

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-16/0560
of 17 July 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

Edilmatic anchor channels and channel bolts

Product family
to which the construction product belongs

Anchor channels

Manufacturer

EDILMATIC srl
Via Gonzaga 11
46020 PEGOGNAGA
ITALIEN

Manufacturing plant

EDILMATIC srl
Via Gonzaga 11
46020 PEGOGNAGA
ITALIEN

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

European Assessment Document (EAD)
330008-02-0601

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Specific Part

1 Technical description of the product

The Edilmatic anchor channels 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. Edilmatic 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 C3

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

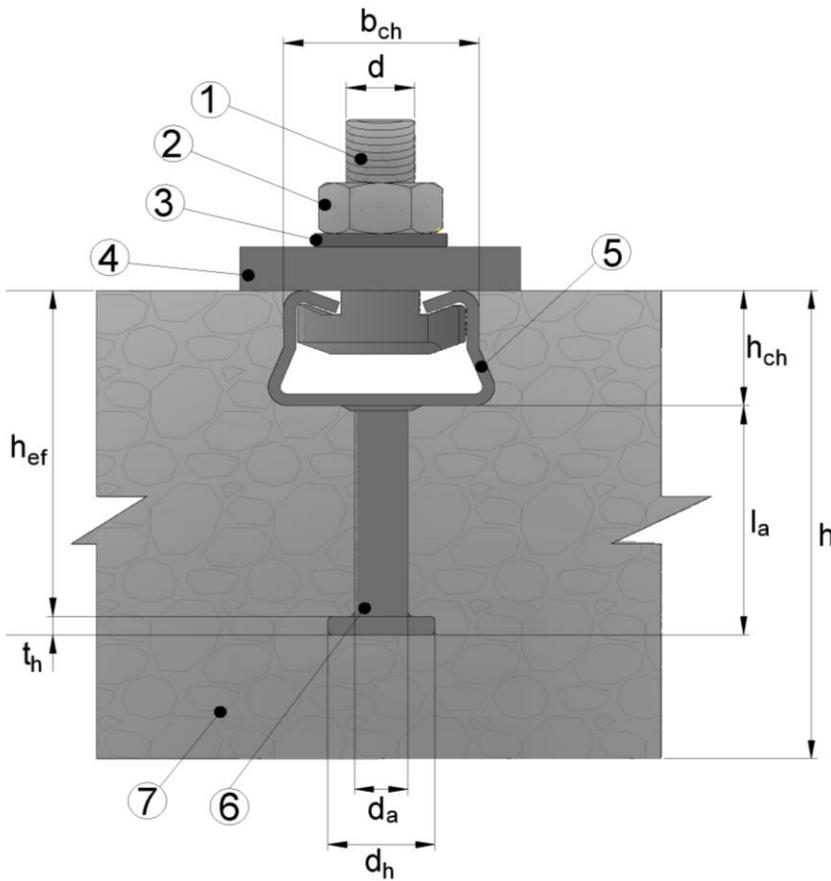
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 17 July 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

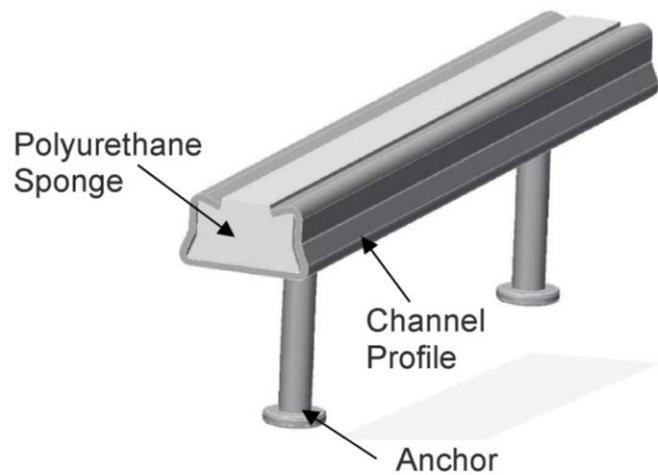
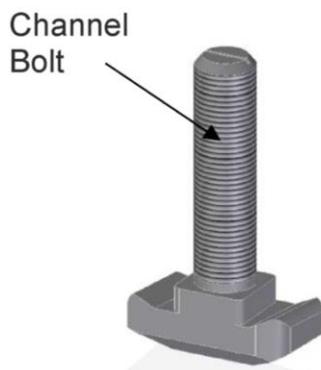
beglaubigt:
Lange

