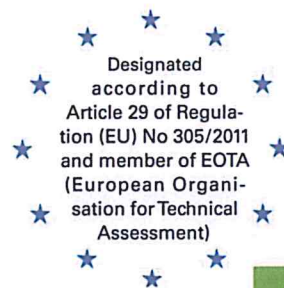


Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-16/0387
of 7 August 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

BGW Bohr anchor channels with channel bolts

Product family
to which the construction product belongs

Anchor channels

Manufacturer

BGW-Bohr GmbH
Kastanienstraße 10
97854 Steinfeld
DEUTSCHLAND

Manufacturing plant

This European Technical Assessment
contains

22 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

European Assessment Document (EAD)
330008-02-0601

Specific Part

1 Technical description of the product

The BGW Bohr anchor channels with channel bolts is 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. BGW Bohr 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

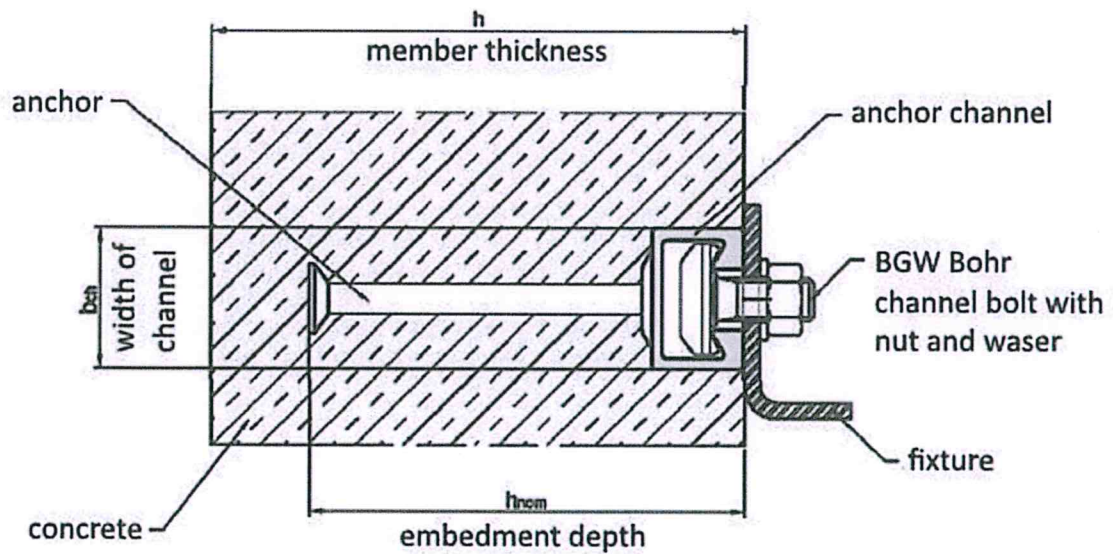
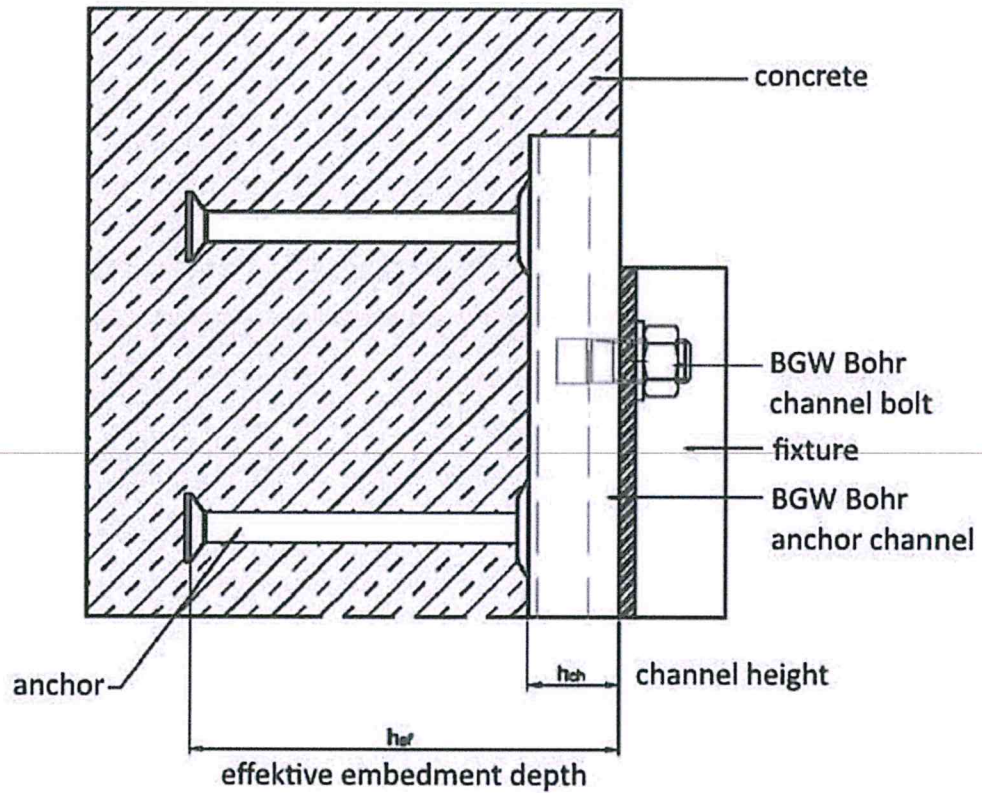
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 7 August 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Müller

