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European Technical Assessment Body for construction products



European Technical Assessment

ETA-15/0163 of 8 September 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

This version replaces

Deutsches Institut für Bautechnik

Novatech Injection system Novatio Q-Fix for concrete

Bonded fasteners and bonded expansion fasteners for use in concrete

Novatech International nv Industrielaan 5b 2250 OLEN **BELGIEN**

Novatech Plant 1

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

EAD 330499-02-0601, Edition 12/2023

ETA-15/0163 issued on 10 April 2015

Z192869.25

European Technical Assessment ETA-15/0163

English translation prepared by DIBt



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Specific Part

1 Technical description of the product

The "Novatech Injection system Novatio Q-Fix for concrete" is a bonded anchor consisting of a cartridge with injection mortar Novatio Q-Fix and a steel element. The steel element consists of a commercial threaded rod with washer and hexagon nut in the range of M8 to M30 or reinforcing bar in the range of \varnothing 8 to \varnothing 32 mm or an internal threaded anchor rod IG-M6 to IG-M20.

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

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B 2, C 1, C 2, C 3, C 5 and C 7
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1, C 4, C 6 and C 8
Displacements (static and quasi-static loading)	See Annex C 9 to C 11
Characteristic resistance for seismic performance categories C1	No performance assessed
Characteristic resistance and displacements for seismic performance categories C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance				
Reaction to fire	Class A1				
Resistance to fire	No performance assessed				

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 8 September 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Andreas Kummerow Head of Department

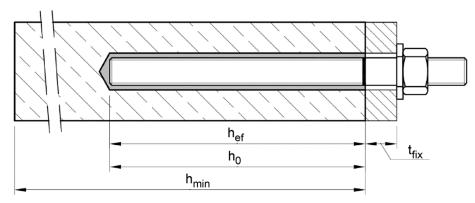
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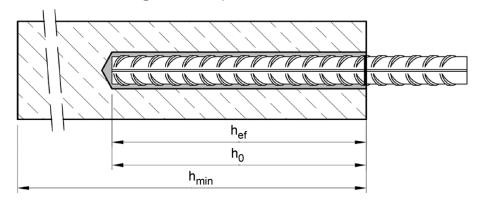


Installation threaded rod M8 up to M30

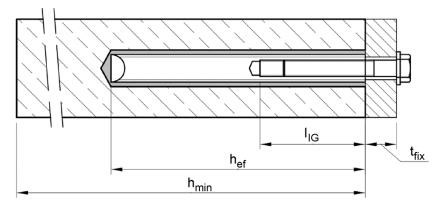
prepositioned installation or push through installation (annular gap filled with mortar)



Installation reinforcing bar Ø8 up to Ø32



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



 t_{fix} = thickness of fixture h_0 = nominal drill hole diameter

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

h_{min} = minum thickness of member

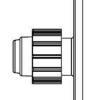
Novatech Injection system Novatio Q-Fix for concrete Product description Installed condition Annex A 1



Cartridge system

Coaxial Cartridge:

150 ml, 280 ml, 300 ml up to 333 ml and 380 ml up to 420 ml



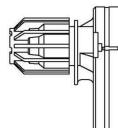
Imprint:

Novatio Q-Fix

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Side-by-Side Cartridge: 235 ml, 345 ml up to 360 ml

235 ml, 345 ml up to 360 ml and 825 ml



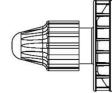
Imprint:

Novatio Q-Fix

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Foil tube Cartridge:

165 ml and 300 ml



Imprint:

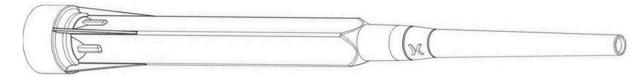
Novatio Q-Fix

Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Static mixer SM-14W



Static mixer PM-19E



Piston plug VS and mixer extension VL



Novatech Injection system Novatio Q-Fix for concrete

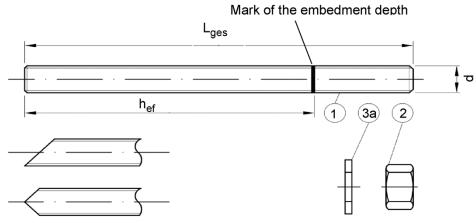
Product description

Injection system

Annex A 2



Threaded rod M8 up to M30 with washer and hexagon nut

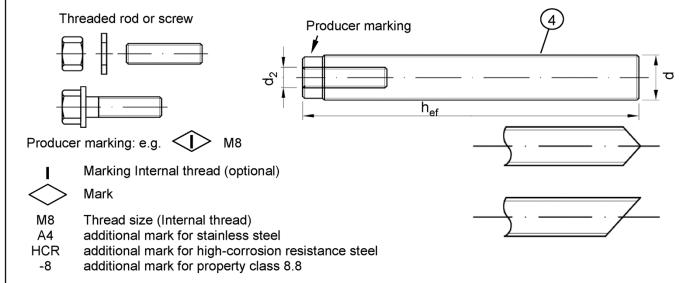


Commercial standard rod with:

