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## European Technical Assessment

**ETA 14/0233  
of 17/02/2025**

**Technical Assessment Body issuing the ETA:** Technical and Test Institute  
for Construction Prague

**Trade name of the construction product**

J-Fix Epoxy Acrylate JFEA-SF

**Product family to which the construction  
product belongs**

Product area code: 33  
Bonded injection type anchor for use  
in uncracked concrete

**Manufacturer**

Hexstone Ltd. T/A JCP Construction Products  
Opal Way, Stone Business Park  
Stone, Staffordshire, ST15 OSW  
United Kingdom

**Manufacturing plant**

JCP Plant 1 United Kingdom

**This European Technical Assessment  
contains**

19 pages including 16 Annexes which form  
an integral part of this assessment

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

EAD 330499-02-0601  
Bonded fasteners and bonded expansion  
fasteners for use in concrete

**This version replaces**

ETA 14/0233 issued on 27/06/2014

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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## 1. Technical description of the product

The J-Fix Epoxy Acrylate JFEA-SF with steel elements is bonded anchor (injection type).

Steel elements can be galvanized or stainless steel threaded rods or rebar.

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

The illustration and the description of the product are given in Annex A.

## 2. Specification of the intended use in accordance with the applicable EAD

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 provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years and 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 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 5
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 6, C 7
Displacements under short-term and long-term loading	See Annex C 8

### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Satisfy the requirements for performance class A1
Resistance to fire	No performance assessed

### 3.3 Hygiene, health and environment (BWR 3)

No performance determined.

### 3.4 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are kept.

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

According to the Decision 96/582/EC of the European Commission<sup>1</sup> the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units.	-	1

<sup>1</sup> Official Journal of the European Communities L 254 of 08.10.1996

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

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technical and Test Institute for Construction Prague.<sup>2</sup> The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

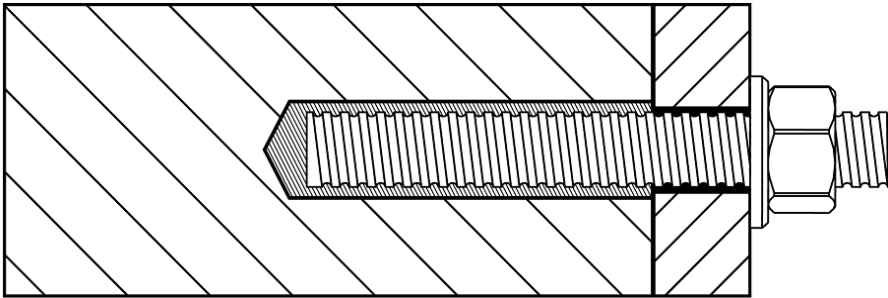
Issued in Prague on 17.02.2025

By  
**Ing. Jiří Studnička, Ph.D.**  
Head of the Technical Assessment Body

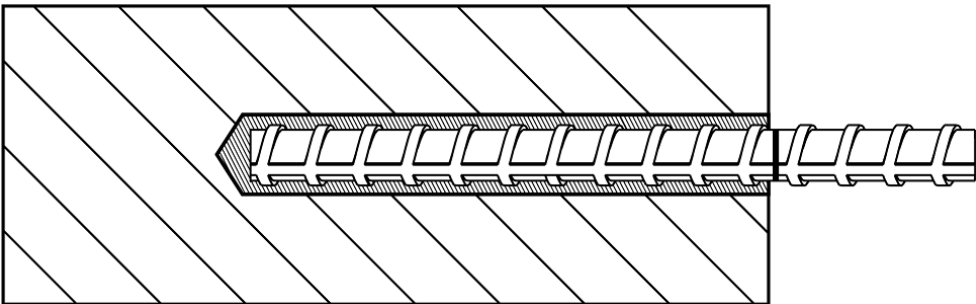
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<sup>2</sup> The control plan is a confidential part of the documentation of the European Technical Assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

**Threaded rods M8 to M24**



**Reinforcing bars Ø8 to Ø25**



<b>J-Fix Epoxy Acrylate JFEA-SF</b>	<b>Annex A 1</b>
<b>Product description</b> Installed conditions	

