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Member of



## European Technical Assessment

**ETA-20/0822  
of 17/08/2021**

### General Part

**Technical Assessment Body issuing the European Technical Assessment**

Instytut Techniki Budowlanej

**Trade name of the construction product**

SMART S-TB7

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

Torque controlled expansion anchor for use in uncracked concrete

**Manufacturer**

pgb-Polska Sp. z o.o.  
ul. Fryderyka Wilhelma Redena 3  
41-807 Zabrze  
Poland

**Manufacturing plant**

Manufacturing plant no. 7

**This European Technical Assessment contains**

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

**This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of**

European Assessment Document EAD 330232-00-0601 "Mechanical fasteners for use in concrete"

**This version replaces**

ETA-20/0822 issued on 29/12/2020

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## Specific Part

### 1 Technical description of the product

The SMART S-TB7 anchor in the sizes M6, M8, M10, M12, M14, M16 and M20 is made of carbon steel. The anchor is placed into a drilled hole and anchored by torque-controlled expansion.

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 Annex C 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 producer or 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 tension load (static and quasi-static loading), displacements	Annex C1
Characteristic resistance to shear load (static and quasi-static loading), displacements	Annex C2

##### 3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	No performance assessed

#### 3.2 Methods used for the assessment

The assessment of the product has been made in accordance with the European Assessment Document EAD 330232-00-0601 "Mechanical fasteners for use in concrete".

### 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).

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

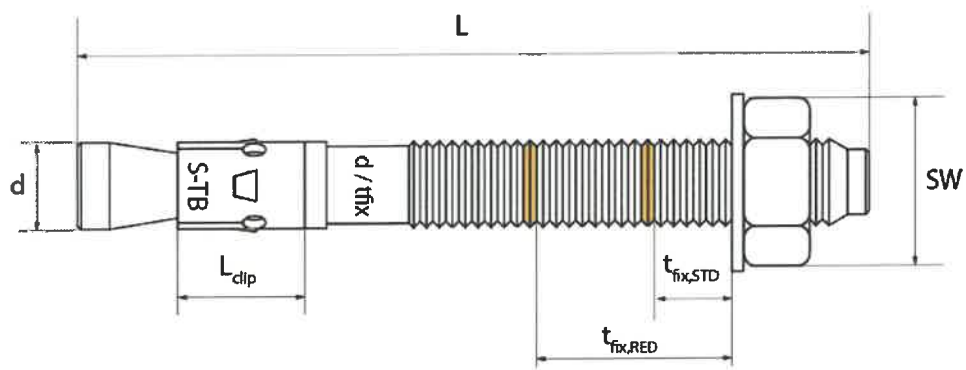
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

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 17/08/2021 by Instytut Techniki Budowlanej



Anna Panek, MSc  
Deputy Director of ITB



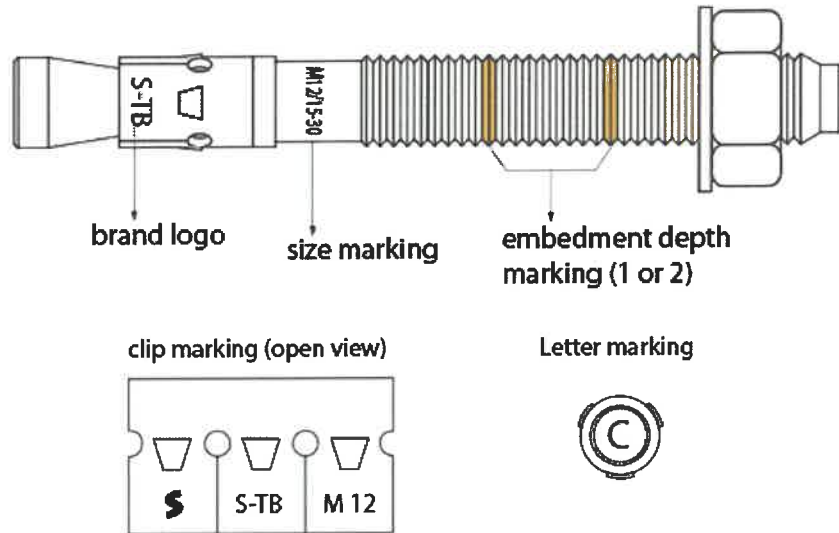
**Table A1: SMART S-TB7 anchor dimensions**

