

# TOGE Dübel

## Concrete screw TSM High Performance



Hexagonal head  
with pressed-on washer



Countersunk socket head



Pan head



Large Pan head



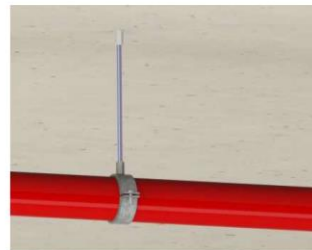
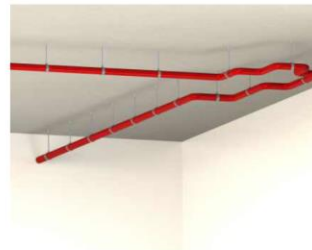
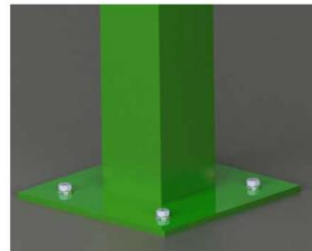
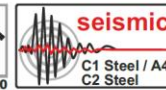
Metric connection thread  
and hexagonal drive



Countersunk socket head with  
metric female thread



Hexagonal head with metric  
connection thread



### Material:

- zinc flake-coated steel - TSM B, TSM BC
- A4 stainless steel - TSM BS
- HCR high corrosion-resistant steel - TSM BSH

### Base material:

- approved for concrete C 20/25 to C 50/60
- cracked and non-cracked concrete
- suitable for natural brick with a dense microstructure

### Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- can be removed without leaving residue behind
- can be loaded immediately

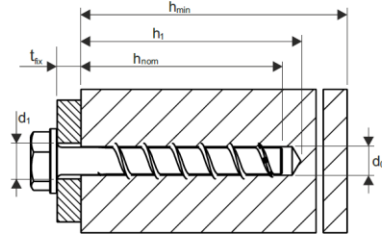
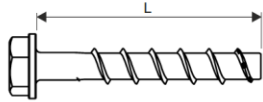
### Applications:

- pipeline fastening
- ceiling suspension fastening
- handrail bracket fastening
- fastening of shelf uprights in high-bay warehouses
- ventilation duct fastening
- wood substructure fastening

## Product overview:

zinc flake-coated steel

Hexagonal head with pressed-on washer



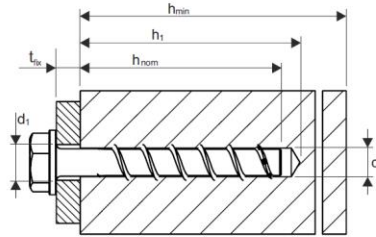
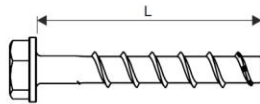
item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]		max. thickness of fixt. [mm]			Box Qty.	
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
400 005 040*	TSM	5 x 40	SW10 ZFC	5	35	-	-	40	-	-	5	-	-	100
400 005 050*	TSM	5 x 50	SW10 ZFC	5	35	-	-	40	-	-	15	-	-	100
400 005 060*	TSM	5 x 60	SW10 ZFC	5	35	-	-	40	-	-	25	-	-	100
400 006 040*	TSM	6 x 40	SW13 ZFC	6	35	-	-	40	-	-	5	-	-	100
400 006 050	TSM	6 x 50	SW13 ZFC	6	35	40	-	40	45	-	15	10	-	100
400 006 060	TSM	6 x 60	SW13 ZFC	6	35	40	55	40	45	60	25	20	5	100
400 006 080	TSM	6 x 80	SW13 ZFC	6	35	40	55	40	45	60	45	40	25	100
400 006 100	TSM	6 x 100	SW13 ZFC	6	35	40	55	40	45	60	65	60	45	100
400 008 050	TSM	8 x 50	SW13 ZFC	8	45	-	-	55	-	-	5	-	-	50
400 008 060	TSM	8 x 60	SW13 ZFC	8	45	55	-	55	65	-	15	5	-	50
400 008 070	TSM	8 x 70	SW13 ZFC	8	45	55	65	55	65	75	25	15	5	50
400 008 080	TSM	8 x 80	SW13 ZFC	8	45	55	65	55	65	75	35	25	15	50
400 008 090	TSM	8 x 90	SW13 ZFC	8	45	55	65	55	65	75	45	35	25	50
400 008 100	TSM	8 x 100	SW13 ZFC	8	45	55	65	55	65	75	55	45	35	50
400 008 120	TSM	8 x 120	SW13 ZFC	8	45	55	65	55	65	75	75	65	55	50
400 008 140	TSM	8 x 140	SW13 ZFC	8	45	55	65	55	65	75	95	85	75	50
400 010 060	TSM	10 x 60	SW15 ZFC	10	55	-	-	65	-	-	5	-	-	50
400 010 070	TSM	10 x 70	SW15 ZFC	10	55	-	-	65	-	-	15	-	-	50
400 010 080	TSM	10 x 80	SW15 ZFC	10	55	75	-	65	85	-	25	5	-	50
400 010 090	TSM	10 x 90	SW15 ZFC	10	55	75	85	65	85	95	35	15	5	50
400 010 100	TSM	10 x 100	SW15 ZFC	10	55	75	85	65	85	95	45	25	15	50
400 010 120	TSM	10 x 120	SW15 ZFC	10	55	75	85	65	85	95	65	45	35	50
400 010 140	TSM	10 x 140	SW15 ZFC	10	55	75	85	65	85	95	85	65	55	50
400 010 150	TSM	10 x 150	SW15 ZFC	10	55	75	85	65	85	95	95	75	65	50
400 010 160	TSM	10 x 160	SW15 ZFC	10	55	75	85	65	85	95	105	85	75	50
400 010 180	TSM	10 x 180	SW15 ZFC	10	55	75	85	65	85	95	125	105	95	25
400 010 200	TSM	10 x 200	SW15 ZFC	10	55	75	85	65	85	95	145	125	115	25
400 010 240	TSM	10 x 240	SW15 ZFC	10	55	75	85	65	85	95	185	165	155	25
400 010 280	TSM	10 x 280	SW15 ZFC	10	55	75	85	65	85	95	225	205	195	25
400 010 320	TSM	10 x 320	SW15 ZFC	10	55	75	85	65	85	95	265	245	235	25
400 010 360	TSM	10 x 360	SW15 ZFC	10	55	75	85	65	85	95	305	285	275	25
400 010 400	TSM	10 x 400	SW15 ZFC	10	55	75	85	65	85	95	345	325	315	25
400 012 080	TSM	12 x 80	SW17 ZFC	12	65	-	-	75	-	-	15	-	-	25
400 012 110	TSM	12 x 110	SW17 ZFC	12	65	85	100	75	95	110	45	25	10	25
400 012 130	TSM	12 x 130	SW17 ZFC	12	65	85	100	75	95	110	65	45	30	25
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400 014 080	TSM	14 x 80	SW21 ZFC	14	75	-	-	85	-	-	5	-	-	25
400 014 110	TSM	14 x 110	SW21 ZFC	14	75	100	-	85	110	-	35	10	-	25
400 014 130	TSM	14 x 130	SW21 ZFC	14	75	100	115	85	110	125	55	30	15	25
400 014 150	TSM	14 x 150	SW21 ZFC	14	75	100	115	85	110	125	75	50	35	25

