Concrete screw TSM L 6

TSM L 6 LiKo VZ30

TSM L 6 LP VZ30

TSM L 6 M6 VZ15

TSM L 6 M8 VZ25

TSM L 6 IM M8/10 SW13

ETA-15/0055

Für Mehrfachbefestigung von nichttragenden Systemen im gerissenen und ungerissenen Beton

R 30 - R 120

Material:

- zinc plated steel

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- approved for multiple use
- high load capacity in cracked and non cracked concrete
- small drill holes
- quick and safe installation
- short anchorage depth

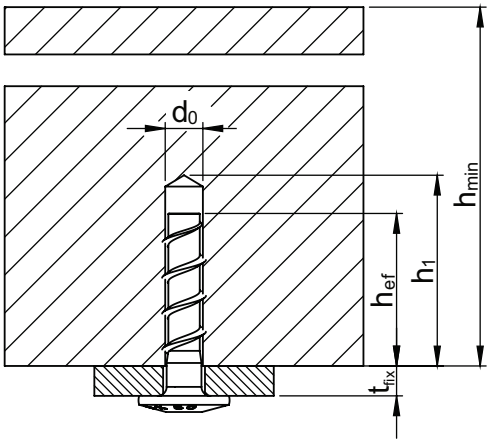
Product overview:

item nr.	Designation size	L		drive	Drill bit-Ø [mm]	Embed. Depht of anchor [mm] h_{nom1}	Depth of drill hole [mm] h_1	max. thiknes of fixt. [mm] t_{fix}	Box Qty.
205 060 280	TSM L 6 x	28	LiKo	VZ30	6	25	30	3	100
205 060 281	TSM L 6 x	28	LP	VZ30	6	25	30	3	100
205 060 401	TSM L 6 x	40	LP	VZ30	6	35	40	5	100
205 060 282	TSM L 6 x	28	M6	VZ15	6	25	30	3	100
205 060 283	TSM L 6 x	28	M8	VZ25	6	25	30	3	100
205 060 404	TSM L 6 x	40	IM M8/10	SW13	6	40	45	-	50

Technical data:

Technical characteristics without fire exposure			
			TSM L 6
drill bit diameter	d_0	[mm]	6
depth of drill hole	h_1	[mm]	28
effective anchorage depth	h_{ef}	[mm]	25
minimum thickness of member	h_{min}	[mm]	80
edge distance	c	[mm]	150
spacing	s	[mm]	200
permissible load in cracked and non-cracked concrete C 20/25 to C 50/60[1)]	N_{per}	[kN]	0.43

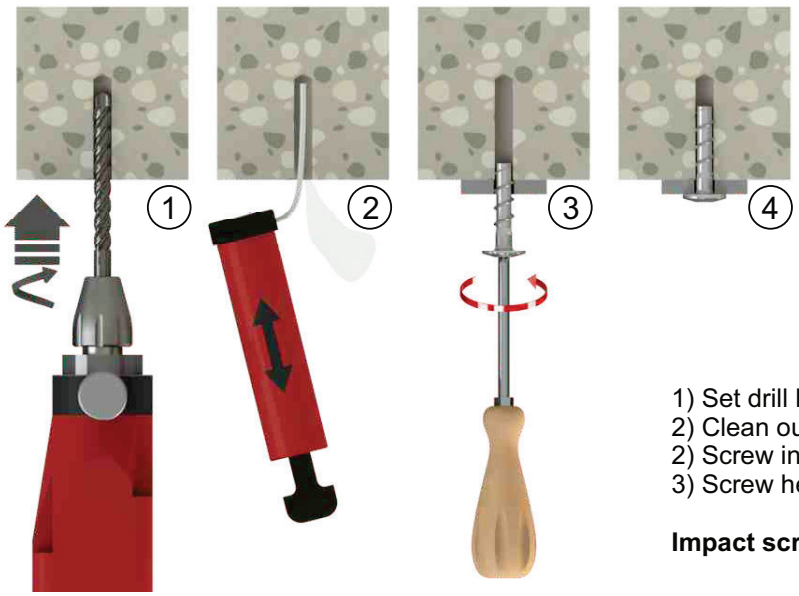
[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.



Technical characteristics under fire exposure			
			TSM L 6
fire resistance class			
R 30	permissible load $F_{fi,per,30}$[1)]	[kN]	0.34
R 60	permissible load $F_{fi,per,60}$[1)]	kN]	0.31
R 90	permissible load $F_{fi,per,90}$[1)]	[kN]	0.22
R 120	permissible load $F_{fi,per,120}$[1)]	[kN]	0.17
R 30 to R120	spacing $c_{cr,fi}$	[mm]	120
	edge distance $s_{cr,fi}$		60

[1)] The partial safety factor for material resistance from the approval $\gamma_{M,fi}$ = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
2) Screw in the screw
3) Screw head must fully contact the fixture

Impact screwdrivers may not be used here!

Concrete screw TSM High Performance

Hexagonal head
with pressed-on washer

Countersunk socket head

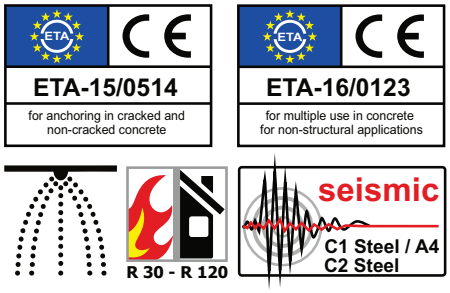
Pan head

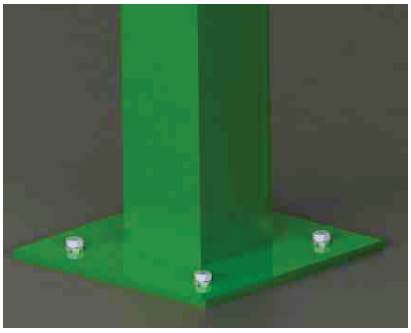
Large Pan head

Metric connection thread
and hexagonal drive

Countersunk socket head with
metric female thread

Hexagonal head with metric
connection thread



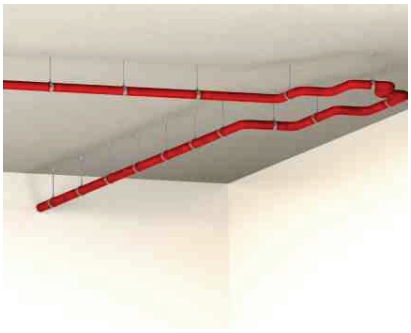


Material:

- zinc flake-coated steel - TSM ZFC
- zinc plated steel - TSM
- A4 stainless steel - TSM A4
- HCR high corrosion-resistant steel - TSM HCR

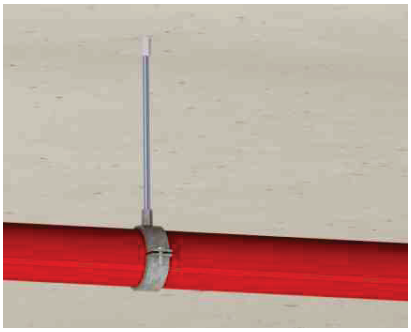
Base material:

- 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



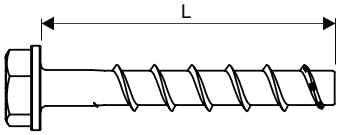
Applications:

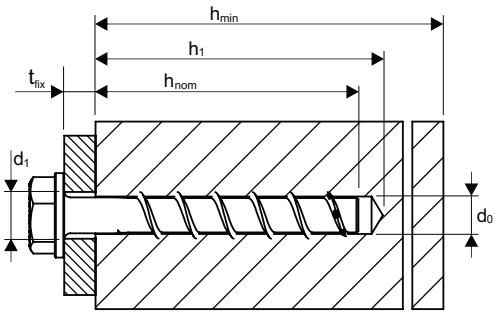
- pipeline fastening
- ceiling suspension fastening
- handrail bracket fastening
- fastening of shelf uprights in high-bay warehouses
- ventilation duct fastening
- wood substructure fastening

Product overview:

zinc flake-coated steel

Hexagonal head with pressed-on washer



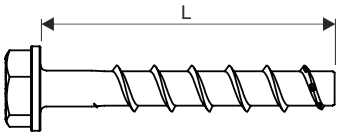


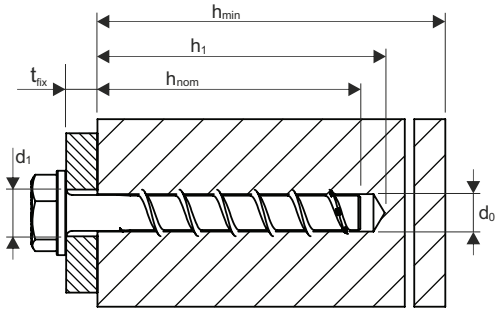
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
400 005 040*	TSM 5 x	40	SW10 ZFC	5	35 / - / -	40 / - / -	5 / - / -	100
400 005 050*	TSM 5 x	50	SW10 ZFC	5	35 / - / -	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
400 012 150	TSM 12 x	150	SW17 ZFC	12	65 / 85 / 100	75 / 95 / 110	85 / 65 / 50	25
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

zinc plated steel

Hexagonal head with pressed-on washer



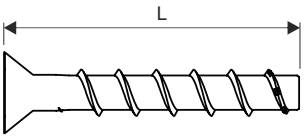


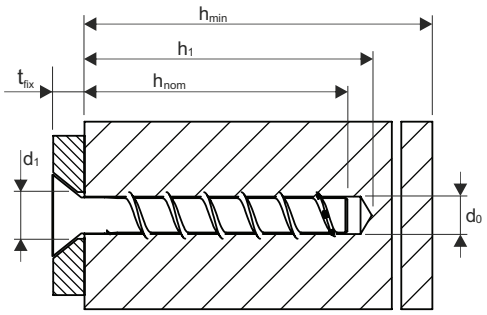
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
300 005 040*	TSM 5 x	40	SW10	5	35 / - / -	40 / - / -	5 / - / -	100
300 005 050*	TSM 5 x	50	SW10	5	35 / - / -	40 / - / -	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
300 010 140	TSM 10 x	140	SW15	10	55 / 75 / 85	65 / 85 / 95	85 / 65 / 55	50
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

* only for multiple use approved

zinc plated steel

Countersunk head with multipoint drive





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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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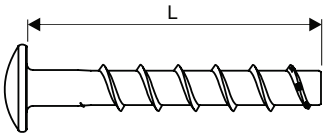
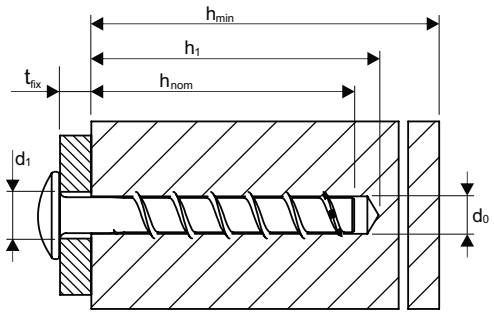
zinc plated steel

Pan head with multipoint drive





item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
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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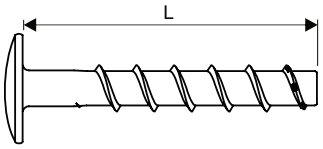
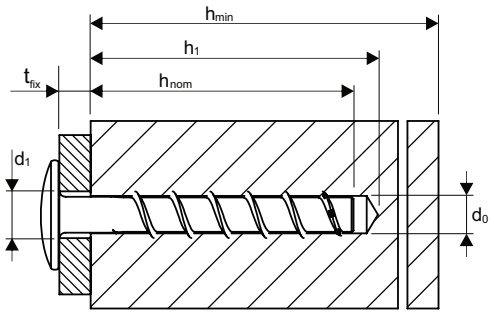
zinc plated steel

Large Pan head with multipoint drive



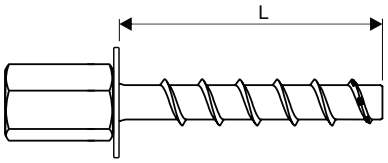


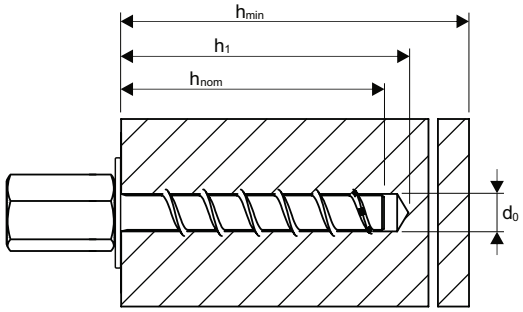
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
333 006 040*	TSM 6 x 40	LP	VZ30	6	35 / - / -	40 / - / -	5 / - / -	100
333 006 060	TSM 6 x 60	LP	VZ30	6	35 / 40 / 55	40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

* only for multiple use approved

zinc plated steel

Countersunk socket head with metric female thread IM M8/10



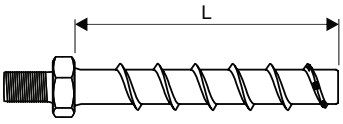


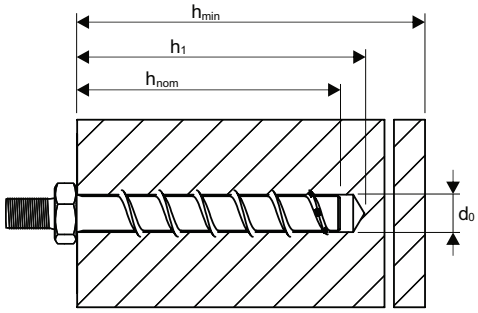
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
344 006 035*	TSM 6 x	35 K	IM M8/10 SW13	6	35 / - / -	40 / - / -	0 / - / -	50
344 006 055	TSM 6 x	55	IM M8/10 SW13	6	35 / 40 / 55	40 / 45 / 60	20 / 15 / 0	50

* only for multiple use approved

zinc plated steel

Hexagonal head with metric connection thread



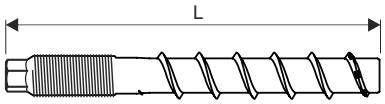


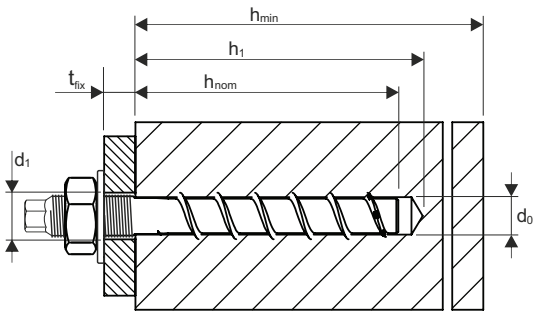
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
355 006 035*	TSM 6 x	35 K	M8-16 SW10	6	35 / - / -	40 / - / -	0 / - / -	100
355 006 055	TSM 6 x	55	M8-16 SW10	6	35 / 40 / 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

* only for multiple use approved

zinc plated steel

Metric connection thread and hexagonal drive

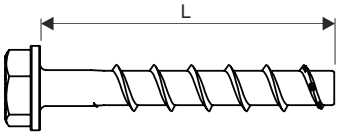


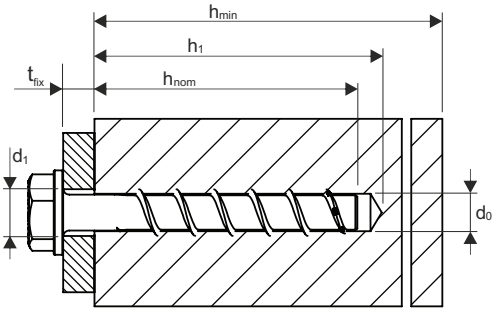


item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
366 008 105	TSM 8 x	105	M10x30 SW7	8	45 / 55 / 65	55 / 65 / 75	39 / 29 / 19	50
366 010 120	TSM 10 x	120	M12x20 SW9	10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



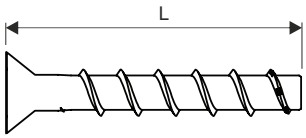


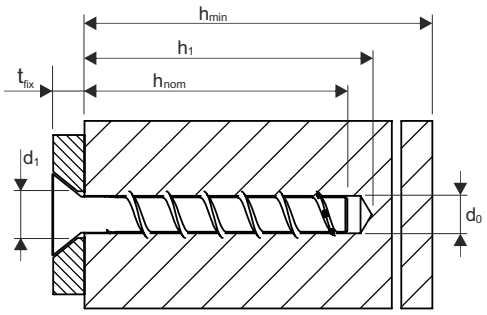
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
800 006 040*	TSM 6 x	40	SW13 A4	6	35 / - / -	40 / - / -	5 / - / -	100
800 006 050	TSM 6 x	50	SW13 A4	6	35 / 40 / -	40 / 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

stainless steel

Countersunk head with multipoint drive in A4 stainless steel

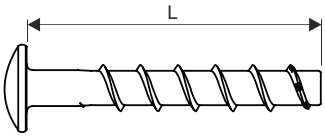


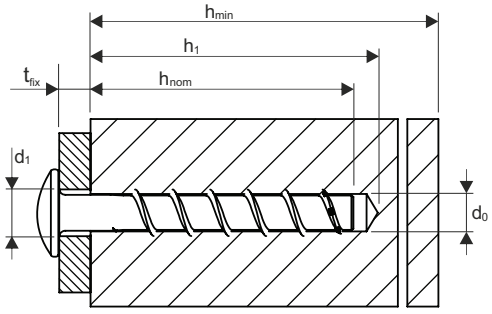


item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
811 006 050	TSM 6 x 50	C	VZ30 A4	6	35 / 40 / -	40 / 45 / -	15 / 10 / -	100
811 006 065	TSM 6 x 65	C	VZ30 A4	6	35 / 40 / 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