Anchor size		M6	M8	M10	M12	M14	M16	M20
Conical bolt diameter	$d = [mm]$	6	8	10	12	14	16	20
Clip length	$L_{clip} = [mm]$	10	12	15	18	21	24	28
Total length (minimum)	$L_{min} = [mm]$	48	51	65	81	87	97	123
Total length (maximum)	$L_{max} = [mm]$	450	450	450	450	450	450	450
Thickness of fixture with DIN 125 washer (standard)	$t_{fix,STD} \leq [mm]$	L - 58	L - 66	L - 75	L - 96	L - 107	L - 122	L - 148
Thickness of fixture with DIN 440 or DIN 9021 washer (standard)	$t_{fix,STD} \leq [mm]$	L - 58	L - 67	L - 76	L - 97	L - 108	L - 124	L - 150
Thickness of fixture with DIN 125 washer (reduced)	$t_{fix,RED} \leq [mm]$	L - 48	L - 51	L - 65	L - 81	L - 87	L - 97	L - 123
Thickness of fixture with DIN 440 or DIN 9021A washer (reduced)	$t_{fix,RED} \leq [mm]$	L - 48	L - 52	L - 66	L - 82	L - 88	L - 99	L - 125
Hexagonal nut	SW [mm]	10	13	17	19	22	24	30

**SMART S-TB7**

**Product description**  
Dimensions and marking

**Annex A1**  
of European  
Technical Assessment  
ETA-20/0822



Marking on anchor:

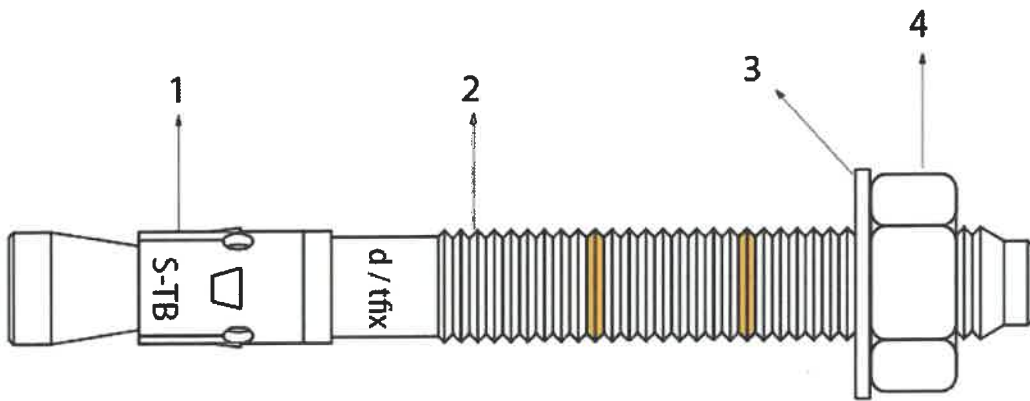
- expansion clip: brand logo / metric size (for example S / S-TB / M12)
- anchor body: metric size /  $t_{fix}$  standard -  $t_{fix}$  reduced (for example M12 / 15 - 30)
- coloured rings on thread to show embedment depth (standard and/or reduced)
- letter code marking (head marking) on bolt

