

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0055
of 19 November 2021

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 L 6

Product family
to which the construction product belongs

Fasteners for use in concrete for redundant non-structural
systems

Manufacturer

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

Manufacturing plant

TOGE Dübel GmbH & Co. KG

This European Technical Assessment
contains

12 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

EAD 330747-00-0601, Edition 06/2018

This version replaces

ETA-15/0055 issued on 10 February 2016

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Specific Part

1 Technical description of the product

The TOGE concrete screw TSM L in size of 6 mm is an anchor made of galvanized steel respectively steel with zinc flake coating, made of stainless or high corrosion resistant steel. 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.

The product description is 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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 2

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C 1
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1
Durability	See Annex B 1

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. 330747-00-0601, the applicable European legal act is: [97/161/EC].

The system to be applied is: 2+

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 November 2021 by Deutsches Institut für Bautechnik

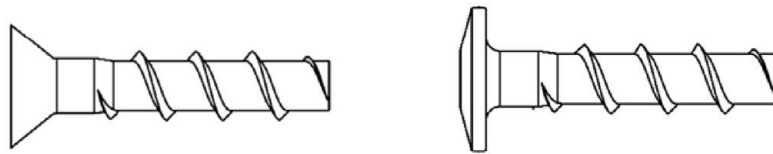
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Tempel

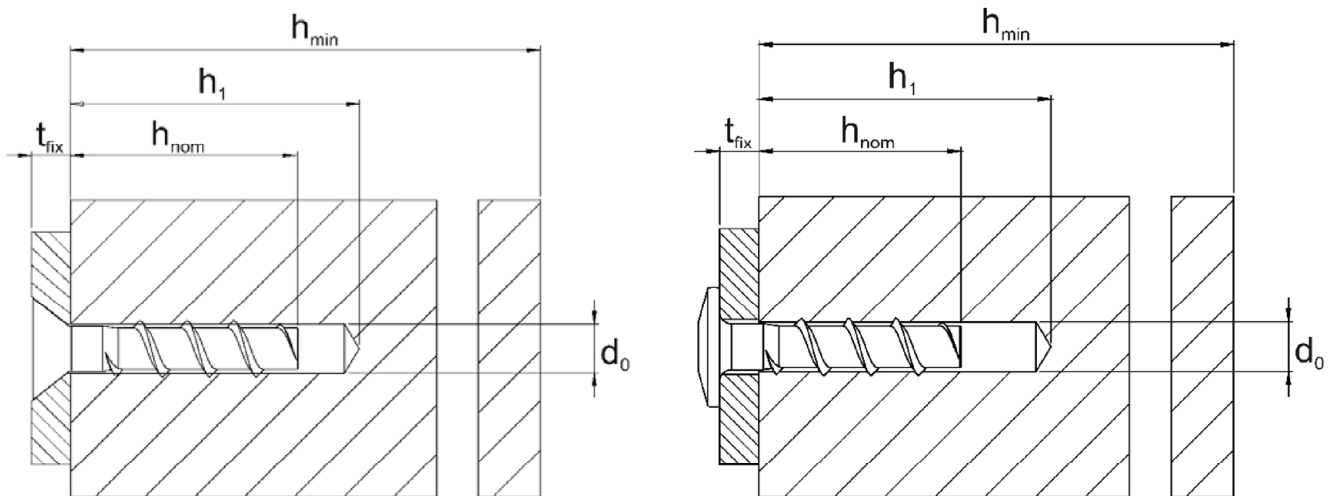
Product in installed condition

TOGE concrete screw TSM L

- Galvanized carbon steel
- Zinc flakes coated carbon steel
- Stainless steel A4
- Stainless steel HCR



e.g. TOGE concrete screw TSM L, configuration with countersunk head and TORX drive



d_0 = nominal drill hole diameter
 t_{fix} = thickness of fixture
 h_1 = drill hole depth

