

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-13/0537
of 4 September 2018

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

Yuanda anchor channel

Product family
to which the construction product belongs

Cast-in anchor channels

Manufacturer

Yuanda Europe Ltd.
Uferstrasse 90
4057 BASEL
SCHWEIZ

Manufacturing plant

Yuanda Werk 1

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 330008-02-0601

This version replaces

ETA-13/0537 issued on 26 June 2013

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This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No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 Yuanda anchor channel with channel bolts is a system consisting of C-shaped channel profile of carbon 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 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 to tension load (static and quasi-static loading)	see Annex C1 to C2
Characteristic resistance to shear load (static and quasi-static loading)	see Annex C2 to C3
Displacements (static and quasi-static loading)	see Annex C2 to C3
Characteristic resistance under fatigue cyclic loads (tension)	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

English translation prepared by DIBt

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

In accordance with EAD No. 330008-02-0601, 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

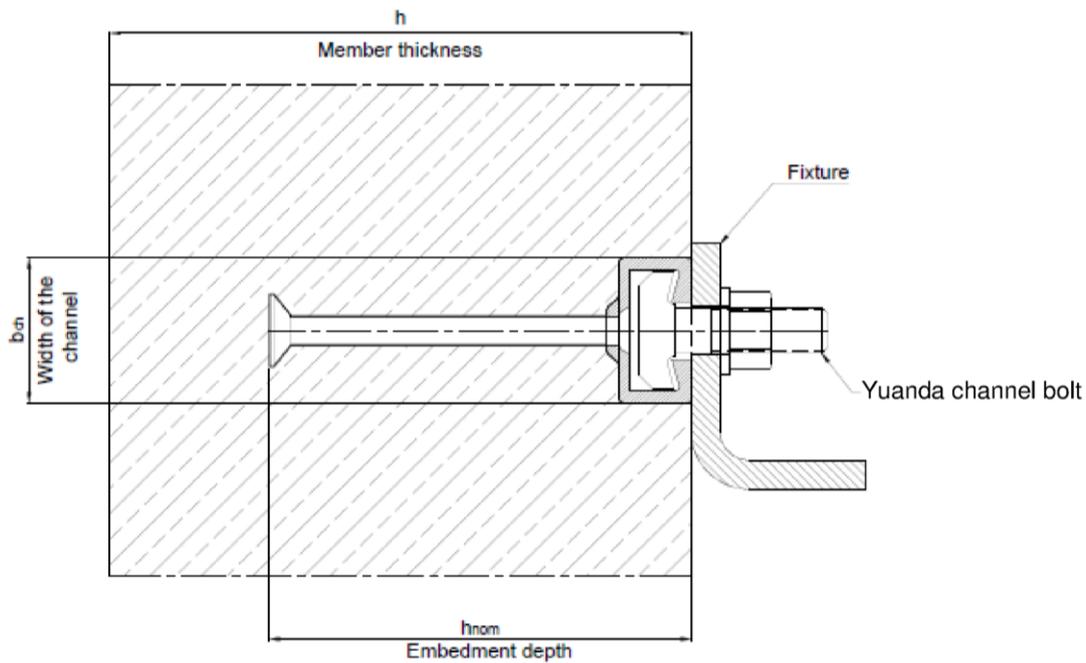
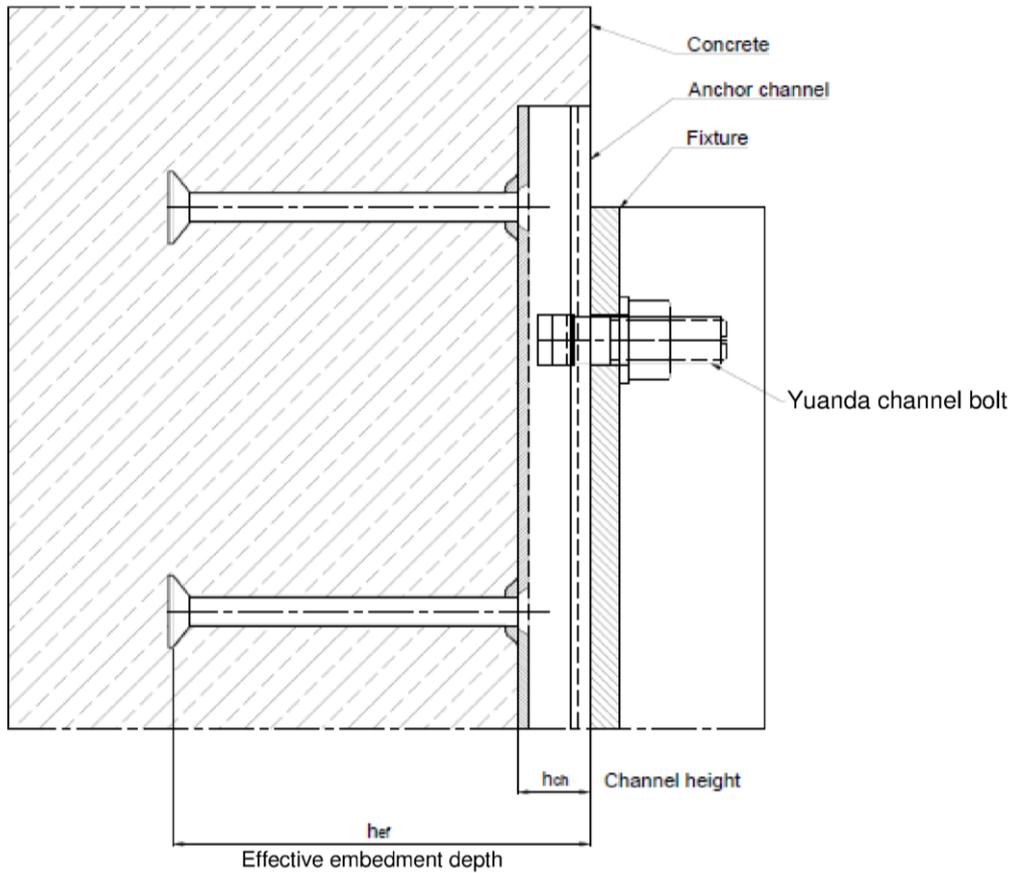
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin 4 September 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Lange

