ZAVOD ZA GRADBENIŠTVO SLOVENIJE
SLOVENIAN NATIONAL BUILDING AND CIVIL ENGINEERING INSTITUTE

Designated according to Article 29 of Regulation (EU) No 305/2011

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# European Technical Assessment

# ETA-17/0835
## of 06.02.2019

*English version prepared by ZAG*

## General Part

| | |
|---|---|
| **Organ za tehnično ocenjevanje, ki je izdal ETA**<br>*Technical Assessment Body issuing the ETA* | **ZAG Ljubljana** |
| **Komercialno ime gradbenega proizvoda**<br>*Trade name of the construction product* | **EJOT concrete screw JC2** |
| **Družina proizvoda, ki ji gradbeni proizvod pripada**<br>*Product family to which the construction product belongs* | **33: Vijak za beton velikosti 6, 8 in 10 za vgradnjo v razpokani in nerazpokani beton**<br>*33: Concrete screw of size 6, 8 and 10 for use in cracked and non-cracked concrete* |
| **Proizvajalec**<br>*Manufacturer* | **EJOT Baubefestigungen GmbH**<br>**In der Stockwiese 35**<br>**57334 Bad Laasphe**<br>**Germany**<br>www.ejot.com |
| **Proizvodni obrat**<br>*Manufacturing plant* | **EJOT Plant 14** |
| **Ta Evropska tehnična ocena vsebuje**<br>*This European Technical Assessment contains* | 13 strani vključno s 10 prilogami, ki so sestavni del te ocene<br>*13 pages including 10 annexes, which form an integral part of the document* |
| **Ta Evropska tehnična ocena je izdana na podlagi Uredbe (EU) št. 305/2011 na osnovi**<br>*This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of* | EAD 330232-00-0601, izdaja oktober 2016<br>*EAD 330232-00-0601, edition October 2016* |
| Ta Evropska tehnična ocena zamenjuje<br>*This European Technical Assessment replaces* | ETA-16/0945 izdano dne 10.10.2017<br>*ETA-16/0945 issued on 10.10.2017* |

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# Specific Part

## 1 Technical description of the product

The EJOT concrete screw JC2 is an anchor in sizes 6, 8 and 10 made of galvanised zinc or zinc alloy coated steel. The anchor 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 Hygiene, health and environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transported European legislation and national laws, regulations and administrative provisions). In order to meet provisions of the regulation (EU) No 305/2011, these requirements need also to be complied with, when they apply.

### 3.4 Safety in use (BWR 4)

For basic work requirement safety in use the same criteria are valid as for basic work requirement mechanical resistance and stability.

### 3.5 Protection against noise (BWR 5)

Not relevant.

### 3.6 Energy economy and heat retention (BWR 6)

Not relevant.

### 3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

### 3.8 General aspects relating to fitness for use

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

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## 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 06.02.2019

