

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-17/0728
of 7 June 2019

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

HALFEN Anchor Channel HZA-PS 53/34

Product family
to which the construction product belongs

Anchor channel

Manufacturer

HALFEN GmbH
Liebigstraße 14
40764 Langenfeld
DEUTSCHLAND

Manufacturing plant

Halfen Werke

This European Technical Assessment
contains

19 pages including 3 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 330008-03-0601

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Specific Part

1 Technical description of the product

The HALFEN Anchor Channel HZA-PS 53/34 is a system consisting of a C-shaped serrated channel profile of steel and at least two metal anchors non-detachably fixed on the channel back and HALFEN serrated channel bolts.

The anchor channel is embedded surface-flush in the concrete. Halfen serrated channel bolts 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 of anchor channel under tension load (static and quasi-static loading)	See Annex C1 to C2
Characteristic resistance of anchor channel under shear load perpendicular to the longitudinal axis of the channel (static and quasi-static loading)	See Annex C3 to C4
Characteristic resistance of anchor channel under shear load in the direction of the longitudinal axis of the channel (static and quasi-static loading)	See Annex C3
Characteristic resistance of anchor channel under combined tension and shear (static and quasi-static loading)	See Annex C4
Characteristic resistance of serrated channel bolt under tension and shear load (static and quasi-static loading)	See Annex C1 and C4
Displacements (static and quasi-static loading)	See Annex C2 to C3
Characteristic resistances under fatigue cyclic load	No performance determined

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Characteristic resistance to fire	No performance determined

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

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

The system to be applied is: 1

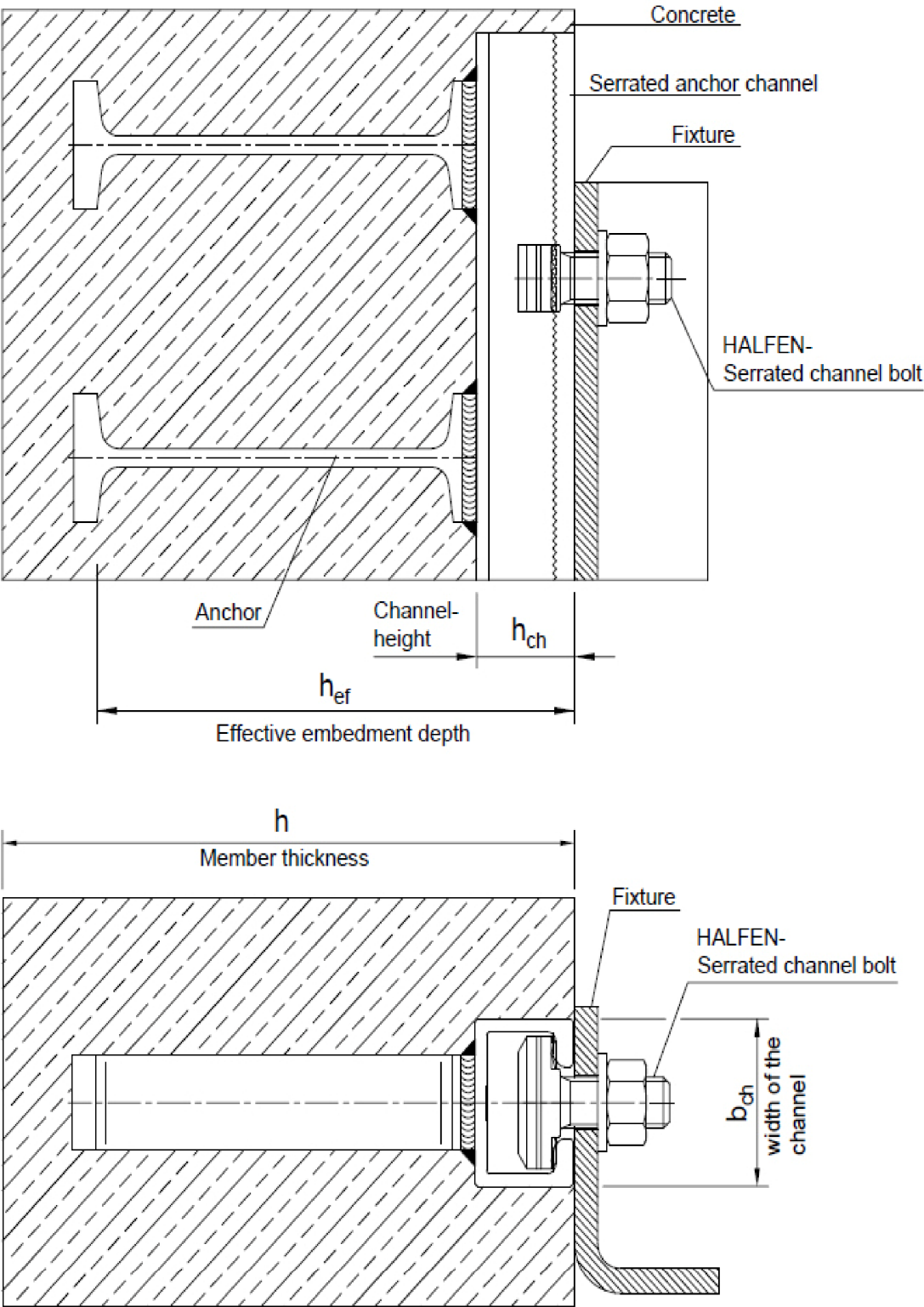
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