Product and installation condition



Key

- 1 Channel Bolt
- 2 Hexagonal nut
- 3 Washer
- 4 Fixture
- 5 Channel Profile
- 6 Anchor
- 7 Concrete member

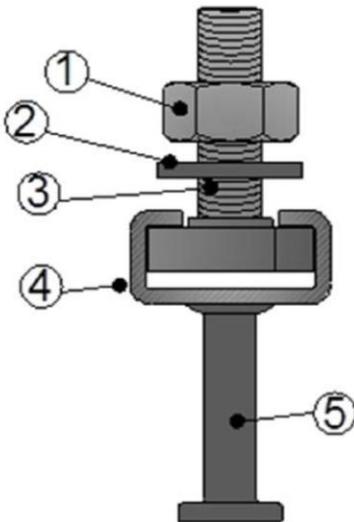


Edilmatic anchor channels with channel bolts

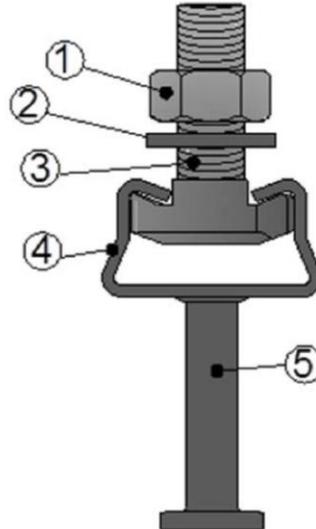
Product description
Installed condition

Annex A1

Anchor channel types



Anchor channel type
GF and GI
with channel bolt type
TMG1 and TMG2



Anchor channel type
GD, GE and GM
with channel bolt type
TAG1 and TAG2

Key

- 1 Hexagon nut
- 2 Washer
- 3 Channel Bolt
- 4 Channel Profile
- 5 Anchor

Edilmatic anchor channels with channel bolts

Product description
Anchor channel types

Annex A2

Marking of the Edilmatic anchor channel:

E-X

E = Identifying mark of the manufacturer (Edilmatic)
X = Size of Anchor Channel



(e.g. E-GD)

E = EDILMATIC
GD = Anchor channel size GD

Marking of the Edilmatic channel bolt:

E-X

E = Identifying mark of the manufacturer (Edilmatic)
X = Steel grade



(e.g. E-8.8)

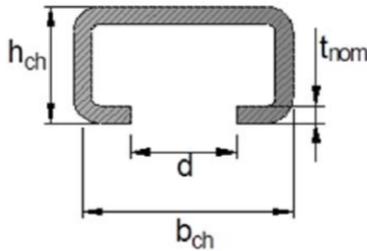
E = EDILMATIC
8.8 = Steel grade

Edilmatic anchor channels with channel bolts

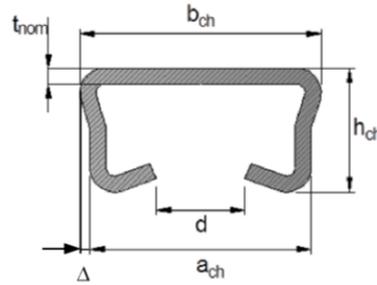
Product description
Marking of channel and channel bolt