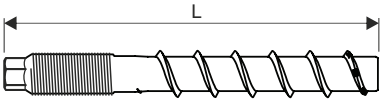


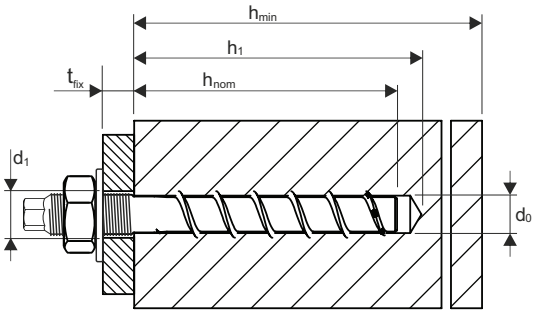


item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
822 006 050	TSM 6 x 50	P	VZ30 A4	6	35 / 40 / -	40 / 45 / -	15 / 10 / -	100
822 006 060	TSM 6 x 60	P	VZ30 A4	6	35 / 40 / 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

stainless steel

Metric connection thread and hexagonal drive in A4 stainless steel





item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
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			TSM 6		TSM 8			TSM 10			TSM 12			TSM 14		
nominal embedment depth	h_{nom}	[mm]	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$
			40	55	45	55	65	55	75	85	65	85	100	75	100	115
nominal diametrer 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 [1);2)]	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 [1);2)]	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 [1);2)]	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 [1);2)]	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}	[kN]	6,2		14,9			32,0			64,6			105,7		
minimum edge distance	C_{min}	[mm]	40		40	50		50			50		70	50	70	
minimum spacing	S_{min}	[mm]	40		40	50		50			50		70	50	70	
minimum base material thickness	h_{min}	[mm]	100		100		120	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			500			500		
ETA seismic C1 + C2 [3)]			x		x		Ja	x		Ja	x		Ja	x		Ja

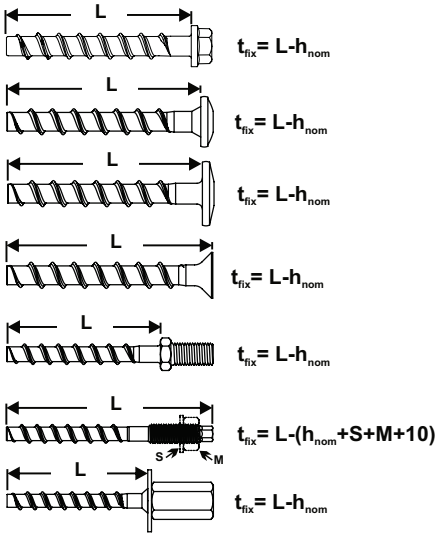
1) the partial safety factor for material resistance from the approval γM=1,5 as well a partial safety factor for load actions γF=1,4 were considered for determining the load.
2) these values apply without influence of the spacing and edge distances.
3) C2 only for version zinc plated

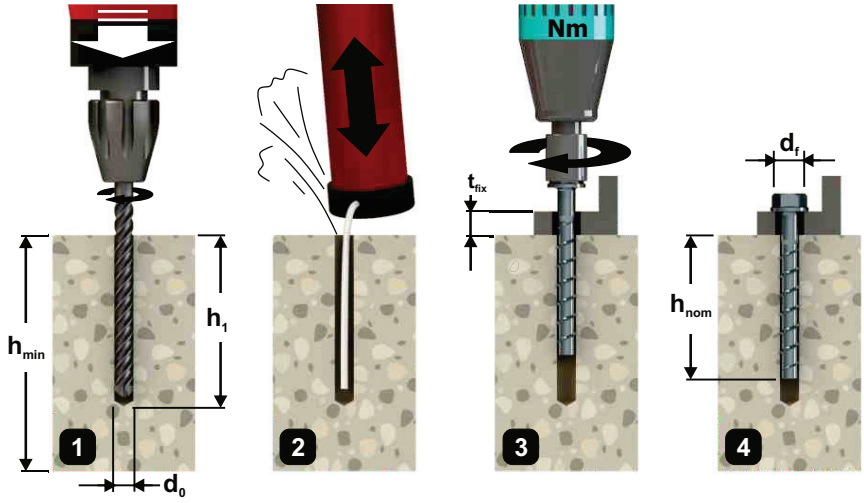
technical characteristics under fire exposure for single fastening TSM, TSM A4 and TSM HCR

screw size TSM high performance				TSM 6		TSM 8			TSM 10			TSM 12			TSM 14		
nominal embedment depth		h_{nom}	[mm]	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$
				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																	

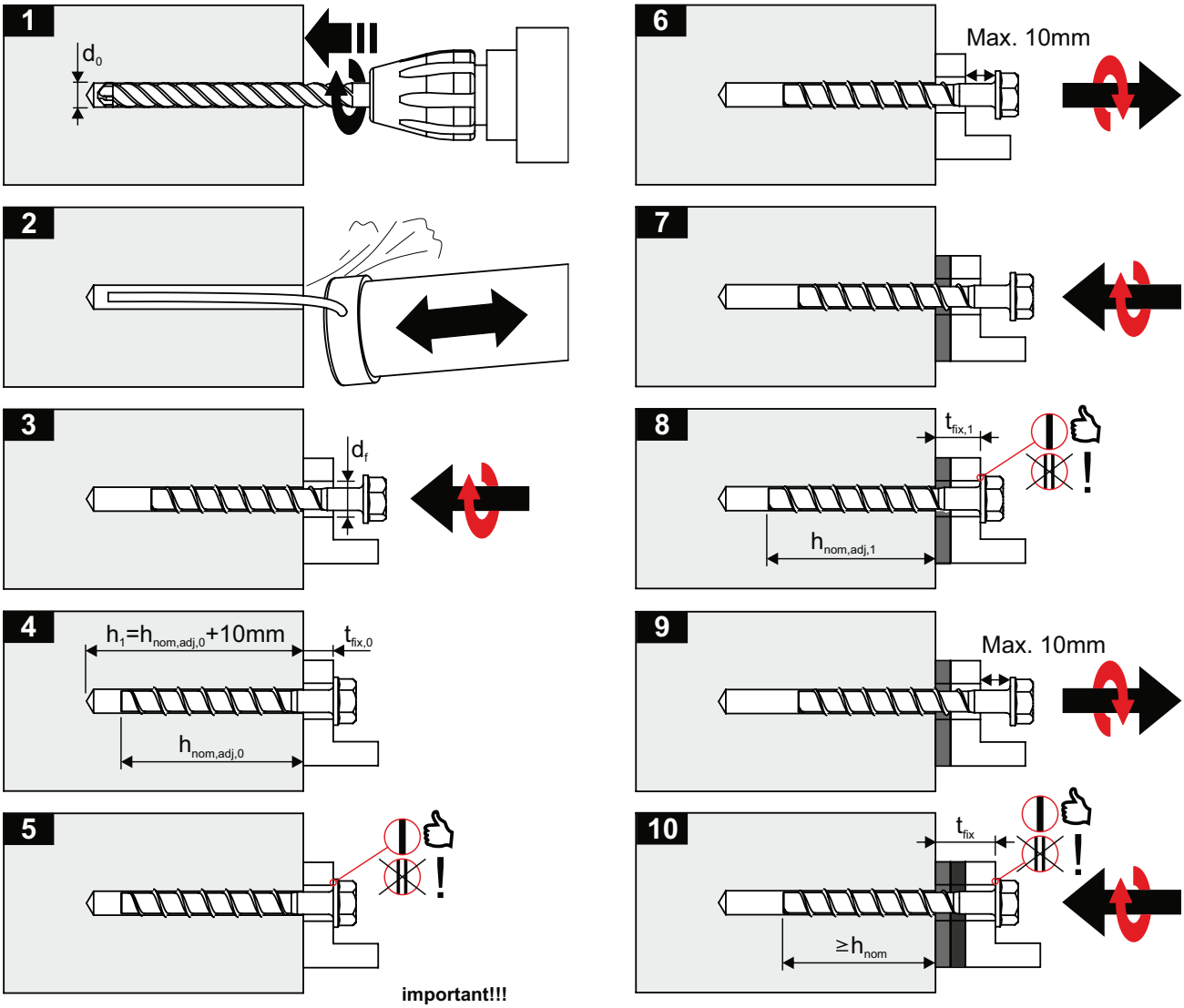
1) the partial safety factor for material resistance from the approval γM=1,0 as well a partial safety factor for load actions γF=1,0 were considered for determining the load.

Installation instructions:





Installations intructions 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 hnom.

Technical characteristics

Multiple fastening

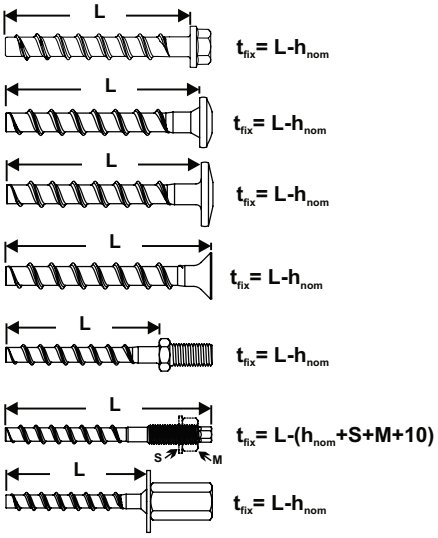
Technical characteristic without fire exposure for multiple fastening TSM / TSM A4 / TSM HCR						
Screw size TSM high performance				**TSM 5**	**TSM 6**	
nominal embedment depth	h_{nom}		[mm]	**35**	**35**	**55**
nominal diametrer of drill bit	d_0		[mm]	5	6	
depth of drill hole	h_1	min	[mm]	40	40	60
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 [1);2)]	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 [1);2)]	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	

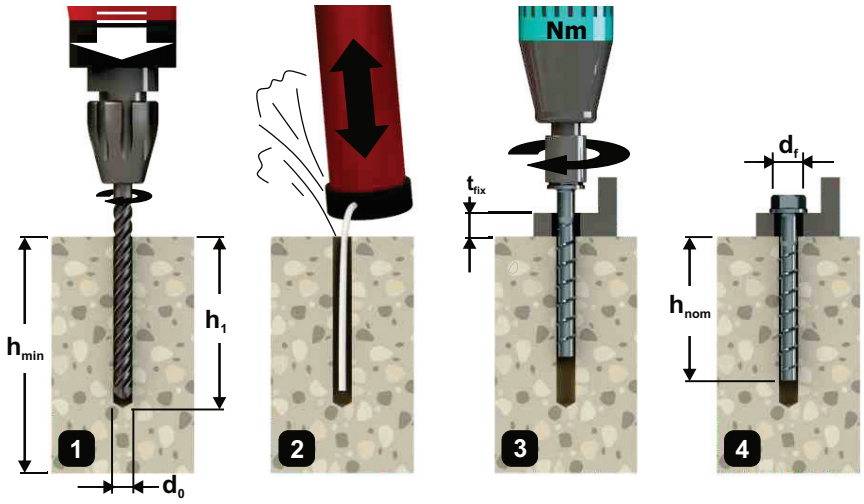
1) the partial safety factor for material resistance from the approval γM=1,5 as well a partial safety factor for load actions γF=1,4 were considered for determining the load..
2) these values apply without influence of the spacing and edge distances.

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]	$2 \times h_{ef}$			
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 γM=1,0 as well a partial safety factor for load actions γF=1,0 were considered for determining the load.

Installations intructions

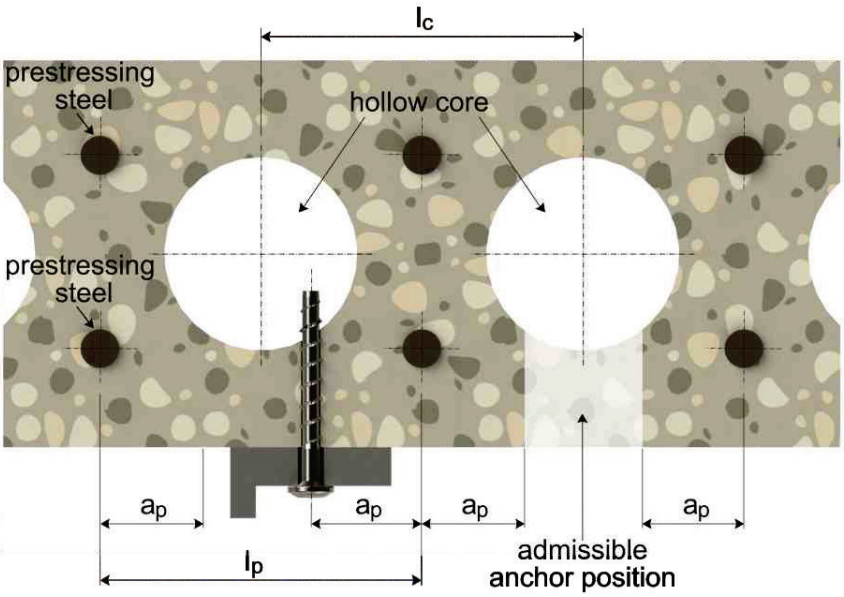


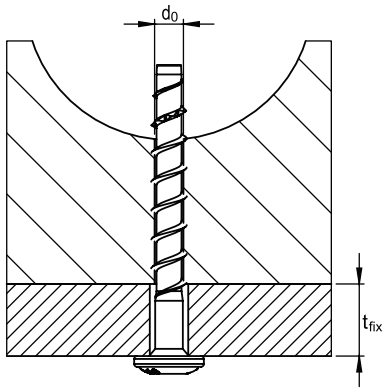


Technical characteristics

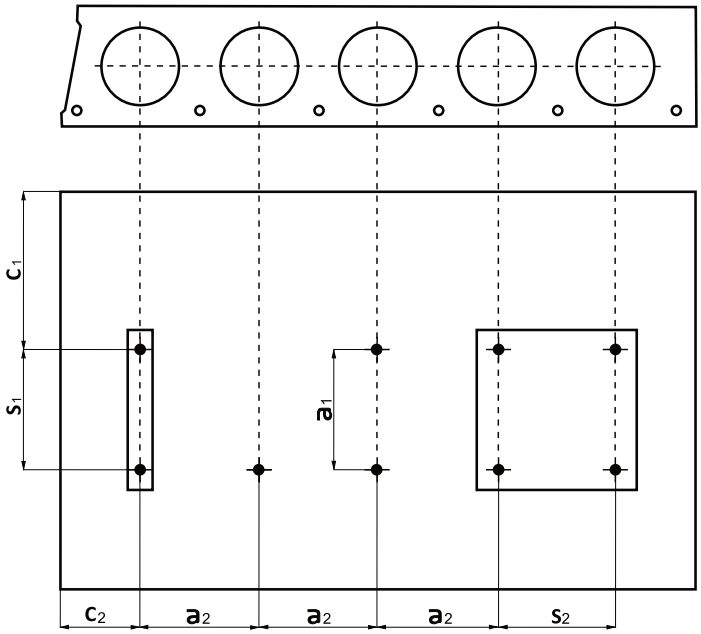
Multiple fastening on prestressed concrete slabs

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) / bridge width (e)	(w/e)	max	[mm]	4,2		
installation torque	T_{inst}		[Nm]	10		
max. torque (for impact screw driver)			[Nm]	160		

