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European Technical Assessment Body for construction products



European Technical Assessment

ETA-25/0641 of 16 October 2025

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the **European Technical Assessment:**

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

Deutsches Institut für Bautechnik

IM PURE HX ETA 1+ chemical anchor injection system

Bonded fastener and bonded expansion fastener for use in concrete

Ter Laare B.V. Postbus 355 NL-3140 AJ MAASSLUIS **NIEDERLANDE**

Ter Laare - plant 1

49 pages including 3 annexes which form an integral part of this assessment

EAD 330499-02-0601, Edition 12/2023

8.06.01-269/25 Z223556.25

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Specific Part

1 Technical description of the product

The "IM PURE HX ETA 1+ chemical anchor injection system for concrete" is a bonded anchor consisting of a cartridge with injection mortar Injection mortar IM PURE HX ETA 1+ and a steel element according to Annex A 3 to Annex A 5.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

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 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 of at least 50 and/or 100 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C 1 to C 6, C 8 to C 11, C 13 to C 16, B 3
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1, C 7, C 12, C 17
Displacements under short-term and long-term loading	See Annex C 18 to C 20
Characteristic resistance and displacements for seismic performance categories C1 and C2	See Annex C 21 to C 28

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 29 to C 31

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed

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

In accordance with the European Assessment Document EAD 330499-02-0601 the applicable European legal act is: [96/582/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 European Assessment Document

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

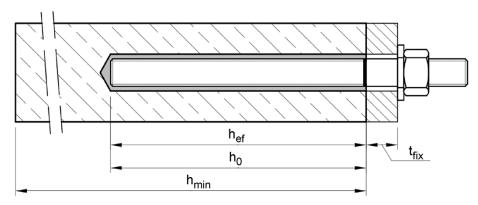
Issued in Berlin on 16 October 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock Head of Section beglaubigt: Baderschneider

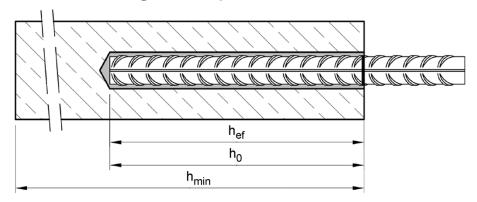


Installation threaded rod M8 up to M30

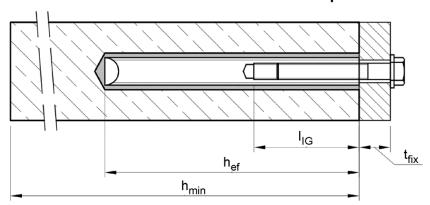
prepositioned installation or push through installation (annular gap filled with mortar)



Installation reinforcing bar Ø8 up to Ø40



Installation internal threaded anchor rod I-M6 up to I-M20



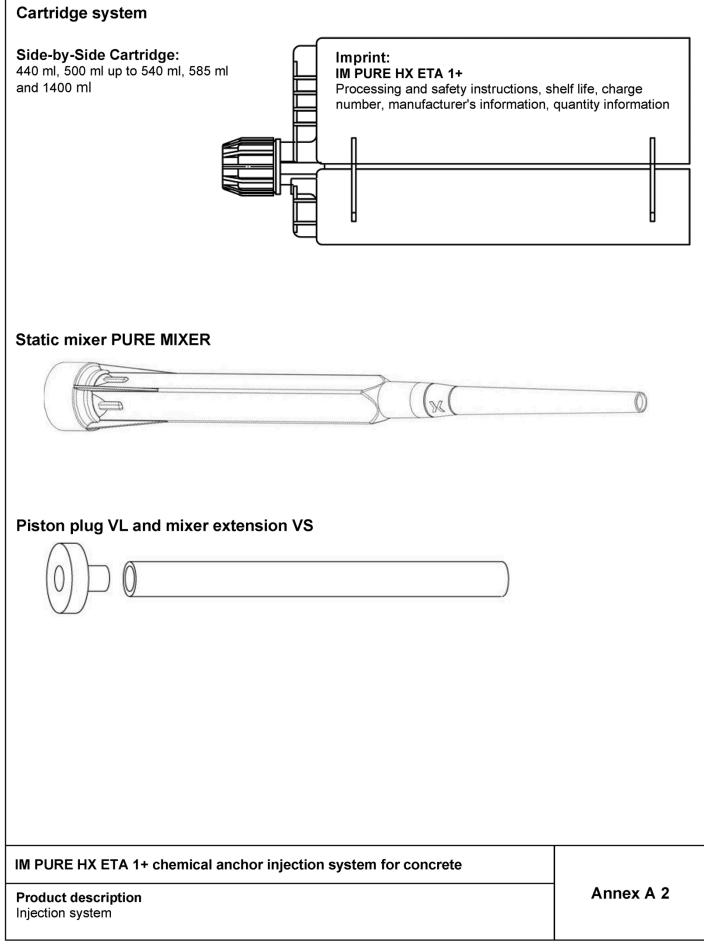
 t_{fix} = thickness of fixture h_0 = drill hole depth

 h_{ef} = effective embedment depth I_{IG} = thread engagement length

h_{min} = minum thickness of member

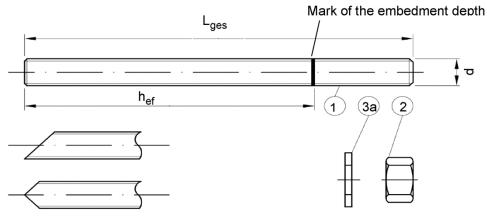
IM PURE HX ETA 1+ chemical anchor injection system for concrete Product description Installed condition Annex A 1







Threaded rod M8 up to M30 with washer and hexagon nut

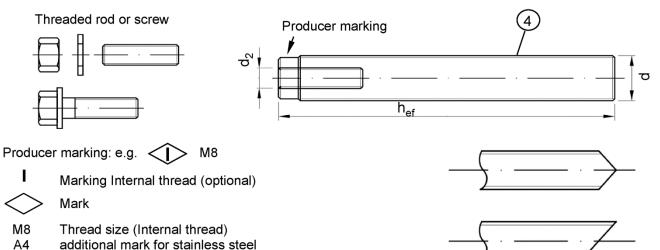


Commercial standard rod with:

- Materials, dimensions and mechanical properties acc. to Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored.
- Marking of embedment depth

For hot dip galvanized elements, the requirements with regards to the combination of nuts and rods according to EN ISO 10684:2004+AC:2009 Annex F shall be considered.

Internal threaded rod I-M6 to I-M20

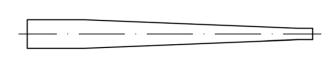


Filling washer VR Mixer reduction nozzle MR

additional mark for property class 8.8

additional mark for high-corrosion resistance steel





IM PURE HX ETA 1+ chemical anchor injection system for concrete

Product description

Threaded rod; Internal threaded rod Filling washer; Mixer reduction nozzle

Annex A 3

HCR

-8



Des	Danimatian	Matarial				
	Designation	Material	2010	or EN 40060-0047)		
		acc. to EN ISO 683-4:2 µm acc. to EN ISO				
				1:2022	2004+AC:2009 or	
		5 μm acc. to EN ISO				
		T		Characteristic steel	Characteristic steel	Elongation at
		Property class		ultimate tensile strength	yield strength	fracture
			4.6	f _{uk} = 400 N/mm ²	f _{yk} = 240 N/mm ²	A ₅ > 8%
1	Threaded rod		4.8	f _{uk} = 400 N/mm ²	f _{yk} = 320 N/mm ²	A ₅ > 8%
	Tilleaded fod	acc. to	5.6	f _{uk} = 500 N/mm ²	f _{yk} = 300 N/mm ²	A ₅ > 8%
		EN ISO 898-1:2013	5.8	f _{uk} = 500 N/mm ²	f _{yk} = 400 N/mm ²	A ₅ > 8%
				f _{uk} = 800 N/mm ²	f _{yk} = 640 N/mm ²	$A_5 \ge 12\%^{3}$
		<u> </u>	4	for anchor rod class 4.6 o	r 4.8	
2	Hexagon nut	acc. to EN ISO 898-2:2022	5 8	for anchor rod class 5.6 o		
		EN 150 090-2.2022	8	for anchor rod class 8.8		
3a	Washer	Steel, zinc plated, ho	t-dip	galvanised or sherardized	7000 0000 - 511100	7004.0000
3b	Filling washer			EN ISO 7089:2000, EN ISC galvanised or sherardized	7093:2000 or EN ISO	7094:2000)
טט	Filling washel		t-uip	Characteristic steel	Characteristic steel	Elongation at
Into		Property class		Unaraciensiic sieei	Characteristic steel	
	laste as all these and and	Froperty class		ultimate tensile strength	vield strenath	
4	Internal threaded		5.8	ultimate tensile strength f _{IJk} = 500 N/mm ²	yield strength f _{vk} = 400 N/mm ²	fracture
4	Internal threaded anchor rod	acc. to EN ISO 898-1:2013		f _{uk} = 500 N/mm ²	f _{yk} = 400 N/mm ²	
	anchor rod	acc. to EN ISO 898-1:2013	8.8	f _{uk} = 500 N/mm ²	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ²	fracture A ₅ > 8%
Stai Stai	anchor rod nless steel A2 (Mater nless steel A4 (Mater	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1	8.8 .431 .457	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023)	fracture A ₅ > 8%
Stai Stai	anchor rod nless steel A2 (Mater nless steel A4 (Mater	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1	8.8 .431 .457	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t r 1.4565, acc. to EN 10088	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023)	fracture A ₅ > 8% A ₅ > 8%
Stai Stai	anchor rod nless steel A2 (Mater nless steel A4 (Mater	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45	8.8 .431 .457	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t r 1.4565, acc. to EN 10088 Characteristic steel	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at
Stai Stai	anchor rod nless steel A2 (Mater nless steel A4 (Mater	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1	8.8 .431 .457 29 o	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t r 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength	fracture A ₅ > 8% A ₅ > 8% Elongation at fracture
Stai Stai Higl	anchor rod nless steel A2 (Mater nless steel A4 (Mater	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class	8.8 .431 .457 29 or	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t r 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ²	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$
Stai Stai Higl	anchor rod nless steel A2 (Maternless steel A4 (Maternless steel A4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45	8.8 .431 .457 29 or	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t 1 .4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ²	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$
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Stai Stai Higl	anchor rod nless steel A2 (Material (Material Corrosion resistant) Threaded rod 1)4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class acc. to EN ISO 3506-1:2020	8.8 .431 .457 29 or	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t 1 .4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ²	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$
Stai Stai HigI	anchor rod nless steel A2 (Maternless steel A4 (Maternless steel A4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class acc. to EN ISO 3506-1:2020 acc. to	8.8 .431 .457 29 or 50 70 80 50 70	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² f _{uk} = 800 N/mm ² for anchor rod class 50 for anchor rod class 70	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$
Stai Stai Higl	anchor rod nless steel A2 (Material (Material Corrosion resistant) Threaded rod 1)4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class acc. to EN ISO 3506-1:2020 acc. to EN ISO 3506-1:2020	8.8 .431 .457 29 or 50 70 80 50 70 80	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² f _{uk} = 800 N/mm ² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ² f _{yk} = 600 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$ $A_5 \ge 12\%^3$
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Stai Stai Higl	anchor rod nless steel A2 (Material (Material Corrosion resistant) Threaded rod 1)4) Hexagon nut 1)4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45) Property class acc. to EN ISO 3506-1:2020 A2: Material 1.4301 / A4: Material 1.4401 / HCR: Material 1.4529	8.8 .431 .457 29 or 1 .430 .70 .80 .70 .80 .1.43 .1.44 .9 or 1	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 307 / 1.4311 / 1.4567 or 1.4 1.4565, acc. to EN 10088-1	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ² f _{yk} = 600 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$) $A_5 \ge 12\%^3$) 1:2023 1:2023
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Stai Stai HigI	anchor rod nless steel A2 (Material (Material Corrosion resistant) Threaded rod 1)4) Hexagon nut 1)4)	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class acc. to EN ISO 3506-1:2020 A2: Material 1.4301 / A4: Material 1.4401 / HCR: Material 1.4529 (e.g.: EN ISO 887:20 Stainless steel A4, H	8.8 .431 .457 29 of 50 70 80 70 80 1.43 1.44 9 or 1	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 807 / 1.4311 / 1.4567 or 1.4 1.4565, acc. to EN 10088-1 EN ISO 7089:2000, EN ISC. corrosion resistance steel	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ² f _{yk} = 600 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$ $A_5 \ge 12\%^3$ $A_5 \ge 12\%^3$ 1:2023 1:2023 7094:2000)
Stai Stai Higl	anchor rod nless steel A2 (Materials steel A4	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45) Property class acc. to EN ISO 3506-1:2020 A2: Material 1.4301 / A4: Material 1.4401 / HCR: Material 1.4529 (e.g.: EN ISO 887:20	8.8 .431 .457 29 of 50 70 80 70 80 1.43 1.44 9 or 1	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² for anchor rod class 50 for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 807 / 1.4311 / 1.4567 or 1.4 1.4565, acc. to EN 10088-1 EN ISO 7089:2000, EN ISC	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ² f _{yk} = 600 N/mm ² 541, acc. to EN 10088-578, acc. to EN 10088-:2023 7093:2000 or EN ISO	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$ $A_5 \ge 12\%^3$ $A_5 \ge 12\%^3$ 1:2023 1:2023 7094:2000)
Stai	anchor rod nless steel A2 (Materials steel A4	acc. to EN ISO 898-1:2013 rial 1.4301 / 1.4307 / 1 rial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class acc. to EN ISO 3506-1:2020 A2: Material 1.4301 / A4: Material 1.4401 / HCR: Material 1.4529 (e.g.: EN ISO 887:20 Stainless steel A4, H	8.8 .431 .457 29 or 70 80 .70 80 1.43 1.44 9 or 1 igh c	f _{uk} = 500 N/mm ² f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1.4565, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm ² f _{uk} = 700 N/mm ² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 s07 / 1.4311 / 1.4567 or 1.4 soc. to EN 10088-1 EN ISO 7089:2000, EN ISC corrosion resistance steel Characteristic steel	f _{yk} = 400 N/mm ² f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength f _{yk} = 210 N/mm ² f _{yk} = 450 N/mm ² f _{yk} = 600 N/mm ²	fracture $A_5 > 8\%$ $A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 12\%^3$) $A_5 \ge 12\%^3$) 1:2023 1:2023 7094:2000)

⁴⁾ Property class 80 only for stainless steel A4 and HCR

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Product description Materials threaded rod, Internal threaded anchor rod and filling washer	Annex A 4

 ²⁾ for I-M20 only property class 50
 3) A₅ > 8% fracture elongation if no use for seismic performance category C2



Reinforcing bar: ø8 up to ø40



Minimum value of related rip area $f_{R,min}$ according to EN 1992-1-1:2004+AC:2010 Rib height of the bar shall be in the range $0.05d \le h_{rib} \le 0.07d$ (d: Nominal diameter of the bar; h_{rib} : Rib height of the bar)

