

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-17/0299**  
**of 12 September 2017**

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

Dumbo anchor channels with Dumbo channel bolts

Product family  
to which the construction product belongs

Anchor channels

Manufacturer

Reuß-Seifert GmbH  
Wuppertaler Straße 77  
45549 Sprockhövel  
DEUTSCHLAND

Manufacturing plant

This European Technical Assessment  
contains

23 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

**European Technical Assessment**

**ETA-17/0299**

English translation prepared by DIBt

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## Specific Part

### 1 Technical description of the product

The Dumbo anchor channels with Dumbo channel bolts 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. Dumbo 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 resistances under static and quasi-static loads and displacements	See Annex C1 to C6

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1

### 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

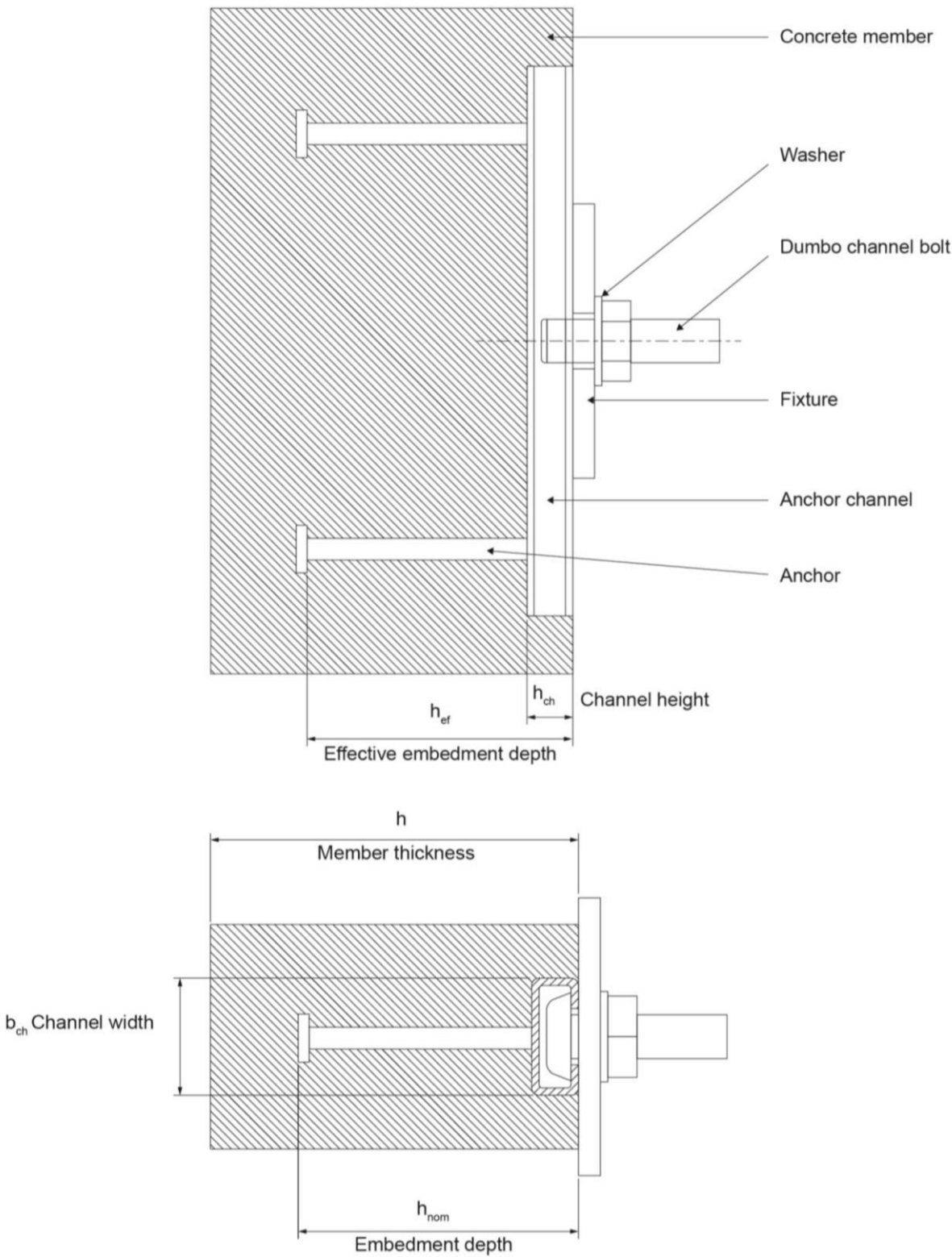
**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

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 on 12 September 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Müller