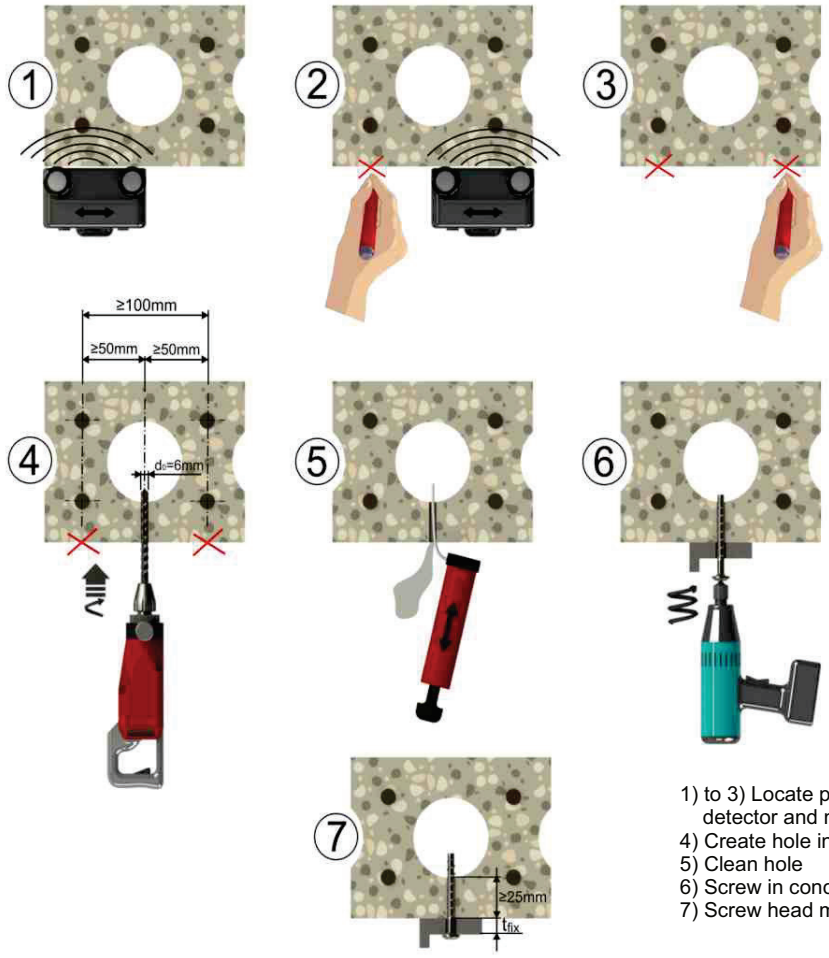




C_1, C_2 = edge distance
S_1, S_2 = spacing
a_1, a_2 = distance between anchor groups



Installations intructions



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

Concrete screw TSM for fire-protection panels

Hexagonal head
with pressed-on washer

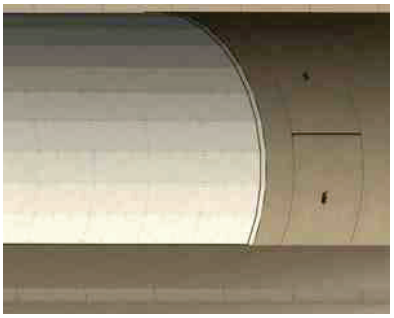
pan head

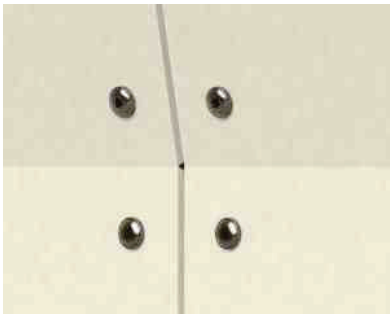
TOGE
Z-21.1.1905
Institut für Massivbau
Technische Universität
Darmstadt

R 30 - R 120

Material:

- stainless steel - TSM A4
- high corrosion-resistant steel - TSM HCR





Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- approved for the fastening of fire-protection panels in tunnels
- quick instalaltion
- reusable

Product overview:

stainless steel

Hexagonal head with pressed-on washer in A4 stainless steel

item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
800 006 060	TSM 6 x	60	SW13 A4	6	35 / 40 / 55	40 / 45 / 60	25 / 20 / 5	100

stainless steel

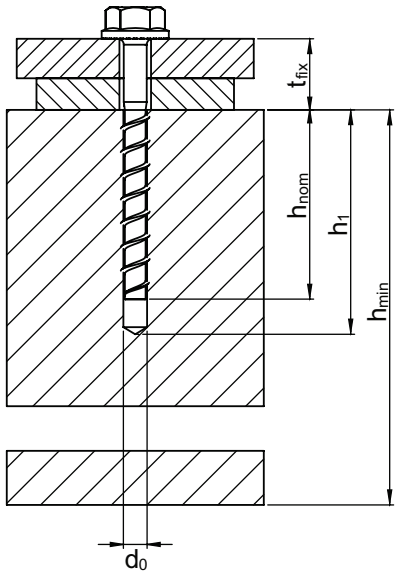
Pan head with multipoint drive in A4 Stahl

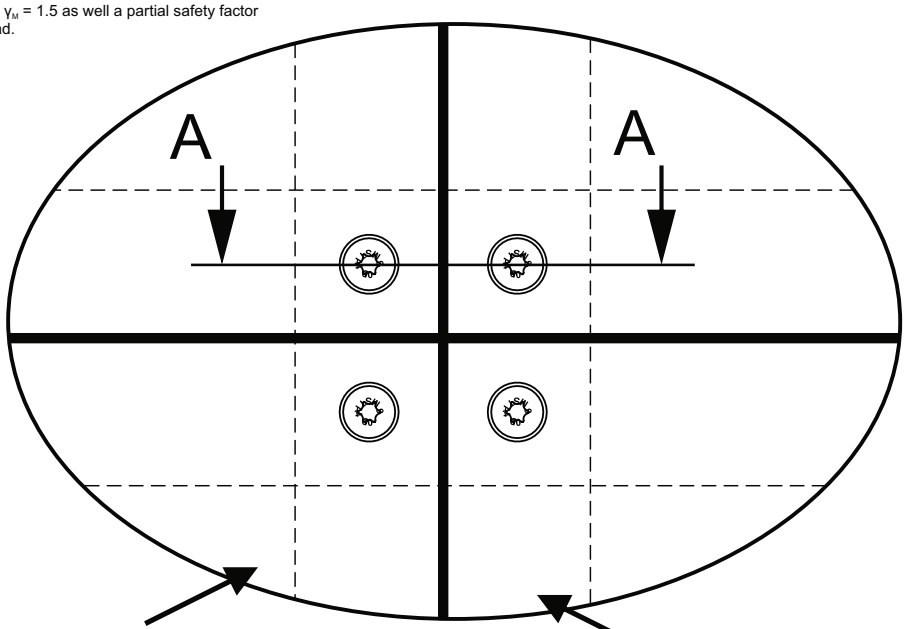
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
822 006 050	TSM 6 x	50	P VZ30 A4	6	35 / 40 / -	40 / 45 / -	15 / 10 / -	100
822 006 060	TSM 6 x	60	P VZ30 A4	6	35 / 40 / 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

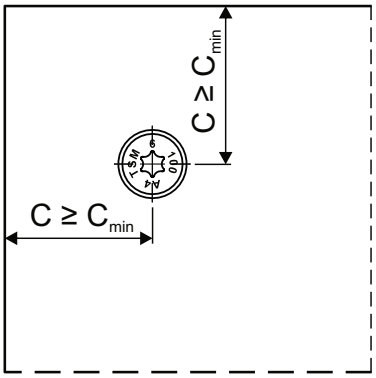
Technical data:

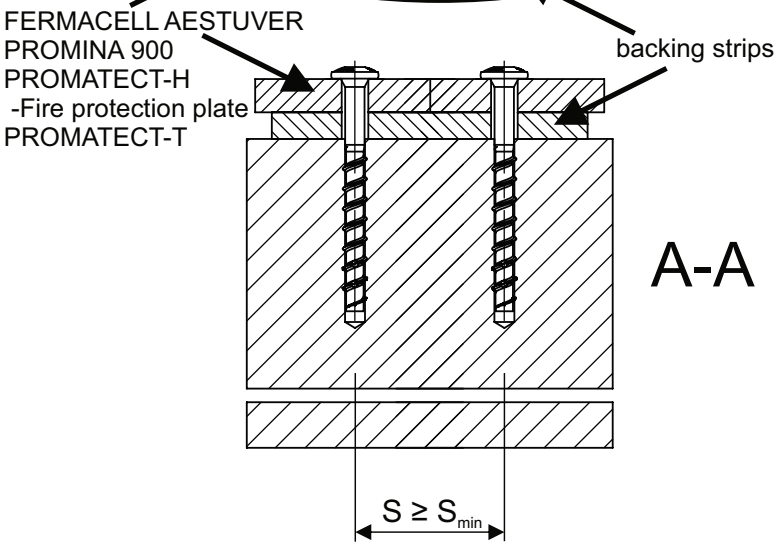
Technical characteristics			
			TSM 6 A4 / HCR
drill bit diameter	d_0	[mm]	6
depth of drill hole	h_1 ≥	[mm]	h_{nom}+5
embedment depth of anchor	h_{nom} ≥	[mm]	40
minimum thickness of member	h_{min}	[mm]	100
minimum edge distance	c_{min}	[mm]	60
minimum spacing	s_{min}	[mm]	120
permissible load in cracked and non-cracked concrete C20/25 - C50/60 [1)2)]	N_{zul}	[kN]	0.3[1)2)]

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[2)] These values also apply for fire exposure up to 120 minutes.

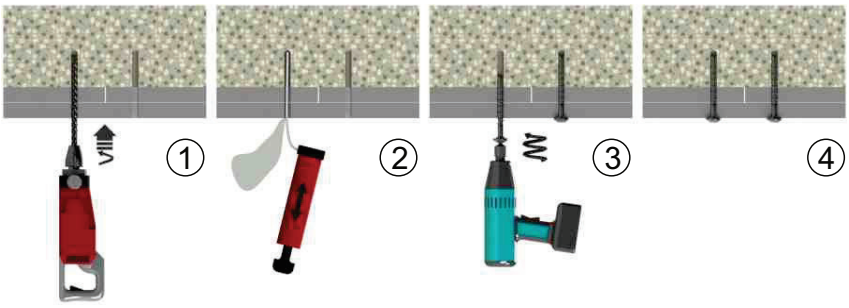








Montagehinweise:



1) Set drill hole through fire-protection panel and backing strip
2) Clean out drill hole from the base
3) Screw concrete screw through fire-protection panel
4) Screw head must fully contact the panel

Adhesive screw anchor TSM

TOGE
Z-21.1.1799
Institut für Massivbau
Technische Universität
Darmstadt

R 30 - R 120

Hexagonal head with
pressed-on washer

with metric connection
thread

Material:

- corrosion protection-coated steel
  as per corrosiveness category C5-I
  medium TOGE-KORR - TSM B
- A4 stainless steel - TSM BS
- HCR high corrosion-resistant steel - TSM BSH

Base material:

- suitable for concrete C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by chemical mortar
- can be loaded immediately, regardless of the chemical mortar curing time

Applications:

- fastening of crash barriers
- railing fastening
- soundproof wall fastening

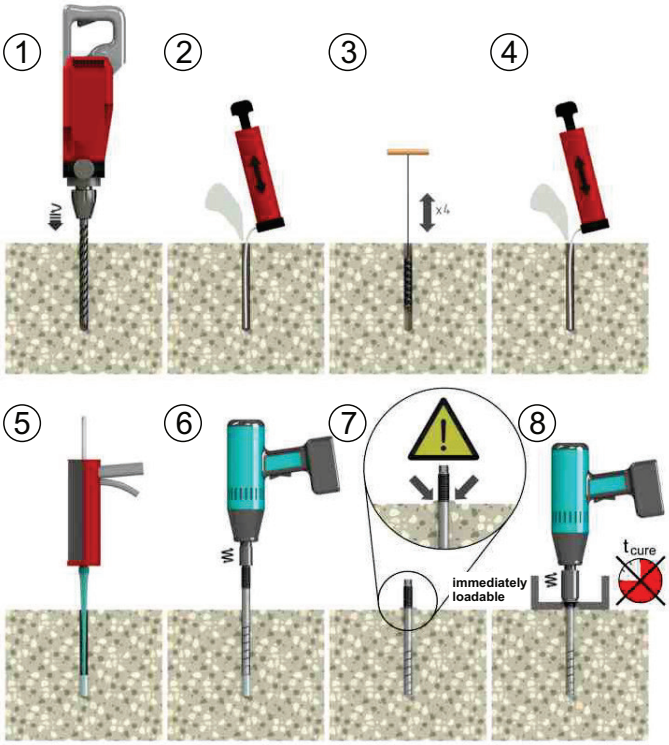
Product overview:
stainless steel A4 and HCR

item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
741 101 900	TSM A4 10 x	90	SW15	12	80 - 110	≥ 80	10	50
741 101 001	TSM A4 10 x	100	SW15	14	80 - 110	≥ 80	20	50
741 101 200	TSM A4 10 x	120	SW15	16	80 - 110	≥ 80	40	50
741 010 140	TSM A4 10 x	140	M12 x 45 SW13	16	80 - 110	≥ 80	35	50
741 010 160	TSM A4 10 x	160	SW27	16	80 - 110	≥ 80	55	50
741 162 300	TSM BS 16 x	230	SW27	16	100 - 160	≥ 100	130	25
741 162 750	TSM BS 16 x	275	SW27	16	100 - 160	≥ 100	175	25
740 162 751	TSM BSH 16 x	275	SW27	16	100 - 160	≥ 100	175	25
741 222 500	TSM BS 22 x	250	SW17	22	100 - 160	≥ 100	110	20

Corrosion protection-coated steel

item nr.	Designation			Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
	size	L	drive					
202 141 650	TSM B	14 x 165	M16 x 35 SW12	14	100 - 140	≥ 100	35	25
202 161 900	TSM B	16 x 190	M18 x 45 SW13	16	100 - 160	≥ 100	60	25
202 162 200	TSM B	16 x 220	M18 x 45 SW13	16	100 - 160	≥ 100	90	25

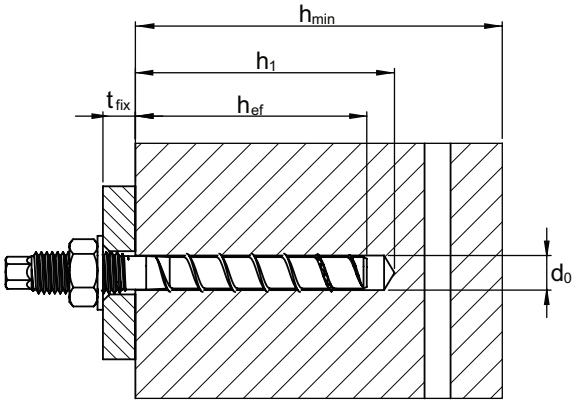
Installation instructions:



1) Set drill hole (hammer drilling or diamond core drilling method)
2) Clean out drill hole from the base
3) Brush out drill hole four times
4) Clean out drill hole from the base again
5) Inject composite mortar
6) Screw in concrete screw
7) After reaching the screw-in depth, the composite mortar must extrude at the concrete surface
8) The fixture can be installed right away, as the curing time of the composite mortar need not be taken into account

More information about the composite mortar can be found on page 84

Technical data:



Technical characteristics without fire exposure for single fastening							
			TSM				
			10	12	14	16	22
drill bit diameter	d_0	[mm]	10	12	14	16	22
depth of drill hole	h_1 ≥ ≥	[mm]	80 110	100 130	100 140	100 160	160 200
embedment depth of anchor	h_{nom} ≥ ≥	[mm]	80 110	100 130	100 140	100 160	160 200
effective anchorage depth	h_{ef} ≥ ≥	[mm]	80 110	100 130	100 140	100 160	160 200
minimum thickness of member	h_{min}	[mm]	h_{ef}+60		h_{ef}+70		h_{ef}+100
minimum edge distance	c_{min}	[mm]	40	50	60	70	80
minimum spacing	s_{min}	[mm]	40	50	60	70	80
characteristic edge distance	$c_{cr,N}$	[mm]	1,5xh_{ef}	1,5xh_{ef}	1,5xh_{ef}	1,5xh_{ef}	1,5xh_{ef}
characteristic spacing	$s_{cr,N}$	[mm]	3xh_{ef}	3xh_{ef}	3xh_{ef}	3xh_{ef}	3xh_{ef}
installation torque	T_{inst}	[Nm]	40	60	80	100	200
design value of tension load in cracked concrete C 20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	18.8 27.7	28.3 42.0	28.3 46.9	23.8 68.6	57.4 80.1
design value of shear load in cracked and non-cracked concrete C 20/25 to C 50/60[1)3)]	V_{Rd}	[kN]	22.7	28.0	42.7	68.6	71.4
permissible tension load in cracked and non-cracked concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	13.4 19.8	20.2 30.0	20.2 33.5	20.2 41.0	41.0 57.2
permissible shear load in cracked and non-cracked concrete C 20/25 to C 50/60[2)3)]	V_{per}	[kN]	16.2	20.0	30.5	45.7	51.0

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics with fire exposure for single fastening								
				TSM				
				10	12	14	16	22
fire resistance class								
R 30	permissible load $F_{fi.per,30}$ [1)]		[kN]	4.0	6.3	9.8	13.9	23.8
R 60	permissible load $F_{fi.per,60}$ [1)]		[kN]	3.3	5.8	8.1	11.1	21.6
R 90	permissible load $F_{fi.per,90}$ [1)]		[kN]	2.2	4.2	5.9	8.0	15.8
R 120	permissible load $F_{fi.per,120}$ [1)]		[kN]	1.7	3.4	4.8	6.5	12.8
R 30 to R 120	spacing	s_{fi}	[mm]	4xh_{ef}				
		s_{min}		40	50	60	70	80
	edge distance	c_{fi}		2xh_{ef}				
		c_{min}						

[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

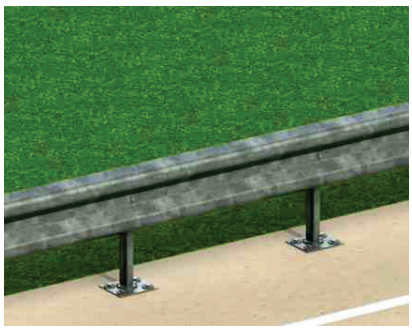
Adhesive screw anchor TSM (internal sleeve)

