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Member of



# European Technical Assessment

# ETA-21/1078 of 30/12/2021

### **General Part**

Technical Assessment Body issuing the European Technical Assessment

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Instytut Techniki Budowlanej

**TSC V Spin In Capsules** 

Bonded fasteners for use in concrete

Trutek Fasteners Polska Sp. z o.o. Al. Krakowska 38, Janki 05-090 Raszyn, Poland e-mail: info@trutek.com.pl www.trutek.com.pl www.trutekfasteners.eu

Plant no. 10

11. 1011

18 pages including 3 Annexes which form an integral part of this Assessment

European Assessment Document EAD 330499-01-0601 "Bonded fasteners for use in concrete"

#### **Manufacturing plant**

This European Technical Assessment contains

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## **Specific Part**

1

#### Technical description of the product

The TSC V Spin In Capsules are bonded anchors (injection type) consisting of chemical mortar glass capsules with mortar and threaded anchor rod sizes M8 to M30 made of:

- galvanized carbon steel,
- stainless steel,
- high corrosion resistant stainless steel,

with hexagon nut and washer.

The threaded rods are made with two types of tip end: a one side 45 chamfer or a two sides 45 chamfer.

The glass capsule is placed into a drilled hole previously cleaned and the threaded rod is driven by machine with simultaneous hammering and turning. The steel rod is anchored by the bond between rod, mortar and concrete.

The product description is given in Annex A.

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

The performances given in Section 3 are only valid if the anchorages are 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 producer or the Technical Assessment Body, 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 Performance of the product

#### 3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance	
Characteristic resistance to static and quasi-static loading, displacements	See Annexes C1 to C5	

#### 3.1.2 Hygiene, health and the environment (BWR 3)

No performance assessed.

#### 3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 330499-01-0601.

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

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

41.001

# Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 30/12/2021 by Instytut Techniki Budowlanej

Anna Panek, MSc Deputy Director of ITB



# Page 6 of European Technical Assessment ETA-21/1078, issued on 30/12/2021

		Designation	
Part	Steel, galvanized	Stainless steel	High corrosion resistance stainless steel
Threaded rod	Steel, property class from 5.8 to 12.9, acc. to EN ISO 898-1; zinc plated ≥ 5 µm acc. to EN ISO 4042 or hot-dip galvanized ≥ 40 µm	Material 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362, 1.4062, 1.4662, 1.4462 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4565, 1.4529 acc. to EN 10088; property class 70 acc. to EN ISO 3506
acc. to EN ISO 10684		Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:2016
Hexagon nut	Steel, property class 5 to 12, acc. to EN 898-2; zinc plated ≥ 5µm acc. to EN ISO 4042 or hot-dip galvanized ≥ 40 µm acc. to EN ISO 10684	Material 1.4401, 1.4404, 1.4578, 1.4439, 1.4462, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529, 1.4565, 1.4547 act to EN 10088; property class 70 acc. to EN ISO 3506
	acc. to EN ISO 10684	Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:201
Washer	Steel, acc. to EN ISO 7089; zinc plated $\ge$ 5µm acc. to EN ISO 4042 or hot-dip galvanized $\ge$ 40 µm	Material 1.4401, 1.4404, 1.4578, 1.4439, 1.4462, 1.4571 acc. to EN 10088; corresponding to anchor rod material	Material 1.4529, 1.4565, 1.4547 act to EN 10088; corresponding to anchor rod material
	acc. to EN ISO 10684	Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015	Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:201

Commercial threaded rods (in the case of rods made of galvanized steel – rods with property class  $\leq$  8.8 only), with:

- material and mechanical properties according to Table A1,

- confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204:2004; the documents shall be stored,
- marking of the threaded rod with the embedment depth.

Note: Commercial standard threaded rods made of galvanized steel with property class above 8.8 are not permitted in some Member States.

#### Table A2: Mortar

Product	Composition						
TSC V Spin In Capsules	Bonding agent: resin Hardener: peroxide powder Additives: quartz sand						
TSC V Spin In Capsules	6	Annex A2					

#### Specification of intended use

#### Anchors subject to:

Static and quasi-static loads: sizes M8 to M30.

#### Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 to C50/60 to EN 206:2013+A1:2016.
- Uncracked concrete for anchors sizes M8 to M30 and cracked concrete for anchors sizes M12 to M24.

#### Temperature ranges:

#### Installation temperature (temperature of substrate):

-5°C to +40°C.

#### In-service temperature:

The anchorages may be used in the following temperature range:

- -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C).
- -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C).

#### Use conditions (environmental conditions):

- Structures subject to dry internal conditions: all materials.
- For all other conditions according to EN 1993-1-4 corresponding to corrosion resistance class (CRC): elements made of stainless steel.

#### Design:

- Anchorages under static or quasi-static loads are designed in accordance to EN 1992-4:2018 and EOTA Technical Report TR 055.
- Anchorages are designed under the responsibility of the engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads 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:

- Dry or wet concrete (use category I1).
- Flooded holes (use category I2).
- Installation direction D3 (downward, horizontal and upwards installation).
- Rotary hammer drilled holes.

#### **TSC V Spin In Capsules**

Intended use Specification

11. 011

#### Annex B1

# Page 8 of European Technical Assessment ETA-21/1078, issued on 30/12/2021



## **Table B1: Installation parameters**

Size			M8	M10	M12	M16	M20	M24	M27	M30
Diameter of anchor rod	d	[mm]	8	10	12	16	20	24	27	30
Nominal drilling diameter	d <sub>0</sub>	[mm]	10	12	14	18	24	28	32	35
Maximum diameter hole in the fixture	d <sub>f</sub>	[mm]	12	14	16	20	26	30	28	37
Effective embedment depth	h <sub>ef</sub>	[mm]	85	90	110	125	180	210	250	260
Depth of the drilling hole	h <sub>0</sub>	[mm]	90	95	115	130	185	215	255	265
Minimum thickness of the concrete slab	h <sub>min</sub>	[mm]	120	130	140	180	230	270	300	340
Installation torque	T <sub>inst</sub>	[Nm]	10	20	40	80	120	200	250	300
Capsule length	Lc	[mm]	85	85	95	98	180	210	250	260
Capsule diameter	d <sub>c</sub>	[mm]	9,25	10,75	12,75	16,75	21,50	23,50	27,00	30,00
Minimum spacing	S <sub>min</sub>	[mm]	<mark>40</mark>	40	50	65	80	100	110	120
Minimum edge distance	C <sub>min</sub>	[mm]	40	40	50	65	80	100	110	120

# **TSC V Spin In Capsules**

Intended use Installation parameters Annex B2

Mortar temperature [°C]	Concrete (substrate) temperature [°C]	Minimum curing time <sup>1)</sup> [min.]	
+ 15	-5	480	
+ 15	0	240	1
+ 15	+5	150	]
+ 15	+10	120	
+ 15	+15	90	
+ 15	+20	45	
+ 15	+30	20	
+ 15	+40 for installation +5°C; maximum mortar tempe	10	]
			1
TSC V	/ Spin In Capsules	Annex B3 of European	
		of European	

# Page 10 of European Technical Assessment ETA-21/1078, issued on 30/12/2021



	<ol> <li>Drill the correct diameter hole to the correct depth using a rotary percussion drill. Clean up the dust from the surface.</li> </ol>
	<ol> <li>Blow out the dust for 4 times with a hand pump or compressed air gun.</li> </ol>
	<ol> <li>Blow out the dust with 4 pumps of a hand pump or compressed air gun.</li> </ol>
	<ol> <li>Clean the hole 4 times with the correct size brush by inserting and removing the brush with a rotary action.</li> </ol>
	<ul> <li>5. Insert the capsule into the hole with the air gap nearest to the surface.</li> <li>In case of fixing in the ceiling, secure the capsule against falling out for example with adhesive tape.</li> </ul>
	<ol> <li>Attach the rod to the setting tool and drive it into the capsule using a rotary percussion drill.</li> </ol>
	<ol> <li>Remove any excess resin from the surface and leave for the correct curing time depending on temperature.</li> </ol>
	8. Attach the fixture and tighten using a calibrated torque wrench. Do not exceed the recommended installation torque.
TSC V Spin In Capsu	iles Annex B5
Intended use Installation instruction	of European Technical Assessm ETA-21/1078

