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European Technical Assessment

ETA-10/0423 of 19.1.2026

English version prepared by ZAG

General Part

Technical Assessment Body issuing the European Technical Assessment	**ZAG**
Trade name of the construction product	**ATS evo ®**
Product family to which the construction product belongs	**33: Torque controlled expansion anchor made of galvanised steel of sizes M6, M8, M10, M12, M16, M20 and M24 for use in cracked and non-cracked concrete**
Manufacturer	**FRIULSIDER S.p.A.** **via Trieste, 1** **33048 San Giovanni al Natisone (UD)** **Italy** www.friulsider.com
Manufacturing plant	**FRIULSIDER S.p.A.** **via Trieste, 1** **33048 San Giovanni al Natisone (UD)** **Italy**
This European Technical Assessment contains	15 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-10/0423 issued on 14.1.2016

Specific Parts

1 Technical description of the product

The ATS evo ® in the ranges M6, M8, M10, M12, M16, M20 and M24 is a fastener made of zinc plated carbon steel which is placed into a drilled hole and anchored by torque-controlled expansion.

For the anchor itself and installed anchor see Figures given in Annex A (1/3) and A (2/3).

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 this 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), C (4/5) 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 Annex C (3/5).

3.3 General aspects relating to fitness for use

Durability and serviceability are only ensured if specifications of intended use according to Annex B 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 19.1.2026

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

1 Official Journal of the European Communities L 254 of 8.10.1996

Type **S** with screw

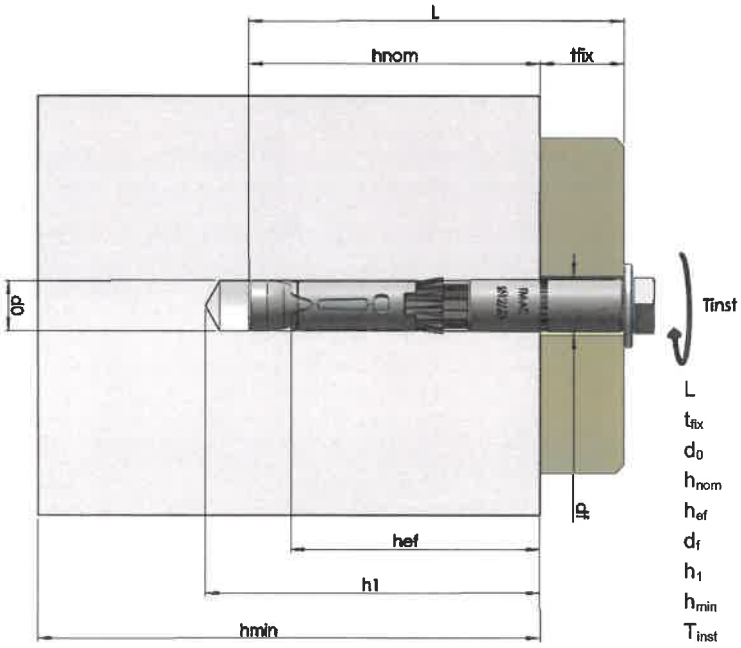
(SH)

Marking: Identification mark of the producer - trade name of the anchor
nominal drill hole diameter / max thickness of fixture
(and line for minimum embedment and max thickness of fixture)
e.g.: FM-ATS
Ø15/20

