

TOGE TSM High Performance

Allrounder Concrete Screw - for heavy loads



Large variety

Seven different head shapes and up to three different embedment depths for variable load absorption: always perfectly matched to your individual requirements.

Environmental Product Declaration (EPD)

This product has an Environmental Product Declaration (EPD) in accordance with ISO 14025 and EN 15804+A2.

Easy and fast installation

The optimized thread enables a fast and easy installation process.

Particularly near the edge

Small edge distances and spacing allow very closed-edge and closely spaced installation.

Adjustable & Demountable

If required, the TOGE TSM High Performance can be adjusted up to twice during assembly. After assembly, it can be disassembled again at any time.

High load level

The special thread geometry ensures extreme hold and high loads in concrete – whether tensile or shear loads.

Combinable system

In combination with our composite mortar, the TSM HP has an even higher load level – and can be loaded immediately. Tested impermeability, even to critical substances, enables use even under WHG requirements (only for TSM LT A4).

Approval

Approval

Environmental product declaration in accordance with ISO 14025 and EN 15804+A2.

European technical assessment ETA-15/0514, single fastening.

European technical assessment ETA-16/0123, multiple fastening.

European technical assessment ETA-21/0425, TSM LT A4.

European technical assessment ETA-23/0099, single fastening in masonry.

European technical assessment ETA-23/0923, single fastening in masonry TSM LT A4.

General design approval Z-21.8-2115 for temporary fastening.

General design approval Z-21.1-2074 adhesive concrete screw.

Base Material

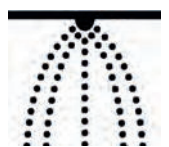
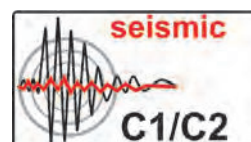
Approved for concrete strength classes from C20/25 to C50/60.

Cracked and non-cracked concrete.

Prestressed hollow core slabs (size 6).

Approved for masonry.

Suitable for natural stone with dense structure.



Headshapes & Materials

		Steel, zinc plated	TOGE ZFC	TOGE ZFC Solid	Stainless steel A4
	Hexagon head and pressed-on washer	✓	✓	✓	✓
	Countersunk head with multipoint drive	✓			✓
	Panhead with multipoint drive	✓			✓
	Large panhead with multipoint drive	✓			
	Hexagonal drive and metric external thread M8 and M10	✓			
	Metric female thread M8/M10	✓			✓
	Metric external thread	✓			✓

Application Examples



Fastening piping



Fastening of racks in high-bay warehouses



Fastening cable ducts



Fastening railings



Fastening ventilation ducts

Single fastening without fire exposure, Steel

Screw size TSM high performance			TSM 6			TSM 8			TSM 10			TSM 12			TSM 14		
Nominal embedment depth	h _{nom}	[mm]	h _{nom1}	h _{nom2}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	
			40	55	45	55	65	55	75	85	65	85	100	75	100	115	
Nominal diameter of drill bit	d ₀	[mm]	6			8			10			12			14		
Depth of drill hole	h ₀ min	[mm]	45	60	55	65	75	65	85	95	75	95	110	85	110	125	
Effective anchorage depth	h _{ef}	[mm]	31	44	35	43	52	43	60	68	50	67	80	58	79	92	
Diameter of clearance hole in the fixture	d _f max	[mm]	8			12			14			16			18		
Approved tension load in cracked concrete ^{1) 2)}	N _{zul}	[kN]	1,0	1,9	2,4	4,3	5,7	4,3	7,6	9,2	5,7	9,0	11,7	7,2	11,5	14,5	
Approved shear load in cracked concrete ^{1) 2)}	V _{zul}	[kN]	2,8	4,0	3,4	4,6	6,2	4,6	15,2	18,4	5,8	18,0	23,5	7,2	23,0	28,9	
Approved tension load in non-cracked concrete ^{1) 2)}	N _{zul}	[kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	12,4	7,6	12,9	16,8	10,4	16,5	20,7	
Approved shear load in non-cracked concrete ^{1) 2)}	V _{zul}	[kN]	4,0	4,0	4,9	6,6	8,8	6,6	19,4	19,4	8,3	24,0	24,0	10,4	32,0	32,0	
Approved bending resistance	M _{zul}	[kNm]	6,2			14,9			32,0			64,6			105,7		
Minimum edge distance	C _{min}	[mm]	40	40	50		50			50	70	50	70	50	70		
Minimum spacing	S _{min}	[mm]	40	40	50		50			50	70	50	70	50	70		
Minimum base material thickness	h _{min}	[mm]	100	100			100	130		120	130	150	130	150	170		
Installation torque (with metric connection thread)	T _{inst}	[Nm]	10			20			40			60			80		
Maximum torque (with impact screw driver)		[Nm]	160			300			400			650			650		
ETA Seismic C1	C1		Yes	x		Yes	Yes	x	Yes	x		Yes	x		Yes		
ETA Seismic C2 ³⁾	C2		x	x		Yes	x		Yes	x		Yes	x		Yes		

Single fastening under fire exposure, Steel

Screw size TSM high performance			TSM 6			TSM 8			TSM 10			TSM 12			TSM 14		
Nominal embedment depth	h _{nom}	[mm]	h _{nom1}	h _{nom2}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	
			40	55	45	55	65	55	75	85	65	85	100	75	100	115	
Approved load under tensile and shear use (F _{zul,fi} = N _{zul,fi} = V _{zul,fi}) ^{2) 3)}																	
Fire resistance class																	
R 30	Approved load	F _{zul,fi 30}	[kN]	0,5	0,9	1,2	2,1	2,4	2,1	4,0	4,4	3,0	4,7	6,2	3,8	6,0	7,6
R 60		F _{zul,fi 60}	[kN]	0,5	0,8	1,2	1,7	1,7	2,1	3,3	3,0	4,7	5,8	3,8	6,0	7,6	
R 90		F _{zul,fi 90}	[kN]	0,5	0,6	1,1		2,1	2,3	3,0	4,2	3,8	5,9				
R 120		F _{zul,fi 120}	[kN]	0,4		0,7		1,7		2,4	3,4	3,0	4,8				
R 30		M _{zul,fi 30}	[Nm]	0,7		2,4		5,9			12,3			20,4			
R 60		M _{zul,fi 60}	[Nm]	0,6		1,8		4,5			9,7			15,9			
R 90		M _{zul,fi 90}	[Nm]	0,5		1,2		3,0			7,0			11,6			
R 120		M _{zul,fi 120}	[Nm]	0,3		0,9		2,3			5,7			9,4			
Edge distance																	
R 30 to R 120	C _{cr,fi}	[mm]	2 x h _{ef}														
The edge distance must be at least 300 mm if the fire load attacks from more than one side.																	
Spacing																	
R 30 to R 120	S _{cr,fi}	[mm]	4 x h _{ef}														
Concrete pry-out failure																	
R 30 to R 120	k	[-]	1,0	1,0	1,0	2,0	1,0	2,0	1,0	2,0	1,0	2,0	1,0	2,0	1,0	2,0	
In wet concrete, the embedment depth must be increased by at least 30 mm.																	

¹⁾ For the determination of the approved loads, the partial safety factor from the approval γM=1,5 was taken into account for material resistance and a partial safety factor γF=1,4 for load actions. ²⁾ These values apply without influence of the spacing and edge distances.

³⁾ For the determination of the approved loads, the partial safety factor from the approval γM=1,0 was taken into account for material resistance and a partial safety factor γF=1,0 for load actions.