Female thread sleeve
with collar

TOGE
Z-21.1.1799
Institut für Massivbau
Technische Universität
Darmstadt

Material:

- corrosion protection-coated steel
  as per corrosiveness category C5-I
  medium TOGE-KORR - TSM B/BC



Base material:

- approved for concrete C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by chemical mortar
- can be loaded immediately, regardless of the chemical mortar curing time

Applications:

- fastening of crash barriers

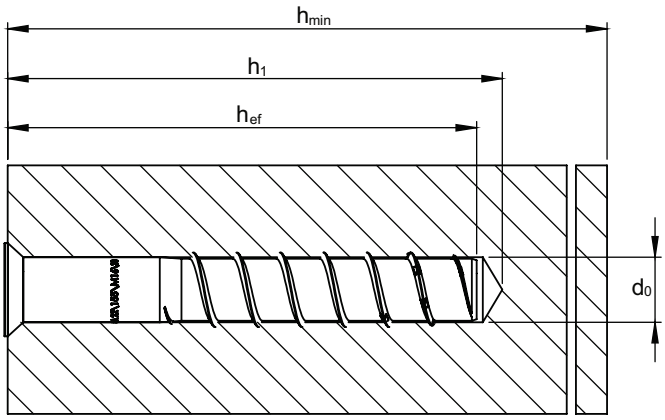
Product overview:

item nr.	Designation	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	Box Qty.
	size / L / drive				
202 161 002	TSM B 16 x 100 IM10 x 20 SW12	16	100	110	50
742 221 000	TSM BC 22 x 100 IM16 x 30 SW12	22	100	110	50
742 221 550	TSM BC 22 x 155 IM16 x 30 SW12	22	155	165	40

accessories:

item nr.	Designation	Box Qty.
500 000 014	metric thread reducer M16 / M12	25
500 000 015	metric thread reducer M16 / M10	25

Technical data:



Technical characteristics without fire exposure					
			TSM		
			16 IM10	22 IM16	
			5.8	5.8	8.8
drill bit diameter	d_0	[mm]	16	22	
depth of drill hole	h_1 IV h_1 V, VI	[mm]	100 160		
embedment depth of anchor	h_{nom} IV h_{nom} V, VI	[mm]	100 160		
effective anchorage depth	h_{ef} IV h_{ef} V, VI	[mm]	100 160		
minimum thickness of member	h_{min}	[mm]	h_{ef} + 70	h_{ef} + 80	
minimum edge distance	c_{min}	[mm]	70	80	
minimum spacing	s_{min}	[mm]	70	80	
characteristic edge distance	$c_{cr,N}$	[mm]	$1.5xh_{ef}$		
characteristic spacing	$s_{cr,N}$	[mm]	$3xh_{ef}$		
installation torque	T_{inst}	[Nm]	40	60	

Technical characteristics without fire exposure						
				16 IM10	22 IM16	
				5.8	5.8	8.8
permissible tension load in cracked and non-cracked concrete C 20/25[1)2)]	4.8	N_{per}	[kN]	11.4	20.2 29.0	20.2 29.0
	5.8	N_{per}	[kN]	14.3	20.2 33.8	20.2 36.3
	8.8	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 22.9	20.2 33.8	20.2 41.1
	10.9	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 26.2	20.2 33.8	20.2 41.0
permissible shear load in cracked and non-cracked concrete C 20/25 to C 50/60[1)2)]	4.8	V_{per}	[kN]	5.7	14.8	14.8
	5.8	V_{per}	[kN]	7.15	14.8	18.1
	8.8	V_{per}	[kN]	11.4	14.8	27.6
	10.9	V_{per}	[kN]	13.3	14.8	27.6

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[2)] These values apply without influence of the spacings and edge distances.

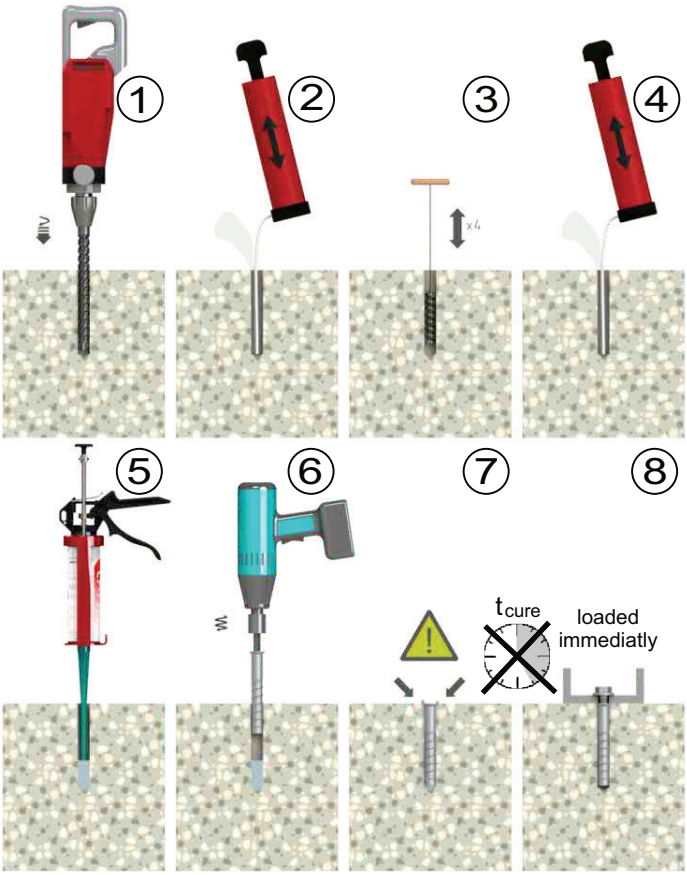
Technical characteristics without fire exposure						
				16 IM10	22 IM16	
				5.8	5.8	8.8
design values for tension load in cracked and non-cracked concrete C 20/25[1)2)]	4.8	N_{Rd}	[kN]	16.0	28.3 40.6	28.3 40.6
	5.8	N_{Rd}	[kN]	20.0	28.3 47.3	28.3 50.7
	8.8	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 32.1	28.3 47.3	28.3 57.4
	10.9	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 36.7	28.3 47.3	28.3 57.4
design values for shear load in cracked and non-cracked concrete C 20/25 to C 50/60[1)2)]	4.8	V_{Rd}	[kN]	8.0	20.7	20.7
	5.8	V_{Rd}	[kN]	7.15	20.7	25.3
	8.8	V_{Rd}	[kN]	11.4	20.7	38.6
	10.9	V_{Rd}	[kN]	13.3	20.7	38.6

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 was considered for determining the load.
[2)] These values apply without influence of the spacings and edge distances.

Technical characteristics under fire exposure					
				TSM	
				16 IM10	22 IM16
fire resistance class					
R 30	permissible load $F_{fi,per,30}$[1)]		[kN]	4.9	11.7
R 60	permissible load $F_{fi,per,60}$[1)]		kN]	3.8	9.2
R 90	permissible load $F_{fi,per,90}$[1)]		[kN]	2.7	6.7
R 120	permissible load $F_{fi,per,120}$[1)]		[kN]	2.3	5.5
R 30 to R 120	spacing	s_{fi}	[mm]	$4xh_{ef}$	
		s_{min}		70	80
	edge distance	c_{fi}		$2xh_{ef}$	
		c_{min}			

[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



1) Set drill hole (hammer drilling or diamond core drilling method)
2) Clean out drill hole from the base
3) Brush out drill hole four times
4) Clean out drill hole from the base again
5) Inject composite mortar
6) Screw in concrete screw
7) After reaching the screw-in depth, the composite mortar must extrude at the concrete surface
8) The fixture can be installed right away, as the curing time of the composite mortar need not be taken into account

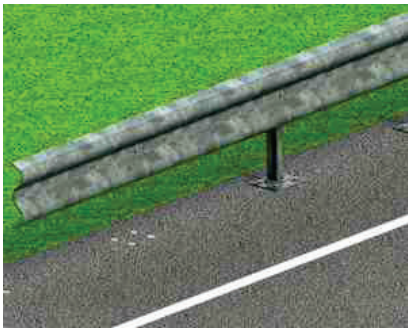
More information about the composite mortar can be found on page 84

Asphalt screw TSM A

TSM A 22x155 IM 16x30

TSM A 22x100 IM 16x30

TSM A 16x100 IM 10x25



Material:

- corrosion protection-coated steel
  as per corrosiveness category C5-I
  medium TOGE-KORR - TSM B/BC

Base material:

- all conventional asphalt types

Product features:

- quick installation
- transmission of force to asphalt via undercut technology
  in conjunction with a chemical mortar
- high transmission of force with repeated shock load
- no transmission of continual tension force thanks to the
  flow properties of the asphalt

Applications:

- fastening of crash barriers
- protective guard fastening
- traffic sign fastening

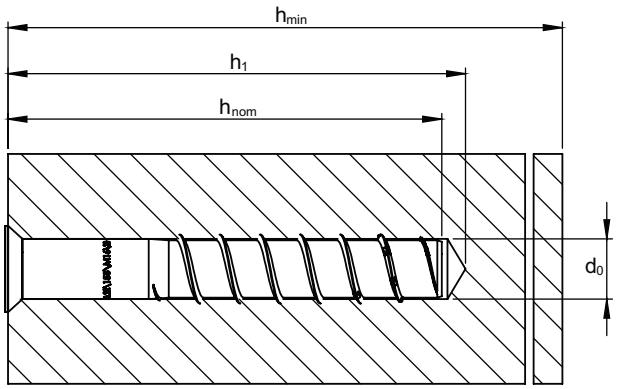
Product overview:

item nr.	Designation							Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	Box Qty.
	size		L		drive						
202 161 001	TSM A	16	x 100	IM10	x 20	SW12 KORR		16	100	110	50
202 221 001	TSM A	22	x 100	IM16	x 30	SW12 KORR		22	100	110	50
202 221 551	TSM A	22	x 155	IM16	x 30	SW12 KORR		22	155	165	40

accessories:

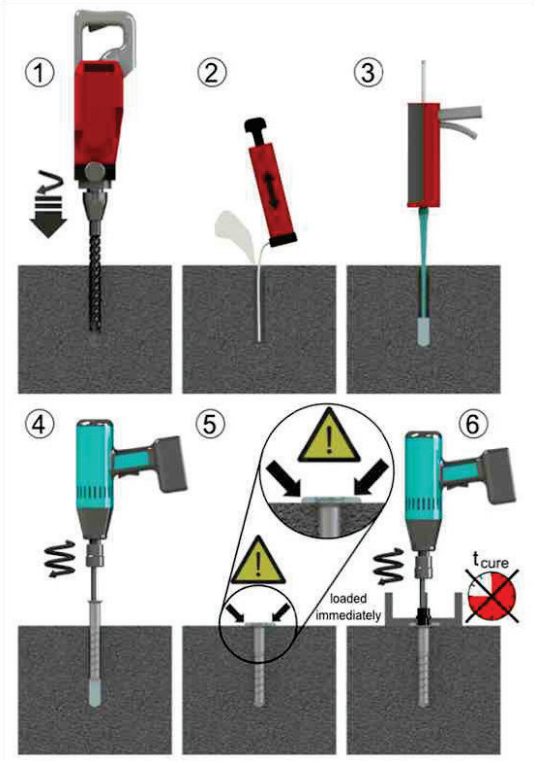
item nr.	Designation	Box Qty.
500 000 014	metric thread reducer M16 / M12	25
500 000 015	metric thread reducer M16 / M10	25

Technical data:



Technical characteristics					
			TSM A		
			16x100	22x100	22x155
drill bit diameter	d_0	[mm]	16	22	22
depth of drill hole	h_1	[mm]	110	110	165
minimum thickness of member	h_{min} ≥	[mm]	150	150	200
embedment depth of anchor	h_{nom}	[mm]	100	100	155
fastening screw used			M10x30	M16x40	M16x40
strokes ATA 2004			1	1 bis 2	2 bis 3
cartridge is sufficient			27	25	17
maximum shock load	F	[kN]	40	50	80

Installation instructions:



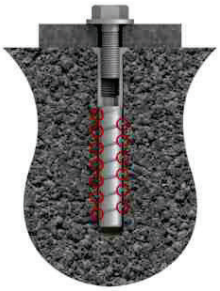
1) Create drill hole
2) Clean out drill hole from the base
3) Inject composite mortar
4) Screw in asphalt screw
5) After reaching the specified screw-in depth, the composite mortar must extrude at the asphalt surface
6) The fixture can be installed immediately; the curing time of the composite mortar need not be taken into account

More information about the composite mortar can be found on page 84

Operating principle of anchoring:

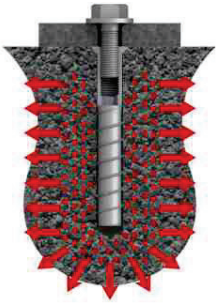
1.The 90° principle

The collar of the anchor is braced against the base plate at an angle of 90°. When torque is applied, the system is tilted. This is prevented by the asphalt. A vertical pull-out of the anchor is not possible.



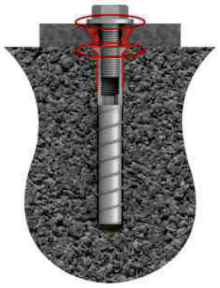
2. The undercut

The special thread of the anchor cuts an internal thread into the member during setting. The anchorage between the subsurface and thread of the asphalt screw is characterised by mechanical interlock in the special thread.



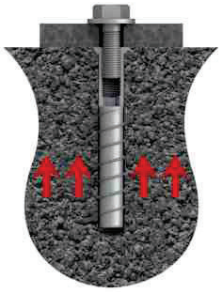
3. The chemical mortar

The air voids which are present in the asphalt will be filled with chemical components during the screw-in process of the TSM A. This results in a more solid and homogeneous material in the force-influenced area.



4. Preloaded free anchoring

The collar of TSM A is larger than the clearance hole in the fixture to be connected. A base plate is clamped between the collar and the head of the fastening screw. Thus, the TSM A remains unencumbered.

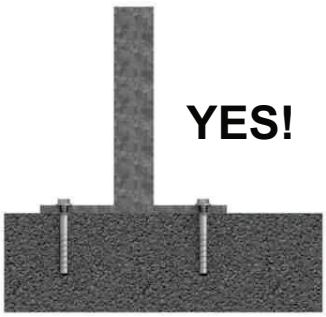


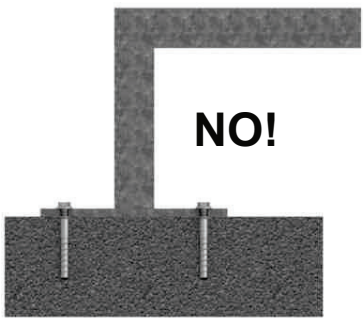
5. Large surface

In case of shock load, there is no limited outbreak as in concrete. There is a much greater active surface.

6. No overhanging loads

The anchoring system is not suitable for a permanent tensile load.