Size			M8	M10	M12	M16	M20	M24	M27	M30			
Steel failure		1 2 2 1	2.0.3	A STREET	10.000								
Steel failure with standard threaded ro	d grade 5.8		-				-						
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	18,3	29,0	42,1	78,5	122.5	176,5	229.5	280.			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]	-			1.							
Steel failure with standard threaded ro													
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	29,3	46,4	67,4	125,6	196.0	282,4	367,2	448.			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]				1.:			1	1.10,			
Steel failure with standard threaded ro	d grade 10.9												
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	36,6	58,0	84,3	157.0	245,0	353.0	459.0	561,			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]	200 B			1,							
Steel failure with standard threaded ro	d grade 12.9												
Characteristic resistance	NRKS	[kN]	43,9	69,6	101.2	188,4	294,0	423,6	550.8	673,			
Partial safety factor	Υ <sub>Ms</sub> <sup>1)</sup>	[-]			-	1,			1 00010	1 010,			
Steel failure with standard stainless ste	eel threaded ro	od A4-70			_			-					
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	25,6	40,6	59.0	109,9	171.5	247,1	321,3	392.			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]				1.			1 02.10	1002,			
Steel failure with standard stainless ste	eel threaded ro	od A4-80											
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	29,3	46,4	67,4	125,6	196.0	282,4	367.2	448.			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]		-	·	1,:		,		1 1 10,			
Steel failure with standard high corrosi	on threaded ro	od grade 70	-										
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	25,6	40,6	59,0	109,9	171,5	247.1	321.3	392.			
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]		-		1.				,			
Combined pull-out and concrete con	ne failure (wo	rking life 50	years)	98. N. 98	2224			10.000	SIE COM	Sugar.			
Characteristic bond resistance in uncra	acked concrete	e C20/25, wo	orking life	50 years	-								
Temperature range I: 40°C/24°C	T <sub>Rk,ucr,50</sub>	[N/mm <sup>2</sup> ]	10	10	10	10	10	10	7,5	7,5			
Temperature range II: 80°C/50°C	TRk,ucr,50	[N/mm <sup>2</sup> ]	10	10	10	10	10	10	7,5	7,5			
		C30/37				1,0	)4						
Increasing factors	Ψα	C40/50				1,0	)7						
		C50/60		AND		1,10							

<sup>2)</sup> h – concrete member thickness

## **TSC V Spin In Capsules**

#### Annex C1

Performances

Characteristic resistance under tension loads in uncracked concrete (1)

Concrete cone failure												
Factor for uncracked concrete		k <sub>ucr,N</sub>	[-]	11,0								
Edge distance		Cucr,N	[mm]		ke L		1,5	· h <sub>ef</sub>	2 <sup>2</sup> 2 2			
Spacing Sucr,N			[mm]	<u> </u>			3,0	) h <sub>ef</sub>				
Splitting failure						Se and						
Edge distance h <sub>min</sub>	C <sub>cr,sp</sub> fo	or h <sub>min</sub>	[mm]	85	85	95	95	270	315	375	390	
	h <sub>min</sub> < h <sup>2</sup> (C <sub>cr,sp</sub> fro	<sub>p</sub> for <sup>)</sup> < 2 ⋅ h <sub>ef</sub> m linear blation)	[mm]	2 x har hmin Caxe Caxe							5	
	C <sub>cr,sp</sub> for h	$h^{(2)} \ge 2 \cdot h_{ef}$	[mm]	C <sub>or,N</sub>								
Spacing	Sc	r,sp	[mm]	2 · C <sub>cr.sp</sub>								
Installation safety factors for	r combined	pull-out, c	oncrete co	one and	splitting	failure				No. 20		
Installation safety factors for o	ategory 11	Yinst	[-]		98 - F. J.		1	1,2			. I	
Installation safety factors for category 12 Yinst			[-]	1,4								

