Deutsches Institut für Bautechnik
Zulassungsstelle für Bauprodukte und Bauarten
Bautechnisches Prüfamt
Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts

Kolonnenstraße 30 B
D-10829 Berlin
Tel.: +49 30 78730-0
Fax: +49 30 78730-320
E-Mail: dibt@dibt.de
www.dibt.de

Authorised and notified according to Article 10 of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products (89/106/EEC)

Deutsches Institut für Bautechnik

DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-13/0399

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung *Trade name*		HAZ METAL Ankerschiene HMPR *HAZ METAL Anchor Channel HMPR*
Zulassungsinhaber *Holder of approval*		Haz Metal Deutschland GmbH Leonhard-Karl-Straße 29 97877 Wertheim DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck *Generic type and use of construction product*		Ankerschienen *Anchor channels*
Geltungsdauer: *Validity:*	vom *from* bis *to*	11 June 2013 11 June 2018
Herstellwerk *Manufacturing plant*		HAZ Werk 1

Diese Zulassung umfasst *This Approval contains*	26 Seiten einschließlich 18 Anhänge *26 pages including 18 annexes*

I LEGAL BASES AND GENERAL CONDITIONS

1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
- *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998[4], as amended by Article 2 of the law of 8 November 2011[5];*
- Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC[6].

2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.

3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.

4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.

6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities L 40, 11 February 1989, p. 12
2 Official Journal of the European Communities L 220, 30 August 1993, p. 1
3 Official Journal of the European Union L 284, 31 October 2003, p. 25
4 *Bundesgesetzblatt Teil I 1998*, p. 812
5 *Bundesgesetzblatt Teil I 2011*, p. 2178
6 Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of the construction product

The HAZ METAL - Anchor Channel HMPR is an anchor channel consisting of a C-shaped channel of cold-formed steel and at least two metal anchors non-detachably fixed on the profile back.

The anchor channel is imbedded surface-flush in the concrete. HAZ METAL special screws (hammerhead or hooked) with appropriate hexagon nuts and washers will be fixed in the channel.

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The anchor channel is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences.

The anchor channel is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C12/15 at minimum to C90/105 at most according to EN 206-1:2000-12. The anchor channel may be anchored in cracked and non-cracked concrete.

The anchor channel may be used for transmission of tensile loads, shear loads, or a combination of tensile and shear loads perpendicular to the longitudinal axis of the channel.

The intended use of the anchor channel (channel profile, anchor, special screw, washer and nut) concerning corrosion is given in Annex 3, Table 1 depending on the chosen material.

The provisions made in this European technical approval are based on an assumed working life of the anchor channel of 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.

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

The anchor channel corresponds to the drawings and information given in Annex 2 to 7. The characteristic material values, dimensions and tolerances of the anchor channel not indicated in the Annexes shall correspond to respective values laid down in the technical documentation[7] of this European technical approval.

Regarding the requirements concerning safety in case of fire it is assumed that the anchor channel meets the requirements of class A1 in relation to reaction to fire in accordance with the stipulations of the Commission decision 96/603/EC, amended by 2000/605/EC.

[7] The technical documentation of this European technical approval is deposited at Deutsches Institut für Bautechnik and, as far as it is relevant to the tasks of the approved body involved in the attestation of conformity procedure, is handed over to the approved bodies.

The characteristic values for the design of the anchorages are given in Annexes 8 to 17.

The anchor channel shall be marked with the identifying mark of the producer, the size and if applicable additionally with the type of stainless steel, e.g. HAZ 54/33 - A4 according to Annex 2.

Each special screw is marked with the identifying mark of the producer and if applicable with the strength grade and if applicable with the type of stainless steel according to Annex 2.

2.2 Method of verification

2.2.1 General

The assessment of the fitness of the anchor channel for the intended use with regard to the requirements of mechanical resistance and stability as well as safety in use in the sense of the Essential Requirements 1 and 4 was performed based on the following verifications:

Verifications for tension loads for

1.	Distribution of acting tension loads	
2.	Steel failure - anchor	$N_{Rk,s,a}$
3.	Steel failure - special screw	$N_{Rk,s,s}$
4.	Steel failure - connection channel/ anchor	$N_{Rk,s,c}$
5.	Steel failure - local flexure of channel lips	$N_{Rk,s,l}$
6.	Steel failure - flexure resistance of channel	$M_{Rk,s,flex}$
7.	Steel failure - transfer of setting torque into prestressing force	T_{inst}
8.	Concrete failure - pullout	$N_{Rk,p}$
9.	Concrete failure - concrete cone	$N_{Rk,c}$
10.	Concrete failure - splitting due to installation	c_{min}, s_{min}, h_{min}
11.	Concrete failure - splitting due to loading	$N_{Rk,sp}$
12.	Concrete failure - blow-out	$N_{Rk,cb}$
13.	Reinforcement	$N_{Rk,re}$, $N_{Rd,a}$
14.	Displacement under tension loads	δ_N

Verifications for shear loads for

1.	Distribution of acting shear loads	
2.	Steel failure without lever arm - special screw	$V_{Rk,s,s}$
3.	Steel failure without lever arm - flexure channel lips	$V_{Rk,sl}$
4.	Steel failure with lever arm	$M^0_{Rk,s}$
5.	Concrete failure - pry-out	$V_{Rk,cp}$
6.	Concrete failure - concrete edge	$V_{Rk,c}$
7.	Reinforcement	$V_{Rk,c,re}$
8.	Displacement under shear loads	δ_V

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation and attestation of conformity and CE-marking

3.1 System of attestation of conformity

According to the Decision 2000/273/EC of the European Commission[8] system 2(i) (referred to as system 1) of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

(a) Tasks for the manufacturer:
- (1) factory production control;
- (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

(b) Tasks for the approved body:
- (3) initial type-testing of the product;
- (4) initial inspection of factory and of factory production control;
- (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.[9]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchor channels in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

[8] Official Journal of the European Communities L 86 of 07.04.2000

[9] The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks of the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor channel. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- trade name of the anchor channels and special screws.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Design of anchorages

The fitness of the anchor channel for the intended use is given under the following condition:

The design of the anchorage is based on the CEN/TS 1992-4:2009 "Design of fastenings for use in concrete", part 1 and 3 under the responsibility of an engineer experienced in anchorages and concrete work.

The verification for shear load with supplementary reinforcement follows CEN/TS 1992-4-3:2009, section 6.3.6 and 6.3.7 or alternatively Annexes 16 and 17.

The reduction of the member cross section caused by the anchor channel is taken into account for the verification of the concrete member if necessary.

The member thickness is not less than h_{min} indicated in Annex 7, Table 7.

The edge distance of the anchors on the profile back of the channel is not less than c_{min} indicated in Annex 7, Table 7.

The spacing of the anchors is between the s_{min} and s_{max} given in Annex 5, Table 4.

The spacing of the special screws is not less than $s_{min,s}$ given in Annex 8, Table 8.

The effective anchorage depth is not less than min h_{ef} according to Annex 7, Table 7.

The characteristic resistances are calculated with the minimum effective anchorage depth.

Taking into account the loads to be anchored verifiable calculation notes and drawings are generated.

The position, the size, the length, of the anchor channel, if applicable the spacing of the anchors, and if applicable the position as well as the size of the special screws are indicated on the design drawings. The material of the anchor channel and the special screw is given additionally on the drawings.

4.3 Installation of the anchor channel

The fitness for use of the anchor channel can only be assumed, if the following installation conditions are observed:

- Installation by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- Use of the anchor channel only as supplied by the manufacturer without exchanging the components.
- Installation in accordance with the manufacturer's specifications given in Annexes 18 and 19 and the design drawings.
- The anchor channels are fixed on the formwork 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.
- Size and spacing of special screws corresponding to the design drawings.
- Orientating the special screw (notch according Annex 6) rectangular to the channel axis.
- Observation of the prescribed values (e.g. T_{inst} according Annex 8) of installation.
- The setting torques given in Annex 8 must not be exceeded.

