DECLARATION OF PERFORMANCE
DoP Nr. Sikla – 710 - en

1. Unique identification code of the product-type: **Sikla Screwbolt TSM**

2. Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4):
ETA-16/0655, Annex A2
Batch number: see packaging of the product.

3. Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:

generic type	Concrete screw
for use in	Cracked and uncracked C20/25 - C50/60 (EN 206)
option	1
loading	static or quasi-static seismic category C1
material	zinc-plated steel: dry internal conditions only covered sizes: TSM6, TSM8, TSM10, TSM12, TSM14 stainless steel (marking A4): internal and external use without particular aggressive conditions covered sizes: TSM6, TSM8, TSM10, TSM12, TSM14 highly corrosion resistant steel (marking HCR): internal and external use with particular aggressive conditions covered sizes: TSM6, TSM8, TSM10, TSM12, TSM14
temperature range *if applicable*	--

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required pursuant to Article 11(5):
Sikla Holding GmbH
Kornstraße 4
4614 Marchtrenk
Austria

Where applicable, name and contact address of the authorised representative whose mandate covers the tasks specified in Article 12(2): --

5. System or systems of assessment and verification of constancy of performance of the construction product as set out in Annex V: **System 1**

6. In case of the declaration of performance concerning a construction product covered by a harmonised standard: --

7. In case of the declaration of performance concerning a construction product for which a European Technical Assessment has been issued:

Deutsches Institut für Bautechnik, Berlin

issued

ETA-16/0655

on the basis of

ETAG 001-1

The notified body 1343-CPR performed under system 1:

(i) determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product;
(ii) initial inspection of the manufacturing plant and of factory production control;
(iii) continuous surveillance, assessment and evaluation of factory production control.

and issued: Certificate of constancy of performance 1343-CPR-M 557-4/11.14

9. Declared performance:

Essential Characteristics	**Design Method**	**Performance**	**Harmonized Technical Specification**
Characteristic resistance for tension	ETAG 001, Annex C CEN/TS 1992-4	Annex C1	ETAG 001
Characteristic resistance for shear	ETAG 001, Annex C CEN/TS 1992-4	Annex C2	
Displacement for serviceability limit state	ETAG 001, Annex C CEN/TS 1992-4	Annex C5	
Characteristic resistance for seismic loading	TR 045	Annex C3	
Characteristic resistance under fire exposure	TR 020	Annex C4	

Where pursuant to Article 37 or 38 in the Specific Technical Documentation has been used, the requirements with which the product complies: --

10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9.

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

Sikla Holding GmbH
Kornstrasse 4
A-4614 Marchtrenk

Dieter Klauß
(Geschäftsführer)
VS – Schwenningen, 08.05.2017

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

Screwbolt TSM

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		

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

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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Performance
Displacements

Annex C5