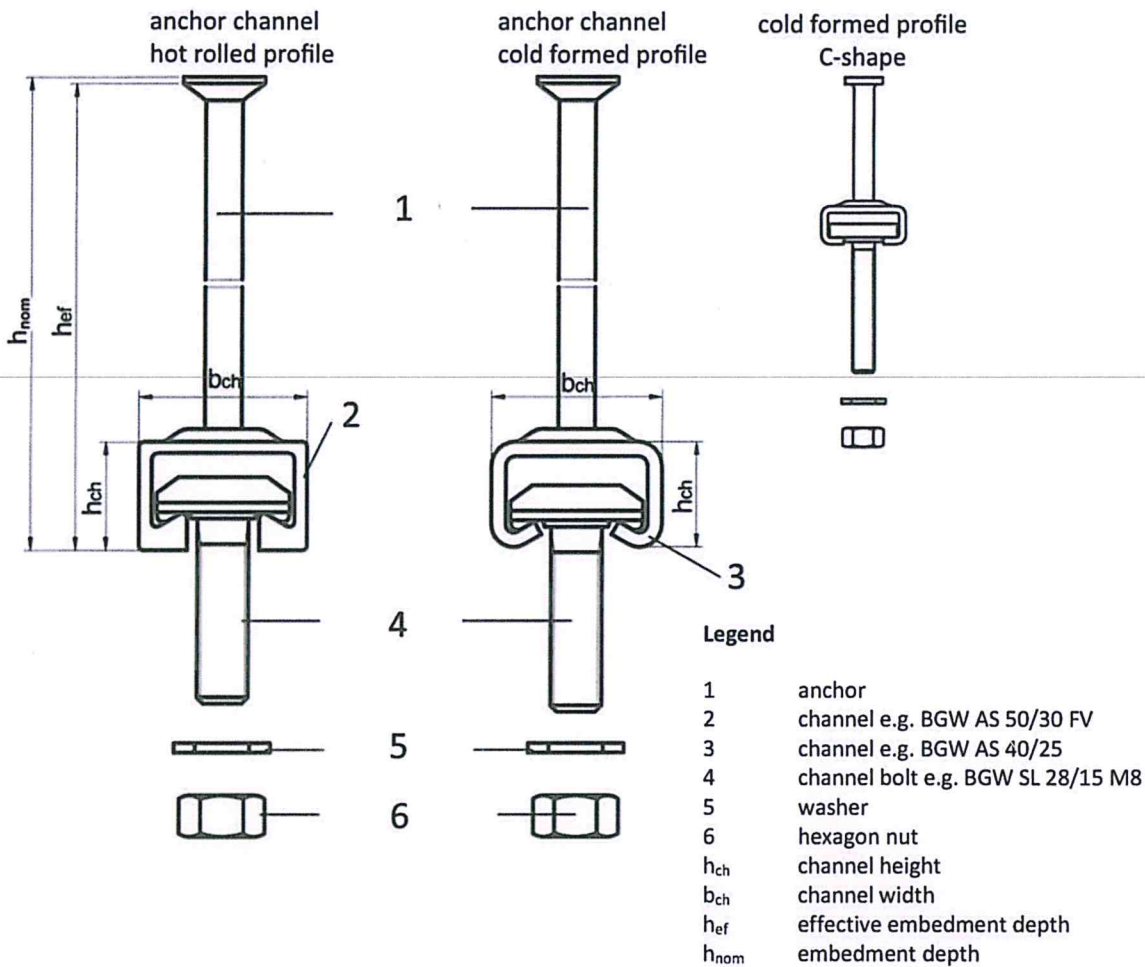


BGW Bohr anchor channels with channel bolts

Product Description
Installed condition

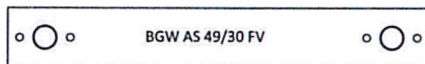
Annex A1

Anchor channel types

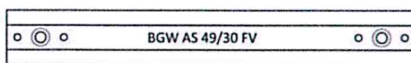


Marking of the BGW Bohr – anchor channel:
e.g. BGW AS 49/30 FV

BGW = Identifying mark of the manufacturer
AS 49/30 = Size of the anchor channel
FV = Material
= 1.0037 / 1.0547



