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European Technical Assessment

ETA-22/0413
of 25. 1. 2024

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 A4 / EJOT Concrete Screw
Anchor JC6**

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

**33: Concrete screw of sizes 6, 8 and 10
for use in cracked and non-cracked
concrete**

Manufacturer

**EJOT SORMAT OY
Vähäkorventie 10
21250 Masku, Finland
www.ejot.fi**

Manufacturing plant

EJOT Production Plants

**This European Technical Assessment
contains**

**13 pages including 3 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 330232-01-0601,
edition December 2019**

This Assessment replaces

ETA-22/0413 issued on 23.3.2023

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Specific part

1 Technical description of the product

The Sormat Concrete Screw Anchor S-CSA A4 / EJOT Concrete Screw Anchor JC6 is a concrete screw of sizes 6, 8 and 10 made of stainless 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 (1/2).

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 (1/5), C (2/5) and C (5/5).

3.2 Safety in case of fire (BWR 2)

The basic work requirements for safety in case of fire are listed in Annexes C (3/5) and C (4/5).

Regarding to reaction to fire product is specified in class A1 according to EN 13501-1.

3.3 General aspects relating to fitness for use

Durability and serviceability are only ensured if specifications of intended use according to Annex B (1/3) 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 Commission¹ the system of assessment and verification of constancy of performance (see Annex V to regulation (EU) No 305/2011) 1 applies.

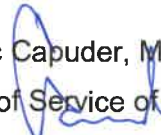
5 Technical details necessary for the implementation of the AVCP system, as provided for on the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in chapter 3 of EAD 330232-01-0601.