**Coaxial cartridge**

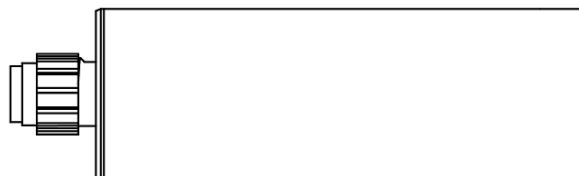
J-Fix Epoxy Acrylate JFEA-SF

150 ml

380 ml

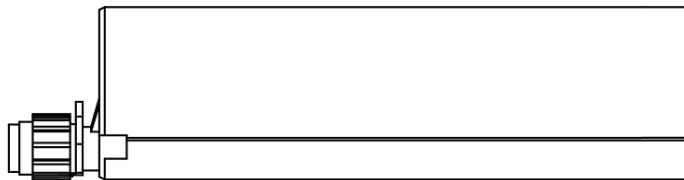
400 ml

410 ml

**Side by side cartridge**

J-Fix Epoxy Acrylate JFEA-SF

350 ml

**Two part foil in a single piston component cartridge**

J-Fix Epoxy Acrylate JFEA-SF

150 ml

170 ml

300 ml

**Marking of the mortar cartridges**

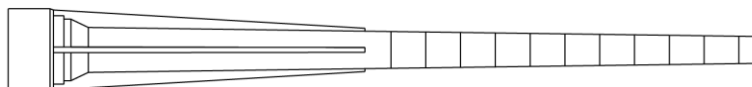
Identifying mark of the producer, Trade name, Charge code number, Storage life, Curing and processing time

**Mixing nozzle**

JMN



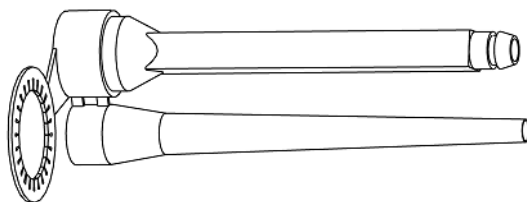
RC



EZ-Flow



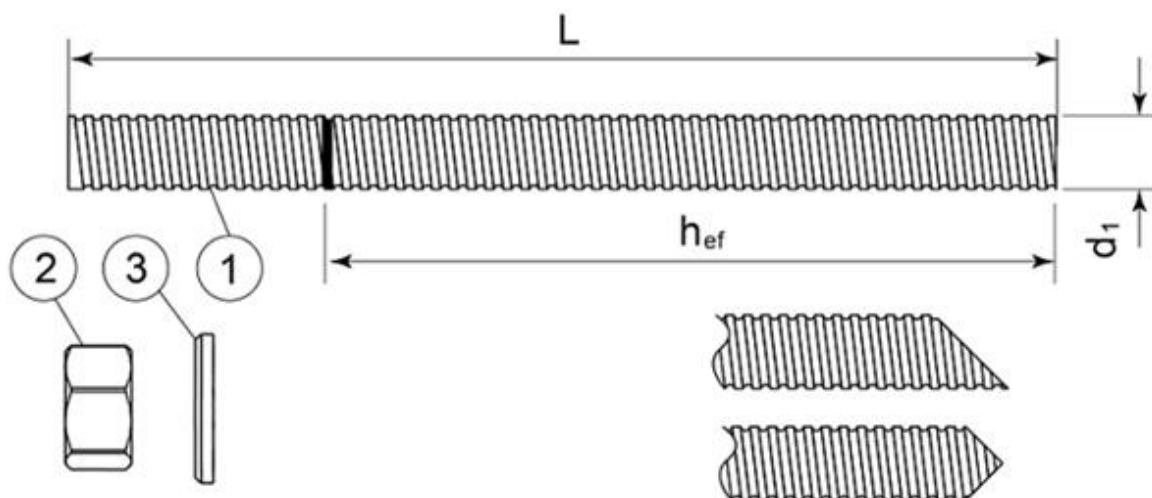
RM

**J-Fix Epoxy Acrylate JFEA-SF****Product description**

Injection system

**Annex A 2**

## Threaded rod M8, M10, M12, M16, M20, M24



Standard commercial threaded rod with marked embedment depth

Part	Designation	Material
<b>Steel, zinc plated <math>\geq 5 \mu\text{m}</math> acc. to EN ISO 4042 or</b> <b>Steel, Hot-dip galvanized <math>\geq 40 \mu\text{m}</math> acc. to EN ISO 1461 and EN ISO 10684 or</b> <b>Steel, zinc diffusion coating <math>\geq 15 \mu\text{m}</math> acc. to EN 13811</b>		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 5.8, 8.8, 10.9* EN ISO 898-1
2	Hexagon nut EN ISO 4032	According to threaded rod, EN 20898-2
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
<b>Stainless steel</b>		
1	Anchor rod	Material: A2-70, A4-70, A4-80, EN ISO 3506
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
<b>High corrosion resistant steel</b>		
1	Anchor rod	Material: 1.4529, 1.4565, EN 10088-1
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod

\*Galvanized rod of high strength are sensitive to hydrogen induced brittle failure

### J-Fix Epoxy Acrylate JFEA-SF

#### Product description

Threaded rod and materials

**Annex A 3**

# Rebar Ø8, Ø10, Ø12, Ø16, Ø20, Ø25



Standard commercial reinforcing bar with marked embedment depth

Product form		Bars and de-coiled rods	
Class		B	C
Characteristic yield strength $f_{yk}$ or $f_{0,2k}$ (MPa)		400 to 600	
Minimum value of $k = (f_t/f_y)_k$		$\geq 1,08$	$\geq 1,15$ $< 1,35$
Characteristic strain at maximum force $\epsilon_{uk}$ (%)		$\geq 5,0$	$\geq 7,5$
Bendability		Bend/Rebend test	
Maximum deviation from nominal mass (individual bar) (%)	Nominal bar size (mm) $\leq 8$	$\pm 6,0$	
	$> 8$	$\pm 4,5$	
Bond: Minimum relative rib area, $f_{R,min}$	Nominal bar size (mm) 8 to 12	0,040	
	$> 12$	0,056	

J-Fix Epoxy Acrylate JFEA-SF

**Product description**  
Rebars and materials

**Annex A 4**

## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static load.

### Base materials

- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete without fibres of strength class C20/25 at minimum and C50/60 at maximum according EN 206:2013 + A2:2021.

### Temperature range:

- -40°C to +80°C (max. short. term temperature +80°C and max. long term temperature +50°C)

### Use conditions (Environmental conditions)

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

### Concrete conditions:

- I1 – installation in dry or wet (water saturated) concrete and use in service in dry or wet concrete.
- I2 – installation in water-filled (not sea water) and use in service in dry or wet concrete

### Design:

- The anchorages are designed in accordance with the EN 1992-4 under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings.

### Installation:

- Hole drilling by hammer drilling, dustless drilling or diamond core drilling mode.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

### Installation direction:

- D3 – downward and horizontal and upwards (e.g. overhead) installation

**J-Fix Epoxy Acrylate JFEA-SF**

**Intended use**  
Specifications

**Annex B 1**



## HDB – Hollow Drill Bit System

Heller Duster Expert hollow drill bit

SDS-Plus ≤ 16mm

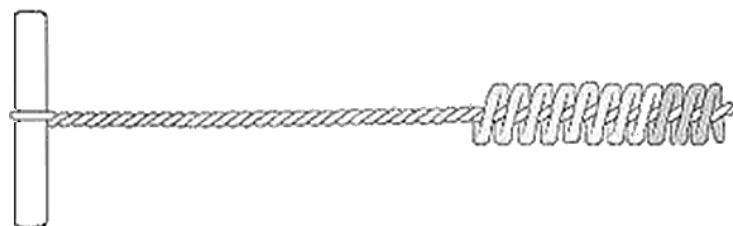
SDS-Max ≥ 16mm

Class M vacuum

Minimum flow rate 266 m³/h (74 l/s)



## Cleaning brush



## Applicator gun

A



B



C



D



E



Applicator gun	A	B	C	D	E
Cartridge	Coaxial 380ml 400ml 410ml	Side by side 350ml	Foil capsule 150ml 300ml	Foil capsule 150ml 300ml	Coaxial 150ml

## J-Fix Epoxy Acrylate JFEA-SF

### Intended use

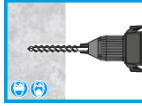
Hollow drill bit system, Cleaning brush

Applicator guns

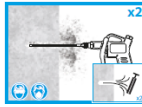
**Annex B 2**

## SOLID SUBSTRATE INSTALLATION METHOD

1. Using the SDS hammer drill (HD) in rotary hammer mode for drilling, with a carbide tipped drill bit of the appropriate size, drill the hole to the specified hole diameter and depth.