Marking on the channel back

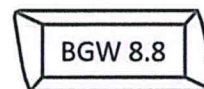


Marking inside the channel

Next to the anchors nail holes are positioned

Marking of the BGW Bohr – channel bolt:
e.g. BGW 8.8

BGW = Identifying mark of the manufacturer
8.8 = Material / strength grade



BGW Bohr anchor channels with channel bolts

Product Description
Marking

Annex A2

Anchor channels

hot rolled profile

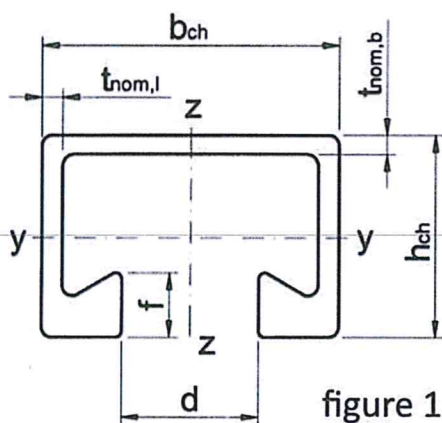


figure 1

cold formed profile

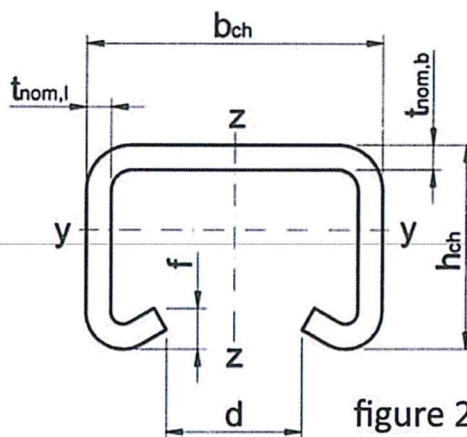


figure 2

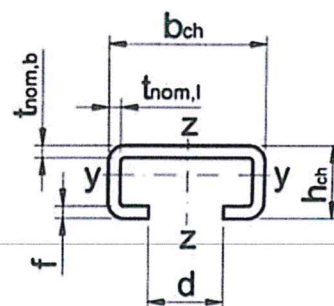


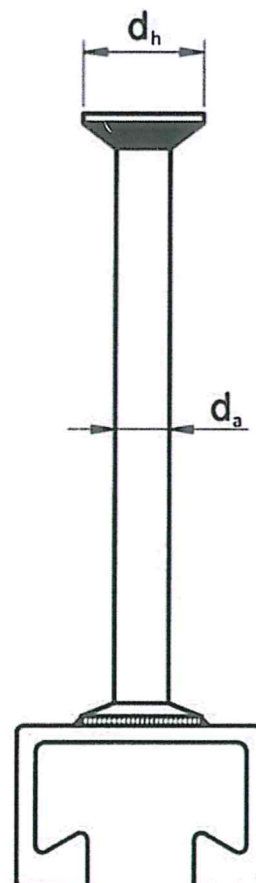
figure 3

Table 1: Dimensions of channel profile

Anchor channel	b _{ch}	h _{ch}	t _{nom}	d	f	l _y
	[mm]					[mm ⁴]
28/15	28	15	2,30	12	-	3438
38/17	38	17	3,00	18	-	7181
40/22	40	22	2,50	18	5,9	16404
40/25	40	25	2,75	18	5,0	22887
49/30	49	30	3,25	22	6,3	47859
50/30	50	30	2,75	22	8,1	41807
52/34	52	34	4,00	22	11,5	83109

Table 2: Dimensions of anchor
(welded or bolted to the channel profile)

Anchor channel	d _a	d _h	t _h	min l _a
	[mm]			
28/15	6	12	2,50	150
38/17	8	16	3,00	150
40/22	8	16	3,00	150
40/25	8	16	3,00	150
49/30	10	20	4,00	150
50/30	10	20	4,00	150
52/34	11	25	5,00	150



BGW Bohr anchor channels with channel bolts

Product Description
Profile and anchor dimensions

Annex A3

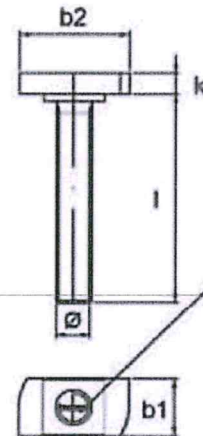
Channel bolts

Table 3: Dimensions of channel bolt

Anchor channel	channel bolt	figure	Dimensions			
			b ₁	b ₂	k	d
			[mm]			
28/15	28/15	1	10,10	22,70	6,00	8
						10
38/17	38/17	1	13,00	30,50	7,00	10
						12
						16
40/22 40/25	40/25	2	14,00	33,00	11,00	10
						12
						16
49/30 50/30 52/34	49/30	2	17,00	41,50	15,20	12
						16
						20

hammer-head channel bolt

figure 1



groove for position determination

Table 4: Steel grade and corrosion protection

Channel Bolt	Carbon steel ¹⁾
Steel grade	8.8
f _{uk} [N/mm ²]	800 ²⁾
f _{uk} [N/mm ²]	640 ²⁾
Corrosion protection	F ³⁾

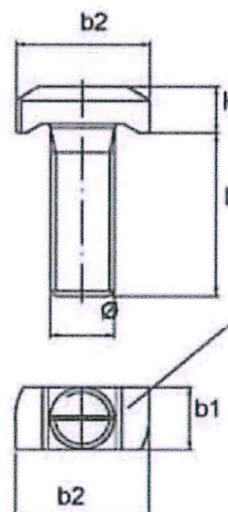
¹⁾ Material properties according to Annex A5