Table A2: Materials Reinforcing bar

Part	Designation	Material
Reba	ar	
1	Reinforcing steel according to EN 1992-1-1:2004+AC:2010, Annex C	Bars and rebars from ring class B or C f_{yk} and k according to NDP or NCI according to EN 1992-1-1/NA f_{uk} = f_{tk} = $k \cdot f_{yk}$

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Product description
Materials reinforcing bar

Annex A 5



Specification of t	the intend	ed use							
Fasteners subject	to (Static	<u> </u>							
			e 50 years 0/25 to C90/105			00 years 5 to C90/105			
Ва	ase material	uncracked concrete	cracked concrete	uncracked concrete		cracked concrete			
HD: Hammer drilling HDB: Hammer drilling hollow drill bit CD: Compressed air		M8 to Ø8 to	M30, Ø32, DI-M20	M Ø	18 to M 88 to Ø //6 to I-	30, 32,			
HD: Hammer drilling CD: Compressed air	drilling	Ø36 to Ø40 No performance assessed Ø36 to Ø4				No performance assessed			
DD: Diamond drilling		M8 to M30, ∅8 to ∅40, I-M6 to I-M20 M8 to M30, ∅8 to ∅40, I-M10 to I-M20 ⁴⁾ M8 to M30, ∅8 to ∅40, I-M6 to I-M20				No performance assessed			
Temperature Range:		I: - 40°C II: - 40°C III: - 40°C	0°C to 0°C to 0°C to	+72°C ²⁾					
Fasteners subject	to (seismi	c action):							
		Performance	Performance Category C1 Performance						
Ва	se material	Crac	ked and uncracked c	oncrete C20/25 to	to C50/60				
HD: Hammer drilling HDB: Hammer drilling hollow drill bit CD: Compressed air			M8 to M30, ∅8 to ∅32						
DD: Diamond drilling		No performar	nce assessed	No perfor	ormance assessed				
Temperature Range:		l: - 40°C II: - 40°C III: - 40°C	to +40°C¹) to +72°C²) to +80°C³)		O°C to O°C to	+72°C ²⁾			
Fasteners subject	to (fire exp	oosure):							
Ва	se material	Crac	ked and uncracked co	oncrete C20/25 to	o C50/6	60			
HD: Hammer drilling HDB: Hammer drilling hollow drill bit CD: Compressed air			M8 to ⊘8 to I-M6 to	Ø32,					
DD: Diamond drilling			No performar						
Temperature Range:			I: - 40°C : II: - 40°C : III: - 40°C :	to +72°C ²⁾					
1) (max. long-term temp 2) (max. long-term temp 3) (max. long-term temp 4) C20/25 to C50/60 onl	erature +50°(erature +60°(C and max. short-term t	emperature +72°C)						
IM PURE HX ETA 14	+ chemical	anchor injection s	ystem for concrete						
Intended use Specifications					Α	Annex B 1			



Base materials:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A2:2021.
- Strength classes C20/25 to C90/105 according to EN 206:2013 + A2:2021.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006 + A1:2015 corresponding to corrosion resistance class:
 - Stainless steel Stahl A2 according to Annex A 4, Table A1: CRC II
 - Stainless steel Stahl A4 according to Annex A 4. Table A1: CRC III
 - High corrosion resistance steel HCR according to Annex A 4, Table A1: CRC V

Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored.
 The position of the fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).
- Fasteners are designed under the responsibility of an engineer experienced in fasteners and concrete work.
- The fasteners are designed in accordance to EN 1992-4:2018 and Technical Report TR 055, Edition February 2018:
- The fasteners under fire exposure are designed in accordance to Technical Report TR 082, Edition June 2023.

Installation:

- Dry, wet concrete or flooded bore holes (not sea-water).
- Hole drilling by hammer (HD), hollow (HDB), compressed air (CD) or diamond drill mode (DD).
- Overhead installation allowed.
- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Intended use Specifications (Continued)	Annex B 2



Table B1:												
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30	
Diameter of elemen	d = d _{nom}	[mm]	8	10	12	16	20	24	27	30		
Nominal drill hole di	ameter	d ₀	[mm]	10	12	14	18	22	28	30	35	
Effective embedment depth hef,			[mm]	60	60	70	80	90	96	108	120	
Effective embedmer	п аериі	h _{ef,max}		160	200	240	320	400 480 540 6			600	
Diameter of	Prepositioned ins		[mm]	9	12	14	18	22	26	30	33	
clearance hole in the fixture	Push through i		[mm]	12	14	16	20	24	30	33	40	
Maximum installatio	n torque	max T _{inst}	[Nm]	10	20	40 ¹⁾	60	100	170	250	300	
Minimum thickness	of member	h _{min}	[mm]	1	f + 30 m 100 mr			h _{ef} + 2d₀				
Minimum spacing		s _{min}	[mm]	40	50	60	75	95	115	125	140	
Minimum edge dista	ince	c _{min}	[mm]	35	40	45	50					

¹⁾ Maximum installation torque for M12 with steel Grade 4.6 is 35 Nm

Table B2: Installation parameters for reinforcing bar

Reinforcing bar			Ø	8 ¹⁾	Ø 1	10 ¹⁾	Ø 1	12 ¹⁾	Ø 14	Ø 16	Ø 20	ø	24 ¹⁾	Ø	25 ¹⁾	Ø 28	Ø 32	Ø 36	Ø 40
Diameter of element	d = d _{nom}	[mm]	8	3	1	0	1	2	14	16	20	2	4	2	25	28	32	36	40
Nominal drill hole diameter	d ₀	[mm]	10	12	12	14	14	16	18	20	25	30	32	30	32	35	40	45	52/55
Effective embedment	h _{ef,min}	[mm]	6	60 60		7	0	75	80	90	9	6	1	00	112	128	144	160	
depth	h _{ef,max}	[mm]		60	20	-	_	40	280	320	400	48	30	5	00	560	640	720	800
Minimum thickness of member	h _{min}	[mm]	h			30 mm ≥ 0 mm						h	l _{ef} +	- 2d	0				
Minimum spacing	s _{min}	[mm]	4	0	5	0	6	0	70	75	95	12	20	1:	20	130	150	180	200
Minimum edge distance	c _{min}	[mm]	3	5	4	0	4	5	50	50	60	7	0	7	'0	75	85	180	200

¹⁾ both nominal drill hole diameter can be used

Table B3: Installation parameters for Internal threaded anchor rod

Internal threaded anchor rod			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20	
Internal diameter of anchor rod	d ₂		6	8	10	12	16	20	
Outer diameter of anchor rod1)	$d = d_{nom}$	[mm]	10	12	16	20	24	30	
Nominal drill hole diameter	d ₀	[mm]	12	14	18	22	28	35	
Effective embedment depth	h _{ef,min}	[mm]	60	70	80	90	96	120	
Effective embedment depth	h _{ef,max}		200	240	320	400	480	600	
Diameter of clearance hole in the fixture	d _f ≤		7	9	12	14	18	22	
Maximum installation torque	max T _{inst}	[Nm]	10	10	20	40	60	100	
Thread engagement length min/max	I _{IG}	[mm]	8/20	8/20	10/25	12/30	16/32	20/40	
Minimum thickness of member	h _{min}	[mm]		30 mm 0 mm	h _{ef} + 2d ₀				
Minimum spacing	s _{min}	[mm]	50	60	75	95	115	140	
Minimum edge distance	c _{min}	[mm]	40	45	50	60	65	80	
1) 1050 (-) - (1	1	1						1	

¹⁾ With metric threads

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Intended use

Installation parameters

Annex B 3



: Para	ameter cle	anin	g and	instal	latio	n tools						
					manni	A PROPERTY.						
Re- inforcing bar	Internal threaded anchor rod	Drill	-	1 "	-	d _{b,min} Piston of p						
[mm]	[mm]	ſm	CD		[mm]	[mm]		•				
	[]			MR10								
	I-M6											
		_				'		No plug	required			
	-											
	I-M10						VL18					
	-							1				
-	I-M12											
20	-							 				
_	I-M16			MB28		28,5	VL28			all		
24 / 25	-	3	30	MB30	31,8	30,5	VL30	[−] 250 mm	[→] 250 mm	¹ 250 mm	250 mm	
24 / 25	-	3	32	MB32	34,0	32,5	VL32					
28	I-M20	3	35	MB35	37,0	35,5	VL35	1				
32	-	4	10	MB40	43,5	40,5	VL40					
36	-		15	MB45	47,0	45,5	VL45					
40	-	52	_	MB52	54,0	52,5	VL52	all	all	all		
40	-	-	55	MB55	58,5	55,5	VL55					
	allation to	ols	55	MBSS		The hollow dril	l system cand a classure of 253	s M hoover v	vith a minimu	um		
	Re- inforcing bar [mm] 8 8 / 10 10 / 12 12 14 16 - 20 - 24 / 25 28 32 36 40 J and inst	Re- Internal threaded anchor rod [mm]	Re-inforcing bar Internal threaded anchor rod DD	Re-inforcing bar Internal threaded anchor rod Internal t	Re-inforcing bar Internal threaded anchor rod Drill bit - Ø Brush	Re-inforcing bar Internal threaded anchor rod Drill bit - Ø Brush - Ø	Re-inforcing bar Internal threaded anchor rod DD HD, HDB, CD HDB, HDB, CD HDB, HDB, HDB, HDB, HDB, HDB, HDB, HDB,	Re-inforcing bar Internal threaded anchor rod Drill bit - Ø Drill bit and a class Dr	Internal threaded anchor rod DD HD, HDB, CD Brush - Ø Brush - Ø Brush - Ø Piston plug Immin. Brush - Ø Piston plug Immin. Brush - Ø Immin. Brus	Internal threaded anchor rod DD HDB, CD HDB, MDB, MDB, MDB, MDB, MDB, MDB, MDB, M		

Brush MB



Piston Plug VL



Brush extension KOP



IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Intended use Cleaning and installation tools	Annex B 4



Table B5:	Worki	ng and curing	j time	
Tempera	ture in bas	se material	Maximum working time	Minimum curing time ¹⁾
	Т		t _{work}	t _{cure}
+ 0°C	to	+ 4 °C	80 min	144 h
+5°C to +9°C			80 min	48 h
+ 10 °C to + 14 °C			60 min	28 h
+ 15°C	to	+ 19°C	40 min	18 h
+ 20 °C	to	+ 24 °C	30 min	12 h
+ 25 °C	to	+ 34 °C	12 min	9 h
+ 35 °C	to	+ 39 °C	8 min	6 h
	+ 40 °C		8 min	4 h
Cartr	idge tempe	erature	+5°C to	+40°C

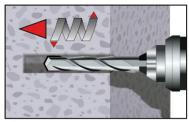
¹⁾ The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Intended use Working time and curing time	Annex B 5

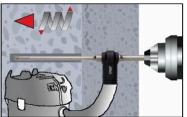


Installation instructions

Drilling of the bore hole (HD, HDB, CD)



1a. Hammer drilling (HD) / Compressed air drilling (CD) Drill a hole to the required embedment depth. Drill bit diameter according to Table B1, B2 or B3. Aborted drill holes shall be filled with mortar. Proceed with Step 2.

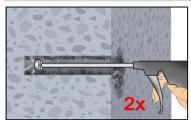


Hollow drill bit system (HDB) (see Annex B 4)
Drill a hole to the required embedment depth.
Drill bit diameter according to Table B1, B2 or B3.
The hollow drilling system removes the dust and cleans the bore hole.
Proceed with Step 3.

Attention! Standing water in the bore hole must be removed before cleaning.

Compressed Air Cleaning (CAC):

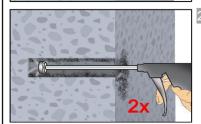
All diameter in cracked and uncracked concrete



Blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)



Brush the bore hole minimum 2x with brush MB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension KOP shall be used.)



Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

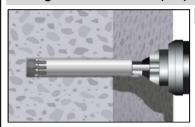
Cleaned bore hole has to be protected against re-contamination in an appropriate way, If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Intended use Installation instructions	Annex B 6



Installation instructions (continuation)

Drilling of the bore hole (DD)



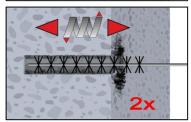
Diamond drilling (DD)
Drill a hole to the required embedment depth required
Drill bit diameter according to Table B1, B2 or B3.
Aborted drill holes shall be filled with mortar.
Proceed with Step 2.

Flush & Compressed Air Cleaning (SPCAC):

All diameter in uncracked concrete



2a. Flushing with water until clear water comes out.



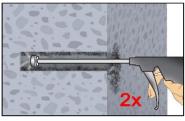
Brush the bore hole minimum 2x with brush MB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension KOP shall be used.)



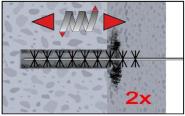
Flushing again with water until clear water comes out.

Attention! Standing water in the bore hole must be removed before proceeding.

2c.



Blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)



2e. Brush the bore hole minimum 2x with brush MB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension KOP shall be used.)

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Intended use

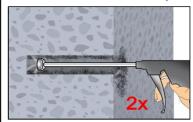
Installation instructions (continuation)

Annex B 7

7223554.25 8.06.01-269/25

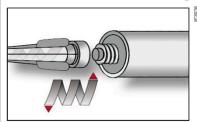


Installation instructions (continuation)



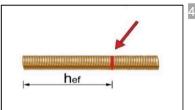
Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar, oil-free) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

Cleaned bore hole has to be protected against re-contamination in an appropriate way, If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.



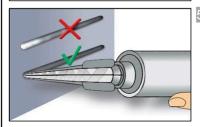
Screw on static-mixing nozzle PURE MIXER and load the cartridge into an appropriate dispensing tool.

For every working interruption longer than the maximum working time t_{work} (Annex B 5) as well as for new cartridges, a new static-mixer shall be used.



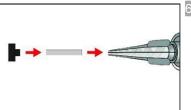
Mark embedment depth on the anchor rod.

The anchor rod shall be free of dirt, grease, oil or other foreign material.



Not proper mixed mortar is not sufficient for fastening.

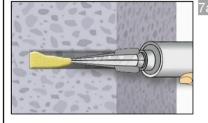
Dispense and discard mortar until an uniform grey or red colour is shown (at least 3 full strokes).



Piston plugs VL and mixer nozzle extensions VS shall be used according to Table B4 for the following applications:

- Horizontal and vertical downwards direction: Drill bit-Ø $d_0 \ge 18$ mm and embedment depth $h_{\rm ef} > 250$ mm
- Vertical upwards direction: Drill bit- \emptyset d₀ \ge 18 mm

Assemble mixing nozzle, mixer extension and piston plug before injecting mortar.



Injecting mortar without piston plug VL:

Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.) Slowly withdraw of the static mixing nozzle avoid creating air pockets Observe the temperature related working time t_{work} (Annex B 5).

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Intended use

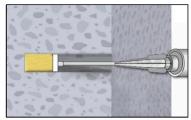
Installation instructions (continuation)

Annex B 8

7223554.25 8.06.01-269/25



Installation instructions (continuation)



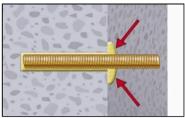
7b. Injecting mortar with piston plug VL:

Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.) During injection the piston plug is pushed out of the bore hole by the back pressure of the mortar.