Single fastening without fire exposure, stainless steel A4

Screw size TSM high performance LT A4			TSM 6			TSM 8			TSM 10		
Nominal embedment depth	h _{nom}	[mm]	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}
			35 ³⁾	45	55	45	55	65	55	75	85
Nominal diameter of drill bit	d ₀	[mm]	6			8			10		
Depth of drill hole	h _{0 min}	[mm]	40	50	60	55	65	75	65	85	95
Effective anchorage depth	h _{ef}	[mm]	25	34	42	32	41	49	40	57	65
Diameter of clearance hole in the fixture	d _{f max}	[mm]	8			12			14		
Approved tension load in cracked concrete ^{1) 2)}	N _{zul}	[kN]	1,2	0,7	1,4	1,4	2,6	3,8	2,9	6,2	8,1
Approved shear load in cracked concrete ^{1) 2)}	V _{zul}	[kN]	2,1	4,0	4,0	6,2	7,7	9,7	10,4	17,6	19,4
Approved tension load in non-cracked concrete ^{1) 2)}	N _{zul}	[kN]	1,7	1,9	4,1	4,2	5,7	8,0	5,2	9,1	11,9
Approved shear load in non-cracked concrete ^{1) 2)}	V _{zul}	[kN]	2,9	4,0	4,0	7,7	7,7	9,7	12,9	19,4	19,4
Approved bending resistance	M _{zul}	[kN]	6,2			14,9			32,0		
Minimum edge distance	C _{min}	[mm]	35			35			40		
Minimum spacing	S _{min}	[mm]	35			35			40		
Minimum base material thickness	h _{min}	[mm]	80	100		80	100	120	100	130	
Installation torque (with metric connection thread)	T _{inst}	[Nm]	10			20			40		
Maximum torque (with impact screw driver)		[Nm]	160			300			450		
ETA Seismic C1	C1		x	Yes		Yes	x	Yes	Yes	x	Yes

Single fastening under fire exposure, stainless steel A4

Screw size TSM high performance LT A4			TSM 6			TSM 8			TSM 10			
Nominal embedment depth	h _{nom}	[mm]	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	h _{nom1}	h _{nom2}	h _{nom3}	
			35 ³⁾	45	55	45	55	65	55	75	85	
Approved load for tension and shear stress ($F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$) ^{2) 4)}												
Fire resistance class												
R 30	Approved load	F _{zul,fi 30}	[kN]	0,5	0,4	0,8	0,8	1,4	2,0	1,5	3,3	4,3
R 60		F _{zul,fi 60}	[kN]	0,5	0,4	0,8	0,8	1,4	1,7	1,5	3,3	
R 90		F _{zul,fi 90}	[kN]	0,5	0,4	0,6	0,8	1,1		1,5	2,3	
R 120		F _{zul,fi 120}	[kN]	0,4	0,3	0,4	0,6	0,7		1,2	1,7	
R 30		M _{zul,fi 30}	[Nm]	0,7			2,4			5,9		
R 60		M _{zul,fi 60}	[Nm]	0,6			1,8			4,5		
R 90		M _{zul,fi 90}	[Nm]	0,5			1,2			3,0		
R 120		M _{zul,fi 120}	[Nm]	0,3			0,9			2,3		
Edge distance												
R 30 to R 120	C _{cr,fi}	[mm]	2 x h _{ef}									
The edge distance must be at least 300 mm if the fire load attacks from more than one side.												
Spacing												
R 30 to R 120	S _{cr,fi}	[mm]	4 x h _{ef}									
Concrete pry-out failure												
R 30 to R 120	k	[-]	1,0	1,6	2,1	2,8		2,5				
In wet concrete, the embedment depth must be increased by at least 30 mm.												

¹⁾ For the determination of the approved loads, the partial safety factor from the approval $\gamma_M=1,5$ was taken into account for material resistance and a partial safety factor $\gamma_F=1,4$ for load actions. ²⁾ These values apply without influence of the spacing and edge distances. ³⁾ Only for multiple use under dry conditions.

⁴⁾ For the determination of the approved loads, the partial safety factor from the approval $\gamma_M=1,0$ was taken into account for material resistance and a partial safety factor $\gamma_F=1,0$ for load actions.

Multiple fastening without fire exposure, Steel

Screw size TSM high performance			TSM 5		TSM 6	
Nominal embedment depth	h_{nom}	[mm]	35	35	55	
Nominal diameter of drill bit	d_o	[mm]	5	6		
Depth of drill hole	h_o min	[mm]	40	40	60	
Effective anchorage depth	h_{ef}	[mm]	27	27	44	
Diameter of clearance hole in the fixture	d_f max	[mm]	7	8		
Approved tension load in cracked concrete ^{1),2)}	N_{zul}	[kN]	0,6	1,4	3,6	
Approved shear load in cracked concrete ^{1),2)}	V_{zul}	[kN]	1,9	2,3	4,8	
Approved tension load in non-cracked concrete ^{1),2)}	N_{zul}	[kN]	0,6	1,4	3,6	
Approved shear load in non-cracked concrete ^{1),2)}	V_{zul}	[kN]	2,5	3,3	4,0	
Minimum edge distance	C_{min}	[mm]	35	35	40	
Minimum spacing	S_{min}	[mm]	35	35	40	
Minimum base material thickness	h_{min}	[mm]	80	80	100	
Installation torque (with metric connection thread)	T_{inst}	[Nm]	8	10		
Maximum torque (with impact screw driver)		[Nm]	110	160		

¹⁾ For the determination of the approved loads, the partial safety factor from the approval $\gamma_M=1,5$ was taken into account for material resistance and a partial safety factor $\gamma_F=1,4$ for load actions.

²⁾ These values apply without influence of the space and edge distancing.

Multiple fastening under fire exposure, Steel

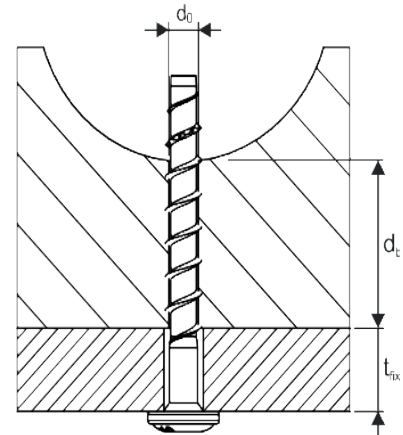
Screw size TSM high performance			TSM 5		TSM 6	
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	
			35	35	55	
Approved load under tensile and shear use ($F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$)						
Fire resistance class						
R 30	Approved load	$F_{zul,fi 30}$	[kN]	0,4	0,8	0,9
R 60		$F_{zul,fi 60}$	[kN]	0,4	0,8	
R 90		$F_{zul,fi 90}$	[kN]	0,4	0,6	
R 120		$F_{zul,fi 120}$	[kN]	0,3	0,4	
R 30		$M_{zul,fi 30}$	[Nm]	0,5	0,7	
R 60		$M_{zul,fi 60}$	[Nm]	0,4	0,6	
R 90		$M_{zul,fi 90}$	[Nm]	0,2	0,5	
R 120		$M_{zul,fi 120}$	[Nm]	0,2	0,3	
Edge distance						
R 30 to R 120	$C_{cr,fi}$	[mm]	$2 \times h_{ef}$			
The edge distance must be at least 300 mm if the fire load attacks from more than one side.						
Spacing						
R 30 to R 120	$S_{cr,fi}$	[mm]	$4 \times h_{ef}$			
Concrete pry-out failure						
R 30 to R 120	k	[-]	1,0			
In wet concrete, the embedment depth must be increased by at least 30 mm.						

¹⁾ For the determination of the approved loads, the partial safety factor from the approval $\gamma_M=1,0$ was taken into account for material resistance and a partial safety factor $\gamma_F=1,0$ for load actions.