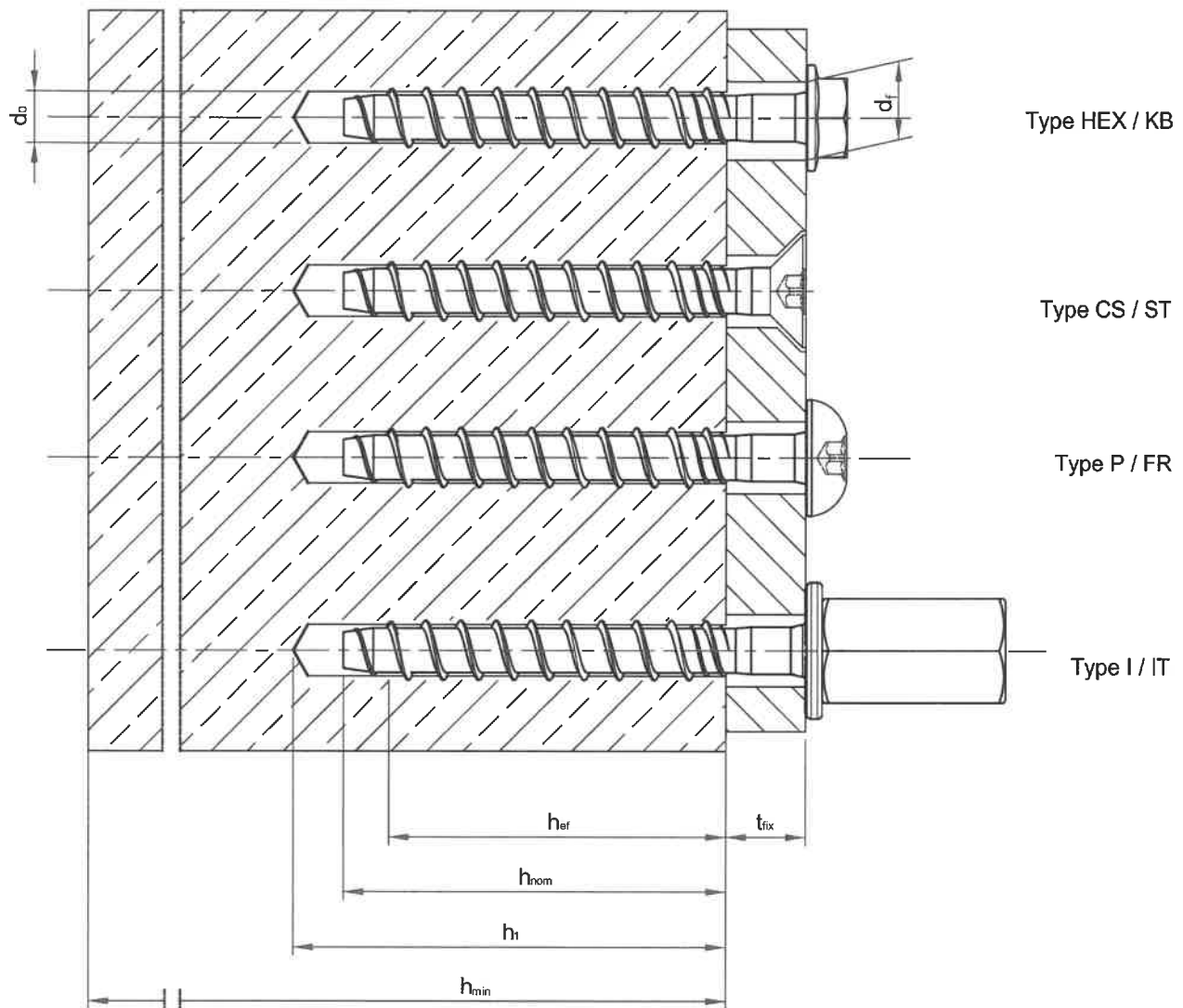
Issued in Ljubljana on 25. 1. 2024

Signed by:

Franc Capuder, M.Sc.
Head of Service of TAB



**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6
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 A4 /
EJOT Concrete Screw Anchor JC6**

Product description
Installation condition

Annex A (1/2)

Table A1: Materials and Types

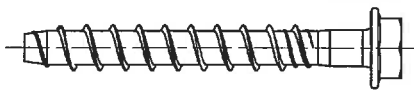
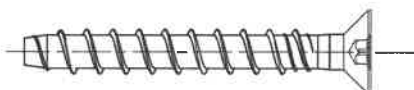
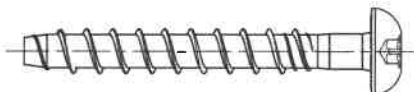
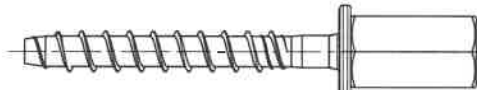
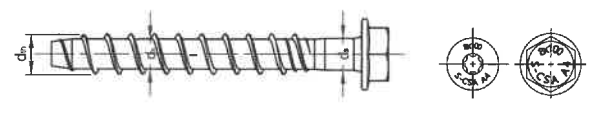
Material			
Tip: hardened steel Shaft and head: stainless steel (A4 grade)			
Part	Designation	Description	Design
1	S-CSA A4 HEX / JC6 KB	Hexagonal head version with or without combined washer	
2	S-CSA A4 CS / JC6 ST	Countersunk head version with T-drive	
3	S-CSA A4 P / JC6 FR	Pan head version with T-drive	
4	S-CSA A4 I / JC6 IT	Internal thread version with hexagonal drive	

Table A2: Anchor dimensions and head marking

S-CSA A4 / JC6					
Anchor size			6	8	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]	5,90	7,85	9,67
Stressed section	A_s	[mm ²]	24,19	42,43	67,93

Marking:

Identifying mark: S
Anchor identity: CSA A4
Nominal diameter: d_{nom}
Screw length: L
Example: S-CSA A4 8x100 / JC6 8x100



Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6

Product description

Materials, types and dimensions

Annex A (2/2)

Specifications of intended use

Anchorage subjected to:

- Static and 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 and also in concrete subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist.

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 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 range given and is not lower than 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 B(2/3).