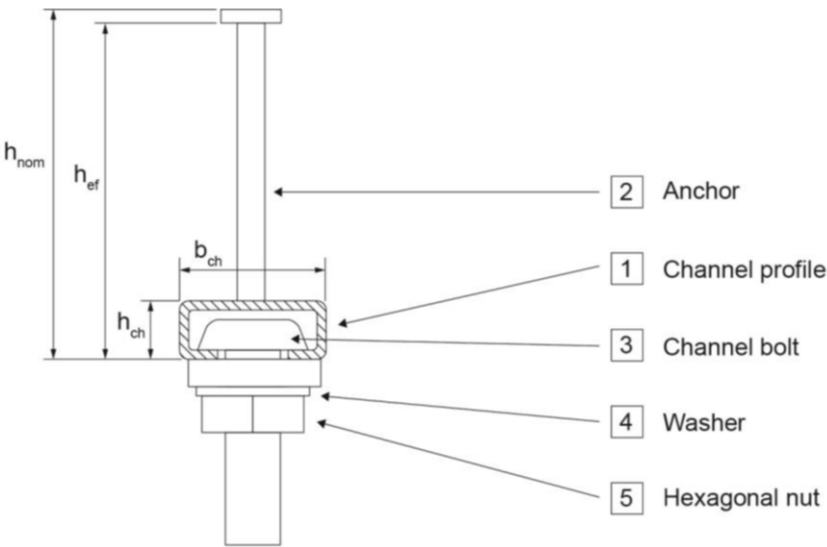


**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Product description –  
Installed condition**

**Annex A1**

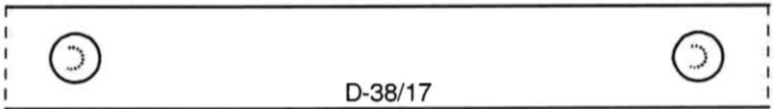
Anchor channel



Legend:  
 $h_{ch}$  = Profile height  
 $b_{ch}$  = Width of the profile  
 $h_{ef}$  = Effective embedment depth  
 $h_{nom}$  = Embedment depth

Marking of the anchor channel

E.g.: D-38/17 – stamped on the channel back:  
D = Identifying mark of the manufacturer (Dumbo)  
38 = channel width  
17 = channel height  
V4A = Additional for stainless steel



Material channels see Annex A3  
Close to the anchor a nail hole is positioned.

DUMBO Anchor Channels with DUMBO Channel Bolts

Product description –  
Product and marking

Annex A2

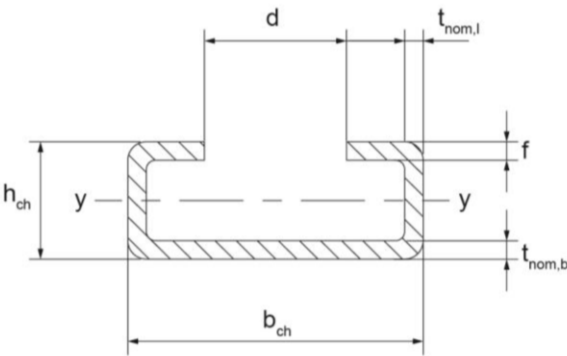
**Table A1: Material and intended use**

	Intended use		
	1	2	3
	Dry internal condition	Internal conditions with usual humidity	Medium corrosion exposure
<b>Specification</b>	Anchor channels may only be used in structures subject to dry, internal conditions (e.g. accommodations, bureaus, 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 permanently damp conditions and application under water).	Anchor channels may also be used in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal condition, if no particular aggressive conditions (e.g. permanent, alternating, immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pool or atmosphere with chemical pollution e.g. desulphurization plants or road tunnels where deicing materials are used).
<b>Materials</b>			
<b>Channel profile</b>	carbon steel S235 according to EN 10025:2005, hot-dip galv. $\geq 50 \mu\text{m}$ according to EN ISO 1461:2009		stainless steel, 1.4571, 1.4401 according to EN 10088:2005
<b>Anchor</b>	carbon steel S235 according to EN 10025:2005, hot-dip galv. $\geq 50 \mu\text{m}$ according to EN ISO 1462:2009		stainless steel, 1.4571 according to EN 10088:2005
<b>Channel bolt</b>	carbon steel, steel grade 4.6 / 8.8 according to EN ISO 898-1:2013, electroplated $\geq 5 \mu\text{m}$ according to EN ISO 4042:1999	carbon steel, steel grade 4.6 / 8.8 according to EN ISO 898-1:2013, hot-dip galv. $\geq 50 \mu\text{m}$ according to EN ISO 1461:2009	stainless steel, steel grade A4-50 / 70 1.4571, 1.4401 according to EN 10088:2005
<b>Washer acc.</b> EN ISO 7089:2000 and EN ISO 7093-1:2000	carbon steel, according to EN 10025:2005, electroplated $\geq 5 \mu\text{m}$ according to EN ISO 4042:1999	carbon steel, according to EN 10025:2005 hot-dip galv. $\geq 50 \mu\text{m}$ according to EN ISO 1461:2009	stainless steel, 1.4571, 1.4401 according to EN 10088:2005
<b>Hexagonal nuts</b>	carbon steel, class 5 / 8 according to EN ISO 898-2:2012, electroplated $\geq 5 \mu\text{m}$ according to EN ISO 4042:1999	carbon steel, class 5 / 8 according to EN ISO 898-2:2012, hot-dip galv. $\geq 50 \mu\text{m}$ according to EN ISO 1461:2009	stainless steel, steel grade A4-50 / 70, 1.4571, 1.4401 according to EN 10088:2005

