Rk,p}$	[kN]	7,6	13,6	13,6	21,2	21,2	34,0	34,0	41,6	- 2)
	I-anchors 3)			11,7	11,7	14,0	17,8	21,0	24,7	29,7	40,6	46,4
Characteristic resistance in uncracked concrete C12/15	Round anchors	$N_{Rk,p}$	[kN]	10,6	19,0	19,0	29,7	29,7	47,6	47,6	58,2	- 2)
	I-anchors 3)			16,4	16,4	19,6	24,9	29,4	34,6	41,6	56,8	65,0
Increasing factor for $N_{Rk,p} = N_{Rk,p(C12/15)} \cdot \Psi_c$	C20/25	Ψ_c	[-]	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		$k_{cr,N}$		7,2	7,8	7,9	8,0	8,1	8,2	8,7	8,9	8,9
		$k_{ucr,N}$		10,3	11,2	11,2	11,5	11,5	11,7	12,4	12,6	12,7
Charact.edge spacing		$c_{cr,N}$	[mm]	111	171	176	195	199	216	260	269	270
Charact.spacing		$s_{cr,N}$		2,0 $c_{cr,N}$								
Partial factor		γ_{Mc} 1)		1,5								
Concrete failure: Splitting												
Charact.edge spacing		$c_{cr,sp}$	[mm]	135	228	246 / 252	273	282	318	465	525	546
Charact.spacing		$s_{cr,sp}$		2,0 $c_{cr,sp}$								
Partial factor		γ_{Msp} 1)		1,5								

1) In absence of other national regulations
2) No performance assessed
3) Value valid for minimum I-anchor size; for other sizes the characteristic resistance can be calculated using A_h from Annex A6, Table A3 or the actual dimension.

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Annex 4:

Table C5: Characteristic resistances under shear load

Anchor channel			steel	28/15	38/17	41/22 40/25	40/22 / 40/22P	49/30	50/30 / 50/30P	54/33	52/34	55/42	72/49 / 72/48
Steel failure: Anchor													
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	carbon	9	18	29,7 / 20	35	31	52 / 59	55	78	110	100 / 146
			stainless [4]	12,7	22,6	22,6	35	35,3	52 / 59	56,5	78	- [3]	100 / 146
			stainless D4	18	30	22,6 / 30,8	- [3]	58,9	- [3]	56,5	- [3]	- [3]	- [3]
Partial factor	γ_{Ms} [1]			1,8									
Steel failure: Connection channel / anchor													
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	carbon	9	18	29,7 / 20	35	31	52 / 59	55	78	110	100 / 146
			stainless [4]	12,7	22,6	22,6	35	35,3	52 / 59	56,5	78	- [3]	100 / 146
			stainless D4	18	30	22,6 / 30,8	- [3]	58,9	- [3]	56,5	- [3]	- [3]	- [3]
Partial factor	$\gamma_{Ms,ca}$ [1]			1,8									
Steel failure: Local flexure of channel lips													
Spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	all materials	56	76	83 / 80	79	100	98	107	105	109	144
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	carbon	9	18	29,7 / 20	35	31	52 / 59	55	78	110	100 / 146
			stainless [4]	12,7	22,6	22,6	35	35,3	52 / 59	56,5	78	- [3]	100 / 146
			stainless D4	18	30	22,6 / 30,8	- [3]	58,9	- [3]	56,5	- [3]	- [3]	- [3]
Partial factor	$\gamma_{Ms,l}$ [1]			1,8									
Concrete failure: Pry-out													
Product factor		k_8 [2]	all materials	1,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
Partial factor		γ_{Mc} [1]		1,5									
Concrete failure: Concrete edge													
Product-factor k_{12}	cracked concrete	$k_{cr,V}$	all materials	4,5	7,5	6,5 / 7,5	7,5	7,5	7,5	7,5	7,5	7,5	7,5
	uncracked concrete	$k_{ucr,V}$		6,3	10,5	9,1 / 10,5	10,5	10,5	10,5	10,5	10,5	10,5	10,5
Partial factor		γ_{Mc} [1]		1,5									

[1] In absence of other national regulations
[2] Without supplementary reinforcement. In case of supplementary reinforcement the factor k_8 should be multiplied with 0,75.
[3] No performance assessed
[4] Valid for all stainless steel materials except D4, see Annex A4

