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European Technical Assessment

ETA-21/0020
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English version prepared by ZAG

General Part

Technical Assessment Body issuing the European Technical Assessment	**ZAG Ljubljana**
Trade name of the construction product	**EJOT Concrete Screw Anchor JC2 Plus**
Product family to which the construction product belongs	**33: Concrete screw of size 8, 10 and 14 for use in cracked and non-cracked concrete**
Manufacturer	**EJOT BAUBEFESTIGUNGEN GmbH** **In der Stockwiese 35** **57334 BAD LAASPHE** **Germany** www.ejot.de
Manufacturing plant	**EJOT Plant 14**
This European Technical Assessment contains	13 pages including 10 annexes, which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	**EAD 330232-00-0601, edition October 2016**

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17

Specific part

1 Technical description of the product

The EJOT Concrete Screw Anchor JC2 Plus is a concrete screw in sizes 8, 10 and 14 made of galvanised carbon steel. The fastener is screwed into a predrilled cylindrical hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

For the installed anchor see Figure given in Annex A1.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The performances given in Chapter 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. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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)

The basic work requirements for mechanical resistance and stability are listed in Annexes C1, C2 and C5.

3.2 Safety in case of fire (BWR 2)

The basic work requirements for safety in case of fire are listed in Annexes C3 and C4.

3.3 General aspects relating to fitness for use

Durability and serviceability are only ensured if specifications of intended use according to Annex B1 are kept.

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

According to the decision 96/582/EC of the European Commission[1] the system of assessment and verification of constancy of performance (see Annex V to regulation (EU) No 305/2011) **1** apply.

5 Technical details necessary for the implementation of the AVCP system, as provided for on the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in chapter 3 of EAD 330232-00-0601.

Issued in Ljubljana on 9. 2. 2021

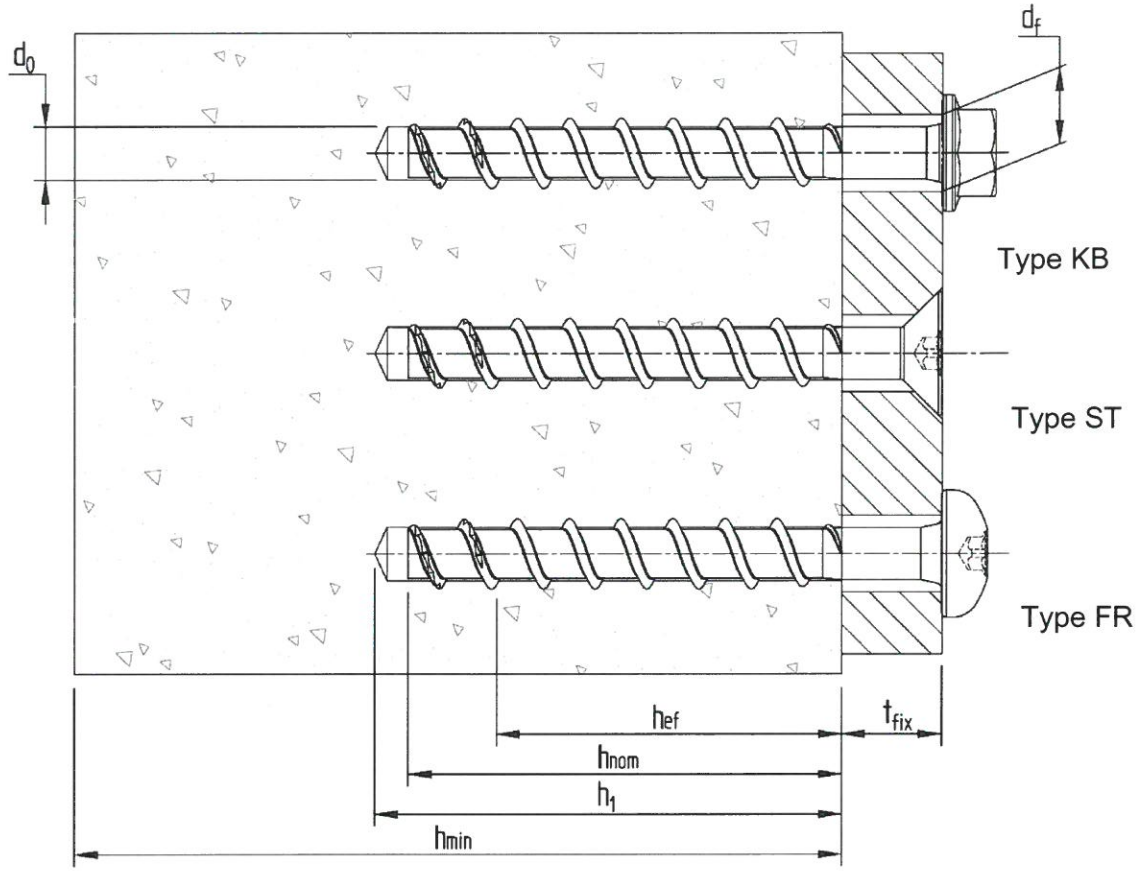
Signed by:

Franc Capuder, M.Sc.

Head of Service of TAB

[1] Official Journal of the European Communities L 254 of 8.10.1996

EJOT Concrete Screw Anchor JC2 Plus after installation



d_0 = Drill hole diameter

h_{nom} = Nominal embedment depth

h_1 = Drill hole depth

h_{min} = Minimum concrete member thickness

t_{fix} = Fixture thickness

d_f = Clearance hole diameter in fixture

EJOT Concrete Screw Anchor JC2 Plus	
Product description Installation condition	**Annex A1**

Table A1: Materials and Types

Material	f_{yk} [N/mm²]	f_{uk} [N/mm²]
Cold forged carbon steel, zinc electroplated according to EN ISO 4042 or zinc alloy coated, thickness ≥ 5µm	640	800

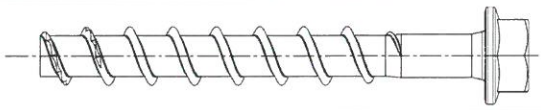
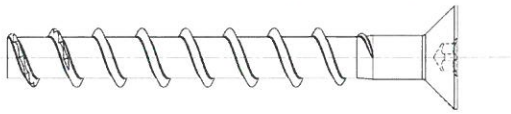
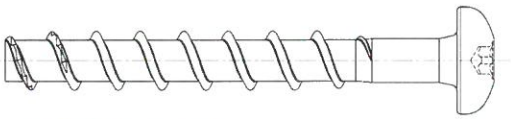
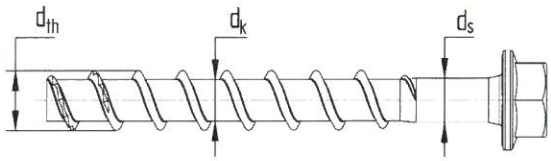
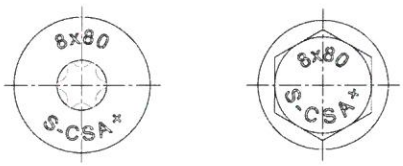
Part	**Designation**	**Description**	**Design**
1	JC2-KB Plus	Hexagonal head version with combined washer and T-drive	
2	JC2-ST Plus	Countersunk head version with T-drive	
3	JC2-FR Plus	Pan head version with T-drive	

Table A2: Anchor dimensions and head marking

Anchor size			**JC2 Plus 8**	**JC2 Plus 10**	**JC2 Plus 14**
Nominal diameter	d_{nom}	[mm]	8	10	14
Thread outer diameter	d_{th}	[mm]	10,50	12,70	16,55
Core diameter	d_k	[mm]	7,30	9,15	13,00
Shaft diameter	d_s	[mm]	7,80	9,62	13,40
Stressed section	A_s	[mm²]	42,43	65,76	132,73

Marking:
Identifying mark: S
Anchor identity: CSA+
Nominal diameter: d_{nom}
Screw length: L
Example: **JC2 Plus 8x80**





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EJOT Concrete Screw Anchor JC2 Plus

Product description
Materials, types and dimensions

Annex A2

Specifications of intended use

Anchorages subjected to:

- Static, quasi static load.
- Fire exposure.

Base materials:

- Cracked and non-cracked concrete.
- Reinforced and unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according to EN 206:2013+A1:2016.