Product and installation condition



Yuanda anchor channels with channel bolts

Product description
Installed condition

Annex A1

Anchor channel, hot-rolled profile

Fig. 1: Standard version

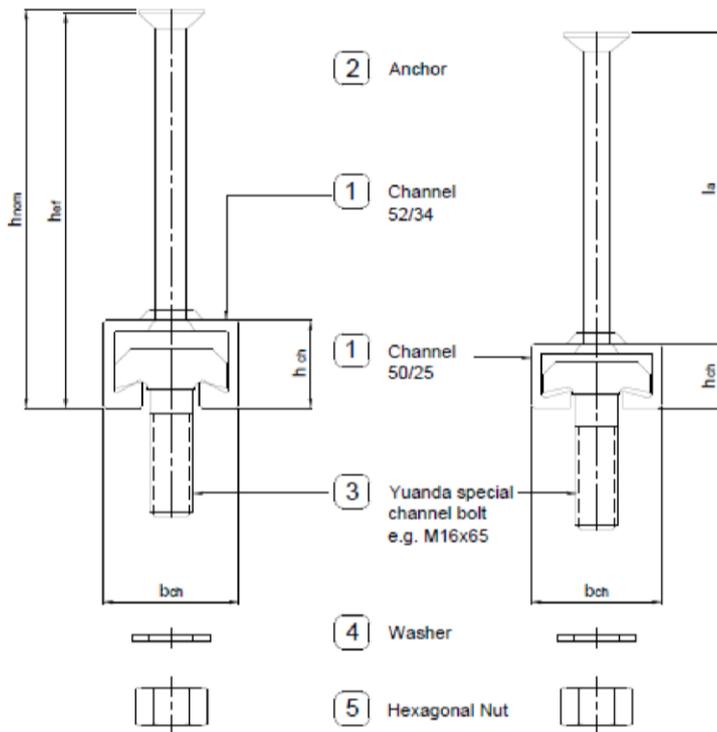
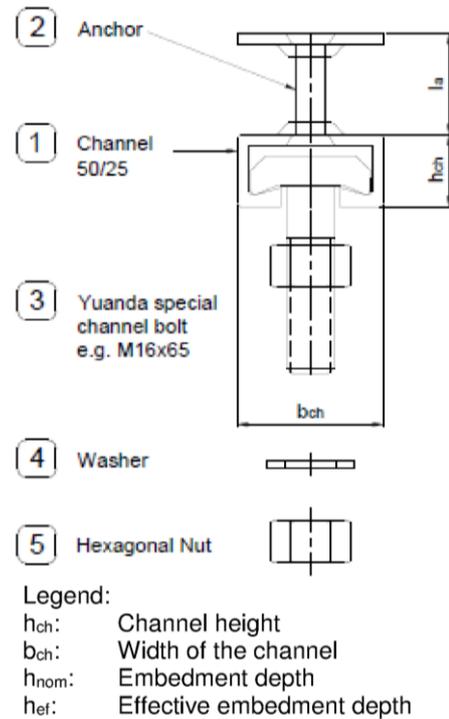
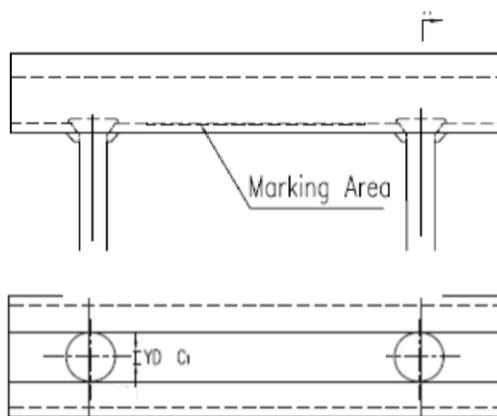