Type **B** with threaded bar

Type **SK** with countersunk screw

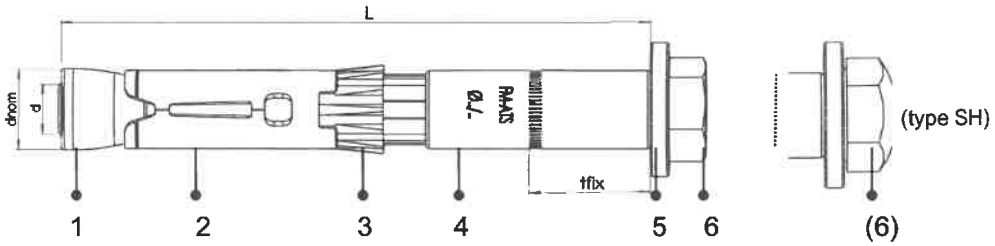
Sleeve for size M16 – M24



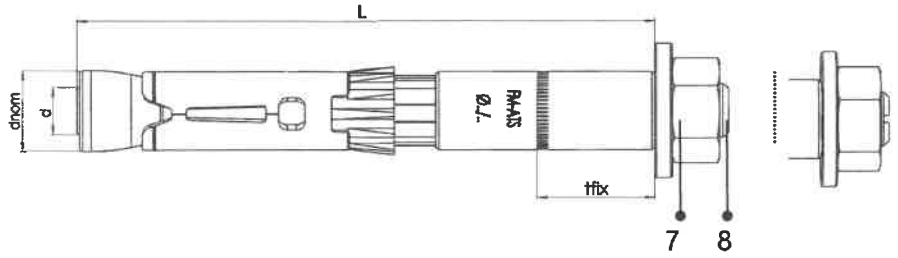
L	= length of the anchor (mm)
t_{fix}	= thickness of fixture (mm)
d_0	= nominal drill hole diameter (mm)
h_{nom}	= minimum installation depth (mm)
h_{ef}	= effective anchorage depth (mm)
d_f	= diameter of clearance hole in the fixture (mm)
h_1	= depth of drill hole (mm)
h_{min}	= minimum thickness of the concrete member (mm)
T_{inst}	= torque moment (Nm)

ATS evo®	
Product description Product and intended use	**Annex A (1/3)**

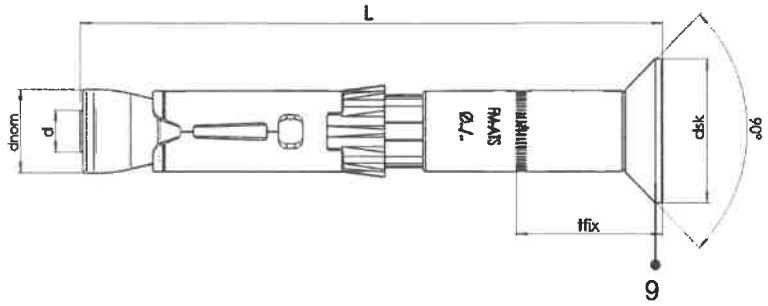
ATS evo-S



ATS evo-B



ATS evo-SK



1 Cone
2 Expansion sleeve
3 Plastic sleeve
4 Distance sleeve
5 Washer
6 Hexagonal screw
7 Hexagonal nut
8 Threaded bar
9 Countersunk screw

ATS evo®	Annex A (2/3)
Product description Product and components	

Table A1: Materials

Part of anchor		Material
1	Cone	hardened steel EN 10087 (EN 10277) [1)]
2	Expansion sleeve	M6 - M12 hardened steel acc. to EN 10132 [1)] M16 - M24 steel acc. to EN 10087 (EN 10277) [1)]
3	Plastic sleeve	PA6 acc. to ISO 1874/1
4	Distance sleeve	Steel acc. to EN 10025 [1)]
5	Washer	Steel acc. to EN 10139 [1)]
6	Hexagon screw	Steel grade 8.8 acc. to EN ISO 898/1[1)] (DIN 931 -DIN 933 - type SH= large head) [1)]
7	Hexagonal nut	Steel grade 8 acc. to EN ISO 898/2 (DIN 934) [1)]
8	Threaded bar	Steel grade acc. to 8.8 EN ISO 898/1 [1)]
9	Countersunk screw	Steel grade acc. to 8.8 EN ISO 898/1 [1)]

[1)] Zinc plated 5µm according to EN ISO 4042

ATS evo®	
Product description Materials	**Annex A (3/3)**

Specifications of intended use

Anchorages subjected to:

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

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+A2: 2021.

Use conditions (Environmental conditions):

- Structures subjected 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 EN 1992-4:2018, Annex D.
- For application with resistance under seismic load the anchorage are designed in accordance with EN 1992-4:2018, Annex C;
- 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.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under supervision of the person responsible for technical matters of the site.
- Use of the anchor only supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer's specification and drawings and 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 ranges 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.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Positioning of the drill holes without damaging the reinforcement.
- Application of specified torque moment using a calibrated torque wrench.
- 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 mortar and no shear or oblique tension loads in the direction of aborted hole.