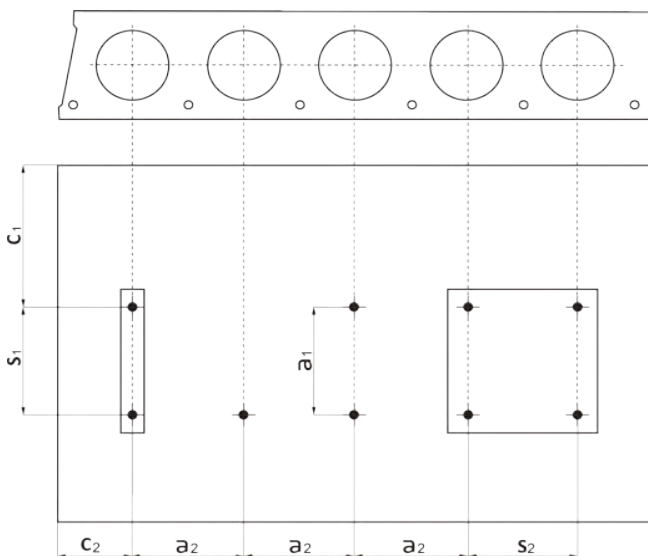
²⁾ These values apply without influence of the space and edge distancing.

Multiple fastening in prestressed hollow core slabs without fire exposure, steel

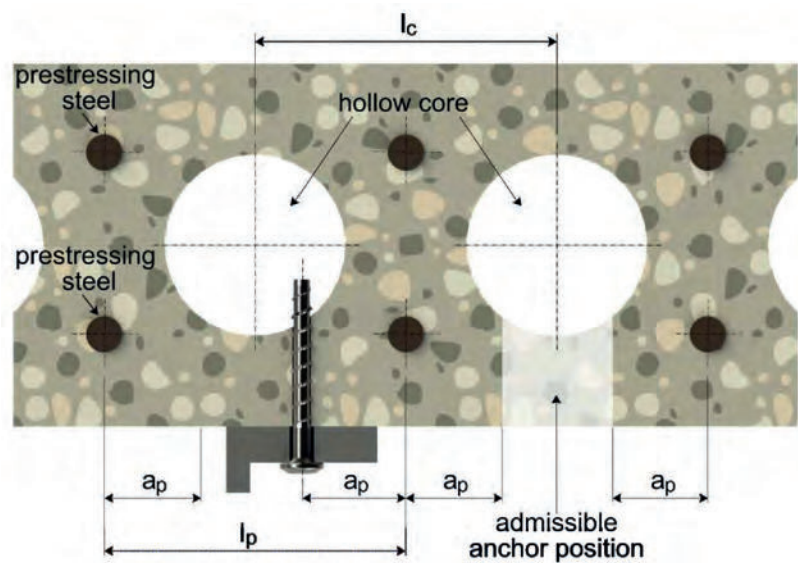
Screw size TSM high performance	TSM 6		
Bottom flange thickness	d_b	[mm]	≥ 25 ≥ 30 ≥ 35
Nominal diameter of drill bit	d_0	[mm]	6
Depth of drill hole	h_b min	[mm]	30 35 40
Clearance hole diameter	d_i max	[mm]	8
Approved tension load ¹⁾	F_{zul}	[kN]	0,5 1,0 1,4
Minimum edge distance	C_{min}	[mm]	100
Minimum spacing	S_{min}	[mm]	100
Minimum distance between anchor groups	a_{min}	[mm]	100
Core distance	l_c min	[mm]	100
Prestressing steel distance	l_p min	[mm]	100
Distance between anchor position & prestressing steel	a_p min	[mm]	50
Hollow core width (w)	(w/e) max [mm]		4,2
Bridge width (e)			
Installation torque	T_{inst}	[Nm]	10
Max. torquet (for impact screw driver)		[Nm]	160



¹⁾ For the determination of the approved loads, the partial safety factor from the approval $\gamma_M=1,0$ was taken into account for material resistance and a partial safety factor $\gamma_F=1,4$ for load actions.



C_1, C_2 = Edge distance
 S_1, S_2 = Spacing
 a_1, a_2 = Distance between anchor groups



l_c = Core distance
 l_p = Prestressing steel distance
 a_p = Distance between anchor position & prestressing steel

Masonry

Solid calcium silicate brick KS acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, steel

Screw size TSM high performance			TSM 5		TSM 6		TSM 8		TSM 10			
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
			35	35	55	45	65	55	75			
Nominal diameter of drill bit	d_0	[mm]	5	6		8		10				
Cutting diameter of drill bit	d_{cut}	[mm]	5,40	6,40		8,45		10,45				
Depth of drill hole	h_0	[mm]	55	55	75	65	85	75	95			
Diameter of clearance hole in the fixture	d_f	[mm]	7	8		12		14				
Torque for manual installation	$max. T_{inst}$	[Nm]	6	11		27		37	46			
Impact screw driver	$T_{imp,max}$	[Nm]	185				300					
Minimum wall thickness	h_{min}	[mm]	240									
Minimum edge distance	C_{min}	[mm]	80									
Minimum spacing	S_{min}	[mm]	80									
Distance to the horizontal joints	C_{\perp}	[mm]	≥ 35									
Distance to the vertical joints	C_{\parallel}	[mm]	≥ 80									

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 5		TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
						35	35	55	45	65	55	75	
KS 20 - 2,0 - NF	L:240 W: 115 H: 71	2	26	N_{zul}	[kN]	1,0	0,9	1,4	1,2	1,2	1,1	1,3	
				V_{zul}	[kN]	0,9							
			30	N_{zul}	[kN]	1,1	1,0	1,5	1,3	1,3	1,1	1,4	
				V_{zul}	[kN]	1,0							
			35	N_{zul}	[kN]	1,1	1,1	1,6	1,4	1,4	1,3	1,5	
				V_{zul}	[kN]	1,1							
			38	N_{zul}	[kN]	1,2	1,1	1,7	1,4	1,5	1,3	1,5	
				V_{zul}	[kN]	1,1							

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_{M,1.4}$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{k,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Single fastening under fire exposure, steel

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 5		TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
				$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		35	35	55	45	65	55	75	
KS 20 - 2,0 - NF	L: 240 W: 115 H: 71	2	R30	$F_{zul,fi30}$	[kN]	1,1	1,3	1,3	1,3	1,3	3,4	3,4	
			R60	$F_{zul,fi60}$	[kN]	0,9	1,0	1,0	1,0	1,0	2,7	2,7	
			R90	$F_{zul,fi90}$	[kN]	0,5	0,6	0,6	0,6	0,6	2,0	2,0	
			R120	$F_{zul,fi120}$	[kN]	0,3	0,5	0,5	0,5	0,5	1,7	1,7	
			R30	$M_{zul,fi30}^0$	[kN]	0,8	1,1	1,1	1,5	1,5	4,9	4,9	
			R60	$M_{zul,fi60}^0$	[kN]	0,5	0,8	0,8	1,1	1,1	4,0	4,0	
			R90	$M_{zul,fi90}^0$	[kN]	0,3	0,5	0,5	0,8	0,8	3,0	3,0	
			R120	$M_{zul,fi120}^0$	[kN]	0,2	0,4	0,4	0,6	0,6	2,5	2,5	

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi} = 1.0$ was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{k,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Masonry

Silka XL solid calcium silicate brick KS 12DF acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, steel