Fig. 2: Ski assembled version

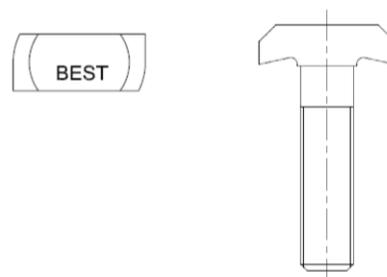


Marking of the YUANDA anchor channel, e.g. YD C1



YD: Identifying mark of the producer
C1: Size and type of channel
Size and type of channels:
C1: YDCH-50/25/350-S
C2: YDCH-52/34/350-S
C3: YDCH-50/25/350-SK
S = standard version
SK = ski assembled version

Marking of the YUANDA- channel bolt, e.g. BEST 8.8 GV



8.8 strength grade
BEST Identifying mark of the producer
GV type of coating
Type of coating:
GV electroplated $\geq 5\mu\text{m}$
HV hot-dip-galvanized $\geq 50\mu\text{m}$

Yuanda anchor channels with channel bolts

Product description

Anchor channel types and marking

Annex A2

Anchor channels

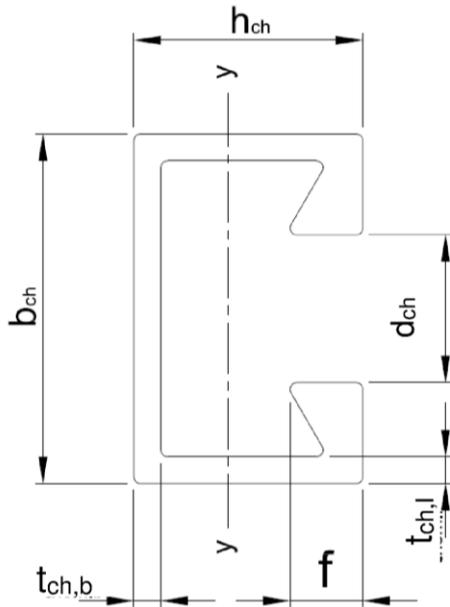


Table 1: Dimensions of profiles

Anchor channel	Dimensions						Material	I_y
	b_{ch}	h_{ch}	$t_{ch,b}$	$t_{ch,l}$	d_{ch}	f		
	[mm]							[mm ⁴]
50/25	50	25	4,0	4,0	20,0	8,0	Steel	38772
52/34	52	34	4,0	4,0	21,0	10,0		95264

Yuanda anchor channels with channel bolts

Product description
Anchor channels

Annex A3

Fig. 3: Anchor for Standard version

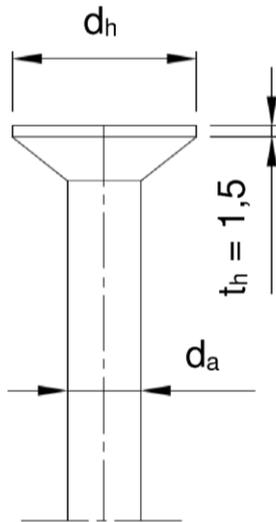


Fig. 4: Anchor for Ski assembled version
(cross-section)

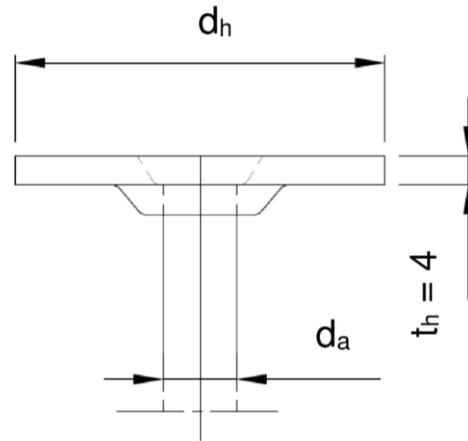


Fig. 5: Anchor for Ski assembled version
(top view)

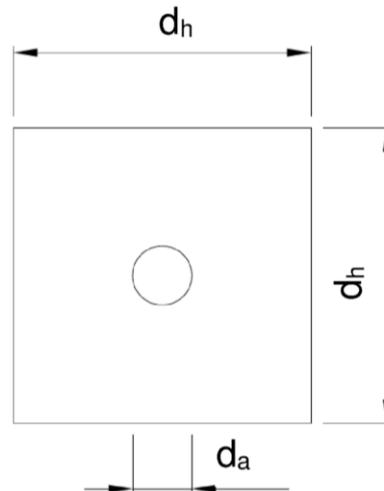


Table 2: Dimensions of the anchor

Anchor channel	Figure	Shaft Ø d _a	Head Ø d _h / □ d _h	l _a (see Fig. 1 and 2)	A _h
[-]	[-]	[mm]	[mm]	[mm]	[mm ²]
50/25	3	10	25 (Ø)	120	412,3
52/34		12	25 (Ø)	120	377,8
50/25	4	10	50 (□)	51	1885,0