²⁾ Material properties according to EN ISO 898-1

³⁾ Hot-dip galvanized

hook-head channel bolt

figure 2



groove for position determination

marking of the channel bolt acc. to annex A2

BGW Bohr anchor channels with channel bolts

Product Description
Channel bolts

Annex A4

English translation prepared by DIBt

Table 5: Materials

Component	Carbon steel	
	Material properties	Coating
1	2a	2b
Channel Profile	Steel according to EN 10025:2005	Hot dip galvanized $\geq 50 \mu\text{m}$
Anchor	Steel according to EN 10263:2001 ²⁾ Steel according to EN 10269:2013 ²⁾	Hot dip galvanized $\geq 90 \mu\text{m}$
Channel bolt	Steel according to EN ISO 898-1:2013 ²⁾	Hot dip galvanized $\geq 50 \mu\text{m}$
Plain washer according to EN ISO 7089:2000 and EN ISO 7093-1:2000	Steel according to EN 10025:2005 ²⁾	Hot dip galvanized $\geq 50 \mu\text{m}$
Hexagonal nut according to EN ISO 4032:2012 or DIN 934:1987-10 ¹⁾	Steel according to EN ISO 898-2:2012 ²⁾	Hot dip galvanized $\geq 50 \mu\text{m}$

¹⁾ Hexagonal nuts according to DIN 934 for channel bolts made from carbon steel (8.8)

²⁾ Hot-dip galvanized according to EN ISO 1461:2009

BGW Bohr anchor channels with channel bolts

Product Description
Materials

Annex A5

Specifications 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, shops, exceptional internal conditions with usual humidity)
- Structures subject to internal conditions with usual humidity (e.g. kitchen, bad and laundry in residential buildings, exeptional permanent damp conditions and application under water)

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 in 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.

BGW Bohr anchor channels with 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 – any manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex B3, Table 6 are generated including end spacing and minimum channel length and only to be used in dry internal conditions.
- Installation in accordance with the manufacturer's specifications given in Annexes B5, B6 and B7
- 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 A5 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex B6 and B7) rectangular to the channel axis.
- The required installation torques given in Annex B4 must be applied and must not be exceeded.