<sup>1)</sup> In the absence of national regulations

<sup>2)</sup> h – concrete member thickness

# **TSC V Spin In Capsules**

Annex C1

of European Technical Assessment ETA-21/1078

Performances Characteristic resistance under tension loads in uncracked concrete (2)

Size		1000	M12	M16	M20	M24		
Steel failure	A MARCH BUSIN		water and					
Steel failure with standard threaded ro	d grade 5.8	- V. I.						
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	42,1	78,5	122,5	176,5		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]	St	-	25			
Steel failure with standard threaded ro		A States		· · · · · · · · · · · · · · · · · · ·				
Characteristic resistance	N <sub>Rk.s</sub>	[kN]	67,4	125,6	196,0	282,4		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]			25	202,1		
Steel failure with standard threaded ro	d grade 10.9							
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	84,3	157,0	245,0	353,0		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]	A		50	000,0		
Steel failure with standard threaded ro	d grade 12.9	1.1.1			2.0			
Characteristic resistance	NRKS	[kN]	101,2	188,4	294.0	423,6		
Partial safety factor	Yms <sup>1)</sup>	[-]			50	120,0		
Steel failure with standard stainless ste		od A4-70						
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	59,0	109.9	171,5	247,1		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]	1,56					
Steel failure with standard stainless ste	eel threaded n	od A4-80	212					
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	67,4	125.6	196.0	282,4		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]			33	202,4		
Steel failure with standard high corrosi	on threaded r	od grade 70						
Characteristic resistance	N <sub>Rk,s</sub>	[kN]	59,0	109,9	171.5	247,1		
Partial safety factor	γ <sub>Ms</sub> <sup>1)</sup>	[-]			56			
Combined pull-out and concrete con	ne failure (wo	rking life 50 y	/ears)					
Characteristic bond resistance in crack	ed concrete C	20/25, workin	g life 50 years					
Temperature range I: 40°C/24°C	T <sub>Rk,cr,50</sub>	[N/mm <sup>2</sup> ]	4	5	5	5		
Temperature range II: 80°C/50°C	T <sub>Rk,cr,50</sub>	[N/mm <sup>2</sup> ]	4	5	5	5		
		C30/37	р. (1997) 1977 - П. (1997) 1977 - П. (1997)	1.0	04			
Increasing factors	Ψο	C40/50	L		07			
		C50/60		1,				

# Table C2: Characteristic resistance under tension load in cracked concrete – static and quasi-static loads

<sup>1)</sup> In the absence of national regulations

<sup>2)</sup> h – concrete member thickness

## **TSC V Spin In Capsules**

#### Annex C2

Performances

Characteristic resistance under tension loads in cracked concrete

Concrete cone failure									
Factor for cracked concrete		K <sub>cr,N</sub>	[-]	81	7,	7			
Edge distance	C <sub>cr,N</sub>	[mm]	1,5 · h <sub>ef</sub>						
Spacing		S <sub>cr,N</sub>	[mm]	3,0 h <sub>ef</sub>					
Splitting failure							Contraction of		
	C <sub>cr,sp</sub> fc	or h <sub>min</sub>	[mm]	95	95	270	315		
Edge distance		o for <2 · h <sub>ef</sub> m linear lation)	[mm]	2 x her hmin C <sub>cr.Np</sub> C <sub>cr.sp</sub>		a.Np Ca.Ap			
	C <sub>cr,sp</sub> for h	$h^{2)} \ge 2 \cdot h_{ef}$	[mm]	C <sub>or,N</sub>					
Spacing	Sci	r,sp	[mm]	2 · c <sub>cr,sp</sub>					
Installation safety factors for	combined	pull-out, co	oncrete con	e and splitting	failure				
Installation safety factors for ca	ategory I1	Yinst	[-]			,2			
Installation safety factors for category I2 Yinst				1,4					

<sup>2)</sup> h – concrete member thickness

**TSC V Spin In Capsules** 

Annex C2

of European Technical Assessment ETA-21/1078

Performances Characteristic resistance under tension loads in cracked concrete (2)