**Table A2: SMART S-TB7 head marking**

Head Marking	a	b	c	d	e	f	A	B	C	D	E	F	G	H	I	J	
$t_{fix}$ max	< 5	5	10	15	20	25	5	10	15	20	25	30	35	40	45	50	
Total length $\geq$ (mm)	M6	48	53	58	-		63	73	78	83	88	93	98	103	108	113	
	M8	51	56	61	66	-		71	81	86	91	96	101	106	111	116	121
	M10	65	70	75	-		80	90	95	100	105	110	115	120	125	130	
	M12	81	86	91	96	-		101	111	116	121	126	131	136	141	146	151
	M14	87	92	97	102	107	-	112	122	127	132	137	142	147	152	157	162
	M16	97	102	107	112	117	122	127	137	142	147	152	157	162	167	172	177
	M20	123	128	133	138	143	148	153	163	168	173	178	183	188	193	198	203
Head Marking	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
$t_{fix}$ max	55	60	65	70	75	80	85	90	95	100	120	140	160	180	200	300	
Total length $\geq$ (mm)	M6	118	123	128	133	138	143	148	153	158	163	183	203	223	243	263	363
	M8	126	131	136	141	146	151	156	161	166	171	191	211	231	251	271	371
	M10	135	140	145	150	155	160	165	170	175	180	200	220	240	260	280	380
	M12	156	161	166	171	176	181	186	191	196	201	221	241	261	281	301	401
	M14	167	172	177	182	187	192	197	202	207	212	232	252	272	292	312	412
	M16	182	187	192	197	202	207	212	217	222	227	247	267	287	307	327	427
	M20	208	213	218	223	228	233	238	243	248	253	273	293	313	333	353	453

Remark : a-b-c-d-e-f are used for reduced embedment anchors only

<b>SMART S-TB7</b>	<b>Annex A1</b> of European Technical Assessment ETA-20/0822
<b>Product description</b> Dimensions and marking	



**Table A3: Materials**

Part	Designation	Material	Coating
1	Clip	carbon steel	Zinc plated $\geq 5 \mu\text{m}$ EN ISO 4042
2	Bolt	carbon steel $f_{uk} \geq 600 \text{ MPa}$ , $f_{yk} \geq 400 \text{ MPa}$	
3	Washer	carbon steel DIN 125 (EN ISO 7089) / DIN 9021A (EN ISO 7093) / DIN 440 (EN ISO 7094)	
4	Nut	EN ISO 898-2 carbon steel class 8 / DIN 934	

**SMART S-TB7**

**Product description**  
Materials

**Annex A2**  
of European  
Technical Assessment  
ETA-20/0822

**Specification of intended use**

**Anchorage subject to:**

- Static and quasi-static loads.

**Base material:**

- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at maximum according to EN 206.
- Uncracked concrete.

**Use conditions (environmental conditions):**

- Structures subject to dry internal conditions.

**Design:**

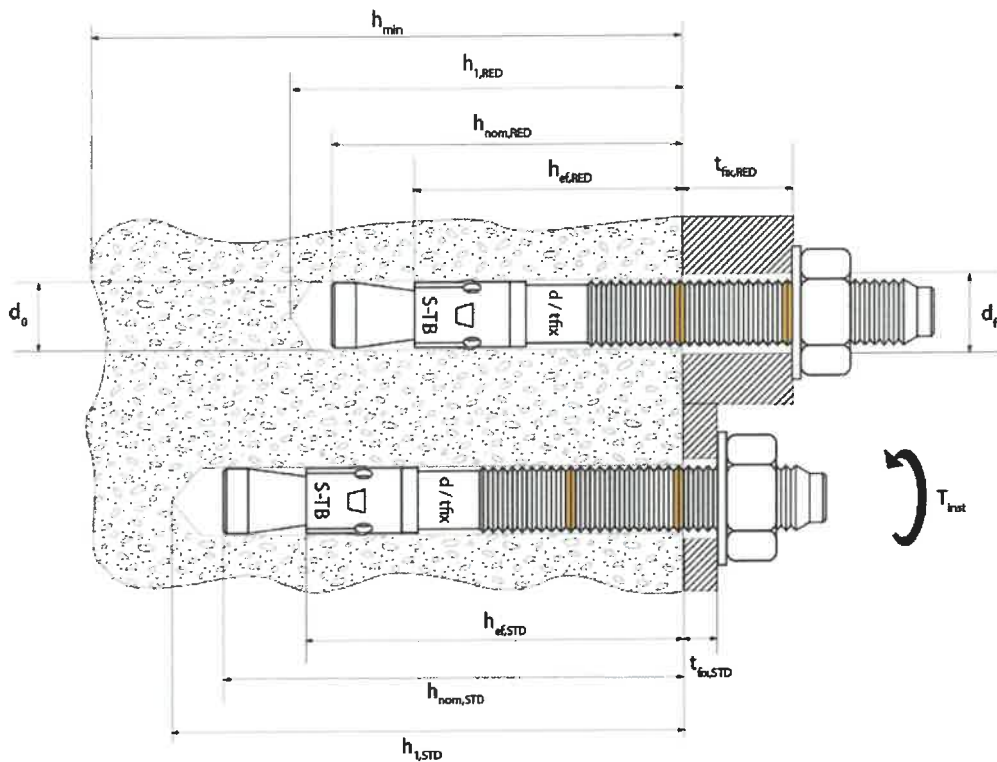
- The anchorages under static loads and quasi-static loads are designed in accordance with EN 1992-4:2018 and EOTA Technical Report TR 055, under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the anchor is indicated on the design drawings.
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.

