DECLARATION OF PERFORMANCE

DoP Nr.: **SIKLA-721** - en

- ✧ **Unique identification code of product-type:** **Sikla Screwbolt TSM**
- ✧ **Intended use/es:** Fasteners for use in concrete for redundant non-structural systems, see Annex B
- ✧ **Manufacturer:** Sikla Holding GmbH
  Kornstraße 4
  4614 Marchtrenk
  Austria
- ✧ **System/s of AVCP:** 2+
- ✧ **European Assessment Document:** **EAD 330747-00-0601**
  European Technical Assessment: **ETA-16/0439, 07.08.2019**
  Technical Assessment Body: DIBt, Berlin
  Notified body/ies: NB 1343 – MPA, Darmstadt

✧ **Declared performance/s:**

Essential characteristics	Performance
Safety in case of fire (BWR 2)	
Reaction to fire	Class A1
Resistance to fire	Annex C3
Safety in use (BWR 4)	
Characteristic resistance to tension load (static and quasi-static loading)	Annex C1
Characteristic resistance to shear load (static and quasi-static loading)	Annex C1
Characteristic resistance for all load directions and modes of failure for simplified design	Annex C2
Durability	Annex B1

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Sikla Holding GmbH
Kornstrasse 4
A-4614 Marchtrenk

Dieter Klauß
(Geschäftsführer)
VS – Schwenningen, 11.11.2019

The original of this declaration of performance was written in German. In the event of deviations in the translation, the German version shall be valid.

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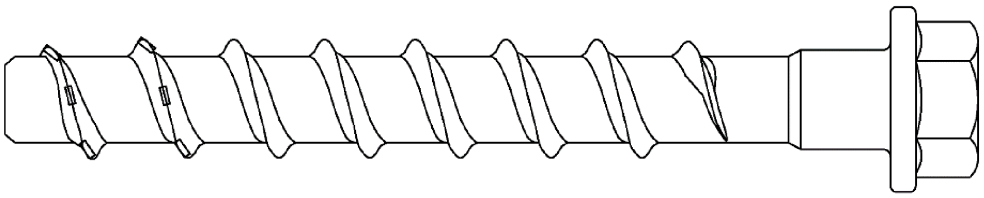
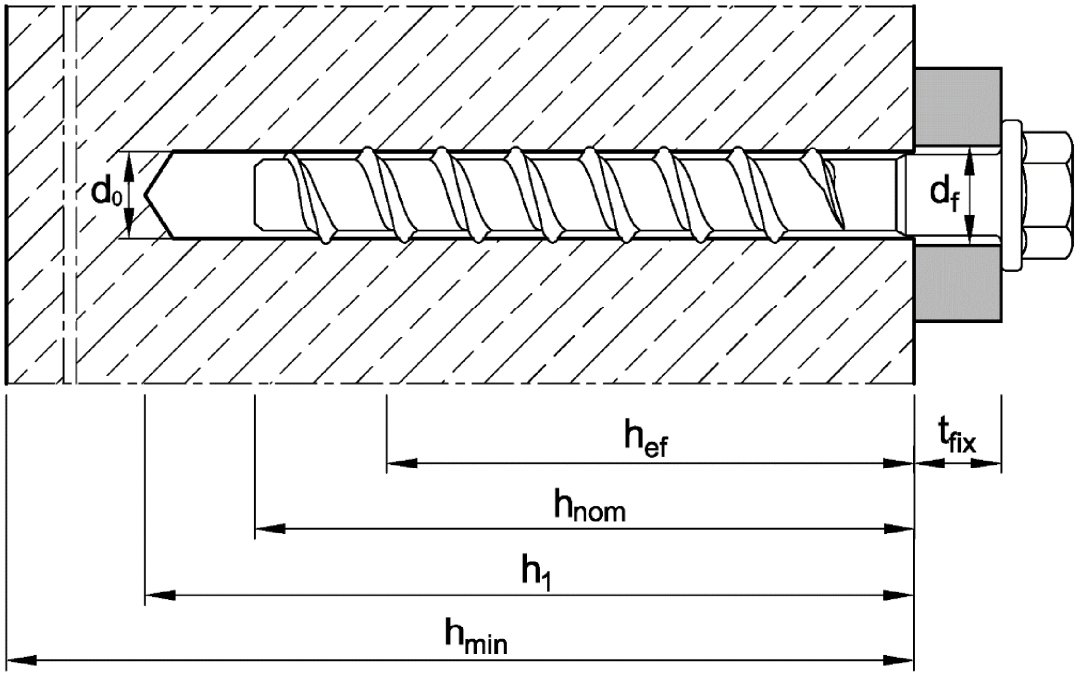
Concrete Screw TSM



TSM zinc plated
TSM A4
TSM HCR

Installation situation in concrete



d_0 = nominal drill bit diameter
h_{ef} = effective anchorage depth
h_{nom} = nominal anchorage depth
h_1 = depth of the drill hole
h_{min} = minimum thickness of member
t_{fix} = thickness of fixture
d_f = diameter of clearance hole in the fixture

Screwbolt TSM	**Annex A1**
Product description Product and installation situation in concrete	