Observe the temperature related working time t_{work} (Annex B 5).

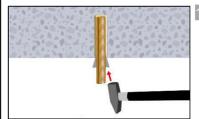


Insert the anchor rod while turning slightly up to the embedment mark.

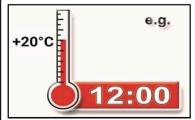


Annular gap between anchor rod and base material must be completely filled with mortar. In case of push through installation the annular gap in the fixture must be filled with mortar also.

Otherwise, the installation must be repeated starting from step 7 before the maximum working time \mathbf{t}_{work} has expired.



For application in vertical upwards direction the anchor rod shall be fixed (e.g. wedges).



11. Temperature related curing time t_{cure} (Annex B 5) must be observed. Do not move or load the fastener during curing time.



Install the fixture by using a calibrated torque wrench. Observe maximum installation torque (Table B1 or B3).

In case of static requirements (e.g. seismic), fill the annular gab in the fixture with mortar (Annex A 2). Therefore replace the washer by the filling washer VR and use the mixer reduction nozzle MR.

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Intended use

Installation instructions (continuation)

Annex B 9

7223554.25 8.06.01-269/25



T	Table C1: Characteristic values for steel tension resistance and steel shear resistance of threaded rods											
Threaded rod M8 M10 M12 M16 M20 M24 M27 I										M30		
Cr	ross section area	A _s	[mm²]	36,6	58	84,3	157	245	353	459	561	
Cł	naracteristic tension resistance, Steel failu	re ¹⁾						•				
St	eel, Property class 4.6 and 4.8	N _{Rk,s}	[kN]	15 (13)	23 (21)	34	63	98	141	184	224	
St	eel, Property class 5.6 and 5.8	N _{Rk,s}	[kN]	18 (17)	29 (27)	42	78	122	176	230	280	
St	eel, Property class 8.8	N _{Rk,s}	[kN]	29 (27)	46 (43)	67	125	196	282	368	449	
St	ainless steel A2, A4 and HCR, class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177	230	281	
St	ainless steel A2, A4 and HCR, class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247	_3)	_3)	
	ainless steel A4 and HCR, class 80	N _{Rk,s}	[kN]	29	46	67	126	196	282	_3)	_3)	
Cł	naracteristic tension resistance, Partial fac	tor ²⁾										
St	eel, Property class 4.6 and 5.6	γ _{Ms,N}	[-]				2,0					
	eel, Property class 4.8, 5.8 and 8.8	γMs,N	[-]				1,					
	ainless steel A2, A4 and HCR, class 50	γMs,N	[-]				2,8					
	ainless steel A2, A4 and HCR, class 70	γMs,N	[-]	1,87								
	ainless steel A4 and HCR, class 80	γ _{Ms,N}	[-]				1,6	3				
Cł	naracteristic shear resistance, Steel failure	1)	I	I				I	l			
arm	Steel, Property class 4.6 and 4.8	V ⁰ _{Rk,s}	[kN]	9 (8)	14 (13)	20	38	59	85	110	135	
	Steel, Property class 5.6 and 5.8	V ⁰ _{Rk,s}	[kN]	11 (10)	17 (16)	25	47	74	106	138	168	
eve	Steel, Property class 8.8	V ⁰ Rk,s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224	
ont.	Stainless steel A2, A4 and HCR, class 50	$V^0_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140	
Without lever	Stainless steel A2, A4 and HCR, class 70	V ⁰ Rk,s	[kN]	13	20	30	55	86	124	_3)	_3)	
>	Stainless steel A4 and HCR, class 80	V ⁰ Rk,s	[kN]	15	23	34	63	98	141	_3)	_3)	
	Steel, Property class 4.6 and 4.8	M ⁰ Rk,s	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900	
arm	Steel, Property class 5.6 and 5.8	M ⁰ _{Rk,s}	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123	
		M ⁰ _{Rk,s}	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797	
h lever	Stainless steel A2, A4 and HCR, class 50	M ⁰ _{Rk,s}	[Nm]	19	37	66	167	325	561	832	1125	
	Stainless steel A2, A4 and HCR, class 70	M ⁰ _{Rk,s}	[Nm]	26	52	92	232	454	784	_3)	_3)	
	Stainless steel A4 and HCR, class 80	M ⁰ _{Rk,s}	[Nm]	30	59	105	266	519	896	_3)	_3)	
Cł	Characteristic shear resistance, Partial factor ²⁾											
Steel, Property class 4.6 and 5.6 $\gamma_{Ms,V}$ [-] 1,67						7						
						1,2	:5					
Stainless steel A2, A4 and HCR, class 50 $\gamma_{Ms,V}$ [-] 2,38												
Stainless steel A2, A4 and HCR, class 70 $\gamma_{Ms,V}$ [-] 1,56												
St	ainless steel A4 and HCR, class 80	$\gamma_{Ms,V}$	[-]				1,3	3				
1	1) Values are only valid for the given stress area A. Values in brackets are valid for undersized threaded rods with smaller											

¹⁾ Values are only valid for the given stress area A_s. Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009.

³⁾ Fastener type not part of the ETA

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values for steel tension resistance and steel shear resistance of threaded rods	Annex C 1

²⁾ in absence of national regulation



Table C2:	Table C2: Characteristic values of tension loads under static and quasi-static action for a working life of 50 and 100 years										
Fastener	Fastener All Fastener type and sizes										
Concrete cone f	ailure										
Uncracked concr	ete	k _{ucr,N}	[-]	11,0							
Cracked concrete	k _{cr,N}	[-]	7,7								
Edge distance	c _{cr,N}	[mm]	1,5 h _{ef}								
Axial distance		s _{cr,N}	[mm]	2 c _{cr,N}							
Splitting			<u>'</u>								
	h/h _{ef} ≥ 2,0			1,0 h _{ef}							
Edge distance	2,0 > h/h _{ef} > 1,3	C _{cr,sp}	[mm]	$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$							
	h/h _{ef} ≤ 1,3			2,4 h _{ef}							
Axial distance		s _{cr,sp}	[mm]	2 c _{cr,sp}							

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under static and quasi-static action for a working life of 50 and 100 years	Annex C 2



	racteristic val			s und	der st	atic a	ınd q	uasi-	static	actio	n
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel failure											
Characteristic tension res	istance	N _{Rk,s}	[kN]			$A_{s} \cdot f_{l}$	_{ık} (or s	ee Tab	le C1)		
Partial factor		γ _{Ms,N}	[-]				see Ta	ble C1			
Combined pull-out and											
Characteristic bond resist	ance in uncracked	d concrete C20.	/25 in hamr ⊺			ľ				d holes	(CD)
E 24°C/40°C	Dry, wet			20	20	19	19	18	17	16	16
II: 50°C/72°C III: 60°C/80°C	concrete or flooded bore	^τ Rk,ucr	[N/mm²]	15	15	15	14	13	13	12	12
<u>□</u> III:60°C/80°C	hole			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
Characteristic bond resist	ance in uncracked	d concrete C20	/25 in hamr	ner dril	led hole	es with	hollow	drill bit	(HDB))	
<u>ω</u> Ι: 24°C/40°C				17	16	16	16	15	14	14	13
1: 24°C/40°C 1: 50°C/72°C	Dry or wet			14	14	14	13	13	12	12	11
º III:60°C/80°C	concrete			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
I: 24°C/40°C		^τ Rk,ucr	[N/mm²]	16	16	16	15	15	14	14	13
II: 50°C/72°C	flooded bore			14	14	14	13	13	12	12	11
HII:60°C/80°C	hole			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
Characteristic bond resist	⊥ ance in cracked c	⊥ oncrete C20/25	⊥ 5 in hamme		_ ′		,				
and in hammer drilled hol						, , ,					
at 1: 24°C/40°C	Dry, wet	[₹] Rk,cr	[N/mm²]	7,0	7,0	8,5	8,5	8,5	8,5	8,5	8,5
III: 50°C/80°C	concrete or flooded bore hole			6,0	6,0	7,0	7,0	7,0	7,0	7,0	7,0
<u>α</u> III:60°C/80°C	Tiole			5,0	5,0	5,0	4,5	4,5	4,5	4,5	4,5
Reduction factor $\psi^0_{ extsf{sus}}$ in holes (CD) and in hamme				hamme	er drille	d holes	s (HD),	compre	essed a	air drille	d
្នា	Dry, wet			0,80							
II: 50°C/72°C	concrete or	Ψ ⁰ sus	[-]	0,68							
II: 24°C/40°C II: 50°C/72°C III: 60°C/80°C	flooded bore hole			0,70							
·	≤ C50/60			(f _{ck} / 20) ^{0,1}							
Increasing factors for concrete	> C50/60	Ψc	[-]	1,1							
Characteristic bond resist		τ _{Rk,ucr} =		Ψ _c • τ _{Rk,ucr,(C20/25)}							
on the concrete strength		τ _{Rk,cr} =						cr,(C20/2			
Concrete cone failure o	r Splitting	1 1 111,01					- 1315,	,(02012			
Relevant parameter Installation factor							see Ta	ble C2			
for dry and wet concrete (HD: HDB CD)						1	,0			
for flooded bore hole (HD)		γinst	[-]					,2			
IM PURE HX ETA 1+ chemical anchor injection system for concrete											
Performances Characteristic values of for a working life of 50			l quasi-stat	ic actio	on			-	Anne	x C 3	



Table C4: Characteristic values of tension loads under static and quasi-static action for a working life of 100 years												
Thread					M8	M10	M12	M16	M20	M24	M27	M30
Steel fa			T.,	T	Ι					L 04)		
	teristic tension res	istance	N _{Rk,s}	[kN]			A _s ·1	_{uk} (or s		ie C1)		
Partial 1			γ _{Ms,N}	[-]				see Ta	able C1			
	ned pull-out and eteristic bond resist		d concrete C20	/25 in hamr	ner dril	led (HC)) and	compre	ssed a	ir drille	d holes	(CD)
	I: 24°C/40°C		001101010 020	/20 111 1141111	20	20	19	19	18	17	16	16
Temperature range	II: 50°C/72°C	Dry, wet concrete or flooded bore	^τ Rk,ucr,100	[N/mm²]	15	15	15	14	13	13	12	12
Temp	III:60°C/80°C	hole			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
Charac	teristic bond resist	ance in uncracke	d concrete C20	/25 in hamr	ner dril	led hole	es with	hollow	drill bi	t (HDB))	
a)	I: 24°C/40°C				17	16	16	16	15	14	14	13
ang	II: 50°C/72°C	Dry or wet			14	14	14	13	13	12	12	11
lrer	III:60°C/80°C	concrete			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
eratı	I: 24°C/40°C		^τ Rk,ucr,100	[N/mm²]	16	16	16	15	15	14	14	13
Temperaturerange	II: 50°C/72°C	flooded bore			14	14	14	13	13	12	12	11
Le Le	III:60°C/80°C	hole			6,5	6,5	6,5	6,0	6,0	5,5	5,5	5,5
	teristic bond resist hammer drilled hol			in hamme	r drilled	holes	(HD) ,	compre	essed a	air drille	d holes	(CD)
	I: 24°C/40°C	Dry, wet concrete or flooded bore	^T Rk,cr,100	[N/mm²]	6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5
Temperature range	II: 50°C/72°C				5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5
Ter	III:60°C/80°C	hole			5,0	5,0	5,0	4,5	4,5	4,5	4,5	4,5
	ion factor ψ ⁰ sus,10 CD) and in hamme				5 in har	nmer d	rilled h	oles (H	D), cor	npress	ed air d	Irilled
tur	I: 24°C/40°C	Dry, wet		[-]	0,80							
nperatu range	II: 50°C/72°C	concrete or	Ψ ⁰ sus,100		0,68							
Temperatur e range	III:60°C/80°C	flooded bore hole	345,100	''	0,70							
<u> </u>	sing factors for	≤ C50/60			(f _{ck} / 20) ^{0,1}							
concret	-	> C50/60	Ψc	[-]	1,1							
	teristic bond resist		τ _{Rk,ucr,100} =				Ψ _c •	^τ Rk,ucr	,100,(C2	20/25)		
	concrete strength		τ _{Rk,cr,100} =				Ψ c '	^τ Rk,cr,	100,(C2	0/25)		
	ete cone failure o	r Splitting			Ι				hl- 00			
	nt parameter ation factor							see 1a	able C2			
for dry and wet concrete (HD: HDB_CD)						,0						
for flooded bore hole (HD; HDB, CD) γ_{inst} [-] 1,2												
									Ī			
Perfo Chara	IM PURE HX ETA 1+ chemical anchor injection system for concrete Performances Characteristic values of tension loads under static and quasi-static action for a working life of 100 years (threaded rod)							-	Anne	x C 4		



Table		racteristic va a working life			ls und	der st	atic a	and q	uasi-	static	actio	on
Thread	ed rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel fa	ailure											
Charac	teristic tension re	sistance	$N_{Rk,s}$	[kN]			$A_{s} \cdot f_{l}$	_{uk} (or s	ee Tab	le C1)		
Partial f	actor		γ _{Ms,N}	[-]				see Ta	able C1			
Combii	ned pull-out and	concrete failure	•	•								
Characteristic bond resistance in uncracked concrete C20/25 in diamond drilled holes (DD)												
iture	I: 24°C/40°C	Dry, wet			15	14	14	13	12	12	11	11
Temperature range	II: 50°C/72°C	concrete or flooded bore	^τ Rk,ucr	[N/mm²]	12	12	11	10	9,5	9,5	9,0	9,0
Ten	III:60°C/80°C	hole			5,5	5,5	5,0	4,5	4,5	4,5	4,0	4,0
Charac	teristic bond resis	tance in cracked c	oncrete C20/2	5 in diamon	d drille	d holes	(DD)					
ture	I: 24°C/40°C	Dry, wet						5,5	5,5	5,5	5,5	5,4
Temperature range	II: 50°C/72°C	concrete or flooded bore	^T Rk,cr	^τ Rk,cr	[N/mm²]	1)		4,6	4,6	4,6	4,6	4,5
Ter	III:60°C/80°C	hole					2,4	2,3	2,4	2,4	2,3	
Reducti	ion factor ψ ⁰ sus in	uncracked concre	ete C20/25 in d	liamond drill	ed hole	es (DD))					
ture	I: 24°C/40°C	Dry, wet			0,77							
Temperature range	II: 50°C/72°C	concrete or flooded bore	Ψ ⁰ sus	[-]	0,72							
Tem	III:60°C/80°C	hole			0,72							
		≤ C50/60						(f _{ck} / 2	20) ^{0,2}			
Increas	ing factors for e	> C50/60	Ψc,ucr	[-]	1,2							
		≤ C50/60	Ψc,cr	[-]				(f _{ck} / 2	20) ^{0,4}			
Charact	teristic bond resis	tance depending	τ _{Rk,ucr} =	'			Ψc.u	cr • τ _{Rk}	,ucr,(C2	0/25)		
on the concrete strength class $\tau_{Rk,cr} = \psi_{c,cr} \cdot \tau_{Rk,cr,(C20/25)}$												
	te cone failure c	or Splitting										
Relevant parameter see Table C2												
Installation factor												
for dry and wet concrete (DD) for flooded bore hole (DD) 7inst [-] 1,0 1,4												
	erformance asses	<u>'</u>		•	•			•				