**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6**

**Intended use
Specifications**

Annex B (1/3)

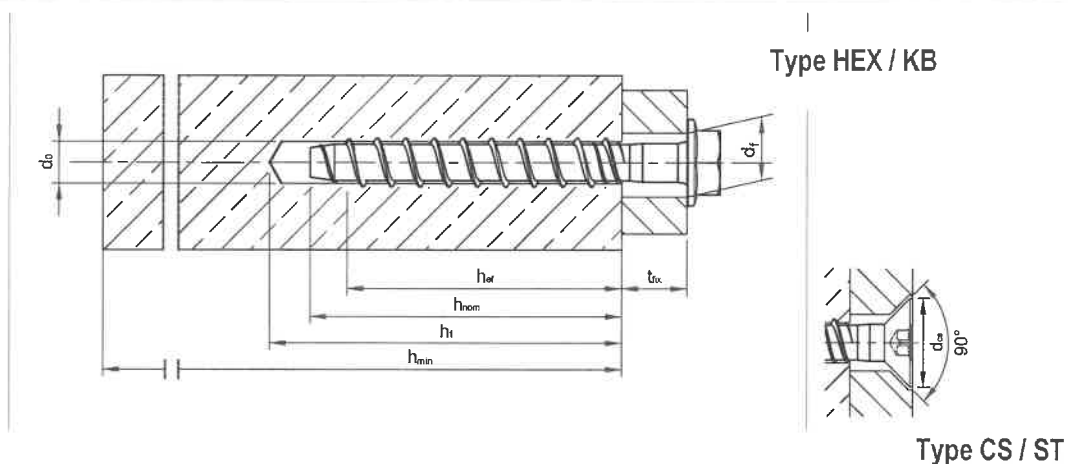


Table B1: Installation data

Sormat Concrete Screw Anchor S-CSA A4 / EJOT Concrete Screw Anchor JC6		Anchor size					
		S-CSA A4 / JC6					
		6-1	6-2	8-1	8-2	10-1	10-2
Nominal embedment depth	h_{nom} [mm]	45	55	50	65	55	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]	6,4		8,45		10,45	
Depth of drilled hole to deepest point	$h_1 \geq$ [mm]	55	65	60	75	65	95
Effective anchorage depth	h_{ef} [mm]	34	42,5	35,8	48,5	39,1	64,6
Diameter of clearance hole in the fixture	d_f [mm]	≤ 9		≤ 12		≤ 14	
Maximum installation torque	$T_{inst} \leq$ [Nm]	14		40		75	
Max installation torque for impact screw driver	T_{SD} [Nm]	90		290		360	

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

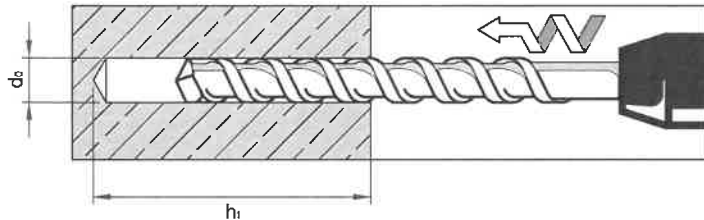
Sormat Concrete Screw Anchor S-CSA A4 / EJOT Concrete Screw Anchor JC6		Anchor size					
		S-CSA A4 / JC6					
		6-1	6-2	8-1	8-2	10-1	10-2
Minimum thickness of concrete member	h_{min} [mm]	80	100	100	100	100	130
Minimum spacing	s_{min} [mm]	35	35	35	35	40	40
Minimum edge distance	c_{min} [mm]	35	35	35	35	40	40

**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6**

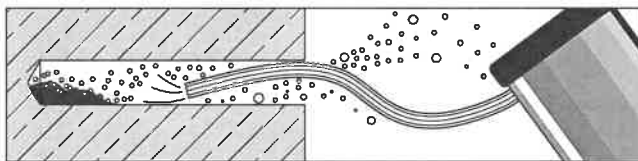
Intended use
Installation data

Annex B (2/3)

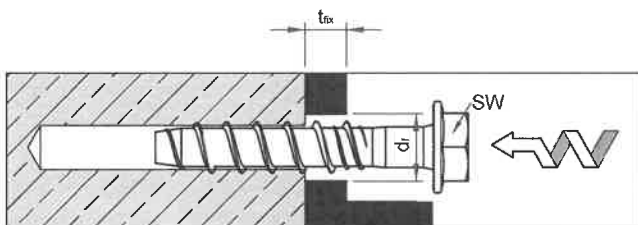
Installation instructions



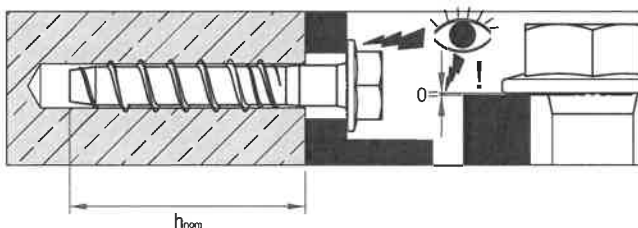
Make a cylindrical hole



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

**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6**

Intended use
Installation instructions

Annex B (3/3)