Concrete screw for temporary fixing TSM BC ST

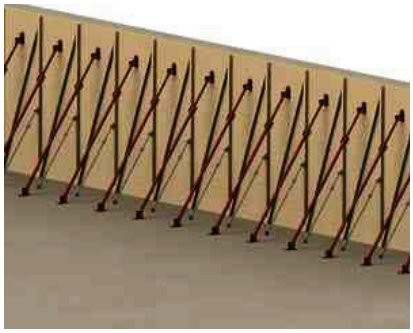
TSM BC ST with collar

TSM BC ST

Sleeve gauge

TOGE
Z-21.8.1916
Institut für Massivbau
Technische Universität
Darmstadt

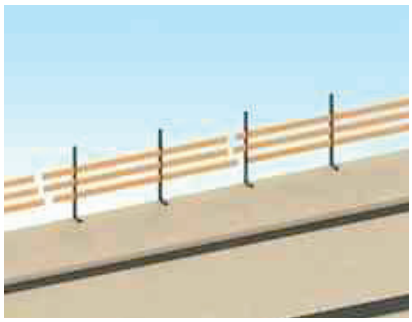
R 30 - R 120



Material:
- zinc plated steel

Base material
- approved for fresh concrete with a compressive strength of ≥ 10 N/mm^2
- cracked and non-cracked concrete

Product features:
- anchoring site equipment in fresh concrete
- high load capacity in cracked and non-cracked concrete
- temporary fastening, also outdoors
- reusable (operational check with sleeve gauge)
- quick installation
- residual-free removal



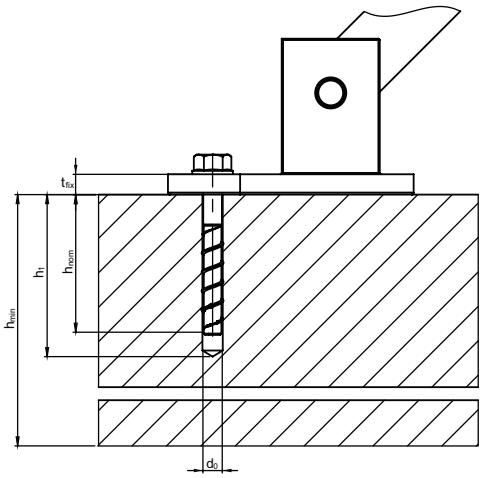
Product overview:

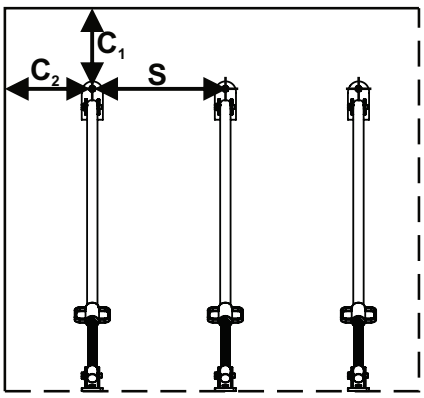
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
377 010 080	TSM BC ST 10 x	80	SW15	10	75 / - / -	85 / - / -	5 / - / -	50
377 010 110	TSM BC ST 10 x	110	SW15	10	75 / 90 / -	85 / 100 / -	35 / 20 / -	50
743 121 050	TSM BC ST 12 x	105	SW22	12	75 / 90 / -	85 / 100 / -	30 / 15 / -	25
377 014 080	TSM BC ST 14 x	80	SW22	14	75 / - / -	85 / - / -	5 / - / -	25
377 014 110	TSM BC ST 14 x	110	SW22	14	75 / 90 / -	85 / 100 / -	35 / 20 / -	25
377 014 130	TSM BC ST 14 x	130	SW22	14	75 / 90 / 115	85 / 100 / 125	55 / 40 / 15	25
377 014 134	TSM BC ST 14 x	130	SW24	14	75 / 90 / 115	85 / 100 / 125	55 / 40 / 15	25
377 014 150	TSM BC ST 14 x	150	SW22	14	75 / 90 / 115	85 / 100 / 125	75 / 60 / 35	25

Technical data:

Technical characteristics without fire exposure for TSM BC ST										
screw size TSM BC ST			TSM 10	TSM 12		TSM 14				
nominal anchorage depth [1]	h_{nom}	[mm]	$h_{nom,1}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$		
			75	75	90	75	90	115		
nominal diameter of drill bit	d_0	[mm]	10	12		14				
depth of drill hole	h_1 min	[mm]	85	85	100	85	100	125		
clearance hole diameter	d_f max	[mm]	14	16		14				
minimum base material thickness	h_{min}	[mm]	150	150	195	150	195	200	225	
permissible tension load in cracked concrete with Compressive strength fck,cube ≥ 10 N/mm² [3]	N_{zul}	[kN]	4,0	4,0	8,0	4,0	8,0	10,0	11,3	
permissible tension load in cracked concrete with compressive strength fck,cube ≥ 15 N/mm² [3]	N_{zul}	[kN]	4,7	4,7	8,7	4,7	8,7	12,0	14,0	
permissible tension load in cracked concrete with compressive strength $f_{ck,cube}$ ≥ 20 N/mm² [3]	N_{zul}	[kN]	5,3	5,3	9,3	5,3	9,3	13,3	16,0	
Minimum edge distance in load direction [2]	C_1	[mm]	105	105	130	105	130	165		
Minimum edge distance across the load direction [2]	C_2	[mm]	160	160	195	160	195	250		
minimum spacing	S	[mm]	320	320	390	320	390	500		
max. torque for impact screw driver		[Nm]	250	350		450				

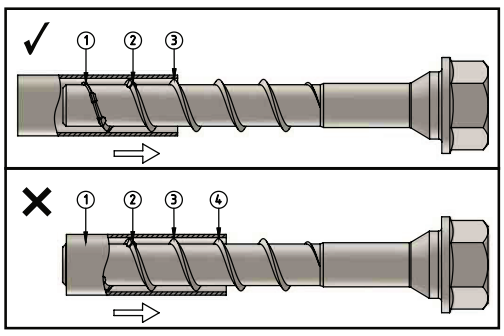
1) Setting depth depending on the anchor length
2) see sketch
3) the partial safety factor for material resistance from the approval γM=1,5 were considered for determining the load.

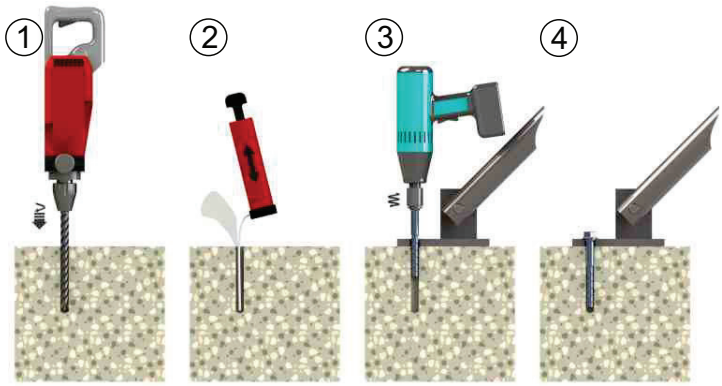




Installation instructions:

before use!





1) Set drill hole
2) Clean out drill hole from the base
3) Screw in concrete screw
4) Screw head must fully contact the fixture

Ceiling anchor TDN

TDN 6/5

TDN 6/35

ETA 06/0259

For multiple use of non-structural applications in cracked and non-cracked concrete

Material:

- zinc plated steel

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- approved for multiple use
- high load capacity in cracked and non cracked concrete
- small drill holes
- quick and safe installation

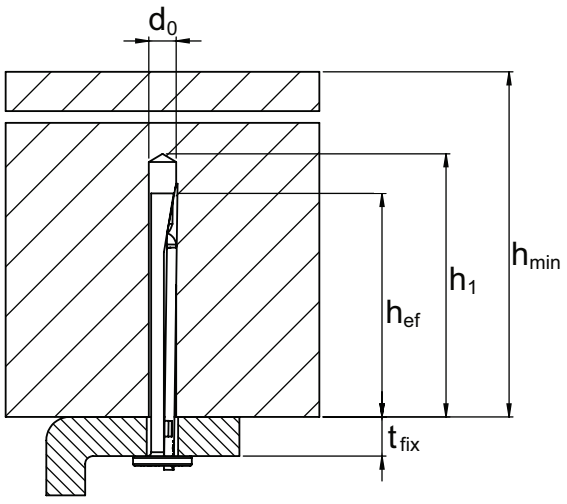
Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
050 035	TDN 6/5	40 mm	32 mm	5 mm	100
050 065	TDN 6/35	40 mm	32 mm	35 mm	100

Technical data:

Technical characteristics without fire exposure				
			TDN 6/5	TDN 6/35
drill bit diameter	d_0	[mm]	6	
depth of drill hole	h_1 ≥	[mm]	40	
effective anchorage depth	h_{ef} ≥	[mm]	32	
minimum thickness of member	h_{min}	[mm]	80	
minimum edge distance	c_{min}	[mm]	150	
minimum spacing	s_{min}	[mm]	200	
thiknes of fixture	t_{fix} ≤	[mm]	5	35
permissible load in cracked and non-cracked concrete C20/25- C50/60[1)]	N_{zul}	[kN]	2,4	

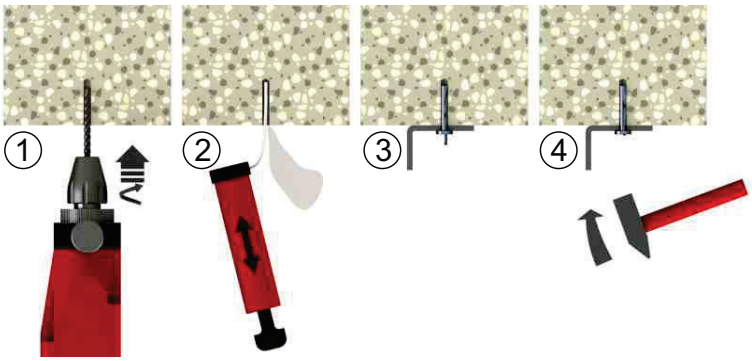
[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.



Technical characteristics under fire exposure				
			TDN 6/5	TDN 6/35
fire resistance class				
R 30	permissible load $F_{fi,per,30}$ [1]	[kN]	0.8	
R 60	permissible load $F_{fi,per,60}$ [1]	kN]	0.7	
R 90	permissible load $F_{fi,per,90}$ [1]	[kN]	0.6	
R 120	permissible load $F_{fi,per,120}$ [1]	[kN]	0.4	
R 30 to R 120	spacing s_{fi}	[mm]	200	
	edge distance c_{fi}		150	

[1] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



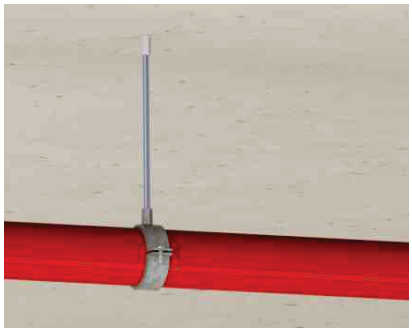
1) Set drill hole
2) Clean out drill hole from the base
3) Insert ceiling nail into the drill hole over the fixture
4) Knock in wedge until flush

Spring anchor TS

TSÖ

ETA 11/0290

For multiple use of non-structural applications in cracked and non-cracked concrete



Material:

- zinc plated steel

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- approved for multiple use
- high load capacity in cracked and non-cracked concrete
- small drill holes
- quick and safe installation

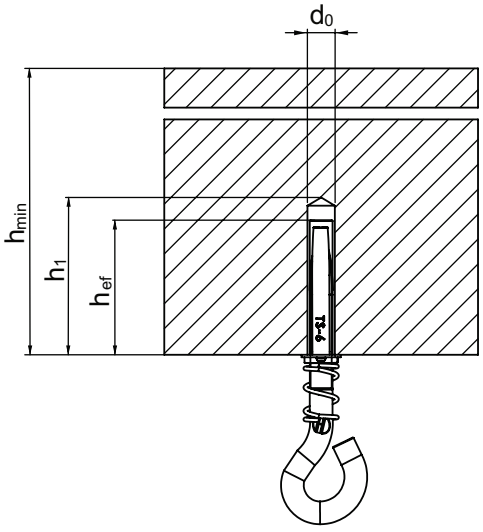
Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Qty.
071 002	TSÖ	40 mm	33 mm	100

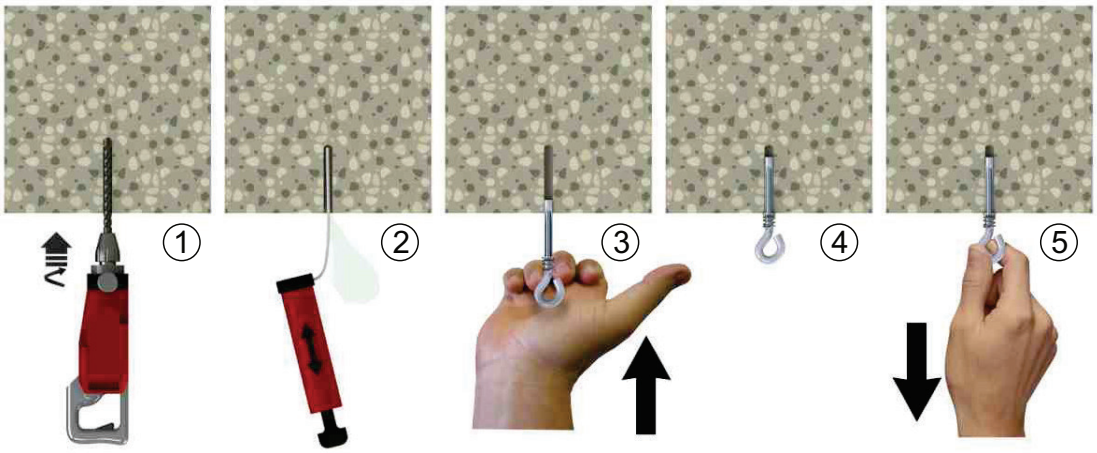
Technical data:

Technical characteristics without fire exposure			
drill bit diameter			**TSÖ**
depth of drill hole	d_0	[mm]	6
effective anchorage depth	h_1 ≥	[mm]	40
minimum thickness of member	h_{ef} ≥	[mm]	33
minimum edge distance	h_{min}	[mm]	80
minimum spacing	c_{min}	[mm]	100
thicknes of fixture	s_{min}	[mm]	200
permissible load in cracked and non-cracked concrete C20/25 - C50/60[1)]	N_{per}	[kN]	0.7

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.



Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Insert spring anchor into the hole
4) Anchor must lie properly in the hole
5) Pull spring anchor with a jerk

Metal frame anchor TU

ETA 09/0237
European technical assessment
Option 1 ETAG 001-8

ETA 09/0238
For multiple use of non-structural applications
in cracked and non-cracked concrete

Material:
- galvanised steel

Base material:
- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete
- natural brick with a dense microstructure
- solid brick
- perforated brick
- lime-sand brick
- aerated concrete

Product features:
- single fastening (non-cracked concrete)
- multiple fastening of non-load-bearing systems
- quick and safe installation of all types of window frames
- fastening of all types of substructures made of wood and metal

Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
111 010 052	TU 10x52	55 mm	40 mm	10 mm	100
111 010 072	TU 10x72	55 mm	40 mm	30 mm	100
111 010 092	TU 10x92	55 mm	40 mm	50 mm	100
111 010 112	TU 10x112	55 mm	40 mm	70 mm	100
111 010 132	TU 10x132	55 mm	40 mm	90 mm	100
111 010 152	TU 10x152	55 mm	40 mm	110 mm	100
111 010 182	TU 10x182	55 mm	40 mm	140 mm	100
111 010 202	TU 10x202	55 mm	40 mm	160 mm	100

Flat cover caps:

Item number	Designation	Qty.
041 501	CAPS 15 W (white)	100
041 502	CAPS 15 GR (grey)	100
041 503	CQPS 15 HBR (light brown)	100
041 504	CAPS 15 DBR (dark browb)	100
041 505	CAPS 15 S (black)	100

Cylindrical cover caps:

Item number	Designation	Qty.
041 701	CAPS 17 W (white)	100
041 702	CAPS 17 GR (grey)	100
041 703	CAPS 17 HBR (light brown)	100
041 704	CAPS 17 DBR (dark brown)	100
041 705	CAPS 17 S (black)	100

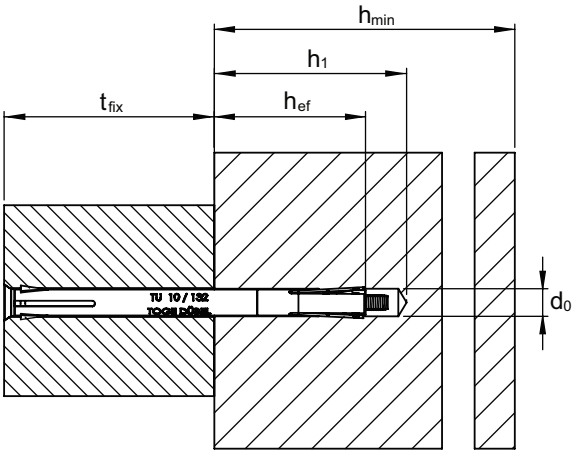
Technical data:

Technical characteristics without fire exposure				
			TU 10	
			single fastening	multiple use
drill bit diameter	d_0	[mm]	10	
depth of drill hole	h_1 ≥	[mm]	55	
effective anchorage depth	h_{ef} ≥	[mm]	40	
minimum thickness of member	h_{min}	[mm]	100	
characteristic edge distance	$c_{cr,N}$	[mm]	60	
characteristic spacing	$s_{cr,N}$	[mm]	120	
thickness of fixture	t_{fix} ≤	[mm]	162	
installation torque	T_{inst}	[Nm]	8	
permissible load in cracked and non-cracked concrete C20/25 - C50/60 [1)2)]	N_{per}	[kN]	2.8	3.5
recommended load in solid brick	N_{rec}	[kN]	1.25	
recommended load in lime-sand brick	N_{rec}	[kN]	0.80	
recommended load in perforated brick	N_{rec}	[kN]	0.65	
recommended load in aerated concrete	N_{rec}	[kN]	0.40	

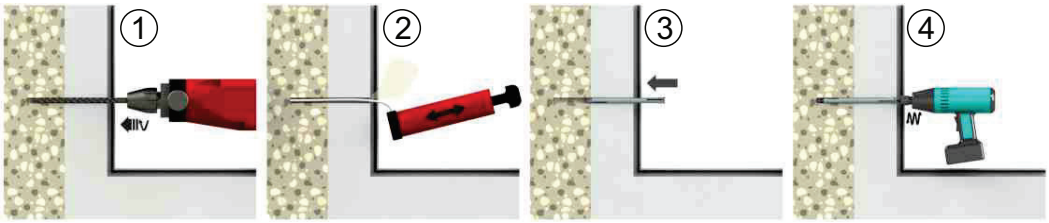
[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load..
[2)] These values apply without influence of the spacings and edge distances.

Technical characteristics under fire exposure			
			TU 10
fire resistance class			
R 30	permissible load $F_{fi,per,30}$ [1)]	[kN]	0.50
R 60	permissible load $F_{fi,per,60}$ [1)]	kN]	0.35
R 90	permissible load $F_{fi,per,90}$ [1)]	[kN]	0.25
R 120	permissible load $F_{fi,per,120}$ [1)]	[kN]	0.20
R 30 to R 120	spacing s_{fi}	[mm]	200
	edge distance c_{fi}		150

[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.



