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European Technical Assessment

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English version prepared by ZAG

General Part

Technical Assessment Body issuing the European Technical Assessment	**ZAG**
Trade name of the construction product	**Sormat Concrete Screw Anchor S-CSA+/ EJOT Concrete Screw Anchor JC2 Plus**
Product family to which the construction product belongs	**33: Concrete screw of size 6, 8, 10 and 14 for use in cracked and uncracked concrete**
Manufacturer	**EJOT SORMAT OY** **Vähäkorventie 10** **21250 Masku** **Finland** www.ejot.fi
Manufacturing plant	**EJOT Production Plants**
This European Technical Assessment contains	23 pages including 3 annexes, which form an integral part of the document
This European Technical Assessment is issued in accordance with Article 95 (4) of Regulation (EU) 2024/3110, on the basis of	EAD 330232-02-0601, edition September 2024
This version replaces	ETA-20/0446 issued on 24. 10. 2022

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Specific part

1 Technical description of the product

The Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus is a concrete screw in sizes 6, 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 A (1/3).

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 C(1/10), C (2/10), C (3/10), C (4/10), C (7/10), C (8/10), C (9/10) and C (10/10).

3.2 Safety in case of fire (BWR 2)

The basic work requirements for safety in case of fire are listed in Annexes C (5/10) and C(6/10).

3.3 General aspects relating to fitness for use

Durability and serviceability are only ensured if specifications of intended use according to Annex B (1/7) 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 330232-02-0601.

Issued in Ljubljana on 30. 01. 2026

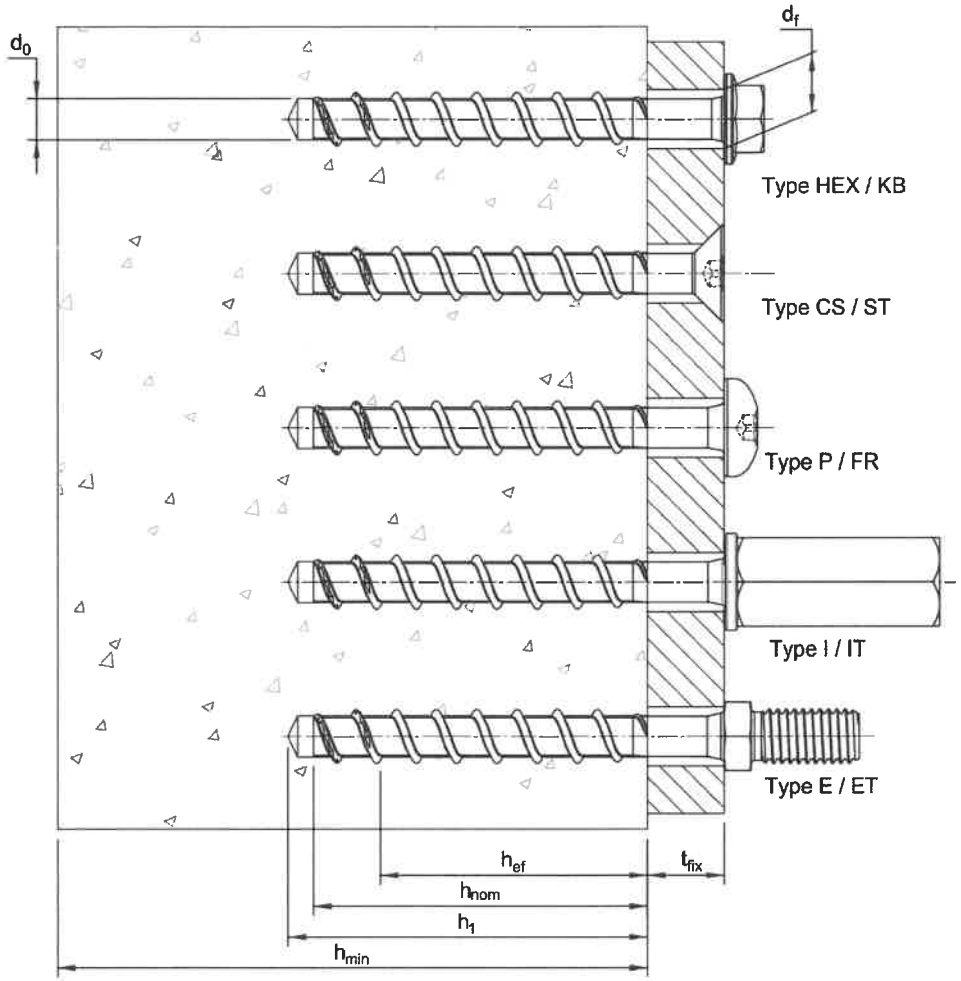
Signed by:

Franc Capuder, M.Sc.