- 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 IG-M6 to IG-M20



Filling washer VFS

Mixer reduction nozzle MR





Novatech Injection system Novatio Q-Fix for concrete

Product description

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

Annex A 3



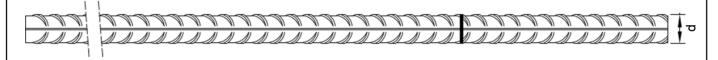
	Designation	Material				
		acc. to EN ISO 683-4:2				
		5 μm acc. to EN ISO		2:2022 or 1:2022 and EN ISO 10684:	2004+4C:2009 or	
		45 µm acc. to EN ISO			2004 1 AC. 2009 01	
				Characteristic steel	Characteristic steel	Elongation at
		Property class		ultimate tensile strength	yield strength	fracture
			4.6	f _{uk} = 400 N/mm ²	f _{yk} = 240 N/mm ²	A ₅ > 8%
l	Threaded rod		4.8	f _{uk} = 400 N/mm ²	f _{yk} = 320 N/mm ²	A ₅ > 8%
		acc. to EN ISO 898-1:2013	5.6	f _{uk} = 500 N/mm ²	f _{yk} = 300 N/mm ²	A ₅ > 8%
		LN 130 090-1.2013		f _{uk} = 500 N/mm ²	f _{yk} = 400 N/mm ²	A ₅ > 8%
			8.8	f _{uk} = 800 N/mm ²	f _{yk} = 640 N/mm ²	A ₅ ≥ 8%
		acc. to	4	for anchor rod class 4.6 o		
2	Hexagon nut	EN ISO 898-2:2022	5	for anchor rod class 5.6 o	r 5.8	
			8	for anchor rod class 8.8		
3a	Washer			galvanised or sherardized	7000 0000 - 511100	7004.0000
) I-				EN ISO 7089:2000, EN ISO) 7093:2000 or EN ISO	7094:2000)
3b	Filling washer	Steel, zinc plated, no	t-aip	galvanised or sherardized Characteristic steel	Characteristic steel	Clangation of
	Internal threaded anchor rod	Property class		ultimate tensile strength	yield strength	Elongation at fracture
4		acc. to	5.8	f _{uk} = 500 N/mm ²	f _{vk} = 400 N/mm ²	A ₅ > 8%
				f _{uk} = 800 N/mm ²	J 1 1	
Sta		EN ISO 898-1:2013	8.8		f _{yk} = 640 N/mm ²	A ₅ > 8%
	nless steel A2 (Mate	EN ISO 898-1:2013 erial 1.4301 / 1.4307 / 1	8.8	f _{uk} = 800 N/mm ² 1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t	f _{yk} = 640 N/mm ² o EN 10088-1:2023)	
Sta	nless steel A2 (Mate nless steel A4 (Mate	EN ISO 898-1:2013 rrial 1.4301 / 1.4307 / 1 rrial 1.4401 / 1.4404 / 1	8.8 .431 .457	1 / 1.4567 or 1.4541, acc. t	f _{yk} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023)	
Sta	nless steel A2 (Mate nless steel A4 (Mate	EN ISO 898-1:2013 erial 1.4301 / 1.4307 / 1 erial 1.4401 / 1.4404 / 1 ce steel (Material 1.45	8.8 .431 .457	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} = 640 N/mm ² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel	A ₅ > 8% Elongation at
Sta Hig	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistan	EN ISO 898-1:2013 rrial 1.4301 / 1.4307 / 1 rrial 1.4401 / 1.4404 / 1	8.8 .431 .457 29 oi	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} = 640 N/mm² o EN 10088-1:2023) o EN 10088-1:2023) -1:2023) Characteristic steel yield strength	A ₅ > 8% Elongation at fracture
Sta Hig	nless steel A2 (Mate nless steel A4 (Mate	EN ISO 898-1:2013 erial 1.4301 / 1.4307 / 1 erial 1.4401 / 1.4404 / 1 ce steel (Material 1.45	8.8 .431 .457 29 or	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} = 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	$A_5 > 8\%$ Elongation at fracture $A_5 \ge 8\%$
Sta Hig	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistan	EN ISO 898-1:2013 erial 1.4301 / 1.4307 / 1 erial 1.4401 / 1.4404 / 1 ce steel (Material 1.45 Property class	8.8 .431 .457 29 or	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 _{uk} = 700 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	Elongation at fracture $A_5 \ge 8\%$ $A_5 \ge 8\%$ $A_5 \ge 8\%$
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Sta Hig	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistant Threaded rod 1)3) Hexagon nut 1)3)	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 70 80 50 70 80 1.43 1.44 9 or 1	1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t 1 / 1.4365, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm² f _{uk} = 700 N/mm² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 07 / 1.4311 / 1.4567 or 1.4 04 / 1.4571 / 1.4362 or 1.4 1.4565, acc. to EN 10088-1	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	Elongation at fracture $A_5 \ge 8\%$ 1:2023 1:2023
Sta Hig 11 22	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistant Threaded rod 1)3) Hexagon nut 1)3) Washer	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 or 70 80 70 80 1.43 1.44 9 or 1	1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1 / 1.4365, acc. to EN 10088 Characteristic steel ultimate tensile strength fuk = 500 N/mm² fuk = 700 N/mm² fuk = 800 N/mm² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 07 / 1.4311 / 1.4567 or 1.4 04 / 1.4571 / 1.4362 or 1.4 1.4565, acc. to EN 10088-1	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	Elongation at fracture $A_5 \ge 8\%$ 1:2023 1:2023
Sta Hig 1 1	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistant Threaded rod 1)3) Hexagon nut 1)3)	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 1.452(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	1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t 1 / 1.4365, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm² f _{uk} = 700 N/mm² for anchor rod class 50 for anchor rod class 70 for anchor rod class 80 07 / 1.4311 / 1.4567 or 1.4 04 / 1.4571 / 1.4362 or 1.4 1.4565, acc. to EN 10088-1	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	Elongation at fracture $A_5 \ge 8\%$ 1:2023 1:2023
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Sta Hig 1 1 2	nless steel A2 (Mate nless steel A4 (Mate n corrosion resistant numbers) Threaded rod 1/3) Hexagon nut 1/3) Washer Filling washer	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 1.452(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	1 / 1.4567 or 1.4541, acc. to 1 / 1.4362 or 1.4578, acc. to 1 / 1.4365, acc. to EN 10088 Characteristic steel ultimate tensile strength f _{uk} = 500 N/mm² f _{uk} = 700 N/mm² for anchor rod class 50 for anchor rod class 70 for anchor rod class 70 for anchor rod class 80 07 / 1.4311 / 1.4567 or 1.4 04 / 1.4571 / 1.4362 or 1.4 1.4565, acc. to EN 10088-1 EN ISO 7089:2000, EN ISO orrosion resistance steel Characteristic steel	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 Characteristic steel Characteristic steel	A ₅ > 8% Elongation at fracture A ₅ \geq 8% A ₅ \geq 8% A ₅ \geq 8% A ₅ \geq 8% 1:2023 1:2023 0:7094:2000) Elongation at