2. Thoroughly clean the hole by using a manual pump or compressed air. A manual pump shall not be used for embedment depth higher than 300 mm. For compressed air cleaning, select the correct air lance, insert to the bottom of the hole, and depress the trigger for 2 seconds. The compressed air must be clean and free from water and oil, with a minimum pressure of 90 psi (6 bar). Perform the blowing operation twice.



3. Select the correct size hole cleaning brush. Ensure that the brush is in good condition and of the correct diameter. Insert the brush to the bottom of the hole, using a brush extension if needed to reach the bottom. Withdraw with a twisting motion. There should be a positive interaction between the bristles of the brush and the sides of the drilled hole. Perform the brushing operation twice.



4. Repeat step 2 (blowing operation x2)

5. Repeat step 3 (brushing operation x2)

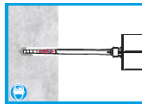
6. Repeat step 2 (blowing operation x2)

7. Select the most appropriate static mixer nozzle, checking that the mixing elements are present and fit for purpose. Never modify the mixer. Attach the mixer nozzle to the cartridge. Check the dispensing tool is in good working order. Place the cartridge into the dispensing tool.



8. Extrude some resin to waste until an even coloured mixture is achieved. The cartridge is now ready for use.

9. Insert the mixing nozzle to the bottom of the hole. Extrude the resin and slowly withdraw the nozzle from the hole. Ensure no air voids are created as the nozzle is withdrawn. Inject resin until the hole is approximately  $\frac{3}{4}$  full and remove the nozzle from the hole.



10. Select the steel anchor element ensuring it is free from oil or other contaminants, and mark with the required embedment depth. Insert the steel element into the hole using a back and forth twisting motion to ensure complete cover, until it reaches the bottom of the hole. Excess resin will be expelled from the hole evenly around the steel element and there shall be no gaps between the anchor element and the wall of the drilled hole.

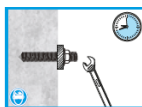


11. Clean any excess resin from around the mouth of the hole.

12. Refer to the working and loading times within the tables to determine the appropriate cure time.



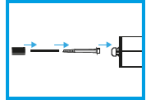
13. Position the fixture and tighten the anchor to the appropriate installation torque. Do not over-torque the anchor, as this could adversely affect its performance.



## DEEP EMBEDMENT & OVERHEAD INSTALLATION METHOD

1a. Perform steps 1-8 under "solid substrate installation method".

2a. Attach the correct diameter and length extension tube to the nozzle. Select the correct diameter resin stopper for the application, then push and screw the extension tube into the resin stopper. This is held in place with a coarse internal thread. The resin stopper is a reusable accessory.



3a. Push the resin stopper and extension tube to the back of the drill hole.

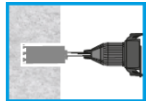
4a. Ensure the extension tube is angled to allow free movement of the resin stopper as the resin is extruded.



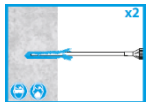
5a. Continue from step 10 under "solid substrate installation method".

## DIAMOND CORE DRILLING

1b. Using a diamond core drill (DD) and following the manufacturer's instructions, drill the specified diameter hole to the correct embedment depth then remove the concrete core.



2b. Starting from the back of the hole, flush with pressurised water a minimum of two times and until there is only clean water.



3b. Select the correct size hole cleaning brush. Ensure that the brush is in good condition and of the correct diameter. Insert the brush to the bottom of the hole, using a brush extension if needed to reach the bottom. Withdraw with a twisting motion. There should be a positive interaction between the bristles of the brush and the sides of the drilled hole. Perform the brushing operation twice.

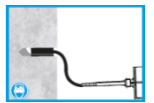


4b. Repeat step 2b (flushing operation x2).

5b. Repeat step 3b (brushing operation x2).



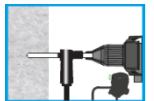
6a. Using the correct air lance and starting from the back of the hole and withdrawing, perform a minimum of two blowing operations and ensure that the hole is clear of debris and excess water.



7a. Continue from step 7 under "solid substrate installation method".