Head of Service of TAB

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

Sormat Concrete Screw Anchor S-CSA+ / 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

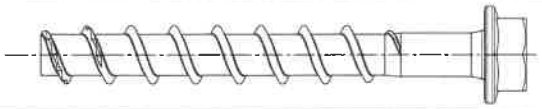
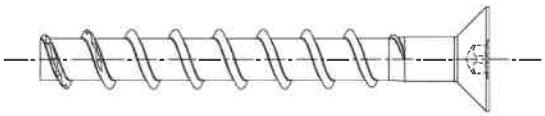
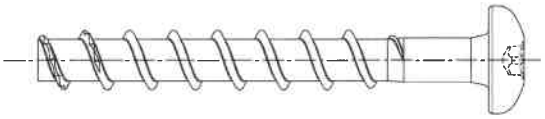
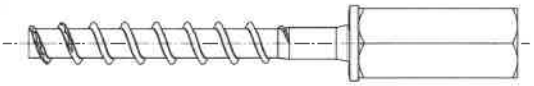
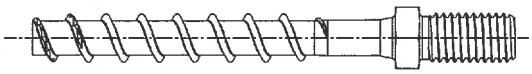
t_{fix} = Fixture thickness

d_f = Clearance hole diameter in fixture

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex A (1/3)**
Product description Installation condition	

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 with Multi Layer Coating (zinc alloy coated), thickness ≥ 5µm	640	800

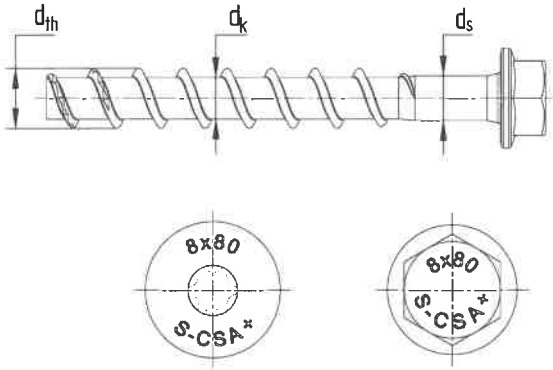
Part	Designation	Description	Design
1	S-CSA+ HEX / JC2-KB Plus	Hexagonal head version with or without combined washer	
2	S-CSA+ CS / JC2-ST Plus	Countersunk head version with T-drive	
3	S-CSA+ P / JC2-FR Plus	Pan head version with T-drive	
4	S-CSA+ I / JC2-IT Plus	Internal thread version with hexagonal drive	
5	S-CSA+ E / JC2-ET Plus	External thread version with hexagonal drive	

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex A (2/3)**
Product description Materials and types and dimensions	

Table A2: Anchor dimensions and head marking

Anchor size			S-CSA+ / JC2 Plus 6	S-CSA+ / JC2 Plus 8	S-CSA+ / JC2 Plus 10	S-CSA+ / JC2 Plus 14
Nominal diameter	d_{nom}	[mm]	6	8	10	14
Thread outer diameter	d_{th}	[mm]	7,45	10,50	12,70	16,55
Core diameter	d_k	[mm]	5,55	7,30	9,00	13,00
Shaft diameter	d_s	[mm]	5,88	7,80	9,62	13,40
Stressed section	A_s	[mm²]	24,19	41,85	63,62	132,73

Marking: Identifying mark: S / J
Anchor identity: CSA+
Nominal diameter: d_{nom}
Screw length: L
Example: S-CSA+ 8x80 / JC2 Plus 8×80



Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex A (3/3)**
Intended use Dimensions	

Specifications of intended use

Anchorages subjected to:

- Static, quasi static load and seismic load,
- fire exposure.

Base materials:

- Cracked and uncracked concrete.
- Reinforced and unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according to EN 206:2013+A2:2021.

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 EN 1992-4:2018.
- For seismic application the anchorages are designed in accordance with EN 1992-4:2018.
- For application with resistance under fire exposure the anchorages are designed in accordance with the method given in EN 1992-4:2018.
- 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 and B3.

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (1/7)**
Intended use Specifications	