²⁾ for IG-M20 only property class 50
3) Property class 80 only for stainless steel A4 and HCR

Novatech Injection system Novatio Q-Fix for concrete	
Product description Materials threaded rod and internal threaded rod	Annex A 4







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	
	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} = $k \cdot f_{yk}$

Novatech Injection system Novatio Q-Fix for concrete

Product description
Materials reinforcing bar

Annex A 5



Specification of the intended use

Fasteners subject to (Static and quasi-static loads):

	Working life	50 years	Working life 100 years		
Base material	uncracked concrete	cracked concrete	uncracked concrete	cracked concrete	
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to M30, Ø8 to Ø32, IG-M6 to IG-M20	No performance assessed	No performance assessed		
Temperature Range	I: - 40°C 1 II: - 40°C 1 III: - 40°C 1		No performanc	e assessed	

^{1) (}max. long-term temperature +24°C and max. short-term temperature +40°C)

Base material:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A2:2021.
- Strength classes C20/25 to C50/60 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

Installation:

- Dry, wet concrete or flooded bore holes (not sea-water).
- Hole drilling by hammer (HD), hollow (HDB) or compressed air (CD).
- 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.
- Installation temperature in concrete:

Novatio Q-Fix: -10°C up to +40°C for the standard variation of temperature after installation.

Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Specifications	Annex B 1

^{2) (}max. long-term temperature +50°C and max. short-term temperature +80°C)

^{3) (}max. long-term temperature +72°C and max. short-term temperature +120°C)



Table B1:	Installation p	arameters	for thre	eaded	rod						
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30
Diameter of elemen	t	d = d _{nom}	[mm]	8	10	12	16	20	24	27	30
Nominal drill hole di	ameter	d ₀	[mm]	10	12	14	18	24	28	32	35
Effective embedme	nt donth	h _{ef,min}	[mm]	60	60	70	80	90	96	108	120
Effective embedme	пі аеріп	h _{ef,max}	[mm]	160	200	240	320	400	480	540	600
Diameter of	Prepositioned ins	stallation d _f ≤	[mm]	9	12	14	18	22	26	30	33
clearance hole in the fixture	Push through installation df		[mm]	12	14	16	20	24	30	33	40
Maximum installation	n torque	max T _{inst}	[Nm]	10	20	40	60	100	170	250	300
Minimum thickness	of member	h _{min}	[mm]	`	ef + 30 n : 100 mi		h _{ef} + 2d ₀				
Minimum spacing		s _{min}	[mm]	40	50	60	80	80 100 120 135 15			
Minimum edge dista	ance	c _{min}	[mm]	40	50	60	80	100	120	135	150

Table B2: Installation parameters for reinforcing bar

Reinforcing bar				Ø 10¹)	Ø 12 ¹⁾	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Diameter of element	$d = d_{nom}$	[mm]	8	10	12	14	16	20	25	28	32
Nominal drill hole diameter	d ₀	[mm]	10 12	12 14	14 16	18	20	25	32	35	40
Effective embedment death	h _{ef,min}	[mm]	60	60	70	75	80	90	100	112	128
Effective embedment depth	h _{ef,max}	[mm]	160	200	240	280	320	400	500	560	640
Minimum thickness of member	h _{min}	[mm]		+ 30 mm 00 mm	ì	h _{ef} + 2d ₀					
Minimum spacing	s _{min}	[mm]	40 50		60	70	80	100	125	140	160
Minimum edge distance	c _{min}	[mm]	40	50	60	70	80	100	125	140	160