## DUSTLESS DRILLING

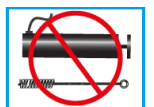
1c. Using the specified hollow drill bit (HDB) and vacuum system and following the manufacturer's instructions, drill the specified diameter hole to the correct embedment depth. Ensure that the minimum vacuum specifications are met and that the vacuum is turned on.



2c. The hole should be inspected to ensure the system has worked correctly. If the hole is clear of dust and debris, no further cleaning is required.



3c. Continue from step 7 under "solid substrate installation method".



## J-Fix Epoxy Acrylate JFEA-SF

Intended use  
Installation procedure

Annex B 3

**Table B1:** Installation parameters of threaded rod

Size			M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	$\varnothing d_0$	[mm]	10	12	14	18	22	26
Diameter of cleaning brush	$d_b$	[mm]	14	14	20	20	29	29
Torque moment	$\max T_{fix}$	[Nm]	10	20	40	80	150	200
Depth of drill hole for $h_{ef,min}$	$h_0 = h_{ef}$	[mm]	64	80	96	128	160	192
Depth of drill hole for $h_{ef,max}$	$h_0 = h_{ef}$	[mm]	96	120	144	192	240	288
Minimum edge distance	$c_{min}$	[mm]	35	40	50	65	80	96
Minimum spacing	$s_{min}$	[mm]	35	40	50	65	80	96
Minimum thickness of member	$h_{min}$	[mm]	$h_{ef} + 30 \text{ mm} \geq 100 \text{ mm}$				$h_{ef} + 2d_0$	

**Table B2:** Installation parameters of rebar

Size			Ø8	Ø10	Ø12	Ø16		Ø20	Ø25		
Nominal drill hole diameter	Ød <sub>0</sub>	[mm]	12	14	16	20	22*	25	30*	32	
Diameter of cleaning brush	d <sub>b</sub>	[mm]	14	14	19	22		29	40		
Manual pump cleaning			h <sub>ef</sub> < 300 mm								
Depth of drill hole for h <sub>ef,min</sub>	h <sub>ef</sub>	[mm]	64	80	96		128	160			
Depth of drill hole for h <sub>ef,max</sub>	h <sub>ef</sub>	[mm]	96	120	144		192	240		300	
Depth of drill hole	h <sub>0</sub>	[mm]	h <sub>ef</sub> +5	h <sub>ef</sub> +5	h <sub>ef</sub> +5		h <sub>ef</sub> +5	h <sub>ef</sub> +5		h <sub>ef</sub> +5	
Minimum edge distance	c <sub>min</sub>	[mm]	40	40	50		70	80		100	
Minimum spacing	s <sub>min</sub>	[mm]	40	40	50		70	80		100	
Minimum thickness of member	h <sub>min</sub>	[mm]	h <sub>ef</sub> + 30 mm ≥ 100 mm				h <sub>ef</sub> + 2d <sub>0</sub>				

\* Only for hammer and dustless drilling

**Table B3:** Minimum curing time

Resin cartridge temperature [°C]	T Work [mins]	Base material Temperature [°C]	T Load [mins]
min +5	18	min +5	145
+5 to +10	10	+5 to +10	
+10 to +20	6	+10 to +20	85
+20 to +25	5	+20 to +25	50
+25 to +30	4	+25 to +30	40
+30		+30	35

T work is typical gel time at highest temperature

T load is set at the lowest temperature

## J-Fix Epoxy Acrylate JFEA-SF

**Intended use**  
Installation parameters  
Curing times

## Annex B 4

**Table C1:** Design method EN 1992-4

Steel failure - Characteristic values of resistance to tension load of threaded rod

Steel failure – Characteristic resistance			M8	M10	M12	M16	M20	M24
Size								
Steel grade <b>5.8</b>	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	$\gamma_{Ms}$	[-]	1,5					
Steel grade <b>8.8</b>	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms}$	[-]	1,5					
Steel grade <b>10.9</b>	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	$\gamma_{Ms}$	[-]	1,4					
Stainless steel grade <b>A2-70, A4-70</b>	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms}$	[-]	1,9					
Stainless steel grade <b>A4-80</b>	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms}$	[-]	1,6					
Stainless steel grade <b>1.4529</b>	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms}$	[-]	1,5					
Stainless steel grade <b>1.4565</b>	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms}$	[-]	1,9					