Issued in Berlin on 7 June 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Müller



HALFEN Anchor Channel HZA-PS 53/34	Annex A1
Product description Installed condition	

<div>Legend</div> <div><div><div>h_{ch}</div><div>Channel height</div></div><div><div>b_{ch}</div><div>Width of the channel</div></div><div><div>h_{ef}</div><div>effective embedment depth</div></div></div> <div><div><div>2</div><div>Weld-on anchor as I-profile</div></div><div><div>1</div><div>Serrated channel profile HZA-PS 53/34</div></div><div><div>3</div><div>HALFEN-Serrated channel bolt e.g. HZS 53/34 M16x60</div></div><div><div>4</div><div>Washer</div></div><div><div>5</div><div>Hexagonal Nut</div></div></div>																																																	
Table A0: Marking of anchor channel and serrated channel bolt																																																	
<table><tr><th colspan="2">HALFEN anchor channel</th><th colspan="2">HALFEN serrated channel bolt</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>a) Stamped on inner side of channel back</td><td>b) Printed on channel web</td><td></td><td></td></tr><tr><td>Marking</td><td>Meaning</td><td>Marking</td><td>Meaning</td></tr><tr><td colspan="2">General</td><td colspan="2"></td></tr><tr><td>"H" or "HALFEN"</td><td>Identifying mark of producer</td><td>"H" or "HALFEN"</td><td>Identifying mark of producer</td></tr><tr><td>"ZA"</td><td>Type of anchor channel</td><td>"8.8"</td><td>Strength grade</td></tr><tr><td>"PS 53/34"</td><td>Size</td><td></td><td></td></tr><tr><td colspan="2">Material steel</td><td colspan="2"></td></tr><tr><td>No marking</td><td>1.0044</td><td>No marking</td><td>Carbon steel or alloyed steel</td></tr><tr><td colspan="2">Finish</td><td colspan="2"></td></tr><tr><td>No marking</td><td>Hot-dip galvanized</td><td>No marking</td><td>Electroplated or hot-dip galv.</td></tr></table>		HALFEN anchor channel		HALFEN serrated channel bolt						a) Stamped on inner side of channel back	b) Printed on channel web			Marking	Meaning	Marking	Meaning	General				"H" or "HALFEN"	Identifying mark of producer	"H" or "HALFEN"	Identifying mark of producer	"ZA"	Type of anchor channel	"8.8"	Strength grade	"PS 53/34"	Size			Material steel				No marking	1.0044	No marking	Carbon steel or alloyed steel	Finish				No marking	Hot-dip galvanized	No marking	Electroplated or hot-dip galv.
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HALFEN Anchor Channel HZA-PS 53/34		Annex A2																																															
Product description Marking and materials																																																	

Table A1: Materials and intended use

Item no.	Specification	Intended use	
		1	2
		Dry internal conditions	Internal conditions with usual humidity
		Anchor channels may only be used in structures subject to dry internal conditions <i>(e.g. accommodations, bureaus, schools, hospitals, shops, exceptional internal conditions with usual humidity acc. column 2)</i>	Anchor channels may also be used in structures subject to internal conditions with usual humidity <i>(e.g. kitchen, bath and laundry in residential buildings, exceptional permanent damp conditions and application under water)</i>
		Materials	
①	Serrated channel profile	Steel 1.0044(A) hot-dip galvanized ≥ 55 μm ⁴⁾	Steel 1.0044(A) hot-dip galvanized ≥ 55 μm ⁴⁾
②	Anchor	Steel 1.0045(A) hot-dip galvanized ≥ 55 μm ⁴⁾	Steel 1.0045(A) hot-dip galvanized ≥ 55 μm ⁴⁾
③	HALFEN serrated channel bolts	Steel strength grade 8.8 EN ISO 898-1:2013 hot-dip galvanized ≥ 50 μm ^{1) 3)}	Steel strength grade 8.8 EN ISO 898-1:2013 hot-dip galvanized ≥ 50 μm ^{1) 3)}
④	Washer ⁵⁾ EN ISO 7089:2000 and EN ISO 7093-1:2000 production class A 200 HV	Steel electroplated ≥ 5 μm ²⁾	Steel hot-dip galvanized ≥ 50 μm ^{1) 3)}
⑤	Hexagonal nuts EN ISO 4032:2012	Steel strength grade 8 EN ISO 898-2:2012 electroplated ≥ 5 μm ²⁾	Steel strength grade 8 EN ISO 898-2:2012 hot-dip galvanized ≥ 50 μm ^{1) 3)}