Installation instructions:



1) Set drill hole
2) Clean out drill hole
3) Insert anchor into the hole through the fixture
4) Apply installation torque

Metal frame anchor TK

Material:

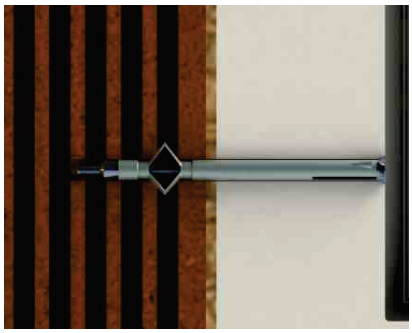
- galvanised steel

Base Material:

- cracked and non-cracked concrete
- solid brick
- lime-sand brick
- perforated brick
- aerated concrete

Product features:

- quick and safe installation of all types of window frames
- fastening of all types of substructures made of wood and metal



Product overview

Item number	Designation	Maximum thickness of fixture	Qty.
110 010 112	TK 10x112	45 mm	100
110 010 132	TK 10x132	65 mm	100
110 010 152	TK 10x152	85 mm	100
110 010 182	TK 10x182	115 mm	100
110 010 202	TK 10x202	135 mm	100

Flat cover caps:

Item number	Designation	Qty.
041 501	CAPS 15 W (white)	100
041 502	CAPS 15 GR (grey)	100
041 503	CAPS 15 HBR (light brown)	100
041 504	CAPS 15 DBR (dark brown)	100
041 505	CAPS 15 S (black)	100

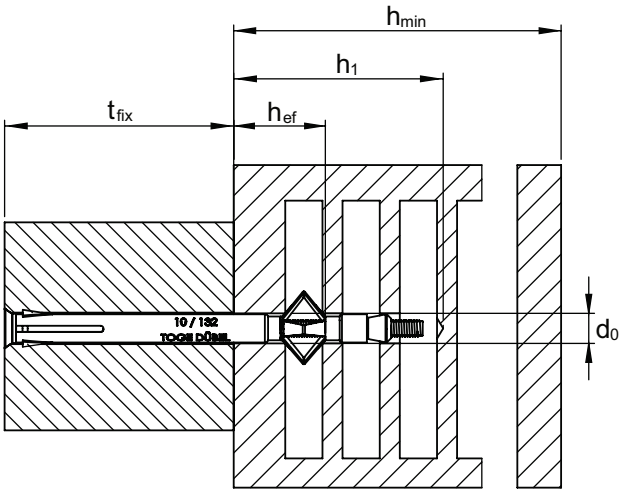
Cylindrical cover caps:

Item number	Designation	Qty.
041 701	CAPS 17 W (white)	100
041 702	CAPS 17 GR (grey)	100
041 703	CAPS 17 HBR (light brown)	100
041 704	CAPS 17 DBR (dark brown)	100
041 705	CAPS 17 S (black)	100

Technical data:

Technical characteristics without fire exposure			
			TK 10
drill bit diameter	d_0	[mm]	10
depth of drill hole	h_1 ≥	[mm]	55
effective anchorage depth	h_{ef} ≥	[mm]	40
minimum thickness of member	h_{min}	[mm]	100
characteristic edge distance	$c_{cr,N}$	[mm]	60
characteristic spacing	$s_{cr,N}$	[mm]	120
thikness of fixture	t_{fix} ≤	[mm]	140
installation torque	T_{inst}	[Nm]	8
permissible load in cracked and non-cracked concrete C20/25 - C50/60 [1)2)]	N_{rec}	[kN]	1.25
recommended load in solid brick	N_{rec}	[kN]	1.25
recommended load in lime-sand brick	N_{rec}	[kN]	0.80
recommended load in perforated brick	N_{rec}	[kN]	0.80
recommended load in aerated concrete	N_{rec}	[kN]	0.50

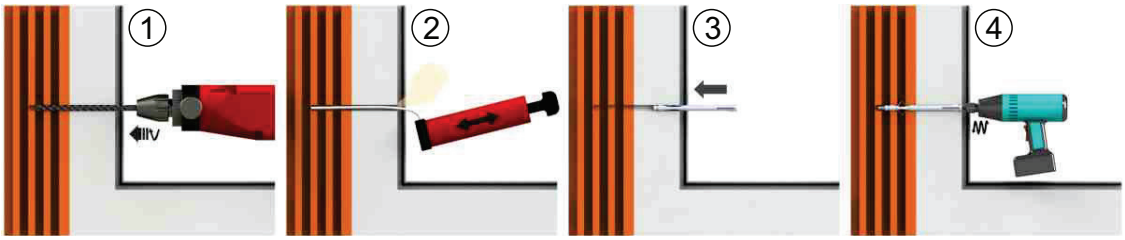
[1)]) The required partial safety factor was considered.



Technical characteristics under fire exposure			
		TK 10	
fire resistance class			
R 30	permissible load $F_{fi,per,30}$ [1)]	[kN]	0.50
R 60	permissible load $F_{fi,per,60}$ [1)]	kN]	0.35
R 90	permissible load $F_{fi,per,90}$ [1)]	[kN]	0.25
R 120	permissible load $F_{fi,per,120}$ [1)]	[kN]	0.20
R 30 to R 120	spacing s_{fi}	[mm]	200
	edge distance c_{fi}		150

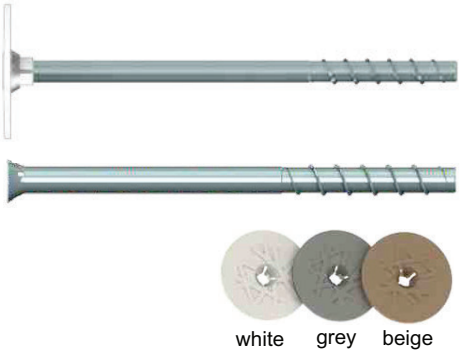
[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Insert the anchor into the hole trough the fixture
4) Apply installation torque

Isolierschraube TIS



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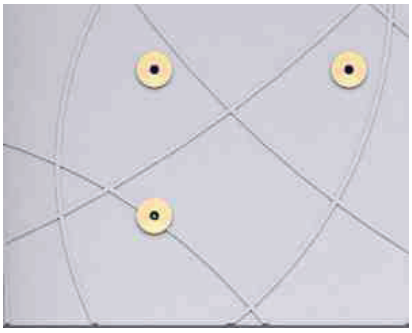
R 30 - R 120

Material:

- screw: zinc plated steel or TOGE KORR coated
- Cap: polyethylene (3 colors)

Base material:

- approved for concrete strength classes from C20/25 to C50/60
- cracked and non-cracked concrete



Product features:

- approved for multiple fastening of insulation panels
- high load-bearing capacity in cracked and non-cracked concrete
- small drill holes
- quick and safe installation

Product overview with galvanised steel screw:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 069 050	TIS 50 GREY	30 mm	25 mm	25 mm	100
031 069 075	TIS 75 GREY	30 mm	25 mm	50 mm	100
031 069 085	TIS 85 GREY	30 mm	25 mm	60 mm	100
031 069 100	TIS 100 GREY	30 mm	25 mm	75 mm	100
031 069 125	TIS 125 GREY	30 mm	25 mm	100 mm	100
031 069 135	TIS 135 GREY	30 mm	25 mm	110 mm	100
031 069 150	TIS 150 GREY	30 mm	25 mm	125 mm	100
031 069 175	TIS 175 GREY	30 mm	25 mm	150 mm	100
031 069 200	TIS 200 GREY	30 mm	25 mm	175 mm	100
031 069 225	TIS 225 GREY	30 mm	25 mm	200 mm	100
031 069 250	TIS 250 GREY	30 mm	25 mm	225 mm	100
031 069 275	TIS 275 GREY	30 mm	25 mm	250 mm	100
031 069 300	TIS 300 GREY	30 mm	25 mm	275 mm	100
031 069 325	TIS 325 GREY	30 mm	25 mm	300 mm	100

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 169 050	TIS 50 WHITE	30 mm	25 mm	25 mm	100
031 169 075	TIS 75 WHITE	30 mm	25 mm	50 mm	100
031 169 085	TIS 85 WHITE	30 mm	25 mm	60 mm	100
031 169 100	TIS 100 WHITE	30 mm	25 mm	75 mm	100
031 169 125	TIS 125 WHITE	30 mm	25 mm	100 mm	100
031 169 135	TIS 135 WHITE	30 mm	25 mm	110 mm	100
031 169 150	TIS 150 WHITE	30 mm	25 mm	125 mm	100
031 169 175	TIS 175 WHITE	30 mm	25 mm	150 mm	100
031 169 200	TIS 200 WHITE	30 mm	25 mm	175 mm	100
031 269 225	TIS 225 WHITE	30 mm	25 mm	200 mm	100
031 169 250	TIS 250 WHITE	30 mm	25 mm	225 mm	100
031 169 275	TIS 275 WHITE	30 mm	25 mm	250 mm	100
031 169 300	TIS 300 WHITE	30 mm	25 mm	275 mm	100
031 169 325	TIS 325 WHITE	30 mm	25 mm	300 mm	100

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 269 050	TIS 50 BEIGE	30 mm	25 mm	25 mm	100
031 269 075	TIS 75 BEIGE	30 mm	25 mm	50 mm	100
031 269 085	TIS 85 BEIGE	30 mm	25 mm	60 mm	100
031 269 100	TIS 100 BEIGE	30 mm	25 mm	75 mm	100
031 269 125	TIS 125 BEIGE	30 mm	25 mm	100 mm	100
031 269 135	TIS 135 BEIGE	30 mm	25 mm	110 mm	100
031 269 150	TIS 150 BEIGE	30 mm	25 mm	125 mm	100
031 269 175	TIS 175 BEIGE	30 mm	25 mm	150 mm	100
031 269 200	TIS 200 BEIGE	30 mm	25 mm	175 mm	100
031 269 225	TIS 225 BEIGE	30 mm	25 mm	200 mm	100
031 269 250	TIS 250 BEIGE	30 mm	25 mm	225 mm	100
031 269 275	TIS 275 BEIGE	30 mm	25 mm	250 mm	100
031 269 300	TIS 300 BEIGE	30 mm	25 mm	275 mm	100
031 269 325	TIS 325 BEIGE	30 mm	25 mm	300 mm	100

Product overview of galvanised TIS screw :

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 969 050	Schraube TIS 50	30 mm	25 mm	25 mm	100
031 969 075	Schraube TIS 75	30 mm	25 mm	50 mm	100
031 969 085	Schraube TIS 85	30 mm	25 mm	60 mm	100
031 969 100	Schraube TIS 100	30 mm	25 mm	75 mm	100
031 969 125	Schraube TIS 125	30 mm	25 mm	100 mm	100
031 969 135	Schraube TIS 135	30 mm	25 mm	110 mm	100
031 969 150	Schraube TIS 150	30 mm	25 mm	125 mm	100
031 969 175	Schraube TIS 175	30 mm	25 mm	150 mm	100
031 969 200	Schraube TIS 200	30 mm	25 mm	175 mm	100
031 969 225	Schraube TIS 225	30 mm	25 mm	200 mm	100
031 969 250	Schraube TIS 250	30 mm	25 mm	225 mm	100
031 969 275	Schraube TIS 275	30 mm	25 mm	250 mm	100
031 969 300	Schraube TIS 300	30 mm	25 mm	275 mm	100
031 969 325	Schraube TIS 325	30 mm	25 mm	300 mm	100

Product overview with TOGE KORR coated screw:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 068 050	TIS KORR 50 GREY	30 mm	25 mm	25 mm	100
031 068 075	TIS KORR 75 GREY	30 mm	25 mm	50 mm	100
031 068 085	TIS KORR 85 GREY	30 mm	25 mm	60 mm	100
031 068 100	TIS KORR 100 GREY	30 mm	25 mm	75 mm	100
031 068 125	TIS KORR 125 GREY	30 mm	25 mm	100 mm	100
031 068 135	TIS KORR 135 GREY	30 mm	25 mm	110 mm	100
031 068 150	TIS KORR 150 GREY	30 mm	25 mm	125 mm	100
031 068 175	TIS KORR 175 GREY	30 mm	25 mm	150 mm	100
031 068 200	TIS KORR 200 GREY	30 mm	25 mm	175 mm	100
031 068 225	TIS KORR 225 GREY	30 mm	25 mm	200 mm	100
031 068 250	TIS KORR 250 GREY	30 mm	25 mm	225 mm	100
031 068 275	TIS KORR 275 GREY	30 mm	25 mm	250 mm	100
031 068 300	TIS KORR 300 GREY	30 mm	25 mm	275 mm	100
031 068 325	TIS KORR 325 GREY	30 mm	25 mm	300 mm	100

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 168 050	TIS KORR 50 WHITE	30 mm	25 mm	25 mm	100
031 168 075	TIS KORR 75 WHITE	30 mm	25 mm	50 mm	100
031 168 085	TIS KORR 85 WHITE	30 mm	25 mm	60 mm	100
031 168 100	TIS KORR 100 WHITE	30 mm	25 mm	75 mm	100
031 168 125	TIS KORR 125 WHITE	30 mm	25 mm	100 mm	100
031 168 135	TIS KORR 135 WHITE	30 mm	25 mm	110 mm	100
031 168 150	TIS KORR 150 WHITE	30 mm	25 mm	125 mm	100
031 168 175	TIS KORR 175 WHITE	30 mm	25 mm	150 mm	100
031 168 200	TIS KORR 200 WHITE	30 mm	25 mm	175 mm	100
031 168 225	TIS KORR 225 WHITE	30 mm	25 mm	200 mm	100
031 168 250	TIS KORR 250 WHITE	30 mm	25 mm	225 mm	100
031 168 275	TIS KORR 275 WHITE	30 mm	25 mm	250 mm	100
031 168 300	TIS KORR 300 WHITE	30 mm	25 mm	275 mm	100
031 168 325	TIS KORR 325 WHITE	30 mm	25 mm	300 mm	100

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 268 050	TIS KORR 50 BEIGE	30 mm	25 mm	25 mm	100
031 268 075	TIS KORR 75 BEIGE	30 mm	25 mm	50 mm	100
031 268 085	TIS KORR 85 BEIGE	30 mm	25 mm	60 mm	100
031 268 100	TIS KORR 100 BEIGE	30 mm	25 mm	75 mm	100
031 268 125	TIS KORR 125 BEIGE	30 mm	25 mm	100 mm	100
031 268 135	TIS KORR 135 BEIGE	30 mm	25 mm	110 mm	100
031 268 150	TIS KORR 150 BEIGE	30 mm	25 mm	125 mm	100
031 268 175	TIS KORR 175 BEIGE	30 mm	25 mm	150 mm	100
031 268 200	TIS KORR 200 BEIGE	30 mm	25 mm	175 mm	100
031 268 225	TIS KORR 225 BEIGE	30 mm	25 mm	200 mm	100
031 268 250	TIS KORR 250 BEIGE	30 mm	25 mm	225 mm	100
031 268 275	TIS KORR 275 BEIGE	30 mm	25 mm	250 mm	100
031 268 300	TIS KORR 300 BEIGE	30 mm	25 mm	275 mm	100
031 268 325	TIS KORR 325 BEIGE	30 mm	25 mm	300 mm	100

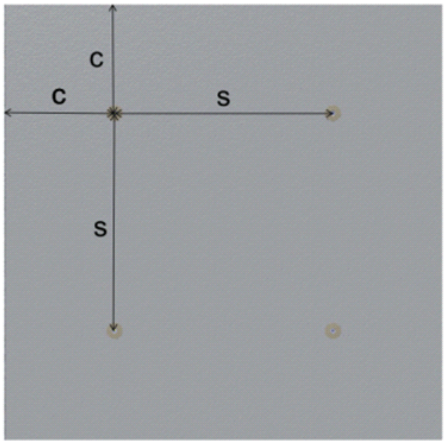
Product overview of TOGE KORR coated TIS screw:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
031 968 050	Schraube TIS 50 KORR	30 mm	25 mm	25 mm	100
031 968 075	Schraube TIS 75 KORR	30 mm	25 mm	50 mm	100
031 968 085	Schraube TIS 85 KORR	30 mm	25 mm	60 mm	100
031 968 100	Schraube TIS 100 KORR	30 mm	25 mm	75 mm	100
031 968 125	Schraube TIS 125 KORR	30 mm	25 mm	100 mm	100
031 968 135	Schraube TIS 135 KORR	30 mm	25 mm	110 mm	100
031 968 150	Schraube TIS 150 KORR	30 mm	25 mm	125 mm	100
031 968 175	Schraube TIS 175 KORR	30 mm	25 mm	150 mm	100
031 968 200	Schraube TIS 200 KORR	30 mm	25 mm	175 mm	100
031 968 225	Schraube TIS 225 KORR	30 mm	25 mm	200 mm	100
031 968 250	Schraube TIS 250 KORR	30 mm	25 mm	225 mm	100
031 968 275	Schraube TIS 275 KORR	30 mm	25 mm	250 mm	100
031 968 300	Schraube TIS 300 KORR	30 mm	25 mm	275 mm	100
031 968 325	Schraube TIS 325 KORR	30 mm	25 mm	300 mm	100

Technical data:

Technical characteristics without fire exposure			
drill bit diameter	d_0	[mm]	6
depth of drill hole	h_1 ≥	[mm]	30
effective anchorage depth	h_{ef} ≥	[mm]	25
minimum thickness of member	h_{min}	[mm]	80
edge distance	c	[mm]	60
spacing	s	[mm]	120
diameter of plastic disc	d_{kt}	[mm]	37
permissible load in cracked and non-cracked concrete C20/25 - C50/60[1)2)]	N_{per}	[kN]	0.22

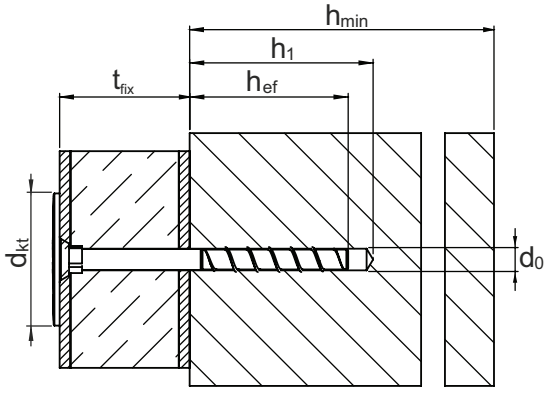
[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.