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Product description –  
Material and intended use**

**Annex A3**



Marking of the channel according to Annex A2

Table A2: Geometry

Anchor channel	Dimensions						
	$b_{ch}$	$h_{ch}$	$t_{nom,b}$	$t_{nom,l}$	$d$	$f$	$I_y$
	[mm]						[mm <sup>4</sup> ]
28/15	28	15	2.3	2.3	12	2.3	4245
38/17	38	17	3	3	18	3	8216

DUMBO Anchor Channels with DUMBO Channel Bolts

Product description –  
Profile dimensions

Annex A4



## Anchor

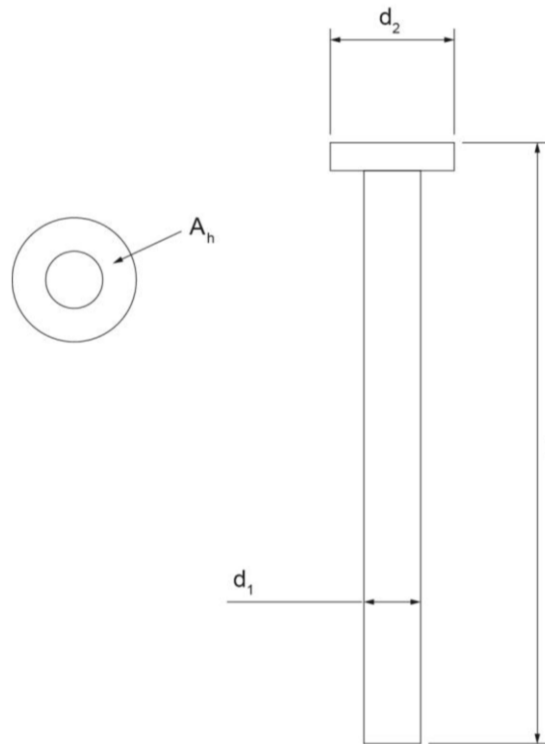


Table A3: Anchor dimensions and appropriate anchor channels

Anchor channel	Shaft $\varnothing$ $d_1$	Head $\varnothing$ $d_2$	Load bearing area of the head min $A_h$	Length min $l$
	[mm]			
28/15	6	13	104.5	35
38/17 <sup>1)</sup>	8	17	176.8	60
38/17 <sup>2)</sup>	10	19	205.1	60

1) Only 1.4571 and 1.4401

2) Only S235

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Product description –  
Anchor dimensions**

**Annex A5**

Anchor positioning

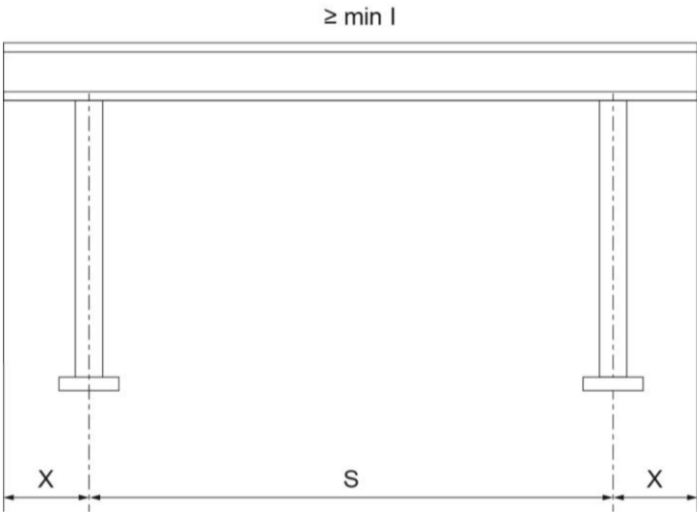


Table A4: Anchor positioning

Anchor channel	Channel length	Anchor spacing		End spacing
	min l	S <sub>min</sub>	S <sub>max</sub>	x
	[mm]			
28/15	100	50	250	25
38/17	100	50	250	25

