

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

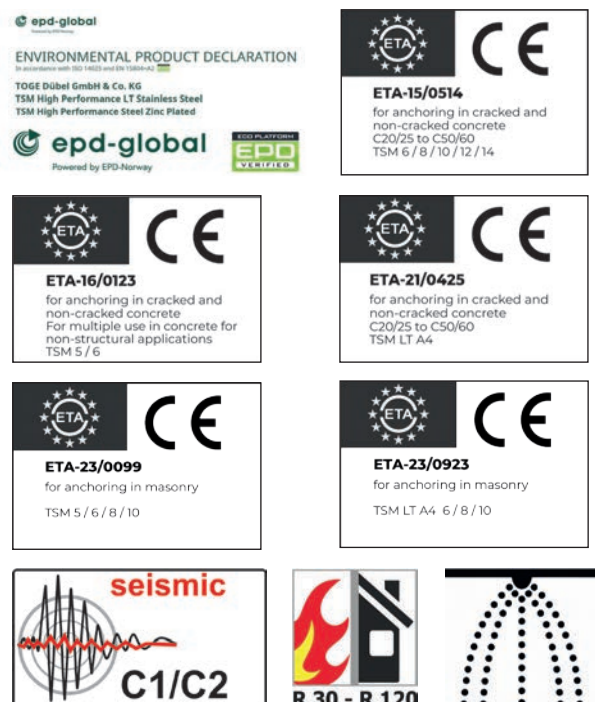
Approved for concrete strength classes from C20/25 to C50/60.

Cracked and non-cracked concrete.

Prestressed hollow core slabs (size 6).

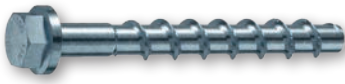


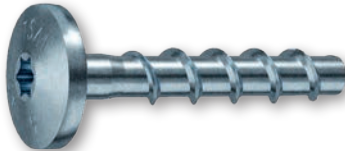

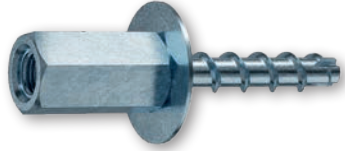

Approved for masonry.

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 TX drive	✓			✓
	Panhead with TX drive	✓			✓
	Large panhead with TX 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



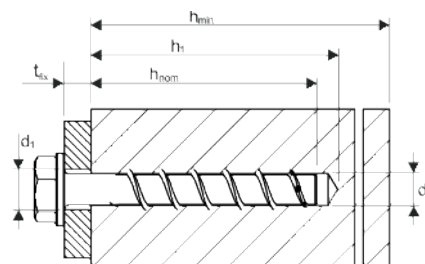
Product Overview

Steel - zinc plated

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Item nr.	Designation	Depth of drill hole $h_{o1} / h_{o2} / h_{o3}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
300 005 040	TSM 5x40 SW10	40mm / - / -	35mm / - / -	5mm / - / -	100
300 005 050	TSM 5x50 SW10	40mm / - / -	35mm / - / -	15mm / - / -	100
300 005 060	TSM 5x60 SW10	40mm / - / -	35mm / - / -	25mm / - / -	100
300 005 080	TSM 5x80 SW10	40mm / - / -	35mm / - / -	45mm / - / -	100
300 006 040	TSM 6x40 SW13	40mm / - / -	35mm / - / -	5mm / - / -	100
300 006 050	TSM 6x50 SW13	40mm / 45mm / -	35mm / 40mm / -	15mm / 10mm / -	100
300 006 060	TSM 6x60 SW13	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100
300 006 080	TSM 6x80 SW13	40mm / 45mm / 60mm	35mm / 40mm / 55mm	45mm / 40mm / 25mm	100
300 006 100	TSM 6x100 SW13	40mm / 45mm / 60mm	35mm / 40mm / 55mm	65mm / 60mm / 45mm	100
300 008 050	TSM 8x50 SW13	55mm / - / -	45mm / - / -	5mm / - / -	50
300 008 060	TSM 8x60 SW13	55mm / 65mm / -	45mm / 55mm / -	15mm / 5mm / -	50
300 008 070	TSM 8x70 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	25mm / 15mm / 5mm	50
300 008 080	TSM 8x80 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
300 008 090	TSM 8x90 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	45mm / 35mm / 25mm	50
300 008 100	TSM 8x100 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	55mm / 45mm / 35mm	50
300 008 120	TSM 8x120 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	75mm / 65mm / 55mm	50
300 008 140	TSM 8x140 SW13	55mm / 65mm / 75mm	45mm / 55mm / 65mm	95mm / 85mm / 75mm	50
300 010 060	TSM 10x60 SW 15	65mm / - / -	55mm / - / -	5mm / - / -	50
300 010 070	TSM 10x70 SW15	65mm / - / -	55mm / - / -	15mm / - / -	50
300 010 080	TSM 10x80 SW15	65mm / 85mm / -	55mm / 75mm / -	25mm / 5mm / -	50
300 010 090	TSM 10x90 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
300 010 100	TSM 10x100 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
300 010 120	TSM 10x120 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50
300 010 140	TSM 10x140 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	85mm / 65mm / 55mm	50
300 010 150	TSM 10x150 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	95mm / 75mm / 65mm	50
300 010 160	TSM 10x160 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	105mm / 85mm / 75mm	50
300 010 180*	TSM 10x180 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	125mm / 105mm / 95mm	25
300 010 200*	TSM 10x200 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	145mm / 125mm / 115mm	25
300 010 240*	TSM 10x240 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	185mm / 165mm / 155mm	25
300 010 280*	TSM 10x280 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	225mm / 205mm / 195mm	25

* Washer according to DIN 440, galvanised steel, included in scope of delivery.

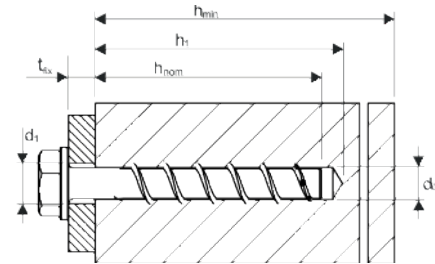


Steel - zinc plated

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Type list - continued from p. 3

Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
300 010 320*	TSM 10x320 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	265mm / 245mm / 235mm	25
300 010 360*	TSM 10x360 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	305mm / 285mm / 275mm	25
300 010 400*	TSM 10x400 SW15	65mm / 85mm / 95mm	55mm / 75mm / 85mm	345mm / 325mm / 315mm	25
300 012 080	TSM 12x80 SW17	75mm / - / -	65mm / - / -	15mm / - / -	25
300 012 110	TSM 12x110 SW17	75mm / 95mm / 110mm	65mm / 85mm / 100mm	45mm / 25mm / 10mm	25
300 012 130	TSM 12x130 SW17	75mm / 95mm / 110mm	65mm / 85mm / 100mm	65mm / 45mm / 30mm	25
300 012 150	TSM 12x150 SW17	75mm / 95mm / 110mm	65mm / 85mm / 100mm	85mm / 65mm / 50mm	25
300 014 080	TSM 14x80 SW21	85mm / - / -	75mm / - / -	5mm / - / -	25
300 014 110	TSM 14x110 SW21	85mm / 110mm / -	75mm / 100mm / -	35mm / 10mm / -	25
300 014 130	TSM 14x130 SW21	85mm / 110mm / 125mm	75mm / 100mm / 115mm	55mm / 30mm / 15mm	25
300 014 150	TSM 14x150 SW21	85mm / 110mm / 125mm	75mm / 100mm / 115mm	75mm / 50mm / 35mm	25