**Installation of anchors:**

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the 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 range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.

<b>SMART S-TB7</b>	<b>Annex B1</b> of European Technical Assessment ETA-20/0822
<b>Intended use Specifications</b>	





**Table B1: Installation parameters**

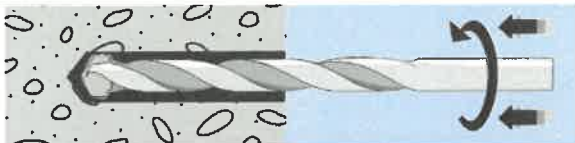

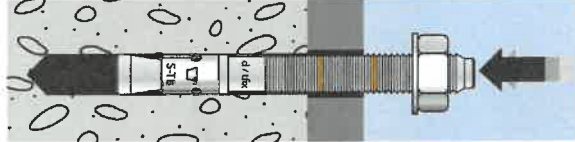
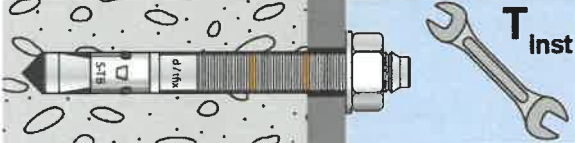
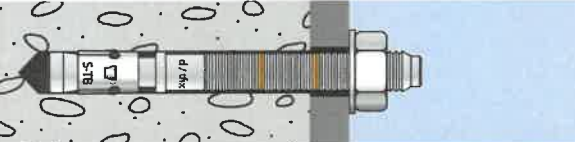
Anchor size		M6	M8	M10	M12	M14	M16	M20	
Nominal drill hole diameter	$d_o = [\text{mm}]$	6	8	10	12	14	16	20	
Diameter of clearance hole in the fixture	$d_f \leq [\text{mm}]$	8	10	12	14	16	18	22	
Installation torque	$T_{\text{inst}} = [\text{Nm}]$	6	15	30	50	80	100	200	
Standard embedment depth	Effective anchorage depth	$h_{\text{ef,STD}} = [\text{mm}]$	40	45	50	65	75	85	105
	Depth of drill hole	$h_{1,\text{STD}} \geq [\text{mm}]$	54	60	67	88	98	111	134
	Depth of embedment	$h_{\text{nom,STD}} \geq [\text{mm}]$	49	55	62	80	90	103	126
	Minimum thickness of member	$h_{\text{min,STD}} = [\text{mm}]$	100	100	100	130	150	170	210
	Minimum spacing	$s_{\text{min,STD}} = [\text{mm}]$	56	63	70	91	105	119	147
	Minimum edge distance	$c_{\text{min,STD}} = [\text{mm}]$	56	63	70	91	105	119	147
Reduced embedment depth	Effective anchorage depth	$h_{\text{ef,RED}} = [\text{mm}]$	30	30	40	50	55	60	80
	Depth of drill hole	$h_{1,\text{RED}} \geq [\text{mm}]$	44	45	57	73	78	86	109
	Depth of embedment	$h_{\text{nom,RED}} \geq [\text{mm}]$	39	40	52	65	70	78	101
	Minimum thickness of member	$h_{\text{min,RED}} = [\text{mm}]$	100	100	100	100	110	120	160
	Minimum spacing	$s_{\text{min,RED}} = [\text{mm}]$	42	42	56	70	77	84	112
	Minimum edge distance	$c_{\text{min,RED}} = [\text{mm}]$	42	42	56	70	77	84	112