¹⁾ both nominal drill hole diameter can be used

Table B3: Installation parameters for Internal threaded anchor rod

Internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M12 IG-M16 IG-M2			
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		12	14	18	24	28	35		
Cff ative amb admont doubt	h _{ef,min}	[mm]	60	70	80	90	96	120		
Effective embedment depth	h _{ef,max}	[mm]	200	240	320	400	480	600		
Diameter of clearance hole in the fixture	d _f ≤	[mm]	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]	h _{ef} + 3 ≥ 100	30 mm) mm	h _{ef} + 2d ₀					
Minimum spacing	s _{min}	[mm]	50	60	80	100	120	150		
Minimum edge distance	c _{min}	[mm]	50	60	80	100	120	150		
4) 14 50										

¹⁾ With metric threads according to EN 1993-1-8:2005+AC:2009

Novatech Injection system Novatio Q-Fix for concrete

Intended Use Installation parameters Annex B 2



Table B4: Parameter cleaning and installation tools											
Threaded Rod	Re- inforcing bar	Internal threaded anchor rod	d ₀ Drill bit - Ø HD, HDB, CD	d _b Brush		d _{b,min} min. Brush - Ø	Piston plug	Installation direction and us of piston plug			
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		1	\rightarrow	1	
M8	8		10	RBT10	12	10,5					
M10	8 / 10	IG-M6	12	RBT12	14	12,5		No plug	roquirod		
M12	10 / 12	IG-M8	14	RBT14	16	14,5		ivo piug	required		
	12		16	RBT16	18	16,5					
M16	14	IG-M10	18	RBT18		18,5	VS18				
	16		20	RBT20		20,5	VS20				
M20		IG-M12	24	RBT24	26	24,5	VS24	h .>	h.>		
	20		25	RBT25		25,5	VS25	h _{ef} >	h _{ef} >	all	
M24		IG-M16	28	RBT28	30	28,5	VS28	250 mm 250 mm			
M27	25		32	RBT32	34	32,5	VS32				
M30	28	IG-M20	35	RBT35	37	35,5	VS35				
	32		40	RBT40	41,5	40,5	VS40				

Cleaning and installation tools

Hand pump

(Volume 750 ml, $h_0 \le 10 d_s$, $d_0 \le 20 mm$)



Compressed air tool

(min 6 bar)



Brush RBT



Piston Plug VS



Brush extension RBL



Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Cleaning and installation tools	Annex B 3



Table B5:	Worki	ng time and c	uring time Novatio Q-Fix			
Tempera	ture in bas	se material	Maximum working time	Minimum curing time ¹⁾		
	Т		t _{gel}	t _{cure}		
- 10°C	to	- 6°C	90 min ²⁾	24 h		
- 5°C	to	- 1°C	90 min	14 h		
0°C	to	+ 4 °C	45 min	7 h		
+ 5°C	to	+ 9°C	25 min	2 h		
+ 10°C	to	+ 19°C	15 min	80 min		
+ 20 °C	to	+ 29°C	6 min	45 min		
+ 30 °C	to	+ 34 °C	4 min	25 min		
+ 35 °C	to	+ 39 °C	2 min	20 min		
	+40°C		1,5 min	15 min		
Cartr	idge tempe	erature	+5°C to +40°C			

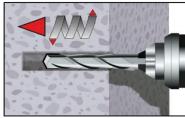
The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.
 Cartridge temperature must be at least +15°C

Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Working time and curing time	Annex B 4



Installation instructions

Drilling of the bore hole



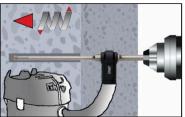
Hammer drilling (HD) / Compressed air drilling (CD)

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 (CAC and MAC).



1b. Hollow drill bit system (HDB)

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 (CAC and MAC).

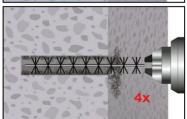
Attention! Standing water in the bore hole must be removed before cleaning

Manual Air Cleaning (MAC)

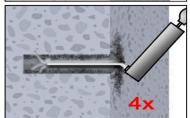
for bore hole diameter $d_0 \le 20$ mm and bore hole depth $h_0 \le 10d_{nom}$ ($d_0 < 14$ mm uncracked concrete only) with drilling method HD, HDB and CD



Blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 4).



Brush the bore hole minimum 4x with brush RBT according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)



Finally blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 4).

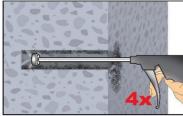
Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Installation instructions	Annex B 5



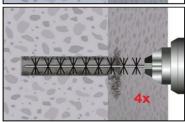
Installation instructions (continuation)

Compressed Air Cleaning (CAC):

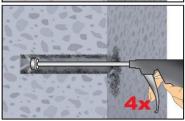
All diameter with drilling method HD, HDB and CD



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

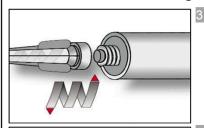


Brush the bore hole minimum 4x with brush RBT according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension RBL shall be used.)