¹⁾ or electroplated with special coating $\geq 12 \mu\text{m}$

(A) acc. EN 10025-2:2004

²⁾ electroplated acc. to EN ISO 4042:1999

³⁾ hot-dip-galvanized acc. to EN ISO 10684:2004 + AC2009

⁴⁾ hot-dip-galvanized acc. to EN ISO 1461:2009

⁵⁾ not included in scope of delivery

HALFEN Anchor Channel HZA-PS 53/34

Product description
Material and intended use

Annex A3

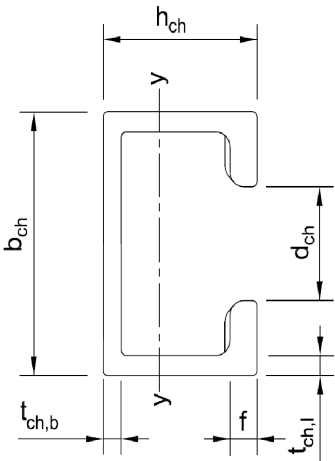


Table A2: Profile dimensions

Anchor channel	Dimensions						I _y
	b _{ch}	h _{ch}	t _{ch,b}	t _{ch,l}	d _{ch}	f	
	[mm]						[mm ⁴]
PS 53/34	52,5	34	4,0	4,0	22,5	6,0	92600

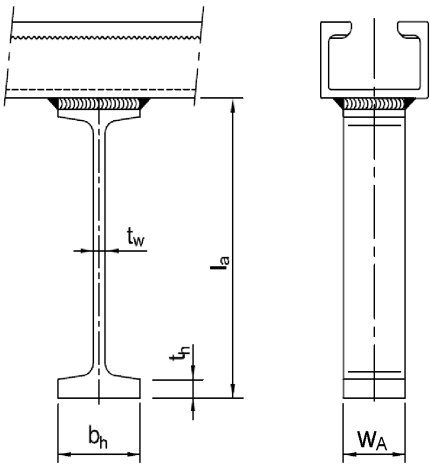


Table A3: Dimensions of anchor

Anchor channel	I-Anchor					
	min l_a	t_w	b_h	t_h	w_A	A_h
	[mm]					[mm ²]
PS 53/34	140	5,7	40	8	30 - 40	1029

HALFEN Anchor Channel HZA-PS 53/34

Product description
Profile dimensions and dimensions of anchor

Annex A4

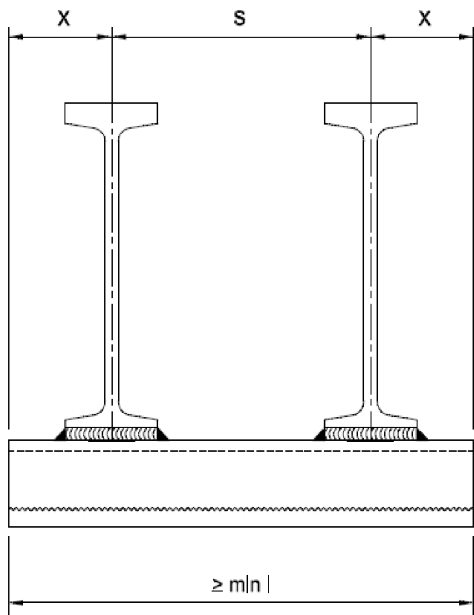


Table A4: Anchor positioning

Anchor channel	Anchor spacing		End spacing	Min. channel length
	s_{min}	s_{max}	x	l_{min}
	[mm]			
PS 53/34	80	250	35	150