5 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

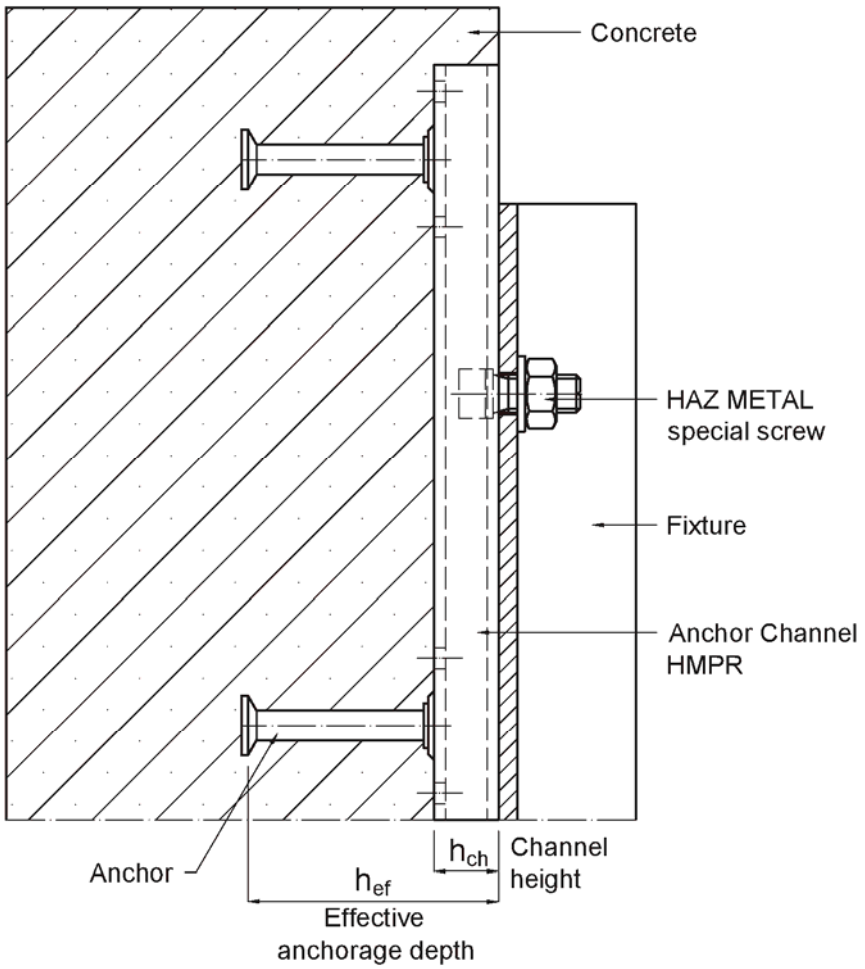
The minimum data required are:

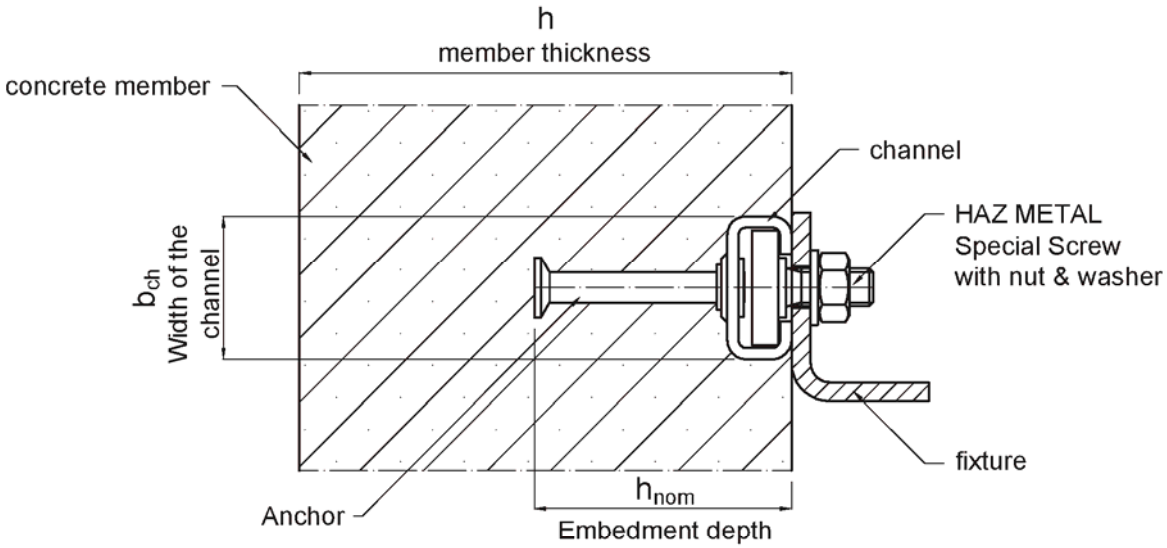
- dimensions of the anchor channel,
- mentioning of the matching screws,
- materials of the anchor channel (channel, anchor, screw , washer, nut)
- details on the installation procedure, preferably by using illustrations,
- maximum setting torque,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Müller





HAZ METAL - Anchor Channel HMPR	**Annex 1**
Product and intended use	

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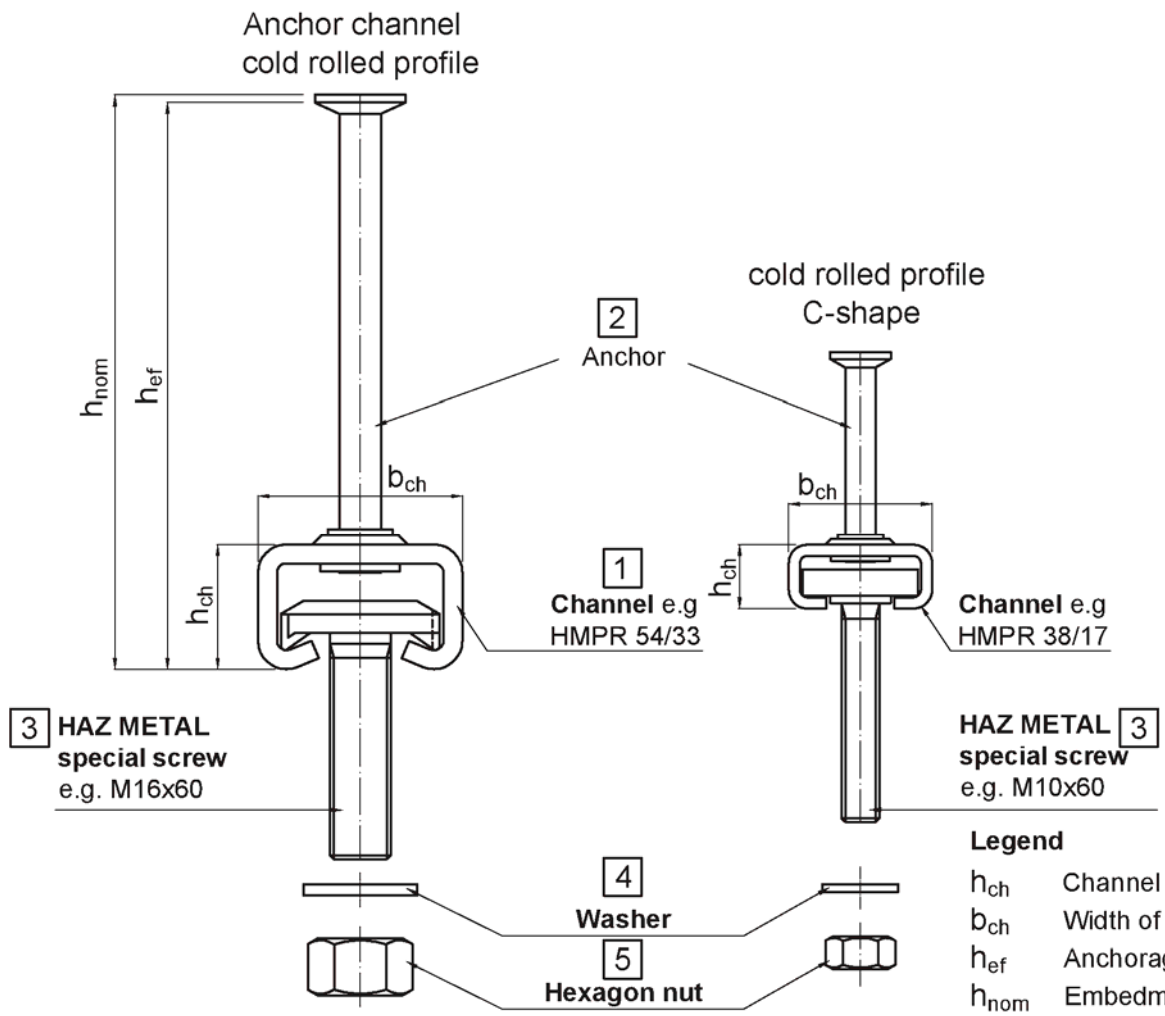
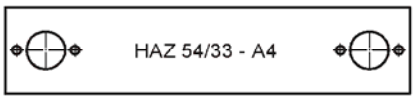