\* only for multiple use approved

# TOGE Dübel

zinc plated steel

Hexagonal head with pressed-on washer



item nr.	Designation			Drill bit Ø [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$			$t_{fx}$			
300 005 040*	TSM	5 x 40	SW10	5	35	-	-	40	-	-	5	-	-	100
300 005 050*	TSM	5 x 50	SW10	5	35	-	-	40	-	-	15	-	-	100
300 005 060*	TSM	5 x 60	SW10	5	35	-	-	40	-	-	25	-	-	100
300 006 040*	TSM	6 x 40	SW13	6	35	-	-	40	-	-	5	-	-	100
300 006 050	TSM	6 x 50	SW13	6	35	40	-	40	45	-	15	10	-	100
300 006 060	TSM	6 x 60	SW13	6	35	40	55	40	45	60	25	20	5	100
300 006 080	TSM	6 x 80	SW13	6	35	40	55	40	45	60	45	40	25	100
300 006 100	TSM	6 x 100	SW13	6	35	40	55	40	45	60	65	60	45	100
300 008 050	TSM	8 x 50	SW13	8	45	-	-	55	-	-	5	-	-	50
300 008 060	TSM	8 x 60	SW13	8	45	55	-	55	65	-	15	5	-	50
300 008 070	TSM	8 x 70	SW13	8	45	55	65	55	65	75	25	15	5	50
300 008 080	TSM	8 x 80	SW13	8	45	55	65	55	65	75	35	25	15	50
300 008 090	TSM	8 x 90	SW13	8	45	55	65	55	65	75	45	35	25	50
300 008 100	TSM	8 x 100	SW13	8	45	55	65	55	65	75	55	45	35	50
300 008 120	TSM	8 x 120	SW13	8	45	55	65	55	65	75	75	65	55	50
300 008 140	TSM	8 x 140	SW13	8	45	55	65	55	65	75	95	85	75	50
300 010 060	TSM	10 x 60	SW15	10	55	-	-	65	-	-	5	-	-	50
300 010 070	TSM	10 x 70	SW15	10	55	-	-	65	-	-	15	-	-	50
300 010 080	TSM	10 x 80	SW15	10	55	75	-	65	85	-	25	5	-	50
300 010 090	TSM	10 x 90	SW15	10	55	75	85	65	85	95	35	15	5	50
300 010 100	TSM	10 x 100	SW15	10	55	75	85	65	85	95	45	25	15	50
300 010 120	TSM	10 x 120	SW15	10	55	75	85	65	85	95	65	45	35	50
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300 010 150	TSM	10 x 150	SW15	10	55	75	85	65	85	95	95	75	65	50
300 010 160	TSM	10 x 160	SW15	10	55	75	85	65	85	95	105	85	75	50
300 010 180	TSM	10 x 180	SW15	10	55	75	85	65	85	95	125	105	95	25
300 010 200	TSM	10 x 200	SW15	10	55	75	85	65	85	95	145	125	115	25
300 010 240	TSM	10 x 240	SW15	10	55	75	85	65	85	95	185	165	155	25
300 010 280	TSM	10 x 280	SW15	10	55	75	85	65	85	95	225	205	195	25
300 010 320	TSM	10 x 320	SW15	10	55	75	85	65	85	95	265	245	235	25
300 010 360	TSM	10 x 360	SW15	10	55	75	85	65	85	95	305	285	275	25
300 010 400	TSM	10 x 400	SW15	10	55	75	85	65	85	95	345	325	315	25
300 012 080	TSM	12 x 80	SW17	12	65	-	-	75	-	-	15	-	-	25
300 012 110	TSM	12 x 110	SW17	12	65	85	100	75	95	110	45	25	10	25
400 012 130	TSM	12 x 130	SW17	12	65	85	100	75	95	110	65	45	30	25
300 012 150	TSM	12 x 150	SW17	12	65	85	100	75	95	110	85	65	50	25
300 014 080	TSM	14 x 80	SW21	14	75	-	-	85	-	-	5	-	-	25
300 014 110	TSM	14 x 110	SW21	14	75	100	-	85	110	-	35	10	-	25
300 014 130	TSM	14 x 130	SW21	14	75	100	115	85	110	125	55	30	15	25
300 014 150	TSM	14 x 150	SW21	14	75	100	115	85	110	125	75	50	35	25