HALFEN Anchor Channel HZA-PS 53/34

Product description
Anchor positioning and channel length

Annex A5

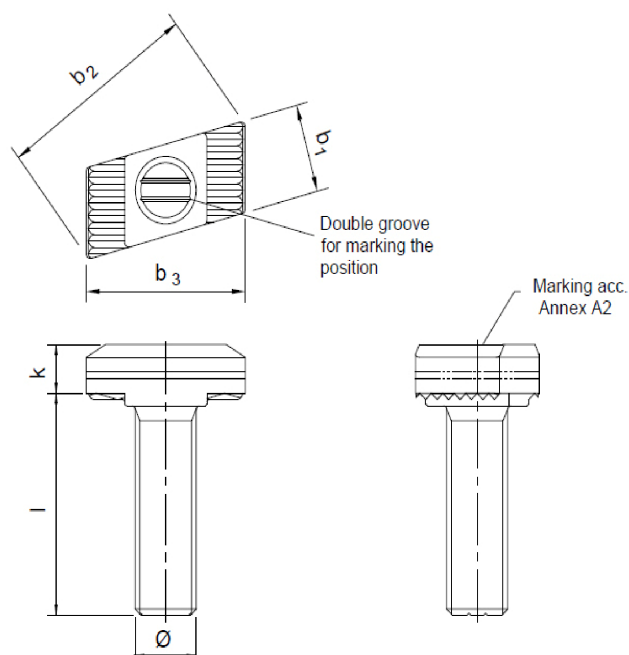


Table A5: Dimensions of HALFEN serrated channel bolt

HZS	Diameter	Dimensions			
		Width	Diagonal	Length	Thickness
		b_1	b_2	b_3	k
		[mm]	[mm]	[mm]	[mm]
53/34	M16	21,0	51,6	41,6	11,5
	M20	21,0	51,6	41,6	13,0

Table A6: Strength grade

	Steel ¹⁾
Strength grade	8.8
f_{uk} [N/mm ²]	800
f_{yk} [N/mm ²]	640
Finish	Hot-dip galvanized or electroplated

¹⁾ Materials according Annex A2, Tab. A0 and Annex A3, Tab. A1

HALFEN Anchor Channel HZA-PS 53/34

Product description
HALFEN serrated channel bolt, dimensions, strength grade

Annex A6

Specifications for intended use

Serrated anchor channels and serrated channel bolts subject to:

- Static and quasi-static loads in tension, shear perpendicular to the longitudinal axis of the channel and shear in the direction of the longitudinal axis of the channel

Base materials:

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

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (e.g. accommodations, bureaus, schools, hospitals, shops, exceptional internal conditions with usual humidity)
(serrated anchor channels and serrated channel bolts according to Annex A3, Table A1, column 1 - 2)
- 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)
(serrated anchor channels and serrated channel bolts according to Annex A3, Table A1, column 2)

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 serrated 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 the anchor channels are designed in accordance with EOTA TR 047 "Design of Anchor Channels", March 2018 or EN 1992-4:2018.
- The characteristic resistances are calculated with the minimum effective embedment depth.

Installation:

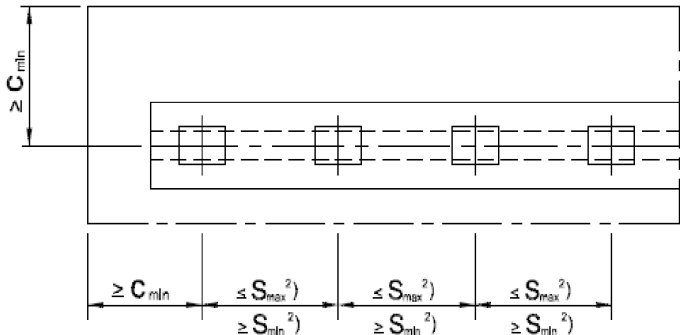
- The installation of anchor channels is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the anchor channels only as supplied by the manufacturer – without any manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex A5, Table A4 are generated including end spacing and minimum channel length and only to be used in dry internal conditions (Annex A3, Table A1, column 1).
- Installation in accordance with the installation instruction given in Annexes B4 and B5.
- The anchor channels are fixed on the formwork, reinforcement or auxiliary construction such that no movement of the anchor 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 anchor channels are protected from penetration of concrete into the internal space of the channel profiles.
- Washer may be chosen according to Annex A3 and provided separately by the user.
- Orientating the serrated channel bolt (groove mark according to Annex B5) rectangular to the channel axis.
- The required installation torque given in Annex B3 must be applied and must not be exceeded.