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Annex 5:

Table C5 (continued): Characteristic resistances under shear load

Anchor channel			steel	40/22P
Steel failure: Anchor				
Characteristic resistance	$V_{Rk,s,B,X}$	[kN]	carbon	18,6
Partial factor	γ_{Ms} [1]		1,8	
Steel failure: Connection channel / anchor				
Characteristic resistance	$V_{Rk,s,c,x}$	[kN]	carbon	17,4
Partial factor	$\gamma_{Ms,ca}$ [1]		1,8	
Steel failure: Connection between channel lips and channel bolt				
Characteristic resistance	$V_{Rk,s,l,x}$	[kN]	carbon	13,5
Installation factor	γ_{inst} [1]		1,2	

[1] In absence of other national regulations

Table C6: Charact. resistances under shear load – steel failure of HALFEN channel bolts

HALFEN Channel bolts Ø				M6	M8	M10	M12	M16	M20	M24	M27	M30
Steel failure												
Characteristic resistance	$V_{Rk,s}$	[kN]	4.6	4,8	8,8	13,9	20,2	37,7	58,8	84,7	110,2	134,6
			8.8	8,0	14,6	23,2	33,7	62,8	98,0	141,2	183,6	224,4
			50 [1]	6,0	11,0	17,4	25,3	47,1	73,5	105,9	137,7	168,3
			70 [1]	8,4	15,4	24,4	35,4	65,9	102,9	148,3	192,8	235,6
Characteristic flexure resistance	$M^0_{Rk,s}$	[Nm]	4.6	6,3	15,0	29,9	52,4	133,2	259,5	449,0	665,8	898,6
			8.8	12,2	30,0	59,8	104,8[3]	266,4[4]	519,3[5]	898,0	1331,5	1799,2
			50 [1]	7,6	18,7	37,4	65,5	166,5	324,5	561,3	832,2	1124,5
			70 [1]	10,7	26,2	52,3	91,7 [3]	233,1[4]	454,4	785,8	1165,1	1574,3
Partial factor	γ_{Ms} [2]		4.6	1,67								
			8.8	1,25								
			50 [1]	2,33								
			70 [1]	1,55								

[1] Materials according Annex A2 and A3
[2] In absence of other national regulations
[3] For HTA 25/15 $M^0_{Rk,s}$ is limited to 84 Nm.
[4] For HTA 35/17 $M^0_{Rk,s}$ is limited to 231 Nm.
[5] For HTA 49/30 $M^0_{Rk,s}$ is limited to 509 Nm.

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Annex 6:

Table C7: Displacements under tension load

Anchor channel			28/15	38/17 41/22	40/25 40/22	40/22P	49/30 50/30	50/30P	54/33 52/34	55/42	72/49 72/48
Tension load	N_{Ek}	[kN]	3,6	7,1	7,9	11,5	12,3	15,5	21,8	31,7	39,7
Short-term displacement	δ_{N0}	[mm]	0,3	0,3 0,6	0,4	0,4	0,4	0,5	0,5	0,5	0,5
Long-term displacement	$\delta_{N\infty}$	[mm]	0,6	0,6 1,3	0,8	0,8	0,8	1,0	1,0	1,0	1,0

Table C8: Displacements under shear load

Anchor channel			28/15	38/17 41/22	40/25 40/22	40/22P	49/30 50/30	50/30P	54/33 52/34	55/42	72/49 72/48
Shear load in y-direction [1]	V_y	[kN]	3,6	7,1 11,8	7,9 13,9	13,9	12,3 20,6	23,4	21,8 31,0	43,7	39,7 57,9
Short-term displacements	$\delta_{V,y,0}$	[mm]	0,6	0,6 1,1	0,6	0,6	0,6	0,6	1,2	1,2	1,2
Long-term displacements	$\delta_{V,y,\infty}$	[mm]	0,9	0,9 1,7	0,9	0,9	0,9	0,9	1,8	1,8	1,8
Shear load in x-direction [2]	V_x	[kN]	- [3]	- [3]	- [3]	4,5	- [3]	- [3]	- [3]	- [3]	- [3]
Short-term displacements	$\delta_{V,x,0}$	[mm]	- [3]	- [3]	- [3]	0,2	- [3]	- [3]	- [3]	- [3]	- [3]
Long-term displacements	$\delta_{V,x,\infty}$	[mm]	- [3]	- [3]	- [3]	0,3	- [3]	- [3]	- [3]	- [3]	- [3]