Screw size TSM high performance		TSM 5	TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom} [mm]	h_{nom1}	h_{nom1}	h_{nom1}	h_{nom1}
		h_{nom2}	h_{nom2}	h_{nom2}	h_{nom2}
Nominal diameter of drill bit	d_0 [mm]	5	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	5,40	6,40	8,45	10,45
Depth of drill hole	$h_0 \geq$ [mm]	55	55	75	75
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	8	12	14
Torque for manual installation	$max. T_{inst}$ [Nm]	6	10	25	45
Torque for rotary screw driver	$T_{imp,max}$ [Nm]	8	10	-	
Impact screw driver	$T_{imp,max}$ [Nm]	-		185	300
Minimum wall thickness	h_{min} [mm]	175			
Minimum edge distance	c_{min} [mm]	80			
Minimum spacing	s_{min} [mm]	80			
Distance to the horizontal joints	$c_{j \perp}$ [mm]	≥ 40			
Distance to the vertical joints	$c_{j \parallel}$ [mm]	≥ 80			

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 5		TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
						35	35	55	45	65	55	75	
KS - R (P) 20 - 2,0 - 12 DF	L: 498 W: 175 H: 248	1,8	14	N_{zul}	[kN]	0,7	0,7	1,2	1,8	1,8	1,8	1,9	
				V_{zul}	[kN]	0,9	0,9	2,4	0,9	2,1	1,7	2,4	
			15	N_{zul}	[kN]	0,7	0,7	1,2	1,9	1,9	1,9	2,0	
				V_{zul}	[kN]	0,9	0,9	2,4	0,9	2,2	1,7	2,4	
			20	N_{zul}	[kN]	0,8	0,8	1,4	2,1	2,1	2,2	2,3	
				V_{zul}	[kN]	1,1	1,1	2,8	1,1	2,6	2,0	3,4	

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_F=1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{v,sk}=0.15$ [N/mm²] and $\sigma_{s,sk}=0.2$ [N/mm²].

Single fastening under fire exposure, steel

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 5		TSM 6		TSM 8		TSM 10		
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}		
						$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		35	35	55	45	65	55	75
KS - R (P) 20 - 2,0 - 12 D	L: 498 W: 175 H: 248	1,8	R30	$F_{zul,fi30}$	[kN]	1,1	0,3	0,7	1,3	1,3	3,4	3,4		
			R60	$F_{zul,fi60}$	[kN]	0,8	0,3	0,7	1,0	1,0	2,7	2,7		
			R90	$F_{zul,fi90}$	[kN]	0,5	0,3	0,6	0,6	0,6	2,0	2,0		
			R120	$F_{zul,fi120}$	[kN]	0,3	0,2	0,4	0,5	0,5	1,7	1,7		
			R30	$M_{zul,fi30}^0$	[kN]	0,8	1,2	1,2	1,5	1,5	4,9	4,9		
			R60	$M_{zul,fi60}^0$	[kN]	0,5	0,9	0,9	1,1	1,1	4,0	4,0		
			R90	$M_{zul,fi90}^0$	[kN]	0,3	0,5	0,5	0,8	0,8	3,0	3,0		
			R120	$M_{zul,fi120}^0$	[kN]	0,2	0,3	0,3	0,6	0,6	2,5	2,5		

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi}$ = 1.0 was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{v,sk}=0.15$ [N/mm²] and $\sigma_{s,sk}=0.2$ [N/mm²].



Masonry

Perforated calcium silicate brick KSL 3DF acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, steel

Screw size TSM high performance		TSM 5	TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom} [mm]	h_{nom1}	h_{nom1} h_{nom2}	h_{nom1} h_{nom2}	h_{nom1} h_{nom2}
		35	35 55	45 65	55 75
Nominal diameter of drill bit	d_0 [mm]	5	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	5,40	6,40	8,45	10,45
Depth of drill hole	$h_0 \geq$ [mm]	55	55 75	65 85	75 95
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	8	12	14
Torque for manual installation	T_{inst}^{max} [Nm]	3	4	9	9
Torque for rotary screw driver	$T_{imp,max}$ [Nm]	9	11	-	
Impact screw driver	$T_{imp,max}$ [Nm]	-		100	200
Minimum wall thickness	h_{min} [mm]	175			
Minimum edge distance	C_{min} [mm]	58			
Minimum spacing	S_{min} [mm]	80			
Distance to the horizontal joints	$C_{j \perp}$ [mm]	≥ 35			
Distance to the vertical joints	$C_{j \parallel}$ [mm]	≥ 58			

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 5	TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}
						35	35	55	45	65	55	75
SWKV KSL 12 - 1,6 3DF	L: 240 W: 175 H: 113	1,5	17	N_{zul}	[kN]	0,3		0,5		0,6		
				V_{zul}	[kN]	0,5				0,6		
			20	N_{zul}	[kN]	0,4		0,5		0,7		
				V_{zul}	[kN]	0,5				0,7		
			25	N_{zul}	[kN]	0,4		0,6		0,9		
				V_{zul}	[kN]	0,6				0,8		

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_F=1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{v,sk}$:0.15 [N/mm²] and $\sigma_{s,sk}$:0.2 [N/mm²].

Single fastening under fire exposure, steel

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 5	TSM 6	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}
				$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		35	35	55
SWKV KSL 12 - 1,6 3DF	L: 240 W: 175 H: 113	1,5	R30	$F_{zul,fi30}$	[kN]	0,7	0,1	0,2
			R60	$F_{zul,fi60}$	[kN]	0,6	0,1	0,2
			R90	$F_{zul,fi90}$	[kN]	0,4	0,1	0,2
			R120	$F_{zul,fi120}$	[kN]	0,3	0,1	0,2
			R30	$M_{zul,fi30}^0$	[kN]	0,5	0,8	0,8
			R60	$M_{zul,fi60}^0$	[kN]	0,4	0,6	0,6
			R90	$M_{zul,fi90}^0$	[kN]	0,2	0,4	0,4
			R120	$M_{zul,fi120}^0$	[kN]	0,2	0,3	0,3

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi}$ = 1.0 was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{v,sk}$:0.15 [N/mm²] and $\sigma_{s,sk}$:0.2 [N/mm²].



Masonry

Solid clay brick MZ acc. to DIN EN 771-1:2015-11

Single fastening without fire exposure, steel

Screw size TSM high performance			TSM 5	TSM 6	TSM 8	TSM 10			
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}		
			35	35	55	45	65	55	75
Nominal diameter of drill bit	d_o	[mm]	5	6	8	10			
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	5,40	6,40	8,45	10,45			
Depth of drill hole	$h_o \geq$	[mm]	55	55	75	65	85	75	95
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	8	12	14			
Torque for manual installation	$max. T_{inst}$	[Nm]	2	3	16	23			
Torque for rotary screw driver	$T_{imp,max}$	[Nm]	4	9	14	-			
Impact screw driver	$T_{imp,max}$	[Nm]	-				185		
Minimum wall thickness	h_{min}	[mm]	240						
Minimum edge distance	C_{min}	[mm]	80						
Minimum spacing	S_{min}	[mm]	80						
Distance to the horizontal joints	$C_{j \perp}$	[mm]	≥ 35						
Distance to the vertical joints	$C_{j \parallel}$	[mm]	≥ 80						

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 5		TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
						35	35	55	45	65	55	75	
MZ 20 - 2,0 - NF	L: 240 W: 115 H: 71	2,1	21	N_{zul}	[kN]	0,5		0,7		0,9	0,9		
				V_{zul}	[kN]	0,6				0,8			
			25	N_{zul}	[kN]	0,5		0,7		1,0	1,0		
				V_{zul}	[kN]	0,7				0,9			
			30	N_{zul}	[kN]	0,5		0,8		1,1	1,1		
				V_{zul}	[kN]	0,7				0,9			
			31	N_{zul}	[kN]	0,5		0,8		1,1	1,1		
				V_{zul}	[kN]	0,7				0,7	0,9		

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M1} = 2.5$ was taken into account on the resistance side and a partial safety factor $\gamma_F = 1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{vko} = 0.15$ [N/mm²] and $\sigma_{gr} = 0.2$ [N/mm²].