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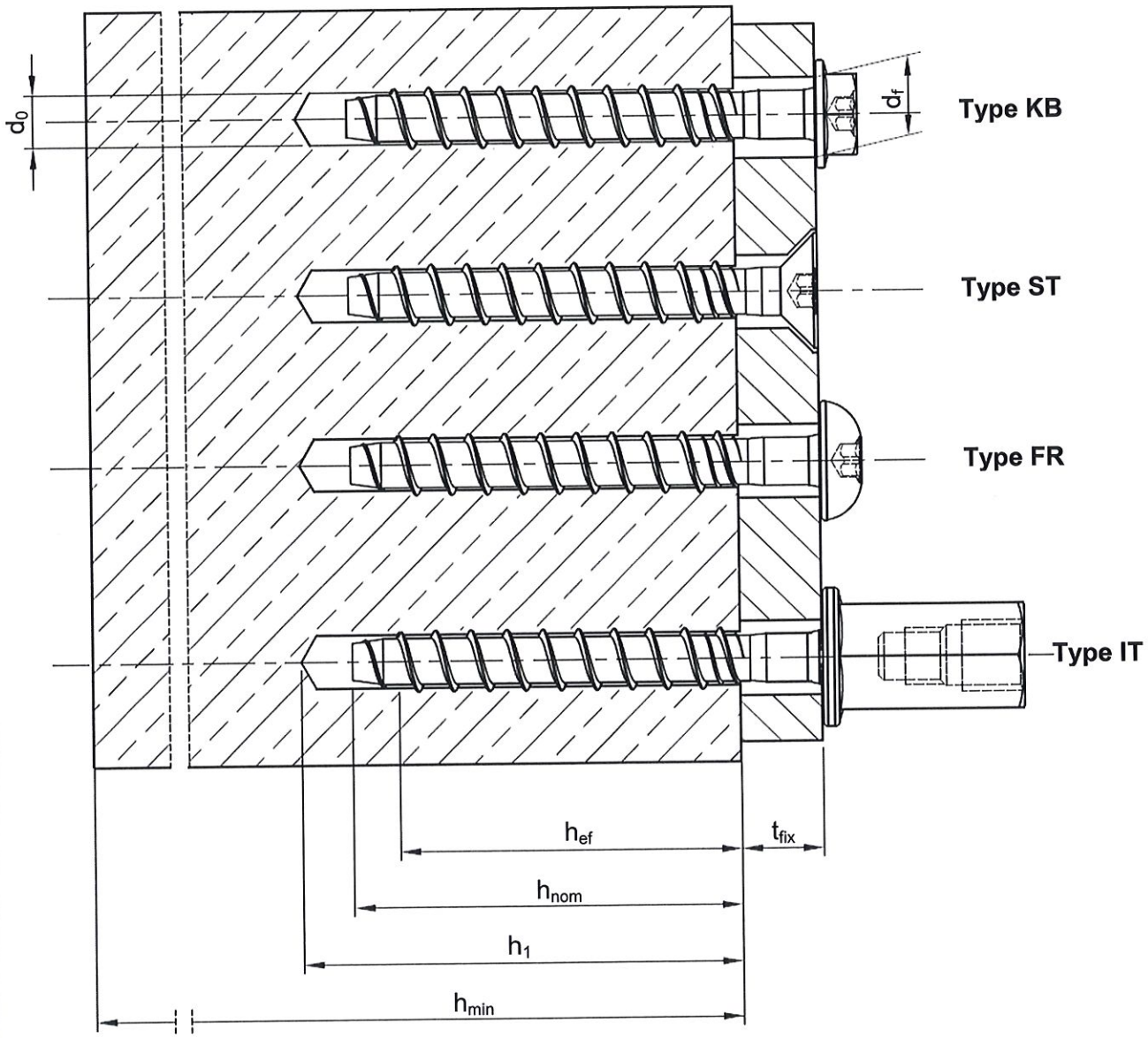
Signed by:
Franc Capuder, M.Sc.
Head of Service of TAB

1 Official Journal of the European Communities L 254 of 8.10.1996

## EJOT concrete screw JC2 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 JC2 | |
|---|---|
| **Product description**<br>Installation condition | **Annex A1** |

**Table A1:** Materials and Types

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

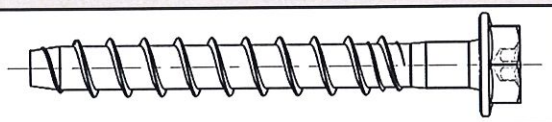
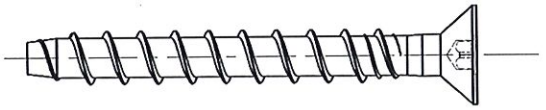
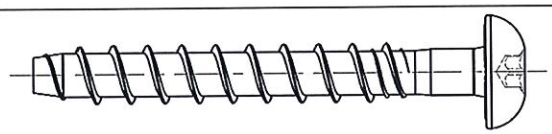
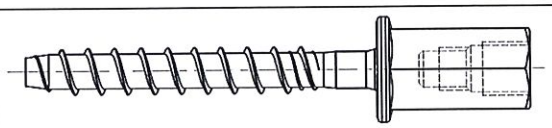
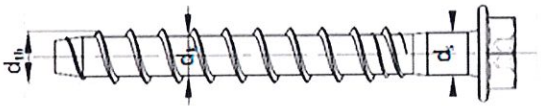
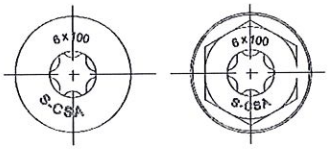
| Part | Designation | Description | Design |
|---|---|---|---|
| 1 | JC2-KB | Hexagonal head version with combined washer and TX-drive |  |
| 2 | JC2-ST | Countersunk head version with TX-drive |  |
| 3 | JC2-FR | Pan head version with TX-drive |  |
| 4 | JC2-IT | Internal thread version with hexagonal drive |  |