h_{min} = minimum thickness of member
 h_{nom} = nominal embedment depth

TOGE concrete screw TSM L

Product description
Product in installed condition

Annex A1

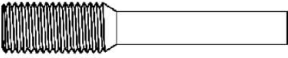



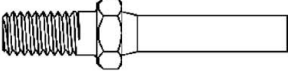

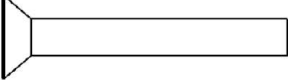

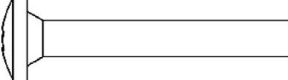

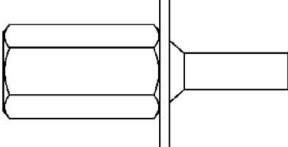
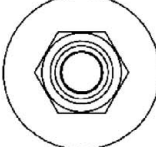
		Configuration with metric connection thread and TORX drive e.g. TSM L 6x30 M10 SW5
		Configuration with countersunk head and metric connection thread e.g. TSM L 6x30 AG M8
		Configuration with hexagon drive and metric connection thread e.g. TSM L 6x30 M8 SW10
		Configuration with countersunk head and TORX drive e.g. TSM L 6x30 C VZ 40
		Configuration with pan head and TORX drive e.g. TSM L 6x30 P VZ 40
		Configuration with internal thread and hexagon drive e.g. TSM L 6x30 IM M8/10

Table 1: Material

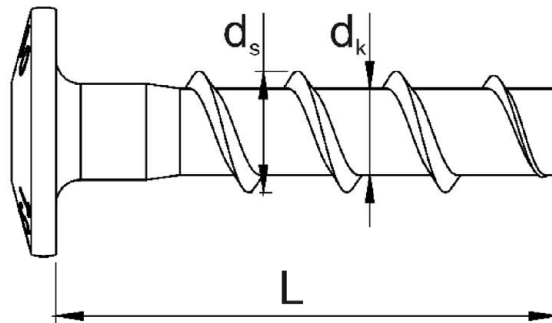
Part	Product name	Material
all types	TSM L	- Steel EN 10263-4:2017 galvanized acc. to EN ISO 4042:2018 - Zinc flake coating according to EN ISO 10683:2018 ($\geq 5\mu\text{m}$)
	TSM L A4	1.4401; 1.4404; 1.4571; 1.4578
	TSM L HCR	1.4529

Part	Product name	Nominal characteristic steel		Rupture elongation A_5 [%]
		Yield strength f_{yk} [N/mm ²]	Ultimate strength f_{uk} [N/mm ²]	
all types	TSM L	400	600	≤ 8
	TSM L A4			
	TSM L HCR			

TOGE concrete screw TSM L	Annex A2
Product description Screw types and material	

Table 2: Dimensions

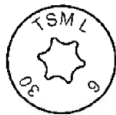
Anchor size			6
Screw length	$L \geq$	[mm]	26
Thread outer diameter	d_s	[mm]	7,0
Core diameter	d_k	[mm]	5,4



Marking:

TSM L

Screw type: TSM L
Screw size: 6
Screw length: 30



TSM L A4

Screw type: TSM L
Screw size: 6
Screw length: 30
Material: A4



TSM L HCR

Screw type: TSM L
Screw size: 6
Screw length: 30
Material: HCR



TOGE concrete screw TSM L

Product description
Dimensions and markings

Annex A3

Specification of Intended use

Anchorage subject to:

- Static and quasi-static loads.
- Used only for anchorages with requirements related to resistance of fire.
- Used only for multiple use for non-structural application according to EN 1992-4:2018.

Base materials:

- Compacted reinforced and compacted 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 screws subject to dry internal conditions: all screw types with h_{nom1} and h_{nom2}
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition no particular aggressive conditions exists:
nominal embedment depth h_{nom2} , screw types made of stainless steel with marking A4.
Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition if particular aggressive conditions exists:
nominal embedment depth h_{nom2} screw types made of stainless steel with marking HCR.

Note: Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

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 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:

- Only hammer 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.

TOGE concrete screw TSM L

**Intended use
Specification**

Annex B1

Table 3: Installation parameters

Toge concrete screw TSM L			6	
Nominal embedment depth	h_{nom}		$h_{nom1}^{1)}$	h_{nom2}
	[mm]		25	35
Nominal drill hole diameter	d_0	[mm]	6,0	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,35	
Drill hole depth	$h_1 \geq$	[mm]	28	38
Clearance hole diameter	$d_f \leq$	[mm]	8	
Installation torque (version with connection thread)	T_{inst}	[Nm]	10	

¹⁾ only subject to dry internal conditions

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

TSM concrete screw TSM L			6	
Nominal embedment depth	h_{nom}		$h_{nom1}^{1)}$	h_{nom2}
	[mm]		25	35
Minimum thickness of member	h_{min}	[mm]	80	
Minimum edge distance	c_{min}	[mm]	30	
Minimum spacing	s_{min}	[mm]	30	