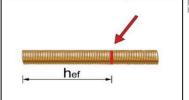
Finally blow the bore hole clean minimum 4x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

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 SM-14W / PM-19E and load the cartridge into an appropriate dispensing tool. With foil tube cartridges cut off the foil tube clip before use.

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.



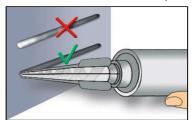
Mark embedment depth on the anchor rod.

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

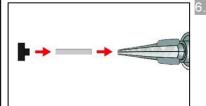
Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Installation instructions (continuation)	Annex B 6



Installation instructions (continuation)

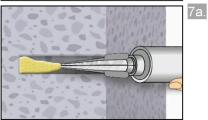


Not proper mixed mortar is not sufficient for fastening. Dispense and discard mortar until an uniform grey or red colour is shown (at least 3 full strokes, for foil tube cartridges at least 6 full storkes).



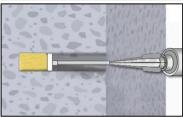
Piston plugs VS and mixer nozzle extensions VL shall be used according to Table B4 for the following applications:

- Horizontal and vertical downwards direction: Drill bit-Ø $d_0 \ge 18$ mm and embedment depth $h_{ef} > 250$ mm
- Vertical upwards direction: Drill bit-Ø $d_0 \ge 18$ mm Assemble mixing nozzle, mixer extension and piston plug before injecting mortar.



Injecting mortar without piston plug VS:

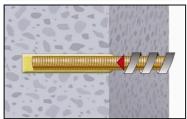
Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.) Slowly withdraw of the static mixing nozzle avoid creating air pockets. Observe the temperature related working time t_{work} (Annex B 5).



Injecting mortar with piston plug VS:

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). .



8.

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

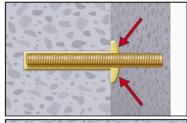
Novatech Injection system Novatio Q-Fix for concrete

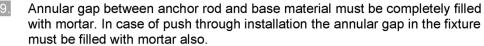
Intended Use
Installation instructions (continuation)

Annex B 7

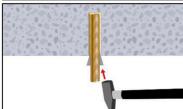


Installation instructions (continuation)

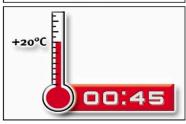




Otherwise, the installation must be repeated starting from step 7 before the maximum working time \mathbf{t}_{work} has expired.



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



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, B2 or B3).
In case of static requirements (e.g. seismic), fill the annular gab in the fixture with mortar (Annex A 3). Therefore replace the washer by the filling washer VFS and use the mixer reduction nozzle MR.

Novatech Injection system Novatio Q-Fix for concrete	
Intended Use Installation instructions (continuation)	Annex B 8



Т	able C1: Characteristic values resistance of threade			ension	resist	ance	and s	teel s	hear		
Th	readed rod			M8	M10	M12	M16	M20	M24	M27	M30
Cr	oss section area	A _s	[mm²]	36,6	58	84,3	157	245	353	459	561
Ch	aracteristic tension resistance, Steel failu	re ¹⁾									
Steel, Property class 4.6 and 4.8			[kN]	15 (13)	23 (21)	34	63	98	141	184	224
Ste	eel, Property class 5.6 and 5.8	$N_{Rk,s}$	[kN]	18 (17)	29 (27)	42	78	122	176	230	280
Ste	eel, Property class 8.8	$N_{Rk,s}$	[kN]	29 (27)	46 (43)	67	125	196	282	368	449
Sta	ainless steel A2, A4 and HCR, class 50	$N_{Rk,s}$	[kN]	18	29	42	79	123	177	230	281
Sta	ainless steel A2, A4 and HCR, class 70	$N_{Rk,s}$	[kN]	26	41	59	110	171	247	_3)	_3)
Sta	ainless steel A4 and HCR, class 80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282	_3)	_3)
Cr	naracteristic tension resistance, Partial fac	tor ²⁾									
Ste	eel, Property class 4.6 and 5.6	$\gamma_{Ms,N}$	[-]				2,0	0			
Ste	eel, Property class 4.8, 5.8 and 8.8	$\gamma_{Ms,N}$	[-]				1,	5			
Sta	ainless steel A2, A4 and HCR, class 50	γMs,N	[-]				2,8	6			
Sta	ainless steel A2, A4 and HCR, class 70	γMs,N	[-]				1,8	7			
-	ainless steel A4 and HCR, class 80	γMs,N	[-]	1,6							
Cr	naracteristic shear resistance, Steel failure	1)									
_	Steel, Property class 4.6 and 4.8	V ⁰ _{Rk,s}	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
arm	Steel, Property class 5.6 and 5.8	$V^0_{Rk,s}$	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
evel	Steel, Property class 8.8	$V^0_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
out I	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
	Steel, Property class 8.8	M ⁰ _{Rk,s}	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
th 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)
Cr	naracteristic shear resistance, Partial facto										
Ste	eel, Property class 4.6 and 5.6	$\gamma_{Ms,V}$	[-]	1,67							
Ste	eel, Property class 4.8, 5.8 and 8.8	$\gamma_{Ms,V}$	[-]	1,25							
Sta	ainless steel A2, A4 and HCR, class 50	$\gamma_{Ms,V}$	[-]				2,3	88			
Sta	ainless steel A2, A4 and HCR, class 70	$\gamma_{Ms,V}$	[-]				1,5	6			
Sta	ainless steel A4 and HCR, class 80	γ _{Ms,V}	[-]				1,3	3			
1)	Values are only valid for the given atrees area	A 1/-1		_1 _ 1 1	11.16		Sec 1. (1		1 201-		