BGW Bohr anchor channels with channel bolts

**Intended Use
Specifications**

Annex B2

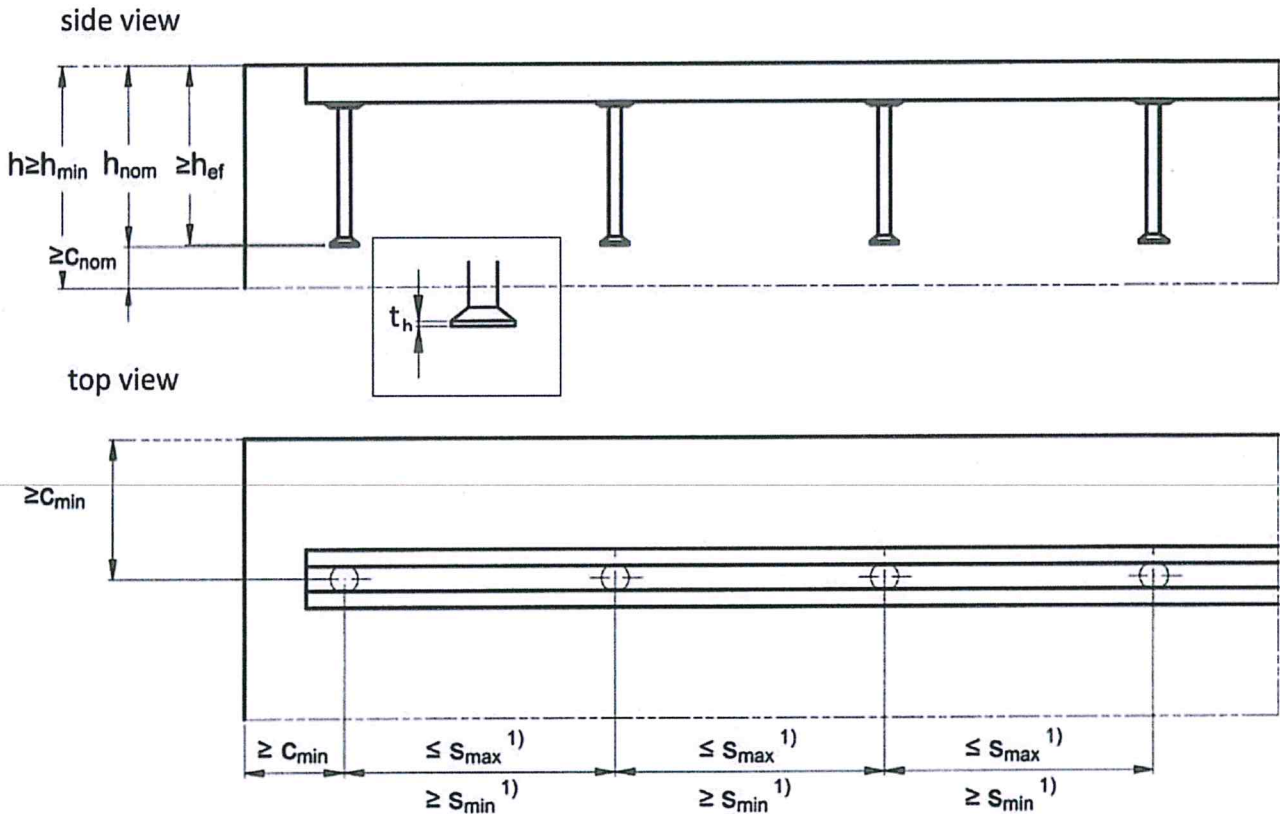


Table 6: Installation parameters for anchor channel

Anchor channel		28/15	38/17	40/22	40/25	49/30	50/30	52/34
Minimum effective embedment depth	$h_{ef, min}$	45	65	71	73	86	86	148
Minimum spacing	S_{min}	100						80
Maximum spacing	S_{max}	250						230
End spacing	x	25						35
Minimum channel length	l_{min}	150						
Minimum edge distance	C_{min}	54	69	70	70	100	100	100
Minimum thickness of concrete member	h_{min}	85	100	110	110	120	120	200

Table 7: Minimum spacing for channel bolts

		M8	M10	M12	M16	M20
Minimum spacing between channel bolts	$S_{cbo, min}$ [mm]	40	50	60	80	100

S_{cbo} =center to center spacing between channel bolts ($S_{cbo, min} = 5d$)

BGW Bohr anchor channels with channel bolts

Intended Use
Installation parameters for anchor channels

Annex B3

Table 8: Required installation torque T_{inst}

Profile	Channel bolt		T_{inst} [Nm] ¹⁾	
			General	Steel-steel contact
28/15	M8	8.8	8	15
	M10	8.8	13	16
38/17	M10	8.8	15	28
	M12	8.8	20	20
	M16	8.8	40	40
40/22 40/25	M10	8.8	15	22
	M12	8.8	25	28
