

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-23/0693**  
**of 19 December 2023**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

TOGE concrete screw TSM E

Product family  
to which the construction product belongs

Mechanical fasteners for use in concrete

Manufacturer

TOGE Dübel GmbH & Co. KG  
Illesheimer Straße 10  
90431 Nürnberg

Manufacturing plant

TOGE Dübel GmbH & Co. KG

This European Technical Assessment  
contains

16 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

330232-01-0601, Edition 05/2021

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## Specific Part

### 1 Technical description of the product

The TOGE concrete screw TSM E is an anchor of size 8 and 10 mm made of galvanized steel or steel with zinc flake coating. The anchor is screwed into a predrilled cylindrical drill 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.

Product and product description are given in Annex A.

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

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B4, C1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 and C2
Displacements (static and quasi-static loading)	See Annex C4
Characteristic resistance for seismic performance categorie C1	No performance assessed
Characteristic resistance and displacements for seismic performance categorie C2	No performance assessed

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

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C3

#### 3.3 Aspects of durability linked with the Basic Works Requirements

Essential characteristic	Performance
Durability	See Annex B1

English translation prepared by DIBt

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

In accordance with European Assessment Document EAD No. 330232-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

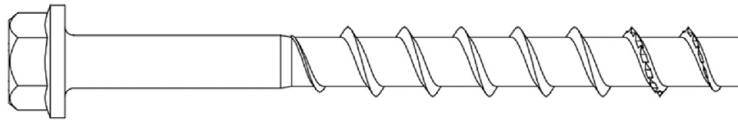
Issued in Berlin on 19 December 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock  
Head of Section

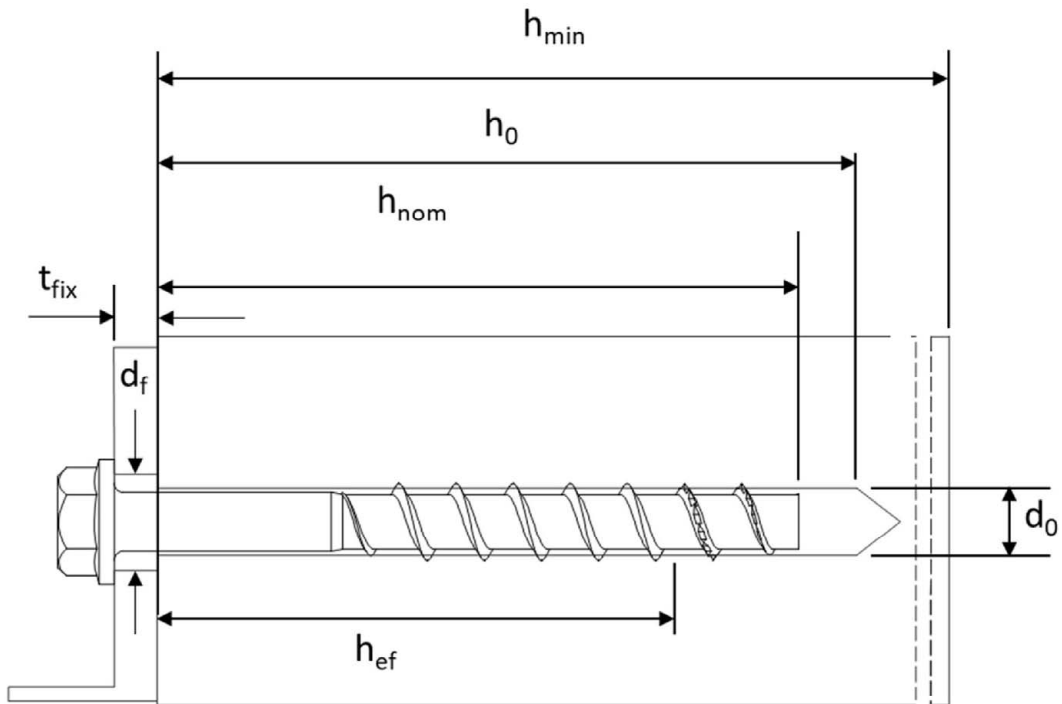
*beglaubigt:*  
Tempel

## Product in installed condition

### TOGE concrete screw TSM E



e.g. TOGE concrete screw with hexagon head and fixture



$d_0$  = nominal diameter of drill hole  
 $t_{fix}$  = thickness of fixture  
 $d_f$  = diameter of clearance hole