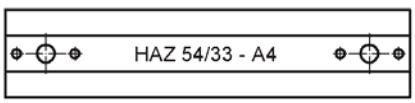
Marking of the HAZ - anchor channel :
e.g. HAZ 54/33 - A4

HAZ = Identifying mark of the manufacturer
54/33 = Size
A4 = Material



Marked on back of channel

or



Marked inside of channel

Material channels :
No marking for 1.0038 / 1.0044

A4 = 1.4401 / 1.4404 / 1.4571
L4 = 1.4362 / 1.4462
HC = 1.4529 / 1.4547

Marking of the HAZ METAL special screw
e.g. HS A4-70

HS = Identifying mark of the manufacturer
A4 - 70 = Material / Strength grade

Material / Strength grade special screws :
4.6 = Strength grade 4.6
8.8 = Strength grade 8.8
A4-50 = Stainless steel (1.4401 / 1.4404 / 1.4571) Strength grade - 50
A4-70 = Stainless steel (1.4401 / 1.4404 / 1.4571) Strength grade - 70
L4-70 = Stainless steel (1.4362 / 1.4462) Grade - 70
HC-70 = Stainless steel (1.4529 / 1.4547) Grade - 70

HAZ METAL - Anchor Channel HMPR	**Annex 2**
Product and marking	

Table1: Materials and intended use

1	2	3	4	5	6
Item no.	Specification	Intended use			
		Dry internal conditions	**Internal conditions with usual humidity**	**Medium corrosion exposure**	**High corrosion exposure**
		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 4)	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 conditions, if no particular agressive conditions (e.g. permanent, alternating immersion in seawater etc. acc column 6) exist.	Anchor channels may also be used in structures subject to exposure in particular agressive conditions (e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools) or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where deicing materials are used)
		Materials			
1	**Channel profile**	Steel 1.0038; 1.0044 EN 10025 hot-dip galv. ≥ 50 µm [4]	Steel 1.0038; 1.0044 EN 10025 hot-dip galv. ≥ 50 µm[4]	Stainless steel 1.4401/ 1.4404/ 1.4571; 1.4362, EN 10088	Stainless steel 1.4462 [1] 1.4529/ 1.4547 EN 10088
2	**Anchor**	Steel 1.0038; 1.0214, 1.0401, 1.1132, 1.5525 EN 10263 hot-dip galv. ≥ 50 µm [4]	Steel 1.0038; 1.0214, 1.0401, 1.1132, 1.5525 EN 10263 hot-dip galv. ≥ 50 µm [4]	Stainless steel 1.4401/ 1.4404/ 1.4571/ 1.4578; 1.4362; 1.0038 [2] EN 10088	
3	**HAZ METAL Special Screw with thread and shaft acc. EN ISO 4018**	Steel, strength grade 8.8 / 4.6 EN ISO 898-1 electroplated ≥ 5 µm [3]	Steel, strength grade 8.8 / 4.6 EN ISO 898-1 hot-dip galv. ≥ 50 µm [4]	Stainless steel 1.4401/ 1.4404/ 1.4571; 1.4362; EN 3506-1	Stainless steel 1.4462 [1], 1.4529/ 1.4547 EN ISO 3506-1
4	**Washer, EN ISO 7089 and EN ISO 7093-1 production class A, 200HV**	Steel EN 10025 electroplated ≥ 5 µm [3]	Steel EN 10025 hot-dip galv. ≥ 50 µm [4]	Stainless steel 1.4401/ 1.4404/ 1.4571; EN 10088	Stainless steel 1.4462 [1] 1.4529/ 1.4547 EN 10088
5	**Hexagonal nuts EN ISO 4032**	Steel, strength grade 8.8 EN 20898-2 electroplated ≥ 5 µm[3]	Steel, strength grade 8.8 EN 20898-2 hot-dip galv. ≥ 50 µm [4]	Stainless steel 1.4401/ 1.4404/ 1.4571 EN ISO 3506-2	Stainless steel 1.4462 [1], 1.4529/ 1.4547 EN ISO 3506-2

1) 1.4462 not applicable fo indoor swimming-pools
2) Steel acc. to EN 10025, 1.0038 not for anchor channels 28/15 and 38/17
3) Electroplated acc. to EN ISO 4042
4) Hot-dip galvanized on the basis of EN ISO 1461, but coating thickness ≥ 50 µm

HAZ METAL - Anchor Channel HMPR

Materials and intended use

Annex 3

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Cold rolled profile

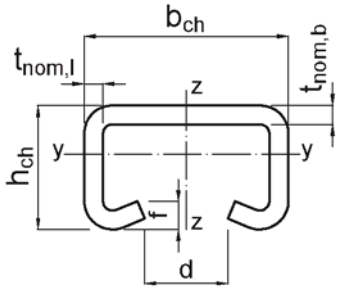

Fig.1

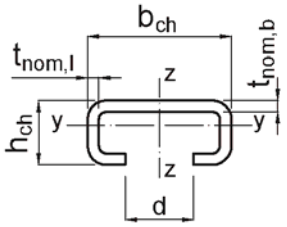

Fig.2

Table 2: Geometrical profile properties

Anchor channel	Figure	Material	Dimensions						
			b_{ch}	h_{ch}	$t_{nom,b}$	$t_{nom,l}$	d	f	I_y
			[mm]						[mm^4]
28/15	2	Steel	28.00	15.00	2.30	2.30	12.00	2.30	3727
38/17	2		38.00	17.00	3.00	3.00	18.00	3.00	7629
40/25	1		40.00	25.00	2.75	2.75	18.00	6.00	19448
49/30	1		49.00	30.00	3.25	3.25	22.00	7.50	41119
54/33	1		54.00	33.00	5.00	5.00	22.00	7.50	72572
28/15	2	Stainless Steel	28.00	15.00	2.30	2.30	12.00	2.30	3727
38/17	2		38.00	17.00	3.00	3.00	18.00	3.00	7629
40/25	1		40.00	25.00	2.75	2.75	18.00	6.00	19448
49/30	1		49.00	30.00	3.25	3.25	22.00	7.50	41119
54/33	1		54.00	33.00	5.00	5.00	22.00	7.50	72572

Cold rolled profile

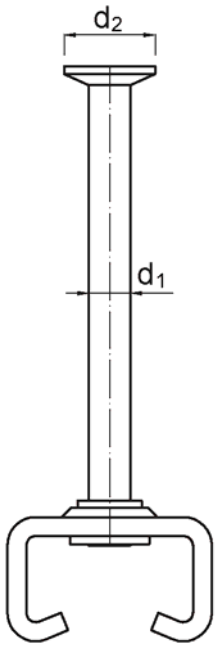

Table 3: Types of round anchors

Type	Shaft Φ d1	Head Φ d2
	[mm]	
R	6	12
	8	16
	10	20
	12	24

HAZ METAL - Anchor Channel HMPR	**Annex 4**
Geometrical profile properties / Types of anchors	

Deutsches Institut für Bautechnik DIBt

Round anchor

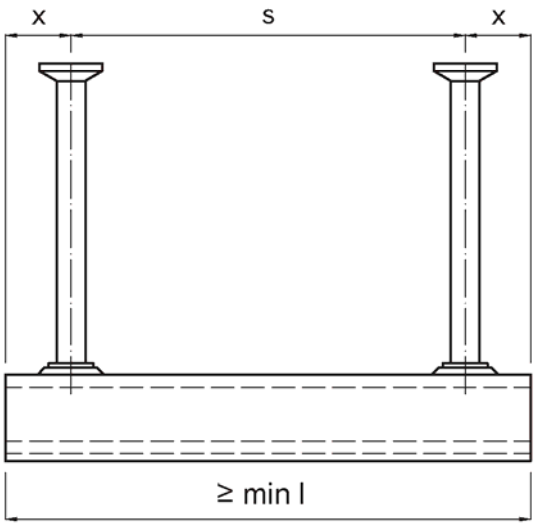

Table 4: Anchor positioning

Anchor channel	Anchor spacing		End spacing x	Min. channel length (min l)
	s_{min}	s_{max}	Round anchor	Round anchor
	[mm]			
28/15 38/17	50	200	25	100
40/25 49/30	100	250	25	150
54/33	100	270	35	170