[1] y-direction (perpendicular to longitudinal axis of channel)
[2] x-direction (in direction of the longitudinal channel axis)
[3] No performance assessed

Table C9: Characteristic resistances under combined tension and shear load

Anchor channel		28/15	38/17 41/22	40/25 40/22	40/22P	49/30 50/30	50/30P	54/33 52/34	55/42	72/49 72/48
Steel failure: Local failure by flexure of channel lips and failure by flexure of channel										
Product factor	k_{13}	Values according to EN 1992-4:2018, section 7.4.3.1								
Steel failure: Failure of anchor and connection between anchor and channel										
Product factor	k_{14}	Values according to EN 1992-4:2018, section 7.4.3.1								

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Annex 7:

Table C10: Combinations of anchor channels and channel bolts under fatigue tension load

Anchor channel				Channel bolts			
Profile	Anchor	d_1 [mm]	Material	Channel bolt	Thread Ø [mm]	Grade	Material
40/22	B6	8	Steel hot-dip galv.	HS 40/22	M12	8.8	Steel electro-plated, hot-dip galv.; stainless steel
					M16	4.6	
						8.8	
40/22P	B6	10	Steel hot-dip galv.; stainless steel	HS 40/22	M12	8.8 / A4-70	
					M16	4.6	
						8.8 / A4-70	
50/30	B6	10	Steel hot-dip galv.	HS 50/30	M16	4.6	
					M20	8.8	
50/30P	B6	12	Steel hot-dip galv.	HS 50/30	M16	4.6	
					M20	8.8	
52/34	B6	12	Steel hot-dip galv.; stainless steel	HS 50/30	M16	8.8 / A4-70	
					M20		

Design Method I acc. EOTA TR 050, June 2022

Table C11: Characteristic resistances under fatigue tension load after n load cycles without static preload ($N_{Ed} = 0$) – Steel failure

Anchor channel		40/22	40/22P		50/30 50/30P	52/34	
	Load cycles n	$\Delta N_{Rk,s;lo;n}$ with $N_{lok,s,n} = 0$ [kN]					
		carbon	carbon	stainless	carbon	carbon	stainless
Characteristic resistances under fatigue tension load without static preload	$\leq 10^4$	11,7	12,8		16,5	22,2	
	$\leq 10^5$	6,7	7,7		9,8	13,2	
	$\leq 10^6$	3,8	4,7		5,8	7,9	
	$\leq 2 \cdot 10^6$	3,2	4,0		4,9	6,7	
	$\leq 5 \cdot 10^6$	2,6	3,3		4,0	5,5	
	$\leq 7 \cdot 10^6$	2,4	3,3	3,0		5,5	5,1
	$\leq 10^8$	1,2					
	$> 10^8$	-					

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Annex 8:

Table C12: Characteristic resistances under fatigue tension load after n load cycles with lower load share N_{Elok} – Concrete cone and pull-out failure

	Load cycles n	$\eta_{k,c,fat} = \eta_{k,p,fat}$ [-]								
		S_{lok} =								
		0,0	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8
	≤ 10^4	0,725	0,668	0,600	0,527	0,450	0,370	0,288	0,205	0,120
	2· 10^4	0,704	0,650	0,585	0,514	0,439	0,360	0,279	0,197	0,114
Reduction factor for	5· 10^4	0,677	0,627	0,566	0,497	0,424	0,347	0,268	0,188	0,106
	1· 10^5	0,656	0,610	0,551	0,484	0,412	0,337	0,260	0,181	0,100
$\Delta N_{Rk,c,E,n} = \eta_{k,c,fat} \cdot N_{Rk,c}$ [1]	2· 10^5	0,636	0,592	0,536	0,471	0,401	0,328	0,251	0,174	0,094
$\Delta N_{Rk,p,E,n} = \eta_{k,p,fat} \cdot N_{Rk,p}$ [2]	5· 10^5	0,608	0,569	0,516	0,454	0,386	0,315	0,240	0,164	0,087
	1· 10^6	0,588	0,551	0,501	0,441	0,375	0,305	0,232	0,157	0,081
$S_{lok} = 2{,}25 \cdot N_{Elok}/N_{Rk,c(p)} \leq 0{,}8$ [3]	2· 10^6	0,567	0,534	0,486	0,428	0,364	0,295	0,223	0,150	0,075
	5· 10^6	0,539	0,511	0,466	0,411	0,349	0,282	0,212	0,140	0,067
	1· 10^7	0,519	0,493	0,451	0,398	0,337	0,272	0,204	0,133	0,061
	2· 10^7	0,498	0,476	0,436	0,385	0,326	0,262	0,195	0,126	0,055
	5· 10^7	0,471	0,453	0,416	0,367	0,311	0,250	0,184	0,116	0,047
	10^8	0,450	0,435	0,401	0,354	0,300	0,240	0,176	0,109	0,041