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 A4 / EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Steel failure								
Characteristic resistance	N _{Rk,s}	[kN]	19,4		33,9		47,9	
Partial safety factor	γ _{Ms} ¹⁾	[-]	1,4					
Pull-out failure								
Characteristic resistance in cracked concrete C20/25	N _{Rk,p}	[kN]	2,5	3,5	3,0	8,5	2,5	9,0
Characteristic resistance in non-cracked concrete C20/25	N _{Rk,p}	[kN]	6,0	9,5	8,5	16,6	11,0	25,4
Increasing factor for N _{Rk,p}	Ψ _C	C25/30	1,118	1,080	1,090	1,104	1,065	1,067
		C30/37	1,224	1,152	1,172	1,198	1,125	1,127
		C35/45	1,323	1,218	1,247	1,285	1,179	1,182
		C40/50	1,414	1,280	1,316	1,366	1,230	1,234
		C45/55	1,500	1,338	1,382	1,441	1,277	1,282
		C50/60	1,581	1,393	1,444	1,513	1,322	1,328
Partial safety factor	γ _{inst}	[-]	1,0					
	γ _{Mp} ¹⁾	[-]	1,5 ²⁾					
Concrete cone and splitting failure								
Effective anchorage depth	h _{ef}	[mm]	34,0	42,5	35,8	48,5	39,1	64,6
Factor for cracked concrete	k _{cr}	[-]	7,7					
Factor for non-cracked concrete	k _{ucr}	[-]	11,0					
Spacing	s _{cr,N}	[mm]	102,0	127,5	107,4	145,5	117,3	193,8
Edge distance	c _{cr,N}	[mm]	51,0	63,8	53,7	72,8	58,7	96,9
Spacing (splitting)	s _{cr,sp}	[mm]	136,0	127,5	121,7	165	195,5	184,5
Edge distance (splitting)	c _{cr,sp}	[mm]	68,0	63,8	60,9	82,5	97,8	92,3
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 A4 /
EJOT Concrete Screw Anchor JC6**

Performance

Characteristic resistance under tension loads

Annex C(1/5)

Table C2: 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 A4/ EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	14,3		24,3		29,4	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5					
Factor for considering ductility	k_7	[-]	1,0					
Steel failure with lever arm								
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	19,4		45,6		75,1	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5					
Concrete pryout failure								
k-factor	k_8	[-]	2,5		2,9		3,3	
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5					
Concrete edge failure								
Effective length of anchor under shear load	l_f	[mm]	34,0	42,5	35,8	48,5	39,1	64,6
Outside diameter of anchor	d_{nom}	[mm]	6		8		10	
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5					

¹⁾ In absence of other national regulations

**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6**

Performance

Characteristic resistance under shear loads

Annex C(2/5)

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

Sormat Concrete Screw Anchor S-CSA A4/ EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Steel failure								
Characteristic resistance $N_{Rk,s,fi}$	R30	[kN]	0,24		0,85		1,70	
	R60	[kN]	0,22		0,68		1,36	
	R90	[kN]	0,17		0,51		1,09	
	R120	[kN]	0,12		0,42		0,95	
Pull-out failure								
Characteristic resistance $N_{Rk,p,fi}$	R30	[kN]	0,63	0,88	0,75	2,13	2,75	5,50
	R60	[kN]	0,63	0,88	0,75	2,13	2,75	5,50
	R90	[kN]	0,63	0,88	0,75	2,13	2,75	5,50
	R120	[kN]	0,50	0,50	0,60	1,70	2,20	4,40
Concrete cone and splitting failure ¹⁾								
Characteristic resistance $N^0_{Rk,c,fi}$	R30	[kN]	1,66	2,90	1,89	2,82	2,35	8,19
	R60	[kN]	1,66	2,90	1,89	2,82	2,35	8,19
	R90	[kN]	1,66	2,90	1,89	2,82	2,35	8,19
	R120	[kN]	1,33	2,32	1,51	2,26	1,88	6,55
Spacing	$s_{cr,N,fi}$	[mm]	102	127,5	107,4	145,5	117,3	193,8
	s_{min}	[mm]	35	35	35	35	40	40
Edge distance	$c_{cr,N,fi}$	[mm]	51	63,8	53,7	72,8	58,7	96,9
	c_{min}	[mm]	Fire attack from one side: $c_{min} = 2 \times h_{ef}$ Fire attack from more than one side: $c_{min} \geq 300 \text{ mm}$ 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 A4 /
EJOT Concrete Screw Anchor JC6**