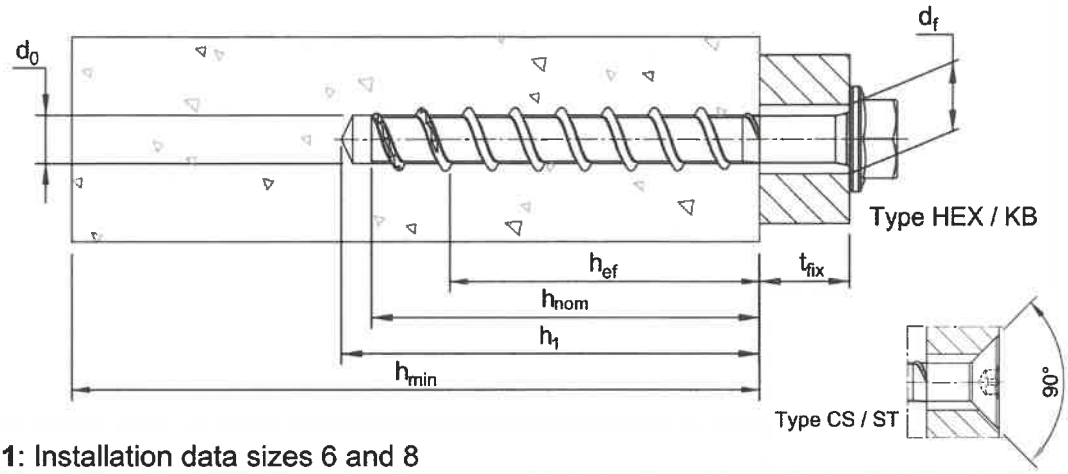


Table B1: Installation data sizes 6 and 8

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			**Anchor size**			
			S-CSA+ 6 / JC2 Plus 6		**S-CSA+ 8 / JC2 Plus 8**	
			6-1	**6-2**	**8-1**	**8-2**
Nominal embedment depth	h_{nom}	[mm]	40-54	55	50-64	65
Drill hole diameter	d_0	[mm]	6		8	
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut,max} \leq$	[mm]	6,40		8,45	
Depth of drilled hole to deepest point	$h_1 \geq$	[mm]	h_{nom} + 10 mm		h_{nom} + 10 mm	
Effective embedment depth	h_{ef}	[mm]	29,8	42,5	39,2	51,9
Effective embedment depth	h_{ef}	[mm]	$0,85*(h_{nom}-5,0) \leq h_{ef,max}$		$0,85*(h_{nom}-3,9) \leq h_{ef,max}$	
Diameter of clearance hole in the fixture	d_f	[mm]	7,7 - 9,0		10,8 - 12,0	
Maximum installation torque	$T_{inst} \leq$	[Nm]	14		45	
Max installation torque for impact screw driver	T_{SD}	[Nm]	90		290	

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (2/7)**
Intended use Installation data	

Table B2: Installation data sizes 10 and 14

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			10-1	10-2	10-3	14-1	14-1	14-3
Nominal embedment depth	h_{nom}	[mm]	55-69	70-84	85	65-84	85-114	115
Drill hole diameter	d_0	[mm]	10			14		
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut,max} \leq$	[mm]	10,45			14,50		
Depth of drilled hole to deepest point	$h_1 \geq$	[mm]	h_{nom} + 10 mm			h_{nom} + 10 mm		
Effective embedment depth	h_{ef}	[mm]	42,5	55,3	68,0	49,3	66,3	91,8
Effective embedment depth	h_{ef}	[mm]	$0,85*(h_{nom}-5,0) \leq h_{ef,max}$			$0,85*(h_{nom}-7,0) \leq h_{ef,max}$		
Diameter of clearance hole in the fixture	d_f	[mm]	13,0 – 14,0			17,0 – 18,0		
Maximum installation torque	$T_{inst} \leq$	[Nm]	85			100		
Max installation torque for impact screw driver	T_{SD}	[Nm]	650			650		

Table B3: Minimum thickness of concrete member, spacing and edge distance

			S-CSA+ / JC2 Plus			
			6	8	10	14
Minimum effective embedment depth	$h_{ef,min}$	[mm]	29,8	39,2	42,5	49,3
Minimum member thickness depending on h_{ef}	$h_{min} \geq$	[mm]	$80 + h_{ef} - h_{ef,min}$	$100 + h_{ef} - h_{ef,min}$	$100 + h_{ef} - h_{ef,min}$	$120 + h_{ef} - h_{ef,min}$
Minimum edge distances and spacing for cracked and uncracked concrete						
Minimum edge distance	c_{min}	[mm]	35	35	40	60
	$s \geq$	[mm]	according to Table B4 and Table B5			
Minimum spacing	s_{min}	[mm]	35	35	40	60
	$c \geq$	[mm]	according to Table B4 and Table B5			
Minimum required splitting area	$A_{sp,req}$	[mm²]	17283	19257	24600	50148

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus

Intended use

Installation data

Annex B (3/7)

Table B4: Effective splitting area

Effective splitting area $A_{sp,ef}$ for concrete slab thickness $h > h_{ef} + 1{,}5 \cdot c$ and $h \geq h_{min}$				
Anchors and anchor groups with [1]	$s > 3 \cdot c$ $h_{ef} \leq 1{,}5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \geq c_{min}$
Anchors and anchor groups in a corner with [1]	$s > 3 \cdot c$ $h_{ef} \leq 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + c_2) \cdot (h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \geq c_{min}$ $c_2 < 1{,}5 \cdot c$
Anchor groups with [1]	$s \leq 3 \cdot c$ $h_{ef} \leq 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \geq c_{min}$ $s \geq s_{min}$
Anchor groups in a corner with [1]	$s \leq 3 \cdot c$ $h_{ef} \leq 1{,}5 \cdot c$	$A_{sp,ef} = (1{,}5 \cdot c + s + c_2) \cdot (h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \geq c_{min}$, $c_2 < 1{,}5 \cdot c$ $s \geq s_{min}$
Anchors and anchor groups with [1]	$s > 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (3 \cdot c)$	[mm²]	$c \geq c_{min}$
Anchors and anchor groups in a corner with [1]	$s > 3 \cdot c$ $h_{ef} > 1.5 \cdot c$	$A_{sp,ef} = (3 \cdot c + c_2) \cdot (3 \cdot c)$	[mm²]	$c \geq c_{min}$ $c_2 < 1{,}5 \cdot c$
Anchors groups with [1]	$s \leq 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (3 \cdot c)$	[mm²]	$c \geq c_{min}$ $s \geq s_{min}$
Anchors groups in a corner with [1]	$s \leq 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (1{,}5 \cdot c + s + c_2) \cdot (3 \cdot c)$	[mm²]	$c \geq c_{min}$, $c_2 < 1{,}5 \cdot c$ $s \geq s_{min}$