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under static and quasi-static action for a working life of 50 years (threaded rod)	Annex C 5



Table C6: Characteristic values of tension loads under static and quasi-static action for a working life of 100 years											
Threaded rod	M10	M12	M16	M20	M24	M27	M30				
Steel failure											
Characteristic tension resistance $N_{Rk,s}$ [kN] $A_s \cdot f_{uk}$ (or see Table C1)											
Partial factor		$\gamma_{Ms,N}$	[-]				see Ta	ble C1			
Combined pull-out and	concrete failure										
Characteristic bond resist	ance in uncracked	d concrete C20	/25 in diam	ond dri	lled hol	es (DD)				
धु ।: 24°C/40°C	Dry, wet			15	14	14	13	12	12	11	11
II: 24°C/40°C III: 50°C/72°C III: 60°C/80°C	concrete or flooded bore	^τ Rk,ucr,100	[N/mm²]	11	11	10	10	9,5	9,0	8,5	8,5
HII:60°C/80°C	hole			5,5	5,5	5,0	4,5	4,5	4,5	4,0	4,0
Reduction factor ψ ⁰ _{sus,100}	o in uncracked co	ncrete C20/25 i	n diamond	drilled	holes (l	DD)		'			
한 I: 24°C/40°C	Dry, wet			0,73							
Line	concrete or flooded bore	Ψ ⁰ sus,100	[-]	0,70							
III:60°C/80°C	hole			0,72							
Increasing factors for	≤ C50/60		.,	(f _{ck} / 20) ^{0,2}							
concrete	> C50/60	Ψc	[-]	1,2							
Characteristic bond resist on the concrete strength of		τ _{Rk,ucr,100} =		Ψc • τRk,ucr,100,(C20/25)							
Concrete cone failure or		'									
Relevant parameter							see Ta	ble C2			
Installation factor											
for dry and wet concrete (for flooded bore hole (DD)		γ _{inst}	[-]	1,0							

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 6
Characteristic values of tension loads under static and quasi-static action for a working life of 100 years (threaded rod)	



Table C7: Characteristic for a working I					nder s	tatic a	ınd qu	asi-st	atic acti	on	
Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure without lever arm											
Characteristic shear resistance Steel, strength class 4.6, 4.8 and 5.6, 5.8	[kN]	0,6 ⋅ A _s ⋅ f _{uk} (or see Table C1)									
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all strength classes	V ⁰ _{Rk,s}	[kN]	0,5 ⋅ A _s ⋅ f _{uk} (or see Table C1)								
Partial factor	γ _{Ms,V}	[-]	see Table C1								
Ductility factor k ₇ [-]				1,0							
Steel failure with lever arm											
Characteristic bending moment	M ⁰ _{Rk,s}	[Nm]		1,2 ⋅ W _{el} ⋅ f _{uk} (or see Table C1)							
Elastic section modulus	W _{el}	[mm³]	31	62	109	277	541	935	1387	1874	
Partial factor	$\gamma_{Ms,V}$	[-]				see	Table C	:1			
Concrete pry-out failure											
Factor	k ₈	[-]					2,0				
Installation factor	γ_{inst}	[-] 1,0									
Concrete edge failure											
Effective length of fastener I _f [mm]				min(h _{ef} ; 12 · d _{nom}) min(h _{ef} ; 300mm)						300mm)	
Outside diameter of fastener	d _{nom}	[mm]	8 10 12 16 20 24 27 30					30			
Installation factor	γinst	[-]	1,0								

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of shear loads under static and quasi-static action for a working life of 50 and 100 years (threaded rod)	Annex C 7



Table C8:		eristic value rking life of			ads un	ider sta	tic and	quasi-s	tatic ac	tion	
Internal threa	ded anchor rod	s			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20	
Steel failure ¹⁾											
Characteristic	tension resistand	e, <u>5.8</u>	$N_{Rk,s}$	[kN]	10	17	29	42	76	123	
Steel, strength class 8.8		$N_{Rk,s}$	[kN]	16	27	46	67	121	196		
Partial factor,	strength class 5.8	3 and 8.8	γMs,N	[-]			1	,5			
	tension resistand ICR, Strength cla		N _{Rk,s}	[kN]	14	26	41	59	110	124	
Partial factor			γMs,N	[-]			1,87			2,86	
Combined pu	II-out and conci	ete cone failui	re								
Characteristic	bond resistance		oncrete C	20/25 in h	ammer dr	illed (HD)	and comp	ressed ai	r drilled ho	les (CD	
	I: 24°C/40°C	Dry, wet			20	19	19	18	17	16	
Temperature II: 50°C/72°C	concrete or flooded bore	τ _{Rk,ucr}	[N/mm²]	15	15	14	13	13	12		
range	III:60°C/80°C	hole			6,5	6,5	6,0	6,0	5,5	5,5	
Characteristic	bond resistance	in uncracked co	ncrete C	20/25 in h	ammer dr	illed holes	with hollo	w drill bit	(HDB)		
	I: 24°C/40°C	D=			16	16	16	15	14	13	
Temperature range II: 60°0 II: 50°0 II: 50°0	II: 50°C/72°C	Dry or wet concrete		[N/mm²]	14	14	13	13	12	11	
	III:60°C/80°C	Concrete	τ		6,5	6,5	6,0	6,0	5,5	5,5	
	I: 24°C/40°C	flooded bose	^τ Rk,ucr		16	16	15	15	14	13	
	II: 50°C/72°C	flooded bore hole			14	14	13	13	12	11	
III:60°C/80°C					6,5	6,5	6,0	6,0	5,5	5,5	
	bond resistance r drilled holes wit	h hollow drill bi		/25 in ham	ımer drille	ed holes (F	HD), comp	ressed air	drilled ho	les (CD)	
T	I: 24°C/40°C	Dry, wet	τ _{Rk,cr}		7,0	8,5	8,5	8,5	8,5	8,5	
Temperature range	II: 50°C/72°C	concrete or flooded bore		[N/mm²]	6,0	7,0	7,0	7,0	7,0	7,0	
range	III:60°C/80°C	hole			5,0	5,0	4,5	4,5	4,5	4,5	
	or ψ ⁰ sus in crac d in hammer drille				5 in hamı	mer drilled	holes (HI	O), compre	essed air o	drilled	
	I: 24°C/40°C	Dry, wet			0,80						
Temperature range	II: 50°C/72°C	concrete or flooded bore	Ψ^0_{sus}	[-]	0,68						
range	III:60°C/80°C	hole			0,70						
la sus s sia a fo si		≤ C50/60		.,			(f _{ck} / 2	20) ^{0,1}			
increasing fact	tors for concrete	> C50/60	Ψc	[-]				,1			
Characteristic	bond resistance	depending on		τ _{Rk,ucr} =			Ψ c • τ _{Rk,ι}	ucr,(C20/25)	ı		
the concrete strength class				τ _{Rk,cr} =			Ψ c • τ _{Rk,}	cr,(C20/25)			
	e failure or Spli	tting									
Relevant para							see Ta	able C2			
Installation fa											
	t concrete (HD; H		γinst	[-]				,0			
	e hole (HD; HDE	· · · · · · · · · · · · · · · · · · ·			o motori-	l and near		,2	and through	d rod	
	(incl. nut and was teristic tension res									a roa.	
2\ =					oul						

²⁾ For I-M20 strength class 50 is valid

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under static and quasi-static action for a working life of 50 years (Internal threaded anchor rod)	Annex C 8



Table C9:		eristic value rking life of			ıds und	der stat	ic and (quasi-s	tatic ac	tion
Internal threa	ded anchor rods	S			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Steel failure ¹⁾										
Characteristic	tension resistand	e, <u>5.8</u>	N _{Rk,s}	[kN]	10	17	29	42	76	123
Steel, strength class 8.8		N _{Rk,s}	[kN]	16	27	46	67	121	196	
Partial factor, s	strength class 5.8	3 and 8.8	γMs,N	[-]			1	,5		
	tension resistand ICR, Strength cla		N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial factor			γMs,N	[-]			1,87			2,86
Combined pu	II-out and concr	rete cone failu	re							
Characteristic	bond resistance	in uncracked c	oncrete C20	0/25 in har	nmer dril	led (HD) a	and comp	ressed air	drilled ho	les (CE
_	I: 24°C/40°C	Dry, wet			20	19	19	18	17	16
Temperature range	II: 50°C/72°C	concrete or flooded bore	τ _{Rk,ucr.100}	[N/mm²]	15	15	14	13	13	12
	III:60°C/80°C	hole			6,5	6,5	6,0	6,0	5,5	5,5
Characteristic	bond resistance	1	oncrete C20)/25 in har			<u> </u>	<u>'</u>		-,-
				16	16	16	15	14	13	
Temperature range	II: 50°C/72°C	Dry or wet concrete	TRk,ucr,100		14	14	13	13	12	11
	III:60°C/80°C	Concrete		[N/mm²]	6,5	6,5	6,0	6,0	5,5	5,5
	I: 24°C/40°C	flooded bore		[[[[[[[[[[[[[[[[[[[16	16	15	15	14	13
	II: 50°C/72°C	hole			14	14	13	13	12	11
III:60°C/80°C The control of the c		<u> </u>	1 000/0		6,5	6,5	6,0	6,0	5,5	5,5
	bond resistance r drilled holes wit	h hollow drill bi		5 in namm	ner drilled	noies (H	D), compr	essed air	arilled no	les (CL
	I: 24°C/40°C	Dry, wet			6,5	7,5	7,5	7,5	7,5	7,5
Temperature range	II: 50°C/72°C	concrete or flooded bore	τ _{Rk,cr,100}	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5
range	III:60°C/80°C	hole			5,0	5,0	4,5	4,5	4,5	4,5
	or ${\psi^0}_{ extsf{Sus},100}$ in (CD) and in hamm	er drilled holes				ammer dri			mpressed	air
Temperature	I: 24°C/40°C	Dry, wet concrete or						80		
range	II: 50°C/72°C	flooded bore	Ψ^0 sus,100	[-]			0,	68		
	III:60°C/80°C	hole			0,70					
n ara a sin a fa al	lara for concrete	≤ C50/60	\ \ \	,,			$(f_{ck} / 1)$	20) ^{0,1}		
noreasing fact	tors for concrete	> C50/60	Ψc	[-]				,1		
Characteristic	bond resistance	depending on	τ _{Rk,}	ucr,100 =	Ψc • ^τ Rk,ucr,100,(C20/25)					
the concrete strength class		τ _{RI}	k,cr,100 =		ı	^{l/} c • ^τ Rk,cr,	100,(C20/2	5)		
Concrete con	e failure or Spli	tting								
Relevant paraı							see Ta	able C2		
nstallation fa										
	t concrete (HD; H		γ _{inst}	[-]				,0		
	e hole (HD; HDB) (incl. nut and was	· ,						,2		

¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.

²⁾ For I-M20 strength class 50 is valid

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 9
Characteristic values of tension loads under static and quasi-static action for a working life of 100 years (Internal threaded anchor rod)	



Table C10		eristic value rking life of					-	•		-
Internal threa	ded anchor rod				I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Steel failure1)										
Characteristic	tension resistance	ce, 5.8	$N_{Rk,s}$	[kN]	10	17	29	42	76	123
Steel, strength	n class	8.8	N _{Rk,s}	[kN]	16	27	46	67	121	196
Partial factor,	strength class 5.8	3 and 8.8	γ _{Ms,N}	[-]			1	,5		
	tension resistand HCR, Strength cla	,	N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial factor			$\gamma_{Ms,N}$	[-]			1,87			2,86
Combined pu	ıll-out and concı	rete cone failu	re							
Characteristic	bond resistance	in uncracked c	oncrete C20	0/25 in dia	mond dril	led holes	(DD)			
Tomporatura —	I: 24°C/40°C	Dry, wet		[N/mm²]	14	14	13	12	12	11
	II: 50°C/72°C	noodod boro	^τ Rk,ucr		12	11	10	9,5	9,5	9,0
	III:60°C/80°C	hole			5,5	5,0	4,5	4,5	4,5	4,0
Characteristic	bond resistance i	n cracked cond	crete C20/2	5 in diamo	nd drilled	holes (D	D)			
	I: 24°C/40°C		^τ Rk,cr				5,5	5,5	5,5	5,4
Temperature range	II: 50°C/72°C			[N/mm²]	3)		4,6	4,6	4,6	4,5
	III:60°C/80°C	hole					2,4	2,3	2,4	2,3
Reduction fact	or $\psi^0{}_{ extsf{sus}}$ in uncra	acked concrete	C20/25 in o	diamond d	rilled hole	es (DD)				
	I: 24°C/40°C	Dry, wet			0,77					
Temperature range	II: 50°C/72°C	concrete or flooded bore	Ψ ⁰ sus	[-]	0,72					
	III:60°C/80°C	hole					0,	72		
		≤ C50/60	- 116	[-]			(f _{ck} /	20) ^{0,2}		
Increasing fact	tors for concrete	> C50/60	Ψc,ucr	1-3	1,2					
		≤ C50/60	Ψc,cr	[-]			(f _{ck} /	20) ^{0,4}		
Characteristic bond resistance depending on the concrete strength class			τ _{Rk,ucr} =				k,ucr,(C20/2			
		44!		τ _{Rk,cr} =			Ψc,cr • ^τ R	k,cr,(C20/25	5)	
Relevant para	e failure or Spli	tung		Т			800 T	able C2		
Installation fa							See 18	ADIE UZ		
	et concrete (DD)						1	,0		
for flooded bo			γinst	[-]	1,	2	<u> </u>	1,	4	

¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under static and quasi-static action for a working life of 50 years (Internal threaded anchor rod)	Annex C 10

²⁾ For I-M20 strength class 50 is valid

³⁾ no performance assessed



1,0

1,4

Table C11		eristic value king life of			ids und	ler stat	ic and o	quasi-s	tatic ac	tion
	ded anchor rod	S			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Steel failure1)										
Characteristic	tension resistand	e, 5.8	$N_{Rk,s}$	[kN]	10	17	29	42	76	123
Steel, strength	class	8.8	$N_{Rk,s}$	[kN]	16	27	46	67	121	196
Partial factor,	strength class 5.8	3 and 8.8	$\gamma_{Ms,N}$	[-]			1	,5		
	tension resistand ICR, Strength cla		N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial factor			$\gamma_{Ms,N}$	[-]			1,87			2,86
Combined pu	II-out and concr	ete cone failu	re							
Characteristic	bond resistance	in uncracked c	oncrete C20	0/25 in dia	mond dril	led holes	(DD)			
Temperature range	I: 24°C/40°C	Dry, wet concrete or flooded bore	^τ Rk,ucr,100	[N/mm²]	14	14	13	12	12	11
	II: 50°C/72°C				11	10	10	9,5	9,0	8,5
	III:60°C/80°C	hole			5,5	5,0	4,5	4,5	4,5	4,0
Reduction factor	or ψ^0 sus, 100 in ι	incracked cond	crete C20/2	5 in diamo	nd drilled	holes (D	D)			
	I: 24°C/40°C	Dry, wet			0,73					
Temperature range	II: 50°C/72°C	concrete or flooded bore	Ψ ⁰ sus,100	[-]	0,70					
	III:60°C/80°C	hole			0,72					
Increasing fact	ors for concrete	≤ C50/60	,,,,				(f _{ck} / 2	20) ^{0,2}		
Increasing factors for concrete > 0		> C50/60	Ψς	[-]	1,2					
Characteristic I	bond resistance or rength class	^τ Rk,	ucr,100 =	Ψc • τRk,ucr,100,(C20/25)						
Concrete con	e failure or Spli	tting								
Relevant paraı	meter						see Ta	able C2		
Installation fa	ctor									

¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.