11.000

Size		- Partie	M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure with standard threaded	rod grade 5.8	and the state	12 347	TT MES	112200	1.1.192	NET DEL T	14.1 · · · · · ·	1.58		
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub>	[kN]	9,2	14,5	21,1	29,3	61,3	88,3	114,75	140,3	
Partial safety factor	УMs	[-]		- 1 ° 1 ' 1 ( -		1,	25	5			
Ductility factor	k7	[-]	0.8								
Steel failure with standard threaded	rod grade 8.8	C. Diselects	Start	No.				and the second	a di secolo	Magazine 1	
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub>	[kN]	14,6	23,2	33,7	62,8	98,0	141,2	183.6	224,4	
Partial safety factor	Умs	[-]	1.25								
Ductility factor	k7	[-]	0.8								
Steel failure with standard threaded	rod grade 10.9	12.23.24	195.5	1.000	1000	- NACE		Sec. 3			
Characteristic resistance	V <sub>Rk,s</sub>	[kN]	18,3	29,0	42,2	78,5	122,5	176,5	229,5	280.5	
Partial safety factor	Умs	[-]	1,50								
Ductility factor	k7	[-]	0.8								
Steel failure with standard threaded	rod grade 12.9	S State State						Sec. 23	1.0X	1.200	
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub>	[kN]	22,0	34,8	50,6	94,2	147.0	211.8	275.4	336.6	
Partial safety factor	ÝМs	[-]	18.9	1.1.1.1.1.1.1	-	1,	50				
Ductility factor	k7	[-]	1. Sec.	1	1.115.7	0	.8			_	
Steel failure with standard stainless	steel threaded rod	A4-70	and But	11.5° 2.50	E TAL ON	1.63.9.5	Contract of	1. S.	Contraction of the		
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub>	[kN]	12,8	20,3	29,5	55,0	85.8	123.6	160,65	196.3	
Partial safety factor	ÝМs	[-]				1,	56				
Ductility factor	k7	[-]				0	.8				
Steel failure with standard stainless		A4-80	Sheet ar	a dea	200.00	See. 37		Red Star		and states	
Characteristic resistance	V⁰ <sub>Rk,s</sub>	[kN]	14,6	23,2	33,7	62,8	98,0	141.2	183.6	224.4	
Partial safety factor	Ϋ́Ms	[-]				1,	33				
Ductility factor	k7	[-]				0	.8				
Steel failure with high corrosion sta	inless steel threade	ed rod gra	ade 70	150 3000			N 10 200	1000	200 C	1.5	
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub>	[kN]	12,8	20,3	29,5	55,0	85,8	123,6	160,65	196.3	
Partial safety factor	Ϋ́Ms	[-]	1 . · · · ·	•			56				
Ductility factor	k7	[-]					.8			a da an	

# **TSC V Spin In Capsules**

#### Annex C3

Performances Characteristic resistance under shear loads

Size			M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure with standard threade	d rod grade 5.8	des constant					Contractor of	1. Sec. 1. 11	Same		
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	18,7	37,4	65,5	166,5	324,5	561,3	832,2	1124,5	
Partial safety factor	ΎMs	[-]	1,25								
Steel failure with standard threade	d rod grade 8.8	Congression		- Seland		1.6/5.8	1	100	and the second		
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	30,0	59,8	104,8	266,4	519,3	898,0	1331,5	1799,2	
Partial safety factor	Yмs	[-]	1,25								
Steel failure with standard threade	d rod grade 10.9	100	-28.57	-	1 102.0	Sec. 1		150 205	- Marian		
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	37,5	74,8	131,0	333,0	649,1	1122,6	1664,4	2249,0	
Partial safety factor	ΎMs	[-]	1,50								
Steel failure with standard threade	d rod grade 12.9						and the second		Mar -	See See	
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	45,0	89,7	157,2	399,6	778,9	1347,1	1997,3	2698,8	
Partial safety factor	Yмs	[-]		1.1.1.1		1,	50			- H	
Steel failure with standard stainles	s steel threaded ro	d A4-70	S. Seep	- Michard		Co. Aud	1000 a a		118 N. 11	1. 122.0	
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	26,2	52,3	91,7	233,1	454,4	785,8	1165,1	1574,3	
Partial safety factor	Yмs	[-]	2 C 2 C	2.2.2	- 18 X -	1,	56	-		-	
Steel failure with standard stainles	s steel threaded ro	d A4-80	-		E SE M		Section for		1000	144 M.S.	
Characteristic resistance	M <sup>0</sup> Rk,s	[Nm]	30,0	59,8	104,8	266,4	519,3	898,0	1331,5	1799,2	
Partial safety factor	ΎMs	[-]	and the state	1 1 1	1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 -	1,	33		1.0	10 - 26a 16	
Steel failure with high corrosion st	tainless steel threa	ded rod g	rade 70	Sector Page	Sector Sector	2. 1. 4.	Sales -	- State of		- Sector Sector	
Characteristic resistance	M <sup>0</sup> <sub>Rk,s</sub>	[Nm]	26,2	52,3	91,7	233,1	454,4	785,8	1165,1	1574,3	
Partial safety factor	YMs	[-]				1.	56				