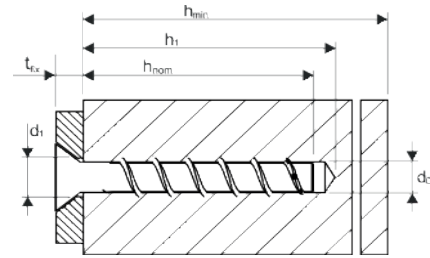
* Washer according to DIN 440, galvanised steel, included in scope of delivery.

Steel - zinc plated

Version with countersunk head
with TX drive



Size	Head-Ø
5	12,0 mm
6	13,0 mm
8	19,5 mm
10	21,5 mm



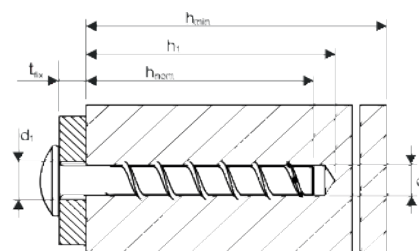
Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
311 005 040	TSM 5x40 C VZ25	40mm / - / -	35mm / - / -	5mm / - / -	100
311 005 050	TSM 5x50 C VZ25	40mm / - / -	35mm / - / -	15mm / - / -	100
311 005 060	TSM 5x60 C VZ25	40mm / - / -	35mm / - / -	25mm / - / -	100
311 006 040	TSM 6x40 C VZ30	40mm / - / -	35mm / - / -	5mm / - / -	100
311 006 050	TSM 6x50 C VZ30	40mm / 45mm / -	35mm / 40mm / -	15mm / 10mm / -	100
311 006 060	TSM 6x60 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100
311 006 080	TSM 6x80 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	45mm / 40mm / 25mm	100
311 006 100	TSM 6x100 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	65mm / 60mm / 45mm	100
311 006 120	TSM 6x120 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	85mm / 80mm / 65mm	100
311 006 140	TSM 6x140 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	105mm / 100mm / 85mm	100
311 006 160	TSM 6x160 C VZ30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	125mm / 120mm / 105mm	100
311 008 080	TSM 8x80 C VZ40	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
311 008 100	TSM 8x100 C VZ40	55mm / 65mm / 75mm	45mm / 55mm / 65mm	55mm / 45mm / 35mm	50
311 008 120	TSM 8x120 C VZ40	55mm / 65mm / 75mm	45mm / 55mm / 65mm	75mm / 65mm / 55mm	50
311 010 090	TSM 10x90 C VZ50	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
311 010 100	TSM 10x100 C VZ50	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
311 010 120	TSM 10x120 C VZ50	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50

Steel - zinc plated

Version with panhead and TX drive



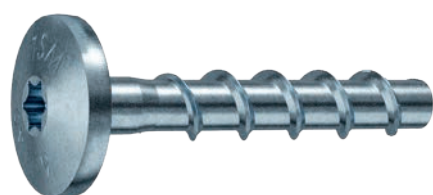
Size	Head-Ø
4	8,0 mm
5	14,0 mm
6	14,5 mm



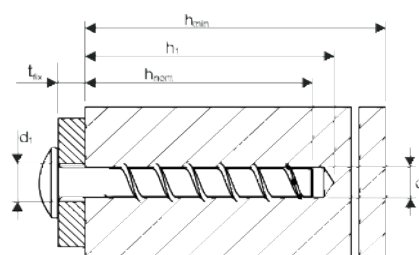
Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
322 004 030	TSM 4x30 P TX20	35mm	25mm / - / 29mm	5mm / - / 1mm	100
322 005 040	TSM 5x40 P TX30	40mm / - / -	35mm / - / -	5mm / - / -	100
322 005 050	TSM 5x50 P TX30	40mm / - / -	35mm / - / -	15mm / - / -	100
322 005 060	TSM 5x60 P TX30	40mm / - / -	35mm / - / -	25mm / - / -	100
322 006 040	TSM 6x40 P TX30	40mm / - / -	35mm / - / -	5mm / - / -	100
322 006 050	TSM 6x50 P TX30	40mm / 45mm / -	35mm / 40mm / -	15mm / 10mm / -	100
322 006 060	TSM 6x60 P TX30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100
322 006 080	TSM 6x80 P TX30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	45mm / 40mm / 25mm	100
322 006 100	TSM 6x100 P TX30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	65mm / 60mm / 45mm	100

Steel - zinc plated

Version with large panhead and TX drive



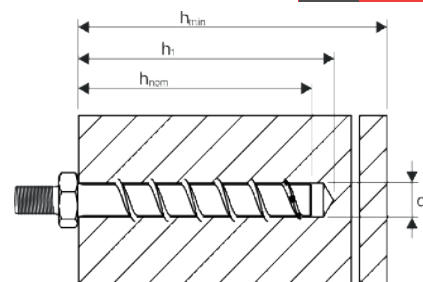
Size	Head-Ø
6	18,0 mm



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
333 006 040	TSM 6x40 LP TX30	40mm / - / -	35mm / - / -	5mm / - / -	100
333 006 050	TSM 6x50 LP TX30	40mm / 45mm / 40mm	35mm / 40mm / 55mm	15mm / 10mm / 5mm	100
333 006 060	TSM 6x60 LP TX30	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100

Steel - zinc plated

Version with hexagonal drive and metric external thread M8



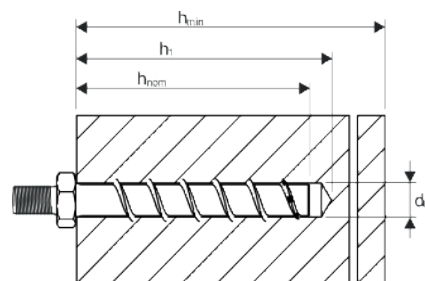
Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
355 006 035	TSM 6x35 K M8-16 SW10	40mm / - / -	35mm / - / -	- / - / -	100
355 006 055	TSM 6x55 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	20mm / 15mm / -	100
355 006 075	TSM 6x75 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	40mm / 35mm / 20mm	100
355 006 095	TSM 6x95 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	60mm / 55mm / 40mm	100
355 006 135	TSM 6x135 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	100mm / 95mm / 80mm	100
355 006 155	TSM 6x155 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	120mm / 115mm / 100mm	100
355 006 175	TSM 6x175 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	140mm / 135mm / 120mm	100
355 006 195	TSM 6x195 M8-16 SW10	40mm / 45mm / 60mm	35mm / 40mm / 55mm	160mm / 155mm / 140mm	100