**SMART S-TB7**

**Intended use**  
Installation parameters

**Annex B2**  
of European  
Technical Assessment  
ETA-20/0822

**Table B2: Installation instruction .**

STEP	PROCESS
	<p>Check if the base material is compacted and porosity insignificant</p> <p>Drill a perpendicular hole with the correct diameter using a rotary percussive machine</p>
	<p>Clean hole from dust and drill debris</p>
	<p>Introduce the anchor in the hole to the nominal embedment depth</p>
	<p>Apply the correct torque according to the instructions</p>
	<p>Anchor installed</p>

<p><b>SMART S-TB7</b></p>	<p><b>Annex B3</b> of European Technical Assessment ETA-20/0822</p>
<p><b>Intended use</b> Installation instruction</p>	

**Table C1: Design method A, characteristic values under tension loads**

Anchor size		M6	M8	M10	M12	M14	M16	M20
<b>Steel failure</b>								
Characteristic resistance	$N_{Rk,s}$ [kN]	7,9	15,3	25,1	35,6	57,0	67,9	113,2
Partial safety factor	$\gamma_{Ms}^{1)}$	1,8						
<b>Pull-out failure</b>								
Characteristic resistance in uncracked concrete C20/25 (standard depth)	$N_{Rk,p,STD}$ [kN]	7,6	12,9	..2)	..2)	..2)	..2)	..2)
Characteristic resistance in uncracked concrete C20/25 (reduced depth)	$N_{Rk,p,RED}$ [kN]	7,6	..2)	..2)	..2)	..2)	..2)	..2)
Installation safety factor	$\gamma_{inst}^{3)}$	1,0						
Increasing factor for concrete C30/37		1,0	1,06					
Increasing factor for concrete C40/50	$\psi_c$	1,0	1,11					
Increasing factor for concrete C50/60		1,0	1,16					
<b>Concrete cone failure and splitting failure</b>								
Effective anchorage depth (standard)	$h_{ef,STD}$ [mm]	40	45	50	65	75	85	105
Effective anchorage depth (reduced)	$h_{ef,RED}$ [mm]	30	30	40	50	55	60	80
Factor for uncracked concrete	$k_1^{3)}) = k_{ucr,N}^{3)}$	11,0						
Spacing (standard depth)	$s_{cr,N,STD}$ [mm]	$3 \times h_{ef}$						
Edge distance (standard depth)	$c_{cr,N,STD}$ [mm]	$1,5 \times h_{ef}$						
Spacing (reduced depth)	$s_{cr,N,RED}$ [mm]	$3 \times h_{ef}$						
Edge distance (reduced depth)	$c_{cr,N,RED}$ [mm]	$1,5 \times h_{ef}$						
Characteristic resistance for splitting (standard depth)	$N^0_{Rk,sp,STD}^{3)})$ [kN]	7,6	12,9	..2)	..2)	..2)	..2)	..2)
Characteristic resistance for splitting (reduced depth)	$N^0_{Rk,sp,RED}^{3)})$ [kN]	7,6	..2)	..2)	..2)	..2)	..2)	..2)
Spacing (standard depth)	$s_{cr,sp,STD}$ [mm]	200	225	250	325	375	425	525
Edge distance (standard depth)	$c_{cr,sp,STD}$ [mm]	100	113	125	163	188	213	263
Spacing (reduced depth)	$s_{cr,sp,RED}$ [mm]	150	150	200	250	275	300	400
Edge distance (reduced depth)	$c_{cr,sp,RED}$ [mm]	75	75	100	125	138	150	200
Installation safety factor	$\gamma_{inst}^{3)}$	1,0						
<sup>1)</sup> in the absence of other national regulations <sup>2)</sup> pull-out failure mode is not decisive <sup>3)</sup> parameter for design according to EN 1992-4:2018								