HAZ METAL - Anchor Channel HMPR	**Annex 5**
Anchors positioning	

Deutsches Institut für Bautechnik DIBt

Hammer-head screw

Fig.1

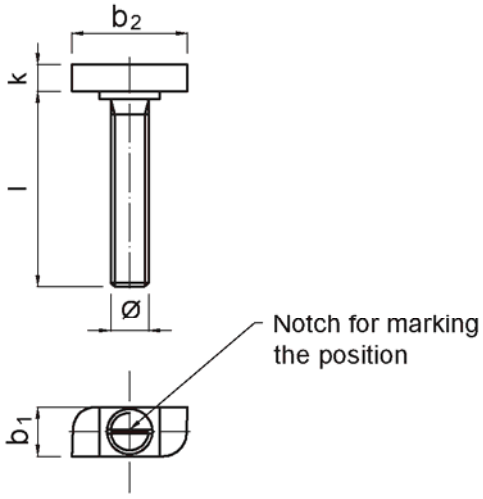

Table 5: Dimensions of the HAZ METAL special screw

Anchor channels	Fig.	Dimensions				Length l
		b1	b2	k	Φ	
		[mm]				[mm]
28/15	1	10	23	4	8	15-200
	1	10	23	5	10	20-300
38/17	1	13	31	6	8	20-300
	1	13	31	6	10	20-300
	1	13	31	7	12	20-300
	1	16	31	7	16	30-300
40/25	2	14	35	7,5	8	20-300
	2	14	35	7,5	10	20-300
	2	14	34	8,5	16	30-300
49/30 54/33	2	13	43,3	10	10	20-300
	2	13	43,3	10	12	20-300
	2	17	43,3	11	16	20-300
	2	21	42,2	12	20	30-300

Hook-head special screw

Fig.2

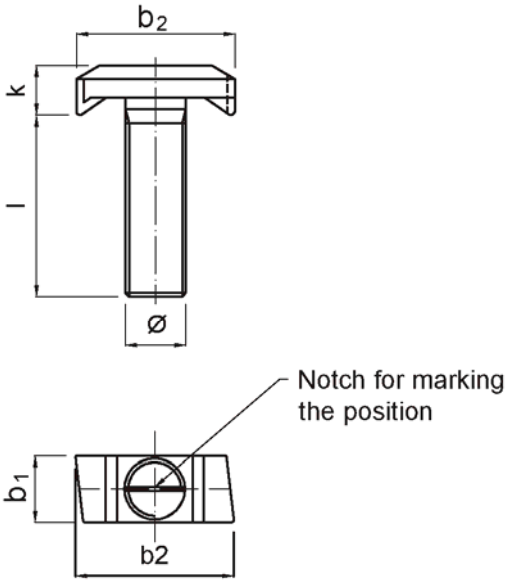

Table 6: Strength grade

Special Screws	Steel [1]		Stainless Steel [1]	
Strength grade	4.6	8.8	A4-50	A4-70
f_{uk} [N/mm^2]	400	800	500	700
f_{yk} [N/mm^2]	240	640	210	450
Finish	z.p., h.d.g		-	

1) Materials according to Annex 3, Table 1

Marking of the special screw head acc. to Annex 2

HAZ METAL - Anchor Channel HMPR	Annex 6
HAZ METAL special screws **Dimensions and strength grade**	

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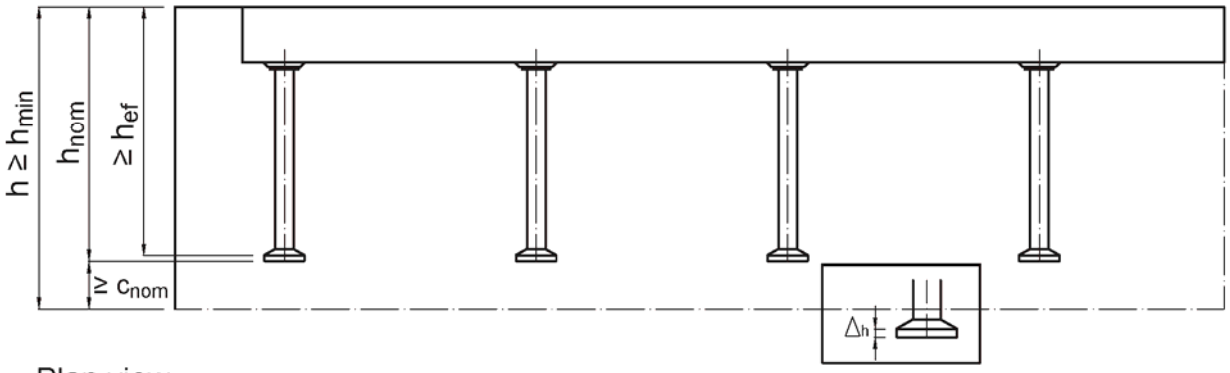
Side view



Plan view

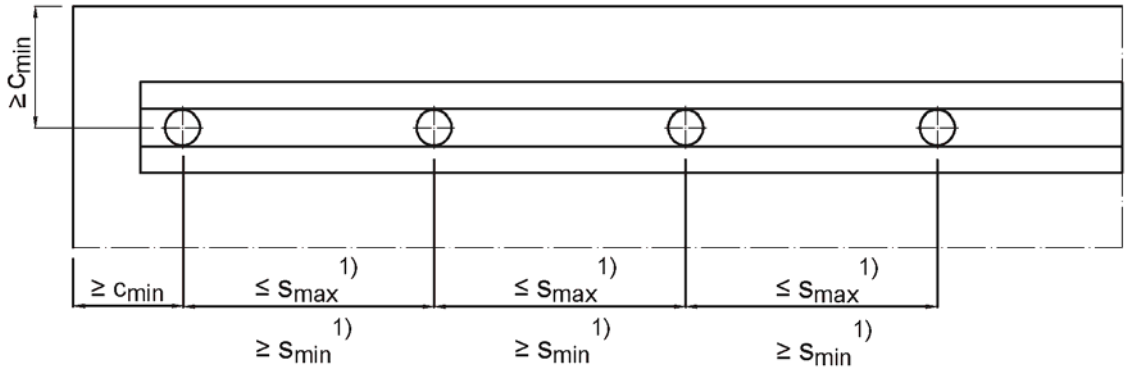


Table 7: Minimum anchorage depth, edge distance and member thickness for cold rolled profiles

Anchor Channel			28/15	38/17	40/25	49/30	54/33
Min. anchorage depth	min h_{ef}	[mm]	45	76	79	94	155
Min. edge distance	c_{min}		40	50	50	75	100
Min. member thickness	h_{min}		$h_{ef} + \Delta_h$ 2) + c_{nom} 3)				

1) s_{min}, s_{max} acc. to Table 4, Annex 5
2) Δ_h = anchor head thickness
3) $c_{nom} \geq 20$ mm and acc. EN 1992-1-1

HAZ METAL - Anchor Channel HMPR	**Annex 7**
Installation parameters for cold anchor channels	

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Table 8: Minimum spacing and setting torque of HAZ METAL special screw

Anchor channel	Special screw Φ	Min. spacing $s_{min,s}$ [4] of the special screw	Setting Torque T_{inst} [5]				
			General [2]	Steel-Steel contact [3]			
			4.6; 8.8; A4-50; A4-70 [1]	4.6	8.8	A4-50 [1]	A4-70 [1]
	[mm]	[mm]	[Nm]				
28/15	8	40	8	-	20	8	-
	10	50	13	-	40	-	40
38/17	8	40	8	8	-	-	-
	10	50	15	15	-	-	40
	12	60	25	-	70	-	70
	16	80	40	-	100	-	120
40/25	8	40	8	8	-	-	-
	10	50	15	15	-	-	40
	16	80	45	-	150	-	120
49/30	10	50	15	-	-	15	-
	12	60	25	-	70	-	50
	16	80	60	-	180	-	180
	20	100	75	-	90	-	-
54/33	10	50	15	-	-	15	-
	12	60	25	-	70	-	50
	16	80	60	-	180	-	180
	20	100	120	-	120	-	-