Steel - zinc plated

Version with hexagonal drive and metric external thread M10



Size 6
Washer-Ø 19,0 mm

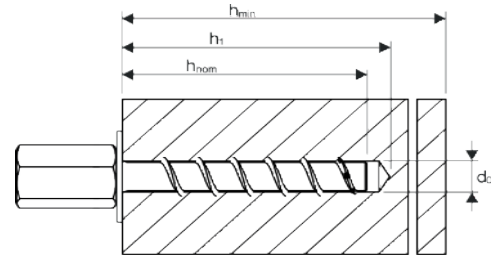
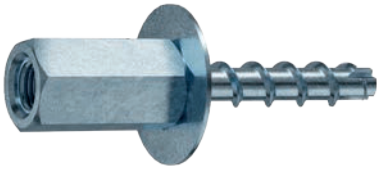


Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
355 206 040	TSM 6x40 M10-20 SW13	40mm / 45mm / -	35mm / 40mm / -	5mm / - / -	100

Steel - zinc plated

Version with metric female thread
M8/M10

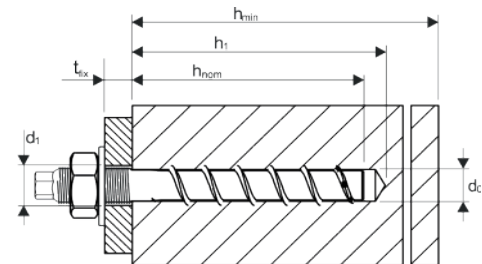
Size 6
Washer-Ø 25,0 mm



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
344 006 035	TSM 6x35 K IM 8/10	40mm / - / -	35mm / - / -	- / - / -	50
344 006 040	TSM 6x40 IM 8/10	40mm / 45mm / -	35mm / 40mm / -	??	50
344 006 055	TSM 6x55 IM 8/10	40mm / 45mm / 65mm	35mm / 40mm / 55mm	20mm / 15mm / -	50

Steel - zinc plated

Version with metric external thread
M10



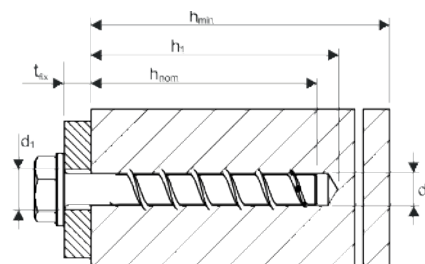
Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
366 008 105	TSM 8x105 M10x30 SW7	55mm / 65mm / 75mm	45mm / 55mm / 65mm	39mm / 29mm / 19mm	50
366 010 120	TSM 10x120 M12x20 SW9	65mm / 85mm / 95mm	55mm / 75mm / 85mm	40mm / 20mm / 10mm	50

Steel - TOGE ZFC

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
400 005 040	TSM 5x40 SW10 ZFC	40mm / - / -	35mm / - / -	5mm / - / -	100
400 005 050	TSM 5x50 SW10 ZFC	40mm / - / -	35mm / - / -	15mm / - / -	100
400 005 060	TSM 5x60 SW10 ZFC	40mm / - / -	35mm / - / -	25mm / - / -	100
400 005 080	TSM 5x80 SW10 ZFC	40mm / - / -	35mm / - / -	45mm / - / -	100
400 006 040	TSM 6x40 SW13 ZFC	40mm / - / -	35mm / - / -	5mm / - / -	100
400 006 050	TSM 6x50 SW13 ZFC	40mm / 45mm / -	35mm / 40mm / -	15mm / 10mm / -	100
400 006 060	TSM 6x60 SW13 ZFC	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100
400 006 080	TSM 6x80 SW13 ZFC	40mm / 45mm / 60mm	35mm / 40mm / 55mm	45mm / 40mm / 25mm	100
400 006 100	TSM 6x100 SW13 ZFC	40mm / 45mm / 60mm	35mm / 40mm / 55mm	65mm / 60mm / 45mm	100
400 008 050	TSM 8x50 SW13 ZFC	55mm / - / -	45mm / - / -	5mm / - / -	50
400 008 060	TSM 8x60 SW13 ZFC	55mm / 65mm / -	45mm / 55mm / -	15mm / 5mm / -	50
400 008 070	TSM 8x70 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	25mm / 15mm / 5mm	50
400 008 080	TSM 8x80 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
400 008 090	TSM 8x90 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	45mm / 35mm / 25mm	50
400 008 100	TSM 8x100 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	55mm / 45mm / 35mm	50
400 008 120	TSM 8x120 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	75mm / 65mm / 55mm	50
400 008 140	TSM 8x140 SW13 ZFC	55mm / 65mm / 75mm	45mm / 55mm / 65mm	95mm / 85mm / 75mm	50
400 010 060	TSM 10x60 SW 15 ZFC	65mm / - / -	55mm / - / -	5mm / - / -	50
400 010 070	TSM 10x70 SW15 ZFC	65mm / - / -	55mm / - / -	15mm / - / -	50
400 010 080	TSM 10x80 SW15 ZFC	65mm / 85mm / -	55mm / 75mm / -	25mm / 5mm / -	50
400 010 090	TSM 10x90 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
400 010 100	TSM 10x100 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
400 010 120	TSM 10x120 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50
400 010 140	TSM 10x140 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	85mm / 65mm / 55mm	50
400 010 150	TSM 10x150 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	95mm / 75mm / 65mm	50
400 010 160	TSM 10x160 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	105mm / 85mm / 75mm	50
400 010 180*	TSM 10x180 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	125mm / 105mm / 95mm	25
400 010 200*	TSM 10x200 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	145mm / 125mm / 115mm	25
400 010 240*	TSM 10x240 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	185mm / 165mm / 155mm	25
400 010 280*	TSM 10x280 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	225mm / 205mm / 195mm	25

* Washer according to DIN 440, galvanised steel, included in scope of delivery.

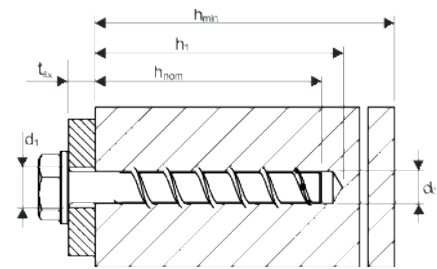


Steel - TOGE ZFC

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Type list - continued from p. 9

Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
400 010 320*	TSM 10x320 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	265mm / 245mm / 235mm	25
400 010 360*	TSM 10x360 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	305mm / 285mm / 275mm	25
400 010 400*	TSM 10x400 SW15 ZFC	65mm / 85mm / 95mm	55mm / 75mm / 85mm	345mm / 325mm / 315mm	25
400 012 080	TSM 12x80 SW17 ZFC	75mm / - / -	65mm / - / -	15mm / - / -	25
400 012 110	TSM 12x110 SW17 ZFC	75mm / 95mm / 110mm	65mm / 85mm / 100mm	45mm / 25mm / 10mm	25
400 012 130	TSM 12x130 SW17 ZFC	75mm / 95mm / 110mm	65mm / 85mm / 100mm	65mm / 45mm / 30mm	25
400 012 150	TSM 12x150 SW17 ZFC	75mm / 95mm / 110mm	65mm / 85mm / 100mm	85mm / 65mm / 50mm	25
400 014 080	TSM 14x80 SW21 ZFC	85mm / - / -	75mm / - / -	5mm / - / -	25
400 014 110	TSM 14x110 SW21 ZFC	85mm / 110mm / -	75mm / 100mm / -	35mm / 10mm / -	25
400 014 130	TSM 14x130 SW21 ZFC	85mm / 110mm / 125mm	75mm / 100mm / 115mm	55mm / 30mm / 15mm	25
400 014 150	TSM 14x150 SW21 ZFC	85mm / 110mm / 125mm	75mm / 100mm / 115mm	75mm / 50mm / 35mm	25

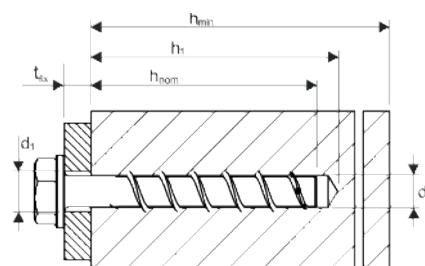
* Washer according to DIN 440, galvanised steel, included in scope of delivery.

Steel - TOGE ZFC Solid

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
500 005 040	TSM 5x40 SW10 ZFC Solid	40mm / - / -	35mm / - / -	5mm / - / -	100
500 005 050	TSM 5x50 SW10 ZFC Solid	40mm / - / -	35mm / - / -	15mm / - / -	100
500 005 060	TSM 5x60 SW10 ZFC Solid	40mm / - / -	35mm / - / -	25mm / - / -	100
500 005 080	TSM 5x80 SW10 ZFC Solid	40mm / - / -	35mm / - / -	45mm / - / -	100
500 006 040	TSM 6x40 SW13 ZFC Solid	40mm / - / -	35mm / - / -	5mm / - / -	100
500 006 050	TSM 6x50 SW13 ZFC Solid	40mm / 45mm / -	35mm / 40mm / -	15mm / 10mm / -	100
500 006 060	TSM 6x60 SW13 ZFC Solid	40mm / 45mm / 60mm	35mm / 40mm / 55mm	25mm / 20mm / 5mm	100
500 006 080	TSM 6x80 SW13 ZFC Solid	40mm / 45mm / 60mm	35mm / 40mm / 55mm	45mm / 40mm / 25mm	100
500 006 100	TSM 6x100 SW13 ZFC Solid	40mm / 45mm / 60mm	35mm / 40mm / 55mm	65mm / 60mm / 45mm	100
500 008 050	TSM 8x50 SW13 ZFC Solid	55mm / - / -	45mm / - / -	5mm / - / -	50
500 008 060	TSM 8x60 SW13 ZFC Solid	55mm / 65mm / -	45mm / 55mm / -	15mm / 5mm / -	50
500 008 070	TSM 8x70 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	25mm / 15mm / 5mm	50
500 008 080	TSM 8x80 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
500 008 090	TSM 8x90 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	45mm / 35mm / 25mm	50
500 008 100	TSM 8x100 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	55mm / 45mm / 35mm	50
500 008 120	TSM 8x120 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	75mm / 65mm / 55mm	50
500 008 140	TSM 8x140 SW13 ZFC Solid	55mm / 65mm / 75mm	45mm / 55mm / 65mm	95mm / 85mm / 75mm	50
500 010 060	TSM 10x60 SW 15 ZFC Solid	65mm / - / -	55mm / - / -	5mm / - / -	50
500 010 070	TSM 10x70 SW15 ZFC Solid	65mm / - / -	55mm / - / -	15mm / - / -	50
500 010 080	TSM 10x80 SW15 ZFC Solid	65mm / 85mm / -	55mm / 75mm / -	25mm / 5mm / -	50
500 010 090	TSM 10x90 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
500 010 100	TSM 10x100 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
500 010 120	TSM 10x120 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50
500 010 140	TSM 10x140 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	85mm / 65mm / 55mm	50
500 010 150	TSM 10x150 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	95mm / 75mm / 65mm	50
500 010 160	TSM 10x160 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	105mm / 85mm / 75mm	50
500 010 180*	TSM 10x180 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	125mm / 105mm / 95mm	25
500 010 200*	TSM 10x200 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	145mm / 125mm / 115mm	25
500 010 240*	TSM 10x240 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	185mm / 165mm / 155mm	25
500 010 280*	TSM 10x280 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	225mm / 205mm / 195mm	25

* Washer according to DIN 440, galvanised steel, included in scope of delivery.

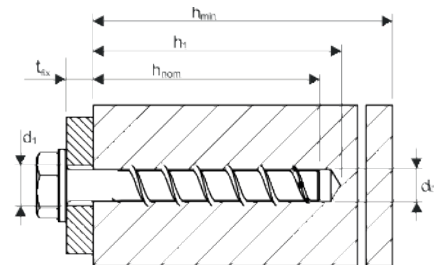


Steel - TOGE ZFC Solid

Version with hexagon head and pressed-on washer



Size	Washer-Ø
5	12,5 mm
6	15,0 mm
8	16,0 mm
10	20,0 mm
12	23,5 mm
14	28,5 mm



Type list - continued from p. 11

Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
500 010 320*	TSM 10x320 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	265mm / 245mm / 235mm	25
500 010 360*	TSM 10x360 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	305mm / 285mm / 275mm	25
500 010 400*	TSM 10x400 SW15 ZFC Solid	65mm / 85mm / 95mm	55mm / 75mm / 85mm	345mm / 325mm / 315mm	25
500 012 080	TSM 12x80 SW17 ZFC Solid	75mm / - / -	65mm / - / -	15mm / - / -	25
500 012 110	TSM 12x110 SW17 ZFC Solid	75mm / 95mm / 110mm	65mm / 85mm / 100mm	45mm / 25mm / 10mm	25
500 012 130	TSM 12x130 SW17 ZFC Solid	75mm / 95mm / 110mm	65mm / 85mm / 100mm	65mm / 45mm / 30mm	25
500 012 150	TSM 12x150 SW17 ZFC Solid	75mm / 95mm / 110mm	65mm / 85mm / 100mm	85mm / 65mm / 50mm	25
500 014 080	TSM 14x80 SW21 ZFC Solid	85mm / - / -	75mm / - / -	5mm / - / -	25
500 014 110	TSM 14x110 SW21 ZFC Solid	85mm / 110mm / -	75mm / 100mm / -	35mm / 10mm / -	25
500 014 130	TSM 14x130 SW21 ZFC Solid	85mm / 110mm / 125mm	75mm / 100mm / 115mm	55mm / 30mm / 15mm	25
500 014 150	TSM 14x150 SW21 ZFC Solid	85mm / 110mm / 125mm	75mm / 100mm / 115mm	75mm / 50mm / 35mm	25

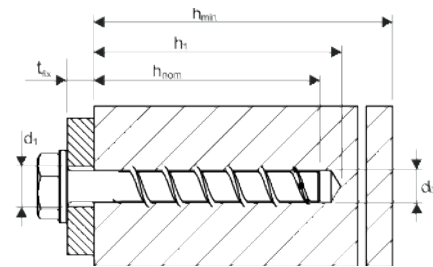
* Washer according to DIN 440, galvanised steel, included in scope of delivery.