Annex A3

Channel profiles



Anchor channel type
GF and GI



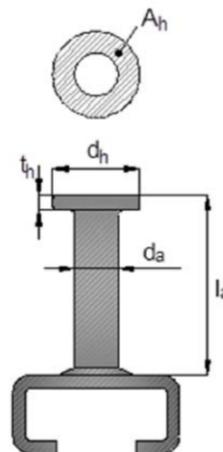
Anchor channel type
GD, GE and GM

Table A1: Dimensions of channel profile

Anchor Channel	a _{ch}	b _{ch}	Δ	h _{ch}	t _{nom}	d	I _y
	[mm]						
GF	--	28,0	-	15,0	2,3	12,2	3776
GI	--	38,0	-	17,0	3,0	17,5	9080
GD	40,5	46,0	2,75	25,0	2,5	17,5	21055
GE	52,0	56,0	2	30,5	3,3	21,5	48251
GM	52,0	56,0	2	31,0	4,0	21,5	59279

Table A2: Dimensions of anchor

Anchor Channel	d _a	d _h	t _h	min I _a
	[mm]			
GF	6,0	12,0	2,5	34,1
GI	11,0	21,0	4,0	45,0
GD	11,0	21,0	4,0	47,0
GE	13,5	25,0	5,0	64,0
GM	13,0	25,5	5,0	98,5



Edilmatic anchor channels with channel bolts

Product description

Dimensions of channel profiles and anchors

Annex A4

Channel bolts

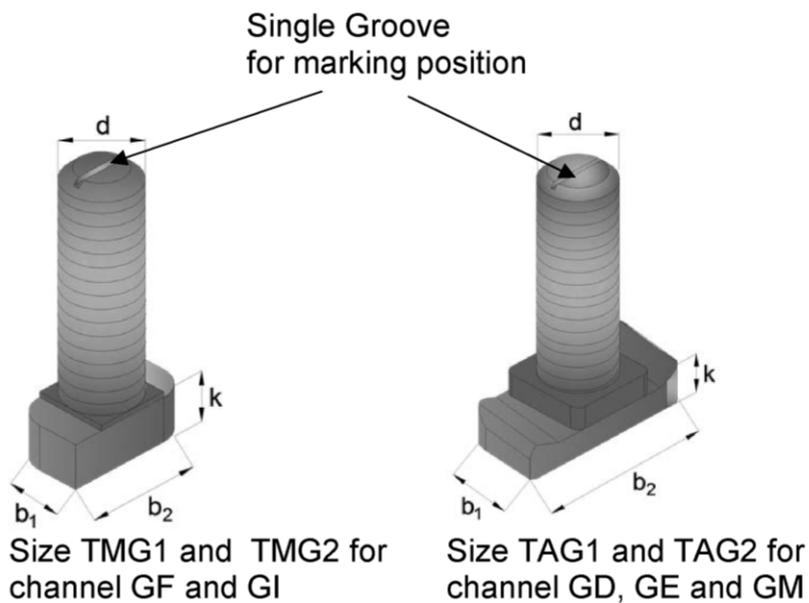


Table A3: Dimensions of channel bolts

Anchor channel	Channel bolt Type	Dimensions			
		b_1	b_2	k	d
GF	TMG1	12,0	22,0	7,5	12
GI	TMG2	16,0	30,0	7,5	12
GD	TAG1	16,0	36,0	8,5	12
					14
					16
GE	TAG2	20,0	46,0	9,5	16
GM					