ATS evo®	**Annex B (1/2)**
Intended use Specification	

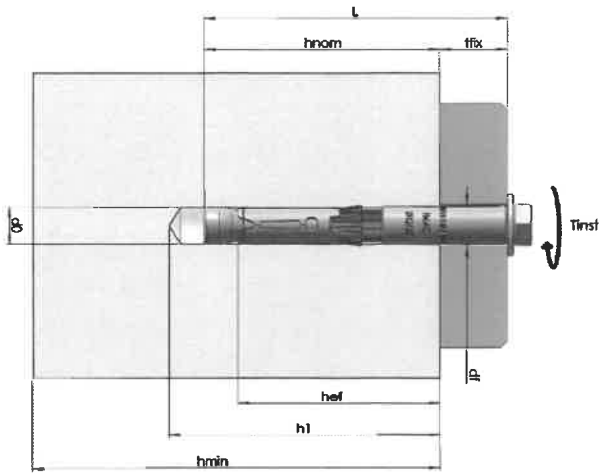


Table B1: Installation data

ATS evo ®				ATS evo ®						
				M6	M8	M10	M12	M16	M20	M24
Nominal drill hole diameter		d_o	[mm]	10	12	15	18	24	28	32
Cutting diameter of drill bit		d	[mm]	10,45	12,50	15,50	18,50	24,55	28,55	32,55
Maximum diameter of clearance hole in the fixture		d_f	[mm]	12	14	18	20	26	31	35
Effective anchorage depth		h_{ef}	[mm]	49	59	67	88	99	125	150
Nominal embedment depth		h_{nom}	[mm]	60	70	80	100	115	145	165
Depth of drill hole		$h_1 \geq$	[mm]	75	85	95	115	130	160	180
Thickness of the fixture	Type S	t_{fix}	[mm]	5-200	6-250	6-300	8-350	400	450	500
	Type SK	t_{fix}	[mm]	0-200	0-250	0-300	0-350	0-400	0-450	0-500
Installation torque		T_{inst}	[Nm]	10	20	45	80	150	170	200
Length of an anchor		L	[mm]	t_{fix} + 60	t_{fix} 0 70	t_{fix} + 80	t_{fix} + 100	t_{fix} + 115	t_{fix} + 145	t_{fix} + 165

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

ATS evo ®		M6	M8	M10	M12	M16	M20	M24
Minimum thickness of the concrete member	h_{min} [mm]	100	120	140	180	200	250	300
Minimum spacing	s_{min} [mm]	50	60	70	80	100	125	150
	for c [mm] ≥	75	90	100	150	200	250	300
Minimum edge distance	c_{min} [mm]	50	60	70	80	100	125	150
	for s ≥ [mm]	75	90	100	150	200	250	300

ATS evo®	Annex B (2/2)
Intended use Installation parameters	

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

ATS evo®			Anchor size						
			M6	M8	M10	M12	M16	M20	M24
Steel failure									
Characteristic tension steel failure	$N_{Rk,s}$	[kN]	16	29	46	67	126	203	293
Partial safety factor	γ_{Ms} [2)]	[-]	1,5						
Pull-out failure									
Characteristic pull-out failure in **non-cracked** concrete	$N_{Rk,p}$	[kN]	13	-[1)]	-[1)]	-[1)]	-[1)]	-[1)]	-[1)]
Characteristic pull-out failure in **cracked** concrete	$N_{Rk,p}$	[kN]	11,3	14,9	-[1)]	-[1)]	-[1)]	-[1)]	-[1)]
Increasing factor for $N_{Rk,p}$ for concrete	ψc	C25/30	1,00[4)]	1,01	1,05	1,05	1,04	1,12	1,10
		C30/37		1,02	1,09	1,08	1,10	1,22	1,19
		C35/45		1,03	1,12	1,12	1,16	1,32	1,26
		C40/50		1,04	1,16	1,15	1,19	1,41	1,34
		C45/55		1,04	1,19	1,18	1,21	1,50	1,41
		C50/60		1,05	1,21	1,20	1,25	1,58	1,47
Partial safety factor	γ_{inst} [2)]	[-]	1,0						
	γ_{Mp} [3)]	[-]	1,5						
Concrete cone and splitting failure									
Effective anchorage depth	h_{ef}	[mm]	49	59	67	88	99	125	150
Factor for cracked concrete	k_{cr}	[-]	7,7						
Factor for non-cracked concrete	k_{ucr}	[-]	11,0						
Spacing	$s_{cr,N}$	[mm]	$3 \times h_{ef}$						
Edge distance	$c_{cr,N}$	[mm]	$1,5 \times h_{ef}$						
Spacing-splitting	$s_{cr,sp}$	[mm]	$3 \times h_{ef}$						
Edge distance - splitting	$c_{cr,sp}$	[mm]	$1,5 \times h_{ef}$						
Partial safety factor	γ_{Mc} [2)]	[-]	1,5						
	γ_{Msp} [2)]	[-]	1,5						
Displacement under tension load									
Non-cracked concrete C20/25-C50/60									
Service tension load	N	[kN]	6,2	10,6	12,9	19,3	23,1	32,7	43,4
Short term displacement	δ_{N0}	[mm]	0,34	0,87	0,33	0,06	0,07	0,28	0,88
Long term displacement	$\delta_{N\infty}$	[mm]	1,58	1,66	1,33	0,75	1,43	0,51	0,88
Cracked concrete C20/25									
Service tension load	N	[kN]	5,	7,10	9,0	13,5	16,2	22,9	30,1
Short term displacement	δ_{N0}	[mm]	1,75	1,30	1,88	0,75	1,05	0,51	0,88
Long term displacement	$\delta_{N\infty}$	[mm]	1,58	1,66	1,33	0,75	1,43	0,51	0,88