[1] Edge and spacing must be rounded up in 5mm increments

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (4/7)**
Intended use Installation data	

Table B5: Effective splitting area

Effective splitting area $A_{sp,ef}$ for concrete slab thickness $h \le h_{ef} + 1{,}5 \cdot c$ and $h \ge h_{min}$				
Anchors and anchor groups with [1]	$s > 3 \cdot c$ $h_{ef} \le 1{,}5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot h$	[mm²]	$c \ge c_{min}$
Anchors and anchor groups in a corner with [1]	$s > 3 \cdot c$ $h_{ef} \le 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + c_2) \cdot h$	[mm²]	$c \ge c_{min}$ $c_2 < 1{,}5 \cdot c$
Anchor groups with [1]	$s \le 3 \cdot c$ $h_{ef} \le 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot h$	[mm²]	$c \ge c_{min}$ $s \ge s_{min}$
Anchor groups in a corner with [1]	$s \le 3 \cdot c$ $h_{ef} \le 1{,}5 \cdot c$	$A_{sp,ef} = (1{,}5 \cdot c + s + c_2) \cdot h$	[mm²]	$c \ge c_{min}$, $c_2 < 1{,}5 \cdot c$ $s \ge s_{min}$
Anchors and anchor groups with [1]	$s > 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (h - h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \ge c_{min}$
Anchors and anchor groups in a corner with [1]	$s > 3 \cdot c$ $h_{ef} > 1.5 \cdot c$	$A_{sp,ef} = (3 \cdot c + c_2) \cdot (h - h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \ge c_{min}$ $c_2 < 1{,}5 \cdot c$
Anchors groups with [1]	$s \le 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (h - h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \ge c_{min}$ $s \ge s_{min}$
Anchors groups in a corner with [1]	$s \le 3 \cdot c$ $h_{ef} > 1{,}5 \cdot c$	$A_{sp,ef} = (1{,}5 \cdot c + s + c_2) \cdot (h - h_{ef} + 1{,}5 \cdot c)$	[mm²]	$c \ge c_{min}$, $c_2 < 1{,}5 \cdot c$ $s \ge s_{min}$

[1] Edge and spacing must be rounded up in 5mm increments

Table B6: Area A_{sp} to determine characteristic edge distance $c_{cr,sp}$

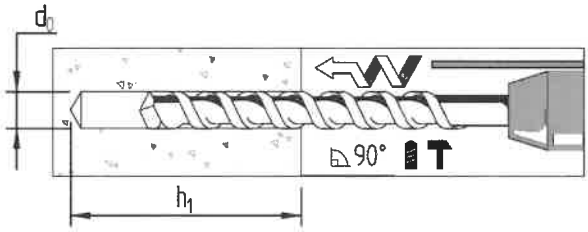
		S-CSA+ / JC2 Plus			
		6	8	10	14
Minimum edge distances and spacing					
Area to determine $c_{cr,sp}$ [1]	A_{sp} [mm²]	$\frac{N^0_{Rk,sp} + 15{,}99}{0{,}0016}$	$\frac{N^0_{Rk,sp} + 4{,}64}{0{,}0009}$	$\frac{N^0_{Rk,sp} - 0{,}33}{0{,}0008}$	$\frac{N^0_{Rk,sp} + 6{,}16}{0{,}0009}$

[1] $N^0_{Rk,sp}$ in kN

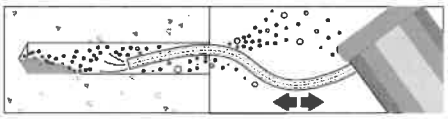
Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (5/7)**
Intended use Installation data	

Installation instructions

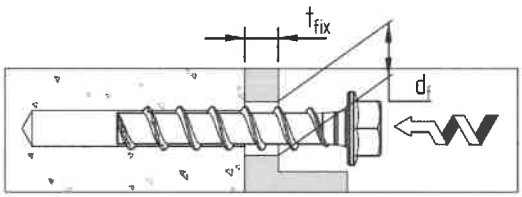
Part 1



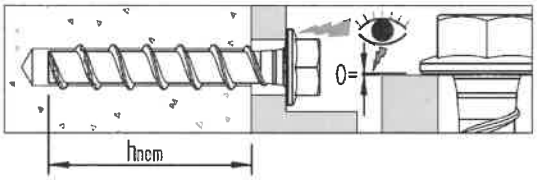
Make a cylindrical hole



Clean the hole



Install the screw anchor by impact screwdriver or torque wrench

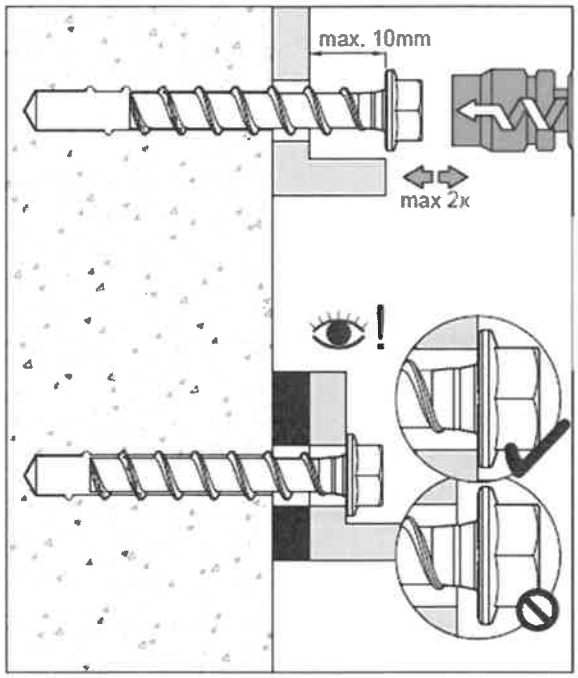


Ensure that the screw anchor head fully rests without any gap on the fixture and is not damaged