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

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Novatech Injection system Novatio Q-Fix 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:	Characteristic v	alues of te	nsion load	ls under static and quasi-static action
Fastener				All Anchor types and sizes
Concrete cone f	ailure			
Uncracked concre	ete	k _{ucr,N}	[-]	11,0
Edge distance		c _{cr,N}	[mm]	1,5 h _{ef}
Axial distance		s _{cr,N}	[mm]	2 c _{cr,N}
Splitting				
	h/h _{ef} ≥ 2,0			1,0 h _{ef}
Edge distance	2,0 > h/h _{ef} > 1,3) > h/h _{ef} > 1,3		$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$
	h/h _{ef} ≤ 1,3			2,4 h _{ef}
Axial distance		s _{cr,sp}	[mm]	2 c _{cr,sp}

Novatech Injection system Novatio Q-Fix for concrete	
Performances Characteristic values for Concrete cone failure and Splitting with all kind of action	Annex C 2



	ded rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel f	failure											
Charac	cteristic tension resi	stance	N _{Rk,s}	[kN]	A _s ⋅ f _{uk} (or see Table C1)							
Partial	l factor		γ _{Ms,N}	[-]				see Ta	ble C1			
	ined pull-out and											
Chara	cteristic bond resist	ance in uncracke ⊺	d concrete C	20/25		<u> </u>	<u> </u>					
d)	I: 40°C/24°C	Day wet			10	12	12	12	12	11	10	9,0
rang	II: 80°C/50°C	Dry, wet concrete			7,5	9,0	9,0	9,0	9,0	8,5	7,5	6,5
Temperature range	III: 120°C/72°C		τ _{Rk,ucr}	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
pera	I: 40°C/24°C		TRK,uci	[14/11111]	7,5	8,5	8,5	8,5				
Tem	II: 80°C/50°C	flooded bore hole			5,5	6,5	6,5	6,5	No Performance Assessed			æ
	III: 120°C/72°C				4,0	5,0	5,0	5,0				
Reduk	ction factor $\psi^0_{ extsf{Sus}}$ in	uncracked conc	rete C20/25			•		•				
	I: 40°C/24°C	Dry, wet						0,	73			
Temperature range	II: 80°C/50°C	concrete and flooded bore	Ψ^0 sus	[-]	0,65							
Temp	III: 120°C/72°C	hole			0,57							
Increa	sing factors for cond	l crete	Ψς	[-]	(f _{ck} / 20) ^{0,11}							
	cteristic bond resist			τ _{Rk,ucr} =	Ψ _c • τ _{Rk,ucr} (C20/25)							
	concrete strength of	class		τ _{Rk,cr} =	ψ _c • τ _{Rk,cr} (C20/25)							
	rete cone failure											
Splitti	ant parameter		see T					see 1a	able C2			
	ant parameter		see 7				see Ta	Table C2				
	lation factor											
for dry	and wet concrete				1,0				1,2			
for floo	oded bore hole		γ _{inst} [-]		1,4				No Performance Assessed			
Perfo	atech Injection systems ormances racteristic values of								-	Anne	ex C 3	



Table C4: Characteristic	values	of sh	ear lo	ads ur	nder s	tatic a	nd 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, 5.6 and 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 classes	th class 8.8 $\sqrt{0}$. $\sqrt{10}$.									
Partial factor	Partial factor Y _{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 0	21)	
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	γinst	[-]					1,0			
Concrete edge failure										
Effective length of fastener	I _f	[mm]	$min(h_{ef}; 12 \cdot d_{nom})$ $min(h_{ef}; 300mm)$							
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γinst	[-]					1,0			

Novatech Injection system Novatio Q-Fix for concrete	
Performances Characteristic values of shear loads under static and quasi-static action (Threaded rod)	Annex C 4