[1)] Pull-out is not decisive
[2)] In absence of other national regulations
[3)] The installation safety factor γ_{inst} = 1,0 is included
[4)] Steel failure occur in low and high strength concrete

ATS evo®	Annex C (1/6)
Performace Characteristic resistance under tension loads	

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

ATS evo®			Anchor size						
			M6	M8	M10	M12	M16	M20	M24
Steel failure without lever arm									
Characteristic resistance	$V_{Rk,s}$	[kN]	14,0	25,7	42,0	54,2	96,6	125,2	151,5
Partial safety factor	γ_{Ms} 1)	[-]	1,25					1,50	
Factor for considering ductility	k_7	[-]	1,0						
Steel failure with lever arm									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266	539	932
Partial safety factor	γ_{Ms} 1)	[-]	1,25					1,5	
Concrete pryout failure									
k-factor	k_8	[-]	1,0		2,0				
Partial safety factor	γ_{iMc}	[-]	1,5						
Concrete edge failure									
Effective length of anchor under shear load	l_{ef}	[mm]	49	59	67	88	99	125	150
Outside diameter of anchor	d_{nom}	[mm]	10	12	15	18	24	28	32
Partial safety factor	γ_{iMc}	[-]	1,5						
Displacement under sher load									
C20/25 – C50/60									
Service shar load	V	[kN]	8,0	14,9	24,0	31,0	55,4	59,6	72,1
Short term displacement	δ_{V0}	[mm]	2,63	2,78	3,81	2,41	3,07	5,27	6,05
Long term displacement	$\delta_{V\infty}$	[mm]	3,95	4,17	5,72	3,62	4,61	7,91	9,08

ATS evo®	Annex C (2/6)
Performace Characteristic resistance under shear loads	

Table C3: Characteristic resistance under tension loads in case of fire exposure for design acc. to EN 1992-4:2018

Essential characteristics			Anchor size						
			M6	M8	M10	M12	M16	M20	M24
Steel failure									
Characteristic resistance $N_{Rk,s,fi}$	R30	[kN]	0,20	0,37	0,87	1,69	3,14	4,90	7,06
	R60	[kN]	0,18	0,33	0,75	1,26	2,36	3,68	5,30
	R90	[kN]	0,14	0,26	0,58	1,10	2,04	3,19	4,59
	R120	[kN]	0,10	0,18	0,46	0,84	1,57	2,45	3,53
Pull-out failure									
Characteristic resistance $N_{Rk,p,fi}$	R30	[kN]	2,83	3,73	-[1)]				
	R60	[kN]	2,83	3,73					
	R90	[kN]	2,83	3,73					
	R120	[kN]	2,26	2,98					
Concrete cone and splitting failure[2)]									
The characteristic resistance $N^0_{Rkc,fi}$ 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 x h_{ef}						
	s_{min}	[mm]	50	60	70	80	100	125	150
Edge distance	$c_{cr,N,fi}$	[mm]	2 x h_{ef}						
	c_{min}	[mm]	Fire attack from one side: c_{min} = 2 x h_{ef}						
			Fire attack from more than one side: c_{min} ≥ 300 mm and ≥ 2 x h_{ef}						

[1)] Pull-out isn't decisive

Design under fire exposure is performed according to the design method given in EN 1992-4:2018, Annex D.

Under fire exposure usually cracked concrete is assumed. The design equations are given in EN 1992-4:2018, Annex D.