1) Materials according to Annex 3, Table 1
2) Acc. to Annex 9, Figure 1
3) Acc. to Annex 9, Figure 2
4) See Annex 10, Fig. 1
5) T_{inst} must not be exceeded

HAZ METAL - Anchor Channel HMPR	**Annex 8**
Installation parameters of HAZ METAL special screws	

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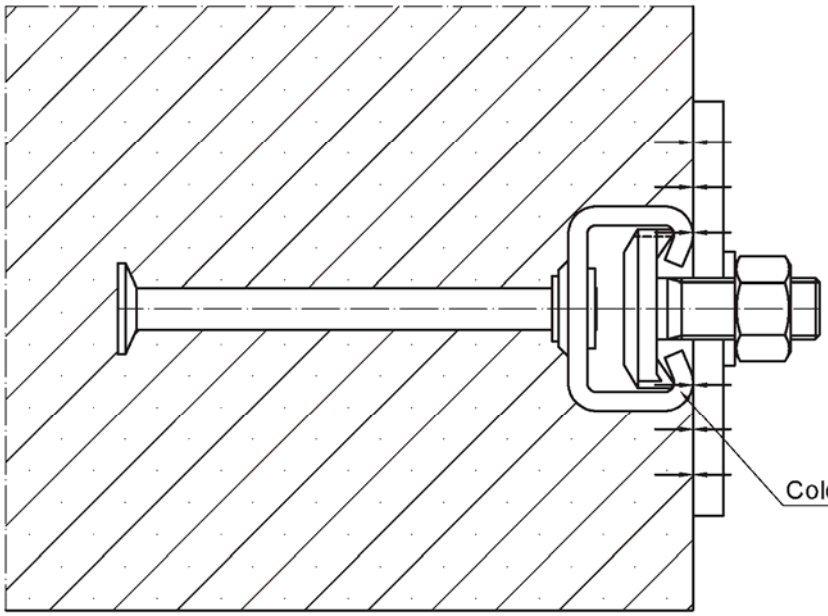

Fig.1

General :

The fixture is braced to the concrete or to the anchor channel respectively braced to concrete and anchor channel.
The setting torques acc.to Annex 8, Table 8 shall be applied and must not be exceeded.

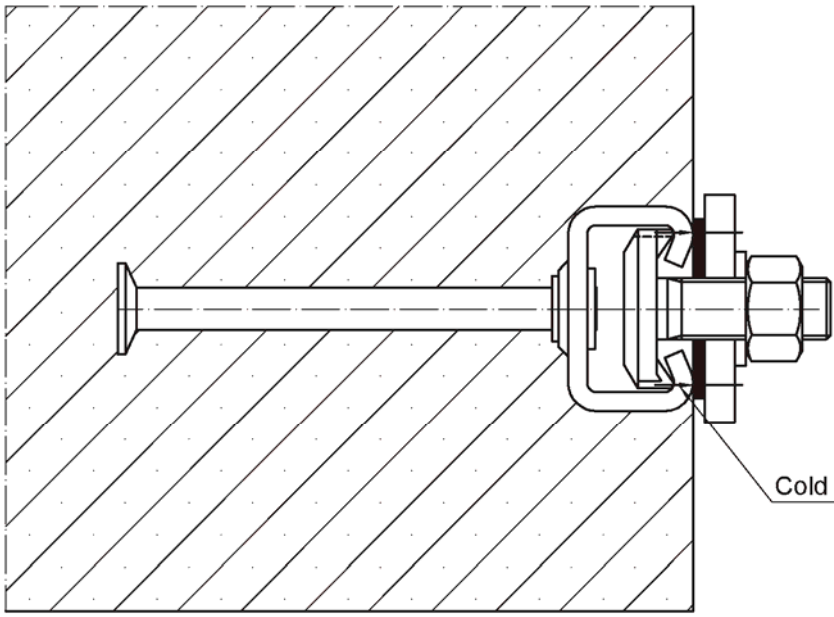

Fig.2

Steel-steel contact :

The fixture is braced to the anchor channel by suitable washer.
The setting torques acc.to Annex 8, Table 8 shall be applied and must not be exceeded.

HAZ METAL - Anchor Channel HMPR	**Annex 9**
Positions of the fixture	

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Table 9: Characteristic values for tension loads - Steel failure channel

Anchor Channel		Steel					Stainless Steel				
		28/15	38/17	40/25	49/30	54/33	28/15	38/17	40/25	49/30	54/33
Steel failure, Anchor											
Characteristic resistance	$N_{Rk,s,a}$ [kN]	14	25	25	39	57	17	30	30	47	68
Partial safety factor	$\gamma_{Ms,a}$ [1)]	1,8					1,8				
Steel failure, Connection Channel anchor											
Characteristic resistance	$N_{Rk,s,c}$ [kN]	13	19	22	31	75	15	22	27	45	66
Partial safety factor	$\gamma_{Ms,c}$ [1)]	1,8					1,8				
Steel failure, Local flexure of channel lips for $s_s \geq s_{slb}$											
Spacing of special screws for $N_{Rk,s,l}$	s_{slb} [mm]	41	47	64	74	80	41	47	64	74	80
Characteristic resistance	$N_{Rk,s,l}$ [kN]	13	19	22	31	75	15	22	27	45	66
Partial safety factor	$\gamma_{Ms,l}$ [1)]	1,8					1,8				
Steel failure, Local flexure of channel lips for $s_{slb} \geq s_s \geq s_{min,s}$ [2)]											
Characteristic resistance	$N_{Rk,s,l}$ [kN]	$0,5\ (1+s_s/s_{slb})\ N_{Rk,s,l} \leq N_{Rk,s,c}$					$0,5\ (1+s_s/s_{slb})\ N_{Rk,s,l} \leq N_{Rk,s,c}$				
Partial safety factor	$\gamma_{Ms,l}$ [1)]	1,8					1,8				

1) In absence of other national regulations
2) $s_{min,s}$ acc.to Table 8, Annex 8

Fig.1

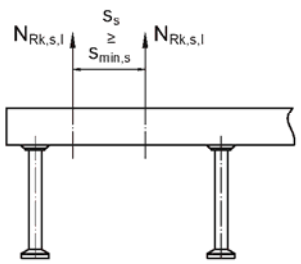

Fig.2

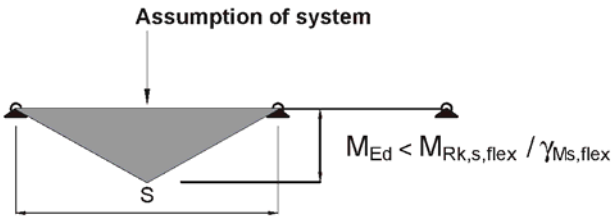

Table 10: Flexure resistance of channel

Anchor channel (Fig.2)				28/15	38/17	40/25	49/30	54/33
Characteristic flexure resistance of channel	$M_{Rk,s,flex}$	[Nm]	Steel	349	595	1356	1893	3257
			Stainless steel	348	651	1048	1840	3101
Partial safety factor	$\gamma_{Ms,flex}$ [1)]			1,15				

1) In absence of other national regulations

HAZ METAL - Anchor Channel HMPR	**Annex 10**
Characteristic values for tension loads Steel failure channel	