**Table C2:** Design method EN 1992-4

Steel failure - Characteristic values of resistance to tension load of rebar

Steel failure – Characteristic resistance			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Size								
Rebar BSt 500 S	$N_{Rk,s}$	[kN]	28	43	62	111	173	270
Partial safety factor	$\gamma_{Ms}$	[-]	1,4					

**J-Fix Epoxy Acrylate JFEA-SF****Performances**

Steel failure characteristic resistance

**Annex C 1**

**Table C3:** Design method EN 1992-4

Characteristic values of resistance to tension load of threaded rod

**Hammer drilling, Dustless drilling****Combined pullout and concrete cone failure in uncracked concrete C20/25**

Size			M8	M10	M12	M16	M20	M24		
Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years										
Dry, wet concrete and flooded hole			$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	10,0	8,0	9,0	9,5	8,5	8,5
Installation safety factor										
Dry, wet concrete			$\gamma_{inst}$	[-]	1,2					
Hammer drilling - flooded hole			$\gamma_{inst}$	[-]	1,2					
Dustless drilling - flooded hole			$\gamma_{inst}$	[-]	1,4					
Factor for influence of sustained load for a working life 50 years			$\psi^0_{sus}$	[-]	0,78					
Factor for concrete	C25/30	$\psi_c$	[-]	1,06						
	C30/37			1,12						
	C35/45			1,19						
	C40/50			1,23						
	C45/55			1,27						
	C50/60			1,30						

**Concrete cone failure**

Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	1,5h <sub>ef</sub>

**Splitting failure**

Size			M8	M10	M12	M16	M20	M24
Edge distance	$c_{cr,sp}$	[mm]	2,0h <sub>ef</sub>			1,5h <sub>ef</sub>		
Spacing	$s_{cr,sp}$	[mm]	4,0h <sub>ef</sub>			3,0h <sub>ef</sub>		

**J-Fix Epoxy Acrylate JFEA-SF****Performances**

Hammer drilling, Dustless drilling

Characteristic resistance for tension loads – threaded rod

**Annex C 2**

**Table C4:** Design method EN 1992-4  
Characteristic values of resistance to tension load of rebar

**Hammer drilling, Dustless drilling**

**Combined pullout and concrete cone failure in uncracked concrete C20/25**

Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
<b>Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years</b>								
Dry, wet concrete, flooded hole	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]		8,5	8,0	8,0	7,0	7,0	5,5
<b>Installation safety factor</b>								
Dry, wet concrete	$\gamma_{inst}$	[-]	1,2					
Hammer drilling - flooded hole	$\gamma_{inst}$	[-]	1,2					
Dustless drilling - flooded hole	$\gamma_{inst}$	[-]	1,4					
Factor for influence of sustained load for a working life 50 years	$\psi^0_{sus}$	[-]	0,75					
Factor for concrete	C25/30	$\psi_c$	[-]	1,04				
	C30/37			1,08				
	C35/45			1,12				
	C40/50			1,15				
	C45/55			1,17				
	C50/60			1,19				

**Concrete cone failure**

Factor for concrete cone failure	$k_{ucr,N}$	[-]	11					
Edge distance	$c_{cr,N}$	[mm]	$1,5h_{ef}$					

**Splitting failure**

Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Edge distance	$c_{cr,sp}$	[mm]	$2 \cdot h_{ef}$					
Spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$					

**J-Fix Epoxy Acrylate JFEA-SF**

**Performances**

Hammer drilling, Dustless drilling  
Characteristic resistance for tension loads - rebar

**Annex C 3**

**Table C5:** Design method EN 1992-4

Characteristic values of resistance to tension load of threaded rod

**Diamond core drilling**

Combined pullout and concrete cone failure in uncracked concrete C20/25									
Size				M8	M10	M12	M16	M20	M24
Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years									
Dry, wet concrete and flooded hole		$\tau_{RK,ucr}$	[N/mm <sup>2</sup> ]	9,0	8,0	8,5	7,5	6,5	6,5
Installation safety factor									
Dry, wet concrete		$\gamma_{inst}$	[-]	1					
Flooded hole		$\gamma_{inst}$	[-]	1,4					
Factor for influence of sustained load for a working life 50 years		$\psi^0_{sus}$	[-]	0,82					
Factor for concrete	C25/30	$\psi_c$	[-]	1,02					
	C30/37			1,04					
	C35/45			1,06					
	C40/50			1,07					
	C45/55			1,08					
	C50/60			1,09					