Yuanda anchor channels with channel bolts

Product description
Types of anchors

Annex A4

Fig. 6: Standard version

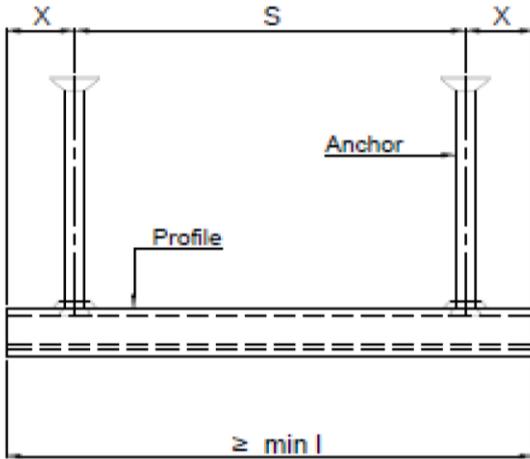


Fig. 7: Ski assembled version

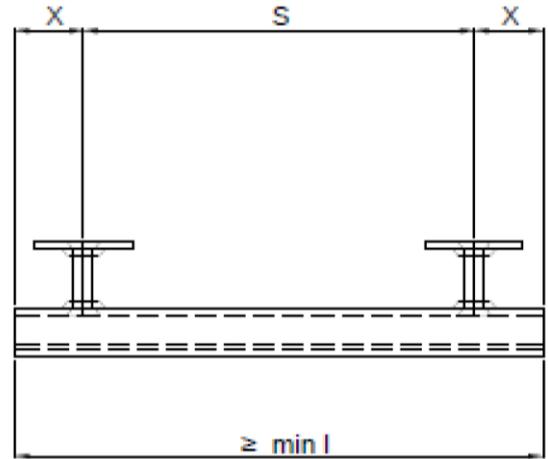


Table 3: Minimum and maximum spacing, end distance and minimum channel length

Anchor channel		Figure	Anchor spacing		End distance	minimum channel length
			S _{min}	S _{max}	x	min l
[mm]						
50/25	standard version	6	140	140	35	210
52/34			140	140	35	210
50/25	ski-assembled version	7	93	93	35	163

Yuanda anchor channels with channel bolts

Product description
Anchor positioning

Annex A5

Channel bolts

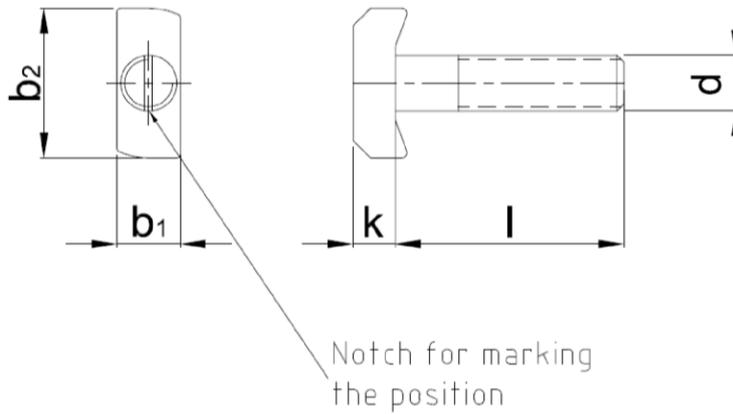


Table 4: Dimensions of the channel bolt

Anchor channel	Annex A2, Figure	Channel bolt d	Width b ₁	Length b ₂	Thickness of head k	Length of shaft l	
		[mm]					
50/25	standard version	1	16	18,0	41,0	10,0	55-100
52/34			16	18,0	43,0	13,0	55-100
50/25	ski-assembled version	2	16	18,0	41,0	10,0	55-100