	M16	8.8	40	40
49/30 50/30	M12	8.8	12	12
	M16	8.8	22	22
52/34	M20	8.8	25	25
	M12	8.8	25	70
	M16	8.8	60	130
	M20	8.8	95	95

¹⁾ T_{inst} must not be exceeded

BGW Bohr anchor channels with channel bolts

Intended Use

Installation parameters for channel bolts

Annex B4

Table 15: Characteristic resistances under shear load - steel failure of anchor channel

Anchor channel			28/15	38/17	40/22	40/25	49/30	50/30	52/34
Steel failure: Failure of anchor									
Characteristic Resistance	$V_{Rk,s,a}$	[kN]	7,5	10,8	13,9	11,4	7,0	13,7	26,3
Partial safety factor	$\gamma_{Ms}^{1)}$		1,5						
Steel failure: Failure of connection between anchor and channel									
Characteristic Resistance	$V_{Rk,s,c}$	[kN]	7,5	10,8	13,9	11,4	7,0	13,7	26,3
Partial safety factor	$\gamma_{Ms,ca}^{1)}$		1,8						
Steel failure: Local failure by flexure of channel lips									
Characteristic spacing of channel	$s_{l,v}$	[mm]	56	76	80	80	98	100	104
Bolts of $V_{Rk,s,l}$									
Characteristic Resistance	$V^0_{Rk,s,l}$	[kN]	7,5	10,8	13,9	11,4	7,0	13,7	26,3
Partial safety factor	$\gamma_{Ms,R}^{1)}$		1,8						

1) In absence of other national regulations.