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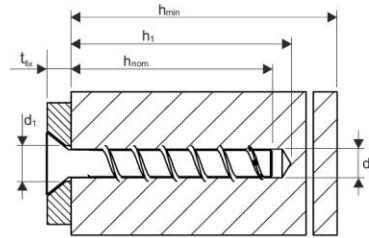
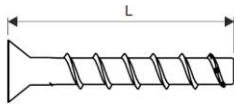
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zinc plated steel

Countersunk head with  
multipoint drive



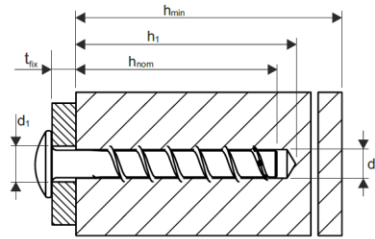
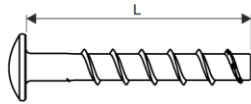
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	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$						
311 005 040*	TSM	5 x 40	C	VZ25	5	35	-	-	40	-	-	5	-	-	100
311 005 050*	TSM	5 x 50	C	VZ25	5	35	-	-	40	-	-	15	-	-	100
311 005 060*	TSM	5 x 60	C	VZ25	5	35	-	-	40	-	-	25	-	-	100
311 006 040*	TSM	6 x 40	C	VZ30	6	35	-	-	40	-	-	5	-	-	100
311 006 050	TSM	6 x 50	C	VZ30	6	35	40	-	40	45	-	15	10	-	100
311 006 060	TSM	6 x 60	C	VZ30	6	35	40	55	40	45	60	25	20	5	100
311 006 080	TSM	6 x 80	C	VZ30	6	35	40	55	40	45	60	45	40	25	100
311 006 100	TSM	6 x 100	C	VZ30	6	35	40	55	40	45	60	65	60	45	100
311 006 120	TSM	6 x 120	C	VZ30	6	35	40	55	40	45	60	85	80	65	100
311 006 140	TSM	6 x 140	C	VZ30	6	35	40	55	40	45	60	105	100	85	100
311 008 080	TSM	8 x 80	C	VZ40	8	45	55	65	55	65	75	35	25	15	50
311 008 080	TSM	8 x 100	C	VZ40	8	45	55	65	55	65	75	55	45	35	50
311 008 080	TSM	8 x 120	C	VZ40	8	45	55	65	55	65	75	75	65	55	50
311 010 090	TSM	10 x 90	C	VZ50	10	55	75	85	65	85	95	35	15	5	50
311 010 090	TSM	10 x 100	C	VZ50	10	55	75	85	65	85	95	45	25	15	50
311 010 090	TSM	10 x 120	C	VZ50	10	55	75	85	65	85	95	65	45	35	50

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zinc plated steel

Pan head with multipoint drive

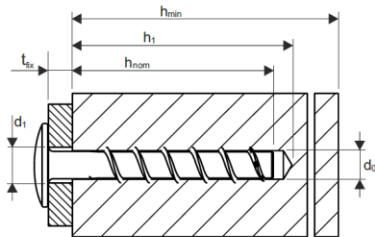
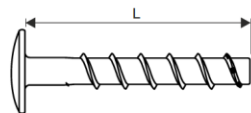


item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
322 005 040*	TSM 5 x 40	P	VZ30	5	35	-	-	40	-	-	5	-	-	100
322 005 050	TSM 5 x 50	P	VZ30	5	35	-	-	40	-	-	15	-	-	100
322 005 060	TSM 5 x 60	P	VZ30	5	35	-	-	40	-	-	25	-	-	100
322 006 040*	TSM 6 x 40	P	VZ30	6	35	-	-	40	-	-	5	-	-	100
322 006 050	TSM 6 x 50	P	VZ30	6	35	40	-	40	45	-	15	10	-	100
322 006 060	TSM 6 x 60	P	VZ30	6	35	40	55	40	45	60	25	20	5	100
322 006 080	TSM 6 x 80	P	VZ30	6	35	40	55	40	45	60	45	40	25	100
322 006 100	TSM 6 x 100	P	VZ30	6	35	40	55	40	45	60	65	60	45	100