[-]

1,2

 γ_{inst}

for dry and wet concrete (DD)

for flooded bore hole (DD)

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 11
Characteristic values of tension loads under static and quasi-static action	
for a working life of 100 years (Internal threaded anchor rod)	

²⁾ For I-M20 strength class 50 is valid



1,0

for a work	ing life	of 50 a	nd 10	0 years	5		-	ı	T
Internal threaded anchor rods				I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Steel failure without lever arm ¹)								
Characteristic shear resistance,	5.8	V ⁰ _{Rk,s}	[kN]	5	9	15	21	38	61
Steel, strength class	8.8	V ⁰ _{Rk,s}	[kN]	8	14	23	34	60	98
Partial factor, strength class 5.8 a	and 8.8	γ _{Ms,V}	[-]				1,25		
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		V ⁰ _{Rk,s}	[kN]	7	13	20	30	55	40
Partial factor		$\gamma_{Ms,V}$	[-]			1,56			2,38
Ductility factor		k ₇	[-]				1,0		
Steel failure with lever arm ¹⁾									
Characteristic bending moment,	5.8	M ⁰ _{Rk,s}	[Nm]	8	19	37	66	167	325
Steel, strength class	8.8	M ⁰ _{Rk,s}	[Nm]	12	30	60	105	267	519
Partial factor, strength class 5.8 a	and 8.8	$\gamma_{Ms,V}$	[-]				1,25		
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70 ²⁾		M ⁰ _{Rk,s}	[Nm]	11	26	52	92	233	456
Partial factor		γ _{Ms,V}	[-]			1,56			2,38
Concrete pry-out failure									
Factor		k ₈	[-]				2,0		
Installation factor		γinst	[-]				1,0		
Concrete edge failure									
Effective length of fastener		I _f	[mm]		min((h _{ef} ; 12 • o	d _{nom})		min(h _{ef} ; 300mm
Outside diameter of fastener		d _{nom}	[mm]	10	12	16	20	24	30
			$\overline{}$		•	•	•	•	•

¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.

[-]

 γ_{inst}

Installation factor

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of shear loads under static and quasi-static action for a working life of 50 and 100 years (Internal threaded anchor rod)	Annex C 12

²⁾ For I-M20 strength class 50 is valid



Table C13:	Characte for a wor					load	s un	der s	tatio	and	qua	si-st	atic a	actio	n	
Reinforcing bar				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40	
Steel failure																
Characteristic tensi resistance		N _{Rk,s}	[kN]		1				A _s ·				1			
Cross section area		A _s	[mm²]	50	79	113	154	201	314		491	616	804	1018	1256	
Partial factor		γ _{Ms,N}	[-]						1,	4 2)						
Combined pull-ou																
Characteristic bond		n uncracked	d concret		T	T		Τ	<u>.</u>		T	T				
i <u>α</u> <u>I: 24°C/40°C</u>				16	16	16	16	16	16	15	15	15	15	15	15	
	concrete or flooded bore hole	^τ Rk,ucr	[N/mm²]	12 5,5	12 5,5	12 5,5	12 5,5	12 5,5	12 5,5	12 5,0	12 5,0	11 5,0	11 5,0	11 4,5	11 4,5	
Characteristic bond		i n uncracke	l concret		<u> </u>									1,0	1,0	
I: 24°C/40°C				14	14	13	13	13	13	13	13	13	13			
<u>B</u> II: 50°C/72°C	Dry, wet			12	12	12	11	11	11	11	11	11	11	1		
amberature and and and and another structure and another structure another s	concrete	Τ.	[N/mm²]	5,5	5,5	5,5	5,5	5,5	5,5	5,0	5,0	5,0	5,0] ,	3)	
င္ကို ဗြဲ	flooded	^τ Rk,ucr	[[14/11111-]	13	13	13	13	13	13	13	13	13	13] `)	
ြေ II: 50°C/72°C	bore hole			11	11	11	11	11	11	11	11	11	11			
III: 60°C/80°C		<u> </u>	<u> </u>	5,5	5,5	5,5	5,5	5,5	5,5	5,0	5,0	5,0	5,0	<u> </u>	(O.D.)	
Characteristic bond and in hammer drill					b in na	ımmer	arille	a noies	s (HD)	, comp	oresse	ed air d	irilled i	noles	(CD)	
1 0400/4000	1			7,0	7,0	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5			
0 B II. 50°C/72°C	concrete or	τ	[N/mm²]		6,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	,	3)	
Lau Lau Cara	flooded	^τ Rk,cr	[[14/11111-]				_			_				,)	
⊢ _ III:60°C/80°C				4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5			
Reduction factor ψ ⁰							hamn	ner dril	led ho	les (H	D), co	mpres	sed ai	ir drille	ed	
holes (CD) and in h	1	ed holes with	n hollow (⊤	drill bi	t (HDB	3)										
l: 24°C/40°C	Dry, wet								0,	80						
II: 50°C/72°C	and flooded	Ψ ⁰ sus	Ψ^0_{sus} [-]	[-]	0,68											
III: 60°C/80°C									0	70						
Increasing factors	≤ C50/60	Ψ _c	[-]						(f _{ck} / 2	20) 0, 1						
for concrete	> C50/60	46	L 1						1	,1						
Characteristic bond depending on the c		τ	Rk,ucr =					Ψ_{C}	• τ _{Rk,u}	cr,(C20)/25)					
strength class	onciele		τ _{Rk,cr} =					Ψ_{C}	• τ _{Rk,0}	cr,(C20	/25)					
Concrete cone fai	lure or Split	ting	,													
Relevant paramete	r							;	see Ta	ble C	2					
Installation factor	• •	CD)														
for dry and wet con		γ _{inst}	[-]						,0						,2	
for flooded bore ho				<u> </u>				1	,2						3)	
f _{uk} shall be take in absence of na no performance	ational regulat		of reinford	cing ba	ars											
Performances	IM PURE HX ETA 1+ chemical anchor injection system for concrete Performances Characteristic values of tension loads under static and quasi-static action								Ar	nnex	C 13	3				
for a working life					- quu	J. Jidi	.5 4011	J.,								



So C/72 C floor	esistance ir ry, wet concrete or coded core hole esistance ir ry or wet concrete coded core hole esistance ir I holes with ry, wet	TRk,ucr,100 TRk,ucr,100 TRk,ucr,100	[N/mm²] I concret	50 e C20 16 12 5,5	79 //25 in 16 12 5,5 //25 in 14 12 5,5 13	16 12 5,5	154 er (HI 16 12 5,5	201 D) and 16 12 5,5	A _s · 314 1,4 comp 16 12 5,5 les with	f _{uk} ¹⁾ 452 4 ²⁾ pressed 15 12 5,0	491 d air d 15 12 5,0	616 rilled h	804 noles (15 11 5,0	1018	
Characteristic tension resistance Cross section area Partial factor Combined pull-out and Characteristic bond resistance L: 24°C/40°C Drown of the control	esistance ir ry, wet concrete or coded core hole esistance ir ry or wet concrete coded core hole esistance ir I holes with ry, wet	A _s γMs,N ete failure uncracked τRk,ucr,100 uncracked τRk,ucr,100 τRk,ucr,100	[mm²] [-] d concret [N/mm²] d concret	e C20 16 12 5,5 e C20 14 12 5,5 13	/25 in 16 12 5,5 //25 in 14 12 5,5 13	hamm 16 12 5,5 hamm 13 12 5,5	ner (HI 16 12 5,5 ner dril 13	D) and 16 12 5,5 led ho 13 11	314 1,4 comp 16 12 5,5 les wit	452 4 ²) oressed 15 12 5,0 th holld	d air d 15 12 5,0 ow dril	rilled h	15 11 5,0 HDB)	(CD) 15 11	15 11
Cross section area Cross s	esistance ir ry, wet concrete or coded core hole esistance ir ry or wet concrete coded core hole esistance ir I holes with ry, wet	A _s γMs,N ete failure uncracked τRk,ucr,100 uncracked τRk,ucr,100 τRk,ucr,100	[mm²] [-] d concret [N/mm²] d concret	e C20 16 12 5,5 e C20 14 12 5,5 13	/25 in 16 12 5,5 //25 in 14 12 5,5 13	hamm 16 12 5,5 hamm 13 12 5,5	ner (HI 16 12 5,5 ner dril 13	D) and 16 12 5,5 led ho 13 11	314 1,4 comp 16 12 5,5 les wit	452 4 ²) oressed 15 12 5,0 th holld	d air d 15 12 5,0 ow dril	rilled h	15 11 5,0 HDB)	(CD) 15 11	15 11
Partial factor Combined pull-out at Characteristic bond re 1	esistance ir ry, wet oncrete or ooded ore hole esistance ir ry or wet oncrete ooded ore hole esistance ir I holes with ry, wet	γMs,N ete failure n uncracked τRk,ucr,100 n uncracked τRk,ucr,100 n cracked co	[N/mm²]	e C20 16 12 5,5 e C20 14 12 5,5 13	/25 in 16 12 5,5 //25 in 14 12 5,5 13	hamm 16 12 5,5 hamm 13 12 5,5	ner (HI 16 12 5,5 ner dril 13	D) and 16 12 5,5 led ho 13 11	1,4 comp 16 12 5,5 les with	15 12 5,0 th holld	d air d 15 12 5,0 ow dril	rilled h	15 11 5,0 HDB)	(CD) 15 11	15 11
Combined pull-out and Characteristic bond red Characteristic bon	esistance ir ry, wet oncrete or ooded ore hole esistance ir ry or wet oncrete ooded ore hole esistance ir I holes with ry, wet	TRk,ucr,100 TRk,ucr,100 TRk,ucr,100	[N/mm²] concret	16 12 5,5 e C20 14 12 5,5 13 11	16 12 5,5 /25 in 14 12 5,5 13	16 12 5,5 hamm 13 12 5,5	16 12 5,5 er dril 13 11	16 12 5,5 led ho 13 11	comp 16 12 5,5 les wit	15 12 5,0 th hollo	15 12 5,0 ow dril	15 11 5,0 I bit (F	15 11 5,0 1DB)	15 11	11
Characteristic bond re	esistance ir ry, wet oncrete or ooded ore hole esistance ir ry or wet oncrete ooded ore hole esistance ir I holes with ry, wet	TRk,ucr,100 TRk,ucr,100 TRk,ucr,100	[N/mm²] I concret	16 12 5,5 e C20 14 12 5,5 13 11	16 12 5,5 /25 in 14 12 5,5 13	16 12 5,5 hamm 13 12 5,5	16 12 5,5 er dril 13 11	16 12 5,5 led ho 13 11	16 12 5,5 les wit	15 12 5,0 th hollo	15 12 5,0 ow dril	15 11 5,0 I bit (F	15 11 5,0 1DB)	15 11	11
1	ry, wet oncrete or coded ore hole esistance in coded ore hole esistance ir l holes with ry, wet	TRk,ucr,100 TRk,ucr,100 TRk,ucr,100	[N/mm²] I concret	16 12 5,5 e C20 14 12 5,5 13 11	16 12 5,5 /25 in 14 12 5,5 13	16 12 5,5 hamm 13 12 5,5	16 12 5,5 er dril 13 11	16 12 5,5 led ho 13 11	16 12 5,5 les wit	15 12 5,0 th hollo	15 12 5,0 ow dril	15 11 5,0 I bit (F	15 11 5,0 1DB)	15 11	11
1	oncrete or coded ore hole esistance in coded ore hole esistance ir I holes with ry, wet	TRk,ucr,100	I concret	12 5,5 e C20 14 12 5,5 13	12 5,5 /25 in 14 12 5,5 13	12 5,5 hamm 13 12 5,5	12 5,5 er dril 13 11	12 5,5 led ho 13 11	12 5,5 les wit 13 11	12 5,0 th hollo	12 5,0 ow dril 13	11 5,0 I bit (F	11 5,0 IDB)	11	11
Characteristic bond re 1	ooded pre hole esistance ir ry or wet proceded pre hole esistance ir I holes with ry, wet	TRk,ucr,100	I concret	5,5 e C20 14 12 5,5 13	5,5 /25 in 14 12 5,5 13	5,5 hamm 13 12 5,5	5,5 er dril 13 11	5,5 led ho 13 11	5,5 les wit 13 11	5,0 th hollo	5,0 ow dril 13	5,0 I bit (F	5,0 IDB)		
Characteristic bond re 1	ore hole esistance ir ry or wet concrete coded ore hole esistance ir I holes with ry, wet	TRk,ucr,100	I concret	5,5 e C20 14 12 5,5 13	/25 in 14 12 5,5 13	hamm 13 12 5,5	er dril 13 11	led ho 13 11	les wit 13 11	th holle	ow dril	l bit (F	HDB)	4,5	4,5
Characteristic bond re 1	esistance ir ry or wet poncrete poded pre hole esistance ir I holes with ry, wet	TRk,ucr,100	[N/mm²]	14 12 5,5 13 11	14 12 5,5 13	13 12 5,5	13 11	13 11	13 11	13	13	 			
### 150°C/72°C Dr. column D	ry or wet oncrete boded ore hole esistance ir I holes with ry, wet	TRk,ucr,100	[N/mm²]	14 12 5,5 13 11	14 12 5,5 13	13 12 5,5	13 11	13 11	13 11	13	13	 			
1. 50°C/72°C 1. 5	ooded ore hole esistance ir I holes with	n cracked co		5,5 13 11	5,5 13	5,5				11	11			I	
III: 60°C/80°C Characteristic bond re and in hammer drilled L: 24°C/40°C Dr. con the second	poded ore hole esistance ir I holes with ry, wet	n cracked co		13 11	13		5,5	5.5			1.1	11	11		
III: 60°C/80°C Characteristic bond re and in hammer drilled L: 24°C/40°C Dr. con the second	esistance ir I holes with ry, wet	n cracked co		11		13			5,5	5,0	5,0	5,0	5,0	3)	
III: 60°C/80°C Characteristic bond re and in hammer drilled L: 24°C/40°C Dr. con the second	esistance ir I holes with ry, wet				1 4 4		13	13	13	13	13	13	13		
Characteristic bond re and in hammer drilled O	I holes with ry, wet				11	11	11	11	11	11	11	11	11		
and in hammer drilled Columbia Columbia	I holes with ry, wet				5,5	5,5	5,5	5,5	5,5	5,0	5,0	5,0	5,0	holoo ((CD)
i: 24°C/40°C Dr.	ry, wet				אוו ווו כ	ımmer	armed	noies	(UD)	, comp	nesse	u ali u	irillea i	noies (CD)
G B II: 50°C/72°C flo				6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5	7,5	7,5		
oll Collection of the distriction of the districtio	concrete or flooded	75	[N/mm²]		5,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	,	3)
F = III. 60° C /00° C 1-		^T Rk,cr,100	[[14/11111]	<u> </u>		<u> </u>	•	<u> </u>				<u> </u>	<u> </u>	`	.,
111:00 0/00 0 00				4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5		
Reduction factor $\psi^0_{ extsf{Su}}$,							amme	r drille	d hole	s (HD)), com	press	ed air	
drilled holes (CD) and		er drilled hol	es with h	ollow	drill b	it (HDE	3)								
i: 24°C/40°C Dr	ry, wet			0,80											
II: 50°C/72°C flo	oncrete or coded	Ψ^0 sus,100	[-]		0,68										
⊢	ore hole								0,	70					
Increasing factors ≤ (C50/60								(f _{ck} / 2	20) ^{0,1}					
C	C50/60	Ψc	[-]						1						
Characteristic bond re		τ	=					111 • 7							
depending on the cond			cr,100 =					Ψс	Rk,ucr	,100,(C	20/25)				
strength class			cr,100 =					Ψ c •	^τ Rk,cr,	100,(C2	20/25)				
Concrete cone failur	re or Splitt	ting													
Relevant parameter	ID. LIDD. C	\D\							see Ta	ble C2	2				
Installation factor (H		(U)													
for dry and wet concre for flooded bore hole	ete	γ_{inst}	[-]						,0 ,2						,2 3)
1) f _{uk} shall be taken fr	rom the sne	cifications o	of reinforc	l ing ba	irs				,∠						' '
2) in absence of nation			71 101111010	mig bo											
3) no performance ass		011													
,															
IM PURE HX ETA															