$h_{min}$  = minimum thickness of member  
 $h_{nom}$  = nominal embedment depth  
 $h_0$  = depth of drill hole  
 $h_{ef}$  = effective embedment depth

TOGE concrete screw TSM E

**Product description**  
Product in installed condition

**Annex A1**





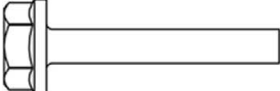

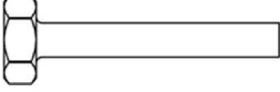



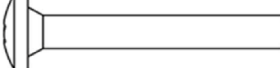

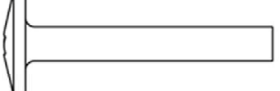





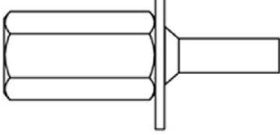

		Version with metric connection thread and hexagon drive e.g. TSM 8x105 M10 SW7; Type ST
		Version with washer and hexagon head e.g. TSM 8x80 SW13 VZ 40; Type S
		Version with washer, hexagon head and TORX drive e.g. TSM 8x80 SW13; Type S
		Version with hexagon head e.g. TSM 8x80 SW13 OS; Type S
		Version with countersunk head and TORX drive e.g. TSM 8x80 C VZ 40; Type SK
		Version with pan head and TORX drive e.g. TSM 8x80 P VZ 40; Type P
		Version with large pan head and TORX drive e.g. TSM 8x80 LP VZ 40; Type P
		Version with countersunk head and connection thread e.g. TSM 6x55 AG M8; Type ST-6
		Version with hexagon drive and connection thread e.g. TSM 6x55 M8 SW10; Type ST-6
		Version with internal thread and hexagon drive e.g. TSM 6x55 IM M8/10; Type I
<b>TOGE concrete screw TSM E</b>		<b>Annex A2</b>
<b>Product description</b> Screw types		

Table 1: Material

Part	Product name	Material		
all types	TSM E	-carbon Steel galvanized -carbon Steel with zinc flake coating -carbon steel with zinc flake duplex coating -carbon steel with zinc flake special coating TOGE KORR		
Part	Product name	Nominal characteristic steel		Rupture elongation $A_5$ [%]
		Yield strength $f_{yk}$ [N/mm <sup>2</sup> ]	Ultimate strength $f_{uk}$ [N/mm <sup>2</sup> ]	
all types	TSM E	560	700	≤ 8

Table 2: Dimensions

Anchor size			8			10		
Nominal embedment depth	$h_{nom}$		1	2	3	1	2	3
	[mm]		45	55	65	55	75	85
Screw length	≤ L	[mm]	500					
Core diameter	$d_k$	[mm]	7,2			9,2		
Thread outer diameter	$d_s$	[mm]	10,5			12,5		
Thickness of filling washer	$t_v$	[mm]	5			5		

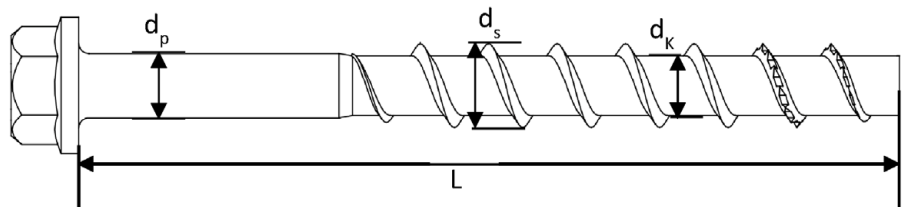
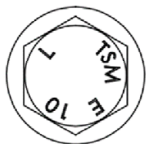
**Marking:**

**TSM E**

Screw type: TSM E

Screw size: 10

Screw length: 100



**TOGE concrete screw TSM E**

**Product description**  
Material, dimensions and markings

**Annex A3**

## Specification of Intended use

### Anchorage subject to:

- Static or quasi-static loading
- Fire exposure

### Base materials:

- Compacted reinforced and unreinforced concrete without fibers according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked and uncracked concrete.

### Use conditions (Environmental conditions):

- Concrete structures subject to dry internal conditions

### Design:

- Anchorages are to be designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are to be 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.).
- Anchorages are designed for static or quasi-static actions according to EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018.
- The design for shear load according to EN 1992-4:2018, Section 6.2.2 applies for all specified diameters  $d_f$  of clearance hole in the fixture in Annex B2, Table 3.