Table 16: Characteristic resistances under shear load - concrete failure

Anchor channel			28/15	38/17	40/22	40/25	49/30	50/30	52/34
Pry out failure									
Product factor	K_8		1,0	2,0					
Partial safety factor	$\gamma_{Mc}^{1)}$		1,5						
Concrete edge failure									
Product Factor k_{12}	Cracked concrete	$k_{cr,v}$	4,4	5,8	5,5	5,3	7,2	3,3	7,5
	Uncracked concrete	$k_{ucr,v}$	6,2	8,1	7,7	7,4	10,1	4,6	10,5
Partial safety factor	$\gamma_{Mc}^{1)}$		1,5						

1) In absence of other national regulations.

BGW Bohr anchor channels with channel bolts

Performance

Characteristic resistances of anchor channels under shear load

Annex C3

Table 17: Displacements under shear load

Anchor channel			28/15	38/17	40/22	40/25	49/30	50/30	52/34
Shear load	V	[kN]	5,4	7,7	9,9	8,1	5,0	9,8	18,8
Short time displacement ¹⁾	δ_{v0}	[mm]	1,6	1,2	0,9	1,2	0,3	0,6	0,7
Long-time displacement ¹⁾	$\delta_{v\infty}$	[mm]	2,4	1,8	1,4	1,8	0,5	0,9	1,1

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete.

Table 18: Characteristic resistances under combined tension and shear load

Anchor channel		28/15	38/17	40/22	40/25	49/30	50/30	52/34
Steel failure: Local failure by flexure of channel lips and failure by flexure of channel								
Product factor	k_{13}	1,0 ¹⁾						
Steel failure: Failure of anchor and connection between anchor and channel								
Product factor	k_{14}	1,0 ²⁾						

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

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

BGW Bohr anchor channels with channel bolts

Performance

Displacements under shear load

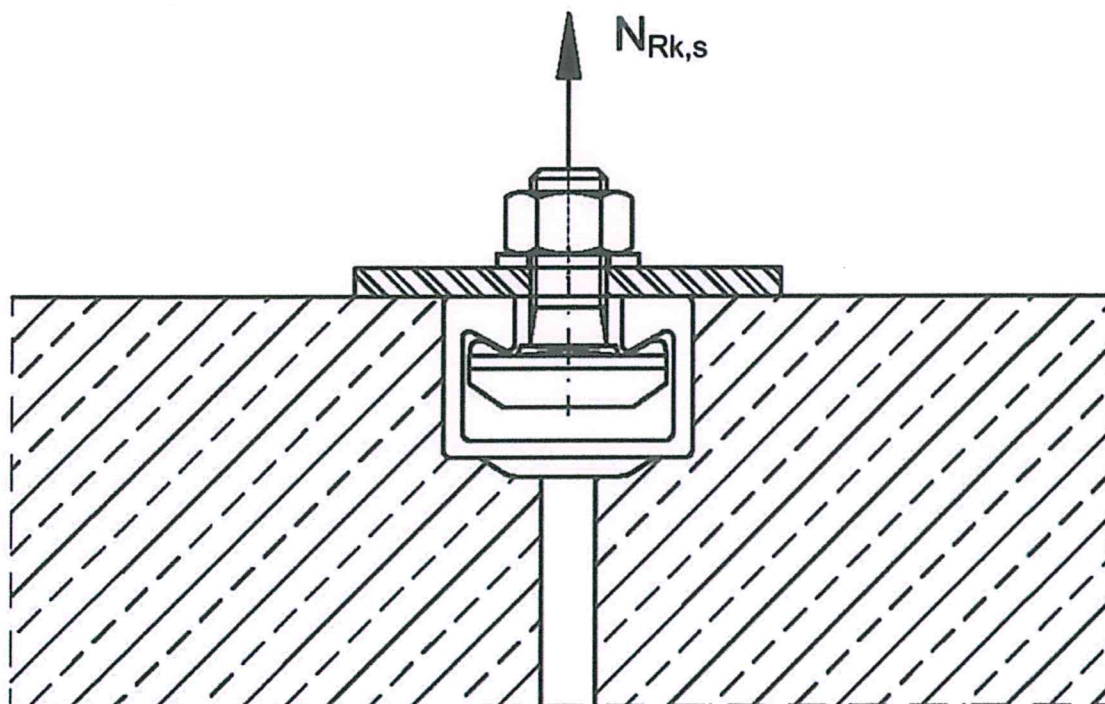
Characteristic resistances under combined tension and shear load