HALFEN Anchor Channel HZA-PS 53/34

Intended use
Specifications

Annex B1

Plan view



Side view

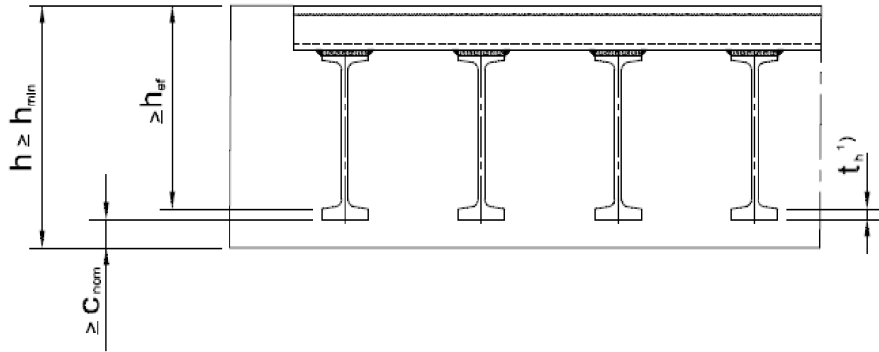


Table B1: Effective embedment depth, edge distance and thickness of concrete member

Anchor channel			PS 53/34
Minimum effective embedment depth	[mm]	$h_{ef,min}$	166
Minimum edge distance		c_{min}	100
Minimum thickness of concrete member		h_{min}	$h_{ef} + t_h + c_{nom}^{3)}$ 190

¹⁾ t_h = Anchor head thickness

²⁾ s_{min}, s_{max} acc. to Annex A5, Tab. A4

³⁾ c_{nom} acc. to EN 1992-1-1 :2004 + AC 2010

HALFEN Anchor Channel HZA-PS 53/34

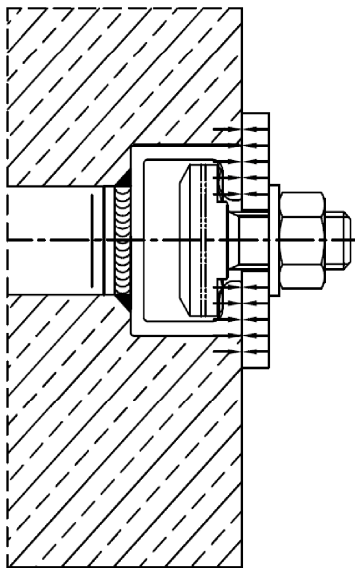
Intended use
Installation parameters of anchor channels

Annex B2

General

The fixture is in contact with the channel profile and the concrete surface.
The installation torque according to Annex B3, Table B2 shall be applied and must not be exceeded.

Fig. 1



Steel – Steel contact

The fixture is not in contact with the concrete surface. The fixture is fastened to the anchor channel by suitable steel parts (e.g. washer).
The installation torque according to Annex B3, Table B2 shall be applied and must not be exceeded.

Fig. 2

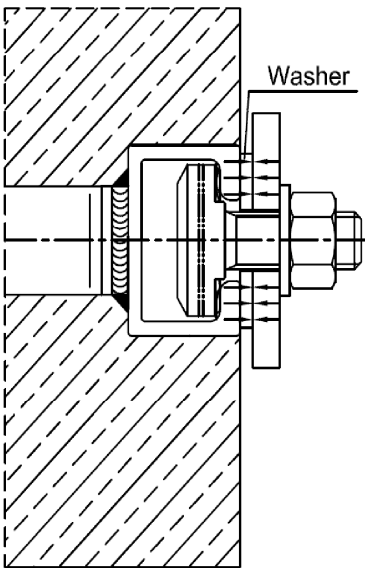


Table B2: Minimum spacing and installation torque of HALFEN serrated channel bolt

Serrated anchor channel	HALFEN serrated channel bolts Ø	Min. spacing $s_{min,cbo}$ of the serrated channel bolts	Installation torque $T_{inst}^{3)}$	
			General ¹⁾	Steel – Steel contact ²⁾
			Steel 8.8	Steel 8.8
			[Nm]	[Nm]
PS 53/34	16	80	185	185
	20	100	235	360

