

DECLARATION OF PERFORMANCE

DoP Nr.: **Sikla-1.3-100_en**

- ❖ **Unique identification code of product-type:** **Screwbolt TSM**
- ❖ **Intended use/es:** Mechanical fastener for use in concrete, see Annex B
- ❖ **Manufacturer:** Sikla Holding GmbH
Kornstraße 4
4614 Marchtrenk - Österreich
- ❖ **System or systems of assessment and verification of constancy of performance:** 1
- ❖ **European Assessment Document:** **EAD 330011-00-0601 + EAD 330232-00-0601**
 European Technical Assessment: **ETA-16/0655, 19.05.2020**
 Technical Assessment Body: DIBt, Berlin
 Notified body/ies: NB 2873 – Technische Universität Darmstadt

❖ **Declared performance/s:**

Essential Characteristics	Performance
Mechanical resistance and stability (BWR 1)	
Characteristic resistance to tension load (static and quasi-static loading)	Annex B2, C1
Characteristic resistance to shear load (static and quasi-static loading)	Annex C1
Characteristic resistance and displacements for seismic performance categories C1+C2	Annex A3, C2, C3, C4, C7
Displacements (static and quasi-static loading)	Annex C6
Durability	Annex B1
Safety in case of fire (BWR 2)	
Reaction to fire	Class A1
Resistance to fire	Annex C5

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:



Günter Brugger
(Leitung F+E)



Achim Münch
(Leitung QM)



Villingen-Schwenningen 27.09.2021

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.

Table C1: Characteristic values for tension loads

Anchor size			TSM 6		TSM 8			TSM 10			
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85	
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0								
Steel failure											
Characteristic load	$N_{Rk,s}$	[kN]	14		27			45			
Pull-out failure											
Characteristic tension load in concrete C20/25	cracked	$N_{Rk,p}$	[kN]	2	4	5	9	12	9	1)	
	uncracked	$N_{Rk,p}$	[kN]	4	9	7,5	12	16	12	20	25
Increasing factor for $N_{Rk,p}$ for strength classes > C20/25	Ψ_C	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$								
Concrete cone failure											
Effective anchorage depth	h_{ef}	[mm]	31	44	35	43	52	43	60	68	
Spacing (Edge distance)	$S_{cr,N}$ ($C_{cr,N}$)	[mm]	3 h_{ef} (1,5 h_{ef})								
Factor for concrete (acc. to CEN/TS 1992-4)	cracked	k_{cr}	7,2								
	uncracked	k_{ucr}	10,1								
Splitting											
Spacing	$S_{cr,sp}$	[mm]	120	160	120	140	150	140	180	210	
Edge distance	$C_{cr,sp}$	[mm]	60	80	60	70	75	70	90	105	
Anchor size			TSM 12				TSM 14				
Nominal embedment depth	h_{nom}	[mm]	65	85	100	75	100	115			
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0								
Steel failure											
Characteristic load	$N_{Rk,s}$	[kN]	67				94				
Pull-out failure											
Characteristic tension load in concrete C20/25	cracked	$N_{Rk,p}$	[kN]	12	1)			1)			
	uncracked	$N_{Rk,p}$	[kN]	16							
Increasing factor for $N_{Rk,p}$ for strength classes > C20/25	Ψ_C	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$								
Concrete cone failure											
Effective anchorage depth	h_{ef}	[mm]	50	67	80	58	79	92			
Spacing (Edge distance)	$S_{cr,N}$ ($C_{cr,N}$)	[mm]	3 h_{ef} (1,5 h_{ef})								
Factor for concrete (acc. to CEN/TS 1992-4)	cracked	k_{cr}	7,2								
	uncracked	k_{ucr}	10,1								
Splitting											
Spacing	$S_{cr,sp}$	[mm]	150	210	240	180	240	280			
Edge distance	$C_{cr,sp}$	[mm]	75	105	120	90	120	140			

1) Pull-out is not decisive

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Performance
Characteristic values for **tension loads**

Annex C1

Table C2: Characteristic values for shear loads

Anchor size			TSM 6		TSM 8			TSM 10		
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0							
Steel failure without lever arm										
Characteristic load	$V_{Rk,s}$	[kN]	7,0	13,5	17,0	22,5	34,0			
Factor of ductility acc. to CEN/TS 1992-4	k_2	[-]	0,8							
Steel failure with lever arm										
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	10,9	26,0	56,0					
Concrete pry-out failure										
Factor k acc. to ETAG 001, Annex C or k_3 acc. to CEN/TS 1992-4	$k_{(3)}$	[-]	1,0	1,0	1,0	2,0				
Concrete edge failure										
Effective length of anchor	$l_f = h_{ef}$	[mm]	31	44	35	43	52	43	60	68
Outside diameter of anchor	d_{nom}	[mm]	6	8	10					
Anchor size			TSM 12			TSM 14				
Nominal embedment depth	h_{nom}	[mm]	65	85	100	75	100	115		
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0							
Steel failure without lever arm										
Characteristic load	$V_{Rk,s}$	[kN]	33,5	42,0	56,0					
Factor of ductility acc. to CEN/TS 1992-4	k_2	[-]	0,8							
Steel failure with lever arm										
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	113,0	185,0						
Concrete pry-out failure										
Factor k acc. to ETAG 001, Annex C or k_3 acc. to CEN/TS 1992-4	$k_{(3)}$	[-]	1,0	2,0	1,0	2,0				
Concrete edge failure										
Effective length of anchor	$l_f = h_{ef}$	[mm]	50	67	80	58	79	92		
Outside diameter of anchor	d_{nom}	[mm]	12	14						