**Table A2:** Anchor dimensions and head marking

| Anchor size | | | JC2-6 | JC2-8 | JC2-10 |
|---|---|---|---|---|---|
| Nominal diameter | $d_{nom}$ | [mm] | 6 | 8 | 10 |
| Thread outer diameter | $d_{th}$ | [mm] | 7,45 | 9,90 | 11,9 |
| Core diameter | $d_k$ | [mm] | 5,55 | 7,35 | 9,30 |
| Shaft diameter | $d_s$ | [mm] | 5,88 | 7,80 | 9,62 |
| Stressed section | $A_s$ | [mm²] | 23,76 | 41,85 | 67,9 |

**Marking:** Identifying mark: S or J
Anchor identity: CSA or C2
Nominal diameter: $d_{nom}$
Screw length: L
**Example:** **S-CSA 6x100**
or: **JC2-6x100**






| **EJOT concrete screw JC2** | |
|---|---|
| **Product description**<br>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.
- Application of the torque moment given in Annex B2 using a calibrated torque wrench.

| EJOT concrete screw JC2 | |
|---|---|
| **Intended use**<br>Specifications | **Annex B1** |

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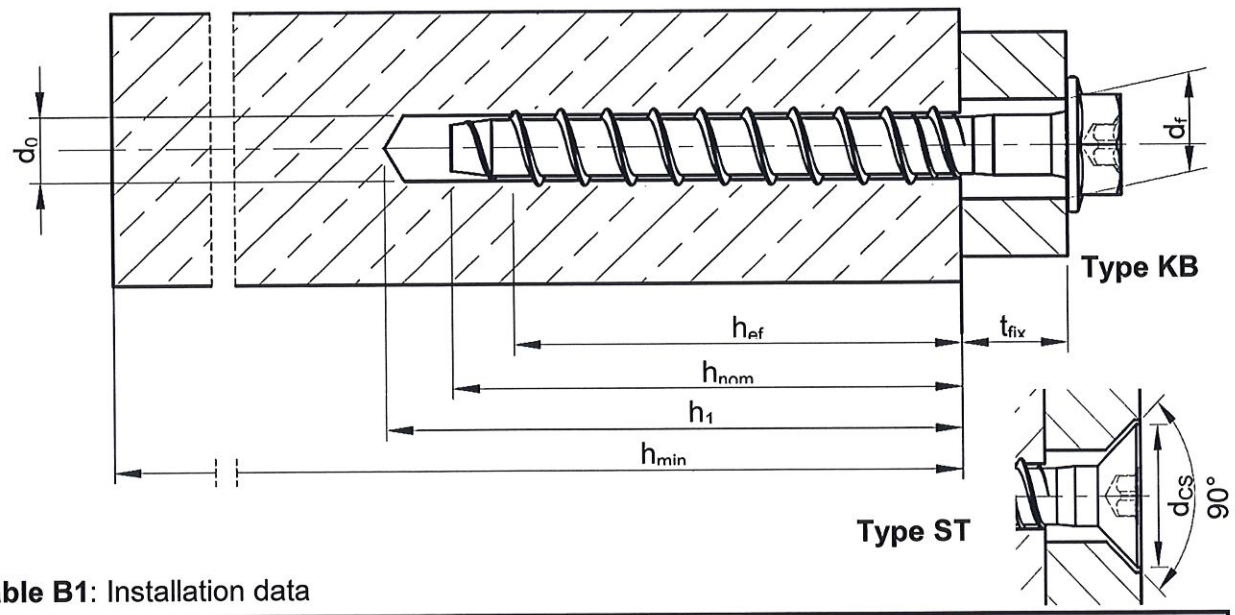