Stainless steel - LT A4

Version with hexagon head and pressed-on washer



Size	Washer-Ø
6	17,0 mm
8	16,0 mm
10	20,0 mm



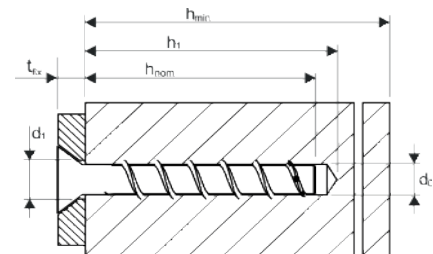
Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
700 006 050	TSM 6x50 SW13 LT A4	40mm / 50mm / -	35mm / 45mm / -	15mm / 5mm / -	100
700 006 060	TSM 6x60 SW13 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	25mm / 15mm / 5mm	100
700 006 070	TSM 6x70 SW13 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	35mm / 25mm / 15mm	100
700 008 070	TSM 8x70 SW13 LT A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	25mm / 15mm / 5mm	50
700 008 080	TSM 8x80 SW13 LT A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
700 010 090	TSM 10x90 SW15 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
700 010 100	TSM 10x100 SW15 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
700 010 120	TSM 10x120 SW15 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50

Stainless Steel - LT A4

Version with countersunk head with TX drive



Size	Head-Ø
6	13,0 mm
8	19,5 mm
10	21,5 mm

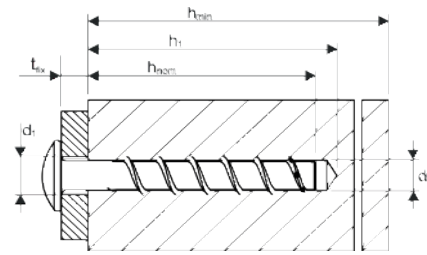


Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
711 006 050	TSM 6x50 C TX30 LT A4	40mm / 50mm / -	35mm / 45mm / -	15mm / 5mm / -	100
711 006 065	TSM 6x65 C TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	30mm / 20mm / 10mm	100
711 006 085	TSM 6x85 C TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	50mm / 40mm / 30mm	100
711 006 105	TSM 6x105 C TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	70mm / 60mm / 50mm	100
711 008 080	TSM 8x80 C TX40 LT A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	35mm / 25mm / 15mm	50
711 008 100	TSM 8x100 C TX40 LT A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	55mm / 45mm / 35mm	50
711 008 120	TSM 8x120 C TX40 LT A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	75mm / 65mm / 55mm	50
711 010 090	TSM 10x90 C TX50 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	35mm / 15mm / 5mm	50
711 010 100	TSM 10x100 C TX50 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	45mm / 25mm / 15mm	50
711 010 120	TSM 10x120 C TX50 LT A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	65mm / 45mm / 35mm	50

Stainless Steel - LT A4

Version with panhead and TX drive

Size 6
Head-Ø 15,0 mm

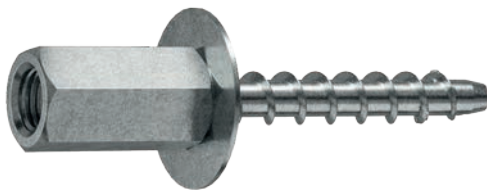
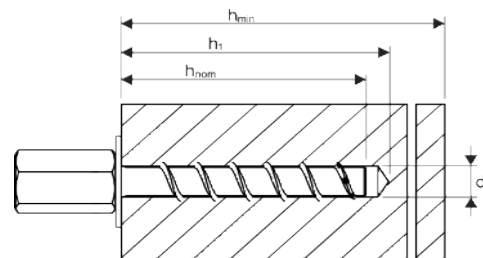


Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
722 006 050	TSM 6x50 P TX30 LT A4	40mm / 50mm / -	35mm / 45mm / -	15mm / 5mm / -	100
722 006 060	TSM 6x60 P TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	25mm / 15mm / 5mm	100
722 006 080	TSM 6x80 P TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	45mm / 35mm / 25mm	100
722 006 100	TSM 6x100 P TX30 LT A4	40mm / 50mm / 60mm	35mm / 45mm / 55mm	65mm / 55mm / 45mm	100

Stainless Steel - LT A4

Version with metric female thread M8/M10

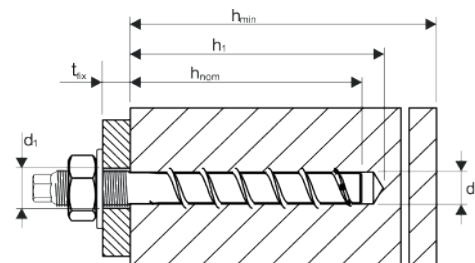
Size 6
Washer-Ø 25,0 mm



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
744 006 045	TSM 6x45 K IM 8/10 LT A4	50mm / - / -	45mm / - / -	- / - / -	50

Stainless Steel - A4

Version with metric external thread ¹⁾



Item nr.	Designation	Depth of drill hole $h_{01} / h_{02} / h_{03}$	Embedment depth of anchor $h_{nom1} / h_{nom2} / h_{nom3}$	Max. thickness of fixture $t_{fix1} / t_{fix2} / t_{fix3}$	Packing Unit
866 008 105	TSM 8x105 M10x30 SW7 A4	55mm / 65mm / 75mm	45mm / 55mm / 65mm	39mm / 29mm / 19mm	50
866 010 140	TSM 10x140 M12x35 SW9 A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	59mm / 39mm / 29mm	50
866 010 160	TSM 10x160 M12x55 SW9 A4	65mm / 85mm / 95mm	55mm / 75mm / 85mm	79mm / 59mm / 49mm	50

¹⁾ Technical data for this design can be found in the tables for steel zinc plated.



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_o	[mm]	6			8			10			12			14		
Depth of drill hole	h_o 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			50	70	50	70		
Minimum spacing	S_{min}	[mm]	40	40	50	50			50			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]	$2 \times h_{ef}$														
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	1,0			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 $\gamma_M=1,5$ 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⁾ 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.