¹⁾ According to figure 1

²⁾ According to figure 2

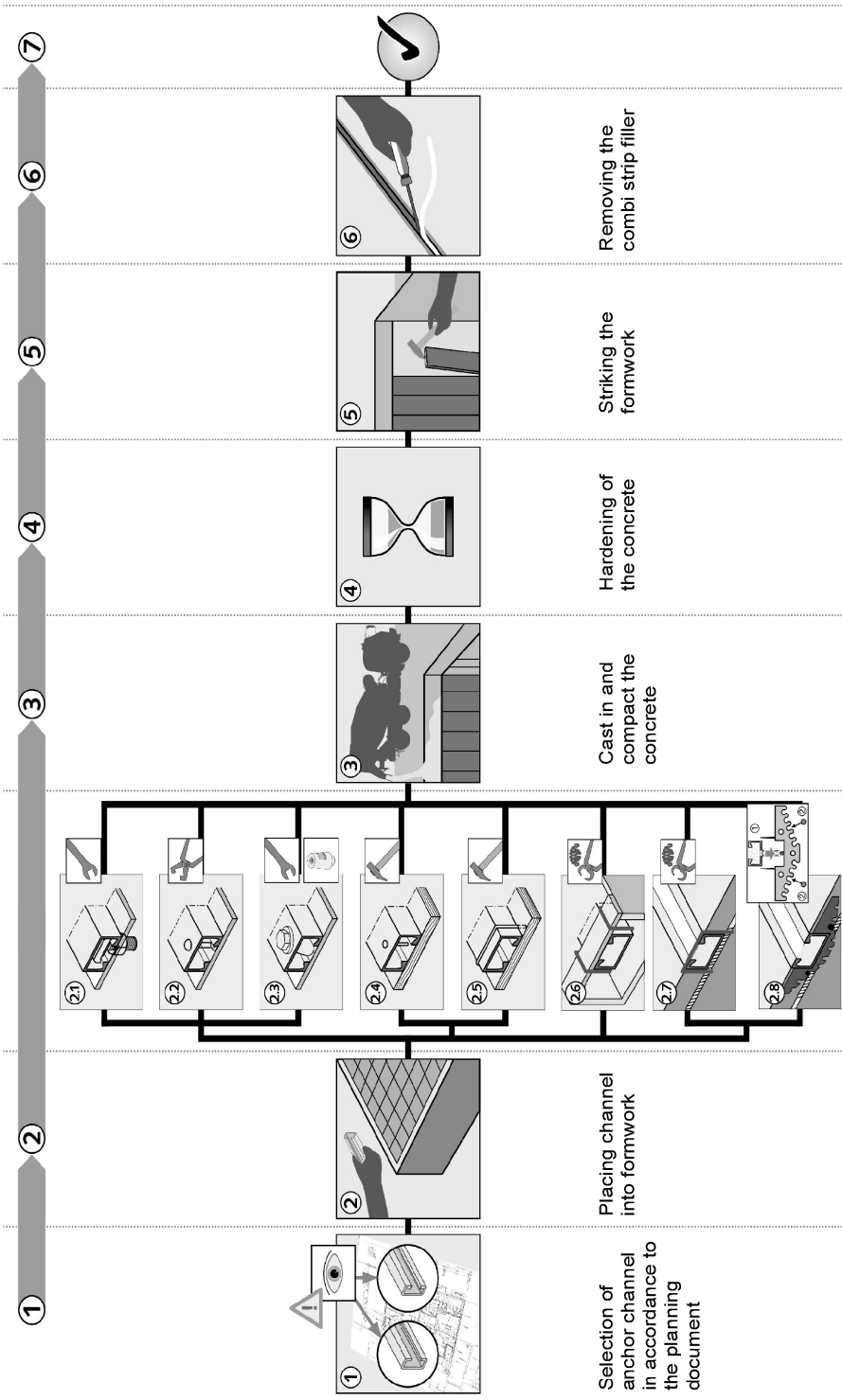
³⁾ T_{inst} must not be exceeded.

HALFEN Anchor Channel HZA-PS 53/34

Intended use
Installation parameters of HALFEN serrated channel bolt

Annex B3

Installation of anchor channel



- 2.1 Steel formwork: Fixing with HALFEN serrated channel bolts through formwork penetration
- 2.2 Steel formwork: Fixing with rivets
- 2.3 Steel formwork: Fixing with HALFEN Fixing cone
- 2.4 Timber formwork: Fixing with nails
- 2.5 Timber formwork: Fixing with staples
- 2.6 Fixing in the top surface of concrete: Fixing by using auxiliary construction
- 2.7 Fixing in the top surface of concrete: Fixing from above directly to the reinforcement
- 2.8 Fixing in the top surface of concrete: Fixing from above to the reinforcement, using the HALFEN ChanClip