Edilmatic anchor channels with channel bolts

Product description
Dimensions of channel bolts

Annex A5

Table A4: Materials

Specification	Intended use	
	1	2
	Dry internal conditions 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)	Internal conditions with usual humidity 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		
Channel profile	Material: S235 JR EN 10346: 2015 Material Number: 1.0244 Coating: Hot dip galvanized (with Sendzimir method) Thickness: $19\mu\text{m} < t < 21\mu\text{m}$	Material: S235 JR EN 10025: 2005 Material Number: 1.0038 Coating: Hot dip galvanized (on the basis of EN ISO 1461: 2009) Thickness: $t \geq 50\mu\text{m}$
Anchor	Material: S235 JR EN 10263-3: 2002 Material Number: 1.1152 Coating: electroplated (on the basis of EN ISO 4042: 1999) Thickness: $t \geq 5\mu\text{m}$	Material: S235 JR EN 10263-3: 2015 Material Number: 1.1152 Coating: Hot dip galvanized (on the basis of EN ISO 1461: 2009) Thickness: $t \geq 50\mu\text{m}$
EDILMATIC Channel bolt	Material: Steel strength grade 8.8 (according to EN ISO 898-1: 2013) Coating: electroplated (on the basis of EN ISO 4042: 1999) Thickness: $t \geq 5\mu\text{m}$	Material: Steel strength grade 8.8 (according to EN ISO 898-1: 2013) Coating: Hot dip galvanized (on the basis of EN ISO 10684: 2004 + AC 2009) Thickness: $t \geq 50\mu\text{m}$
Washer EN 7089	Material: Steel acc. to EN 10025: 2005 Coating: electroplated (on the basis of EN ISO 4042: 1999) Thickness: $t \geq 5\mu\text{m}$	Material: Steel According to EN 10025: 2005 Coating: Hot dip galvanized (on the basis of EN ISO 10684: 2004 + AC 2009)) Thickness: $t \geq 50\mu\text{m}$
Hexagonal nut EN 4032	Material: Steel According to EN 898-2: 2012 Coating: electroplated (on the basis of EN ISO 4042: 1999) Thickness: $t \geq 5\mu\text{m}$	Material: Steel According to EN 898-2: 2012 Coating: Hot dip galvanized (on the basis of EN ISO 10684 2004 + AC 2009)) Thickness: $t \geq 50\mu\text{m}$

Edilmatic anchor channels with channel bolts

Product description
Materials and intended use

Annex A6

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 A6, Table A4, 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 A6, Table A4, 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 EN 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 manufacturer's specifications given in Annexes B4, B5 and B6.
- 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 B5) rectangular to the channel axis.
- The required installation torques given in Annex A3, Table B3 must be applied and must not be exceeded.

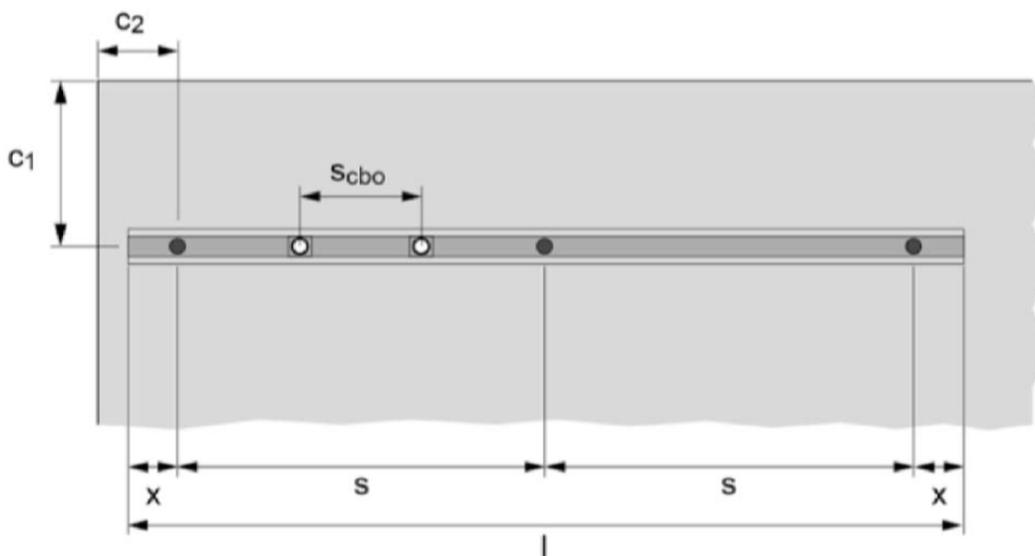
Edilmatic anchor channels with channel bolts