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (6/7)**
Intended use Installation instructions	

Installation instructions

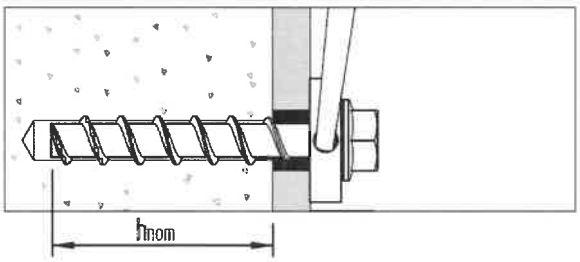
Part 2



Optional:

A screw can be adjusted maximum two times. The total permissible thickness of shims added during the adjustments process is max. 10 mm. The final embedment depth after adjustment process must be larger or equal than h_{nom}.

Part 3



Filling of annular gap.
For seismic category C2 application the annular gap between screw and fixture must be filled with mortar (compressive strength ≥ 50 N/mm^2). It is recommended to use a filling washer and a mixer reducer tip.

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex B (7/7)**
Intended use Installation instructions	

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

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size			
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8	
			6-1	6-2	8-1	8-2
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	19,4		33,5	
Partial safety factor	γ_{Ms} 1)	[-]	1,5			
Pull-out failure						
Effective embedment depth	h_{ef}	[mm]	$0{,}85\,(h_{nom} - 5{,}0) \le h_{ef,max}$		$0{,}85\,(h_{nom} - 3{,}9) \le h_{ef,max}$	
Nominal embedment depth	h_{nom}	[mm]	40-54	55	50-64	65
Characteristic resistance in **cracked** concrete C20/25	$N_{Rk,p}$	[kN]	3,5	4,8	6,8	12,5
Characteristic resistance in **uncracked** concrete C20/25	$N_{Rk,p}$	[kN]	7,0	9,7	$11\,h_{ef}^{1,5}\sqrt{20}/1000$	
Increasing factor for $N_{Rk,p}$	Ψ_C	C25/30	1,09	1,07	1,07	1,08
		C30/37	1,16	1,14	1,14	1,14
		C35/45	1,23	1,19	1,20	1,20
		C40/50	1,29	1,24	1,25	1,26
		C45/55	1,35	1,29	1,30	1,31
		C50/60	1,40	1,33	1,34	1,36
Partial safety factor	γ_{inst}	[-]	1,0			
	γ_{Mp} 1)	[-]	1,5 2)			
Concrete cone and splitting failure						
Effective embedment depth	h_{ef}	[mm]	$0{,}85\,(h_{nom} - 5{,}0) \le h_{ef,max}$		$0{,}85\,(h_{nom} - 3{,}9) \le h_{ef,max}$	
Nominal embedment depth	h_{nom}	[mm]	40-54	55	40-54	55
Factor for cracked concrete	k_{cr}	[-]	7,7			
Factor for uncracked concrete	k_{ucr}	[-]	11,0			
Spacing	$s_{cr,N}$	[mm]	$3\,h_{ef}$			
Edge distance	$c_{cr,N}$	[mm]	$1{,}5\,h_{ef}$			
Spacing (splitting)	$s_{cr,sp}$	[mm]	$2\,c_{cr,sp}$			
Edge distance (splitting)	$c_{cr,sp}$	[mm]	$\frac{A_{sp}+0{,}8\cdot(h_{min}-h_{ef})^2}{(3{,}41\cdot h_{min}-0{,}59\cdot h_{ef})}$			
Partial safety factor	γ_{Msp} 1)	[-]	1,5 2)			

1) In absence of other national regulations

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

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus

Performance

Characteristic resistance under tension loads

Annex C(1/10)

Table C2: Characteristic resistances under tension loads in case of static and quasi-static loading for design according to EN 1992-4:2018