DUMBO Anchor Channels with DUMBO Channel Bolts

Product description –  
Anchor positioning, channel length

Annex A6

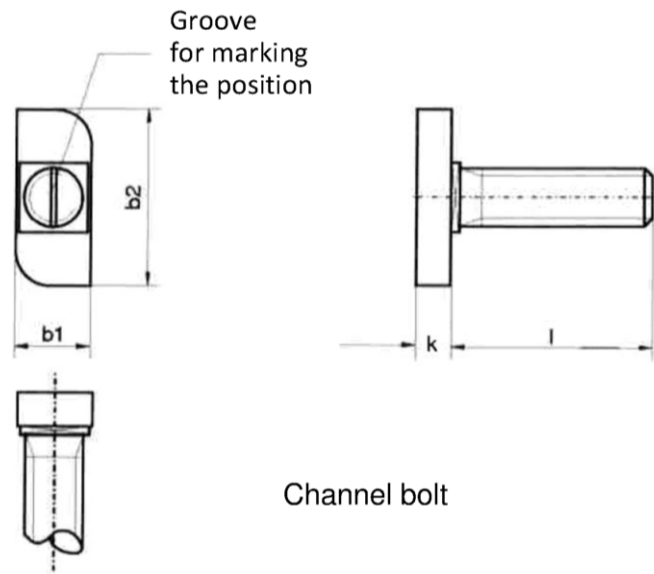


Table A5: Dimensions of channel bolt

Anchor channel	Diameter $\varnothing$	Head width $b_1$	Head length $b_2$	Head thickness $k$	Length $l$
	[mm]				
28/15	8	10.1	22.7	4	30-150
28/15	10	10.1	22.7	5	30-150
38/17	10	13	30.5	6	30-150
38/17	12	13	30.5	7	30-150
38/17	16	16	30.5	7	30-150

Table A6: Steel grade

Channel bolts	Carbon steel <sup>1)</sup>		Stainless steel <sup>1)</sup>	
	Steel grade		A4-50	A4-70
$f_{uk}$ [N/mm <sup>2</sup> ]	400	800	500	700
$f_{yk}$ [N/mm <sup>2</sup> ]	240	640	210	450
Coating	Electroplated / Hot-dip galvanized-			

1) Materials according to Table A1

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Product description -  
Channel bolts dimensions and steel grade**

**Annex A7**

### **Specifications for 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, shops, exceptional internal conditions with usual humidity)  
(anchor channels and channel bolts according to Annex A3, Table A1, column 1-3)
- 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 A3, Table A1, column 2-3)
- Structures subject to external atmospheric exposure (incl. industrial and marine environment) or exposure to permanently damp internal conditions, if no particular aggressive conditions (e.g. permanent, alternating immersion in seawater etc.) exist.  
(anchor channels and channel bolts according to Annex A3, Table A1, column 3)

#### **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 the anchor channels are designed in accordance with EOTA TR 047 "Calculation Method for the Performance of Anchor Channels" or FprEN 1992-4:2016.
- The characteristic resistances are calculated with the minimum effective embedment depth.

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Intended use –  
Specifications**

**Annex B1**

### Installation:

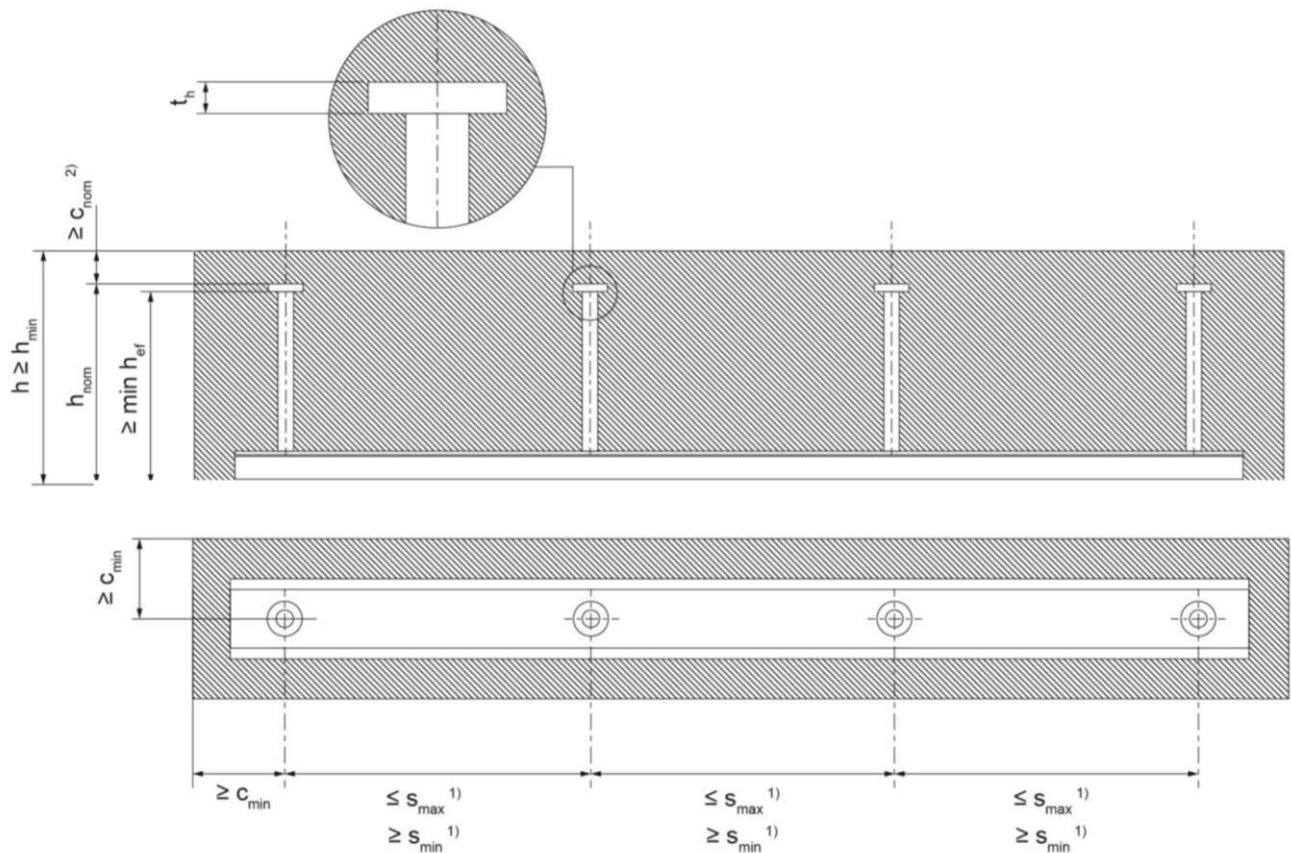
- The installation of anchor channels is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the anchor channels only as supplied by the manufacturer - without any manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex A6, Table A4 are generated including end spacing and minimum channel length and only to be used in dry internal conditions (Annex A3, Table A 1, column 1). For anchor channels made of stainless steel there are no restrictions regarding corrosion resistance when using cut channel pieces, if cutting is done professionally and contamination of cutting edges with corroding material is avoided.
- Installation in accordance with the manufacturer's specifications given in Annex B5 and B6.
- 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 channel bolt rectangular to the channel axis (groove marking according to Annex A7).
- The required installation torque given in Annex B4 must be applied and must not be exceeded.