Intended Use
Specifications and Installation

Annex B1

Table B1: Installation parameters for anchor channels

Anchor channel			GF	GI	GD	GE	GM
Effective embedment depth	h_{ef}	[mm]	46,5	59,0	69,0	91,0	126,0
Minimum spacing	s_{min}	[mm]	100	100	100	100	100
Maximum spacing	s_{max}	[mm]	200	200	200	200	200
End spacing	x	[mm]	50	50	50	50	50
Minimum channel length	l_{min}	[mm]	200	200	200	200	200
Minimum edge distance	$c_{min,1}$	[mm]	60	60	100	100	100
	$c_{min,2}$	[mm]	40	40	80	80	100
Minimum thickness of concrete member	h_{min}	[mm]	100	100	150	150	200



Edilmatic anchor channels with channel bolts

Intended Use
Installation parameters for anchor channels

Annex B2

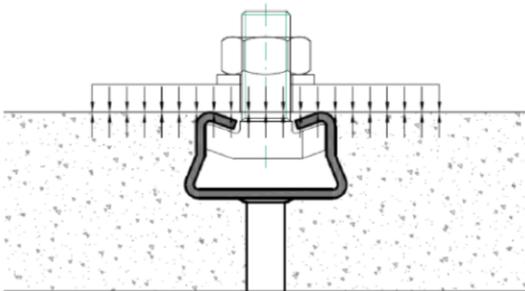
Table B2: Minimum spacing for channel bolts

Channel bolt			M12	M14	M16
Minimum spacing between channel bolts	$s_{cbo,min}$	[mm]	60	70	80

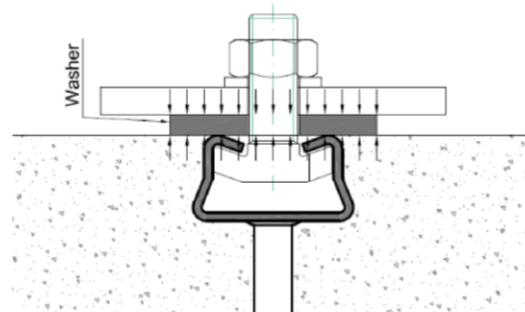
s_{cbo} = center to center spacing between channel bolts ($s_{cbo,min} = 5d$)

Table B3: Required installation torque T_{inst} (general application and steel-steel contact)

Anchor channel			GF	GI	GD			GE	GM
Bolt size			M12	M12	M12	M14	M16	M16	M16
Installation torque	T_{inst}	[Nm]	15	16	30	40	40	60	60



General: The fixture is in contact with the channel profile and the concrete surface



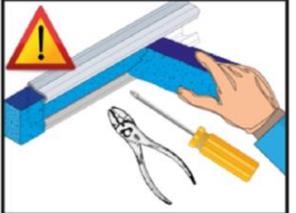
Steel-steel contact: The fixture is fastened to the anchor channel by suitable steel part (e.g. washer). Fixture is in contact with the channel profile only.

Edilmatic anchor channels with channel bolts

Intended Use
Installation instructions for anchor channels (part 1)

Annex B3

1	Selection of anchor channel, in accordance to the planning document	
2	Placing channel into formwork	
2a)	Steel formwork: Fixing with Edilmatic channel bolts through the form	
2b)	Steel formwork: Fixing with rivets using the prefabricated holes in the back of the anchor channel	
2c)	Top surface of concrete: Fixing by using auxiliary construction or fixing from above directly to the reinforcement	
2d)	Wood formwork: Fixing with nails using the prefabricated holes in the back of the anchor channel	
2e)	Wood formwork: Fixing with staples	
Edilmatic anchor channels with channel bolts		
Intended Use Installation instructions for anchor channels (part 1)		Annex B4

<p>3 Cast in and compact the concrete and wait hardening of concrete</p>	
<p>4 Striking the formwork: Removing of the steel or wood formwork</p>	
<p>5 Removing the foam filler</p>	
<p>6 Installation of the anchor channel is finished</p>	
<p>Edilmatic anchor channels with channel bolts</p>	
<p>Intended Use Installation instructions for anchor channels (part 2)</p>	<p>Annex B5</p>