¹⁾ only subject to dry internal conditions

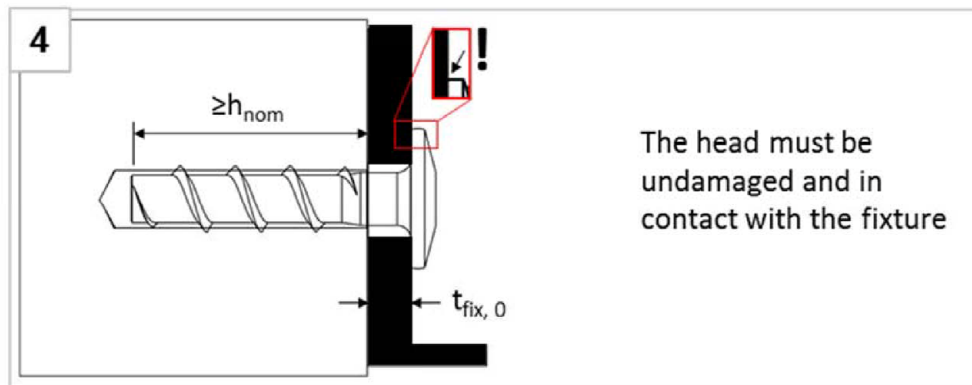
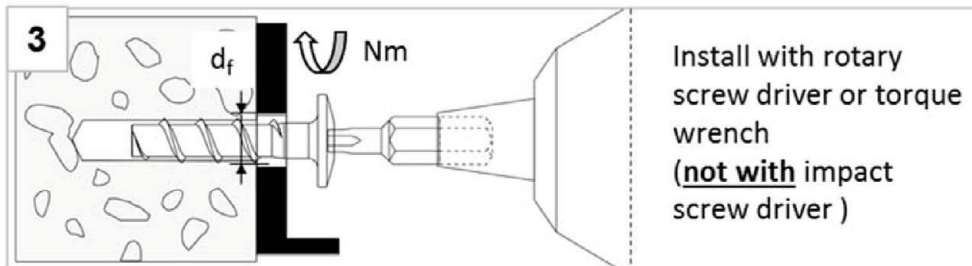
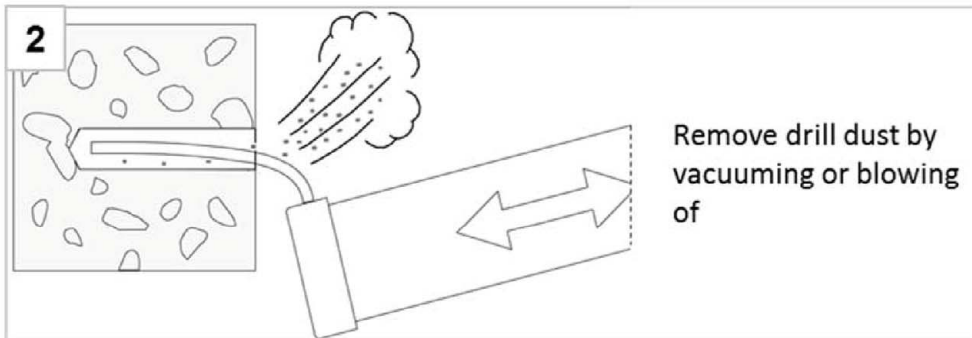
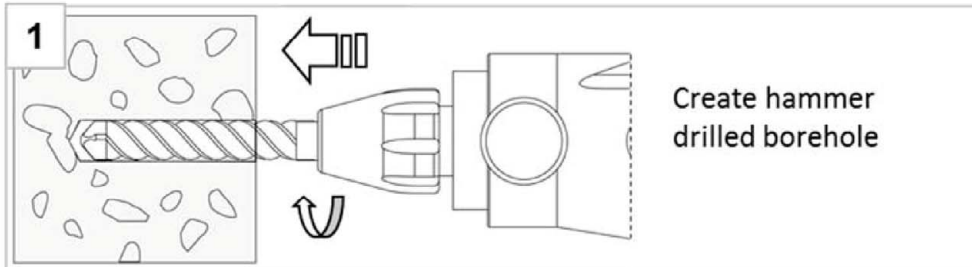
TOGE concrete screw TSM L

Intended use

Installation parameters
Minimum thickness of member, minimum edge distance and minimum spacing

Annex B2

Installation Instructions



The use of impact screw driver is not allowed.
The anchor is correctly installed if the head is supported on the fixture.
Further turning of the anchor is not possible.