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

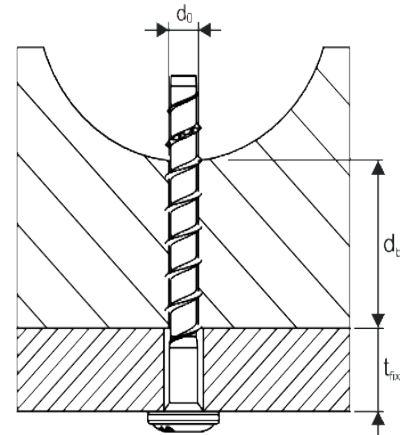
Screw size TSM high performance		TSM 5	TSM 6		
Nominal embedment depth	h_{nom} [mm]	h_{nom1}	h_{nom1}	h_{nom2}	
		35	35	55	
Approved load under tensile and shear use ($F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$)					
Fire resistance class					
R 30	Approved load	$F_{zul,fi 30}$ [kN]	0,4	0,8	0,9
R 60		$F_{zul,fi 60}$ [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.

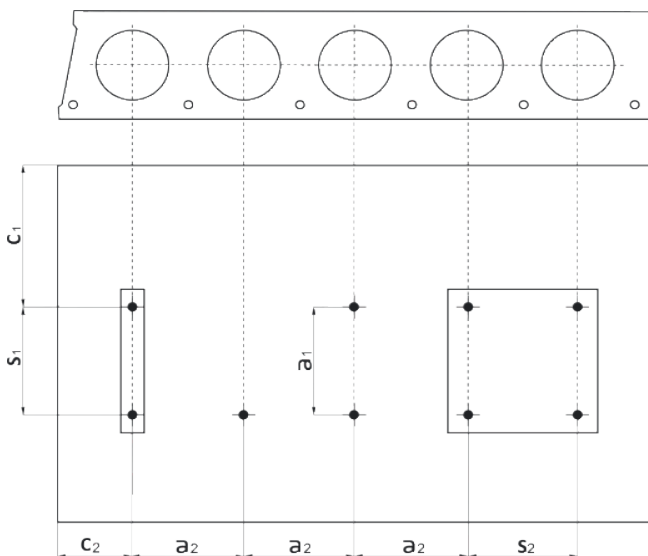
²⁾ These values apply without influence of the space and edge distancing.

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

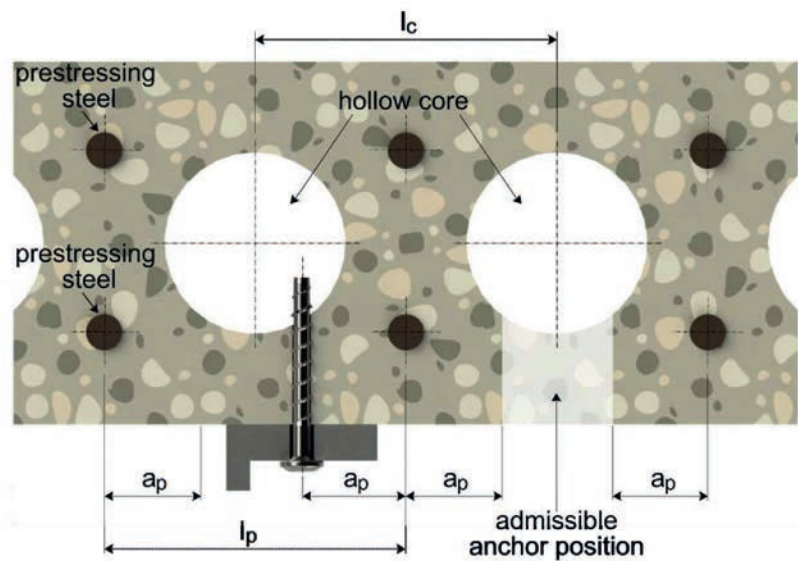
Screw size TSM high performance	TSM 6		
Bottom flange thickness	d_b	[mm]	≥ 25 ≥ 30 ≥ 35
Nominal diameter of drill bit	d_0	[mm]	6
Depth of drill hole	h_b min	[mm]	30 35 40
Clearance hole diameter	d_f max	[mm]	8
Approved tension load ¹⁾	F_{zul}	[kN]	0,5 1,0 1,4
Minimum edge distance	C_{min}	[mm]	100
Minimum 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_{nom2}	h_{nom1}	h_{nom2}		
		35	35	55	45	65	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	$\max. T_{inst}$ [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	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	2,2	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 $\sigma_{s,0.2}$: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 $\sigma_{s,0.2}$: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}	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}	
						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 $\gamma_E=1,4$ on the action side. The specified values apply regardless of edge and center distances. The specified values apply to single fastening with $f_{yk}=0,15$ [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 $f_{k,0.15}$ [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	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 $f_{k,0.15}$ [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, 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	$c_{j \parallel}$	[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}
						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 $f_{v,sk}$:0.15 [N/mm²] and $\sigma_{s,sk}$: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 $f_{v,sk}$: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, 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].

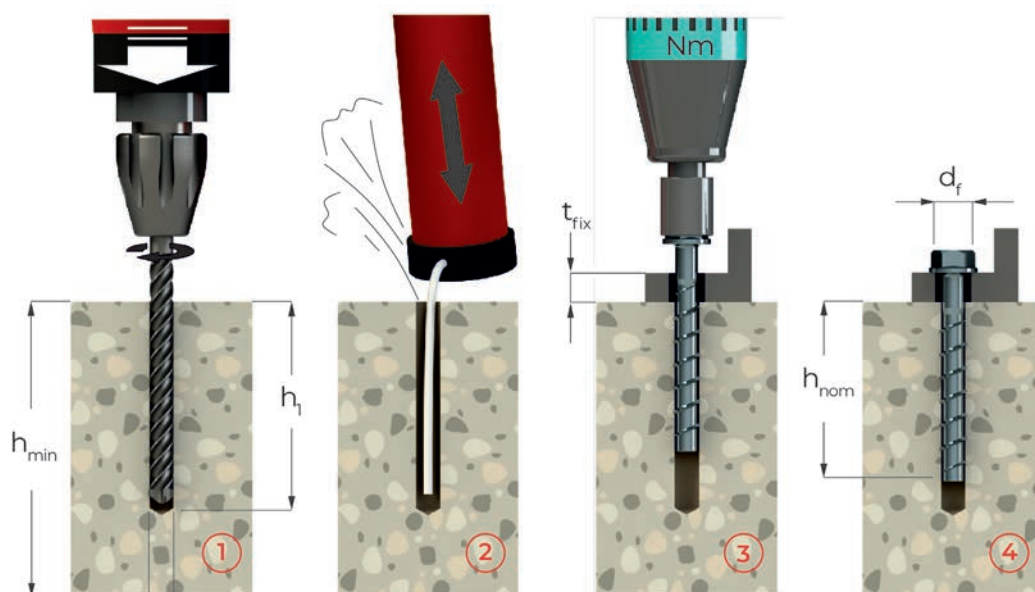
Single fastening under fire exposure, stainless steel A4

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 $\gamma_{M,fi} = 1.0$ 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].