### Installation:

- Hammer drilling or hollow drilling.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- In case of aborted hole: new drilling must be drilled at a minimum distance of twice the depth of aborted hole or closer, if the aborted hole is filled with high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- After installation further turning of the anchor must not be possible. The head of the anchor is supported in the fixture and is not damaged.
- The borehole may be filled with injection mortar CF-T 300V or ATA 2004C.
- Adjustability according to Annex B5
- Cleaning of borehole is not necessary, if using a hollow drill.

TOGE concrete screw TSM E

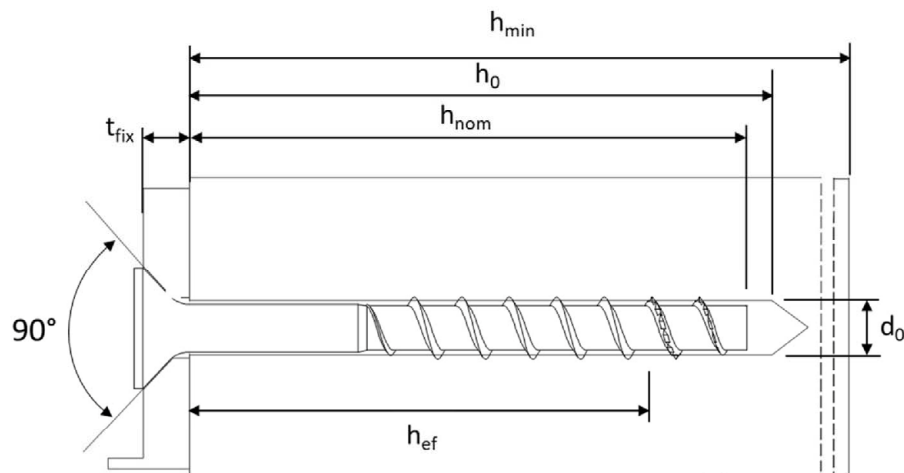
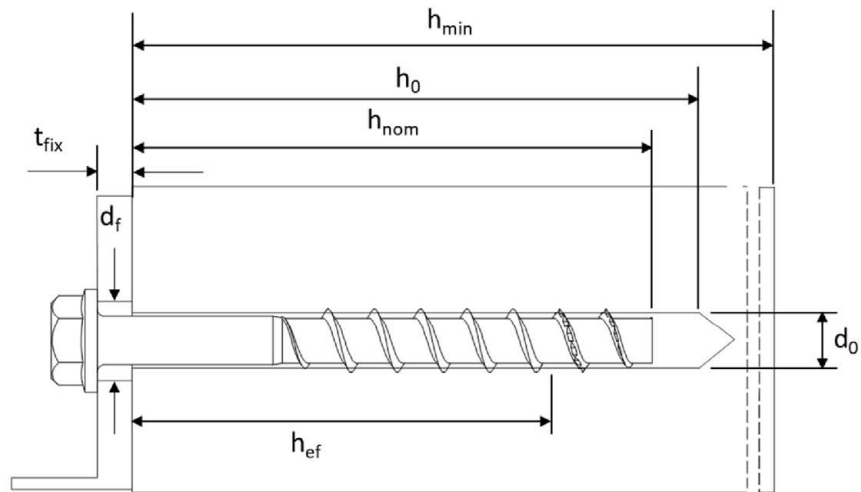
Intended use  
Specification

Annex B1



Table 3: Installation parameters

TSM concrete screw size		8			10		
Nominal embedment depth	$h_{nom}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$
	[mm]	45	55	65	55	75	85
Nominal drill hole diameter	$d_0$	8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	8,45			10,45		
Depth of drill hole	$h_0 \geq$	55	65	75	65	85	95
Clearance hole diameter	$d_f \leq$	12			14		
Installation torque (version with metrical connection thread)	$T_{inst}$	20			40		
Torque impact screw driver	[-]	Max. torque according to manufacturer's instructions					
		300			450		



TOGE concrete screw TSM E

Intended use  
Installation parameters

Annex B2

Table 4: Minimum thickness of member, minimum edge distance and minimum spacing

TSM concrete screw size			8			10		
Nominal embedment depth	$h_{nom}$		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$
	[mm]		45	55	65	55	75	85
Minimum thickness of member	$h_{min}$	[mm]	80	100	120	100	130	130
Minimum edge distance	$c_{min}$	[mm]	35	35	35	40	40	40
Minimum spacing	$s_{min}$	[mm]	35	35	35	40	40	40