Characteristic values of tension loads under static and quasi-static action

for a working life of 100 years (reinforcing bar)



Table C15:	Characte for a wor					load	s un	der s	tatio	and	qua	si-st	atic a	actio	n			
Reinforcing bar				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40			
Steel failure																		
Characteristic tens resistance	ion	N _{Rk,s}	[kN]						A _s ·	f _{uk} 1)								
Cross section area	l	A_s	[mm²]	50	79	113	154	201	314		491	616	804	1018	1256			
Partial factor		γ _{Ms,N}	[-]						1,	4 2)								
Combined pull-ou	it and concr	ete failure																
Characteristic bond	d resistance i	n uncracked	concret	e C20	/25 in	diamo	nd dri	lled ho	oles (E)D)								
일 I: 24°C/40°C				14	13	13	13	12	12	11	11	11	11	11	10			
II: 50°C/72°C	concrete or flooded	^τ Rk,ucr	[N/mm²]	11	11	10	10	10	9,5	9,5	9,5	9,0	9,0	8,5	8,5			
[5,0	5,0	5,0	4,5	4,5	4,5	4,0	4,0	4,0	4,0	4,0	4,0			
Reduction factor ψ	Reduction factor $\psi^0_{ ext{sus}}$ in uncracked concrete C20/25 in diamond drilled holes (DD)																	
일 I: 24°C/40°C									0,	77								
III: 50°C/72°C	concrete or	concrete or flooded	concrete or flooded	Ψ^0 sus	[-]	0,72												
티:60°C/80°C				0,72														
Increasing factors	≤ C50/60								(f _{ck} / 2	20) ^{0,2}	2							
for concrete	> C50/60	Ψc,ucr	[-]						1	,2								
	Characteristic bond resistance lepending on the concrete trength class						Ψc,ucr • τRk,ucr,(C20/25)											
Concrete cone fai	Concrete cone failure or Splitting																	
Relevant paramete				see Table C2														
Installation factor	<u> </u>																	
	or dry and wet concrete		[-]					1	,0					1,2				
for flooded bore ho	le	riiist			1	,2				1	,4			:	3)			

¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under static and quasi-static action for a working life of 50 years (reinforcing bar)	Annex C 15

²⁾ in absence of national regulation

³⁾ no performance assessed



Table C16:	Characte for a wor					load	s un	der s	tatic	and	qua	si-st	atic a	actio	n	
Reinforcing bar				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40	
Steel failure																
Characteristic tens resistance	ion	N _{Rk,s}	[kN]						A _s ·	f _{uk} 1)						
Cross section area	1	A_s	[mm²]	50	79	113	154	201	314	452	491	616	804	1018	1256	
Partial factor		$\gamma_{Ms,N}$	[-]						1,	4 2)						
Combined pull-ou	it and concre	ete failure														
Characteristic bond	d resistance i	n uncracked	concret	e C20	/25 in	diamo	nd dri	lled ho	oles (C)D)						
일 I: 24°C/40°C				14	13	13	13	12	12	11	11	11	11	11	10	
III: 50°C/72°C	concrete or flooded	τRk,ucr,100	[N/mm²]	11	10	10	10	9,5	9,0	9,0	9,0	8,5	8,5	8,0	8,0	
를 III:60°C/80°C	bore hole			5,0	5,0	5,0	4,5	4,5	4,5	4,0	4,0	4,0	4,0	4,0	4,0	
Reduction factor $\psi^0_{ extstyle e$																
할 I: 24°C/40°C	Dry, wet								0,	73						
E 24°C/40°C II: 50°C/72°C II: 60°C/80°C	concrete or flooded	Ψ ⁰ sus,100	[-]	0,70												
티:60°C/80°C									0,	72						
Increasing factors	≤ C50/60								(f _{ck} / 2	20) ^{0,2}	2					
for concrete	> C50/60	Ψc,ucr	[-]	1,2												
Characteristic bond resistance depending on the concrete strength class					Ψc,ucr • ^τ Rk,ucr,100,(C20/25)											
Concrete cone fai	ilure or Split	ting														
Relevant paramete				see Table C2												
Installation factor	<u> </u>															
for dry and wet cor		γ _{inst}	[-]			_		1	,0						,2	
for flooded bore ho	le	.11131	.,		1	,2				1	,4			3	3)	

¹⁾ $\mathbf{f}_{\mathbf{u}\mathbf{k}}$ shall be taken from the specifications of reinforcing bars

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 16
Characteristic values of tension loads under static and quasi-static action	
for a working life of 100 years (reinforcing bar)	

²⁾ in absence of national regulation

³⁾ no performance assessed



Table C17: Character a working						uno	der s	statio	and	quas	si-sta	itic a	ction	for
Reinforcing bar			Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Steel failure without lever arm														
Characteristic shear resistance	V ⁰ _{Rk,s}	[kN]	$0.5 \cdot A_s \cdot f_{uk}^{1)}$											
Cross section area	A _s	[mm²]	50	79	113	154	201	314	452	491	616	804	1018	1256
Partial factor	γMs,V	[-]							1,5 ²⁾					
Ductility factor	k ₇	[-]							1,0					
Steel failure with lever arm														
Characteristic bending moment	M ⁰ _{Rk,s}	[Nm]	1,2 • W _{el} • f _{uk} ¹⁾											
Elastic section modulus	W _{el}	[mm³]	50	98	170	269	402	785	1357	1534	2155	3217	4580	6283
Partial factor	γ _{Ms,V}	[-]							1,5 ²⁾					
Concrete pry-out failure														
Factor	k ₈	[-]							2,0					
Installation factor	γinst	[-]							1,0					
Concrete edge failure														
Effective length of fastener	I _f	[mm]			min(h	_{ef} ; 12	• d _{no}	m)			min(l	h _{ef} ; 300	Omm)	
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	24	25	28	32	36	40
Installation factor	γinst	[-]							1,0			'		

¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of shear loads under static and quasi-static action for a working life of 50 and 100 years (reinforcing bar)	Annex C 17

²⁾ in absence of national regulation



Table C18:	Displacements under tension load ¹⁾ in hammer drilled holes (HD), comp. air
	drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete un	der static and	d quasi-static act	ion for a	workin	g life of	50 and	100 year	rs		
Temperature range I:	δ_{N0} -factor	[mm/(N/mm²)]	0,028	0,029	0,030	0,033	0,035	0,038	0,039	0,041
24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,028	0,029	0,030	0,033	0,035	0,038		0,041
Temperature range II:	$\delta_{ m N0}$ -factor	[mm/(N/mm²)]	0,038	0,039	0,040	0,044	0,047	0,051	0,052	0,055
50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,047	0,049	0,051	0,055	0,059	0,064	0,067	0,070
Temperature range III:	δ_{N0} -factor	[mm/(N/mm²)]	0,038	0,039	0,040	0,044	0,047	0,051	0,052	0,055
60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,047	0,049	0,051	0,055	0,059	0,064	0,067	0,070
Cracked concrete unde	r static and q	uasi-static action	n for a w	orking l	ife of 50	and 10) years			
Temperature range I:	δ_{N0} -factor	[mm/(N/mm²)]	0,069	0,071	0,072	0,074	0,076	0,079	0,081	0,082
24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,100	0,115	0,122	0,128	0,135	0,142	0,155	0,171
Temperature range II:	$\delta_{ m N0}$ -factor	[mm/(N/mm²)]	0,092	0,095	0,096	0,099	0,102	0,106	0,109	0,110
50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,134	0,154	0,163	0,172	0,181	0,189	0,207	0,229
Temperature range III:	δ_{N0} -factor	[mm/(N/mm²)]	0,092	0,095	0,096	0,099	0,102	0,106	0,109	0,110
60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,134	0,154	0,163	0,172	0,181	0,189	0,207	0,229
45										

¹⁾ Calculation of the displacement: $\delta_{N0} = \delta_{N0}$ -factor τ ; $\delta_{N\infty} = \delta_{N\infty}$ -factor τ ; τ : action bond stress for tension

Table C19: Displacements under tension load¹⁾ in diamond drilled holes (DD)

Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Cracked and uncracked concrete under static and quasi-static action for a working life of 50 years										
Temperature range I: 24°C/40°C	δ_{N0} -factor	[mm/(N/mm²)]	0,011	0,012	0,012	0,013	0,014	0,014	0,015	0,015
	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,018	0,019	0,019	0,020	0,022	0,023	0,024	0,025
Temperature range II: 50°C/72°C	δ_{N0} -factor	[mm/(N/mm²)]	0,013	0,014	0,014	0,015	0,016	0,016	0,018	0,018
	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,052	0,053	0,055	0,058	0,062	0,065	0,068	0,070
Temperature range III: 60°C/80°C	δ_{N0} -factor	[mm/(N/mm²)]	0,013	0,014	0,014	0,015	0,016	0,016	0,018	0,018
	$\delta_{N_{\infty}}$ -factor	[mm/(N/mm²)]	0,052	0,053	0,055	0,058	0,062	0,065	0,068	0,070
Uncracked concrete under static and quasi-static action for a working life of 100 years										
Temperature range I: 24°C/40°C	δ_{N0} -factor	[mm/(N/mm²)]	0,011	0,012	0,012	0,013	0,014	0,014	0,015	0,015
	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,020	0,021	0,021	0,023	0,024	0,025	0,026	0,027
Temperature range II: 50°C/72°C	$\delta_{ m N0}$ -factor	[mm/(N/mm²)]	0,013	0,014	0,014	0,015	0,016	0,016	0,018	0,018
	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,038	0,039	0,040	0,043	0,045	0,047	0,049	0,051
Temperature range III: 60°C/80°C	δ_{N0} -factor	[mm/(N/mm²)]	0,013	0,014	0,014	0,015	0,016	0,016	0,018	0,018
	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,038	0,039	0,040	0,043	0,045	0,047	0,049	0,051
A) -										

¹⁾ Calculation of the displacement: $\delta_{N0} = \delta_{N0}$ -factor $\cdot \tau$; $\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$; τ : action bond stress for tension

Table C20: Displacements under shear load¹⁾ for all drilling methods

Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked and cracked concrete under static and quasi-static action for a working life of 50 and 100 years										
All temperature ranges	δ_{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
	$\delta_{V\infty}$ -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05

¹⁾ Calculation of the displacement $\delta_{V0} = \delta_{V0}$ -factor \cdot V; $\delta_{V\infty} = \delta_{V\infty}$ -factor \cdot V; V: action shear load

IM PURE HX ETA 1+ chemical anchor injection system for concrete

Performances

Displacements under static and quasi-static action for a working life of 50 and 100 years (threaded rod)

Annex C 18



arili	ed holes (C	CD) and in	ham	mer dri	lled hol	es with I	nollow d	rill bit (H	DB)
nternal threaded ancho	r rods			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Uncracked concrete un	der static and	l quasi-stati	c actio	n for a wo	orking life	of 50 and	100 years		_
Temperature range I:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,029	0,030	0,033	0,035	0,038	0,041
24°C/40°C	δ_{N_∞} -factor	[mm/(N/ı	mm²)]	0,029	0,030	0,033	0,035	0,038	0,041
Temperature range II:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,039	0,040	0,044	0,047	0,051	0,055
50°C/72°C	δ_{N_∞} -factor	[mm/(N/ı	mm²)]	0,049	0,051	0,055	0,059	0,064	0,070
Temperature range III:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,039	0,040	0,044	0,047	0,051	0,055
60°C/80°C	δ_{N_∞} -factor	[mm/(N/ı	mm²)]	0,049	0,051	0,055	0,059	0,064	0,070
Cracked concrete unde	r static and q	uasi-static a	ction f	or a work	ing life of	50 and 10	0 years		
Temperature range I:	δ_{N0} -factor	[mm/(N/mm²)]		0,071	0,072	0,074	0,076	0,079	0,082
24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/r	mm²)]	0,115	0,122	0,128	0,135	0,142	0,171
Temperature range II:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,095	0,096	0,099	0,102	0,106	0,110
50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	mm²)]	0,154	0,163	0,172	0,181	0,189	0,229
Temperature range III:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,095	0,096	0,099	0,102	0,106	0,110
60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	mm²)]	0,154	0,163	0,172	0,181	0,189	0,229
1) Calculation of the displa		$=\delta_{N0}$ -factor		$S_{N\infty} = \delta_{N\infty}$ -fa			ond stress f		
Table C22: Disp	lacements	under te	nsior	load ¹⁾	in diam	ond drill	ed holes	(DD)	
nternal threaded ancho	r rods			I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Cracked and uncracked	concrete un	der static an	d quas	si-static a	ction for a	working	life of 50 ye	ears	
Temperature range I:	δ_{N0} -factor	[mm/(N/ı	nm²)]	0,012	0,012	0,013	0,014	0,014	0,015
24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	nm²)]	0,019	0,019	0,020	0,022	0,023	0,025
Temperature range II:	δ_{N0} -factor	[mm/(N/r	mm²)]	0,014	0,014	0,015	0,016	0,016	0,018
50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	mm²)]	0,053	0,055	0,058	0,062	0,065	0,070
Temperature range III:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,014	0,014	0,015	0,016	0,016	0,018
60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	mm²)]	0,053	0,055	0,058	0,062	0,065	0,070
Uncracked concrete un		l quasi-stati	c actio	n for a wo	orking life	of 100 year	ırs		
Temperature range I:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,012	0,012	0,013	0,014	0,014	0,015
24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	nm²)]	0,021	0,021	0,023	0,024	0,025	0,027
Temperature range II:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,014	0,014	0,015	0,016	0,016	0,018
50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/r	mm²)]	0,039	0,040	0,043	0,045	0,047	0,051
Temperature range III:	δ_{N0} -factor	[mm/(N/ı	mm²)]	0,014	0,014	0,015	0,016	0,016	0,018
60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/ı	mm²)]	0,039	0,040	0,043	0,045	0,047	0,051
1) Calculation of the displa	acement: δ _{N0}	$=\delta_{N0}$ -factor	· τ; δ	S _{N∞} = δ _{N∞} -fa	actor · τ;	τ: action b	ond stress f	or tension	
Table C23: Disp	lacements	under sh	near le	oad ¹⁾ fo	r all dril	ling met	hods		
nternal threaded ancho	r rods		I-M	6 I-	·M8	I-M10	I-M12	I-M16	I-M20
Jncracked and cracked		der static an							
All temperature δ_{V0} -fa		[mm/kN]	0,0		,06	0,06	0,05	0,04	0,04
ranges $\delta_{V_{\infty}}$ -fa		[mm/kN]	0,1		,09	0,08	0,08	0,06	0,06
1) Calculation of the displa		= δ_{V0} -factor	-	$\delta_{V\infty} = \delta_{V\infty}$ -fa		V: action s	,	0,00	0,00