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zinc plated steel

Large Pan head with multipoint drive



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
333 006 040*	TSM 6 x 40	LP	VZ30	6	35	-	-	40	-	-	5	-	-	100
333 006 060	TSM 6 x 60	LP	VZ30	6	35	40	55	40	45	60	25	20	5	100

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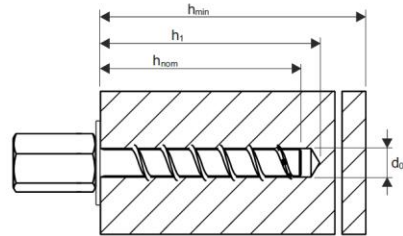
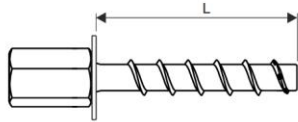
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# TOGE Dübel

zinc plated steel

Countersunk socket head with metric female thread IM M8/10

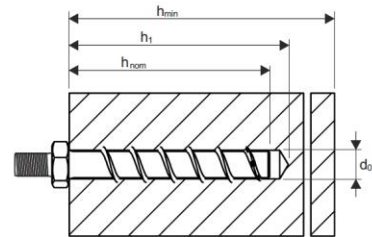
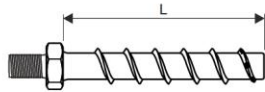


item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
344 006 035*	TSM 6 x 35 K	IMM8/10	SW13	6	35	-	-	40	-	-	0	-	-	50
344 006 055	TSM 6 x 55	IMM8/10	SW13	6	35	40	55	40	45	60	20	15	0	50

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zinc plated steel

Hexagonal head with metric connection thread



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
355 006 035*	TSM 6 x 35 K	M8-16	SW10	6	35	-	-	40	-	-	0	-	-	100
355 006 055	TSM 6 x 55	M8-16	SW10	6	35	40	55	40	45	60	20	15	0	100
355 006 075	TSM 6 x 75	M8-16	SW10	6	35	40	55	40	45	60	40	35	20	100
355 006 095	TSM 6 x 95	M8-16	SW10	6	35	40	55	40	45	60	60	55	40	100
355 006 135	TSM 6 x 135	M8-16	SW10	6	35	40	55	40	45	60	100	95	80	100
355 006 155	TSM 6 x 155	M8-16	SW10	6	35	40	55	40	45	60	120	115	100	100
355 006 175	TSM 6 x 175	M8-16	SW10	6	35	40	55	40	45	60	140	135	120	100
355 006 195	TSM 6 x 195	M8-16	SW10	6	35	40	55	40	45	60	160	155	140	100

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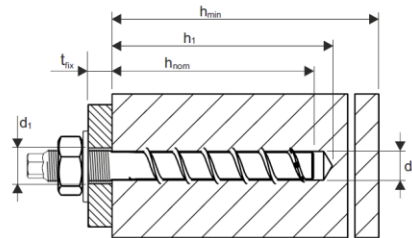
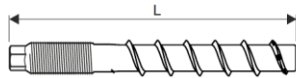
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zinc plated steel

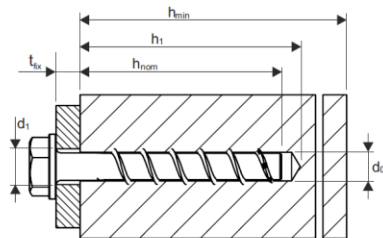
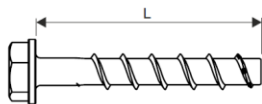
**Metric connection thread and hexagonal drive**



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
366 008 105	TSM	8 x 105	M10x30 SW7	8	45	55	65	55	65	75	39	29	19	50
366 010 120	TSM	10 x 120	M12x20 SW9	10	55	75	85	65	85	95	40	20	10	50
366 010 165	TSM	10 x 165	M12x45 SW9	10	55	75	85	65	85	95	85	65	55	50

stainless steel

**Hexagonal head with pressed-on washer in A4 stainless steel**



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm]			Depth of drill hole [mm]			max. thickness of fixt. [mm]			Box Qty.
	size	L	drive		$h_{nom1}$	$h_{nom2}$	$h_{nom3}$	$h_1$	$t_{fix}$					
800 006 040*	TSM	6 x 40	SW13 A4	6	35	-	-	40	-	-	5	-	-	100
800 006 050	TSM	6 x 50	SW13 A4	6	35	40	-	40	45	-	15	10	-	100
800 006 060	TSM	6 x 60	SW13 A4	6	35	40	55	40	45	60	25	20	5	100
800 008 070	TSM	8 x 70	SW13 A4	8	45	55	65	55	65	75	25	15	5	50
800 008 080	TSM	8 x 80	SW13 A4	8	45	55	65	55	65	75	35	25	15	50
800 010 090	TSM	10 x 90	SW15 A4	10	55	75	85	65	85	95	35	15	5	50
800 010 100	TSM	10 x 100	SW15 A4	10	55	75	85	65	85	95	45	25	15	50
800 010 120	TSM	10 x 120	SW15 A4	10	55	75	85	65	85	95	65	45	35	50