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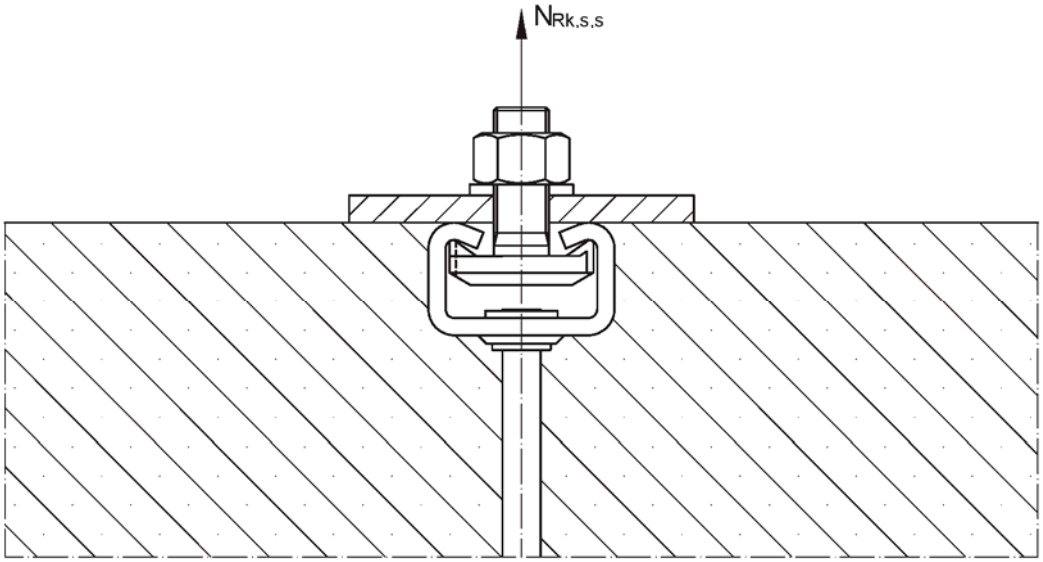
Table 11: Characteristic values for tension loads - Steel failure HAZ METAL special screw

Material			Steel					Stainless Steel				
Anchor Channel			28/15	38/17	40/25	49/30	54/33	28/15	38/17	40/25	49/30	54/33
Steel failure												
Characteristic resistance	$N_{Rk,s,s}$ [2] [kN]	M8 4.6	-	14,3	14,6	-	-					
		M10 4.6	-	23,2	23,2	-	-					
		M8 8.8	29,3	-	-	-	-					
		M10 8.8	38,3	-	-	-	-					
		M12 8.8	-	35,5	-	67,4	67,4					
		M16 8.8	-	55,8	104,3	114,0	114,0					
		M20 8.8	-	-	-	183,1	183,1					
		M8 A4-50 [1]						17,3	-	-	-	-
		M10 A4-50 [1]						-	-	-	29,0	29,0
		M10 A4-70 [1]						31,1	20,5	40,6	-	-
		M12 A4-70 [1]						-	58,6	-	56,8	56,8
		M16 A4-70 [1]						-	53,0	86,3	109,9	109,9
Partial safety factor	$\gamma_{Ms,s}$ [3]	4.6	2,0									
		8.8	1,5									
		A4-50 [1]	2,86									
		A4-70 [1]	1,87									

1) Materials according to Annex 3, Table 1

2) In conformity to EN ISO 898-1 : 1999

3) In absence of other national regulations



Channel under tension load

HAZ METAL - Anchor Channel HMPR	**Annex 11**
Characteristic values for tension loads Steel failure HAZ METAL special screws	

Table 12: Characteristic values for tension loads - Concrete failure

Anchor Channel			**Steel and Stainless Steel**				
			28/15	**38/17**	**40/25**	**49/30**	**54/33**
Pullout failure							
Characteristic resistance in cracked concrete C12/15	Round anchors	$N_{Rk,p}$ [kN]	7,6	13,6	13,6	21,2	30,5
Increasing factor of $N_{Rk,p}$	C20/25	ψ_c	1,67				
	C25/30		2,00				
	C30/37		2,47				
	C35/45		3,00				
	C40/50		3,33				
	C45/55		3,67				
	C50/60		4,00				
		$\psi_{ucr,N}$	1,4				
Partial safety factor		$\gamma_{Mp} = \gamma_{Mc}$ [1)]	1,5				
Concrete cone failure $N^0_{Rk,c}$ see CEN/TS 1992-4-3: 2009, chap. 6.2.5							
		α_{ch}	0,81	0,88	0,88	0,91	0,98
Effective anchorage depth		h_{ef} [mm]	45	76	79	94	155
Characteristic edge distance		$c_{cr,N}$ [mm]	111	171	176	199	260
Characteristic spacing		$s_{cr,N}$ [mm]	223	342	352	399	521
		$\psi_{ucr,N}$	1,4				
Partial safety factor		γ_{Mc} [1)]	1,5				
Splitting							
			Vertification of splitting is not relevant				

1) In absence of other national regulations

Table 13: Displacements under tension loads

Material		**Steel**					**Stainless Steel**				
Anchor channel		**28/15**	**38/17**	**40/25**	**49/30**	**54/33**	**28/15**	**38/17**	**40/25**	**49/30**	**54/33**
Tension Load	N_{Ek} [kN]	3,8	6,5	9,5	17,4	28,3	2,5	4,5	7,4	14,1	24,2
Short time displacement	δ_{N0} [mm]	0,3	0,4	0,5	0,7	0,8	0,3	0,3	0,4	0,6	0,8
Long time displacement	$\delta_{N\infty}$ [mm]	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2

HAZ METAL - Anchor Channel HMPR	**Annex 12**
Characteristic values for tension loads Concrete failure and displacements	

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Table 14: Characteristic values for shear load

Anchor channel			**28/15**	**38/17**	**40/25**	**49/30**	**54/33**
Steel failure, Local flexure of channel lip							
Characteristic resistance	Steel	$V_{Rk,s,l}$ [kN]	13	19	22	31	75
	Stainless Steel		15	22	27	45	66
Partial safety factor		$\gamma_{Ms,l}$ 1)	1,8				
Pry-out failure							
Factor k in equation (31) of CEN/TS 1992-4-3		k_5 3)	2,0				
Partial safety factor		γ_{Mc} 1)	1,5				
Concrete edge failure							
Product of factor α_p and factor $\psi_{re,V}$	Cracked concrete without edge reinforcement of stirrups	$\alpha_p \psi_{re,V}$ [-]	2,5	2,5	2,5	2,5	2,5
	Cracked concrete with straight edge reinforcement (≥ Φ12 mm)	$\alpha_p \psi_{re,V}$ [-]	3,0	3,0	3,0	3,0	3,0
	Non-cracked concrete 2) or cracked concrete with edge reinforcement and stirrups with a spacing a ≤100 mm and a ≤ $2c_1$	$\alpha_p \psi_{re,V}$ [-]	3,5	3,5	3,5	3,5	3,5
Effect of the thickness of the structural component		$\alpha_{h,V}$	$(h/h_{cr,V})^{0,5}$				
Characteristic height		$h_{cr,V}$ [mm]	$2c_1+2h_{ch}$				
Characteristic edge distance		$c_{cr,V}$ [mm]	$2c_1+b_{ch}$				
Characteristic spacing		$s_{cr,V}$ [mm]	$4c_1+2b_{ch}$				
Partial safety factor		γ_{Mc} 1)	1,5				

1) In absence of other national regulations

2) Proof acc. to CEN / TS 1992-4-1:2009, section 5

3) Without supplementary reinforcement. In case of supplementary reinforecement the factor k_5 should

HAZ METAL - Anchor Channel HMPR	**Annex 13**
Characteristic values for shear loads	

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Table 15: Characteristic values for shear loads - Steel failure HAZ METAL Special screws