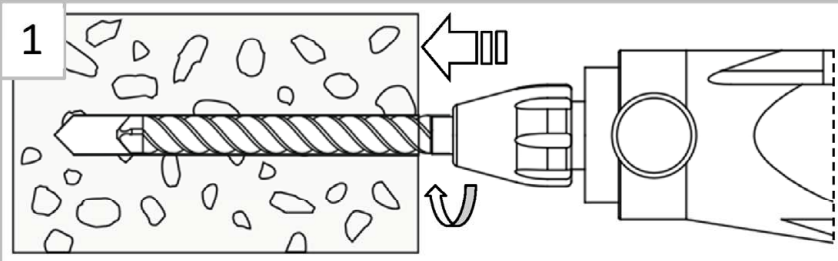
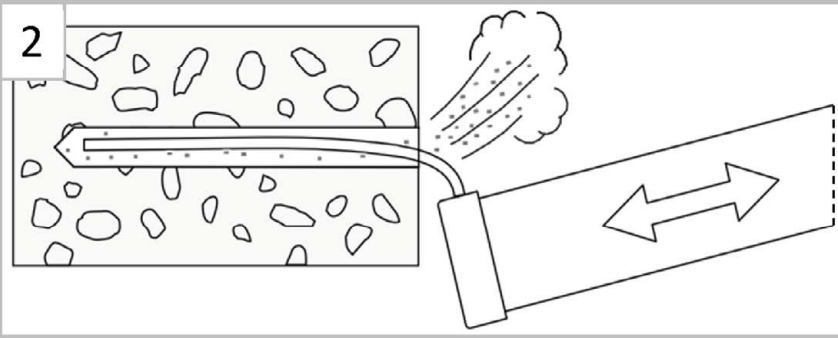
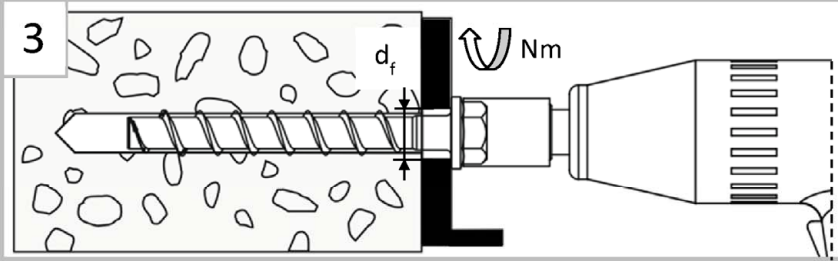
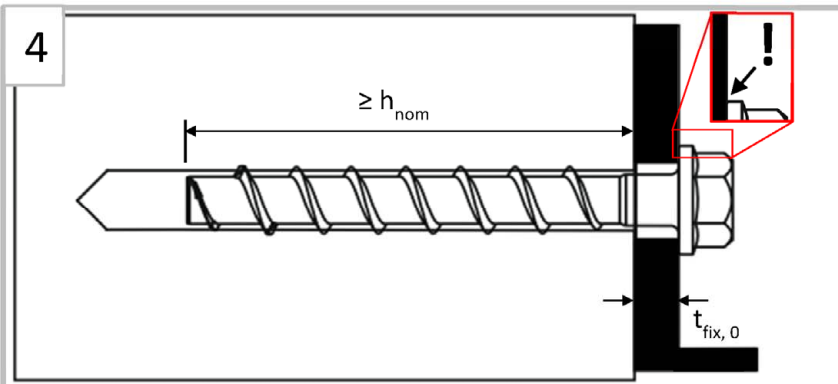
**TOGE concrete screw TSM E**

**Intended use**

Minimum thickness of member, minimum edge distance and minimum spacing

**Annex B3**

## Installation Instructions

<p>1</p> 	<p>Create hammer drilled or hollow drilled borehole</p>
<p>2</p> 	<p>Remove drill dust by vacuuming or blowing of</p>
<p>3</p> 	<p>Install with torque impact screw driver or torque wrench</p>
<p>4</p> 	<p>The head must be undamaged and in contact with the fixture</p>

Note:

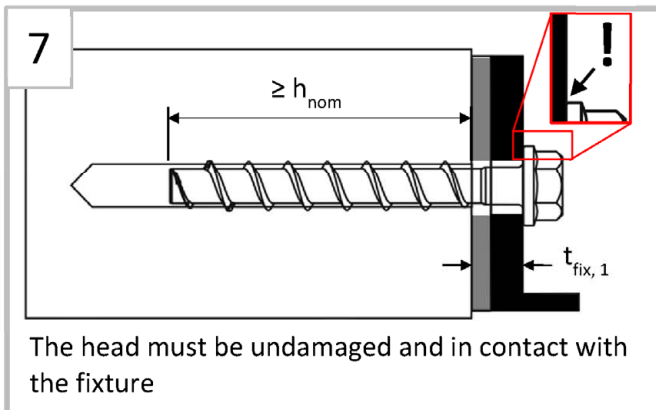
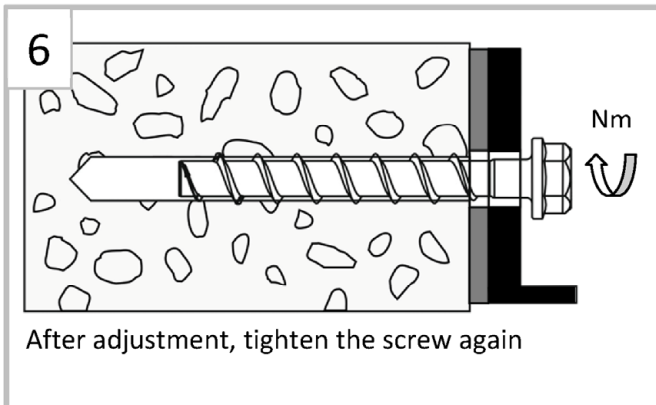
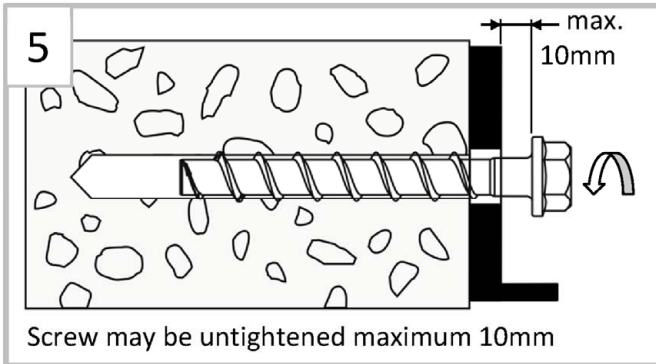
Cleaning of borehole is not necessary when using a hollow drill

TOGE concrete screw TSM E

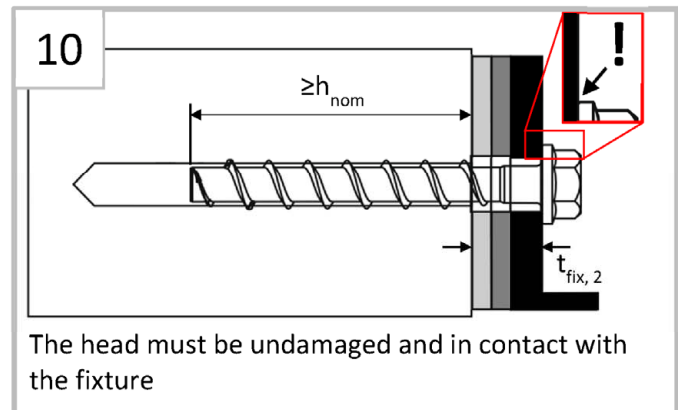
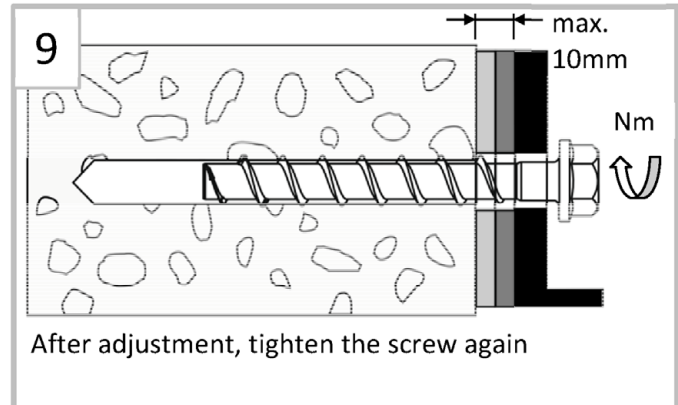
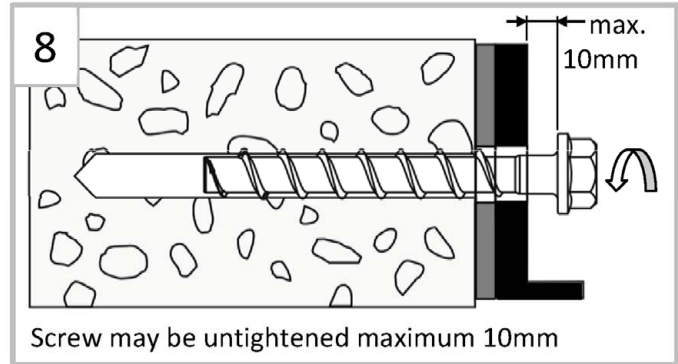
Intended use  
Installation instructions