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Intended use –  
Specifications**

**Annex B2**





1)  $s_{min}$ ,  $s_{max}$  acc. to Annex A6, table A4

2)  $c_{nom} \geq 10$  mm and acc. to EN 1992-1-1

Table B1: Installation parameters of anchor channels

Anchor channel	Min. effective embedment depth	Min. edge distance	Anchor head thickness	Min. member thickness
	$\min h_{ef}$	$c_{min}$	$t_h$	$h_{min}$
	[mm]			
28/15	45	65	5	100
38/17	70	100	7 <sup>1)</sup> (6) <sup>2)</sup>	130

1) For S235

2) For 1.4571 and 1.4401

DUMBO Anchor Channels with DUMBO Channel Bolts

Intended use –  
Installation parameters of anchor channels

Annex B3

**Table B2: Minimum spacing and setting torque for channel bolts**

Anchor channel	Channel bolt $\varnothing$	Min. spacing $s_{\min, cbo}$ for channel bolts	General setting torque $T_{\text{inst}}$
	[mm]	[mm]	[Nm]
28/15	8	40	8
28/15	10	50	12
38/17	10	50	12
38/17	12	60	19
38/17	16	80	38

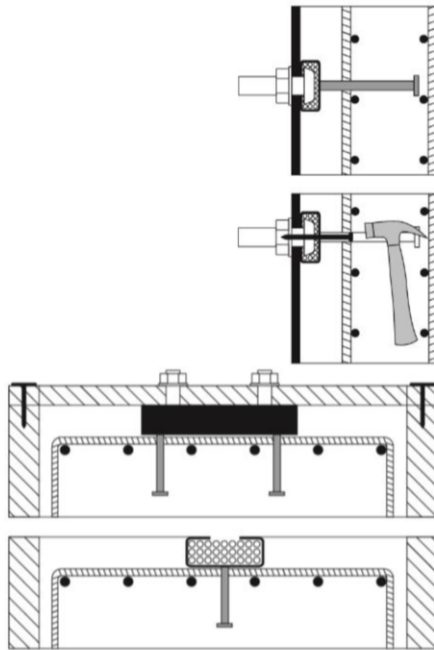
**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Intended use –  
Installation parameter of channel bolt**

**Annex B4**

## 1. Fixing anchor channel

Install the channel surface flush and fix the channel undisplaceable to the formwork or to the reinforcement.



### a) Fixing to steel formwork

With channel bolts and nuts, rivets, cramps or magnetizing fixings.

### b) Fixing to timber formwork

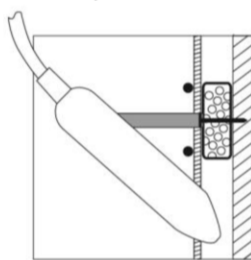
With nails or with staples.

### c) Fixing of anchor channels on the top

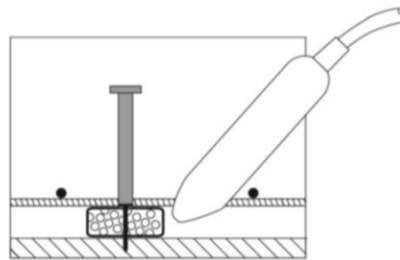
- To timber batten with channel bolts,
- directly to the reinforcement or to a mounting rebar, attach the profile by wire binding.