\* only for multiple use approved

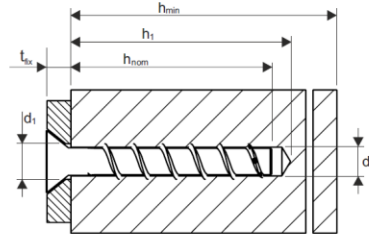
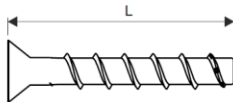
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stainless steel

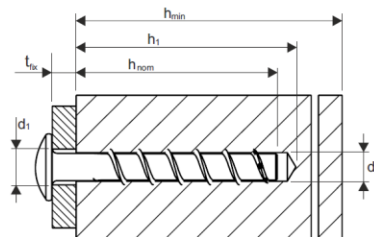
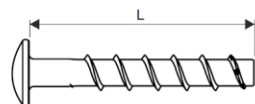
Countersunk head with multipoint drive in A4 stainless steel



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm] $h_{nom1} / h_{nom2} / h_{nom3}$	Depth of drill hole [mm] $h_1$	max. thickness of fixt. [mm] $t_{fix}$	Box Qty.
	size	L	drive					
811 006 050	TSM 6 x 50	C	VZ30 A4	6	35 / 40 / -	40 / 45 / -	15 / 10 / -	100
811 006 065	TSM 6 x 65	C	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	30 / 25 / 10	100
811 006 085	TSM 6 x 85	C	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	50 / 45 / 30	100
811 006 105	TSM 6 x 105	C	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	70 / 65 / 50	100
811 008 080	TSM 8 x 80	C	VZ40 A4	8	45 / 55 / 65	55 / 65 / 75	35 / 25 / 15	50
811 008 100	TSM 8 x 100	C	VZ40 A4	8	45 / 55 / 65	55 / 65 / 75	55 / 45 / 35	50
811 008 080	TSM 8 x 120	C	VZ40 A4	8	45 / 55 / 65	55 / 65 / 75	75 / 65 / 55	50
811 010 090	TSM 10 x 90	C	VZ50 A4	10	55 / 75 / 85	65 / 85 / 95	35 / 15 / 5	50
811 010 090	TSM 10 x 100	C	VZ50 A4	10	55 / 75 / 85	65 / 85 / 95	45 / 25 / 15	50
811 010 090	TSM 10 x 120	C	VZ50 A4	10	55 / 75 / 85	65 / 85 / 95	65 / 45 / 35	50

stainless steel

Pan head with multipoint drive in A4 Stahl



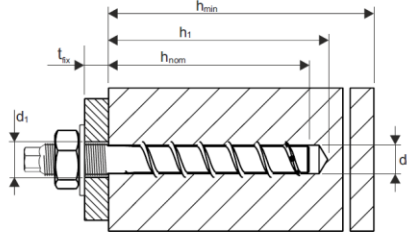
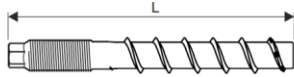
item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm] $h_{nom1} / h_{nom2} / h_{nom3}$	Depth of drill hole [mm] $h_1$	max. thickness of fixt. [mm] $t_{fix}$	Box Qty.
	size	L	drive					
822 006 050	TSM 6 x 50	P	VZ30 A4	6	35 / 40 / -	40 / 45 / -	15 / 10 / -	100
822 006 060	TSM 6 x 60	P	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	25 / 20 / 5	100
822 006 080	TSM 6 x 80	P	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	45 / 40 / 25	100
822 006 100	TSM 6 x 100	P	VZ30 A4	6	35 / 40 / 55	40 / 45 / 60	65 / 60 / 45	100



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stainless steel

Metric connection thread and hexagonal drive in A4 stainless steel



item nr.	Designation			Drill bit $\phi$ [mm]	Embed. Depth of anchor [mm] $h_{nom1} / h_{nom2} / h_{nom3}$	Depth of drill hole [mm] $h_1$	max. thickness of fixt. [mm] $t_{fx}$	Box Qty.
	size	L	drive					
866 008 105	TSM 8 x 105	M10x30	SW7 A4	8	45 / 55 / 65	55 / 65 / 75	39 / 29 / 19	50
866 010 140	TSM 10 x 140	M12x35	SW9 A4	10	55 / 75 / 85	65 / 85 / 95	60 / 40 / 30	50
866 010 160	TSM 10 x 160	M12x55	SW9 A4	10	55 / 75 / 85	65 / 85 / 95	80 / 60 / 50	50

## Technical characteristics

### single fastening

#### Technical characteristic without fire exposure for single fastening TSM / TSM A4 / TSM HCR

Screw size TSM high performance	$h_{nom}$ [mm]	TSM 6			TSM 8			TSM 10			TSM 12			TSM 14		
		$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$
nominal embedment depth		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	$h_1$ 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		
permissible tension load in cracked concrete <sup>1)2)</sup>	$N_{zul}$ [kN]	1,0	1,9	2,4	4,3	5,7	4,3	8,0	9,6	5,7	9,4	12,3	7,6	12,0	15,1	
permissible shear load in cracked concrete <sup>2)3)</sup>	$V_{zul}$ [kN]	3,0	4,0	3,5	4,8	6,4	4,8	15,9	19,2	6,1	18,8	24,0	7,6	24,1	30,3	
perm. tension load in non-cracked concrete <sup>1)2)</sup>	$N_{zul}$ [kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	12,0	7,6	13,2	17,2	10,6	17,0	21,2	
perm. shear load in non-cracked concrete <sup>2)3)</sup>	$V_{zul}$ [kN]	4,0	4,0	5,0	6,8	9,0	6,8	19,4	19,4	8,5	24,0	24,0	10,6	32,0	32,0	
permissible 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			70		
minimum spacing	$S_{min}$ [mm]	40			40			50			50			70		
minimum base material thickness	$h_{min}$ [mm]	100			100			120			120			130		
installation torque (with metric connection thread)	$T_{bst}$ [Nm]	10			20			40			60			80		
maximum torque (with Impact screw driver)	[Nm]	160			300			400			500			500		
ETA seismic C2	C2	x			x			Ja			x			Ja		