Single fastening under fire exposure, steel

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 5		TSM 6		TSM 8		TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	
						$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$	35	35	55	45	65	55	75
MZ 20 - 2,0 - NF	L: 240 W: 15 H: 71	2,1	R30	$F_{zul,fi30}$	[kN]	1,1	1,3	1,3	1,3	1,3	1,7	1,7	
			R60	$F_{zul,fi60}$	[kN]	0,8	1,0	1,0	1,0	1,0	1,6	1,6	
			R90	$F_{zul,fi90}$	[kN]	0,5	0,6	0,6	0,6	0,6	1,6	1,6	
			R120	$F_{zul,fi120}$	[kN]	0,3	0,5	0,5	0,5	0,5	1,5	1,5	
			R30	$M_{zul,fi30}^0$	[kN]	0,8	1,1	1,1	1,5	1,5	2,5	2,5	
			R60	$M_{zul,fi60}^0$	[kN]	0,5	0,8	0,8	1,1	1,1	2,4	2,4	
			R90	$M_{zul,fi90}^0$	[kN]	0,3	0,5	0,5	0,8	0,8	2,3	2,3	
			R120	$M_{zul,fi120}^0$	[kN]	0,2	0,4	0,4	0,6	0,6	2,2	2,2	

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi} = 1.0$ was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{vko} = 0.15$ [N/mm²] and $\sigma_{gr} = 0.2$ [N/mm²].

Masonry

Solid light weight concrete brick acc. to DIN EN 771-3:2015-11

Single fastening without fire exposure, steel

Screw size TSM high performance			TSM 8	TSM 10
Nominal embedment depth	h_{nom}	[mm]	h_{nom2}	h_{nom2}
			65	75
Nominal diameter of drill bit	d_0	[mm]	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,45
Depth of drill hole	$h_0 \geq$	[mm]	85	95
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	12	14
Torque for manual installation	$max. T_{inst}$	[Nm]	6	5
Torque for rotary screw driver	$T_{imp,max}$	[Nm]	10	14
Minimum wall thickness	h_{min}	[mm]	240	
Minimum edge distance	C_{min}	[mm]	80	
Minimum spacing	S_{min}	[mm]	80	
Distance to the horizontal joints	$C_{j\perp}$	[mm]	≥ 35	
Distance to the vertical joints	$C_{j\parallel}$	[mm]	≥ 80	

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 8	TSM 10
				h_{nom}	[mm]	h_{nom2}	h_{nom2}
						65	75
VBL 4 - 1,0 2 DF	L: 240 W: 115 H: 113	1,5	4	N_{zul}	[kN]	0,2	0,3
				V_{zul}	[kN]	0,7	0,9
			5	N_{zul}	[kN]	0,2	0,4
				V_{zul}	[kN]	0,7	1,1

For the determination of the approved load, the partial safety factor from the approval $\gamma_M=2,5$ was taken into account on the resistance side and a partial safety factor $\gamma_F=1,4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{yk}=0,15$ [N/mm²] and $\sigma_d=0,2$ [N/mm²].

Masonry

Solid calcium silicate brick KS acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, stainless steel A4

Screw size TSM high performance			TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom}	[mm]	h_{noml}	h_{noml}	h_{noml}
			45	55	75
Nominal diameter of drill bit	d_o	[mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45
Depth of drill hole	$h_o \geq$	[mm]	55	65	85
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8	12	14
Torque for manual installation	$max. T_{inst}$	[Nm]	11	24	41
Impact screw driver	$T_{imp,max}$	[Nm]	185	300	
Minimum wall thickness	h_{min}	[mm]	240		
Minimum edge distance	C_{min}	[mm]	80		
Minimum spacing	S_{min}	[mm]	80		
Distance to the horizontal joints	C_{\perp}	[mm]	≥ 35		
Distance to the vertical joints	C_{\parallel}	[mm]	≥ 80		

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 6	TSM 8	TSM 10
				h_{nom}	[mm]	h_{noml}	h_{noml}	h_{noml}
						45	55	75
KS 20 - 2,0 - NF	L: 240 W: 115 H: 71	2	26	N_{zul}	[kN]	0,7	1,2	1,3
				V_{zul}	[kN]	0,8	0,6	0,6
			30	N_{zul}	[kN]	0,8	1,3	1,4
				V_{zul}	[kN]	0,9	0,7	0,7
			35	N_{zul}	[kN]	0,9	1,4	1,5
				V_{zul}	[kN]	0,9	0,7	0,7
			38	N_{zul}	[kN]	0,9	1,4	1,5
				V_{zul}	[kN]	1,0	0,7	0,7

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_{E,1.4}$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{p,0.2}$ [N/mm²].

Single fastening under fire exposure, stainless steel A4

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 6	TSM 8	TSM 10
				h_{nom}	[mm]	h_{noml}	h_{noml}	h_{noml}
				$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		45	55	75
KS 20 - 2,0 - NF	L: 240 W: 115 H: 71	2	R30	$F_{zul,fi30}$	[kN]	1,3	1,3	3,4
			R60	$F_{zul,fi60}$	[kN]	1,0	1,0	2,7
			R90	$F_{zul,fi90}$	[kN]	0,6	0,6	2,0
			R120	$F_{zul,fi120}$	[kN]	0,5	0,5	1,7
			R30	$M_{zul,fi30}^0$	[kN]	1,1	1,5	4,9
			R60	$M_{zul,fi60}^0$	[kN]	0,8	1,1	4,9
			R90	$M_{zul,fi90}^0$	[kN]	0,5	0,8	3,0
			R120	$M_{zul,fi120}^0$	[kN]	0,4	0,6	2,5

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi}$ = 1.0 was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{p,0.2}$ [N/mm²].

Masonry

Silka XL solid calcium silicate brick KS 12DF acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, stainless steel A4

Screw size TSM high performance			TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom1}
			45	55	75
Nominal diameter of drill bit	d_0	[mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45
Depth of drill hole	$h_0 \geq$	[mm]	55	65	85
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8	12	14
Torque for manual installation	$max. T_{inst}$	[Nm]	11	25	41
Torque for rotary screw driver	$T_{imp,max}$	[Nm]	10	-	
Impact screw driver	$T_{imp,max}$	[Nm]	185	300	
Minimum wall thickness	h_{min}	[mm]	175		
Minimum edge distance	c_{min}	[mm]	80		
Minimum spacing	s_{min}	[mm]	80		
Distance to the horizontal joints	$c_{j \perp}$	[mm]	≥ 40		
Distance to the vertical joints	$c_{j \parallel}$	[Nm]	≥ 80		

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 6	TSM 8	TSM 10
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom1}
						45	55	75
KS - R (P) 20 - 2,0 - 12 DF	L: 498 W: 175 H: 248	1,8	14	N_{zul}	[kN]	0,7	2,0	1,8
				V_{zul}	[kN]	0,9	0,9	1,7
			15	N_{zul}	[kN]	0,7	2,1	2,0
				V_{zul}	[kN]	0,9	0,9	1,7
			20	N_{zul}	[kN]	0,8	2,4	2,3
				V_{zul}	[kN]	1,1	1,1	2,0

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_F=1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Single fastening under fire exposure, stainless steel A4

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 6
				h_{nom}	[mm]	h_{nom1}
				$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		45
KS - R (P) 20 - 2,0 - 12 D	L: 498 W: 175 H: 248	1,8	R30	$F_{zul,fi30}$	[kN]	0,3
			R60	$F_{zul,fi60}$	[kN]	0,3
			R90	$F_{zul,fi90}$	[kN]	0,3
			R120	$F_{zul,fi120}$	[kN]	0,2
			R30	$M_{zul,fi30}^0$	[kN]	1,2
			R60	$M_{zul,fi60}^0$	[kN]	0,9
			R90	$M_{zul,fi90}^0$	[kN]	0,5
			R120	$M_{zul,fi120}^0$	[kN]	0,3