## 2. Pouring concrete and regular compacting of concrete

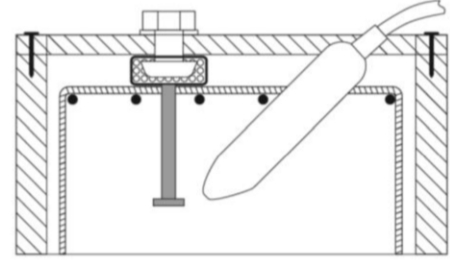
Compact the concrete properly around the anchor channel and the anchors.



a) Sidefaces to the formwork,



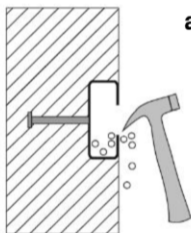
b) on soffits,



c) on top surfaces of concrete.

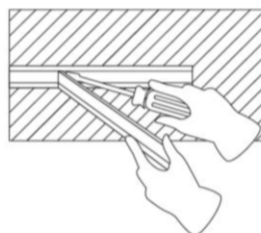
## 3. Removing of the channel infill

Clean the channel on the outside after removing the formwork.



### a) Foam infill

With a hammer or a hook,



### b) PE – foam filler

by hand or with help of a screw driver in one piece.

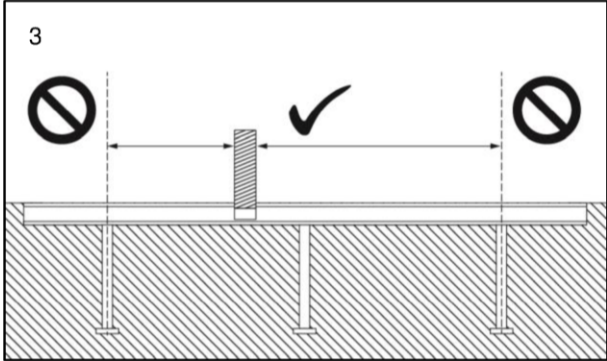
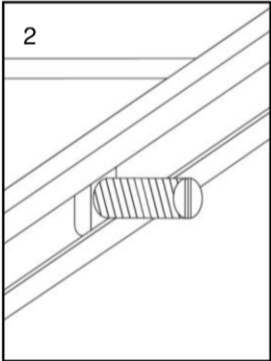
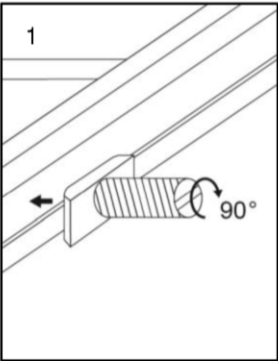
**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Intended use –  
Manufacturer's specification of anchor channel**

**Annex B5**

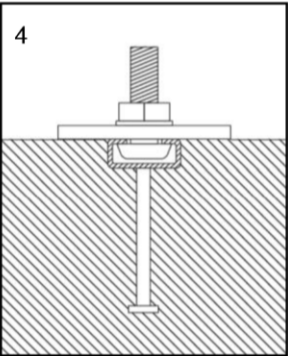


Selecting of the channel bolt in accordance with the design specification.

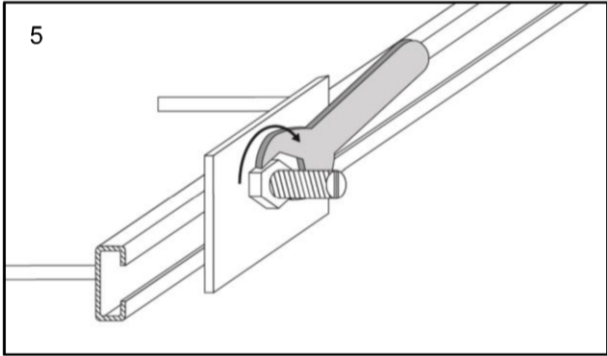


Setting the channel bolt into the channel: After a 90° turn clockwise, the channel bolt locks into the channel. Checking the position of the bolt with the groove.

Positioning of the channel bolt: Clearance at channel ends: channel bolt must be fixed between two anchors or maximum on position of last anchor.



4: General setting



Tightening the hexagonal nut to the setting torque acc. Tab. B3.  $T_{inst}$  must not be exceeded. After fixing check that the bolt is positioned correctly.