Use conditions (Environmental conditions):

- The anchor may be used in concrete subject to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages under static and quasi-static actions are designed in accordance with EOTA TR 055, Edition December 2016 or EN 1992-4:2018.
- For application with resistance under fire exposure the anchorages are designed in accordance with the method given in EOTA TR 020, Edition May 2004.
- Verifiable calculation notes and drawings are prepared taking into account of the load to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the rang given and is not lower that of the concrete to which the characteristic loads apply for.
- Check of concrete being well compacted, e.g. without significant voids.
- Cleaning of the hole of drilling dust.
- Anchor installation ensuring the specified embedment depth.
- Keeping of the edge distance and spacing to the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength non-shrinkage mortar. No shear or oblique tension loads are allowed in the direction of a not filled aborted hole.
- Observe the maximum installation torque given in Annex B2.

EJOT Concrete Screw Anchor JC2 Plus	
Intended use Specifications	**Annex B1**

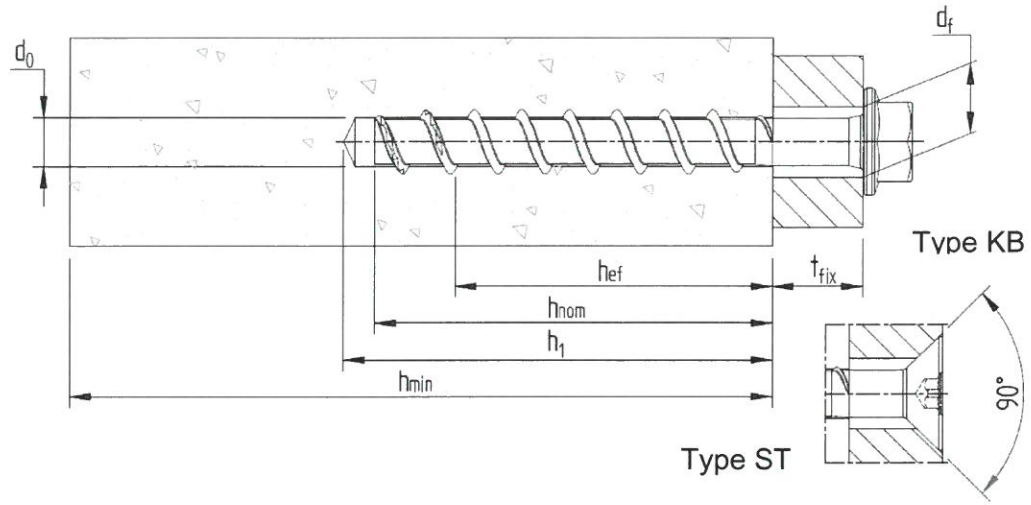

Table B1: Installation data

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Nominal embedment depth	h_{nom}	[mm]	50	65	55	85	65	115
Drill hole diameter	d_0	[mm]	8		10		14	
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut,max} \leq$	[mm]	8,45		10,45		14,50	
Depth of drilled hole to deepest point	$h_1 \geq$	[mm]	60	75	65	95	75	125
Effective anchorage depth	h_{ef}	[mm]	39,2	51,9	42,5	68,0	49,3	91,8
Diameter of clearance hole in the fixture	d_f	[mm]	10,8 - 12,0		13,0 – 14,0		17,0 – 18,0	
Maximum installation torque	$T_{inst} \leq$	[Nm]	45		85		100	
Max installation torque for impact screw driver	T_{SD}	[Nm]	290		650		650	

Table B2: Minimum thickness of concrete member, spacing and edge distance

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Minimum thickness of concrete member	h_{min}	[mm]	100	115	100	130	120	150
Minimum spacing	s_{min}	[mm]	35	35	40	40	60	60
Minimum edge distance	c_{min}	[mm]	35	35	40	40	60	60

EJOT Concrete Screw Anchor JC2 Plus

Intended use

Installation data

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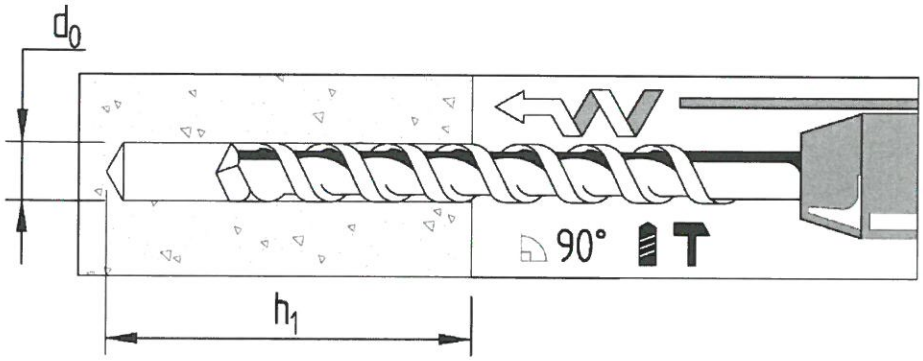
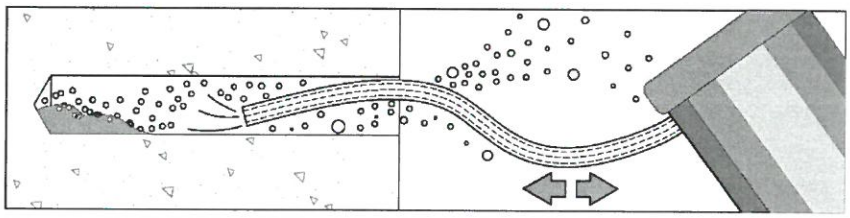
Annex B2