# **TSC V Spin In Capsules**

Annex C4

of European Technical Assessment ETA-21/1078

Performances Characteristic resistance under shear loads

## Page 18 of European Technical Assessment ETA-21/1078, issued on 30/12/2021

Size		Par Sa	M8	M10	M12	M16	M20	M24	M27	M30
Pry out failure		P. P. M.	7.53		1993 Stev		and antio		19.00	
Pry-out factor	k <sub>8</sub>	[-]				2	,0			Contractor (
Concrete edge failure	all and the			5.55 288°	AN A PAR	1225	No. of	New Y	23710	
Outside diameter of anchor	d <sub>nom</sub>	[mm]	8	10	12	16	20	24	27	30
Effective length of anchor If [mm]				min (h <sub>ef</sub> ; 12d <sub>nom</sub> )						
able C6: Displacement	under te	nsion lo	ad in ur	ncracked	d concre	te				
Size			M8	M10	M12	M16	M20	M24	M27	M30
Characteristic displacemen	t in uncra	cked C20	25 to C50	)/60 conci	rete	A States			100	
							-			-
Displacement 1)	δ <sub>N0</sub>	[mm]	0,35	0,40	0,45	0,45	0,50	0,55	0,55	0,60
	δ <sub>N∞</sub> r each temp	[mm] perature rai	0,82 nge and ca	0,82 itegories s	0,82 becified in /	0,82 Annex B1	0,82	0,55 0,82	0,55 0,82	
<sup>1)</sup> These values are suitable for Calculation of the displacement <b>Table C7: Displacement</b>	$\delta_{N\infty}$ r each temp ent: $\delta_{N0} = \delta_{P}$	[mm] perature rai No-factor · N	0,82 nge and ca √; δ <sub>N</sub> = δ <sub>N∞</sub> d in unc	0,82 Integories sp -factor · N; racked o	0,82 pecified in / (N – applie	0,82 Annex B1 ed tension	0,82 load)	0,82	0,82	0,82
<sup>1)</sup> These values are suitable for Calculation of the displacement <b>able C7: Displacement</b> Size	$δ_{N\infty}$ r each temp ent: $δ_{N0} = δ_{P}$ under sl	[mm] perature rai no-factor · N	0,82 nge and ca \; δ <sub>N</sub> = δ <sub>N∞</sub> d in unc M8	0,82 ttegories sp factor · N; racked of M10	0,82 pecified in / (N – applie concrete M12	0,82 Annex B1 ed tension	0,82			0,82
<sup>1)</sup> These values are suitable for Calculation of the displacement <b>able C7: Displacement</b> Size	$δ_{N\infty}$ r each temp ent: $δ_{N0} = δ_{P}$ under sl	[mm] perature ran no-factor · M hear load	0,82 nge and ca v; δ <sub>N</sub> = δ <sub>N</sub> d in unc M8 /25 to C50	0,82 ategories sp factor · N; racked of M10 0/60 conce	0,82 pecified in <i>J</i> (N – applie concrete M12 rete	0,82 Annex B1 ed tension M16	0,82 load) M20	0,82 M24	0,82 M27	0,82
Displacement <sup>1)</sup> <sup>1)</sup> These values are suitable for Calculation of the displacement <b>Table C7: Displacement</b> <b>Size</b> <b>Characteristic displacemen</b> Displacement <sup>1)</sup>	$\frac{\delta_{N\infty}}{r}$ each temp ent: $\delta_{N0} = \delta_{r}$ under sl t in uncra	[mm] perature ran no-factor · N hear load cked C200 [mm]	0,82 nge and ca N; δ <sub>N</sub> = δ <sub>N∞</sub> d in unc M8 /25 to C50 2,5	0,82 tegories sp factor · N; racked ( M10 0/60 concr 2,5	0,82 pecified in <i>A</i> (N – applie concrete M12 rete 2,5	0,82 Annex B1 ed tension M16 2,5	0,82 load) M20 2,5	0,82 M24 2,5	0,82 M27 2,5	0,82 M30