HALFEN Anchor Channel HZA-PS 53/34

Intended use
Installation instruction of serrated anchor channel

Annex B4

Installation of HALFEN serrated channel bolt

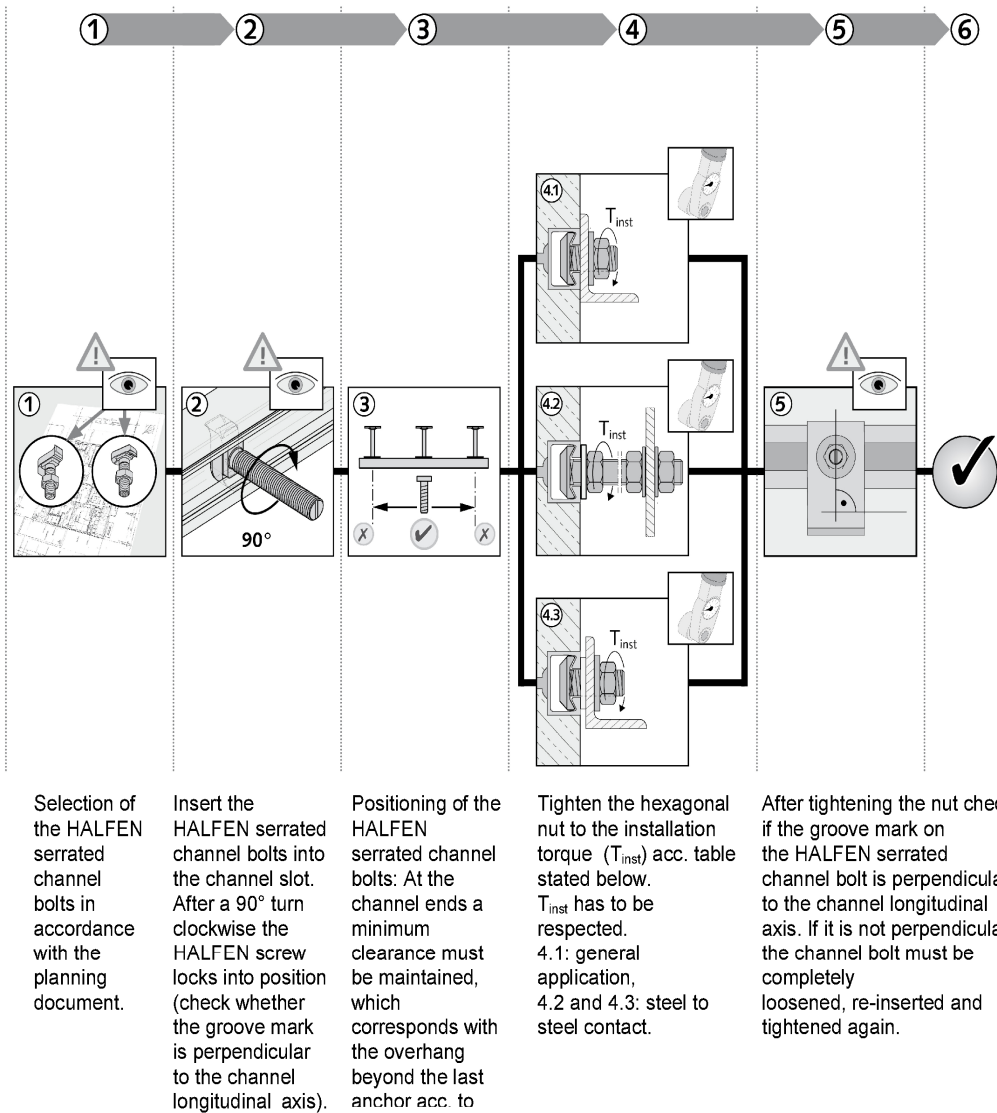


Table B3: Installation torque

Pos. of fixture acc. to annex B3	Material Strength grade		Anchor channel	T_{inst} [Nm] ¹⁾	
				M16	M20
General	Steel	8.8	PS 53/34	185	235
Steel – Steel contact	Steel	8.8	PS 53/34	185	360

¹⁾ T_{inst} has to be respected.

HALFEN Anchor Channel HZA-PS 53/34

Intended use
Installation instruction of HALFEN serrated channel bolt

Annex B5

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

Anchor channel			PS 53/34
Steel failure, anchor			
Characteristic resistance	$N_{Rk,s,a}$	[kN]	80,3
Partial safety factor	$\gamma_{Ms,a}^{1)}$		1,59
Steel failure, connection channel / anchor			
Characteristic resistance	$N_{Rk,s,c}$	[kN]	113,4
Partial safety factor	$\gamma_{Ms,c}^{1)}$		1,8
Steel failure, local flexure of the channel lips			
Spacing of serrated channel bolts for $N_{Rk,s,l}^0$	$S_{l,N}$	[mm]	105
Characteristic resistance	$N_{Rk,s,l}^0$	[kN]	78,7
Partial safety factor	$\gamma_{Ms,l}^{1)}$		1,8

¹⁾ In absence of other national regulations

Table C2: Characteristic flexure resistance of channel

Anchor channel				PS 53/34
Characteristic flexure resistance of channel	$M_{Rk,s,flex}$	[Nm]	Steel	4069
Partial safety factor	$\gamma_{Ms,flex}^{1)}$			1,15

¹⁾ In absence of other national regulations

Table C3: Charact. resistance under tension load – steel failure of HALFEN serrated channel bolt

HALFEN serrated channel bolt Ø				M16	M20
Steel failure					
Characteristic resistance	$N_{Rk,s}$	[kN]	8.8	125,6	196,0
Partial safety factor	$\gamma_{Ms}^{1)}$		8.8	1,50	