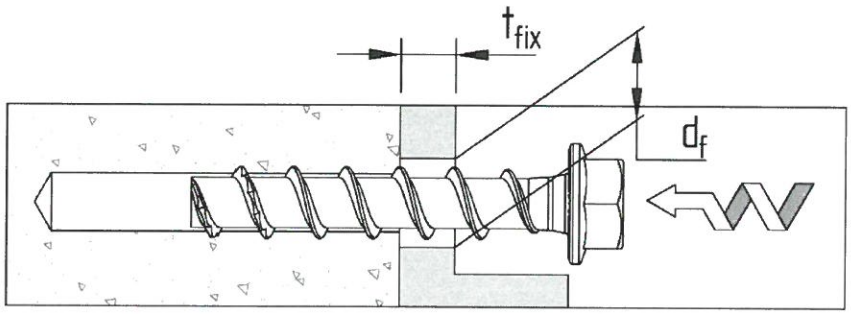
Installation instructions



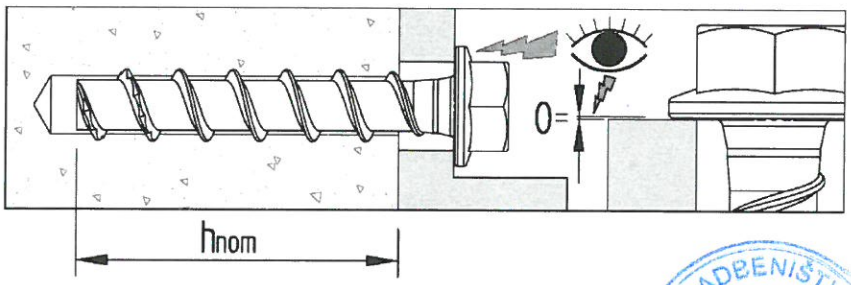
Make a cylindrical hole



Clean the hole



Install the screw anchor by impact screwdriver or torque wrench



Ensure that the screw anchor head fully rests without any gap on the fixture and is not damaged

EJOT Concrete Screw Anchor JC2 Plus

Intended use

Installation instructions

Annex B3

Table C1: Characteristic resistances under tension loads in case of static and quasi-static loading for design according EOTA TR 055 or EN 1992-4:2018

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	33,9		52,6		106,2	
Partial safety factor	γ_{Ms} [1)]	[-]	1,5					
Pull-out failure								
Characteristic resistance in **cracked** concrete C20/25	$N_{Rk,p}$	[kN]	6,5	12	7,5	19	8,5	30
Characteristic resistance in **non-cracked** concrete C20/25	$N_{Rk,p}$	[kN]	/ [1)]	/ [1)]	/ [1)]	/ [1)]	15	42
Increasing factor for $N_{Rk,p}$	Ψ_C	C25/30	1,07	1,07	1,06	1,06	1,08	1,10
		C30/37	1,13	1,14	1,12	1,12	1,14	1,19
		C35/45	1,19	1,19	1,17	1,17	1,20	1,27
		C40/50	1,24	1,24	1,21	1,21	1,26	1,34
		C45/55	1,28	1,29	1,25	1,25	1,31	1,41
		C50/60	1,32	1,33	1,29	1,28	1,35	1,47
Partial safety factor	γ_{inst}	[-]	1,0					
	γ_{Mp} [2)]	[-]	1,5 [3)]					
Concrete cone and splitting failure								
Effective anchorage depth	h_{ef}	[mm]	39,2	51,9	42,5	68,0	49,3	91,8
Factor for cracked concrete	k_{cr}	[-]	7,7					
Factor for non-cracked concrete	k_{ucr}	[-]	11,0					
Spacing	$s_{cr,N}$	[mm]	118	156	128	204	148	275
Edge distance	$c_{cr,N}$	[mm]	59	78	64	102	74	138
Spacing (splitting)	$s_{cr,sp}$	[mm]	118	176	128	232	148	275
Edge distance (splitting)	$c_{cr,sp}$	[mm]	59	88	64	116	74	138
Partial safety factor	γ_{Msp} [1)]	[-]	1,5 [3)]					