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			**Anchor size**					
			S-CSA+ 10 / JC2 Plus 10			**S-CSA+ 14 / JC2 Plus 14**		
			10-1	**10-2**	**10-3**	**14-1**	**14-2**	**14-3**
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	50,9			106,2		
Partial safety factor	γ_{Ms} 1)	[-]	1,5					
Pull-out failure								
Effective embedment depth	h_{ef}	[mm]	$0{,}85\,(h_{nom} - 5{,}0) \le h_{ef,max}$			$0{,}85\,(h_{nom} - 7{,}0) \le h_{ef,max}$		
Nominal embedment depth	h_{nom}	[mm]	55-69	70-84	85	65-84	85-114	115
Characteristic resistance in **cracked** concrete C20/25	$N_{Rk,p}$	[kN]	7,9	10,3	$\frac{7{,}7\,h_{ef}^{1,5}\sqrt{20}}{1000}$	9,0	16,6	30,2
Characteristic resistance in **uncracked** concrete C20/25	$N_{Rk,p}$	[kN]	$11\,h_{ef}^{1,5}\sqrt{20}/1000$			15,8	$\frac{11\,h_{ef}^{1,5}\sqrt{20}}{1000}$	
Increasing factor for $N_{Rk,p}$	Ψ_C	C25/30	1,07	1,12	1,07	1,08	1,12	1,10
		C30/37	1,13	1,22	1,12	1,15	1,22	1,19
		C35/45	1,18	1,32	1,17	1,21	1,32	1,28
		C40/50	1,23	1,41	1,22	1,27	1,41	1,36
		C45/55	1,27	1,50	1,26	1,32	1,50	1,43
		C50/60	1,31	1,58	1,30	1,37	1,58	1,50
Partial safety factor	γ_{inst}	[-]	1,0					
	γ_{Mp} 1)	[-]	1,5 2)					
Concrete cone and splitting failure								
Effective embedment depth	h_{ef}	[mm]	$0{,}85\,(h_{nom} - 5{,}0) \le h_{ef,max}$			$0{,}85\,(h_{nom} - 7{,}0) \le h_{ef,max}$		
Nominal embedment depth	h_{nom}	[mm]	55-69	70-84	85	65-84	85-114	115
Factor for cracked concrete	k_{cr}	[-]	7,7					
Factor for uncracked concrete	k_{ucr}	[-]	11,0					
Spacing	$s_{cr,N}$	[mm]	$3\,h_{ef}$					
Edge distance	$c_{cr,N}$	[mm]	$1{,}5\,h_{ef}$					
Spacing (splitting)	$s_{cr,sp}$	[mm]	$2\,c_{cr,sp}$					
Edge distance (splitting)	$c_{cr,sp}$	[mm]	$\frac{A_{sp}+0{,}8\cdot(h_{min}-h_{ef})^2}{(3{,}41\cdot h_{min}-0{,}59\cdot h_{ef})}$					
Partial safety factor	γ_{Msp} 1)	[-]	1,5 2)					

1) In absence of other national regulations

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

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex C(2/10)**
Characteristic resistance under tension loads	

Table C3: Characteristic resistances under shear loads in case of static and quasi-static loading for design according to EN 1992-4:2018

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size			
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8	
			6-1	6-2	8-1	8-2
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	9,4		19,1	
Partial safety factor	γ_{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	
Partial safety factor	γ_{Ms} 1)	[-]	1,25			
Concrete pryout failure						
k-factor	k_8	[-]	2,3		3,4	
Partial safety factor	γ_{Mc} 1)	[-]	1,5			
Concrete edge failure						
Effective length of anchor under shear load	l_f	[mm]	29,8	42,5	39,2	51,9
Outside diameter of anchor	d_{nom}	[mm]	6		8	
Partial safety factor	γ_{Mc} 1)	[-]	1,5			

1) In absence of other national regulations

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus

Performance

Characteristic resistance under shear loads

Annex C(3/10)

Table C4: Characteristic resistances under shear loads in case of static and quasi-static loading for design according to EN 1992-4:2018

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			10-1	10-2	10-3	14-1	14-2	14-3
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	31,8			61,1		
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]	69			207		
Partial safety factor	γ_{Ms} 1)	[-]	1,25					
Concrete pryout failure								
k-factor	k_8	[-]	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]	42,5	55,3	68,0	49,3	66,3	91,8
Outside diameter of anchor	d_{nom}	[mm]	10			14		
Partial safety factor	γ_{Mc} 1)	[-]	1,5					

1) In absence of other national regulations

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex C(4/10)**
Performance Characteristic resistance under shear loads	

Table C5: Characteristic resistances under tension loads in case of fire exposure for design according to EN 1992-4:2018

Sormat Concrete Screw Anchor S-CSA+ /EJOT Concrete Screw Anchor JC2 Plus			Anchor size									
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8		S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			6-1	6-2	8-1	8-2	10-1	10-2	10-3	14-1	14-2	14-3
Steel failure												
Characteristic resistance $N_{Rk,s,fi}$	R30	[kN]	0,24		0,42		0,95			2,65		
	R60	[kN]	0,22		0,38		0,83			1,99		
	R90	[kN]	0,17		0,29		0,64			1,73		
	R120	[kN]	0,12		0,21		0,51			1,33		
Pull-out failure												
Characteristic resistance $N_{Rk,p,fi}$	R30	[kN]	0,88	1,20	1,70	3,13	1,98	2,58	4,83	2,25	4,15	7,55
	R60	[kN]	0,88	1,20	1,70	3,13	1,98	2,58	4,83	2,25	4,15	7,55
	R90	[kN]	0,88	1,20	1,70	3,13	1,98	2,58	4,83	2,25	4,15	7,55
	R120	[kN]	0,70	0,96	1,36	2,50	1,58	2,06	3,86	1,80	3,32	6,04
Concrete cone and splitting failure [1]												
The characteristic resistance $N^0_{Rk,c,fi}$ of a single fastener not influenced by neighbouring fasteners or concrete edges installed in concrete C20/25 to C50/60 under fire exposure may be determined by: $N^0_{Rkc,fi} = \frac{h_{ef}}{200} \times N^0_{Rk,c}$ (≤ R90) $N^0_{Rkc,fi} = 0{,}8\,\frac{h_{ef}}{200} \times N^0_{Rk,c}$ (R120) where $N^0_{Rk,c}$ is a characteristic resistance of a single fastener in cracked concrete C20/25 under normal temperature												
Spacing	$s_{cr,N,fi}$	[mm]	$4 \times h_{ef}$									
	s_{min}	[mm]	35		35		40			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 EN 1992-4.