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

ATS evo®	Annex C (3/6)
Performance Characteristic tension resistance under fire exposure	

Table C4: Characteristic resistance under shear loads in case of fire exposure for design acc. to EN 1992-4:2018

Essential characteristics			Anchor size						
			M6	M8	M10	M12	M16	M20	M24
Steel failure without lever arm									
Characteristic resistance $V_{Rk,s,fi}$	R30	[kN]	0,20	0,37	0,87	1,69	3,14	4,90	7,06
	R60	[kN]	0,18	0,33	0,75	1,26	2,36	3,68	5,30
	R90	[kN]	0,14	0,26	0,58	1,10	2,04	3,19	4,59
	R120	[kN]	0,10	0,18	0,46	0,84	1,57	2,45	3,53
Steel failure with lever arm									
Characteristic resistance $M^0_{Rk,s,fi}$	R30	[kN]	0,15	0,37	1,12	2,62	6,66	13,07	22,45
	R60	[kN]	0,14	0,34	0,97	1,96	5,00	9,80	16,84
	R90	[kN]	0,11	0,26	0,75	1,70	4,33	8,49	14,59
	R120	[kN]	0,08	0,19	0,60	1,31	3,33	5,44	9,35
Concrete pry-out failure									
The Characteristic resistance $V_{Rk,cp,fi}$ in case of fasteners installed in concrete class C20/25 to C50/60 may be determined by: $V_{RK,cp,fi} = k_8 \times N_{Rk,c,fi}$ ($\leq$ R90) $\quad V_{RK,cp,fi} = k_8 \times N_{Rk,c,fi}$ ($\leq$ R90) where $N_{Rk,c,fi}$ 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									

Design under fire exposure is performed according to the design method given in EN 1992-4:2018, Annex D. Under fire exposure usually cracked concrete is assumed. The design equations are given in EN 1992-4:2018, Annex D. 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.

ATS evo®	
Performance Characteristic tension resistance under fire exposure	**Annex C (4/6)**

Table C5: Characteristic values for resistance in case of seismic actions for design acc. to EN 1992-4:2015 Performance category C1 and C2

			Anchor size						
			M6	M8-	M10	M12	M16	M20	M24
Tension - steel failure									
Characteristic resistance **C1**	$N_{Rk,s,seis,C1}$	[kN]	16	29	46	67	126	203	293
Characteristic resistance **C2**	$N_{Rk,s,seis,C2}$	[kN]	16	29	46	67	126	203	293
Partial safety factor	$\gamma_{Ms,seis}$ [1)]	[-]	1,5						
Tension - pull-out failure									
Characteristic resistance **C1**	$N_{Rk,p,seis,C1}$	[kN]	6,4	12,0	16,0	25	35,5	50,2	66,1
Characteristic resistance **C2**	$N_{Rk,p,seis,C2}$	[kN]	-	3,9	7,8	15,3	28,8	32,8	41,3
Installation safety factor	γ_{inst}	[-]	1,0						
Concrete cone and splitting failure [2)]									
Effective anchorage depth	h_{ef}	[mm]	49	59	67	88	99	125	150
Installation safety factor	γ_{inst}	[-]	1,0						
Shear - steel failure without lever arm									
Characteristic resistance **C1**	$V_{Rk,s,seis,C1}$	[kN]	9,8	13,0	21,0	20,0	48,5	87,5	105,7
Characteristic resistance **C2**	$V_{Rk,s,seis,C2}$	[kN]	-	10,2	17,0	17,0	43,9	72,9	74,6
Partial safety factor	$\gamma_{Ms,seis}$ [1)]	[-]	1,25						
Concrete pryout and concrete edge failure [3)]									
Effective anchorage depth	h_{ef}	[mm]	49	59	67	88	99	125	150
Installation safety factor	γ_{inst}	[-]	1,0						

[1)] In absence of other national regulations

[2)] For concrete cone, splitting, pryout and edge failure, see EN 1992-4:2018

ATS evo®	
Performance Characteristic resistances under seismic action Performance category C1 and C2	**Annex C (5/6)**

Table C6: Displacements in case of seismic action for desgin acc. to EN 1992-4:2018: Performance Category C2

			Anchor size						
			M6	M8	M10	M12	M16	M20	M24
Displacement under tension loads									
Displacement **DLS**	$d_{N,C2(DLS)}$	[mm]	-	2,7	4,9	3,6	3,1	7,0	7,0
Displacement **ULS**	$d_{N,C2(ULS)}$	[mm]	-	12,8	15,3	14,0	11,5	18,4	16,2
Displacement under shear loads									
Displacement **DLS**	$\delta_{V,C2(DLS)}$	[mm]	-	3,5	2,7	2,5	2,7	7,0	7,0
Displacement **ULS**	$\delta_{V,C2(ULS)}$	[mm]	-	6,8	6,3	5,8	6,1	20,9	18,6

ATS evo®	
Performance Characteristic resistances under seismic action Performance category C1 and C2	**Annex C 6/6)**