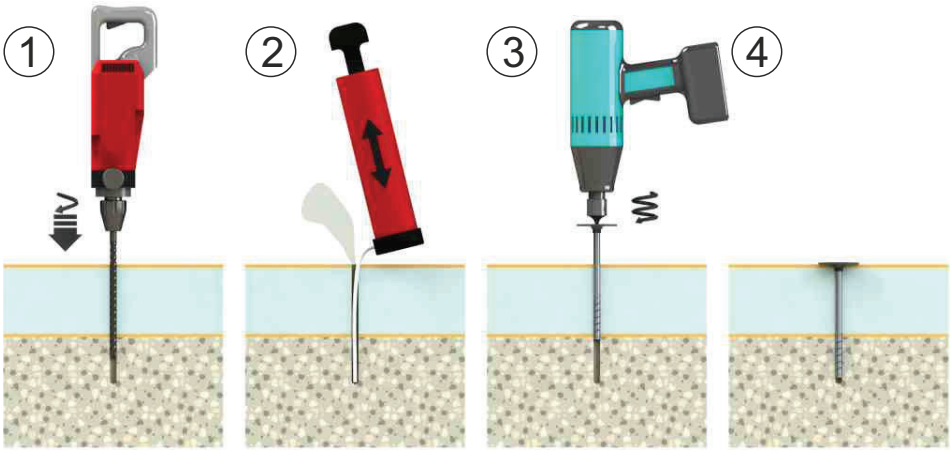
At least 4 anchors per m^2 of panel.

Technical characteristics under fire exposure			
fire resistance class			
R 30	permissible load $F_{fi.per,30}$ [1)]	[kN]	0.34
R 60	permissible load $F_{fi.per,60}$ [1)]	kN]	0.31
R 90	permissible load $F_{fi.per,90}$ [1)]	[kN]	0.22
R 120	permissible load $F_{fi.per,120}$ [1)]	[kN]	0.17
R 30 to R 120	spacing s_{fi}	[mm]	120
	edge distance c_{fi}		60

[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.



Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Screw in insulation screw with a screwdriver
4) Top plate must fully contact the panel

Insulation anchor TID, TID-K

TID
head diameter 35 mm

Plastic cap TID-E
for TID

TID-K
(with fixed plastic
cap as plaster base)
54 mm dia., white

Additional discs
80 mm diameter

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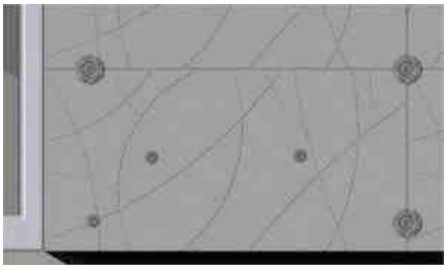


Material:

- galvanised steel - TID S
- A2 stainless steel - TID R
- cap: polyethylene

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- approved for multiple fastening of insulation panels
- high load-bearing capacity in cracked and non-cracked concrete
- small drill holes
- quick and safe installation

Product overview:

Steel

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Depth of drill hole[1)]	Embedment depth of anchor[1)]	Maximum thickness of fixture	Qty.
031 061 080	TIDS 80	35 mm	30 mm	45 mm	40 mm	50 mm	250
031 061 110	TIDS 110	35 mm	30 mm	45 mm	40 mm	75 mm	250
031 061 120	TIDS 120	45 mm	40 mm	45 mm	40 mm	80 mm	250
031 061 140	TIDS 140	45 mm	40 mm	45 mm	40 mm	100 mm	250
031 061 170	TIDS 170	50 mm	45 mm	45 mm	40 mm	125 mm	250
031 061 200	TIDS 200	55 mm	50 mm	45 mm	40 mm	150 mm	250
031 061 250	TIDS 250	55 mm	50 mm	45 mm	40 mm	200 mm	200
031 061 300	TIDS 300	55 mm	50 mm	45 mm	40 mm	250 mm	200
031 361 080	TIDS-K 80	35 mm	30 mm	45 mm	40 mm	50 mm	250
031 361 110	TIDS-K 110	45 mm	40 mm	45 mm	40 mm	75 mm	250
031 361 140	TIDS-K 140	45 mm	40 mm	45 mm	40 mm	100 mm	250
031 361 170	TIDS-K 170	50 mm	45 mm	45 mm	40 mm	125 mm	125
031 361 200	TIDS-K 200	55 mm	50 mm	45 mm	40 mm	150 mm	125
031 361 250	TIDS-K 250	55 mm	50 mm	45 mm	40 mm	200 mm	125

[1)] The depth of the drill hole, embedment depth of the anchor and fastening height deviate to a degree in the application depending on the approval.

A2 stainless steel

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Depth of drill hole[1)]	Embedment depth of anchor[1)]	Maximum thickness of fixture	Qty.
031 063 080	TIDR 80	35 mm	30 mm	45 mm	40 mm	50 mm	250
031 063 110	TIDR 110	35 mm	30 mm	45 mm	40 mm	75 mm	250
031 063 120	TIDR 120	45 mm	40 mm	45 mm	40 mm	80 mm	250
031 063 140	TIDR 140	45 mm	40 mm	45 mm	40 mm	100 mm	250
031 063 170	TIDR 170	50 mm	45 mm	45 mm	40 mm	250 mm	250
031 063 200	TIDR 200	55 mm	50 mm	45 mm	40 mm	150 mm	250
031 063 250	TIDR 250	55 mm	50 mm	45 mm	40 mm	200 mm	200
031 063 300	TIDR 300	55 mm	50 mm	45 mm	40 mm	250 mm	200
031 363 080	TIDR-K 80	35 mm	30 mm	45 mm	40 mm	50 mm	250
031 363 110	TIDR-K 110	45 mm	40 mm	45 mm	40 mm	75 mm	250
031 363 140	TIDR-K 140	45 mm	40 mm	45 mm	40 mm	100 mm	250
031 363 170	TIDR-K 170	50 mm	45 mm	45 mm	40 mm	125 mm	125
031 363 200	TIDR-K 200	55 mm	50 mm	45 mm	40 mm	150 mm	125
031 363 250	TIDR-K 250	55 mm	50 mm	45 mm	40 mm	200 mm	125

[1)] The depth of the drill hole, embedment depth of the anchor and thickness of fixture deviate to a degree in the application depending on the approval.

Cover cap TID-E:

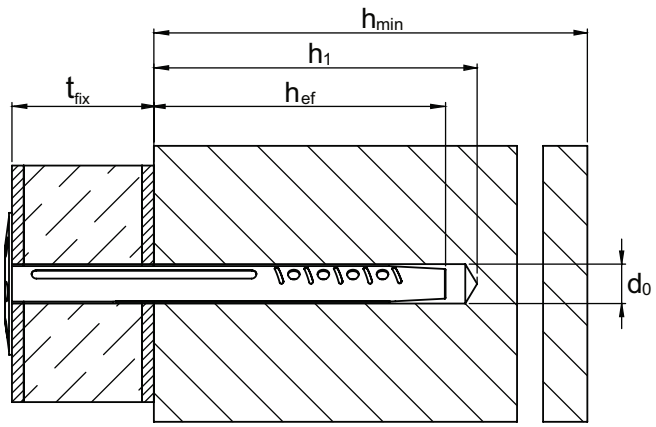
Item number	Designation	Diameter	Qty.
042 000 000	TID-E beige	38 mm	250
042 000 100	TID-E white	38 mm	250
042 000 200	TID-E grey	38 mm	250
042 000 300	TID-E light grey	38 mm	250
042 000 600	TID-E anthracite grey	38 mm	250

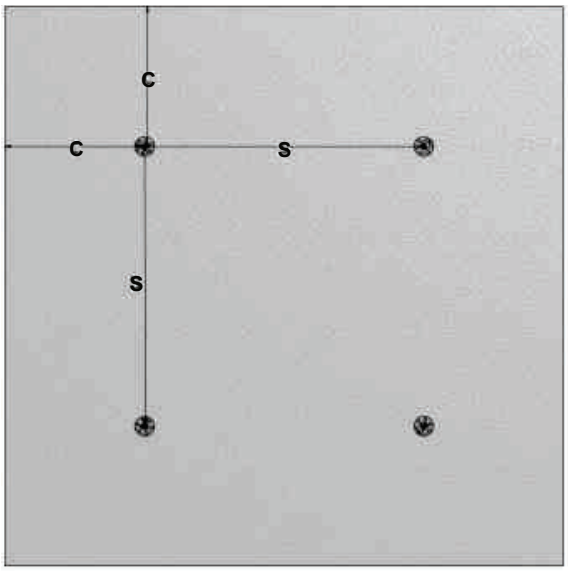
Additional discs:

Item number	Designation	Diameter	Qty.
030 156	TIDS T	**80 mm**	250
030 157	TIDR T	80 mm	250
030 158	TIDS T o. P.[1)]	80 mm	250

[1)] Additional disc without marking

Technical data:





At least 4 anchors per m^2 of panel.

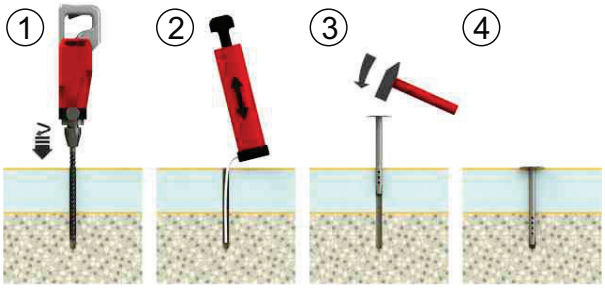
Technical characteristics without fire exposure			
drill bit diameter	d_0	[mm]	6
depth of drill hole	h_1 ≥	[mm]	30
effective anchorage depth	h_{ef} ≥	[mm]	25
minimum thickness of member	h_{min}	[mm]	80
edge distance	c	[mm]	60
spacing	s	[mm]	120
diameter of plastic disc	d_{kt}	[mm]	37
permissible load in cracked and non-cracked concrete C20/25 - C50/60[1)2)]	N_{per}	[kN]	0.074

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.

Technical characteristics under fire exposure			
fire resistance class			
R 30	**permissible load** $F_{fi,per,30}$ [1)]	[kN]	0.09
R 60	**permissible load** $F_{fi,per,60}$ [1)]	kN]	0.09
R 90	**permissible load** $F_{fi,per,90}$ [1)]	[kN]	0.09
R 120	**permissible load** $F_{fi,per,120}$ [1)]	[kN]	0.09
R 30 to R 120	**spacing** s_{fi}	[mm]	120
	edge distance c_{fi}		60

[1)] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Knock insulation fastener through the insulation panel with a hammer
4) Anchor disc must fully contact the insulation panel

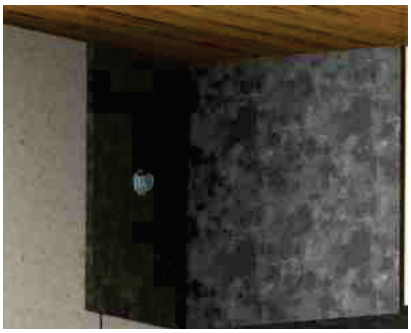
Aerated concrete screw TSM PB

TSM PB SeKo with torx drive

TSM PB SW13

Material:
- zinc plated steel

Base material:
- aerated concrete



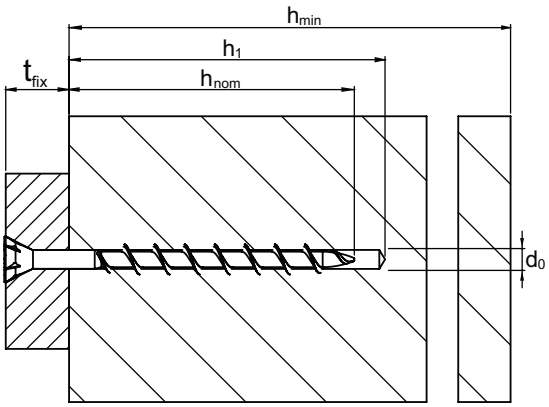
Product features:

- quick and safe installation with and without pre-drilling
- high service loads
- load transmission via undercut in base material

Product overview:

Item number	Designation	Embedment depth of anchor	Maximum fastening height	Qty.
230 081 100	TSM PB 8x110 SeKo VZ 25	80 mm	30 mm	100
230 101 100	TSM PB 10x110 SeKo VZ30	100 mm	10 mm	100
230 101 102	TSM PB 10x110 SW 10	100 mm	10 mm	100
230 101 600	TSM PB 10x160 SeKo VZ30	100 mm	60 mm	100
230 101 602	TSM PB 10x160 SW 10	100 mm	60 mm	100

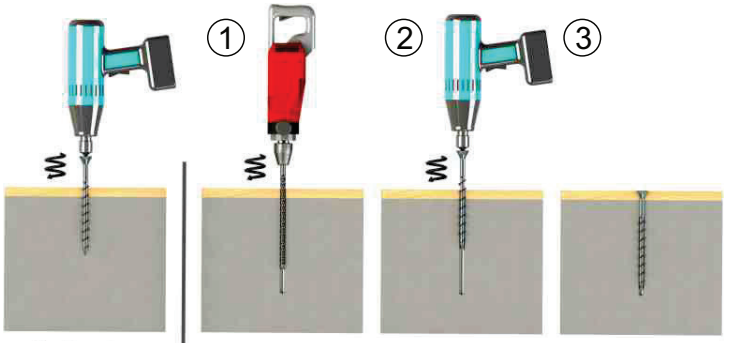
Technical data:



Technical characteristics[1]				
			TSM PB 8	TSM PB 10
drill bit diameter	d_0	[mm]	0/4	0/4
depth of drill hole	h_1 ≥	[mm]	0/40	0/50
embedment depth of the anchor	h_{nom} ≥	[mm]	80	100
recommended load for PP4 -0,65[2]	F_{rec}	[kN]	0,34	0,47
recommended load for PP4 -0,65[2]	F_{rec}	[kN]	0,68	0,92
recommended load for PP6 -0,80[2]	F_{rec}	[kN]	0,99	x
recommended load for PP3,3 -0,60[2]	F_{rec}	[kN]	x	0,94
recommended load for PP4,4 -0,70[2]	F_{rec}	[kN]	x	0,90
diameter of clearening hole in the fixture	d	[mm]	9,0	10,0
installation torque	T_{Inst}	[Nm]	8	10 to 12
test value determination (predominant)			LGA	LGA

[1] All specified values apply for installation with pre-drilled drill hole!
[2] The partial safety factor γ = 5 was considered for determining the load.