1) the partial safety factor for material resistance from the approval  $\gamma_M=1,5$  as well as a partial safety factor for load actions  $\gamma_F=1,4$  were considered for determining the load.

2) these values apply without influence of the spacing and edge distances.

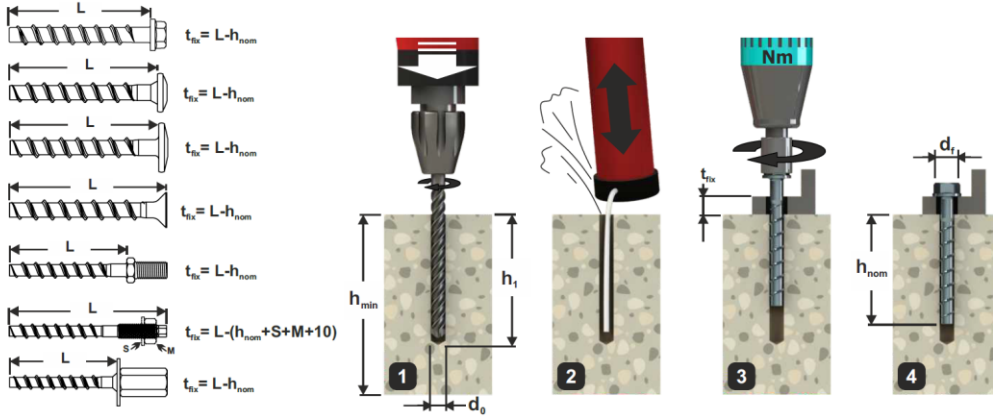
#### technical characteristics under fire exposure for single fastening TSM, TSM A4 and TSM HCR

screw size TSM high performance	$h_{nom}$ [mm]	TSM 6			TSM 8			TSM 10			TSM 12			TSM 14			
		$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	
nominal embedment depth		40	55	45	55	65	55	75	85	65	85	100	75	100	115		
permissible load under tensile and shear use ( $F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$ )																	
fire resistance class																	
R 30	permissible load	$F_{zul,fi 30}$ [kN]	0,5	0,9	1,3	2,3	2,3	2,3	4,1	4,3	3,0	5,0	6,7	3,9	8,8	9,1	
R 60		$F_{zul,fi 60}$ [kN]	0,5	0,8	1,3	1,7	1,7	2,3	3,3	3,3	3,0	5,0	5,8	3,9	8,2	8,2	
R 90		$F_{zul,fi 90}$ [kN]	0,5	0,6	1,3	1,1	1,1	2,3	2,2	2,2	3,0	4,2	4,2	3,9	5,9	5,9	
R 120		$F_{zul,fi 120}$ [kN]	0,4	0,4	0,7	0,7	0,7	1,7	1,7	1,7	2,4	3,4	3,4	3,1	4,8	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 stress of more than one side attacks																	
spacing																	
R 30 to R 120	$S_{cr,fi}$ [mm]	$2 \times C_{cr,fi}$															
concrete pry-out failure																	
R 30 to R 120	k [-]	1,0															
for wet concrete, the anchoring depth must be increased by at least 30 mm																	