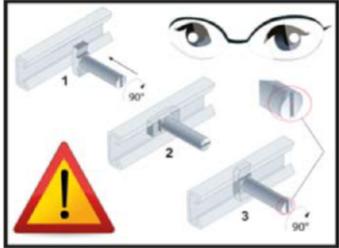
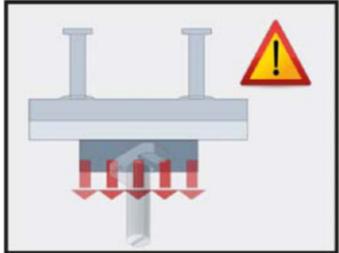
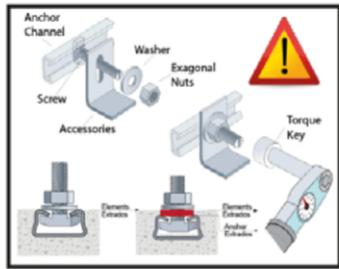
<p>1 Selection of the EDILMATIC channel bolt in accordance to the planning document.</p> <p>2 Insert the channel bolt into the channel. After 90° turn clockwise the channel bolt locks into the channel. (Check of the position of the bolt by notch!!!)</p> <p>4 Positioning of the channel bolt. At the channel ends a minimum clearance must be maintained, which corresponds with the overhang beyond the last anchor. T_{inst} must not be exceeded.</p> <p>5 Tighten the hexagonal nut to the setting torque in accordance with technical prescriptions.</p> <p>6 After fixing the nuts check the correct position of the bolt. If the notch is not perpendicular to the channel length axis, the channel bolt must be released completely, inserted and tightened again.</p> <p><u>Installation of the channel bolt is finished.</u></p>	    
<p>Edilmatic anchor channels with channel bolts</p>	
<p>Intended Use Installation instructions for anchor channels (part 3)</p>	<p>Annex B6</p>

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

Anchor channel				GF	GI	GD	GE	GM
Steel failure, anchor								
Characteristic resistance	$N_{Rk,s,a}$	[kN]		11,3	38,0	38,0	57,3	53,1
Partial safety factor	γ_{Ms} ¹⁾			2,0				
Steel failure, connection anchor/channel								
Characteristic resistance	$N_{Rk,s,c}$	[kN]		8,8	27,0	19,2	31,5	47,8
Partial safety factor	$\gamma_{Ms,ca}$ ¹⁾			1,8				
Steel failure, channel lips								
Characteristic spacing of channel bolt for $N_{Rk,s,l}$	$s_{l,N}$	[mm]		56	76	92	112	112
Characteristic resistance	$N_{Rk,s,l}^0$	[kN]		8,8	27,0	19,2	31,5	47,8
Partial safety factor	$\gamma_{Ms,l}$ ¹⁾			1,8				
Steel failure, bending moment								
Characteristic resistance	$M_{Rk,s,flex}$	[Nm]		159	288	507	938	1152
Partial safety factor	$\gamma_{Ms,flex}$ ¹⁾			1,15				

1) In absence of other national regulations.

Table C2: Characteristic resistances under tension load – concrete failure

Anchor channel				GF	GI	GD	GE	GM
Pullout								
Characteristic resistance in cracked concrete	C12/15	$N_{Rk,p}$	[kN]	7,6	22,6	22,6	31,3	34,0
Increasing 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			4,58				
	≥ C60/75			5,00				
Factor for uncracked concrete		$\psi_{ucr,N}$	[-]	1,4				
Partial safety factor		$\gamma_{Mp}^=$ ¹⁾ γ_{Mc}	[-]	1,5				
Concrete cone failure								
Product factor cracked concrete		$k_{cr,N}$	[-]	7,3	7,5	7,7	8,0	8,4
Product factor uncracked concrete		$k_{ucr,N}$	[-]	10,4	10,7	11,0	11,5	12,0
characteristic edge distance		$c_{cr,N}$	[mm]	115	140	159	195	238
characteristic anchor spacing		$s_{cr,N}$	[mm]	229	280	318	390	476
Partial safety factor		γ_{Mc} ¹⁾		1,5				
Splitting								
		$c_{cr,sp}$	[-]	3,0 h_{ef}				
Partial safety factor		$\gamma_{M,sp}^=$ ¹⁾ γ_{Mc}	[-]	1,5				