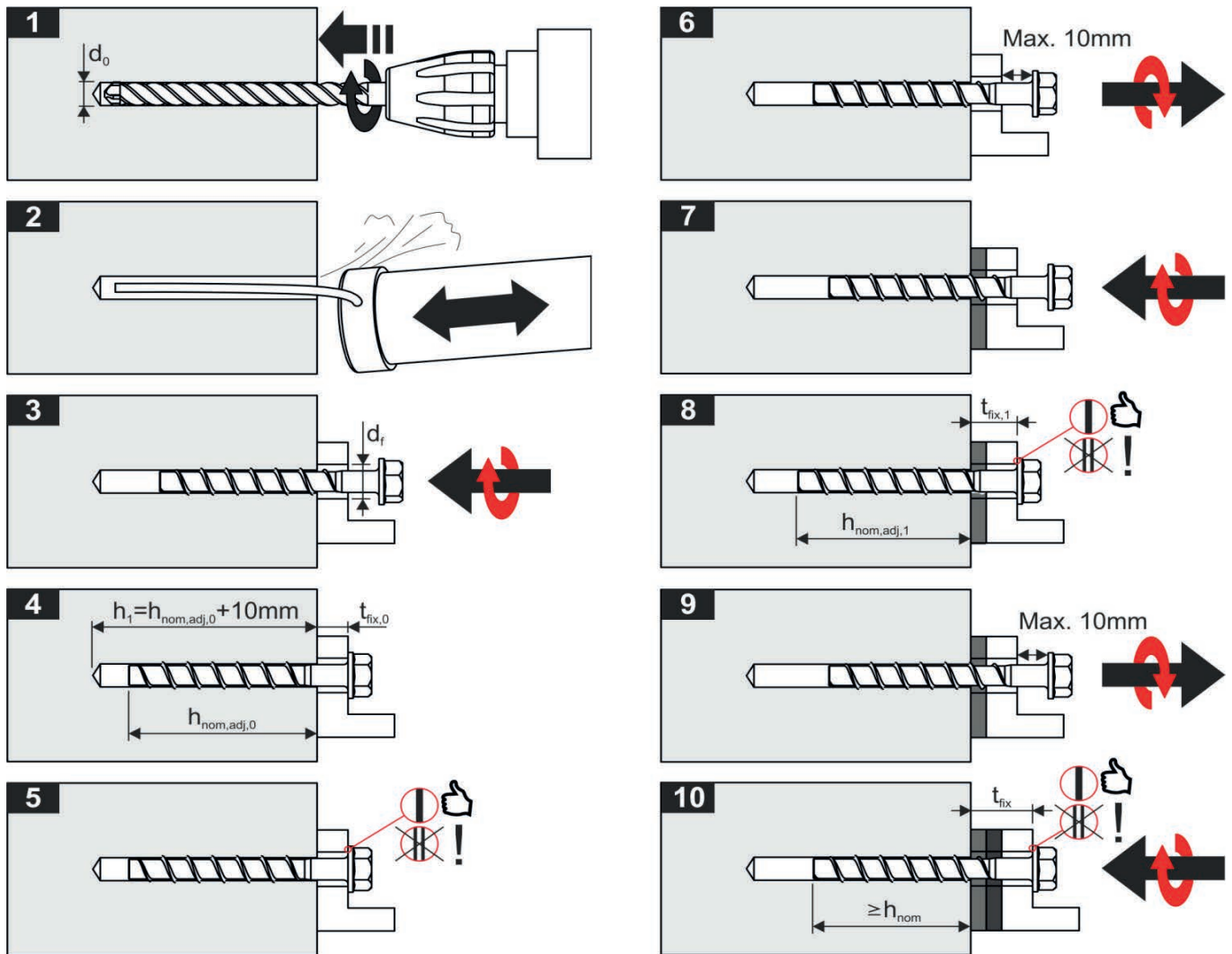
Installation Instructions

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.

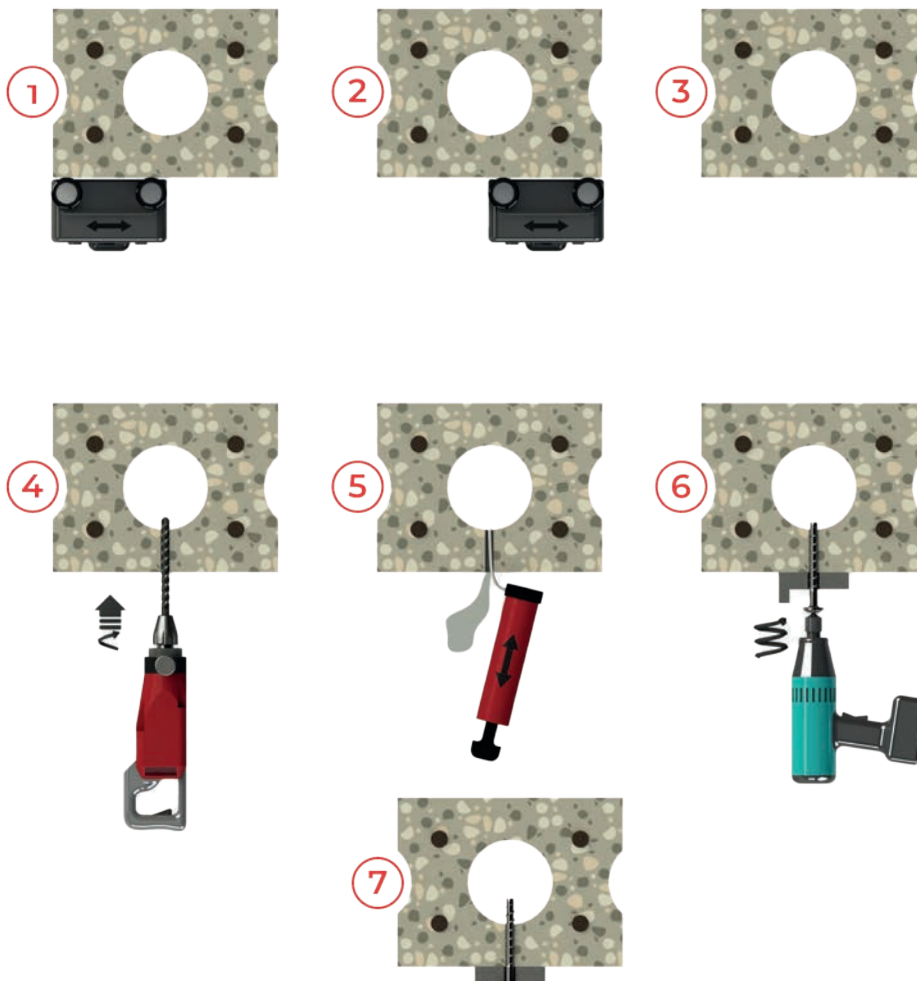
Installation instructions with adjustment for sizes 6 to 14



Important - please note during adjustment:

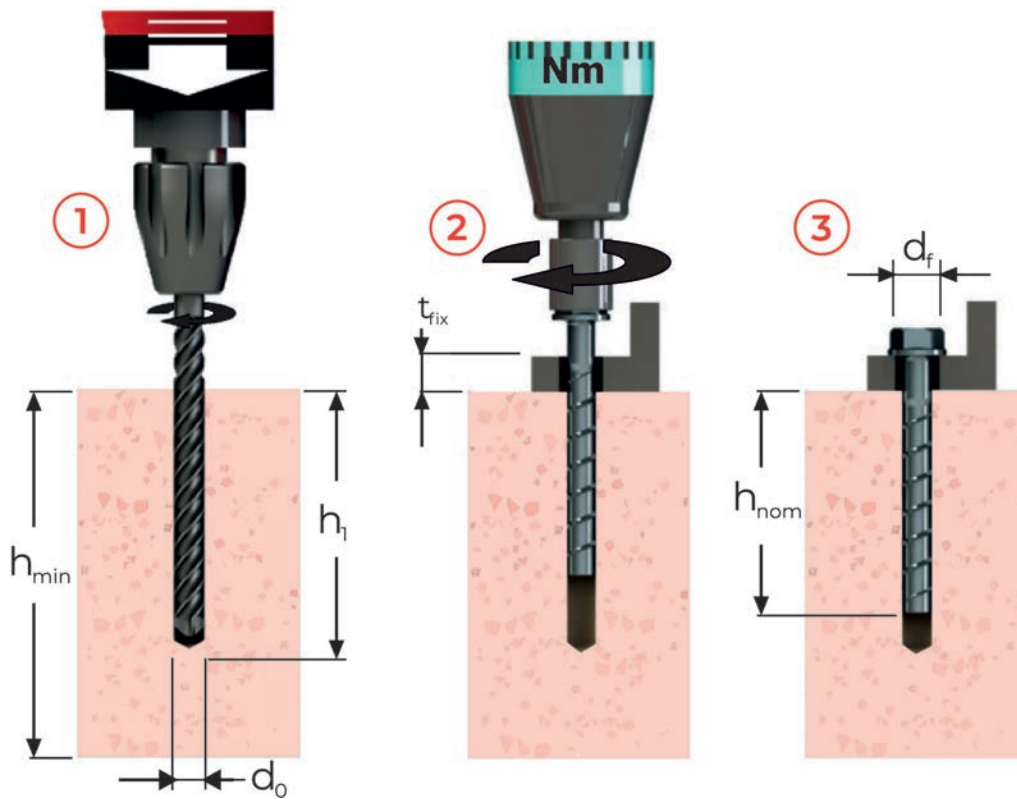
- The anchor may be adjusted maximum two times while the anchor may turn back at most 10 mm.
- The total allowed thickness of shims added during the adjustment process is 10 mm.
- The final embedment depth after adjustment process must be equal or longer than h_{nom} .

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

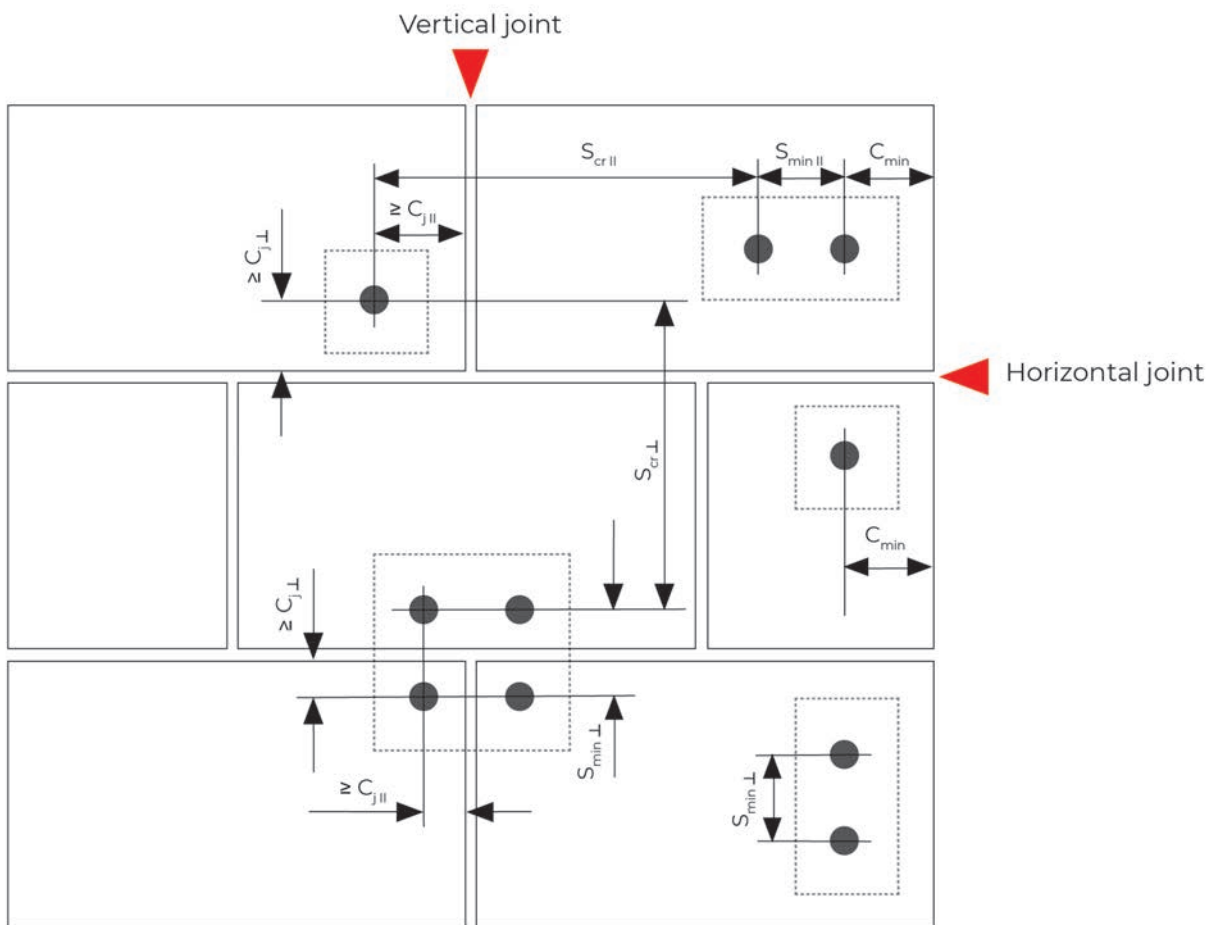


- 1) Drill hole in hammer or rotary mode.
- 2) Screw in with impact screw driver, cordless screw driver or wrench according to the respective stone and size.
- 3) The head must be undamaged and in contact with the fixture. It must not be possible to turn the screw, T_{inst} max. must not be exceeded.

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
- $C_{j\parallel}$ = Distance to vertical joints
- $C_{j\perp}$ = Distance to horizontal joints
- $S_{min\parallel}$ = Minimum spacing parallel to horizontal joint
- $S_{min\perp}$ = Minimum spacing perpendicular to horizontal joint
- $S_{cr\parallel}$ = Characteristic spacing parallel to horizontal joint
- $S_{cr\perp}$ = Characteristic spacing perpendicular to horizontal joint