Annex B4

1. Adjustment



2. Adjustment



Note:

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

TOGE concrete screw TSM E

Intended use  
Installation instructions - Adjustment

Annex B5

Table 5: Characteristic values for static and quasi-static loading

TSM concrete screw size		8				10		
Nominal embedment depth	$h_{nom}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	
	[mm]	45	55	65	55	75	85	
<b>Steel failure for tension and shear loading</b>								
Characteristic resistance	$N_{Rk,s}$ [kN]	27,0			45,0			
Partial factor	$\gamma_{Ms,N}$ [-]	1,5						
Characteristic resistance	$V^0_{Rk,s}$ [kN]	13,5	17,0	22,5	34,0			
Partial factor	$\gamma_{Ms,V}$ [-]	1,25						
Ductility factor	$k_7$ [-]	0,8						
Characteristic bending moment	$M^0_{Rk,s}$ [Nm]	26,0			56,0			
<b>Pull-out failure in uncracked concrete</b>								
Characteristic resistance to tension load in C20/25	$N_{Rk,p}$ [kN]	9,0	12,0	17,0	11,0	19,0	25,0	
Increasing factor for $N_{Rk,p} = N_{Rk,p(C20/25)} \cdot \psi_c$ with $\psi_c = \left(\frac{f_{ck}}{20}\right)^m$	C25/30	m	[-]	0,41	0,33	0,5	0,39	
	C30/37							
	C40/50							
	C50/60							
<b>Pull-out failure in cracked concrete</b>								
Characteristic resistance to tension load in C20/25	$N_{Rk,p}$ [kN]	3,0	5,5	8,0	6,0	13,0	17,0	
Increasing factor for $N_{Rk,p} = N_{Rk,p(C20/25)} \cdot \psi_c$ with $\psi_c = \left(\frac{f_{ck}}{20}\right)^m$	C25/30	m	[-]	0,49	0,39	0,42	0,27	
	C30/37							
	C40/50							
	C50/60							
Installation factor	$\gamma_{inst}$ [-]	1,0						
<b>TOGE concrete screw TSM E</b>							<b>Annex C1</b>	
<b>Performances</b> Characteristic values for static and quasi-static loading								

Table 6: Characteristic values for static and quasi-static loading continuation

TSM concrete screw size			8			10			
Nominal embedment depth	$h_{nom}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$		
	[mm]	45	55	65	55	75	85		
<b>Concrete failure: concrete cone failure and splitting failure</b>									
Effective embedment depth	$h_{ef}$	[mm]	35	44	52	43	60	69	
k-factor	cracked	$k_{cr}$	7,7						
	uncracked	$k_{ucr}$	11,0						
Concrete cone failure	spacing	$s_{cr,N}$	3 x $h_{ef}$						
	edge distance	$c_{cr,N}$	1,5 x $h_{ef}$						
Splitting failure case 1	resistance	$N_{Rk,sp}^0$	[kN]	9,0	12,0	17,0	11,0	19,0	25,0
	spacing	$s_{cr,sp}$	[mm]	200	240	290	230	280	320
	edge distance	$c_{cr,sp}$	[mm]	100	120	145	115	140	160
Splitting failure case 2	resistance	$N_{Rk,sp}^0$	[kN]	5,5	8,0	11,0	7,0	15,0	20,0
	spacing	$s_{cr,sp}$	[mm]	128	164	196	160	224	260
	edge distance	$c_{cr,sp}$	[mm]	64	82	98	80	114	130
Installation factor	$\gamma_{inst}$	[-]	1,0						
<b>Pry-out failure</b>									
Factor for pry-out failure	$k_8$	[-]	2,1	2,8			2,5		
Installation factor	$\gamma_{inst}$	[-]	1,0						
<b>Concrete edge failure</b>									
Effective length in concrete	$l_f$	[mm]	45	55	65	55	75	85	
Nominal outer diameter of screw	$d_{nom}$	[mm]	8			10			
<b>TOGE concrete screw TSM E</b>							<b>Annex C2</b>		
<b>Performances</b> Characteristic values for static and quasi-static loading continuation									