**Table B1**: Installation data

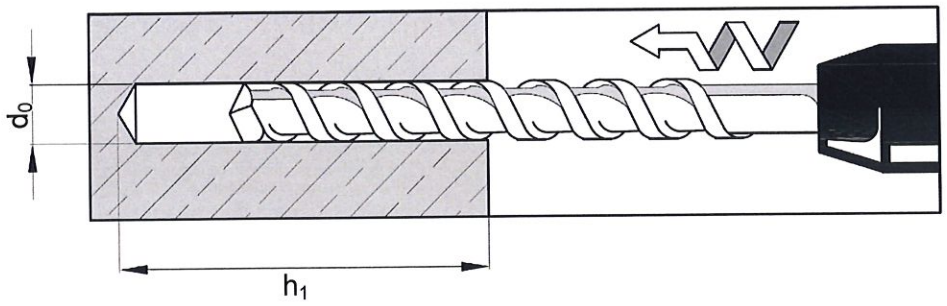
| EJOT concrete screw JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| Nominal embedment depth | $h_{nom}$ | [mm] | 55 | 65 | 85 |
| Drill hole diameter | $d_0$ | [mm] | 6 | 8 | 10 |
| Cutting diameter at the upper tolerance limit (maximum diameter bit) | $d_{cut,max} \leq$ | [mm] | 6,40 | 8,45 | 10,45 |
| Depth of drilled hole to deepest point | $h_1 \geq$ | [mm] | 65 | 75 | 95 |
| Effective anchorage depth | $h_{ef}$ | [mm] | 42,5 | 48,5 | 61,5 |
| Diameter of clearance hole in the fixture | $d_f \leq$ | [mm] | 9 | 12 | 14 |
| Countersunk head diameter (Type ST) | $d_{CS}$ | [mm] | 14 | - | - |
| Hexalobular internal drive | TX | [-] | 30 | 40 | - |
| Width across flats | SW | [mm] | 11 or 13 | 13 | 15 |
| Maximum installation torque | $T_{inst} \leq$ | [Nm] | 14 | 40 | 90 |
| Max installation torque for impact screw driver | $T_{SD}$ | [Nm] | 90 | 200 | 360 |

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

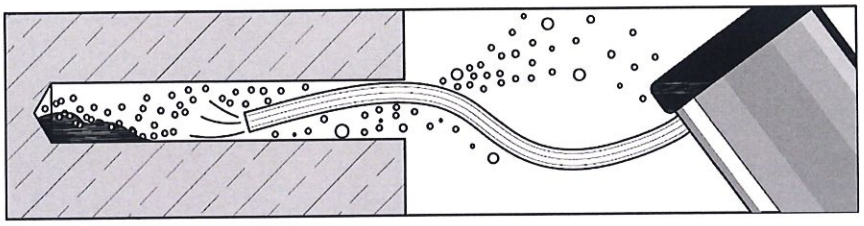
| EJOT concrete screw JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| Minimum thickness of concrete member | $h_{min}$ | [mm] | 100 | 110 | 125 |
| Minimum spacing | $s_{min}$ | [mm] | 35 | 50 | 50 |
| Minimum edge distance | $c_{min}$ | [mm] | 35 | 50 | 50 |

| EJOT concrete screw JC2 | |
|---|---|
| **Intended use**<br>Installation data | **Annex B2** |