Material			Steel					Stainless Steel				
Anchor Channel			28/15	38/17	40/25	49/30	54/33	28/15	38/17	40/25	49/30	54/33
Steel failure												
Characteristic resistance	$V_{Rk,s,s}$ [2] [kN]	M8 4.6	-	7,3	7,3	-	-					
		M10 4.6	-	11,6	11,6	-	-					
		M8 8.8	14,6	-	-	-	-					
		M10 8.8	23,2	-	-	-	-					
		M12 8.8	-	33,7	-	33,7	33,7					
		M16 8.8	-	62,8	62,8	62,8	62,8					
		M20 8.8	-	-	-	98,0	98,0					
		M8 A4-50 [1]						9,2	-	-	-	-
		M10 A4-50 [1]						-	-	-	14,5	14,5
		M10 A4-70 [1]						20,3	20,3	20,3	-	-
		M12 A4-70 [1]						-	29,5	-	29,5	29,5
		M16 A4-70 [1]						-	55,0	55,0	55,0	55,0
Characteristic flexure resistance	$M^0_{Rk,s,s}$ [2] [Nm]	M8 4.6	-	15,0	15,0	-	-					
		M10 4.6	-	29,9	29,9	-	-					
		M8 8.8	30,0	-	-	-	-					
		M10 8.8	59,8	-	-	-	-					
		M12 8.8	-	104,8	-	104,8	104,8					
		M16 8.8	-	266,4	266,4	266,4	266,4					
		M20 8.8	-	-	-	519,3	519,3					
		M8 A4-50 [1]						18,7	-	-	-	-
		M10 A4-50 [1]						-	-	-	37,4	37,4
		M10 A4-70 [1]						52,3	52,3	52,3	-	-
		M12 A4-70 [1]						-	91,7	-	91,7	91,7
		M16 A4-70 [1]						-	233,1	233,1	233,1	233,1
Partial safety factor	$\gamma_{Ms,s}$ [3]	4.6	1,67									
		8.8	1,25									
		A4-50 [1]	2,38									
		A4-70 [1]	1,56									

1) Materials according to Table 1, Annex 3

2) In conformity to EN ISO 898-1 : 1999

3) In absence of other national regulations

Table 16: Displacements under shear loads

Material		Steel					Stainless Steel				
Anchor channel		28/15	38/17	40/25	49/30	54/33	28/15	38/17	40/25	49/30	54/33
Shear Load	V_{Ek} [kN]	5,6	8,2	8,8	10,7	17,5	3,1	4,5	6,4	10,4	18,4
Short time displacement	δ_{V0} [mm]	0,1	0,2	0,2	0,2	0,4	0,2	0,3	0,5	0,6	0,7
Long time displacement	$\delta_{V\infty}$ [mm]	0,2	0,3	0,3	0,3	0,6	0,3	0,5	0,8	0,9	1,1

HAZ METAL - Anchor Channel HMPR

Annex 14

Characteristic values for shear loads Steel failure
HAZ METAL special screws and displacements

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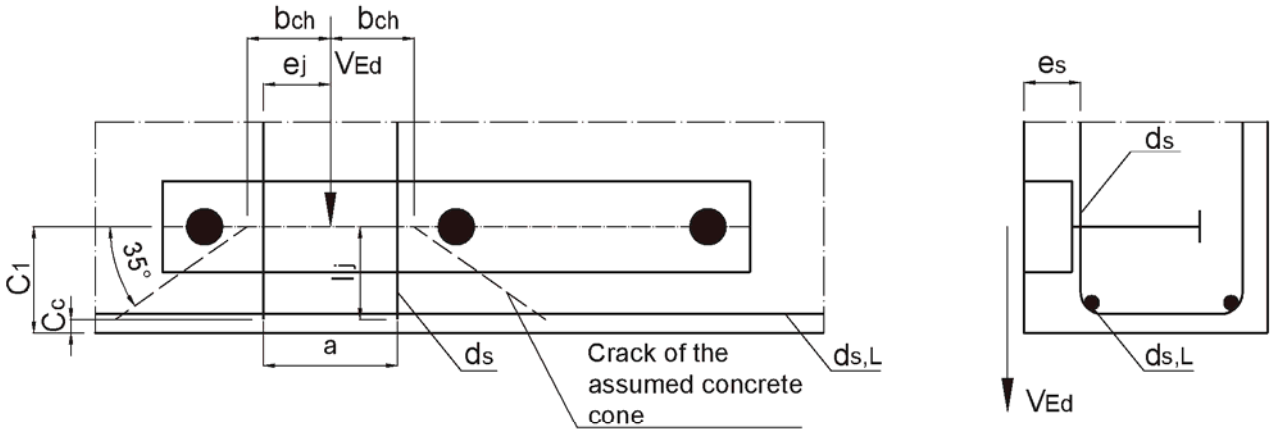
Verification for anchor channels for shear loads with reinforcement (only for loading perpendicular to the edge)



$$V_{Ed} \le V_{Rd,re} = V_{Rk,re} / \gamma_{Mc} \quad (1)$$

$$V_{Ed} = \max\left(V_{Ed}; V_{Ed}^{a}\right)$$

$$V_{Rk,re} = V_{Rk,c,re} / x \quad (2)$$

with

$$V_{Rk,c,re} = V_{Rk,c,hook} + V_{Rk,c,bond} \le V_{Rk,c,re,max} \le \sum_{m+n} A_s \cdot f_{y,k} \quad (3)$$

$$V_{Rk,c,hook} = \sum_{j=1}^{m}\left(\psi_1 \cdot \psi_3 \cdot \psi_4 \cdot A_s \cdot f_{y,k} \cdot \left(\frac{f_{ck}}{30}\right)^{0,1}\right) + \sum_{j=1}^{n}\left(\psi_2 \cdot \psi_3 \cdot \psi_4 \cdot A_s \cdot f_{y,k} \cdot \left(\frac{f_{ck}}{30}\right)^{0,1}\right) \quad (4)$$

$$V_{Rk,c,bond} = \sum_{j=1}^{m+n}\left(\pi \cdot d_s \cdot l_j \cdot f_{bk}\right) \quad (5)$$

$$V_{Rk,c,re,max} = 4{,}2 \cdot c_1^{-0,12} \cdot V_{Rk,c} \quad (6)$$

$$V_{Rk,c} = V_{Rk,c}^{0} \cdot \alpha_{s,V} \cdot \alpha_{c,V} \cdot \alpha_{h,V} \quad (7)$$

Reinforcement requirements

$$50\ \text{mm} \le a \le \begin{cases} s \\ 150\ \text{mm} \\ (c_1 - c_c + 0{,}7 b_{ch} - 4 d_s) / 0{,}35 \\ c_1 - c_c \end{cases} \quad (8)$$

$$6\ \text{mm} \le d_s \le 20\ \text{mm} \quad (9)$$

HAZ METAL - Anchor Channel HMPR	**Annex 15**
Vertification for shear loads with reinforcement	

Deutsches Institut für Bautechnik DIBt

ψ_1 = effectiveness factor
= 0,67 for stirrups directly besides a shear load [1]
- for a stirrup at the location of a shear load [3]
- for a stirrup between 2 shear loads acting on an anchor channel (distance between the loads $p \le S_{cr,V}$ according to Table 16) [2]

ψ_2 = effectiveness factor
= 0,11 for other stirrups in the concrete cone [4]

$\psi_3 = (d_{s,L}/d_s)^{2/3}$

d_s = diameter of stirrup [mm]

$d_{s,L}$ = diameter of edge bars [mm]

$\psi_4 = \left(\frac{l_i}{c_1}\right)^{0.4} \cdot \left(\frac{10}{d_s}\right)^{0.25}$

l_i = anchorage length of a stirrup leg in the concrete cone [mm]
= c1-c_c-0,7.(e_j-b_{ch}) [mm] for stirrups crossed diagonaly by the assumed crack
= c1-c_c [mm] for stirrups directly under the load or for stirrups crossed orthogonally by the assumed crack
≥ 4.ds

c_1 = edge distance [mm]

c_c = concrete cover [mm]

e_j = distance of the stirrup leg to the point of load action [mm]

b_{ch} = width of the anchor channel [mm] (according Table 2)

A_s = cross section of one leg of the stirrup [mm²]

$f_{y,k}$ = characteristic yield strength of the reinforcement [N/mm²]

$f_{c,k}$ = characteristic concrete strength measured on cubes with a side length of 150mm [N/mm²]

$f_{b,k}$ = characteristic bond strength [N/mm²]

m = number of stirrups in the assumed concrete cone with ψ_1

n = number of stirrups in the assumed concrete cone with ψ_2

a = spacing stirrups

x = e_s/z+1 [-]
factor taking into account eccentricity between reinforcement force and load

e_s = distance between reinforcement and shear force acting on the anchor channel

z ≈ 0,85d [mm]
internal lever arm of the concrete member

d = min ($2h_{ef}$, $2c_1$)