Table 7: Fire exposure – characteristic values of resistance

TSM concrete screw size				8			10		
Nominal embedment depth		$h_{nom}$	1	2	3	1	2	3	
		[mm]	45	55	65	55	75	85	
Steel failure for tension and shear load									
Characteristic Resistance	R30	$N_{Rk,s,fi30}$	[kN]	2,4			4,4		
	R60	$N_{Rk,s,fi60}$	[kN]	1,7			3,3		
	R90	$N_{Rk,s,fi90}$	[kN]	1,1			2,3		
	R120	$N_{Rk,s,fi120}$	[kN]	0,7			1,7		
	R30	$V_{Rk,s,fi30}$	[kN]	2,4			4,4		
	R60	$V_{Rk,s,fi60}$	[kN]	1,7			3,3		
	R90	$V_{Rk,s,fi90}$	[kN]	1,1			2,3		
	R120	$V_{Rk,s,fi120}$	[kN]	0,7			1,7		
	R30	$M^0_{Rk,s,fi30}$	[Nm]	2,4			5,9		
	R60	$M^0_{Rk,s,fi60}$	[Nm]	1,8			4,5		
	R90	$M^0_{Rk,s,fi90}$	[Nm]	1,2			3,0		
	R120	$M^0_{Rk,s,fi120}$	[Nm]	0,9			2,3		
Pull-out failure									
Characteristic Resistance	R30-90	$N_{Rk,p,fi}$	[kN]	0,8	1,4	2,0	1,5	3,3	4,3
	R120	$N_{Rk,p,fi}$	[kN]	0,6	1,1	1,6	1,2	2,6	3,4
Concrete cone failure									
Characteristic Resistance	R30-90	$N^0_{Rk,c,fi}$	[kN]	1,0	1,9	2,9	1,7	4,2	5,9
	R120	$N^0_{Rk,c,fi}$	[kN]	0,8	1,5	2,3	1,4	3,4	4,7
Edge distance									
R30 - R120		$C_{cr,fi}$	[mm]	$2 \times h_{ef}$					
In case of fire attack from more than one side, the minimum edge distance shall be $\geq 300$ mm.									
Spacing									
R30 - R120		$S_{cr,fi}$	[mm]	$4 \times h_{ef}$					
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.									
TOGE concrete screw TSM E								Annex C3	
Performances Fire exposure – characteristic values of resistance									

Table 8: Displacements under static and quasi-static tension load

TSM concrete screw size				8			10		
Nominal embedment depth			$h_{nom}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$
			[mm]	45	55	65	55	75	85
Cracked concrete	tension load	N	[kN]	1,63	2,74	4,06	3,04	6,22	8,46
	displacement	$\delta_{N0}$	[mm]	0,27	0,53	0,45	0,26	0,58	0,61
		$\delta_{N\infty}$	[mm]	0,49	0,66	0,61	0,69	0,92	1,1
Uncracked concrete	tension load	N	[kN]	4,24	5,97	8,03	5,42	9,17	12,28
	displacement	$\delta_{N0}$	[mm]	0,33	0,49	0,58	0,84	0,62	0,79
		$\delta_{N\infty}$	[mm]	0,58			0,79		

Table 9: Displacements under static and quasi-static shear load

TSM concrete screw size				8			10		
Nominal embedment depth			$h_{nom}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_{nom1}$	$h_{nom2}$	$h_{nom3}$
			[mm]	45	55	65	55	75	85
Cracked and uncracked concrete	shear load	V	[kN]	8,6			16,2		
	displacement	$\delta_{V0}$	[mm]	2,7			2,7		
		$\delta_{V\infty}$	[mm]	4,1			4,3		

TOGE concrete screw TSM E

**Performances**  
Displacements under static and quasi-static loads

**Annex C4**