²⁾ In absence of other national regulations

HALFEN Anchor Channel HZA-PS 53/34

Performance
Charact. resistances under tension load – steel failure

Annex C1

Table C4: Characteristic resistances under tension load – concrete failure

Anchor channel			PS 53/34	
Pull-out failure				
Characteristic resistance in cracked concrete C12/15		N _{Rk,p}	[kN]	92,6
Characteristic resistance in uncracked concrete C12/15				129,6
Increasing factor for N _{Rk,p}	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 safety factor		γ _{Mp} = γ _{Mc} ¹⁾		1,5
Concrete cone failure				
Product factor k ₁		k _{cr,N}		8,8
		k _{ucr,N}		12,5
Characteristic edge distance		c _{cr,N}	[mm]	266
Characteristic spacing		s _{cr,N}		2,0 c _{cr,N}
Partial safety factor		γ _{Mc} ¹⁾		1,5
Splitting failure				
Characteristic edge distance		c _{cr,sp}	[mm]	498
Characteristic spacing		s _{cr,sp}		2,0 c _{cr,sp}
Partial safety factor		γ _{Msp} ¹⁾		1,5

¹⁾ In absence of other national regulations

Table C5: Displacements under tension load

Anchor channel			PS 53/34
Tension load	N_{Ek}	[kN]	31,2
Short time displacement	δ_{N0}	[mm]	1,5
Long time displacement	$\delta_{N\infty}$	[mm]	3,0

HALFEN Anchor Channel HZA-PS 53/34

Performance
Characteristic resistance under tension load – concrete failure and displacements

Annex C2

Table C6: Characteristic resistances under shear

Anchor channel			PS 53/34
Steel failure, anchor			
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	78,7
Partial safety factor	$\gamma_{Ms,a,y}^{1)}$		1,56
Characteristic resistance	$V_{Rk,s,a,x}$	[kN]	48,2
Partial safety factor	$\gamma_{Ms,a,x}^{1)}$		1,32
Steel failure, connection channel / anchor			
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	78,7
	$V_{Rk,s,c,x}$	[kN]	68,0
Partial safety factor	$\gamma_{Ms,c,y} , \gamma_{Ms,c,x}^{1)}$		1,8
Steel failure, local flexure of channel lips			
Spacing of serrated channel bolt for $V_{Rk,s,l}$	$s_{l,v}$	[mm]	105
Characteristic resistance	$V_{Rk,s,l,y}^0$	[kN]	78,7
Partial safety factor	$\gamma_{Ms,l,y}^{1)}$		1,8
Characteristic resistance	$V_{Rk,s,l,x}$	[kN]	59,0
Installation factor	γ_{inst}		1,2
Pry-out failure			
Product factor	$k_8^{2)}$		2,0
Partial safety factor	$\gamma_{Mc}^{1)}$		1,5
Concrete edge failure			
Product factor k_{12}	Cracked concrete	$k_{cr,v}$	7,5
	Uncracked concrete	$k_{ucr,v}$	10,5
Partial safety factor	$\gamma_{Mc}^{1)}$		1,5

¹⁾ In absence of other national regulations

²⁾ Without supplementary reinforcement. In case of supplementary reinforcement factor k_8 should be multiplied by 0,75.

Table C7: Displacements under shear load

Anchor channel			PS 53/34
Shear load	V_{Ek}	[kN]	31,2
Short time displacement	δ_{v0}	[mm]	0,9
Long time displacement	$\delta_{v\infty}$	[mm]	1,4

HALFEN Anchor Channel HZA-PS 53/34

Performance
Char. resistances and displacements under shear load

Annex C3

Table C8: Characteristic resist. under shear load – steel failure of HALFEN serrated channel bolt

HALFEN serrated channel bolt Ø				M16	M20
Steel failure					
Characteristic resistance	$V_{Rk,s}$	[kN]	8.8	62,8	98,0
Characteristic flexure resistance	$M^0_{Rk,s}$	[Nm]	8.8	266	519
Partial safety factor	γ_{Ms}	¹⁾	8.8	1,25	

¹⁾ In absence of other national regulations

Table C9: Characteristic resistance under combined tension and shear load

Anchor channel		PS 53/34 ¹⁾
Steel failure: Local failure by flexure of channel lips and failure by flexure of channel		
Product factor	k_{13}	2,0
Steel failure: Failure of anchor and connection between anchor and channel		
Product factor	k_{14}	2,0

¹⁾ Design according EN 1992-4:2018

HALFEN Anchor Channel HZA-PS 53/34

Performance
Char. resist. of HALFEN serr. channel bolt under shear, comb. tension and shear load

Annex C4