Internal Steel fa	I threaded anchor rod	S			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20	
	eristic tension resistan	ce. 5.8	N _{Rk,s}	[kN]	10	17	29	42	76	123	
	trength class	8.8	N _{Rk,s}	[kN]	16	27	46	67	121	196	
	actor, strength class 5.	'	[-]	10			,5	121	130		
	teristic tension resistan		γMs,N					ĺ			
	4 and HCR, Strength cl		$N_{Rk,s}$	[kN]	14	26	41	59	110	124	
Partial f			γ _{Ms,N}	[-]		•	1,87			2,86	
Combir	ned pull-out and conc	rete cone failu									
Charact	teristic bond resistance	in uncracked of	concrete	C20/25							
Φ -	I: 40°C/24°C	Dry, wet			12	12	12	12	11	9,0	
Temperature range	II: 80°C/50°C	concrete			9,0	9,0	9,0	9,0	8,5	6,5	
nperati range	III: 120°C/72°C	CONTORCE	τ _{Rk,ucr}	[N/mm²]	6,5	6,5	6,5	6,5	6,5	5,0	
rar	I: 40°C/24°C	flooded bore	*KK,ucr	[]	8,5	8,5	8,5				
. Ter	II: 80°C/50°C	hole			6,5	6,5	6,5	No Performance Asses			
	III: 120°C/72°C				5,0	5,0	5,0				
Redukti	on factor $\psi^0{}_{ extsf{sus}}$ in uncr	racked concrete	e C20/25	5							
iture	I: 40°C/24°C	Dry, wet					0,	73			
Temperature range	II: 80°C/50°C	concrete and flooded bore	Ψ^0 sus	[-]	0,65						
Ten	III: 120°C/72°C	hole						57			
Increasi	ing factors for concrete		Ψc	[-]			(f _{ck} / 2	20) ^{0,11}			
Charact	teristic bond resistance	depending on	τ	Rk,ucr =			Ψc • τ _{Rk,u}	cr(C20/25))		
the cond	crete strength class			τ _{Rk,cr} =			Ψc • τ _{Rk,0}	_{cr} (C20/25)			
Concre	te cone failure						,				
Relevant parameter							see Ta	able C2			
Splittin	g failure										
	nt parameter						see Ta	able C2			
	tion factor										
	and wet concrete		γinst	[-]			1	,2			
or flood	led bore hole	[1]		1,4		No Perf	ormance A	SSESSE			

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.

Novatech Injection system Novatio Q-Fix for concrete	
Performances Characteristic values of tension loads under static and quasi-static action (Internal threaded anchor rod)	Annex C 5

²⁾ For IG-M20 strength class 50 is valid



Internal threaded anchor rods				IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20	
Steel failure without lever arm ¹)									
Characteristic shear resistance,	5.8	V ⁰ _{Rk,s}	[kN]	5	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	ınd 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	[-]			1,56			2,38			
Ductility factor	[-]	1,0								
Steel failure with lever arm ¹⁾										
Characteristic bending moment, Steel, strength class	5.8	M ⁰ _{Rk,s}	[Nm]	8	19	37	66	167	325	
	8.8	M ⁰ _{Rk,s}	[Nm]	12	30	60	105	267	519	
Partial factor, strength class 5.8 a	ınd 8.8	γ _{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}	[-]		2,38					
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]	$min(n : 12 \cdot d)$					min (h _{ef} ; 300mr	
Outside diameter of fastener	<u> </u>	d _{nom}	[mm]	10	12	16	20	24	30	
Installation factor γ_{inst} [-] 1,0										

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.

Novatech Injection system Novatio Q-Fix for concrete	
Performances Characteristic values of shear loads under static and quasi-static action (Internal threaded anchor rod)	Annex C 6

²⁾ For IG-M20 strength class 50 is valid



Reinforcing bar				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
Steel failure				20	2 10	~ 12	~ 1 1	2 10	Lu	2 20		2 32	
Characteristic tension resis	tance	N _{Rk,s}	[kN]	$A_{s} \cdot f_{uk}^{1)}$									
Cross section area		A _s	[mm²]	50	79	113	154	201	314	491	616	804	
Partial factor		γ _{Ms,N}	[-]	1,42)									
Combined pull-out and co	oncrete fail												
Characteristic bond resista			te C20/25										
υ I: 40°C/24°C	Dry, wet			10	12	12	12	12	12	11	10	8,5	
□ II: 80°C/50°C	concrete			7,5	9,0	9,0	9,0	9,0	9,0	8,0	7,0	6,0	
tra en di lili: 120°C/72°C 1: 40°C/24°C		τ _{Rk,ucr}	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5	
© E 1: 40°C/24°C	flooded	r RK, uci	[[,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	7,5	8,5	8,5	8,5	8,5	No Performance		e		
☐ II: 80°C/50°C	II: 80°C/50°C hara hala			5,5	6,5	6,5	6,5	6,5	Assessed		•		
III: 120°C/72°C				4,0	5,0	5,0	5,0	5,0					
Reduktion factor ψ ⁰ sus in ι	uncracked c	oncrete C20	/25										
ent di	Dry, wet concrete			0,73									
eg Eg II: 80°C/50°C	and	and	and ψ ⁰ sι	Ψ^0_{sus}	[-]	0,65							
III: 120°C/72°C	flooded bore hole			0,57									
Increasing factors for concr	rete	Ψc	[-]				(f _C	_k / 20) ⁽	0,11				
Characteristic bond resistal depending on the concrete			τ _{Rk,ucr} =				ψ _c • τ _F	Rk,ucr(C	20/25)				
class	Suchgui		τ _{Rk,cr} =				ψ c • τ	Rk,cr(C	20/25)				
Concrete cone failure													
Relevant parameter							see	Table	C2				
Splitting													
Relevant parameter							see	Table	C2				
Installation factor													
for dry and wet concrete					1,0								
for dry and wet concrete	for flooded bore hole		[-]										