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Performance
Characteristic values for **shear loads**

Annex C2

Table C3: Characteristic resistance for **seismic loading**, Category **C1**

Anchor size			TSM 8	TSM 10	TSM 12	TSM 14
Nominal embedment depth	h_{nom}	[mm]	65	85	100	115
Installation safety factor	γ_2	[-]	1,0			
Tension load						
Steel failure						
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	27	45	67	94
Pull-out failure						
Characteristic resistance in concrete C20/25 to C50/60	$N_{Rk,p,seis}$	[kN]	12	1)		
Concrete cone failure						
Effective anchorage depth	h_{ef}	[mm]	52	68	80	92
Spacing	$s_{cr,N}$	[mm]	3 h_{ef}			
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}			
Shear load						
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	8,5	15,3	21,0	22,4
Concrete pry-out failure						
Factor k acc. to ETAG 001, Annex C	k	[-]	1,0	2,0		
Concrete edge failure						
Effective length of anchor	$l_f = h_{ef}$	[mm]	52	68	80	92
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

¹⁾ Pull-out is not decisive

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Performance
Characteristic values for **seismic loading**, Category **C1**

Annex C3

Table C4: Characteristic values under fire exposure

Anchor size			TSM 6		TSM 8			TSM 10			TSM 12			TSM 14			
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115	
Steel failure (tension and shear load)																	
Characteristic resistance	R30	$N_{Rk,s,fi}$ = $V_{Rk,s,fi}$	[kN]	0,9		2,4			4,4			7,3			10,3		
	R60			0,8		1,7			3,3			5,8			8,2		
	R90			0,6		1,1			2,3			4,2			5,9		
	R120			0,4		0,7			1,7			3,4			4,8		
Steel failure with lever arm																	
Characteristic bending moment	R30	$M^0_{Rk,s,fi}$	[Nm]	0,7		2,4			5,9			12,3			20,4		
	R60			0,6		1,8			4,5			9,7			15,9		
	R90			0,5		1,2			3,0			7,0			11,6		
	R120			0,3		0,9			2,3			5,7			9,4		
Spacing	$s_{cr,fi}$	[mm]	4 h_{ef}														
Edge distance	$c_{cr,fi}$	[mm]	2 h_{ef}														

The characteristic resistance for pull-out, concrete cone failure, concrete pry-out and concrete edge failure shall be calculated according to TR 020 / CEN/TS 1992-4. If no value for $N_{Rk,p}$ is given, in Eq. 2.4 and Eq. 2.5, TR 020 (or Eq. D1 and D.2, CEN/TS 1992-4) $N_{Rk,p}$ must be replaced by the value of $N^0_{Rk,c}$.

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Performance
Characteristic values under **fire exposure**

Annex C4

Table C5: Displacements under tension load

Anchor size			TSM 6		TSM 8			TSM 10		
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85
Cracked concrete	Tension load	N [kN]	0,95	1,9	2,4	4,3	5,7	4,3	7,9	9,6
	Displacement	δ_{N0} [mm]	0,3	0,6	0,6	0,7	0,8	0,6	0,5	0,9
		$\delta_{N\infty}$ [mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2
Uncracked concrete	Tension load	N [kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	11,9
	Displacement	δ_{N0} [mm]	0,4	0,6	0,7	0,9	0,5	0,7	1,1	1,0
		$\delta_{N\infty}$ [mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2

Anchor size			TSM 12			TSM 14		
Nominal embedment depth	h_{nom}	[mm]	65	85	100	75	100	115
Cracked concrete	Tension load	N [kN]	5,7	9,4	12,3	7,6	12,0	15,1
	Displacement	δ_{N0} [mm]	0,9	0,5	1,0	0,5	0,8	0,7
		$\delta_{N\infty}$ [mm]	1,0	1,2	1,2	0,9	1,2	1,0
Uncracked concrete	Tension load	N [kN]	7,6	13,2	17,2	10,6	16,9	21,2
	Displacement	δ_{N0} [mm]	1,0	1,1	1,2	0,9	1,2	0,8
		$\delta_{N\infty}$ [mm]	1,0	1,2	1,2	0,9	1,2	1,0

Table C6: Displacements under shear load

Anchor size			TSM 6		TSM 8			TSM 10			TSM 12			TSM 14		
Nominal embedment depth	h_{nom}	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
Shear load	V	[kN]	3,3		8,6			16,2			20,0			30,5		
Displacement	δ_{V0}	[mm]	1,55		2,7			2,7			4,0			3,1		
	$\delta_{V\infty}$	[mm]	3,1		4,1			4,3			6,0			4,7		

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Displacements**Annex C5**