Performance

Characteristic tension resistance under fire exposure

Annex C(3/5)

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

Sormat Concrete Screw Anchor S-CSA A4/ EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Steel failure without lever arm								
Characteristic resistance $V_{Rk,s,fi}$	R30	[kN]	0,24		0,85		1,70	
	R60	[kN]	0,22		0,68		1,36	
	R90	[kN]	0,17		0,51		1,09	
	R120	[kN]	0,12		0,42		0,95	
Steel failure with lever arm								
Characteristic resistance $M^0_{Rk,s,fi}$	R30	[Nm]	0,20		1,14		2,66	
	R60	[Nm]	0,18		0,91		2,13	
	R90	[Nm]	0,14		0,68		1,70	
	R120	[Nm]	0,10		0,47		1,49	
Concrete pryout failure								
k-factor	k_8	[-]	2,51		2,94		3,29	
Characteristic resistance $V_{Rk,cp,fi}$	R30	[kN]	4,17	7,28	5,56	8,29	7,73	26,95
	R60	[kN]	4,17	7,28	5,56	8,29	7,73	26,95
	R90	[kN]	4,17	7,28	5,56	8,29	7,73	26,95
	R120	[kN]	3,34	5,82	4,44	6,64	6,19	21,55
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 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 A4 /
EJOT Concrete Screw Anchor JC6**

Performance

Characteristic shear resistance under fire exposure

Annex C(4/5)

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

Sormat Concrete Screw Anchor S-CSA A4 EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Cracked C20/25	N	[kN]	1,2	1,7	1,4	4,0	1,2	4,3
	δ_{N0}	[mm]	0,117	0,094	0,087	0,234	0,050	0,261
	$\delta_{N\infty}$	[mm]	0,253	0,386	0,898	0,687	1,575	0,842
Cracked C50/60	N	[kN]	1,9	2,3	2,1	6,1	1,6	5,7
	δ_{N0}	[mm]	0,166	0,103	0,114	0,242	0,068	0,252
	$\delta_{N\infty}$	[mm]	0,253	0,386	0,898	0,687	1,575	0,842
Non-cracked C20/25	N	[kN]	2,9	4,5	4,1	7,9	5,2	12,1
	δ_{N0}	[mm]	0,123	0,154	0,156	0,144	0,217	0,165
	$\delta_{N\infty}$	[mm]	0,253	0,386	0,898	0,687	1,575	0,842
Non-cracked C50/60	N	[kN]	4,5	6,3	5,8	12,0	6,9	16,1
	δ_{N0}	[mm]	0,131	0,171	0,110	0,376	0,104	0,261
	$\delta_{N\infty}$	[mm]	0,253	0,386	0,898	0,687	1,575	0,842

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

Sormat Concrete Screw Anchor S-CSA A4 / EJOT Concrete Screw Anchor JC6			Anchor size					
			S-CSA A4 / JC6					
			6-1	6-2	8-1	8-2	10-1	10-2
Cracked and non-cracked concrete C20/25 - C50/60	V	[kN]	6,8		11,6		14,0	
	δ_{V0}	[mm]	1,090		1,251		1,740	
	$\delta_{V\infty}$	[mm]	1,635		1,877		2,610	

**Sormat Concrete Screw Anchor S-CSA A4 /
EJOT Concrete Screw Anchor JC6**

Performance
Displacements under tension and shear loads

Annex C(5/5)