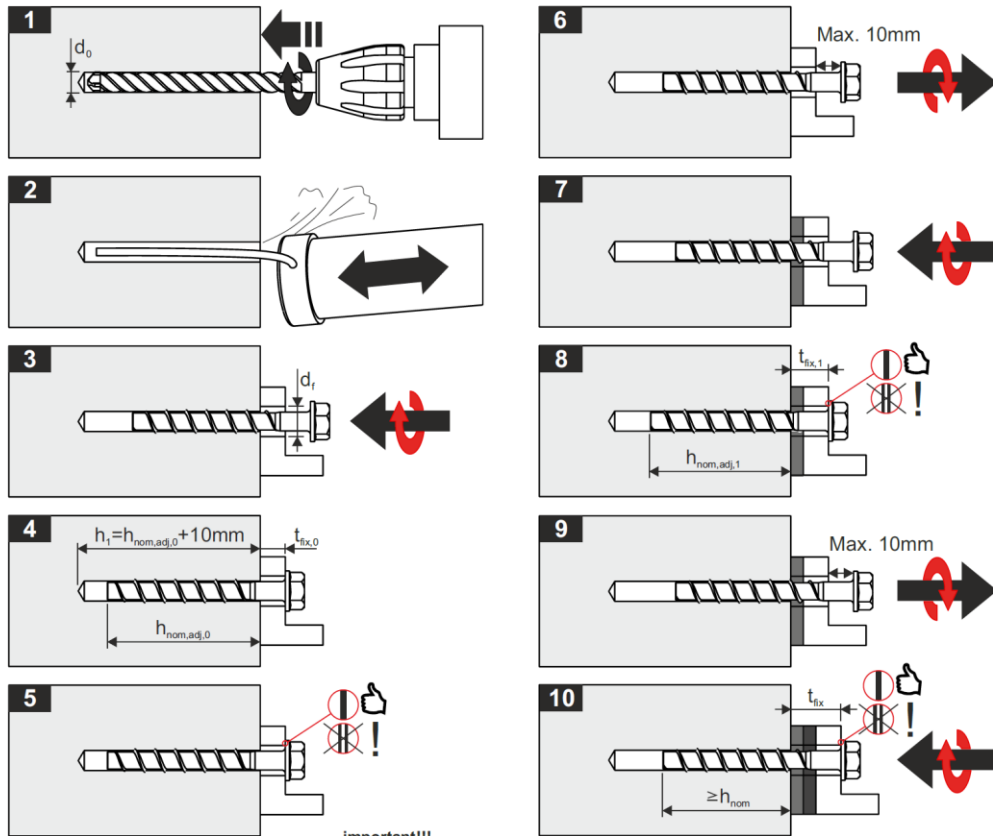
1) the partial safety factor for material resistance from the approval  $\gamma_M=1,0$  as well as a partial safety factor for load actions  $\gamma_F=1,0$  were considered for determining the load.

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## Installation instructions:



## Installations instructions with adjustment, only for the sizes 8 to 14



important!!!

- 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 10mm.
- The final embedment depth after adjustment process must be equal or larger than h<sub>nom</sub>.

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## Technical characteristics

### Multiple fastening

Technical characteristic without fire exposure for multiple fastening TSM / TSM A4 / TSM HCR					
Screw size TSM high performance			TSM 5	TSM 6	
nominal embedment depth	$h_{nom}$	[mm]	35	35	55
nominal diameter of drill bit	$d_0$	[mm]	5	6	
depth of drill hole	$h_1$	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	
permissible tension load in cracked concrete 1);2)	$N_{zul}$	[kN]	0,6	1,2	3,6
permissible shear load in cracked concrete 2);3)	$V_{zul}$	[kN]	2,4	2,4	4
perm. tension load in non-cracked concrete 1);2)	$N_{zul}$	[kN]	0,6	1,2	3,6
perm. shear load in non-cracked concrete 2);3)	$V_{zul}$	[kN]	2,5	3,4	4
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]	140	160	

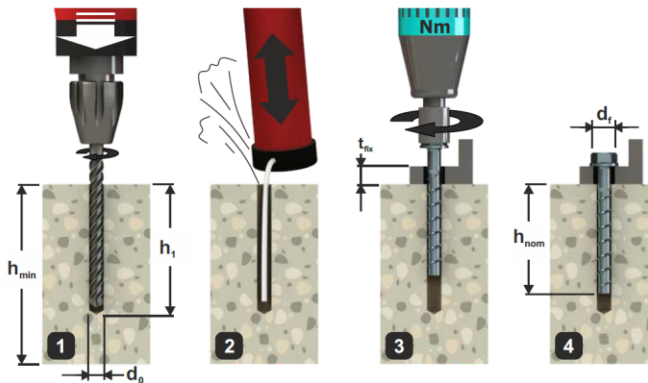
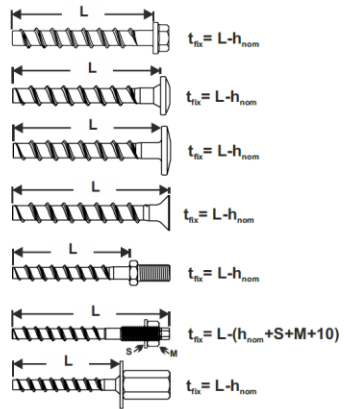
1) the partial safety factor for material resistance from the approval  $\gamma_M=1,5$  as well a partial safety factor for load actions  $\gamma_F=1,4$  were considered for determining the load.  
2) these values apply without influence of the spacing and edge distances.

technical characteristics under fire exposure for multiple fastening TSM / TSM A4 / TSM HCR							
screw size TSM high performance			TSM 6		TSM 6 A4 / HCR		
nominal embedment depth	$h_{nom}$	[mm]	35	55	35	55	
permissible load under tensile and shear use ( $F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$ )							
fire resistance class							
R 30	permissible load	$F_{zul,fi 30}$	[kN]	0,4	0,9	0,4	1,2
R 60		$F_{zul,fi 60}$	[kN]	0,4	0,8	0,4	1,2
R 90		$F_{zul,fi 90}$	[kN]	0,4	0,6	0,4	1,2
R 120		$F_{zul,fi 120}$	[kN]	0,3	0,4	0,3	0,8
R 30		$M_{zul,fi 30}$	[Nm]	0,7		0,9	
R 60		$M_{zul,fi 60}$	[Nm]	0,6		0,9	
R 90		$M_{zul,fi 90}$	[Nm]	0,5		0,9	
R 120		$M_{zul,fi 120}$	[Nm]	0,3		0,6	
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 stress of more than one side attacks							
spacing							
R 30 to R 120	$S_{cr,fi}$	[mm]	2 x $C_{cr,fi}$				
concrete pry-out failure							
R 30 to R 120	$k$	[-]	1,0				
for wet concrete, the anchoring depth must be increased by at least 30 mm							

1) the partial safety factor for material resistance from the approval  $\gamma_M=1,0$  as well a partial safety factor for load actions  $\gamma_F=1,0$  were considered for determining the load.