<b>Concrete cone failure</b>			
Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	1,5h <sub>ef</sub>

<b>Splitting failure</b>							
<b>Size</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>
Edge distance	$c_{cr,sp}$	[mm]	2,0h <sub>ef</sub>		1,5h <sub>ef</sub>		
Spacing	$s_{cr,sp}$	[mm]	4,0h <sub>ef</sub>		3,0h <sub>ef</sub>		

**J-Fix Epoxy Acrylate JFEA-SF****Performances**

Diamond core drilling

Characteristic resistance for tension loads – threaded rod

**Annex C 4**

**Table C6:** Design method EN 1992-4  
Characteristic values of resistance to tension load of rebar

**Diamond core drilling**

Combined pullout and concrete cone failure in uncracked concrete C20/25								
Size		Ø8	Ø10	Ø12	Ø16	Ø20	Ø25	
Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years								
Dry, wet concrete, flooded hole		$\tau_{RK,ucr}$ [N/mm <sup>2</sup> ]	8,0	8,0	7,5	7,0	6,5	6,0
Installation safety factor								
Dry, wet concrete		$\gamma_{inst}$	[-]	1				
Flooded hole		$\gamma_{inst}$	[-]	1,4				
Factor for influence of sustained load for a working life 50 years		$\psi^0_{sus}$	[-]	0,87				
Factor for concrete	C25/30	$\psi_c$	[-]	1,02				
	C30/37			1,04				
	C35/45			1,06				
	C40/50			1,07				
	C45/55			1,08				
	C50/60			1,09				

<b>Concrete cone failure</b>			
Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	1,5h <sub>ef</sub>

Splitting failure								
Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Edge distance	$c_{cr,sp}$	[mm]	$2 \cdot h_{ef}$					
Spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$					

**J-Fix Epoxy Acrylate JFEA-SF**

**Performances**

Diamond core drilling  
Characteristic resistance for tension loads - rebar

**Annex C 5**



**Table C7:** Design method EN 1992-4

Characteristic values of resistance to shear load of threaded rod

Steel failure without lever arm								
Size			M8	M10	M12	M16	M20	M24
Steel grade <b>5.8</b>	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Partial safety factor	$\gamma_{Ms}$	[-]	1,25					
Steel grade <b>8.8</b>	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	$\gamma_{Ms}$	[-]	1,25					
Steel grade <b>10.9</b>	$V_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	$\gamma_{Ms}$	[-]	1,5					
Stainless steel grade <b>A2-70, A4-70</b>	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	$\gamma_{Ms}$	[-]	1,56					
Stainless steel grade <b>A4-80</b>	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	$\gamma_{Ms}$	[-]	1,33					
Stainless steel grade <b>1.4529</b>	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	$\gamma_{Ms}$	[-]	1,25					
Stainless steel grade <b>1.4565</b>	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	$\gamma_{Ms}$	[-]	1,56					
Characteristic resistance of group of fasteners								
Ductility factor $k_7 = 1.0$ for steel with rupture elongation $A_5 > 8\%$								

Steel failure with lever arm								
Size			M8	M10	M12	M16	M20	M24
Steel grade <b>5.8</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	19	37	66	166	325	561
Partial safety factor	γ <sub>Ms</sub>	[-]	1,25					
Steel grade <b>8.8</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	30	60	105	266	519	898
Partial safety factor	γ <sub>Ms</sub>	[-]	1,25					
Steel grade <b>10.9</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	37	75	131	333	649	1123
Partial safety factor	γ <sub>Ms</sub>	[-]	1,50					
Stainless steel grade <b>A2-70, A4-70</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	26	52	92	233	454	786
Partial safety factor	γ <sub>Ms</sub>	[-]	1,56					
Stainless steel grade <b>A4-80</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	30	60	105	266	519	898
Partial safety factor	γ <sub>Ms</sub>	[-]	1,33					
Stainless steel grade <b>1.4529</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	26	52	92	233	454	786
Partial safety factor	γ <sub>Ms</sub>	[-]	1,25					
Stainless steel grade <b>1.4565</b>	M <sup>o</sup> <sub>Rk,s</sub>	[N.m]	26	52	92	233	454	786
Partial safety factor	γ <sub>Ms</sub>	[-]	1,56					
Concrete pry-out failure								
Factor for resistance to pry-out failure	k <sub>8</sub>	[-]	2					