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi}$ = 1.0 was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Masonry

Perforated calcium silicate brick KSL 3DF acc. to DIN EN 771-2:2015-11

Single fastening without fire exposure, stainless steel A4

Screw size TSM high performance			TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom}	[mm]	h_{nom1} 45	h_{nom1} 55	h_{nom1} 75
Nominal diameter of drill bit	d_o	[mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45
Depth of drill hole	$h_o \geq$	[mm]	55	65	85
Diameter of clearance hole in the fixture	$d_i \leq$	[mm]	8	12	14
Torque for manual installation	$max. T_{inst}$	[Nm]	2	5	7
Torque for rotary screw driver	$T_{imp,max}$	[Nm]	8	9	
Impact screw driver	$T_{imp,max}$	[Nm]	200		
Minimum wall thickness	h_{min}	[mm]	175		
Minimum edge distance	C_{min}	[mm]	80		
Minimum spacing	S_{min}	[mm]	80		
Distance to the horizontal joints	C_{\perp}	[mm]	≥ 35		
Distance to the vertical joints	C_{\parallel}	[Nm]	≥ 58		

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 6	TSM 8	TSM 10
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom1}
						45	55	75
SWKV KSL 12 - 1,6 3DF	L: 240 W: 175 H: 113	1,5	17	N_{zul}	[kN]	0,3	0,5	0,6
				V_{zul}	[kN]	0,5	0,5	0,6
			20	N_{zul}	[kN]	0,3	0,5	0,7
				V_{zul}	[kN]	0,5	0,5	0,7
			25	N_{zul}	[kN]	0,3	0,6	0,8
				V_{zul}	[kN]	0,6	0,6	0,8

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M,2.5}$ was taken into account on the resistance side and a partial safety factor $\gamma_F=1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Single fastening under fire exposure, stainless steel A4

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 6
				h_{nom}	[mm]	h_{nom1}
				$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		45
SWKV KSL 12 - 1,6 3DF	L: 240 W: 175 H: 113	1,5	R30	$F_{zul,fi30}$	[kN]	0,6
			R60	$F_{zul,fi60}$	[kN]	0,4
			R90	$F_{zul,fi90}$	[kN]	0,3
			R120	$F_{zul,fi120}$	[kN]	0,2
			R30	$M_{zul,fi30}^0$	[kN]	0,8
			R60	$M_{zul,fi60}^0$	[kN]	0,6
			R90	$M_{zul,fi90}^0$	[kN]	0,4
			R120	$M_{zul,fi120}^0$	[kN]	0,3

To determine the approved load, the partial safety factor from the approval $\gamma_{M,fi}$ = 1.0 was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{vk,0.15}$ [N/mm²] and $\sigma_{s,0.2}$ [N/mm²].

Masonry

Solid clay brick MZ acc. to DIN EN 771-1:2015-11

Single fastening without fire exposure, stainless steel A4

Screw size TSM high performance			TSM 6	TSM 8	TSM 10
Nominal embedment depth	h_{nom}	[mm]	h_{nom1} 35	h_{nom1} 45	h_{nom1} 75
Nominal diameter of drill bit	d_o	[mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45
Depth of drill hole	$h_o \geq$	[mm]	55	65	85
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8	12	14
Torque for manual installation	$max. T_{inst}$	[Nm]	0,3	12	26
Torque for rotary screw driver	$T_{imp,max}$	[Nm]	6	10	-
Impact screw driver	$T_{imp,max}$	[Nm]	-	-	155
Minimum wall thickness	h_{min}	[mm]	240		
Minimum edge distance	C_{min}	[mm]	80		
Minimum spacing	S_{min}	[mm]	80		
Distance to the horizontal joints	C_{\perp}	[mm]	≥ 35		
Distance to the vertical joints	C_{\parallel}	[mm]	≥ 80		

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Compressive strength [N/mm ²]	Screw size		TSM 6	TSM 8	TSM 10
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom1}
MZ 20 - 2,0 - NF	L: 240 W: 115 H: 71	2,1	21	N_{zul}	[kN]	0,4	0,6	0,8
				V_{zul}	[kN]	0,5	0,5	0,6
			25	N_{zul}	[kN]	0,5	0,7	0,9
				V_{zul}	[kN]	0,6	0,6	0,7
			30	N_{zul}	[kN]	0,5	0,8	1,0
				V_{zul}	[kN]	0,6	0,6	0,7
			31	N_{zul}	[kN]	0,5	0,8	1,0
				V_{zul}	[kN]	0,7	0,7	0,7

For the determination of the approved load, the partial safety factor from the approval $\gamma_{M1} = 2.5$ was taken into account on the resistance side and a partial safety factor $\gamma_F = 1.4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{vko} = 0.15$ [N/mm²] and $\sigma_{gr} = 0.2$ [N/mm²].

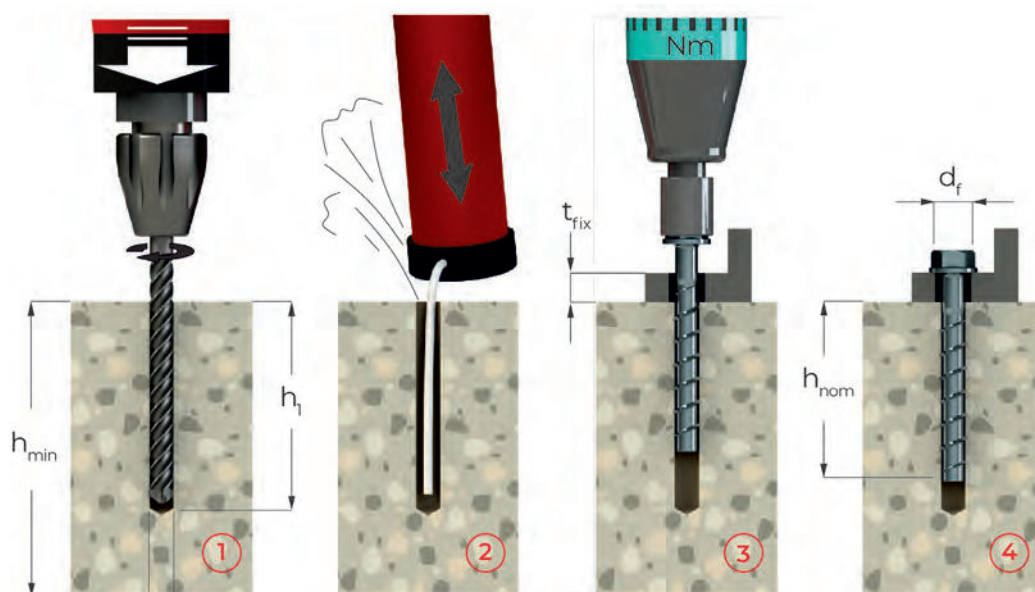
Single fastening under fire exposure, stainless steel A4

Nomenclature	Dimensions [mm]	Bulk density [kg/dm ³]	Fire resistance class	Screw size		TSM 6	TSM 8	TSM 10	
				h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom1}	
MZ 20 - 2,0 - NF	L: 240 W: 115 H: 71	2,1	R30	$F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$		45	55	75	
				R60	$F_{zul,fi60}$	[kN]	1,3	1,3	1,7
				R90	$F_{zul,fi90}$	[kN]	1,0	1,0	1,6
				R120	$F_{zul,fi120}$	[kN]	0,6	0,6	1,6
				R30	$M_{zul,fi30}^0$	[kN]	0,5	0,5	1,5
				R60	$M_{zul,fi60}^0$	[kN]	1,1	1,5	2,5
				R90	$M_{zul,fi90}^0$	[kN]	0,8	1,1	2,4
				R90	$M_{zul,fi90}^0$	[kN]	0,5	0,8	2,3
				R120	$M_{zul,fi120}^0$	[kN]	0,4	0,6	2,2

To determine the approved load, the partial safety factor from the approval $\gamma_{M1,fi} = 1.0$ was taken into account on the resistance side. The specified values apply irrespective of edge and center distances. The specified values apply for single fastening with $f_{vko} = 0.15$ [N/mm²] and $\sigma_{gr} = 0.2$ [N/mm²].