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Displacements under static and quasi-static action for a working life of 50 and 100 years (Internal threaded anchor rod)



Table C24: Displacements under tension load ¹⁾ in hammer drilled holes (HD), comp. air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)																
Reinforcing bar	r		Q	8 (8	Ø 10	Ø 12	Ø 14	Ø 1	6 6	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Uncracked con	crete under	static and o	uasi-	stat	ic act	ion fo	r a wo	rking	life	of 50	and	100 ye	ars			
Temp range	δ_{N0} -factor	[mm/(N/mm	²)] 0,0	028	0,029	0,030	0,03	0,03	3 0	,035	0,038	0,038	0,040	0,043	0,045	0,047
I: 24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/mm	²)] 0,(028	0,029	0,030	0,03	0,03	3 0	,035	0,038	0,038	0,040	0,043	0,045	0,04
Temp range	δ_{N0} -factor	[mm/(N/mm	²)] 0,(038	0,039	0,040	0,042	2 0,04	4 0	,047	0,051	0,051	0,054	0,058	0,060	0,063
II: 50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm		$\overline{}$		_			-					_		
Temp range	δ_{N0} -factor	[mm/(N/mm		$\overline{}$		-	+ -	+ -	-			 	+		-	
III: 60°C/80°C	$\delta_{N\infty}$ -factor	[mm/(N/mm		$\overline{}$		-			-					-	-	-
Cracked concre		<u>'</u>	/-						_					10,012	10,011	10,00
Temp range	δ_{N0} -factor	[mm/(N/mm						-				, -		0 084		
I: 24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/mm		_		_	_	_	_		_	_	_	_	⊣	
	δ_{N0} -factor	[mm/(N/mm		$\overline{}$		_	_	_	-			_		_	-	
Temp range II: 50°C/72°C		· `		$\overline{}$					-			 	_	+ -	4 2	2)
	$\delta_{N\infty}$ -factor	[mm/(N/mm		$\overline{}$		_		_	-						-	
Temp range	δ_{N0} -factor	[mm/(N/mm		\rightarrow		<u> </u>		+ -	-		_	 	+ -		-	
III: 60°C/80°C	$\delta_{N_{\infty}}$ -factor	[mm/(N/mm	/-									1				
 Calculation of the displacement: δ_{N0} = δ_{N0}-factor · τ; δ_{N∞} = δ_{N∞}-factor · τ; τ: action bond stress for tension No performance assessed Table C25: Displacements under tension load¹) in diamond drilled holes (DD) 																
Reinforcing bar	•		Q	8 8	Ø 10	Ø 12	Ø 14	Ø1	6 8	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Uncracked con	crete under	static and c	uasi-	stati	ic acti	ion fo	a wo	rking	life	of 50	year	S		'		
Temp range	δ_{N0} -factor	[mm/(N/mm	²)] 0,0	800	0,009	0,009	0,01	0,01	1 0	,012	0,013	0,013	0,014	0,015	0,016	0,017
I: 24°C/40°C	$\delta_{N\infty}$ -factor	[mm/(N/mm		$\overline{}$		_	_	_	_			_	_	_		_
Temp range	δ_{N0} -factor	[mm/(N/mm	/ -				+	+ -	-					+ -	- -	
II: 50°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm		_				-	_				_			
Tomp range	δ_{N0} -factor	[mm/(N/mm				<u> </u>	-	_	_			-	_	_	<u> </u>	-
Temp range III: 60°C/80°C	$\delta_{N_{\infty}}$ -factor	[mm/(N/mm	/-	$\overline{}$			_	_	-				_			_
Uncracked con	1400	` `	/-						_				10,00	0,000	10,000	0,00
	1	[mm/(N/mm							_				0.014	0.015	0.016	0.04
Temp range I: 24°C/40°C	δ_{N0} -factor	<u> </u>	/ -					<u> </u>	_		· ·	<u> </u>		· ·	<u> </u>	
	$\delta_{N\infty}$ -factor	[mm/(N/mm		\rightarrow		_	_	_	-			_	_	_		_
Temp range	δ_{N0} -factor	[mm/(N/mm	$\stackrel{\prime}{-}$			<u> </u>	_	_	_			<u> </u>	_	<u> </u>	<u> </u>	-
II: 50°C/72°C	$\delta_{ m N\infty}$ -factor	[mm/(N/mm		$\overline{}$					_			-	_			
Temp range	$\delta_{ m N0}$ -factor	[mm/(N/mm				<u> </u>	_	_	_			_	_	_	<u> </u>	
III: 60°C/80°C 1) Calculation of	$\delta_{ m N\infty}$ -factor the displacer	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	²)] 0,(δ _{N0} -fa				0,042 δ _{N∞} -fa					<u> </u>		0,064 tension	<u> </u>	0,070
Table C26:	Displa	cements	ınde	rsl	hear	load	1) for	all	lirk	ling	met	hods				
Reinforcing bar	r		Ø 8	Ø	10 Ø	12 🛭	ð 14 s	Ø 16	Ø	20 2	24	Ø 25	Ø 28	Ø 32	Ø 36	Ø 40
Uncracked and		ncrete unde	r stati	ic ar	nd qu	asi-sta	atic ac	tion f	or a	wor	king l	ife of 5	0 and	100 ye	ears	
All temperature	$\delta_{\text{V0}}\text{-factor}$	[mm/kN]	0,06	0,0	05 0	,05 0),04	0,04	0,0	04 (0,03	0,03	0,03	0,03	0,03	0,03
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,09	0,0	0 80	,08 (),06	0,06	0,0)5 (0,05	0,05	0,04	0,04	0,04	0,04
1) Calculation of	1) Calculation of the displacement $\delta_{V0} = \delta_{V0}$ -factor \cdot V; $\delta_{V\infty} = \delta_{V\infty}$ -factor \cdot V; V: action shear											hear lo	ad I			
Performances Displacements under static and quasi-static action for a working life of 50 and 100 years (reinforcing bar)											,	Anne	x C 2	0		



Tabl	Table C27: Characteristic values of tension loads under seismic action (performance category C1) for a working life of 50 years												
Thread	led rod				M8	M10	M12	M16	M20	M24	M27	M30	
Steel fa	ailure							•					
Charac	teristic tension res	sistance	N _{Rk,s,eq,C1}	[kN]				1,0 •	$N_{Rk,s}$				
Partial	factor		[-]				see Ta	able C1					
Combined pull-out and concrete failure													
Characteristic bond resistance in cracked and uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)													
ture	I: 24°C/40°C	Dry, wet	τ _{Rk,eq,C1}	[N/mm²]	7,0	7,0	8,5	8,5	8,5	8,5	8,5	8,5	
Temperature range	II: 50°C/72°C	concrete and flooded bore	^τ Rk,eq,C1	[N/mm²]	6,0	6,0	7,0	7,0	7,0	7,0	7,0	7,0	
Tem	III:60°C/80°C	hole	^τ Rk,eq,C1	[N/mm²]	5,0	5,0	5,0	4,5	4,5	4,5	4,5	4,5	
Increas	sing factors for cor	ıcrete	Ψс	[-]				1	,0				
	teristic bond resis concrete strength	Rk,eq,C1 =	= Ψ _C • τ _{Rk,eq,C1,(C20/25)}										
Installa	ation factor												
for dry	and wet concrete	(HD; HDB, CD)	γ _{inst}	[-]				1	,0				
for floo	1,2												

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under seismic action (performance category C1)	Annex C 21
for a working life of 50 years (threaded rod)	



Tabl	Table C28: Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years													
Thread	ded rod				M8	M10	M12	M16	M20	M24	M27	M30		
Steel fa	ailure													
Charac	cteristic tension resi	stance	N _{Rk,s,eq,C1}	[kN]		1,0 • N _{Rk,s}								
Partial	factor		γ _{Ms,N}	[-]				see Ta	able C1					
Combined pull-out and concrete failure														
Characteristic bond resistance in cracked and uncracked concrete C20/25 in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)														
ture	I: 24°C/40°C	Dry, wet	τ _{Rk,eq,C1}	[N/mm²]	6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5		
Temperature range	II: 50°C/72°C	concrete and flooded bore	^τ Rk,eq,C1	[N/mm²]	5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5		
Ten	III:60°C/80°C	hole	^τ Rk,eq,C1	[N/mm²]	5,0	5,0	5,0	4,5	4,5	4,5	4,5	4,5		
Increas	sing factors for cond	rete	Ψς	[-]				1	,0					
1	cteristic bond resistate concrete strength c		τ	Rk,eq,C1 =	= Ψ _C • τ _{Rk,eq,C1,(C20/25)}									
Installa	ation factor													
for dry	and wet concrete (F	HD; HDB, CD)	γ _{inst}	[-]					,0					
for floo	ded bore hole (HD;	HDB, CD)	' II IST	[-]	1,2									

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years (threaded rod)	Annex C 22



Table C29:	able C29: Characteristic values of shear loads under seismic action (performance category C1) for a working life of 50 and 100 years													
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30			
Steel failure														
Characteristic shear resistance (Seismic C1) $V_{Rk,s,eq,C1} [kN] \qquad \qquad 0,70 \cdot V_{Rk,s}^0$														
Partial factor		γ _{Ms,V}	[-]				see	Table C	:1					
Factor for annula	r gap	$\alpha_{\sf gap}$	[-]				0,	5 (1,0) ¹⁾						

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of shear loads under seismic action (performance category C1) for a working life of 50 and 100 years (threaded rod)	Annex C 23

¹⁾ Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended.



1,2

Table		aracteristic rformance o									n			
Reinfo	rcing bar				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel fa	ailure													
Charac	teristic tension re	esistance	[kN]	$1.0 \cdot A_s \cdot f_{uk}^{1)}$										
Cross s	section area	[mm²]	50	79	113	154	201	314	452	491	616	804		
Partial t	factor	[-]	1,42)											
Partial factor γ _{Ms,N} [-] 1,4 ² Combined pull-out and concrete failure														
1	teristic bond resinoles (CD) and in						in har	nmer o	drilled	holes ((HD), c	compre	essed	air
ture	I: 24°C/40°C	Dry, wet	^τ Rk,eq,C1	[N/mm²]	7,0	7,0	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5
Temperature range	II: 50°C/72°C	concrete and flooded bore	^τ Rk,eq,C1	[N/mm²]	6,0	6,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0
Tem	III:60°C/80°C	hole	^τ Rk,eq,C1	[N/mm²]	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5
Increas	sing factors for co	ncrete	Ψс	[-]					1	,0				
Charac depend class	k,eq,C1 =				ψ _c •	^τ Rk,eq	_I ,C1,(C2	20/25)						
Installa	ation factor													
for dry a	and wet concrete	(HD; HDB,	[-]	1,0										

 $^{^{1)}}$ f_{uk} shall be taken from the specifications of reinforcing bars

for flooded bore hole (HD; HDB, CD)

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under seismic action (performance category C1) for a working life of 50 years (reinforcing bar)	Annex C 24

²⁾ in absence of national regulation



Tabl	Table C31: Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years													
Reinfo	Reinforcing bar Ø 8 Ø 10 Ø 12 Ø 14 Ø 16 Ø 20 Ø 24 Ø 25 Ø 28 Ø 32													
Steel f	ailure											•		
Characteristic tension resistance $N_{Rk,s,eq,C1}$ [kN] $1,0 \cdot A_s \cdot f_{uk}^{1)}$														
											804			
Partial	factor		γ _{Ms,N}	[-]					1,	4 2)				
Combi	ned pull-out an	d concrete failu	re											
	cteristic bond resi holes (CD) and in						in har	nmer o	drilled	holes (HD), c	compre	essed a	air
ture	I: 24°C/40°C	Dry, wet	^τ Rk,eq,C1	[N/mm²]	6,5	6,5	7,5	7,5	7,5	7,5	7,5	7,5	7,5	7,5
III: 60°C/80°C Dry, wet concrete and flooded bore hole			^τ Rk,eq,C1	[N/mm²]	5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5
Ten	III:60°C/80°C	hole	^τ Rk,eq,C1	[N/mm²]	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5
Increas	Increasing factors for concrete W [-]													

Jpe Jan	II: 50°C/72°C	flooded bore	^τ Rk,eq,C1	[N/mm²]	5,5	5,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	6,5	
Tempe	III:60°C/80°C	hole	^τ Rk,eq,C1	[N/mm²]	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	
Increas	sing factors for co	ncrete	Ψς	[-]	1,0										
1	Characteristic bond resistance depending on the concrete strength class		τ _F	$\tau_{Rk,eq,C1} = \psi_c \cdot \tau_{Rk,eq,C1,(C20/25)}$											
Install	ation factor														
for dry CD)	for dry and wet concrete (HD; HDB, CD)			[-]	1,0										
for floo	ded bore hole (HI	D; HDB, CD)							1	,2					
1) c	-lll l 4 -l 6														

¹⁾ \mathbf{f}_{uk} shall be taken from the specifications of reinforcing bars

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years (reinforcing bar)	Annex C 25

²⁾ in absence of national regulation



Table C32: Characteristic values of shear loads under seismic action (performance category C1) for a working life of 50 and 100 years												
Reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel failure												
Characteristic shear resistance	V _{Rk,s,eq,C1}	[kN]					0,35	· A _s ·	f _{uk} 1)			
Cross section area	A _s	[mm²]	50	79	113	154	201	314	452	4 91	616	804
Partial factor	γ _{Ms,V}	[-]	1,5 ²⁾									
Factor for annular gap	$lpha_{\sf gap}$	[-]	0,5 (1,0) ³⁾									

¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 26
Characteristic values of shear loads under seismic action (performance category C1) for a working life of 50 and 100 years (reinforcing bar)	

²⁾ in absence of national regulation

³⁾ Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended.