[1)] Pull-out isn't decisive

[2)] In absence of other national regulations

[3)] The installation safety factor of γ_{inst} = 1,0 is included

EJOT Concrete Screw Anchor JC2 Plus

Performance

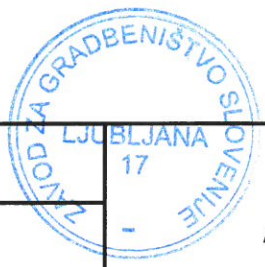
Characteristic resistance under tension loads

Annex C1

Table C2: Characteristic resistances under shear loads in case of static and quasi-static loading for design according to EOTA TR 055 or EN 1992-4:2018

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	19,1	21,5	31,8	35,2	61,1	64,9
Partial safety factor	γ_{Ms} [1)]	[-]	1,25					
Factor for considering ductility	k_7	[-]	0,8				1,0	
Steel failure with lever arm								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	37	45	72	84	207	227
Partial safety factor	γ_{Ms} [1)]	[-]	1,25					
Concrete pryout failure								
k-factor	k_8	[-]	3,4		3,0		3,3	
Partial safety factor	γ_{Mc} [1)]	[-]	1,5					
Concrete edge failure								
Effective length of anchor under shear load	l_f	[mm]	39,2	51,9	42,5	68,0	49,3	91,8
Outside diameter of anchor	d_{nom}	[mm]	8		10		14	
Cracked concrete without any edge reinforcement	$\Psi_{re,V}$	[-]	1,0					
Cracked concrete with straight edge reinforcement > Ø12 mm			1,2					
Cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100mm) or **non-cracked concrete**			1,4					
Partial safety factor	γ_{Mc} [1)]	[-]	1,5					

[1)] In absence of other national regulations



EJOT Concrete Screw Anchor JC2 Plus

Performance

Characteristic resistance under shear loads

Annex C2

Table C3: Characteristic resistances under tension loads in case of fire exposure for design according to EOTA TR 020 or EN 1992-4:2018

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Steel failure								
Characteristic resistance $N_{Rk,s,fi}$	R30	[kN]	0,42		0,99		2,65	
	R60	[kN]	0,38		0,85		1,99	
	R90	[kN]	0,30		0,66		1,73	
	R120	[kN]	0,21		0,53		1,33	
Pull-out failure								
Characteristic resistance $N_{Rk,p,fi}$	R30	[kN]	1,63	3,00	1,88	4,75	2,13	7,50
	R60	[kN]	1,63	3,00	1,88	4,75	2,13	7,50
	R90	[kN]	1,63	3,00	1,88	4,75	2,13	7,50
	R120	[kN]	1,30	2,40	1,50	3,80	1,70	6,00
Concrete cone and splitting failure [1)]								
Characteristic resistance $N^0_{Rk,c,fi}$	R30	[kN]	1,66	3,34	2,03	6,57	2,94	13,90
	R60	[kN]	1,66	3,34	2,03	6,57	294	13,90
	R90	[kN]	1,66	3,34	2,03	6,57	2,94	13,90
	R120	[kN]	1,33	2,67	1,62	5,25	2,35	11,12
Spacing	$s_{cr,N,fi}$	[mm]	$4 \times h_{ef}$					
	s_{min}	[mm]	35	35	40	40	60	60
Edge distance	$c_{cr,N,fi}$	[mm]	$2 \times h_{ef}$					
	c_{min}	[mm]	Fire attack from one side: $c_{min} = 2 \times h_{ef}$					
			Fire attack from more than one side: $c_{min} \geq 300$ mm and $\geq 2 \times h_{ef}$					

[1)] As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed

Design under fire exposure is performed according to the design method given in EOTA TR 020.

Under fire exposure usually cracked concrete is assumed. The design equations are given in EOTA TR 020 § 2.2.1.