**SMART S-TB7****Performance**

Design method A, characteristic values under tension loads

**Annex C1**of European  
Technical Assessment  
ETA-20/0822

**Table C2: Displacements under tension loads**

Anchor size		M6	M8	M10	M12	M14	M16	M20
Tension load	N [kN]	3,6	6,1	8,9	13,8	12,3	20,2	29,1
Displacement	$\delta_{NO}$ [mm]	1,0	1,6	1,7	2,0	2,0	2,0	2,0
	$\delta_{N_{\infty}}$ [mm]	1,7	2,3	2,4	2,7	2,7	2,7	2,7

**SMART S-TB7**

**Performances**  
Design method A, characteristic values under tension loads,  
displacements

**Annex C1**  
of European  
Technical Assessment  
ETA-20/0822

**Table C3: Design method A, characteristic values under shear loads**

Anchor size		M6	M8	M10	M12	M14	M16	M20
<b>Steel failure without lever arm</b>								
Characteristic resistance	$V_{Rk,s}^{(2)}$ [kN]	6,0	11,0	17,4	25,3	30,2	47,1	73,5
Ductility factor	$k_T^{(2)}$	0,8						
Partial safety factor	$\gamma_{Ms}^{(1)}$	1,5						
<b>Steel failure with lever arm</b>								
Characteristic bending resistance	$M_{Rk,s}^{(2)}$ [Nm]	13,8	33,5	66,5	116,1	185,8	278,8	548,7
Partial safety factor	$\gamma_{Ms}^{(1)}$	1,5						
<b>Concrete pry-out failure</b>								
Concrete pry-out failure factor (standard)	$k_{8,STD}^{(2)}$	1,0	1,0	1,0	2,0	2,0	2,0	2,0
Concrete pry-out failure factor (reduced)	$k_{8,RED}^{(2)}$	1,0	1,0	1,0	1,0	1,0	2,0	2,0
Partial safety factor	$\gamma_{Mc}^{(1)}$	1,0						
<b>Concrete edge failure</b>								
Effective length of anchor under shear loading (standard depth)	$l_{f,STD}$ [mm]	40	45	50	65	75	85	105
Effective length of anchor under shear loading (reduced depth)	$l_{f,RED}$ [mm]	30	30	40	50	55	60	80
Effective diameter of anchor	$d_{nom}$ [mm]	6	8	10	12	14	16	20
Partial safety factor	$\gamma_{Mc}^{(1)}$	1,0						
<sup>1)</sup> in the absence of other national regulations								
<sup>2)</sup> parameter for design according to EN 1992-4:2018								

**Table C4: Displacements under shear loads**

Anchor size		M6	M8	M10	M12	M14	M16	M20
Shear load	V [kN]	5,6	6,7	8,3	12,5	14,4	23,5	35,2
Displacement	$\delta_{v0}$ [mm]	1,3	1,6	1,8	2,0	2,0	2,0	2,9
	$\delta_{v\infty}$ [mm]	1,9	2,5	2,7	3,0	3,0	3,0	4,4

**SMART S-TB7**

**Performances**  
Design method A, characteristic values under shear loads,  
displacements

**Annex C2**  
of European  
Technical Assessment  
ETA-20/0822