Concrete edge failure								
Size			M8	M10	M12	M16	M20	M24
Outside diameter of fastener	$d_{nom}$	[mm]	8	10	12	16	20	24
Effective length of fastener	$\ell_f$	[mm]	$\min (h_{ef}, 8 d_{nom})$					

**J-Fix Epoxy Acrylate JFEA-SF****Performances**

Characteristic resistance for shear loads – threaded rod

**Annex C 6**

**Table C8:** Design method EN 1992-4

Characteristic values of resistance to shear load of rebar

Steel failure without lever arm								
Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Rebar BSt 500 S	$V_{RK,S}$	[kN]	14	22	31	55	86	135
Partial safety factor	$\gamma_{Ms}$	[-]	1,5					
Characteristic resistance of group of fasteners								
Ductility factor $k_7 = 1,0$ for steel with rupture elongation $A_5 > 8\%$								

Steel failure with lever arm								
Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Rebar BSt 500 S	M° <sub>RK,S</sub>	[N.m]	33	65	112	265	518	1013
Partial safety factor	γ <sub>Ms</sub>	[-]	1,5					
Concrete pryout failure								
Factor for resistance to pry-out failure	k <sub>8</sub>	[-]	2					

Concrete edge failure								
Size			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Outside diameter of fastener	d <sub>nom</sub>	[mm]	8	10	12	16	20	25
Effective length of fastener	ℓ <sub>f</sub>	[mm]	min (h <sub>ef</sub> , 8 d <sub>nom</sub> )					

**J-Fix Epoxy Acrylate JFEA-SF****Performances**

Characteristic resistance for shear loads - rebar

**Annex C 7**

**Table C9:** Displacement of threaded rod under tension and shear load  
Hammer drilling, Dustless drilling

Anchor size		M8	M10	M12	M16	M20	M24
Tension load							
$\delta_{N0}$	[mm/kN]	0,03	0,03	0,03	0,02	0,02	0,02
$\delta_{N\infty}$	[mm/kN]	0,06	0,05	0,03	0,02	0,02	0,02
Shear load							
$\delta_{V0}$	[mm/kN]	0,02	0,01	0,02	0,02	0,02	0,03
$\delta_{V\infty}$	[mm/kN]	0,04	0,02	0,03	0,03	0,03	0,05

**Table C10:** Displacement of threaded rod under tension and shear load  
Diamond core drilling

Anchor size		M8	M10	M12	M16	M20	M24
Tension load							
$\delta_{N0}$	[mm/kN]	0,04	0,03	0,02	0,03	0,02	0,02
$\delta_{N\infty}$	[mm/kN]	0,11	0,09	0,06	0,05	0,04	0,03
Shear load							
$\delta_{V0}$	[mm/kN]	0,02	0,01	0,02	0,02	0,02	0,03
$\delta_{V\infty}$	[mm/kN]	0,04	0,02	0,03	0,03	0,03	0,05

**Table C11:** Displacement of rebar under tension and shear load  
Hammer drilling, Dustless drilling

Size		Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Tension load							
$\delta_{N0}$	[mm/kN]	0,04	0,04	0,04	0,03	0,03	0,03
$\delta_{N\infty}$	[mm/kN]	0,13	0,12	0,08	0,06	0,05	0,03
Shear load							
$\delta_{V0}$	[mm/kN]	0,02	0,02	0,01	0,01	0,01	0,01
$\delta_{V\infty}$	[mm/kN]	0,03	0,03	0,02	0,02	0,01	0,01

**Table C12:** Displacement of rebar under tension and shear load  
Diamond core drilling

Size		Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Tension load							
$\delta_{N0}$	[mm/kN]	0,04	0,04	0,04	0,04	0,04	0,04
$\delta_{N\infty}$	[mm/kN]	0,12	0,09	0,07	0,05	0,04	0,04
Shear load							
$\delta_{V0}$	[mm/kN]	0,02	0,02	0,01	0,01	0,01	0,01
$\delta_{V\infty}$	[mm/kN]	0,03	0,03	0,02	0,02	0,01	0,01

**J-Fix Epoxy Acrylate JFEA-SF**

**Performances**  
Displacement

**Annex C 8**