<ul> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Table C7: Displacement</b></li> <li><b>Size</b></li> <li><b>Characteristic displacemen</b></li> <li>Displacement <sup>1)</sup></li> <li><sup>1)</sup> These values are suitable for</li> </ul>	$\frac{\delta_{N\infty}}{r}$ r each temp ent: $\delta_{N0} = \delta_{r}$ under sl t in uncra $\delta_{V0}$ $\delta_{V\infty}$ r each temp	[mm] perature ran no-factor · N hear loan cked C20, [mm] [mm] perature ran	0,82 nge and ca $N; \delta_N = \delta_{N=1}$ d in unc M8 /25 to C50 2,5 3,7 nge and ca	0,82 ategories sy -factor · N; racked ( M10 0/60 conci 2,5 3,7 ategories sy	0,82 pecified in / (N – applie concrete M12 rete 2,5 3,7 pecified in /	0,82 Annex B1 ed tension M16 2,5 3,7 Annex B1	0,82 load) M20 2,5 3,7	0,82 M24	0,82 M27	0,82
<ul> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Table C7: Displacement</b></li> <li><b>Size</b></li> <li><b>Characteristic displacemen</b></li> <li>Displacement <sup>1)</sup></li> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> </ul>	$\begin{array}{c} \delta_{N \circ \circ} \\ r \text{ each tempent: } \delta_{N \circ} = \delta_{r} \\ \textbf{under sl} \\ \textbf{t in uncras} \\ \delta_{V \circ} \\ \delta_{V \circ} \\ r \text{ each tempent: } \delta_{N \circ} = \delta_{r} \end{array}$	[mm] perature ran near loan cked C20, [mm] [mm] perature ran no-factor - \	0,82 nge and ca $N; \delta_N = \delta_{N=0}$ d in unc M8 /25 to C50 2,5 3,7 nge and ca /; $\delta_N = \delta_{N=0}$	0,82 tegories sp factor · N; racked ( M10 0/60 concr 2,5 3,7 tegories sp factor · V;	0,82 pecified in / (N – applie concrete M12 rete 2,5 3,7 pecified in / (V – applie	0,82 Annex B1 ed tension M16 2,5 3,7 Annex B1	0,82 load) M20 2,5 3,7	0,82 M24 2,5	0,82 M27 2,5	0,82 M30
<ul> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Table C7: Displacement</b></li> <li><b>Size</b></li> <li><b>Characteristic displacemen</b></li> <li>Displacement <sup>1)</sup></li> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Table C8: Displacement</b></li> </ul>	$\begin{array}{c} \delta_{N \circ \circ} \\ r \text{ each tempent: } \delta_{N \circ} = \delta_{r} \\ \textbf{under sl} \\ \textbf{t in uncras} \\ \delta_{V \circ} \\ \delta_{V \circ} \\ r \text{ each tempent: } \delta_{N \circ} = \delta_{r} \end{array}$	[mm] perature ran near loan cked C20, [mm] [mm] perature ran no-factor - \	0,82 nge and ca $N; \delta_N = \delta_{N=0}$ d in unc M8 /25 to C50 2,5 3,7 nge and ca /; $\delta_N = \delta_{N=0}$	0,82 tegories sp factor · N; racked ( M10 0/60 concr 2,5 3,7 tegories sp factor · V;	0,82 pecified in / (N – applie concrete M12 rete 2,5 3,7 pecified in / (V – applie oncrete	0,82 Annex B1 ed tension M16 2,5 3,7 Annex B1 ed shear los	0,82 load) 2,5 3,7 ad)	0,82 M24 2,5	0,82 M27 2,5	0,82 M30