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

Novatech Injection system Novatio Q-Fix for concrete	
Performances Characteristic values of tension loads under static and quasi-static action (Reinforcing bar)	Annex C 7

²⁾ in absence of national regulation



Reinforcing bar			Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Steel failure without lever arm											
Characteristic shear resistance $V^0_{Rk,s}$ [kN]						0,5	0 • A _s •	f _{uk} 1)			
Cross section area A _s [r			50	79	113	154	201	314	491	616	804
Partial factor	γ _{Ms,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	1534	2155	3217
Partial factor	γ _{Ms,V}	[-]					1,5 ²⁾				
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)					mm)			
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γinst	[-]	1,0								

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

Novatech Injection system Novatio Q-Fix for concrete	
Performances	Annex C 8
Characteristic values of shear loads under static and quasi-static action (Reinforcing bar)	

²⁾ in absence of national regulation



Table C9: Displacements under tension load ¹⁾										
Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete C20/25 under static and quasi-static action										
Temperature range	δ _{N0} -factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
I: 40°C/24°C	δ _{N∞} -factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range	δ _{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
II: 80°C/50°C	δ _{N∞} -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range III: 120°C/72°C	δ _{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	δ _{N∞} -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172

¹⁾ Calculation of the displacement

 $\delta_{N0} = \delta_{N0}$ -factor $\cdot \tau$;

 τ : action bond stress for tension

 $\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$;

Table C10: Displacements under shear load¹⁾

Threaded rod				M10	M12	M16	M20	M24	M27	M30
Uncracked concrete C20/25 under static and quasi-static action										
All temperature	δ _{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
ranges	δ _{V∞} -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 · V;

V: action shear load

 $\delta_{V\infty} = \delta_{V\infty}$ -factor $\cdot V$;

Novatech Injection system Novatio Q-Fix for concrete	
Performances Displacements under static and quasi-static action (threaded rods)	Annex C 9



Table C11: Displacements under tension load ¹⁾									
Internal threaded anchor rod IG-M6 IG-M8 IG-M10 IG-M12 IG-M16 IG-M20									
Uncracked concrete C20/25 under static and quasi-static action									
Temperature range I: 40°C/24°C	δ _{N0} -factor	[mm/(N/mm²)]	0,023	0,026	0,031	0,036	0,041	0,049	
	δ _{N∞} -factor	[mm/(N/mm²)]	0,033	0,037	0,045	0,052	0,060	0,071	
Temperature range	δ _{N0} -factor	[mm/(N/mm²)]	0,056	0,063	0,075	0,088	0,100	0,119	
II: 80°C/50°C	δ _{N∞} -factor	[mm/(N/mm²)]	0,081	0,090	0,108	0,127	0,145	0,172	
Temperature range	δ _{N0} -factor	[mm/(N/mm²)]	0,056	0,063	0,075	0,088	0,100	0,119	
III: 120°C/72°C	δ _{N∞} -factor	[mm/(N/mm²)]	0,081	0,090	0,108	0,127	0,145	0,172	

¹⁾ Calculation of the displacement

 $\delta_{N0} = \delta_{N0}$ -factor $\cdot \tau$;

 $\tau\textsc{:}$ action bond stress for tension

 $\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$;

Table C12: Displacements under shear load¹

<u> </u>									
Internal threade	d anchor rod		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20	
Uncracked concrete C20/25 under static and quasi-static action									
All temperature	δ _{v0} -factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04	
ranges	δ _{V∞} -factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06	

¹⁾ Calculation of the displacement

 $\delta_{V0} = \delta_{V0}$ -factor $\cdot V$;

V: action shear load

 $\delta_{V\infty} = \delta_{V\infty}\text{-factor }\cdot \textbf{V};$

Novatech Injection system Novatio Q-Fix for concrete	
Performances	Annex C 10
Displacements under static and quasi-static action	
(Internal threaded anchor rod)	



Table C13: Displacements under tension load ¹⁾ (rebar)											
Anchor size reinf	Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32		
Uncracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ _{N0} -factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
	δ _{N∞} -factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
Temperature range II: 80°C/50°C	δ _{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	δ _{N∞} -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Temperature range III: 120°C/72°C	δ _{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	δ _{N∞} -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181

¹⁾ Calculation of the displacement

 $\delta_{N0} = \delta_{N0}$ -factor $\cdot \tau$;

τ: action bond stress for tension

 $\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$;

Table C14: Displacement under shear load¹⁾ (rebar)

Anchor size reinforcing bar			Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Uncracked concrete C20/25 under static and quasi-static action											
All temperature	δ _{v0} -factor	[mm/kN]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
l '	δ _{V∞} -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,04	0,04

¹⁾ Calculation of the displacement

 $\delta_{V0} = \delta_{V0}$ -factor $\cdot V$;

V: action shear load

 $\delta_{\text{V}\infty} = \delta_{\text{V}\infty}\text{-factor }\cdot\text{\textbf{V}};$

Novatech Injection system Novatio Q-Fix for concrete	
Performances	Annex C 11
Displacements under static and quasi-static action	
(Reinforcing bar)	