TOGE concrete screw TSM L

Intended use
Installation instructions

Annex B3

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

TSM concrete screw TSM L				6	
Nominal embedment depth	h_{nom}	$h_{nom1}^{1)}$		h_{nom2}	
	[mm]	25		35	
Steel failure for tension and shear loading					
Characteristic tension load	$N_{RK,s}$	[kN]		13,7	
Partial factor	$\gamma_{Ms,N}$	[-]		1,5	
Characteristic shear load	$V_{RK,s}$	[kN]		6,9	
Partial factor	$\gamma_{Ms,V}$	[-]		1,25	
Ductility factor	k_7	[-]		0,8	
Characteristic bending load	$M^0_{RK,s}$	[Nm]		11,1	
Pull-out failure					
Characteristic tension load C20/25	cracked	$N_{RK,p}$	[kN]	0,9	2,0
	uncracked	$N_{RK,p}$	[kN]	2,0	4,0
Increasing factor Ψ_c for $N_{RK,p}$ $= N_{RK,p} (C20/25) \cdot \Psi_c$	C25/30	Ψ_c	[-]	1,12	
	C30/37			1,22	
	C40/50			1,41	
	C50/60			1,58	
Concrete failure: Splitting failure, concrete cone failure and pry-out failure					
Effective embedment depth	h_{ef}	[mm]	19	27	
k-factor	cracked	k_{cr}	[-]	7,7	
	uncracked	k_{ucr}	[-]	11,0	
Concrete cone failure	spacing	$s_{cr,N}$	[mm]	$3 \times h_{ef}$	
	edge distance	$c_{cr,N}$	[mm]	$1,5 \times h_{ef}$	
Splitting failure	resistance	$N^0_{RK,sp}$	[kN]	0,9	
	spacing	$s_{cr,sp}$	[mm]	$3 \times h_{ef}$	
	edge distance	$c_{cr,sp}$	[mm]	$1,5 \times h_{ef}$	
Factor for pry-out failure	k_8	[-]		1,0	
Installation factor	γ_{inst}	[-]		1,0	
Concrete edge failure					
Effective length in concrete	$l_f = h_{ef}$	[mm]	19	27	
Nominal outer diameter of screw	d_{nom}	[mm]	6		

¹⁾ only subject to dry internal conditions

TOGE concrete screw TSM L

Performances

Characteristic values for static and quasi-static loading

Annex C1

Table 6: Fire exposure – characteristic values of resistance

TSM concrete screw TSM L				TSM 6	
Nominal embedment depth		h_{nom}	$h_{nom1}^{1)}$		h_{nom2}
		[mm]	25		35
Steel failure for tension and shear load					
Characteristic Resistance	R30	$N_{Rk,s,fi30}$	[kN]	0,27	
	R60	$N_{Rk,s,fi60}$	[kN]	0,27	
	R90	$N_{Rk,s,fi90}$	[kN]	0,22	
	R120	$N_{Rk,s,fi120}$	[kN]	0,17	
	R30	$V_{Rk,s,fi30}$	[kN]	0,27	
	R60	$V_{Rk,s,fi60}$	[kN]	0,27	
	R90	$V_{Rk,s,fi90}$	[kN]	0,22	
	R120	$V_{Rk,s,fi120}$	[kN]	0,17	
	R30	$M^0_{Rk,s,fi30}$	[Nm]	0,22	
	R60	$M^0_{Rk,s,fi60}$	[Nm]	0,22	
	R90	$M^0_{Rk,s,fi90}$	[Nm]	0,18	
	R120	$M^0_{Rk,s,fi120}$	[Nm]	0,14	
Pull-out failure					
Characteristic Resistance	R30-R90	$N_{Rk,p,fi}$	[kN]	0,23	0,50
	R120	$N_{Rk,p,fi}$	[kN]	0,18	0,40
Concrete cone failure					
Characteristic Resistance	R30-R90	$N^0_{Rk,c,fi}$	[kN]	0,27	0,65
	R120	$N^0_{Rk,c,fi}$	[kN]	0,22	0,52
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 ≥ 300 mm.					
Spacing					
R30 - R120		$S_{cr,fi}$	[mm]	$4 \times h_{ef}$	
Pry-out failure					
R30 - R120		k_8	[-]	1,0	
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given value.					
¹⁾ only subject to dry internal condition					
TOGE concrete screw TSM L					Annex C2
Performances Fire exposure – characteristic values of resistance					