Annex C4

Table 19: Characteristic resistances under tension and shear load – steel failure of BGW Bohr channel bolts

				Channel bolt	28/15	38/17	40/25	49/30
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	8.8	M8	25,0	-	-	-
				M10	39,2	40,4	43,8	-
				M12	-	50,2	57,8	57,4
				M16	-	76,6	88,5	103,3
				M20	-	-	-	144,6
Partial safety factor		$\gamma_{Ms}^{1)}$	8.8	1,5				
Characteristic resistance	$V_{Rk,s}$	[kN]	8.8	M8	14,6	-	-	-
				M10	23,2	23,2	23,2	-
				M12	-	33,7	33,7	33,7
				M16	-	62,8	62,8	62,8
				M20	-	-	-	98,0
Partial safety factor		$\gamma_{Ms}^{1)}$	8.8	1,25				

¹⁾ In absence of other national regulations.



BGW Bohr anchor channels with channel bolts

Performance

Characteristic resistances of channel bolts und tension and shear load

Annex C5

Table 20: Characteristic resistances under shear load with lever arm – steel failure of BGW Bohr channel bolts

				Channel bolt	28/15	38/17	40/22	40/25
Steel failure								
Characteristic flexure resistance	$M^{0}_{Rk,s}^{2)}$	[Nm]	8.8	M8	30,0	-	-	-
				M10	59,8	59,8	59,8	59,8
				M12	-	104,6	104,6	104,6
				M16	-	141,3	187,6	156,6
				M20	-	-	-	-
Partial safety factor		$\gamma_{Ms}^{1)}$	8.8	1,25				
Internal lever arm	a	[mm]	8.8	M8	17	-	-	-
				M10	18	23	24	24
				M12	-	24	25	25
				M16	-	26	27	27
				M20	-	-	-	-

Table 21: Characteristic resistances under shear load with lever arm – steel failure of BGW Bohr channel bolts

				Channel bolt	49/30	50/30	52/34
Steel failure							
Characteristic flexure resistance	$M^{0}_{Rk,s}^{2)}$	[Nm]	8.8	M08	-	-	-
				M10	-	-	-
				M12	102,1	104,6	104,6
				M16	109,1	214,6	265,9
				M20	117,2	230,6	440,5
Partial safety factor		$\gamma_{Ms}^{1)}$	8.8	1,25			
Internal lever arm	a	[mm]	8.8	M08	-	-	-
				M10	-	-	-
				M12	29	29	29
				M16	31	31	31
				M20	34	34	34

1) In absense of other national regulations.

2) The characteristic flexure resistance according to Table 20 is limited as follows:

$$M^{0}_{Rk,s} \leq 0,5 \cdot N_{Rk,s,l} \cdot a \quad (N_{Rk,s,l} \text{ according to TR047 resp. FprEN 1992-4:2016 with } N^{0}_{Rk,s,l} \text{ acc. Annex C1, Tab. 11})$$

$$M^{0}_{Rk,s} \leq 0,5 \cdot N_{Rk,s} \cdot a \quad (N_{Rk,s} \text{ according to Table 19})$$

a = internal lever arm according Table 20 and 21

BGW Bohr anchor channels with channel bolts

Performance

Characteristic flexural resistances of channel bolts under shear load

Annex C6