In the absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

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EJOT Concrete Screw Anchor JC2 Plus	
Performance Characteristic tension resistance under fire exposure	**Annex C3**

Table C4: Characteristic resistances under shear loads in case of fire exposure for design according to EOTA TR 020 or EN 1992-4:2018

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Steel failure without lever arm								
Characteristic resistance $V_{Rk,s,fi}$	R30	[kN]	0,42		0,99		2,65	
	R60	[kN]	0,38		0,85		1,99	
	R90	[kN]	0,30		0,66		1,73	
	R120	[kN]	0,21		0,53		1,33	
Steel failure with lever arm								
Characteristic resistance $M^0_{Rk,s,fi}$	R30	[Nm]	0,47	0,56	1,35	1,57	5,18	5,67
	R60	[Nm]	0,42	0,50	1,17	1,36	3,88	4,25
	R90	[Nm]	0,33	0,39	0,90	1,05	3,36	3,69
	R120	[Nm]	0,23	0,28	0,72	0,84	2,58	2,83
Concrete pryout failure								
k-factor	k_8	[-]	3,4		3,0		3,3	
Characteristic resistance $V_{Rk,cp,fi}$	R30	[kN]	5,64	11,36	6,09	19,71	9,70	45,87
	R60	[kN]	5,64	11,36	6,09	19,71	9,70	45,87
	R90	[kN]	5,64	11,36	6,09	19,71	9,70	45,87
	R120	[kN]	4,52	9,08	4,86	15,75	7,76	36,70
Concrete edge failure								

The initial value $V^0_{Rk,c,fi}$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by:

$$V^0_{Rk,c,fi} = 0{,}25 \times V^0_{Rk,c} \quad (\leq R90) \qquad V^0_{Rk,c,fi} = 0{,}20 \times V^0_{Rk,c} \quad (R120)$$

with $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature.

Design under fire exposure is performed according to the design method given in EOTA TR 020.

Under fire exposure usually cracked concrete is assumed. The design equations are given in EOTA TR 020 § 2.2.1.

EOTA TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \times h_{ef}$.

In the absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1{,}0$ is recommended.

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EJOT Concrete Screw Anchor JC2 Plus	
Performance Characteristic shear resistance under fire exposure	**Annex C4**

Table C5: Displacements under tension loads for static and quasi-static loading

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Cracked C20/25	**N**	**[kN]**	**3,10**	**5,71**	**3,57**	**9,05**	**4,05**	**14,29**
	δ_{N0}	[mm]	0,04	0,08	0,03	0,15	0,20	022
	$\delta_{N\infty}$	[mm]	0,65	0,94	0,48	0,89	1,65	1,52
Cracked C50/60	**N**	**[kN]**	**4,09**	**7,60**	**4,61**	**11,58**	**5,46**	**21,00**
	δ_{N0}	[mm]	0,05	0,13	0,09	0,14	0,24	0,32
	$\delta_{N\infty}$	[mm]	0,65	0,94	0,48	0,89	1,65	1,52
Non-cracked C20/25	**N**	**[kN]**	**5,76**	**8,76**	**6,48**	**13,14**	**7,14**	**20,00**
	δ_{N0}	[mm]	0,07	0,12	0.10	0,09	0,33	0,15
	$\delta_{N\infty}$	[mm]	0,65	0,94	0,48	0,89	1,65	1,52
Non-cracked C50/60	**N**	**[kN]**	**9,10**	**13,85**	**10,26**	**20,76**	**9,64**	**29,40**
	δ_{N0}	[mm]	0,17	0,26	0,07	0,33	0,17	0,23
	$\delta_{N\infty}$	[mm]	0,65	0,94	0,48	0,89	1,65	1,52

Table C6: Displacements under shear loads for static and quasi-static loading

EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			JC2 Plus 8		JC2 Plus 10		JC2 Plus 14	
			8-1	8-2	10-1	10-2	14-1	14-2
Cracked and non-cracked concrete C20/25 - C50/60	**V**	**[kN]**	**10,91**	**12,29**	**18,17**	**20,11**	**34,91**	**37,09**
	δ_{V0}	[mm]	1,19	1,35	3,04	3,20	2,33	2,46
	$\delta_{V\infty}$	[mm]	1,79	2,02	4,56	4,80	3,50	3,69

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

EJOT Concrete Screw Anchor JC2 Plus

Performance

Displacements under tension and shear loads

Annex C5