Table 5: Material properties of channel bolt

Channel bolt	Steel grade 8.8
f _{uk} [N/mm ²]	800
f _{yk} [N/mm ²]	640

Marking of the channel bolt according to Annex A2

Yuanda anchor channels with channel bolts

Product description

Dimensions and material for channel bolts

Annex A6

Materials

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 (e.g. accommodations, bureaux, schools, hospitals, shops, exceptional internal conditions with usual humidity acc. column 2)	Anchor channels may also be used in 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)
Materials			
1	Channel profile	Steel Q235 ¹⁾ acc. to GB/T 700 – 2006 hot-dip galv. $\geq 100\mu\text{m}$	Steel Q235 ¹⁾ acc. to GB/T 700 – 2006 hot-dip galv. $\geq 100\mu\text{m}$
2	Anchor	Steel Q235 ¹⁾ acc. to GB/T 700 – 2006, GB/T 14981-2009 hot-dip galv. $\geq 100\mu\text{m}$	Steel Q235 ¹⁾ acc. to GB/T 700 – 2006 GB/T 14981-2009 hot-dip galv. $\geq 100\mu\text{m}$
3	Channel bolts with shaft and thread according to EN ISO 4018	strength grade 8.8 acc. to EN ISO 898-1 electroplated $\geq 5\mu\text{m}$	strength grade 8.8 acc. to EN ISO 898-1 hot-dip galv. $\geq 50\mu\text{m}$
4	Washer according DIN 125	Referring to EN 10025 electroplated $\geq 5\mu\text{m}$	Referring to EN 10025 hot-dip galv. $\geq 50\mu\text{m}$
5	Hexagonal nuts according DIN 934	strength grade 8.8 acc. to EN ISO 20898-2 electroplated $\geq 5\mu\text{m}$	strength grade 8.8 acc. to EN ISO 20898-2 hot-dip galv. $\geq 50\mu\text{m}$

1) for profile 50/25: $f_{yk}=240\text{ N/mm}^2$, $f_{uk}=360\text{ N/mm}^2$; for profile 52/34: $f_{yk}=380\text{ N/mm}^2$, $f_{uk}=550\text{ N/mm}^2$

Yuanda anchor channels with channel bolts

Product description
Materials and intended use

Annex A7

Specification of intended use

Anchor channels and channel bolts subject to:

- Static and quasi-static loads in tension and shear perpendicular to 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, shos, exceptional internal conditions with usual humidity)
(anchor channels and channel bolts acc. to Annex A7, column 1 and 2).
- Structures subject to internal conditions with usual humidity (e.g. kitchen, batch and laundry in residential buildings, exceptional permanent damp conditions and application under water)
(anchor channels and channel bolts acc. to Annex A7, 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 channel bolt are indicated on the design drawings (e. g. position of the anchor channel relative to reinforcement or to supports, etc.).
- For static and quasi-static loading the anchor channels are designed in accordance with EOTA TR 047 “Calculation Method for the Performance of Anchor Channels” or FprEN 1992-4:2016.

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.
- 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 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 are properly compacted. The channels are protected from penetration of concrete into the internal space of the channels.
- Washer may be chosen according to Annex A7 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex B5) rectangular to the channel axis.
- The required installation torques given in Annex A3, Table B3 must be applied and must not be exceeded.