Table B3: Setting torque

Position of fixture	Strength class	Anchor channel	$T_{inst}$ [Nm] <sup>1)</sup>			
			M8	M10	M12	M16
General setting (acc.Fig.4)	4.6, 8.8 A4-50, A4-70	all anchor channels	8	12	19	38

1)  $T_{inst}$  must not be exceeded

DUMBO Anchor Channels with DUMBO Channel Bolts

Intended use –  
Manufacturer’s specification of channel bolt

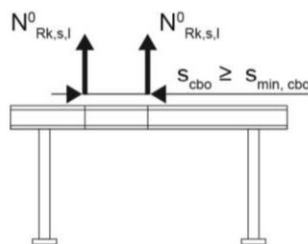
Annex B6

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

Anchor Channel			28/15		38/17	
			stainless steel (1.4571)	carbon steel (S235),	stainless steel (1.4571)	carbon steel (S235)
Steel failure, Anchor						
Characteristic resitances	N <sub>Rk,s,a</sub>	[kN]	14.1	10.2	25.1	28.3
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>		2.5	1.84	2.5	1.84
Steel failure, Connection channel/anchor						
Characteristic resitances	N <sub>Rk,s,c</sub>	[kN]	12.0	8.4	19.7	17.2
Partial safety factor	γ <sub>Ms,ca</sub> <sup>1)</sup>		1.8			
Steel failure, Local flexure of channel lips						
Spacing of channel bolt for N <sup>0</sup> <sub>Rk,s,l</sub>	s <sub>l,N</sub>	[mm]	56	56	76	76
Characteristic resitances	N <sup>0</sup> <sub>Rk,s,l</sub>	[kN]	12.0	8.4	19.7	17.2
Partial safety factor	γ <sub>Ms,l</sub> <sup>1)</sup>		1.8			

1) In absence of other national regulations

**Spacing of channel bolt**



**Assumption of system**

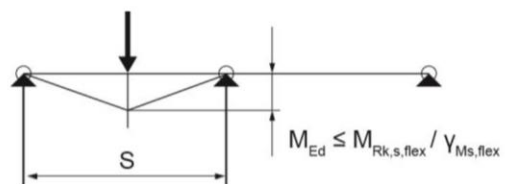


Table C2: Characteristic flexure resistance of channel

Anchor channel			28/15	38/17
Characteristic flexure resistance of channel	$M_{Rk,s,flex}$	[Nm]	119	284
Partial safety factor	$\gamma_{Ms,flex}^{1)}$		1.15	

1) In absence of other national regulations

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Performances –  
Characteristic resistances of anchor channel under  
tension load – steel failure**

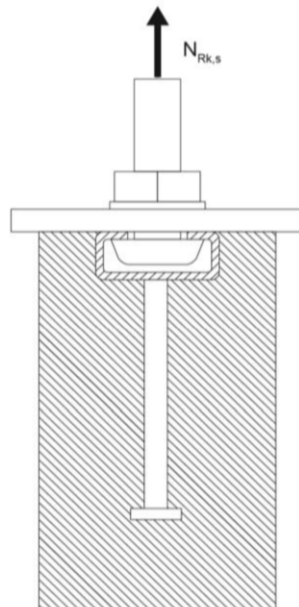
**Annex C1**

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

Channel bolt $\Phi$					M8	M10	M12	M16
Steel failure, Channel bolt								
Characteristic resitances	$N_{Rk,s}$	[kN]	28/15 38/17	4.6		23.2	23.2	62.8
			28/15	8.8	29.3			
			28/15 38/17	A4-50 <sup>2)</sup>		29.0	29.0	78.5
			28/15	A4-70 <sup>2)</sup>	25.6			
Partial safety factor	$\gamma_{Ms}^{1)}$			4.6	2.00			
				8.8	1.50			
				A4-50 <sup>2)</sup>	2.86			
				A4-70 <sup>2)</sup>	1.87			

1) In absence of other national regulations

2) Materials according to Table A1



DUMBO Anchor Channels with DUMBO Channel Bolts

Performances –  
Characteristic resistances of channel bolts under  
tension load

Annex C2

**Table C4: Characteristic resistances under tension load – Concrete failure**

Anchor channel			28/15	38/17 stainless steel	38/17 carbon steel
Pullout failure					
Characteristic resistances in cracked concrete C12/15		N <sub>Rk,p</sub>	[kN]	9.4	15.9
Characteristic resistances in uncracked concrete C12/15		N <sub>Rk,p</sub>	[kN]	13.2	22.3
Amplification factor of N <sub>Rk,p</sub>	C16/20	Ψ <sub>c</sub>	[-]	1.33	
	C20/25			1.67	
	C25/30			2.00	
	C30/37			2.47	
	C35/45			3.00	
	C40/50			3.33	
	C45/55			3.67	
	C50/60			4.17	
	C55/67			4.58	
	≥ C60/75			5.00	
Partial safety factor		γ <sub>MC</sub> <sup>1)</sup>		1.5	
Concrete cone failure					
Characteristic edge distance		C <sub>cr,N</sub>	[mm]	111	161
Characteristic spacing		S <sub>cr,N</sub>	[mm]	222	322
Produktdafactor k <sub>1</sub>		k <sub>cr,N</sub>	[N <sup>0.5</sup> /mm <sup>0.5</sup> ]	7.2	7.7
		k <sub>ucr,N</sub>	[N <sup>0.5</sup> /mm <sup>0.5</sup> ]	10.3	11.1
Partial safety factor		γ <sub>MC</sub> <sup>1)</sup>		1.5	
Concrete splitting failure					
Characteristic edge distance		C <sub>cr,sp</sub>	[mm]	135	210
Characteristic spacing		S <sub>cr,sp</sub>	[mm]	270	420
Partial safety factor		γ <sub>MC</sub> <sup>1)</sup>		1.5	