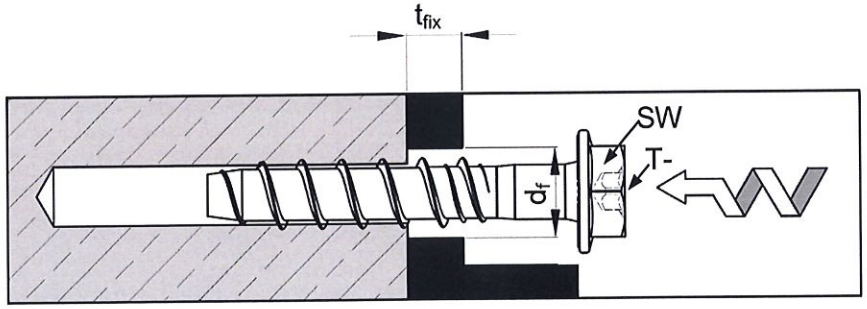
## Installation instructions



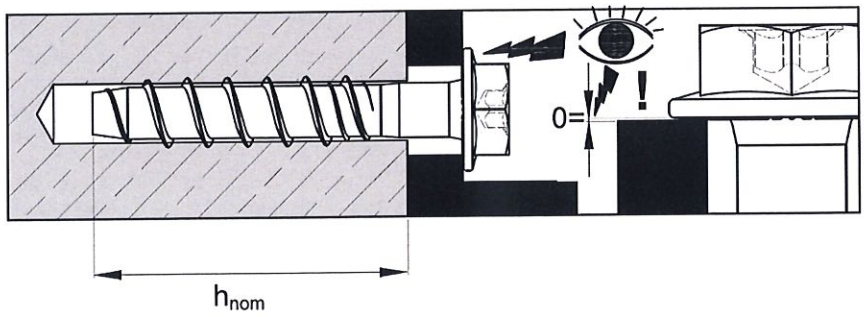

Make a cylindrical hole



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 JC2 | |
|---|---|
| **Intended use**<br>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 JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| **Steel failure** | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 19,1 | 33,5 | 54,3 |
| Partial safety factor | $\gamma_{Ms}$ [1)] | [ - ] | 1,5 | | |
| **Pull-out failure** | | | | | |
| Characteristic resistance in **cracked** concrete C20/25 | $N_{Rk,p}$ | [kN] | 4,5 | 8 | 14 |
| Characteristic resistance in **non-cracked** concrete C20/25 | $N_{Rk,p}$ | [kN] | 9,5 | 16 | 22 |
| Increasing factor for $N_{Rk,p}$ | $\Psi_C$ | C25/30 | 1,08 | 1,08 | 1,10 |
| | | C30/37 | 1,13 | 1,14 | 1,17 |
| | | C35/45 | 1,18 | 1,19 | 1,24 |
| | | C40/50 | 1,24 | 1,25 | 1,32 |
| | | C45/55 | 1,30 | 1,30 | 1,39 |
| | | C50/60 | 1,35 | 1,36 | 1,45 |
| Partial safety factor | $\gamma_{inst}$ | [ - ] | 1,0 | | |
| | $\gamma_{Mp}$ [1)] | [ - ] | 1,5 [2)] | | |
| **Concrete cone and splitting failure** | | | | | |
| Effective anchorage depth | $h_{ef}$ | [mm] | 42,5 | 48,5 | 61,5 |
| Factor for cracked concrete | $k_{cr}$ | [ - ] | 7,7 | | |
| Factor for non-cracked concrete | $k_{ucr}$ | [ - ] | 11,0 | | |
| Spacing | $s_{cr,N}$ | [mm] | 128 | 146 | 184 |
| Edge distance | $c_{cr,N}$ | [mm] | 64 | 73 | 92 |
| Spacing ( splitting ) | $s_{cr,sp}$ | [mm] | 128 | 146 | 184 |
| Edge distance ( splitting ) | $c_{cr,sp}$ | [mm] | 64 | 73 | 92 |
| Partial safety factor | $\gamma_{Msp}$ [1)] | [ - ] | 1,5 [2)] | | |

[1)] In absence of other national regulations

[2)] The installation safety factor of $\gamma_{inst}$ = 1,0 is included

| EJOT concrete screw JC2 | |
|---|---|
| **Performance**<br>Characteristic resistance under tension loads | **Annex C1** |

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**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 JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance | $V_{Rk,s}$ | [kN] | 9,8 | 14,2 | 29,1 |
| Partial safety factor | $\gamma_{Ms}$ [1)] | [ - ] | 1,25 | | |
| Factor for considering ductility | $k_7$ | [ - ] | 0,8 | | |
| **Steel failure with lever arm** | | | | | |
| Characteristic resistance | $M^0_{Rk,s}$ | [Nm] | 16 | 37 | 76 |
| Partial safety factor | $\gamma_{Ms}$ [1)] | [ - ] | 1,25 | | |
| **Concrete pryout failure** | | | | | |
| k-factor | $k_8$ | [ - ] | 1,0 | | 2,0 |
| Partial safety factor | $\gamma_{Mc}$ [1)] | [ - ] | 1,5 | | |
| **Concrete edge failure** | | | | | |
| Effective length of anchor under shear load | $l_f$ | [mm] | 42,5 | 48,5 | 61,5 |
| Outside diameter of anchor | $d_{nom}$ | [mm] | 6 | 8 | 10 |
| **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 | $\gamma_{Mc}$ [1)] | [ - ] | 1,5 | | |

[1)] In absence of other national regulations

| EJOT concrete screw JC2 | |
|---|---|
| **Performance**<br>Characteristic resistance under shear loads | **Annex C2** 17 |