Yuanda anchor channels with channel bolts

Intended use
Specifications

Annex B1

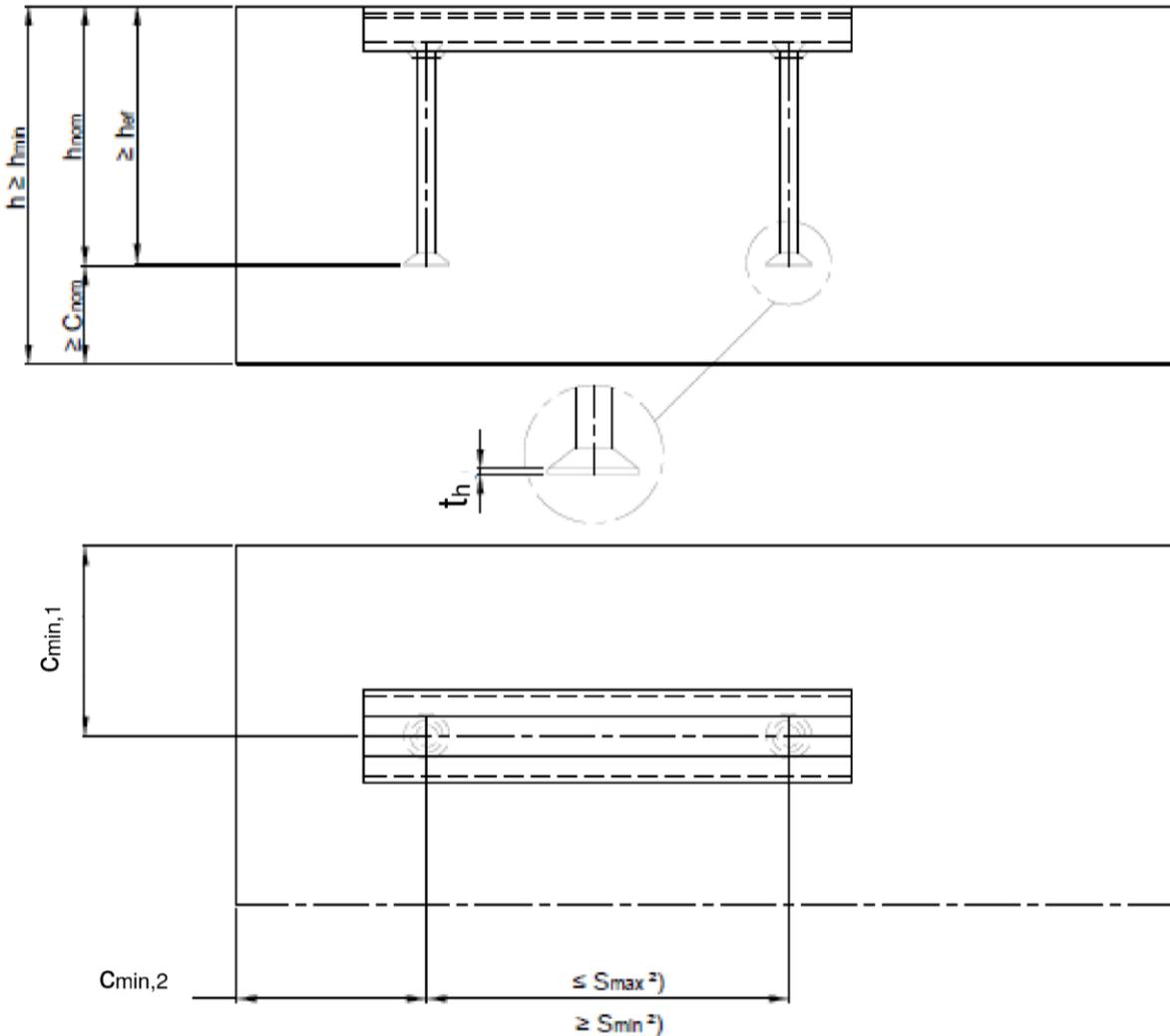


Table 6: Minimum effective embedment, edge distances and member thicknesses

Anchor channel			50/25 standard version	52/34 standard version	50/25 ski-assembled version
Annex A2, Fig.			1		2
min. effective embedment depth	$h_{ef,min}$	[mm]	138	147	72
min. edge distance	$C_{min,1}$		110	110	110
min. edge distance	$C_{min,2}$		60	60	60
min. allowed thickness of concrete member	h_{min}		180	180	90
			$h_{ef} + t_h^{1)} + C_{nom}^{3)}$		

- 1) t_h = Thickness of anchor head
- 2) S_{min} , S_{max} according to Annex A5, Table 3
- 3) C_{nom} according to EN 1992-1-1 and $C_{nom} \geq 30$ mm

Yuanda anchor channels with channel bolts

Intended use
Installation parameters of the anchor channels

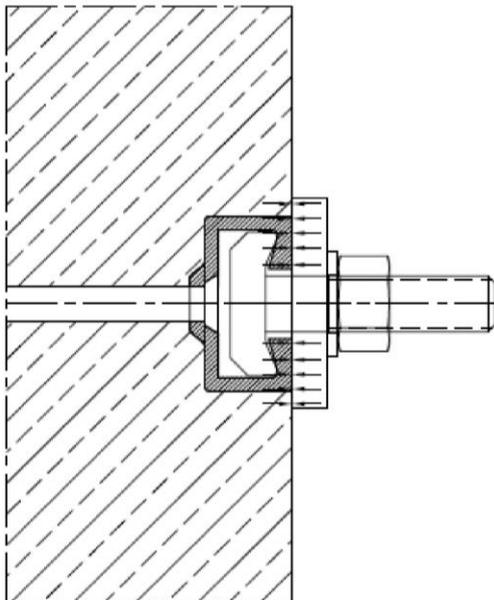
Annex B2

Table 7: Minimum spacing and installation torque of the channel bolts

Anchor channel	Channel bolt \varnothing	Min. spacing $s_{cb,o,min}$ of the channel bolt	Installation torque $T_{inst}^{3)}$		
			General application ¹⁾	Steel-steel contact ²⁾	
	[mm]	[mm]	[Nm]		
50/25	standard version	16	80	60	200
52/34		16	80	60	200
50/25	ski-assembled version	16	80	60	200

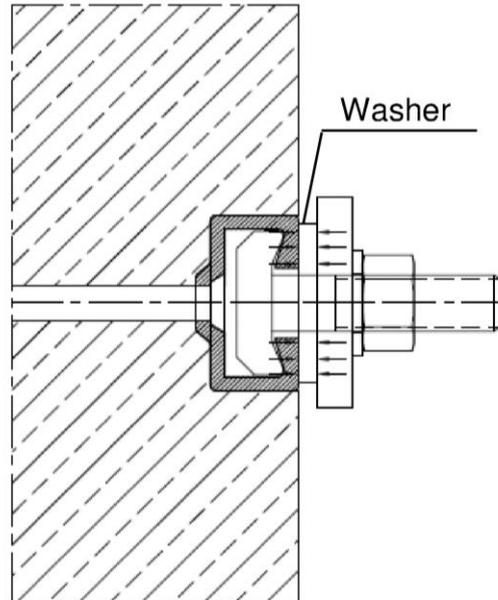
- 1) according to Fig. 8
- 2) according to Fig. 9
- 3) T_{inst} must not exceeded

Fig. 8: General application



The fixture is in contact with the channel profile and the concrete surface. The installation torque T_{inst} according to Table 7, shall be applied and must not be exceeded.