<ul> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Cable C7: Displacement</b></li> <li><b>Size</b></li> <li><b>Characteristic displacemen</b></li> <li>Displacement <sup>1)</sup></li> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Calculation of the displacement</b></li> <li><b>Calculation of the displacement</b></li> <li><b>Size</b></li> </ul>	$\frac{\delta_{Nee}}{\delta_{N0}}$ r each temp ent: $\delta_{N0} = \delta_{P}$ under sl t in uncration $\frac{\delta_{V0}}{\delta_{Vee}}$ r each temp ent: $\delta_{N0} = \delta_{P}$ under te	[mm] perature ran near load cked C20, [mm] [mm] [mm] perature ran no-factor - \ ension lo	0,82 nge and ca $N; \delta_N = \delta_{N extrm{}}$ d in unc M8 /25 to C50 2,5 3,7 nge and ca /; $\delta_N = \delta_{N extrm{}}$ bad in cr M12	0,82 tegories sy factor · N; racked c M10 0/60 concr 2,5 3,7 tegories sy factor · V; acked c M16	0,82 Decified in / (N – applie concrete M12 rete 2,5 3,7 Decified in / (V – applie oncrete M2	0,82 Annex B1 ed tension M16 2,5 3,7 Annex B1 ed shear los	0,82 load) M20 2,5 3,7	0,82 M24 2,5	0,82 M27 2,5	0,82 M30
<ul> <li><sup>1)</sup> These values are suitable for Calculation of the displacement</li> <li><b>Table C7: Displacement</b></li> <li><b>Size</b></li> <li><b>Characteristic displacemen</b></li> <li>Displacement <sup>1)</sup></li> <li><sup>1)</sup> These values are suitable for</li> </ul>	$\frac{\delta_{Nee}}{\delta_{N0}}$ r each temp ent: $\delta_{N0} = \delta_{P}$ under sl t in uncration $\frac{\delta_{V0}}{\delta_{Vee}}$ r each temp ent: $\delta_{N0} = \delta_{P}$ under te	[mm] perature ran near load cked C20, [mm] [mm] [mm] perature ran no-factor - \ ension lo	0,82 nge and ca $N; \delta_N = \delta_{N extrm{}}$ d in unc M8 /25 to C50 2,5 3,7 nge and ca /; $\delta_N = \delta_{N extrm{}}$ bad in cr M12	0,82 tegories sy factor · N; racked c M10 0/60 concr 2,5 3,7 tegories sy factor · V; acked c M16	0,82 Decified in / (N – applie concrete M12 rete 2,5 3,7 Decified in / (V – applie oncrete M2 e	0,82 Annex B1 ed tension M16 2,5 3,7 Annex B1 ed shear loa	0,82 load) 2,5 3,7 ad)	0,82 M24 2,5	0,82 M27 2,5	0,82 M30

# Table C9: Displacement under shear load in cracked concrete

Size			M12	M16	M20	M24	]
Characteristic displace	ement in crack	ed C20/25	to C50/60	concrete		S8 42	1
Displacement 1)	δνο	[mm]	2,5	2,5	2,5	2,5	
Displacement	δ <sub>V∞</sub>	[mm]	3,7	3,7	3,7	3,7	
Calculation of the displ	acement. o <sub>N0</sub> = o	NO-TACLOF · V	$; o_N = o_{N^{\infty}} - Ta$	actor $\cdot$ V; (V -	- applied she	ear load)	J
	TSC V	Spin In C	Capsules				Annex C5 of European