Under fire exposure usually cracked concrete is assumed. The design equations are given in EN 1992-4.

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

Sormat Concrete Screw Anchor S-CSA+ /
EJOT Concrete Screw Anchor JC2 Plus

Performance

Characteristic tension resistance under fire exposure

Annex C(5/10)

Table C6: Characteristic resistances under shear loads in case of fire exposure for design according to EN 1992-4:2018

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size									
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8		S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			6-1	6-2	8-1	8-2	10-1	10-2	10-3	14-1	14-2	14-3
Steel failure without lever arm												
Characteristic resistance $V_{Rk,s,fi}$	R30	[kN]	0,24		0,42		0,95			2,65		
	R60	[kN]	0,22		0,38		0,83			1,99		
	R90	[kN]	0,17		0,29		0,64			1,73		
	R120	[kN]	0,12		0,21		0,51			1,33		
Steel failure with lever arm												
Characteristic resistance $M^0_{Rk,s,fi}$	R30	[Nm]	0,20		0,46		1,29			5,18		
	R60	[Nm]	0,18		0,41		1,12			3,88		
	R90	[Nm]	0,14		0,32		0,86			3,36		
	R120	[Nm]	0,10		0,23		0,69			2,59		
Concrete pryout failure												
k-factor	k_8	[-]	2,3		3,4		3,0			3,3		
The Characteristic resistance $V_{Rk,cp,fi}$ in case of fasteners installed in concrete class C20/25 to C50/60 may be determined by:												
$V_{RK,cp,fi} = k_8 \cdot N_{Rk,c,fi}$ (≤ R90)							$V_{RK,cp,fi} = k_8 \cdot N_{Rk,c,fi}$ (R120)					
where $V_{Rk,cp,fi}$ is characteristic resistance of a single fastener not influenced by neighbouring fasteners or concrete edges installed in concrete C20/25 to C50/60 under fire exposure												
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 EN 1992-4.

Under fire exposure usually cracked concrete is assumed. The design equations are given in EN 1992-4.

EN 1992-4 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.

Sormat Concrete Screw Anchor S-CSA+ /
EJOT Concrete Screw Anchor JC2 Plus

Performance

Characteristic shear resistance under fire exposure

Annex C(6/10)

Table C7: Displacements under tension loads for static and quasi-static loading

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size			
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8	
			6-1	6-2	8-1	8-2
Cracked C20/25	**N**	**[kN]**	**1,67**	**2,29**	**3,24**	**5,95**
	δ_{N0}	[mm]	0,02	0,06	0,05	0,08
	$\delta_{N\infty}$	[mm]	0,17	0,74	0,65	0,94
Cracked C50/60	**N**	**[kN]**	**2,34**	**3,05**	**4,35**	**8,07**
	δ_{N0}	[mm]	0,17	0,06	0,06	0,14
	$\delta_{N\infty}$	[mm]	0,17	0,74	0,65	0,94
Uncracked C20/25	**N**	**[kN]**	3,33	4,62	5,76	8,76
	δ_{N0}	[mm]	0,17	0,13	0,07	0,12
	$\delta_{N\infty}$	[mm]	0,17	0,74	0,65	0,94
Uncracked C50/60	**N**	**[kN]**	**4,68**	**6,16**	**7,75**	**11,87**
	δ_{N0}	[mm]	0,10	0,08	0,16	0,24
	$\delta_{N\infty}$	[mm]	0,17	0,74	0,65	0,94

Table C8: Displacements under tension loads for static and quasi-static loading

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			10-1	10-2	10-3	14-1	14-2	14-3
Cracked C20/25	**N**	**[kN]**	**3,57**	**4,90**	**9,19**	**4,29**	**7,90**	**14,38**
	δ_{N0}	[mm]	0,03	0,13	0,15	0,20	0,44	0,23
	$\delta_{N\infty}$	[mm]	0,61	0,52	0,89	1,27	0,97	1,52
Cracked C50/60	**N**	**[kN]**	**4,67**	**7,76**	**11,92**	**5,88**	**12,50**	**21,50**
	δ_{N0}	[mm]	0,09	0,24	0,15	0,25	0,45	0,30
	$\delta_{N\infty}$	[mm]	0,61	0,52	0,89	1,27	0,97	1,52
Uncracked C20/25	**N**	**[kN]**	**6,48**	**9,62**	**13,14**	**7,52**	**12,67**	**20,62**
	δ_{N0}	[mm]	0,10	0,52	0,09	0,33	0,26	0,16
	$\delta_{N\infty}$	[mm]	0,61	0,52	0,89	1,27	0,97	1,52
Uncracked C50/60	**N**	**[kN]**	**8,47**	**15,21**	**17,05**	**10,32**	**20,03**	**30,83**
	δ_{N0}	[mm]	0,05	0,34	0,31	0,47	0,40	0,24
	$\delta_{N\infty}$	[mm]	0,61	0,52	0,89	1,27	0,97	1,52