Fig. 9: Steel-steel contact



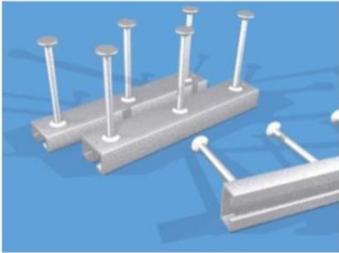
The fixture is fastened to the anchor channel by a suitable steel part (e.g. washer). The installation torque T_{inst} according to Table 7, shall be applied and must not be exceeded.

Yuanda anchor channels with channel bolts

Intended use
Installation parameters for channel bolts

Annex B3

1)



Selection of anchor channel according to planning documents.

2a)



Fixing of the anchor channel to timber formwork with nails through the prefabricated holes in the back of the anchor channel

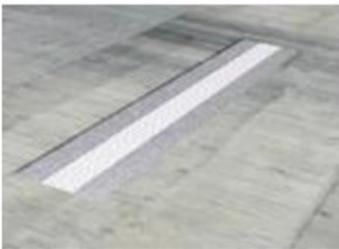
or

2b)



Fixing of the anchor channel from above directly to the reinforcement, attach the channel by wire binding

3)



During casting the concrete has to be compacted properly around the channel and the anchors

4)



Removing the foam filler with a hammer or a hook

Yuanda anchor channels with channel bolts

Intended use
Installation instructions (Part 1)

Annex B4

5)



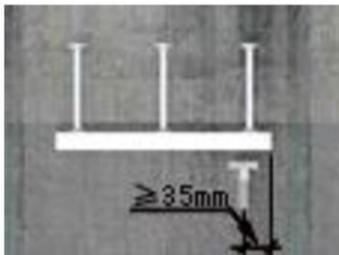
Selection of the channel bolt

6)



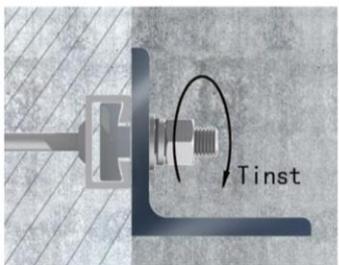
Insert the channel bolt into the slot of the channel. After a 90° turn clockwise, the head of channel bolt locks into the channel.

7)



Positioning of the channel bolt: at the channel ends a minimum clearance must be maintained ($\geq 35\text{mm}$)

8)

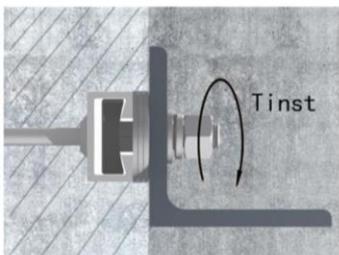


Tighten the hexagonal nut to the installation torque T_{inst} .

1. General application according Annex B3, Fig. 8: $T_{\text{inst}} = 60\text{Nm}$
2. Steel to steel contact according Annex B3, Fig. 9: $T_{\text{inst}} = 200\text{Nm}$

The installation torque must not be exceeded.

9)



If the anchor channel is embedded below the concrete surface, use washers.

($T_{\text{inst}} = 200\text{Nm}$)

The installation torque must not be exceeded.

Yuanda anchor channels with channel bolts

Intended use
Installation instructions (Part 1)

Annex B5

Table 8: Characteristic resistances under tension load – steel failure anchor channel

Anchor channel			50/25 Standard version	52/34 Standard version	50/25 Version „Ski-as- sembled“
Steel failure, anchor					
Characteristic re- sistance	$N_{Rk,s,a}$	[kN]	28,3	40,7	28,3
Partial factor	$\gamma_{Ms}^{1)}$		1,8		
Steel failure, connection between anchor and channel					
Characteristic re- sistance	$N_{Rk,s,c}$	[kN]	24,5	32,5	24,5
Partial factor	$\gamma_{Ms,ca}^{1)}$		1,8		
Steel failure, local flexure of channel lips					
Distance of the channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	100	104	100
Characteristic re- sistance	$N^0_{Rk,s,l}$	[kN]	39,0	60,0	39,0
Partial factor	$\gamma_{Ms,l}^{1)}$		1,8		

1) in absence of other national regulations

Table 9: Flexure resistance of channel

Anchor channel			50/25 Standard version	52/34 Standard version	50/25 Version „Ski- assembled“
Flexure resistance of chan- nel	$M_{Rk,s,flex}$	[Nm]	947	2774	947
Partial factor	$\gamma_{Ms,flex}^{1)}$		1,15		