$V^0_{Rk,c}$ = according to CEN/TS 992-4-3:2009, section 6.3.5.3

V^a_{Ed} = according to CEN/TS 992-4-1:2009, section 3.2.2

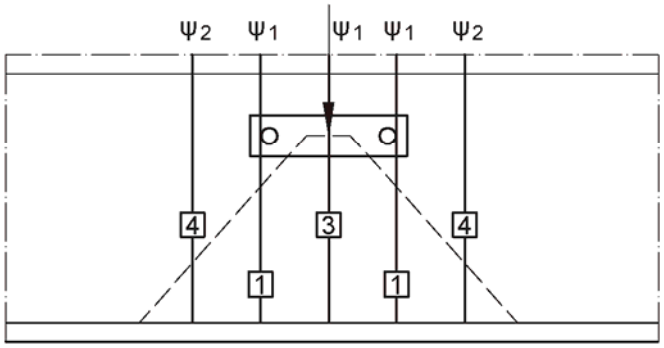


Fig.1 : effectiveness factor for one load

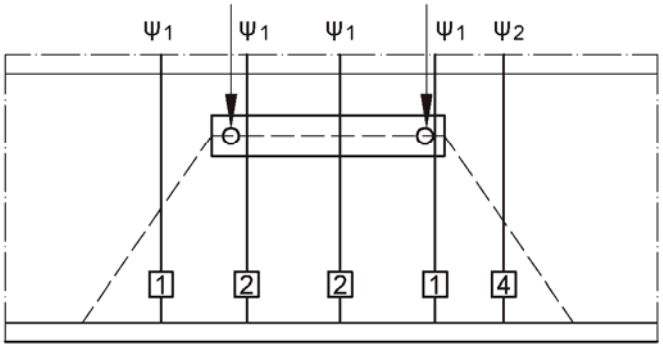


Fig.2 : effectiveness factor for two loads

HAZ METAL - Anchor Channel HMPR	**Annex 16**
Vertification for shear loads with reinforcement	

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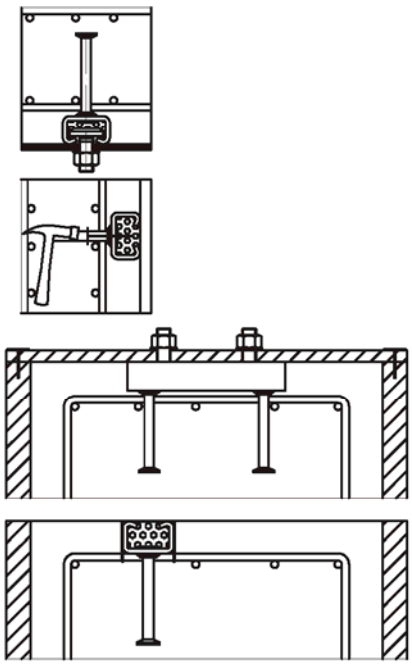
1. Fixing anchor channel

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



a) Fixing to steel formwork

With HAZ METAL special screws and nuts, with rivets cramps or with magneting fixings.

or

b) Fixing to timber formwork

With nails through the pre punched holes in the back of the channels and with staples.

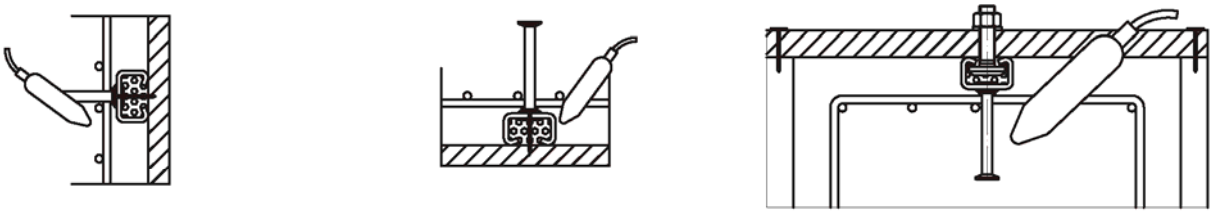
or

c) Fixing to anchor channels at the top

- To timber batten on the side formwork (e.g. with HAZ METAL special screws)
- Fixing from above directly to the reinforcement or to a mounting rebar, attach the channel by wire binding.

2. Pouring concrete and regular compacting of concrete

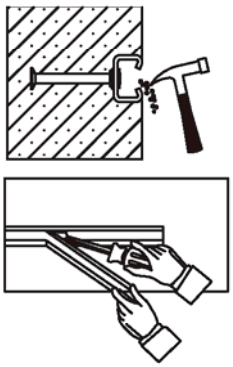
Compact the concrete properly around the channel and the anchors.



a) sidefaces to the formwork or b) in soffits or c) into top surfaces of concrete up stands

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

or

b) PE - foam infill

By hand or with help of a screw driver in one piece

HAZ METAL - Anchor Channel HMPR	**Annex 17**
Manufacturer's Specification Anchor Channel	

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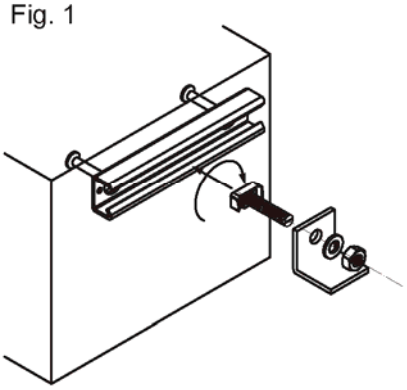
4. Fastening the HAZ METAL special screw to the anchor channel

Fig. 1



a) Setting torques (General)

1. Insert the HAZ METAL special screw into the channel slot at any point along the channel length (Fig.1)
2. Turn the special screw 90^0 clockwise and the head of the screw locks in to position (Fig.1)
3. Do not mount the special screw closer than 25mm resp. 35 mm (HMPR 54/33) from the end of the channel.
4. Use the washer under the nut (Fig.1)
5. Check the correct fit of the screw. The groove on the shank end of the special screw must be perpendicular to the channel longitudinal axis.
6. Tighten the nuts to the setting torque according to Table 17 (Fig.2) The setting torque must not be exceeded.

Fig. 2

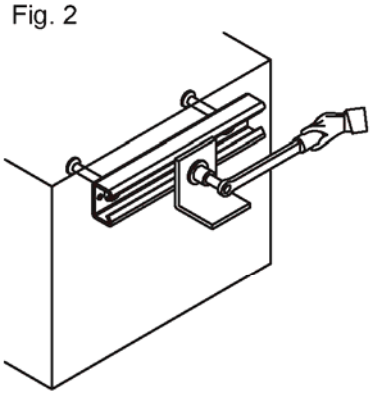
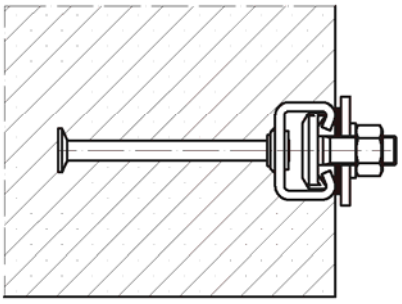


Table 17	Anchor Channel	T_{inst} [Nm]				
		M8	M10	M12	M16	M20
Strength Grade 4.6 8.8 A4-50 A4-70	28/15	8	13	-	-	-
	38/17	8	15	25	40	-
	40/25	8	15	-	45	-
	49/30	-	15	25	60	75
	54/33	-	15	25	60	120

or

b) Setting torques (Steel-to-steel contact)

Fig. 3



1. Use washers between the channel and the fixture to create a defined contact.
2. Tighten the nuts to the setting torque according to Table 18 The setting torque must not be exceeded.

Table 18		Strength / Material Grade	T_{inst} [Nm]				
			M8	M10	M12	M16	M20
Anchor Channel	28/15	8.8	20	40	-	-	-
		A4-50	8	-	-	-	-
		A4-70	-	40	-	-	-
	38/17	4.6	8	15	-	-	-
		8.8	-	-	70	100	-
		A4-70	-	40	70	120	-
	40/25	4.6	8	15	-	-	-
		8.8	-	-	-	150	-
		A4-70	-	40	-	120	-
	49/30	8.8	-	-	70	180	90
		A4-50	-	15	-	-	-
		A4-70	-	-	50	180	-
	54/33	8.8	-	-	70	180	120
		A4-50	-	15	-	-	-
		A4-70	-	-	50	180	-

HAZ METAL - Anchor Channel HMPR	**Annex 18**
Manufacturer's Specification HAZ METAL Special Screw	