Sormat Concrete Screw Anchor S-CSA+ /
EJOT Concrete Screw Anchor JC2 Plus

Performance
Displacements under tension and shear loads

Annex C(7/10)

Table C9: Displacements under shear loads for static and quasi-static loading

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size			
			S-CSA+ 6 / JC2 Plus 6		S-CSA+ 8 / JC2 Plus 8	
			6-1	6-2	8-1	8-2
Cracked and uncracked concrete C20/25 - C50/60	**V**	**[kN]**	**4,48**	**4,67**	**9,10**	**10,24**
	δ_{V0}	[mm]	0,61	0,64	1,02	1,13
	$\delta_{V\infty}$	[mm]	0,92	0,96	1,54	1,69

Table C10: Displacements under shear loads for static and quasi-static loading

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size					
			S-CSA+ 10 / JC2 Plus 10			S-CSA+ 14 / JC2 Plus 14		
			10-1	10-2	10-3	14-1	14-2	14-3
Cracked and uncracked concrete C20/25 - C50/60	**V**	**[kN]**	**15,14**	**15,14**	**16,76**	**29,1**	**29,1**	**30,9**
	δ_{V0}	[mm]	2,81	2,81	2,93	2,01	2,01	2,10
	$\delta_{V\infty}$	[mm]	4,21	4,21	4,39	3,01	3,01	3,15

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex C(8/10)**
Displacements under tension and shear loads	

Table C11: Characteristic resistances in case of seismic action for design acc. to EN 1992-4:2018: Performance Category C1and C2

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			Anchor size			
			S-CSA+ 6 / JC2 Plus 6	S-CSA+ 8 / JC2 Plus 8	S-CSA+ 10 / JC2 Plus 10	S-CSA+ 14 / JC2 Plus 14
			6-2	8-2	10-3	14-3
Tension - steel failure						
Characteristic resistance **C1**	$N_{Rk,s,C1}$	[kN]	19,4	30,2	46,8	106,2
Characteristic resistance **C2**	$N_{Rk,s,C2}$	[kN]	/	33,9	52,6	106,2
Partial safety factor	$\gamma_{Ms,seis}$ [1]	[-]	1,5			
Tension - pull-out failure						
Characteristic resistance **C1**	$N_{Rk,p,C1}$	[kN]	4,8	11,3	17,8	30,2
Characteristic resistance **C2**	$N_{Rk,p,C2}$	[kN]	/	1,9	3,8	6,9
Partial safety factor	$\gamma_{Mp,seis}$ [1]	[-]	1,5 [2]			
Concrete cone and splitting failure [3]						
Effective embedment depth	h_{ef}	[mm]	42,5	51,9	68,0	91,8
Partial safety factor	$\gamma_{Mc,seis}$ [1] $\gamma_{Msp,seis}$ [1]	[-]	1,5 [2]			
Shear - steel failure without lever arm						
Characteristic resistance **C1**	$V_{Rk,s,C1}$	[kN]	7,4	12,9	19,4	51,9
Characteristic resistance **C2**	$V_{Rk,s,C2}$	[kN]	/	13,6	24,6	41,5
Partial safety factor	$\gamma_{Ms,seis}$ [1]	[-]	1,25			
Concrete pryout and concrete edge failure [3]						
Effective embedment depth	h_{ef}	[mm]	42,5	51,9	68,0	91,8
Partial safety factor	$\gamma_{Mc,seis}$ [1]	[-]	1,5 [2]			

[1] In absence of other national regulations
[2] The installation safety factor of $\gamma_2 = 1,0$ is included
[3] For concrete cone, splitting, pryout and edge failure, see EN 1992-4

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex C(9/10)**
Performance Characteristic resistances under seismic action Performance category C1 and C2	

Table C12: Displacements in case of seismic action for design acc. to EN 1992-4:2018, Performance Category C2

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus			**Anchor size**		
			S-CSA+ 8 / JC2 Plus 8	**S-CSA+ 10 / JC2 Plus 10**	**S-CSA+ 14 / JC2 Plus 14**
			8-2	**10-3**	**14-3**
Displacement under tension loads					
Displacement **DLS**	$d_{N,C2}$	[mm]	1,34	0,97	1,85
Displacement **ULS**	$d_{N,C2}$	[mm]	1,70	1,90	4,70
Displacement under shear loads					
Displacement **DLS**	$d_{V,C2}$	[mm]	3,84	3,58	1,98
Displacement **ULS**	$d_{V,C2}$	[mm]	7,48	7,28	6,34

Sormat Concrete Screw Anchor S-CSA+ / EJOT Concrete Screw Anchor JC2 Plus	**Annex C(10/10)**
Performance Characteristic resistances under seismic action Performance category C2	