Table 10: Characteristic resistance under tension load – steel failure of channel bolt

Channel bolt, 8.8			M16
Steel failure			
Characteristic re- sistance	$N_{Rk,s}$	[kN]	125,6
Partial factor	$\gamma_{Ms}^{1)}$		1,50

1) in absence of other national regulations

Yuanda anchor channels with channel bolts

Performance

Characteristic resistance of anchor channel and channel bolt under tension load

Annex C1

Table 11: Characteristic resistance under tension load – concrete failure

Anchor channel				50/25 Standard version	52/34 Standard version	50/25 Version „Ski- assembled“
Pullout						
Characteristic re- sistance in cracked concrete C12/15		$N_{Rk,p}$	[kN]	37,1	34,0	169,3
Amplification factor of $N_{Rk,p}$	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 ≥ C60/75			5,00		
Factor for uncracked concrete		$\psi_{ucr,N}$	[-]	1,4		
Partial factor		$\gamma_{Mp}=\gamma_{Mc}^{1)}$	[-]	1,5		
Concrete cone failure						
Factor cracked concrete		$k_{cr,N}$	[-]	8,5	8,6	7,7
Factor uncracked concrete		$k_{ucr,N}$	[-]	12,2	12,3	11,0
Partial factor		$\gamma_{Mc}^{1)}$		1,5		
Splitting						
Characteristic edge distance		$c_{cr,sp}$	[mm]	3,0 h_{ef}		
Characteristic spacing		$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$		
Partial factor		$\gamma_{M,sp}=\gamma_{Mc}^{1)}$	[-]	1,5		

1) in absence of other national regulations

Table 12: Displacements under tension loads

Anchor channel				50/25 Standard version	52/34 Standard version	50/25 Version „Ski- assembled“
Tension load	N	[kN]		9,7	12,9	9,7
Short term displacement	δ_{N0}	[mm]		0,4	0,5	0,4
Long term displacement	$\delta_{N\infty}$	[mm]		1,2	1,2	1,2

Table 13: Characteristic resistances under combined tension and shear load

Anchor channel				50/25 Standard version	52/34 Standard version	50/25 Version „Ski-as- sembled“
Steel failure: Local failure by flexure of channel lips and failure by flexure of channel						
Product factor	k_{13}	[-]		1,0		
Steel failure: Failure of anchor and connection between anchor and channel						
Product factor	k_{14}	[-]		1,0		

Yuanda anchor channels with channel bolts

Performance

Characteristic resistances and displacements under tension load, characteristic resistances under combined tension and shear loads

Annex C2

Table 14: Characteristic resistances under shear load

Anchor channel			50/25 Standard version	52/34 Standard version	50/25 Version „Ski- assembled“
Steel failure, anchor					
Characteristic resistance	$V_{Rk,s,a}$	[kN]	32,0	42,0	32,0
Partial factor	$\gamma_{Ms,a}^{1)}$		1,5		
Steel failure, connection between anchor and channel					
Characteristic resistance	$V_{Rk,s,c}$	[kN]	32,0	42,0	32,0
Partial factor	$\gamma_{Ms,c}^{1)}$		1,8		
Steel failure, local failure by flexure of channel lips					
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,v}$	[mm]	100	104	100
Characteristic resistance	$V_{Rk,s,l}^0$	[kN]	32,0	42,0	32,0
Partial factor	$\gamma_{Ms,l}^{1)}$		1,8		
Pry out failure					
Factor	k_8		2,0	2,0	2,0
Partial factor	$\gamma_{Mc}^{1)}$		1,5		
Concrete edge failure					
Factor	cracked concrete	$k_{cr,v}$	7,5	7,5	4,5
	uncracked concrete	$k_{ucr,v}$	10,5	10,5	6,3
Partial factor	$\gamma_{Mc}^{1)}$		1,5		

1) in absence of other national regulations

Table 15: Characteristic resistances under shear loads – steel failure of channel bolts

Channel bolt, 8.8			M16
Steel failure			
Characteristic resistance	$V_{Rk,s}$	[kN]	62,8
Characteristic bending resistance	$M_{Rk,s}^0$	[Nm]	256,6
Partial factor	$\gamma_{Ms}^{1)}$		1,25

1) in absence of other national regulations

Table 16: Displacements under shear load

Anchor channel			50/25 Standard version	52/34 Standard version	50/25 Version „Ski- assembled“
Shear load	V	[kN]	12,7	16,7	12,7
Short time displacement	δ_{V0}	[mm]	1,8	1,8	1,8
Long time displacement	$\delta_{V\infty}$	[mm]	2,7	2,7	2,7

Yuanda anchor channels with channel bolts

Performance

Characteristic resistances of anchor channels and channel bolts under shear load, displacements under shear load

Annex C3