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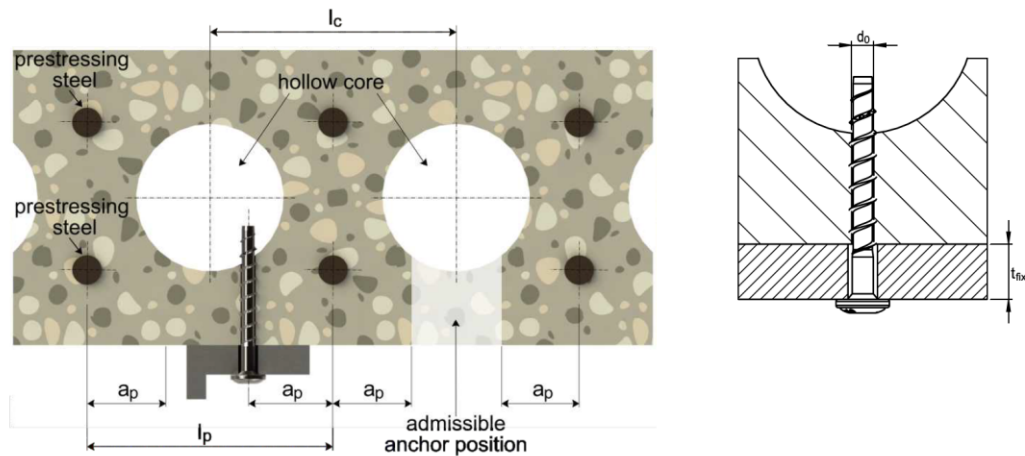
## Installations intructions



## Technical characteristics

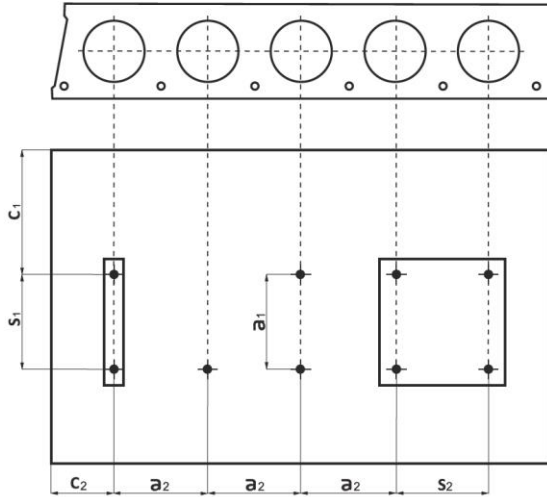
### Multiple fastening on prestressed concrete slabs

Technical characteristics without fire exposure in prestressed hollow core slabs TSM / TSM A4 / TSM HCR					
screw size TSM high performance		TSM 6			
bottom flange thickness	$d_b$	[mm]	min 25	min 30	min 35
nominal diameter of drill bit	$d_0$	[mm]	6		
depth of drill hole	$h_1$	min [mm]	30	35	40
clearance hole diameter	$d_f$	max [mm]	8		
permissible tension load	$F_{zul}$	[kN]	0,4	0,8	1,2
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		
dist. 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. torque (for impact screw driver)		[Nm]	160		

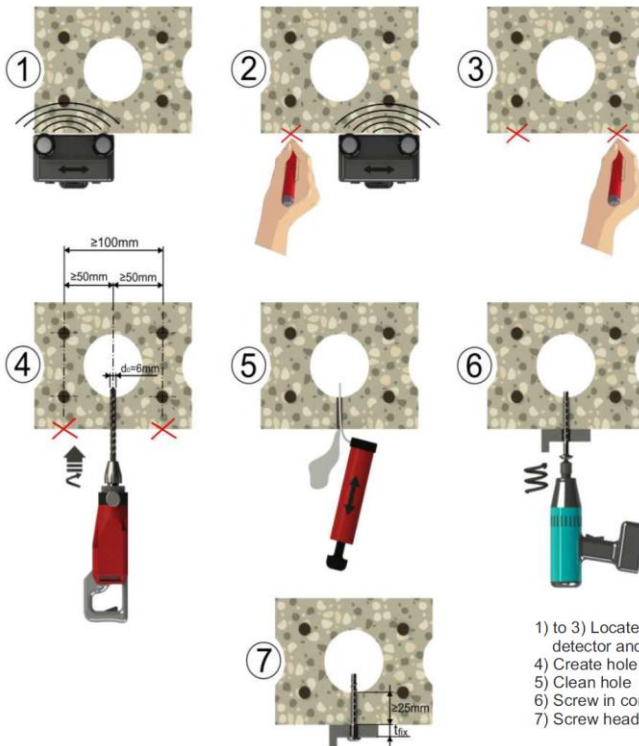


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$C_1, C_2$  = edge distance  
 $S_1, S_2$  = spacing  
 $a_1, a_2$  = distance between anchor groups



## Installations instructions



- 1) to 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