[1] $N_{Rk,c}$ static resistance according to Annex C3 and EN 1992-4:2018 or EOTA TR 047, May 2021
[2] $N_{Rk,p}$ static resistance according to Annex C3
[3] N_{Elok} characteristic value of the static pre-load decisive for concrete cone or pull-out failure

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Annex 9:

Table C13: Combinations of anchor channels and channel bolts under seismic load

Anchor channel		Channel bolt			
Profile	Material	Channel bolt	Thread Ø	Grade	Material
40/22P	hot-dip galvanized	HSR 40/22	16	8.8	Steel electro-plated, hot-dip galvanized

Table C14: Characteristic resistances under seismic tension load – steel failure

Anchor channel			steel	40/22P
Steel failure: Anchor				
Characteristic resistance	$N_{Rk,s,a,eq}$	[kN]	carbon	31
Partial factor	$\gamma_{Ms,a}$ [1)]		1,8	
Steel failure: Connection channel/anchor				
Characteristic resistance	$N_{Rk,s,c,eq}$	[kN]	carbon	29
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8	
Steel failure: Local flexure of the channel lips				
Spacing of channel bolts for $N^0_{Rk,s,l,eq}$	$s_{l,N}$	[mm]	carbon	79
Characteristic resistance	$N^0_{Rk,s,l,eq}$	[kN]	carbon	38
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8	

[1)] In absence of other national regulations

Table C15: Characteristic flexural resistances under seismic tension load

Anchor channel			steel	40/22P
Steel failure: Flexure of channel				
Characteristic flexural resistance of channel	$M_{Rk,s,flex,eq}$	[Nm]	carbon	1389
Partial factor	$\gamma_{Ms,flex}$ [1)]		1,15	

[1)] In absence of other national regulations

Table C16: Characteristic resistances under seismic tension load – steel failure of HALFEN HSR channel bolt

HALFEN HSR channel bolt			M16
Steel failure			
Characteristic resistance	$N_{Rk,s,eq}$	[kN]	125,6
Partial factor	γ_{Ms} [1)]		1,5

[1)] In absence of other national regulations

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Annex 10:

Table C17: Characteristic resistances under seismic shear load – steel failure

Anchor channel			**steel**	**40/22P**
Steel failure: Anchor				
Characteristic resistance	$V_{Rk,s,a,y,eq}$	[kN]	carbon	35
Characteristic resistance	$V_{Rk,s,a,x,eq}$	[kN]	carbon	18,6
Partial factor	$\gamma_{Ms,a}$ [1]		1,8	
Steel failure: Connection channel/anchor				
Characteristic resistance	$V_{Rk,s,c,y,eq}$	[kN]	carbon	35
Characteristic resistance	$V_{Rk,s,c,x,eq}$	[kN]	carbon	17,4
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				
Spacing of channel bolts for $V_{Rk,s,l,eq}$	$s_{l,V}$	[mm]	carbon	79
Characteristic resistance	$V^0_{Rk,s,l,y,eq}$	[kN]	carbon	35
Partial factor	$\gamma_{Ms,l}$ [1]		1,8	
Steel failure: Connection between channel lips and channel bolt under shear in the direction of the longitudinal channel axis				
Characteristic resistance	$V_{Rk,s,l,x,eq}$	[kN]	carbon	13,5
Installation factor	γ_{inst} [1]		1,2	

[1] In absence of other national regulations

Table C18: Characteristic resistance unter seismic shear load – steel failure of HALFEN channel bolt HSR

HALFEN channel bolt HSR			**M16**
Steel failure			
Characterist. resistance	$V_{Rk,s,eq}$	[kN]	62,8
Partial factor	γ_{Ms} [1]		1,25