Table		acteristic va ormance ca							
Thread	ed rod				M12	M16	M20	M24	
Steel fa	ailure								
Characteristic tension resistance, Steel, strength class 8.8 Stainless Steel A4 and HCR, Strength class ≥70			N _{Rk,s,eq,C2}	[kN]	1,0 • N _{Rk,s}				
Partial f	factor		$\gamma_{Ms,N}$	[-]		see Ta	ble C1		
Combin	ned pull-out and c	oncrete failure							
	teristic bond resista noles (CD) and in h					nmer drilled hol	es (HD), comp	ressed air	
ture	I: 24°C/40°C	Dry, wet	^τ Rk,eq,C2	[N/mm²]	5,8	4,8	5,0	5,1	
Temperature range	II: 50°C/72°C	concrete and flooded bore	^τ Rk,eq,C2	[N/mm²]	5,0	4,1	4,3	4,4	
Tem	III:60°C/80°C	hole	^τ Rk,eq,C2	[N/mm²]	1,9	1,6	1,6	1,7	
ncreas	ing factors for cond	rete	Ψc	[-]		1	,0		
	teristic bond resista concrete strength c		τ _{Rk,eq,C2} =		Ψc • τRk,eq,C2,(C20/25)				
nstalla	tion factor								
	and wet concrete (Higher than the concrete (Higher than the concrete than the concrete than the concrete than the concrete that the concrete than the concrete that the concre		γ _{inst}	[-]	1,0 1,2				

Table C34: Characteristic values of shear loads under seismic action (performance category C2) for a working life of 50 and 100 years

Threaded rod		M12	M16	M20	M24		
Steel failure							
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A4 and HCR, Strength class ≥70	$V_{Rk,s,eq,C2}$	[kN]		0,70 •	$V^0_{Rk,s}$		
Partial factor	γ _{Ms,V}	[-]	see Table C1				
Factor for annular gap	$\alpha_{\sf gap}$	[-]	0,5 (1,0) ¹⁾				

¹⁾ Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended.

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 27
Characteristic values of tension and shear loads under seismic action (performance category C2) for a working life of 50 and 100 years (threaded rod)	



Table C35: Displacements under tension load (threaded rod)											
Threaded rod		M12	M16	M20	M24						
Uncracked and cracked concrete under seismic action (performance category C2) for a working life of 50 and 100 years											
All temperature ranges	$\delta_{N,eq,C2(50\%)} = \delta_{N,eq,C2(DLS)}$	[mm]	0,21	0,24	0,27	0,36					
All temperature ranges	$\delta_{\text{N,eq,C2(100\%)}} = \delta_{\text{N,eq,C2(ULS)}}$	[mm]	0,54	0,51	0,54	0,63					

Table C36: Displacements under shear load (threaded rod)

Threaded rod		M12	M16	M20	M24			
Uncracked and cracked concrete under seismic action (performance category C2) for a working life of 50 and 100 years								
All temperature ranges	$\delta_{V,eq,C2(50\%)} = \delta_{V,eq,C2(DLS)}$	[mm]	3,1	3,4	3,5	4,2		
All temperature ranges	$\delta_{V,eq,C2(100\%)} = \delta_{V,eq,C2(ULS)}$	[mm]	6,0	7,6	7,3	10,9		

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances	Annex C 28
Displacements under seismic action (performance category C2)	
for a working life of 50 and 100 years (threaded rod)	

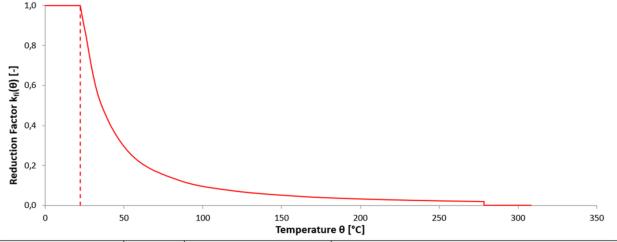


Table C37: Characteristic values of tension and shear loads under fire exposure in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Threaded rod					М8	M10	M12	M16	M20	M24	M27	M30
Steel failure												
Characteristic tension resistance; Steel, Stainless Steel A2, A4 and HCR, strength class 5.8 resp. 50 and higher			Fire	30	1,1	1,7	3,0	5,7	8,8	12,7	16,5	20,2
	N _{Rk,s,fi}	[kN]	exposure time [min]	60	0,9	1,4	2,3	4,2	6,6	9,5	12,4	15,1
				90	0,7	1,0	1,6	3,0	4,7	6,7	8,7	10,7
				120	0,5	0,8	1,2	2,2	3,4	4,9	6,4	7,9

Characteristic bond resistance in cracked and uncracked concrete C20/25 up to C50/60 under fire conditions for a given temperature θ

			θ < 23°C	1,0
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	23°C ≤ θ ≤ 278°C	150,28 • θ -1,598 ≤ 1,0
			θ > 278°C	0,0



Temperature # [*C]												
Characteristic bond resistance for a given temperature (θ)	$\tau_{Rk,fi}(\theta)$	[N/mm²]					$k_{fi,p}(\theta) \cdot \tau_{Rk,cr,(C20/25)}^{-1}$					
Steel failure without lever arm												
Characteristic shear resistance; Steel, Stainless Steel A2, A4 and HCR, strength class 5.8 resp. 50			Fire	30	1,1	1,7	3,0	5,7	8,8	12,7	16,5	20,2
	V _{Rk,s,fi}	[kN]	exposure time [min]	60	0,9	1,4	2,3	4,2	6,6	9,5	12,4	15,1
				90	0,7	1,0	1,6	3,0	4,7	6,7	8,7	10,7
and higher				120	0,5	0,8	1,2	2,2	3,4	4,9	6,4	7,9
Steel failure with lever arm												
Characteristic bending			Fire	30	1,1	2,2	4,7	12,0	23,4	40,4	59,9	81,0
moment; Steel, Stainless	N/O	 [Nm]	ovnosuro	60	0,9	1,8	3,5	9,0	17,5	30,3	44,9	60,7
Steel A2, A4 and HCR, strength class 5.8 resp. 50 and higher	M ⁰ _{Rk,s,fi}	livmj	time [min]	90	0,7	1,3	2,5	6,3	12,3	21,3	31,6	42,7
				120	0,5	1,0	1,8	4,7	9,1	15,7	23,3	31,5

¹⁾ $\tau_{Rk,cr,(C20/25)}$ characteristic bond resistance for cracked concrete for concrete strength class C20/25 for the relevant temperature range

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension and shear loads under fire exposure (threaded rod)	Annex C 29

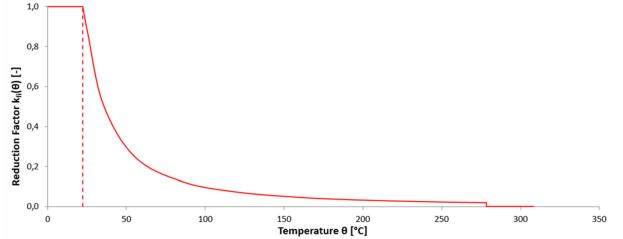


Table C38: Characteristic values of tension and shear loads under fire exposure in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Internal threaded anchor ro	ds				I-M6	I-M8	I-M10	I-M12	I-M16	I-M20
Steel failure										
Characteristic tension			Fire -	30	0,3	1,1	1,7	3,0	5,7	8,8
resistance; Steel, Stainless	N	[[LAI]	exposure	60	0,2	0,9	1,4	2,3	4,2	6,6
Steel A4 and HCR, strength	$N_{Rk,s,fi}$	[kN]	time	90	0,2	0,7	1,0	1,6	3,0	4,7
class 5.8 and 8.8 resp. 70			[min]	120	0,1	0,5	0,8	1,2	2,2	3,4

Characteristic bond resistance in cracked and uncracked concrete C20/25 up to C50/60 under fire conditions for a given temperature θ

<u> </u>			θ < 23°C	1,0
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	23°C ≤ θ ≤ 278°C	150,28 • θ ^{-1,598} ≤ 1,0
			θ > 278°C	0,0



				iemperatur	e o [c]					
Characteristic bond resistance for a given temperature (<i>θ</i>)	$\tau_{Rk,fi}(\theta)$		[N/mm²]		k _f	_{i,p} (θ) • τ _{Rk}	c,cr,(C20/25) ¹⁾	
Steel failure without lever a	arm									
Characteristic shear			Fire	30	0,3	1,1	1,7	3,0	5,7	8,8
resistance; Steel, Stainless	V	 [kN]	exposure	60	0,2	0,9	1,4	2,3	4,2	6,6
Steel A4 and HCR, strength	$V_{Rk,s,fi}$	[KIN]	time	90	0,2	0,7	1,0	1,6	3,0	4,7
class 5.8 and 8.8 resp. 70			[min]	120	0,1	0,5	0,8	1,2	2,2	3,4
Steel failure with lever arm										
Characteristic bending			Fire	30	0,2	1,1	2,2	4,7	12,0	23,4
	N/O	 [Nm]	ovnocuro	60	0,2	0,9	1,8	3,5	9,0	17,5
· · · · · · · · · · · · · · ·	M ⁰ _{Rk,s,fi}	ן נואוון 		90	0,1	0,7	1,3	2,5	6,3	12,3
class 5.8 and 8.8 resp. 70				120	0,1	0,5	1,0	1,8	4,7	9,1
45										

¹⁾ $au_{Rk,cr,(C20/25)}$ characteristic bond resistance for cracked concrete for concrete strength class C20/25 for the relevant temperature range

IM PURE HX ETA 1+ chemical anchor injection system for concrete	
Performances Characteristic values of tension and shear loads under fire exposure (internal threaded anchor rod)	Annex C 30



Reinforcing bar					Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel failure														
				30	0,5	1,2	2,3	3,1	4,0	6,3	9,0	9,8	12,3	16,1
Characteristic tension	N	[[LVI]	Fire	60	0,5	1,0	1,7	2,3	3,0	4,7	6,8	7,4	9,2	12,1
resistance; BSt 500	$N_{Rk,s,fi}$	[kN]	exposure time [min]	90	0,4	0,8	1,5	2,0	2,6	4,1	5,9	6,4	8,0	10,5
	<u> </u>			120	0,3	0,6	1,1	1,5	2,0	3,1	4,5	4,9	6,2	8,0
Characteristic bond resigned temperature θ	istance in c	:racke	d and unc	racked c	oncre	te C2	0/25 u	p to C	50/60	unde	r fire	condi	tions 1	or a
			θ < 25	5°C					1	,0				
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	25°C ≤ θ ≤	≤ 278°C				176,	37 • θ	-1,598	≤ 1,0			
	,,		θ > 27	8°C					0	,0				
n Factor														
Reduction Factor k _{ii} (θ) [-]	50	10	00	150 Tempera	ature θ	200 [°C]		250		3(00		350	
0,0	$\tau_{Rk,fi}(\theta)$	10	[N/mm²]	Tempera	ature θ))•τ _{Rk}		0/25) ¹⁾		350	
Characteristic bond resistance for a given	$\tau_{Rk,fi}(\theta)$	10		Tempera		[°C]		k _{fi,p} (€		k,cr,(C2	0/25)			
Characteristic bond resistance for a given temperature (θ)	$\tau_{Rk,fi}(\theta)$	10	[N/mm²]	Tempera 30	0,5	[°C]	2,3	k _{fi,p} (€	4,0	6,3	0/25) ¹⁾	9,8	12,3	
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear	$\tau_{Rk,fi}(\theta)$ er arm	10 [kN]	[N/mm²] Fire exposure	30 60	0,5 0,5	1,2 1,0	1,7	3,1 2,3	4,0 3,0	6,3 4,7	9,0 6,8	9,8 7,4	12,3 9,2	12,1
Characteristic bond resistance for a given temperature (θ) Steel failure without level	$\tau_{Rk,fi}(\theta)$		[N/mm²]	30 60 90	0,5 0,5 0,4	1,2 1,0 0,8	1,7 1,5	3,1 2,3 2,0	4,0 3,0 2,6	6,3 4,7 4,1	9,0 6,8 5,9	9,8 7,4 6,4	12,3 9,2 8,0	12,1 10,5
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear resistance; BSt 500	$\tau_{Rk,fi}(\theta)$ er arm $V_{Rk,s,fi}$		[N/mm²] Fire exposure	30 60	0,5 0,5	1,2 1,0	1,7	3,1 2,3	4,0 3,0	6,3 4,7	9,0 6,8	9,8 7,4	12,3 9,2	16,1 12,1 10,5 8,0
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear	$\tau_{Rk,fi}(\theta)$ er arm $V_{Rk,s,fi}$		[N/mm²] Fire exposure	30 60 90	0,5 0,5 0,4	1,2 1,0 0,8	1,7 1,5	3,1 2,3 2,0	4,0 3,0 2,6	6,3 4,7 4,1	9,0 6,8 5,9 4,5	9,8 7,4 6,4 4,9	12,3 9,2 8,0	12,1 10,5 8,0
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear resistance; BSt 500 Steel failure with lever a	$\tau_{Rk,fi}(\theta)$ er arm $V_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30 60 90 120	0,5 0,5 0,4 0,3	1,2 1,0 0,8 0,6	1,7 1,5 1,1	3,1 2,3 2,0 1,5	4,0 3,0 2,6 2,0	6,3 4,7 4,1 3,1	9,0 6,8 5,9 4,5	9,8 7,4 6,4 4,9	12,3 9,2 8,0 6,2	12,1 10,5
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear resistance; BSt 500 Steel failure with lever and Characteristic bending	$\tau_{Rk,fi}(\theta)$ er arm $V_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30 60 90 120	0,5 0,5 0,4 0,3	1,2 1,0 0,8 0,6	1,7 1,5 1,1	3,1 2,3 2,0 1,5	4,0 3,0 2,6 2,0	6,3 4,7 4,1 3,1	9,0 6,8 5,9 4,5	9,8 7,4 6,4 4,9 36,8 27,6	12,3 9,2 8,0 6,2 51,7	12,1 10,5 8,0 77,2
Characteristic bond resistance for a given temperature (θ) Steel failure without level Characteristic shear resistance; BSt 500	$\begin{array}{c c} \tau_{Rk,fi}(\theta) \\ \hline \\ \textbf{er arm} \\ \hline \\ \textbf{V}_{Rk,s,fi} \\ \hline \\ \textbf{arm} \\ \hline \\ \textbf{M}^0_{Rk,s,fi} \\ \hline \end{array}$	[kN]	Fire exposure time [min] Fire exposure time [min]	30 60 90 120 30 60 90 120	0,5 0,5 0,4 0,3 0,6 0,5 0,4 0,3	1,2 1,0 0,8 0,6 1,8 1,5 1,2	1,7 1,5 1,1 4,1 3,1 2,6 2,0	3,1 2,3 2,0 1,5 6,5 4,8 4,2 3,2	4,0 3,0 2,6 2,0 9,7 7,2 6,3 4,8	6,3 4,7 4,1 3,1 18,8 14,1 12,3 9,4	9,0 6,8 5,9 4,5 32,6 24,4 21,2 16,3	9,8 7,4 6,4 4,9 36,8 27,6 23,9 18,4	12,3 9,2 8,0 6,2 51,7 38,8 33,6 25,9	12,1 10,5 8,0 77,2 57,9