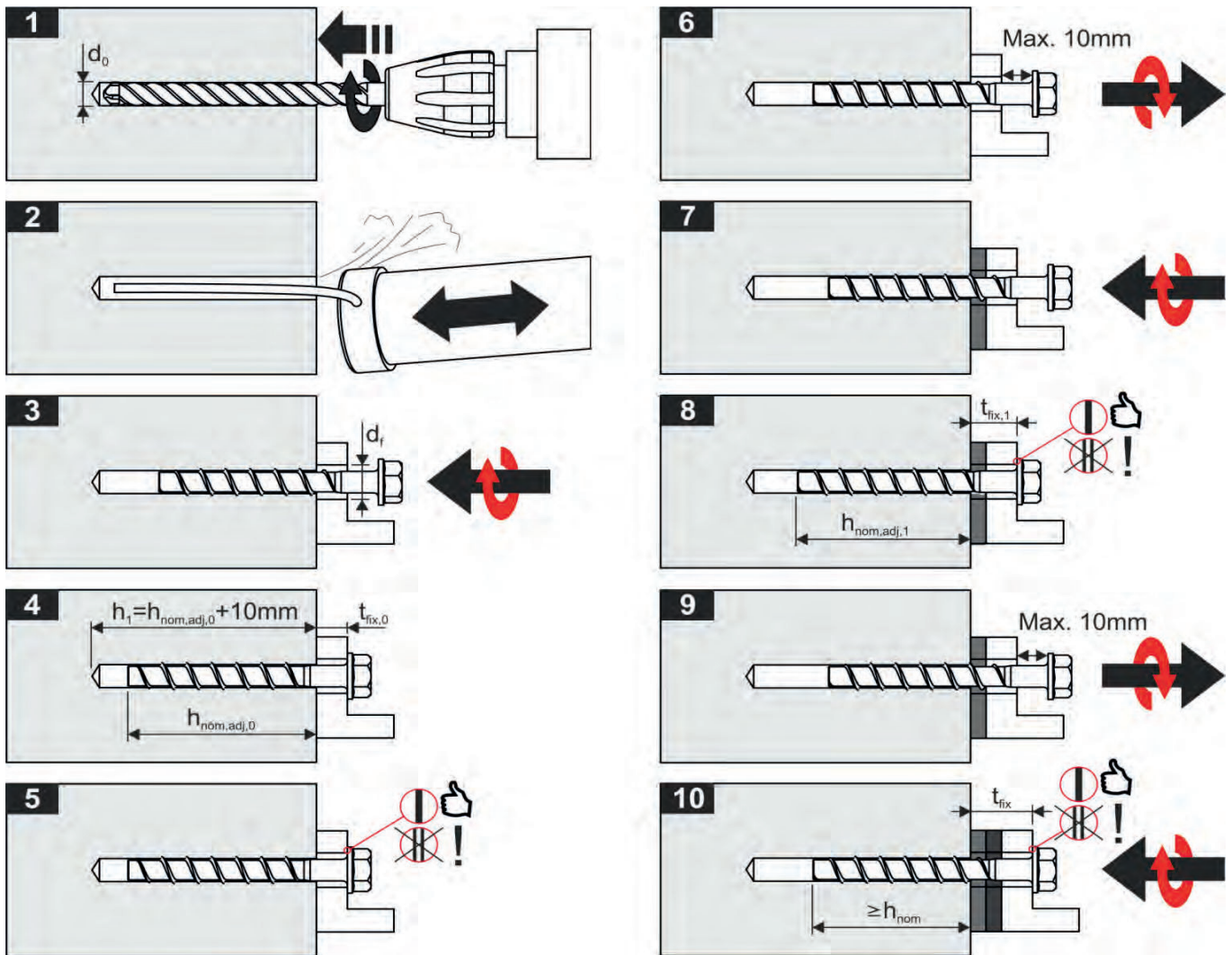
Installation Instructions

Installation instructions for concrete



- 1) Create borehole.
- 2) Thoroughly clean borehole.
- 3) Screw in concrete screw TOGE TSM High Performance.
- 4) The screw head must rest completely on the attachment.

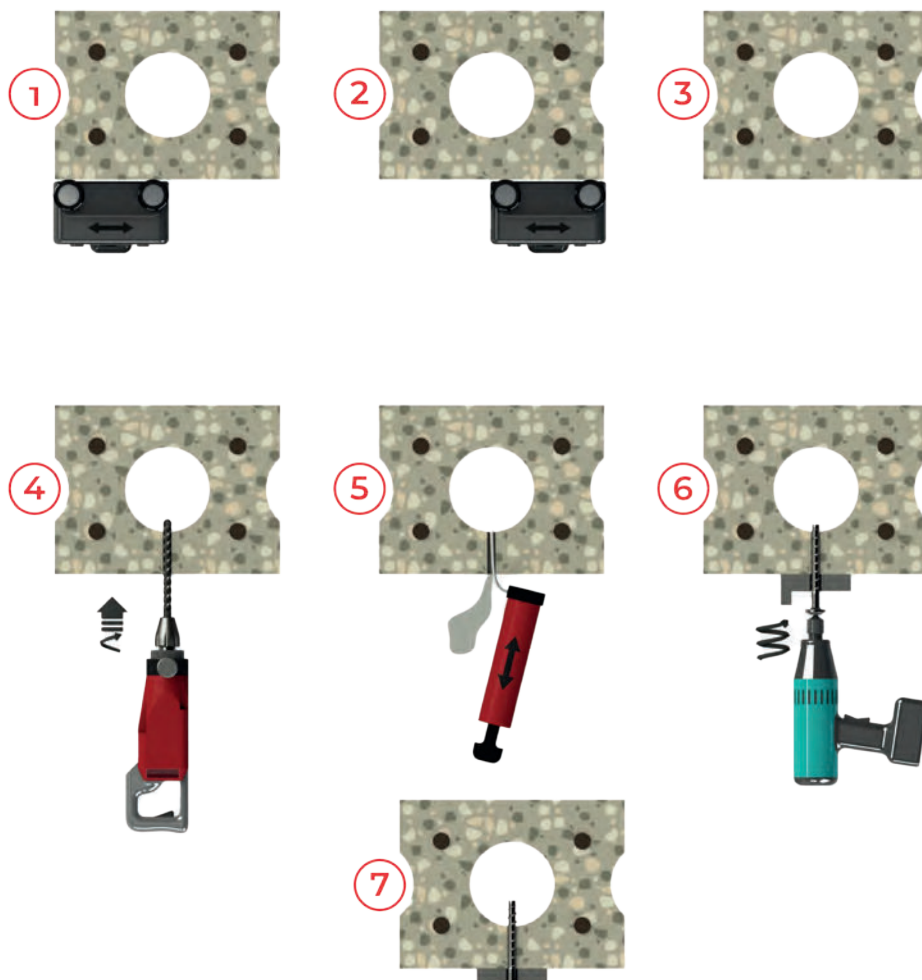
Installation instructions with adjustment for sizes 6 to 14



Important - please note during adjustment:

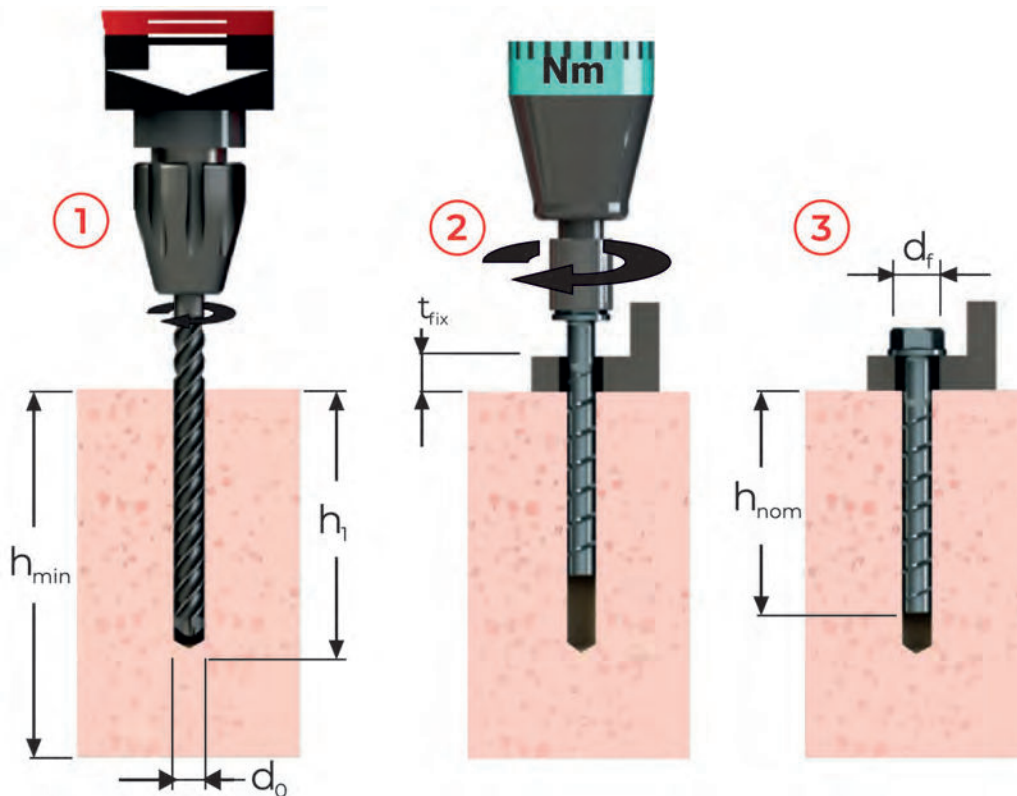
- The anchor may be adjusted maximum two times while the anchor may turn back at most 10 mm.
- The total allowed thickness of shims added during the adjustment process is 10 mm.
- The final embedment depth after adjustment process must be equal or longer than h_{nom} .

Installation instructions for prestressed hollow core slabs



- 1) - 3) Locate prestressing steel with the reinforcement bar detector and mark the location.
- 4) Create hole in the permissible anchoring area.
- 5) Clean hole.
- 6) Screw in concrete screw.
- 7) Screw head must fully contact the fixture.

Installation Instructions for Masonry

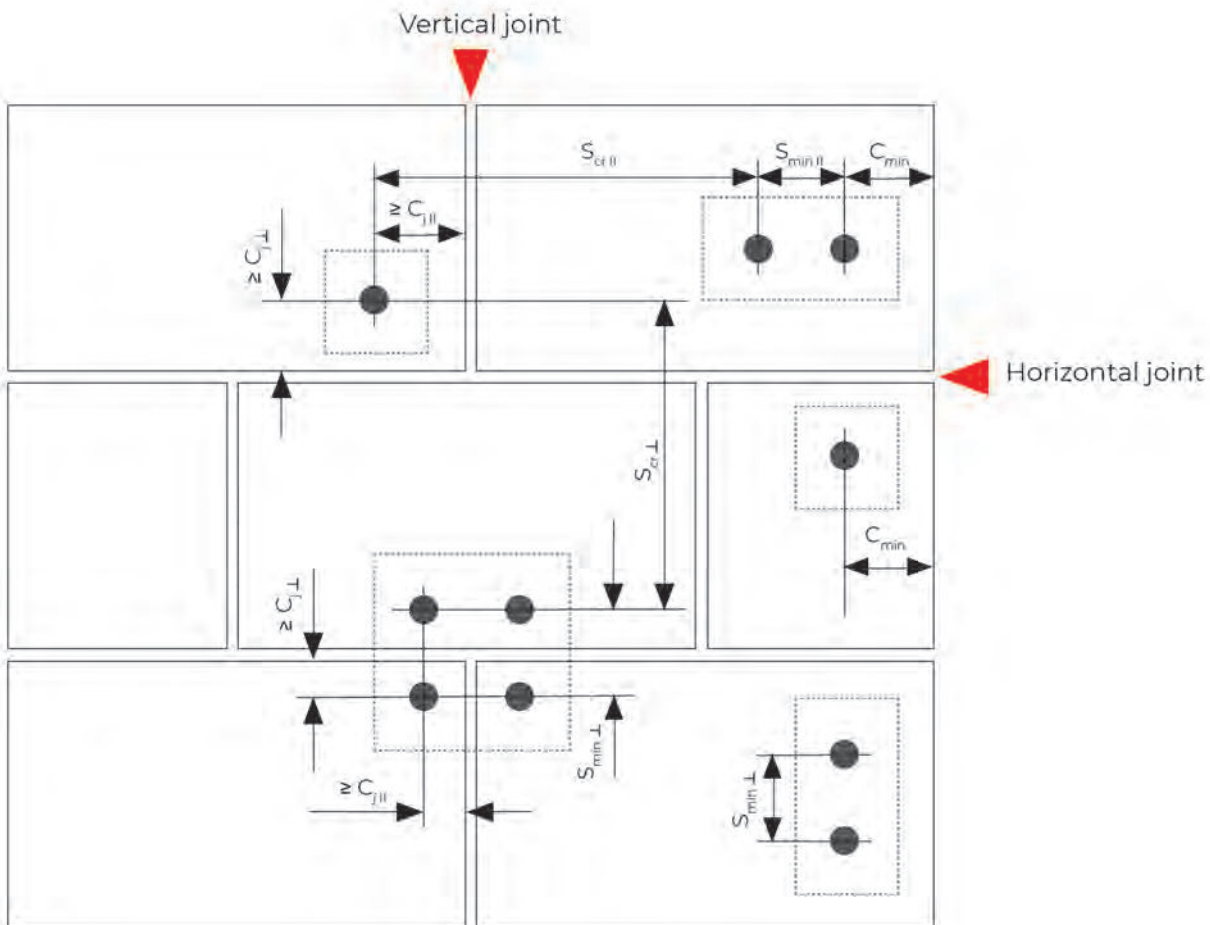


- 1) Drill hole in hammer or rotary mode.
- 2) Screw in with impact screw driver, cordless screw driver or wrench according to the respective stone and size.
- 3) The head must be undamaged and in contact with the fixture. It must not be possible to turn the screw, T_{inst} max. must not be exceeded.

Adjustability for Masonry Installation

See page 29 of the installation manual for adjustment instructions for sizes 6 to 14 (installation in concrete). Please also note the installation data for bricks in masonry.

Possible installation options in masonry



- C_{min} = Minimum edge distance to the free edge of the wall
- $C_{j||}$ = Distance to vertical joints
- $C_{j\perp}$ = Distance to horizontal joints
- $S_{min||}$ = Minimum spacing parallel to horizontal joint
- $S_{min\perp}$ = Minimum spacing perpendicular to horizontal joint
- $S_{cr||}$ = Characteristic spacing parallel to horizontal joint
- $S_{cr\perp}$ = Characteristic spacing perpendicular to horizontal joint