1) In absence of other national regulations.

Edilmatic anchor channels with channel bolts

Performance
Characteristic resistances of anchor channels under tension load

Annex C1

Table C3: Characteristic resistances under tension load – steel failure of anchor channel and concrete failure

Anchor channel			GF	GI	GD	GE	GM
Steel failure, failure of anchor							
Characteristic resistance	$V_{Rk,s,a}$	[kN]	11,3	38,0	38,0	57,3	53,1
Partial safety factor	γ_{Ms} ¹⁾	[-]	1,67				
Steel failure, failure of connection between anchor and channel							
Characteristic resistance	$V_{Rk,s,c}$	[kN]	8,8	27,0	19,2	31,5	47,8
Partial safety 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]	56	76	92	112	112
Characteristic resistance	$V_{Rk,s,l}$	[kN]	8,8	27,0	19,2	31,5	47,8
Partial safety factor	$\gamma_{Ms,l}$ ¹⁾	[-]	1,8				
Concrete pry-out							
Product factor	k_B	[kN]	1,0	1,0	2,0	2,0	2,0
Partial safety factor	γ_{Mc}		1,5				
Concrete edge failure							
Product factors	cracked concrete	$k_{cr,v}$	[-]	4,5			
	uncracked concrete	$k_{ucr,v}$	[-]	6,3			
Partial safety factor	γ_{Mc}	[-]	1,5				

1) In absence of other national regulations.

Table C4: Characteristic resistances under combined tension and shear load

Anchor channel			GF	GI	GD	GE	GM
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				

Edilmatic anchor channels with channel bolts

Performance

Characteristic resistances of anchor channels under shear load
Characteristic resistance under combined tension and shear load

Annex C2

Table C5: Characteristic resistances under tension load – steel failure of Edilmatic channel bolts

Channel bolt			M12	M14	M16
Characteristic resistance	$N_{Rk,s}$	[kN]	56,0	59,5	63,7
Partial safety factor	γ_{Ms}	[-]	1,5		

Table C6: Characteristic resistances under shear load – steel failure of Edilmatic channel bolts

Channel bolt			M12	M14	M16
Characteristic resistance	$V_{Rk,s}$	[kN]	33,7	46,0	62,8
Partial safety factor	γ_{Ms}	[-]	1,25		
Characteristic bending resistance	$M_{Rk,s}^0$	[Nm]	82,4	167,0	267,0
Partial safety factor	γ_{Ms}	[-]	1,25		

Table C7: Displacements under tension load

Anchor channel			GF	GI	GD	GE	GM
Tension load	N	[kN]	3,5	10,7	7,7	12,1	20,0
Short time displacement	δ_{N0}	[mm]	0,6	0,8	0,7	1,0	1,3
Long time displacement	$\delta_{N\infty}$	[mm]	1,2	1,6	1,4	2,0	2,6

Table C8: Displacements under shear load

Anchor channel			GF	GI	GD	GE	GM
Shear load	V	[kN]	3,5	10,7	7,7	12,1	20,0
Short time displacement	δ_{V0}	[mm]	0,9	1,2	1,1	1,5	2,0
Long time displacement	$\delta_{V\infty}$	[mm]	1,4	1,8	1,7	2,3	3,0

Edilmatic anchor channels with channel bolts

Performance

Characteristic resistances of channel bolts under tension and shear loads
Displacements under tension and shear loads

Annex C3