1) In absence of other national regulations

**Displacements under tension load:**  
No performance determined.

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Performances –  
Characteristic resistances of anchor channel under  
tension load – concrete failure**

**Annex C3**

**Table C5: Characteristic resistances under shear load – anchor channel**

Anchor Channel			28/15		38/17	
			stainless steel (1.4571)	carbon steel (S235)	stainless steel (1.4571)	carbon steel (S235)
Steel failure, anchor						
Characteristic resitances	$V_{Rk,s,a}$	[kN]	12.0	8.4	19.7	17.2
Partial safety factor	$\gamma_{Ms}^{1)}$		2.08	1.53	2.08	1.53
Steel failure, connection channel/anchor						
Characteristic resitances	$V_{Rk,s,c}$	[kN]	12.0	8.4	19.7	17.2
Partial safety factor	$\gamma_{Ms,ca}^{1)}$		1.8			
Steel failure, local flexure of channel lips						
Spacing of channel bolts	$s_{l,v}$	[mm]	56		76	
Characteristic resitances	$V_{Rk,s,l}^0$	[kN]	12.0	8.4	19.7	17.2
Partial safety factor	$\gamma_{Ms,l}^{1)}$		1.8			
Anchor Channel			28/15		38/17	
Pry-out failure						
Productfactor	$k_8$	[-]	1.0		2.0	
Partial safety factor	$\gamma_{Mc}^{1)}$		1.5			
Concrete edge failure						
Productfactor $k_{12}$	cracked $k_{cr,v}$	$[N^{1/2}/mm^{1/3}]$	4.5			
	uncracked $k_{ucr,v}$	$[N^{1/2}/mm^{1/3}]$	6.3			
Partial safety factor	$\gamma_{Mc}^{1)}$		1.5			

1) In absence of other national regulations

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Performances –  
Characteristic resistances of anchor channel under shear load**

**Annex C4**

**Table C6: Characteristic resistances under shear load – Steel failure channel bolts**

Channel bolt $\Phi$					M8	M10	M12	M16
Steel failure								
Characteristic resistances	$V_{Rk,s}$	[kN]	28/15	4.6		13.9		
				8.8	14.6			
				A4-50 <sup>2)</sup>		17.4		
				A4-70 <sup>2)</sup>	15.4			
			38/17	4.6		13.9	13.9	37.7
				A4-50 <sup>2)</sup>		17.4	17.4	47.1
Characteristic flexure resistances	$M^0_{Rk,s}$ <sup>3)</sup>	[Nm]	28/15	4.6		29.9		
				8.8	29.9			
				A4-50 <sup>2)</sup>		37.4		
				A4-70 <sup>2)</sup>	26.2			
			38/17	4.6		29.9	29.9	132.8
				A4-50 <sup>2)</sup>		37.4	37.4	166.0
Internal lever arm	a	[mm]	28/15		17	18		
			38/17			23	24	26
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>			4.6	1.67			
				8.8	1.25			
				A4-50 <sup>2)</sup>	2.38			
				A4-70 <sup>2)</sup>	1.56			

1) In absence of other national regulations

2) Materials according to Table A1

3) The characteristic flexure resistance acc. Tab. C6 is limited as follows:

$$M^0_{Rk,s} \leq 0.5 N_{Rk,s,l} \cdot a \quad (N_{Rk,s,l} \text{ acc. TR047 resp. FprEN 1992-4:2016 with } N^0_{Rk,s,l} \text{ acc. Annex C1, Tab. C1})$$

$$M^0_{Rk,s} \leq 0.5 N_{Rk,s} \cdot a \quad (N_{Rk,s} \text{ acc. Annex C2, Tab. C3})$$

a = internal lever arm acc. Tab. C6

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Performances –  
Characteristic resistances of channel bolts under shear load –  
steel failure**

**Annex C5**

**Table C7: Characteristic resistances under combined tension and shear load**

Anchor Channel			28/15	38/17
Steel failure, local failure by flexure of channel lips and failure by flexure of channel				
	$k_{13}$	[-]	1.0	1.0
Steel failure, failure of anchor and connection between anchor and channel				
	$k_{14}$	[-]	1.0	1.0

**Displacements under shear load:**

No performance determined.

**DUMBO Anchor Channels with DUMBO Channel Bolts**

**Performances –  
Characteristic resistances of channel bolts under combined  
tension and shear load – steel failure**

**Annex C6**