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**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 JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| **Steel failure** | | | | | |
| Characteristic resistance $N_{Rk,s,fi}$ | R30 | [kN] | 0,24 | 0,42 | 1,02 |
| | R60 | [kN] | 0,22 | 0,38 | 0,88 |
| | R90 | [kN] | 0,17 | 0,29 | 0,68 |
| | R120 | [kN] | 0,12 | 0,21 | 0,54 |
| **Pull-out failure** | | | | | |
| Characteristic resistance $N_{Rk,p,fi}$ | R30 | [kN] | 1,13 | 2,00 | 3,50 |
| | R60 | [kN] | 1,13 | 2,00 | 3,50 |
| | R90 | [kN] | 1,13 | 2,00 | 3,50 |
| | R120 | [kN] | 0,90 | 1,60 | 2,80 |
| **Concrete cone and splitting failure** [1)] | | | | | |
| Characteristic resistance $N^0_{Rk,c,fi}$ | R30 | [kN] | 2,12 | 2,95 | 5,34 |
| | R60 | [kN] | 2,12 | 2,95 | 5,34 |
| | R90 | [kN] | 2,12 | 2,95 | 5,34 |
| | R120 | [kN] | 1,70 | 2,36 | 4,27 |
| Spacing | $s_{cr,N,fi}$ | [mm] | $4 \times h_{ef}$ | | |
| | $s_{min}$ | [mm] | 35 | 50 | 50 |
| 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.

| EJOT concrete screw JC2 | |
|---|---|
| **Performance**<br>Characteristic tension resistance under fire exposure | **Annex C3** |

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**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 JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance $V_{Rk,s,fi}$ | R30 | [kN] | 0,24 | 0,42 | 1,02 |
| | R60 | [kN] | 0,22 | 0,38 | 0,88 |
| | R90 | [kN] | 0,17 | 0,29 | 0,68 |
| | R120 | [kN] | 0,12 | 0,21 | 0,54 |
| **Steel failure with lever arm** | | | | | |
| Characteristic resistance $M^0_{Rk,s,fi}$ | R30 | [Nm] | 0,19 | 0,46 | 1,42 |
| | R60 | [Nm] | 0,18 | 0,41 | 1,23 |
| | R90 | [Nm] | 0,14 | 0,32 | 0,95 |
| | R120 | [Nm] | 0,10 | 0,23 | 0,76 |
| **Concrete pryout failure** | | | | | |
| k-factor | $k_{(8)}$ | [-] | 1,0 | | 2,0 |
| Characteristic resistance $V_{Rk,cp,fi}$ | R30 | [kN] | 2,12 | 2,95 | 10,68 |
| | R60 | [kN] | 2,12 | 2,95 | 10,68 |
| | R90 | [kN] | 2,12 | 2,95 | 10,68 |
| | R120 | [kN] | 1,70 | 2,36 | 8,54 |
| **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: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ (≤ R90) $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (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.

| EJOT concrete screw JC2 | |
|---|---|
| **Performance**<br>Characteristic shear resistance under fire exposure | ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17<br>**Annex C4** |

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

| EJOT concrete screw JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| Cracked C20/25 | **N** | **[kN]** | **2,1** | **3,8** | **6,7** |
| | $\delta_{N0}$ | [mm] | 0,05 | 0,07 | 0,09 |
| | $\delta_{N\infty}$ | [mm] | 0,74 | 0,32 | 0,85 |
| Cracked C50/60 | **N** | **[kN]** | **2,9** | **5,2** | **9,7** |
| | $\delta_{N0}$ | [mm] | 0,05 | 0,10 | 0,16 |
| | $\delta_{N\infty}$ | [mm] | 0,74 | 0,32 | 0,85 |
| Non-cracked C20/25 | **N** | **[kN]** | **4,5** | **7,6** | **10,5** |
| | $\delta_{N0}$ | [mm] | 0,13 | 0,07 | 0,10 |
| | $\delta_{N\infty}$ | [mm] | 0,74 | 0,32 | 0,85 |
| Non-cracked C50/60 | **N** | **[kN]** | **6,1** | **10,4** | **15,2** |
| | $\delta_{N0}$ | [mm] | 0,08 | 0,09 | 0,12 |
| | $\delta_{N\infty}$ | [mm] | 0,74 | 0,32 | 0,85 |

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

| EJOT concrete screw JC2 | | | Anchor size | | |
|---|---|---|---|---|---|
| | | | JC2-6 | JC2-8 | JC2-10 |
| Cracked and non-cracked concrete C20/25 - C50/60 | **V** | **[kN]** | **5,6** | **8,1** | **16,6** |
| | $\delta_{V0}$ | [mm] | 1,11 | 1,55 | 2,52 |
| | $\delta_{V\infty}$ | [mm] | 1,66 | 2,33 | 3,78 |

**EJOT concrete screw JC2**

**Performance**

Displacements under tension and shear loads

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**Annex C5**