Specifications of Intended use

Concrete screw TSM		TSM 5	TSM 6
Anchorages subject to	**Redundant non-structural systems** according to EN 1992-4:2018	✓	✓
	Static or quasi-static loads	✓	✓
	Fire exposure in solid concrete	-	✓
Base material	Cracked or uncracked concrete	✓	✓
	Compacted, reinforced or unreinforced concrete (without fibres) according to EN 206:2013	✓	✓
	Strength classes according to EN 206:2013: C20/25 to C50/60	✓	✓
	Precast pre-stressed hollow core slabs: C30/37 to C50/60	-	✓

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc plated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure including industrial and marine environment or exposure to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist
  (high corrosion resistant steel)

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

Design:

- Anchorages are designed under the responsibility of an 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.).
- Design method for anchorages acc. to EN 1992-4:2018 and EOTA Technical Report TR 055:
  - Anchorages in solid concrete: design method A
  - Anchorages in precast pre-stressed hollow core slabs: design method C
  - The design method for shear load also applies for the specified diameter d_f of the clearance hole in the fixture in Annex B2, Table B1.

Installation:

- Making of drill hole by hammer drilling or vacuum drill bit.
- Anchor installation carried out by appropriately qualified personal and under the responsibility of the person responsible for technical matters on site
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.

Screwbolt TSM	**Annex B1**
Intended use Specifications	

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Table C1: **Characteristic values** for anchorages in solid concrete

Anchor size				**TSM 5**	**TSM 6**	
Nominal embedment depth		h_{nom}	[mm]	35	35	55
Tension load						
Installation factor		γ_{inst}	[-]	1,2	1,0	
Steel failure						
Characteristic resistance		$N_{Rk,s}$	[kN]	8,7	14,0	
Partial factor		$\gamma_{Ms,N}$	[-]	1,5	1,5	
Pull-out						
Characteristic resistance in cracked and uncracked concrete C20/25		$N_{Rk,p}$	[kN]	1,5	3,0	7,5
Increasing factor for $N_{Rk,p}$		Ψ_C	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,5}$		
Concrete cone failure						
Effective anchorage depth		h_{ef}	[mm]	27	27	44
Spacing		$s_{cr,N}$	[mm]	3 h_{ef}		
Edge distance		$c_{cr,N}$	[mm]	1,5 h_{ef}		
Factor k_1 for concrete	cracked	$k_{cr,N}$	[-]	7,7		
	uncracked	$k_{ucr,N}$	[-]	11,0		
Splitting						
Spacing		$s_{cr,sp}$	[mm]	120	120	160
Edge distance		$c_{cr,sp}$	[mm]	60	60	80
Shear load						
Installation factor		γ_{inst}	[-]	1,0	1,0	
Steel failure without lever arm						
Characteristic resistance		$V^0_{Rk,s}$	[kN]	4,4	7,0	
Partial factor		$\gamma_{Ms,V}$	[-]	1,25	1,25	
Ductility factor		k_7	[-]	0,8	0,8	
Steel failure with lever arm						
Characteristic bending resistance		$M^0_{Rk,s}$	[Nm]	5,3	10,9	
Concrete pry-out failure						
Pry-out factor		k_8	[-]	1,0	1,0	
Concrete edge failure						
Effective length of anchor		$l_f = h_{ef}$	[mm]	27	27	44
Outside diameter of anchor		d_{nom}	[mm]	5	6	

Screwbolt TSM

Performance
Characteristic values for **tension and shear loads** (solid concrete)

Annex C1

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Table C2: Characteristic values of resistance in **precast pre-stressed hollow core slabs** C30/37 to C50/60

Anchor size			**TSM 6**		
Flange thickness	**d_b**	**[mm]**	**≥ 25**	**≥ 30**	**≥ 35**
Characteristic resistance for all directions	F_{Rk}	[kN]	1	2	3
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	10,9		
Edge distance	$c_{cr} = c_{min}$	[mm]	100		
Spacing	$s_{cr} = s_{min}$	[mm]	100		
Partial factor	γ_M	[-]	1,5		
Installation factor	γ_{inst}	[-]	1,0		

Screwbolt TSM

Performance
Characteristic values of resistance in **precast pre-stressed hollow core slabs**

Annex C2

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Table C3: Characteristic values of resistance under **fire exposure** for anchorages in solid concrete

Anchor size				**TSM 6**			
Material				**Steel, zinc plated**		**Stainless steel A4 / HCR**	
Nominal embedment depth		h_{nom}	[mm]	35	55	35	55
Steel failure (tension and shear resistance)							
Characteristic resistance	R30	$N_{Rk,s,fi}$ = $V_{Rk,s,fi}$	[kN]	0,9		1,2	
	R60			0,8		1,2	
	R90			0,6		1,2	
	R120			0,4		0,8	
Steel failure with lever arm							
Characteristic bending resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	0,7		0,9	
	R60			0,6		0,9	
	R90			0,5		0,9	
	R120			0,3		0,6	
Spacing		$s_{cr,fi}$	[mm]	$4\ h_{ef}$			
Edge distance		$c_{cr,fi}$	[mm]	$2\ h_{ef}$			
The anchorage depth has to be increased for wet concrete by at least 30 mm compared to the given values							

The characteristic resistance for pull-out, concrete cone failure, concrete pry-out and concrete edge failure shall be calculated according to EN 1992-4:2018.

Screwbolt TSM	**Annex C3**
Performance Characteristic values of resistance under **fire exposure** (solid concrete)	