[1] In absence of other national regulations

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Annex 11:

Table C19: Characteristic resistances under tension and shear load under fire exposure – steel failure

Anchor channel					28/15	38/17	41/22	40/25	40/22 40/22P	49/30	50/30 50/30P	54/33 52/34	55/42	72/49 72/48
Steel failure: Anchor, Connection channel / anchor, Local flexure of channel lips, channel bolts														
Characteristic resistances	R30	M8	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	1,0	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)
		M10			1,0	1,7	- 2)	1,9	1,9	1,9	1,9	1,9	- 2)	- 2)
		M12			1,9	1,7	2,4	1,9	2,5	2,5	2,5	2,5	- 2)	- 2)
		M16			- 2)	3,2	2,3	3,6	6,0	4,0	6,0	6,0	6,3	6,3
		M20			- 2)	- 2)	- 2)	- 2)	- 2)	4,0	9,5	8,9 10,1	10,3	10,3
		M24			- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	14,8	14,8
	R60	M8			0,8	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)
		M10			0,8	1,5	- 2)	1,5	1,5	1,5	1,5	1,5	- 2)	- 2)
		M12			1,3	1,5	1,7	1,5	2,5	2,5	2,5	2,5	- 2)	- 2)
		M16			- 2)	2,4	1,8	3,6	4,5	3,5	4,5	4,5	4,8	4,8
		M20			- 2)	- 2)	- 2)	- 2)	- 2)	3,5	7,1	6,5 7,5	7,6	7,6
		M24			- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	11,1	11,1
	R90	M8			0,6	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)
		M10			0,6	1,0	- 2)	1,1	1,1	1,1	1,1	1,1	- 2)	- 2)
		M12			0,7	1,0	1,1	1,1	1,6	1,6	1,6	1,6	- 2)	- 2)
		M16			- 2)	1,4	1,2	2,0	2,9	2,5	3,0	3,0	3,3	3,3
		M20			- 2)	- 2)	- 2)	- 2)	- 2)	2,5	4,8	4,2 4,8	4,9	4,9
		M24			- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	7,3	7,3
	R120	M8			0,5	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)
		M10			0,5	0,8	- 2)	0,8	0,8	0,8	0,8	0,8	- 2)	- 2)
		M12			0,5	0,8	0,7	0,8	1,1	1,2	1,2	1,2	- 2)	- 2)
		M16			- 2)	1,0	1,0	1,2	1,6	2,1	2,3	2,3	2,6	2,6
		M20			- 2)	- 2)	- 2)	- 2)	- 2)	2,1	3,6	3,0 3,5	3,6	3,6
		M24			- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	- 2)	5,4	5,4
Partial factor			$\gamma_{M,s,fi}$ 1)	[-]	1,0									

1) In absence of other national regulations 2) No performance assessed

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Annex 12:

Table C20: Characteristic resistances under tension and shear load under fire exposure – concrete cone failure and min. axis distance of reinforcement

Anchor channel				28/15	38/17	41/22 40/25	40/22 40/22P	49/30	50/30 50/30P	54/33 52/34	55/42	72/49 72/48
Min. axis distance of reinforcement [1]												
Min. axis distance	R30	a	[mm]	35	35	35	35	35	35	50	50	50
	R60	a		35	35	35	35	35	35	50	50	50
	R90	a		45	45	45	45	45	45	50	50	50
	R120	a		60	60	60	60	60	60	65	70	70

[1] The reinforced concrete has to be designed acc. to EN 1992. The fire resistance class of the concrete member is not part of this ETA.

Fig. 1

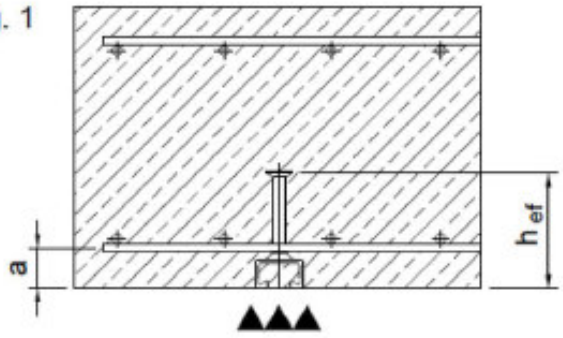

Fig. 2