Installation instructions:



Direct installation | Installation with pre-drilling: Achieves greater load capacity

Direct installation

With direct installation, the screw is screwed in over the fixture

Installation with pre-drilling

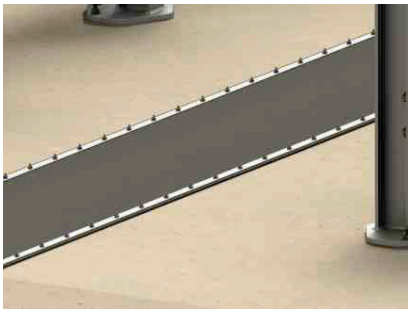
1) Set drill hole
2) Screw in the screw
3) Screw head must fully contact the fixture

Concrete screw TSM A4 for joint covering

ETA-15/0514
for anchoring in cracked and non-cracked concrete

Material:

- stainless steel - TSM A4

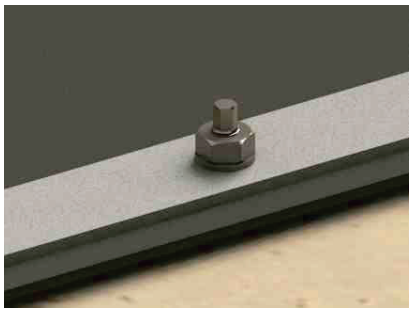


Base material:

- approved for concrete C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by the composite mortar
- can be loaded immediately, regardless of the composite mortar curing time



Applications:

- fastening of joint tapes as per RIZ-ING FUG 6

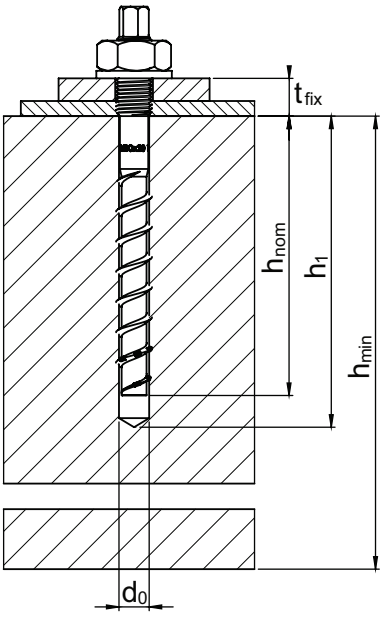
Product overview:

item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom1} / h_{nom2} / h_{nom3}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
866 008 105	TSM 8 x	105	M10x30 SW7 A4	8	45 / 55 / 65	55 / 65 / 75	60 / 50 / 40	50

Technical data:

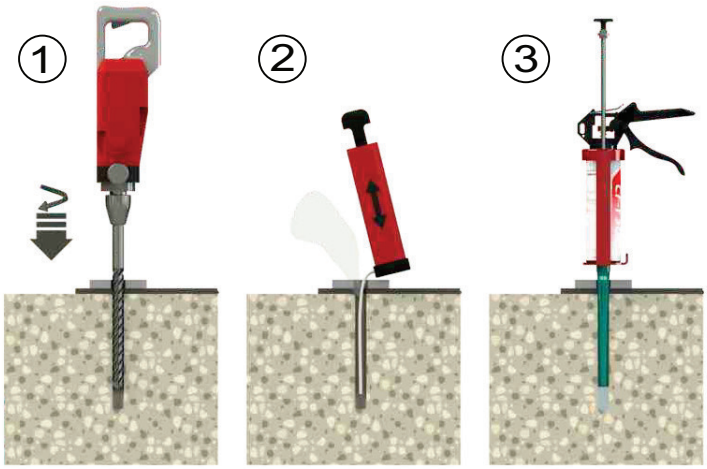
Technical characteristic without fire exposure for TSM 8 (Stahl, A4 and HCR)					
Screw size TSM high performance			**TSM 8**		
nominal embedment depth	h_{nom}	[mm]	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$
			45	**55**	**65**
nominal diametrer of drill bit	d_0	[mm]	8		
depth of drill hole	h_1 min	[mm]	55	65	75
effective anchorage depth	h_{ef}	[mm]	35	43	52
diameter of clearance hole in the fixture	d_f max	[mm]	12		
permissible tension load in cracked concrete [1);2)]	N_{zul}	[kN]	2,4	4,3	5,7
permissible shear load in cracked concrete [1);2)]	V_{zul}	[kN]	3,5	4,8	6,4
perm. tension load in non-cracked concrete [1);2)]	N_{zul}	[kN]	3,6	5,7	7,6
perm. shear load in non-cracked concrete [1);2)]	V_{zul}	[kN]	5,0	6,8	9,0
permissible bending resistance	M_{zul}	[kN]	14,9		
minimum edge distance	C_{min}	[mm]	40	50	
minimum spacing	S_{min}	[mm]	40	50	
minimum base material thickness	h_{min}	[mm]	100		120
installation torque	T_{inst}	[Nm]	20		
maximum torque (with Impact screw driver)		[Nm]	300		
ETA seismic C1 + C2 [3)]			x		Ja

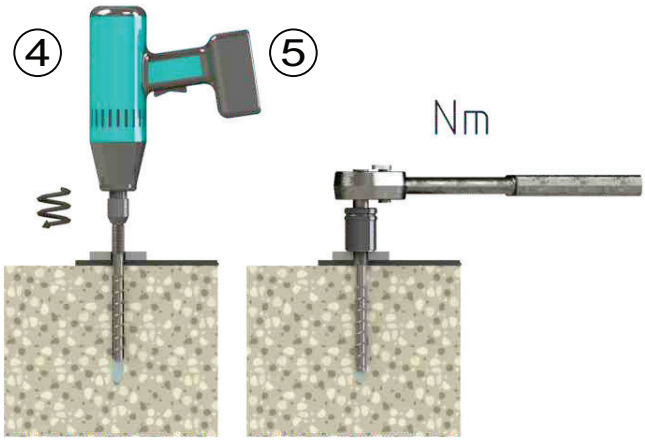
1) the partial safety factor for material resistance from the approval γM=1,5 as well a partial safety factor for load actions γF=1,4 were considered for determining the load.
2) these values apply without influence of the spacing and edge distances.
3) C2 only for version zinc plated



technical characteristics under fire exposure for TSM 8 (steel, A4 and HCR)						
screw size TSM high performance				TSM 8		
nominal embedment depth		h_{nom}	[mm]	$h_{nom,1}$ 45	$h_{nom,2}$ 55	$h_{nom,3}$ 65
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]	1,3	2,3	2,3
R 60		$F_{zul,fi\,60}$	[kN]	1,3	1,7	1,7
R 90		$F_{zul,fi\,90}$	[kN]	1,3	1,1	1,1
R 120		$F_{zul,fi\,120}$	[kN]	0,7	0,7	0,7
R 30		$M_{zul,fi\,30}$	[Nm]	2,4		
R 60		$M_{zul,fi\,60}$	[Nm]	1,8		
R 90		$M_{zul,fi\,90}$	[Nm]	1,2		
R 120		$M_{zul,fi\,120}$	[Nm]	0,9		
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						

Installation instructions:





1) Set drill hole at right angle to concrete surface
2) Blow out drill hole from the base
3) Inject composite mortar
4) Screw in the screw with an impact screwdriver; after reaching the specified anchor embedment depth, the chemical mortar must extrude from the concrete surface
5) Apply installation torque; the curing time of the chemical mortar need not be taken into account

More information about the composite mortar can be found on page 84

Railing screw TSM A4

TSM 10 M12x35 SW9 A4

TOGE
Z-21.1.1799
Institut für Massivbau
Technische Universität
Darmstadt

R 30 - R 120

Material:

- stainless steel A4 - TSM A4

Base material:

- approved for concrete strength classes
  from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by the chemical mortar
- can be loaded immediately, regardless of the chemical mortar curing time

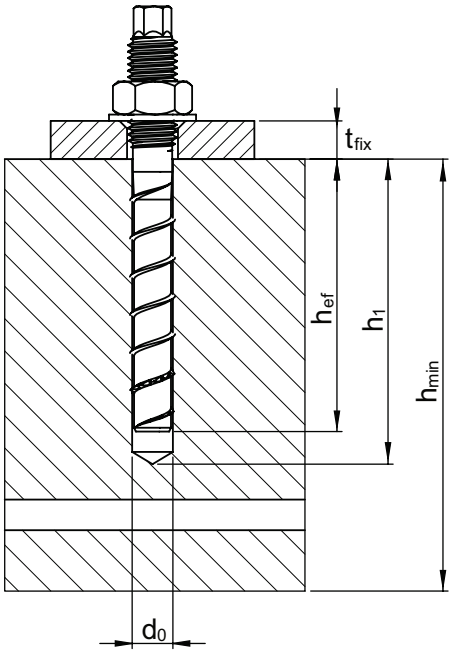
Applications:

- fastening of railings as per RIZ-ING GEL 14 DB GEL 33

Product overview:

item n.	Designation size	L	drive	Drill bitØ [mm]	Embed. Depth of anchor[mm] h_{nom}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
741 010 140	TSM A4 10 x	140	M12 x 35 SW9	10	80 - 110	≥ 80	35	50
741 010 160	TSM A4 10 x	160	M12 x 55 SW9	10	80 - 110	≥ 80	55	50

Technical data:



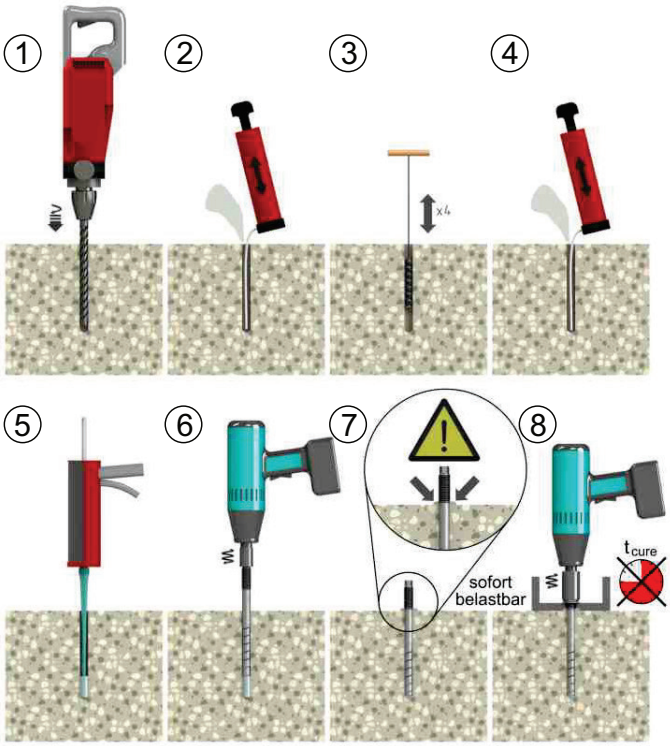
Technical characteristics without fire exposure			TSM 10 A4
drill bit diameter	d_0	[mm]	10
depth of drill hole	h_1 IV h_1 V, VI	[mm]	80 110
embedment depth of anchor	h_{nom} IV h_{nom} V, VI	[mm]	80 110
effective anchorage depth	h_{ef} IV h_{ef} V, VI	[mm]	80 110
minimum thickness of member	h_{min}	[mm]	h_{nom} + 60
minimum edge distance	c_{min}	[mm]	40
minimum spacing	s_{min}	[mm]	40
characteristic edge distance	$c_{cr,N}$	[mm]	1,5xh_{ef}
characteristic spacing	$s_{cr,N}$	[mm]	3xh_{ef}
installation torque	T_{inst}	[Nm]	40
design value of tension load in cracked and non-cracked concrete C 20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	18,8 27,7
design value of shear load in cracked and non-cracked concrete C 20/25 to C 50/60[1)3)]	V_{Rd}	[kN]	22,7
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{zul,min}$ $N_{zul,max}$	[kN]	13,4 19,8
permissible shear load in cracked and non-cracked concrete C 20/25 to C 50/60[2)3)]	V_{zul}	[kN]	16,2

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics under fire exposure for TSM 10 A4				
fire resistance class				
R 30	**permissible load $F_{fi,per,30}$** [1]		[kN]	4.0
R 60	**permissible load $F_{fi,per,60}$** [1]		kN]	3.3
R 90	**permissible load $F_{fi,per,90}$** [1]		[kN]	2.2
R 120	**permissible load $F_{fi,per,120}$** [1]		[kN]	1.7
R 30 to R 120	**spacing**	s_{fi}	[mm]	$4xh_{ef}$
		s_{min}		40
	edge distance	c_{fi}		$2xh_{ef}$
		c_{min}		

[1] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installations intructions:



1) Set drill hole at right angle to concrete surface
2) Blow out drill hole from the base
3) Inject composite mortar
4) Screw in the screw with an impact screwdriver; after reaching the specified anchor embedment depth, the chemical mortar must extrude from the concrete surface
5) Apply installation torque; the curing time of the chemical mortar need not be taken into account

More information about the composite mortar can be found on page 84

Crash barrier screw TSM B

TSM B 12 M14x35 SW10

TSM B 14 M16x35 SW12

TSM B 16 M18x45 SW13

TOGE
Z-21.1.1799
Institut für Massivbau
Technische Universität
Darmstadt

R 30 - R 120

Material:

- corrosion protection-coated steel as per corrosiveness category C5-I medium TOGE-KORR – TSM B

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

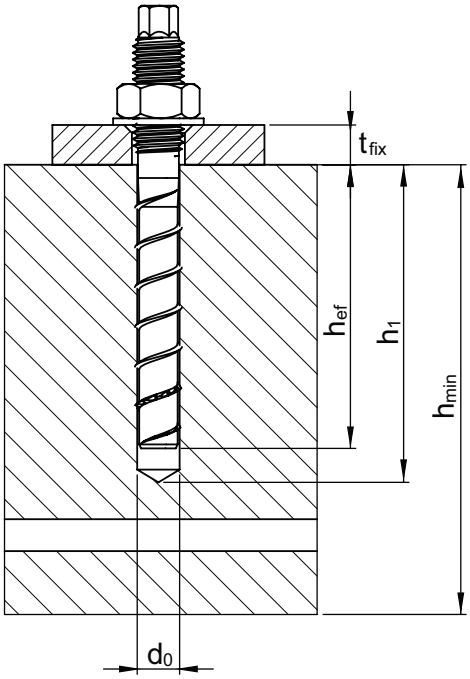
Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by the chemical mortar
- can be loaded immediately, regardless of the chemical mortar curing time

Product overview:

item n.	Designation	Drill bitØ [mm]	Embed. Depth of anchor[mm] h_{nom}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
202 141 650	TSM B 14 x 165 M16 x 35 SW12	14	100 - 140	≥ 100	35	25
202 161 900	TSM B 16 x 190 M18 x 45 SW13	16	100 - 160	≥ 100	60	25
202 162 200	TSM B 16 x 220 M18 x 45 SW13	16	100 - 160	≥ 100	90	25

Technical data:



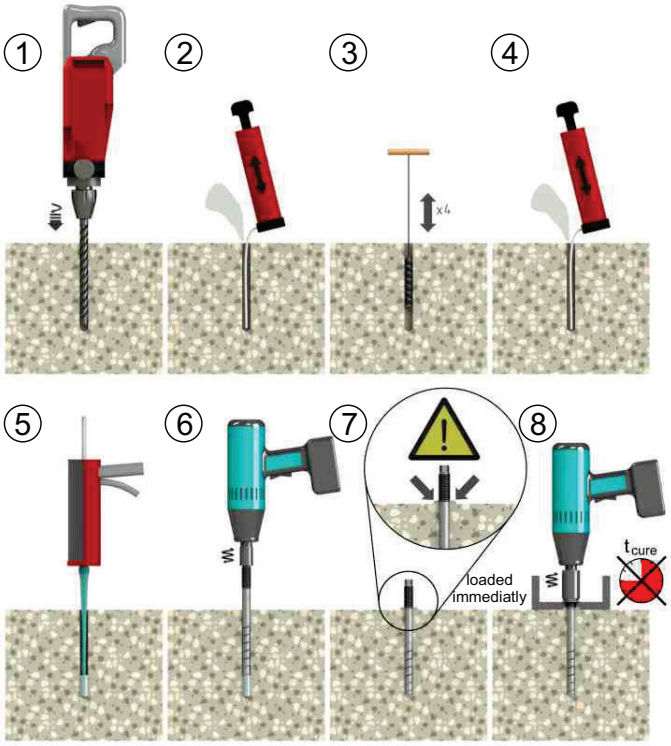
Technical characteristics without fire exposure					
			TSM B		
			12	14	16
drill bit diameter	d_0	[mm]	12	14	16
depth of drill hole	h_1 ≥ ≤	[mm]	100 130	100 140	100 160
embedment depth of anchor	h_{nom} ≥ ≤	[mm]	100 130	100 140	100 160
effective anchorage depth	h_{ef} ≥ ≤	[mm]	100 130	100 140	100 160
minimum thickness of member	h_{min}	[mm]	h_{nom} + 60	h_{nom} + 70	h_{nom} + 70
minimum edge distance	c_{min}	[mm]	50	60	70
minimum spacing	s_{min}	[mm]	50	60	70
characteristic edge distance	$c_{cr,N}$	[mm]	1,5xh_{ef}	1,5xh_{ef}	1,5xh_{ef}
characteristic spacing	$s_{cr,N}$	[mm]	3xh_{ef}	3xh_{ef}	3xh_{ef}
installation torque	T_{inst}	[Nm]	60	80	100
design value of tension load in cracked and non-cracked concrete C 20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 42.0	28.3 46.9	28.3 68.6
design value of shear load in cracked and non-cracked concrete C 20/25 to C 50/60[1)3)]	V_{Rd}	[kN]	28.0	42.7	68.6
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 30.0	20.2 33.5	20.2 41.0
permissible shear load in cracked and non-cracked concrete C 20/25 to C 50/60[2)3)]	V_{per}	[kN]	20.0	30.5	45.7

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics under fire exposure				TSM		
				12	14	16
fire resistance class						
R 30	permissible load $F_{fi,per,30}$ [1]		[kN]	6.3	9.8	13.9
R 60	permissible load $F_{fi,per,60}$ [1]		kN]	5.8	8.1	11.0
R 90	permissible load $F_{fi,per,90}$ [1]		[kN]	4.2	5.9	8.0
R 120	permissible load $F_{fi,per,120}$ [1]		[kN]	3.4	4.8	6.5
R 30 bis R 120	spacing	s_{fi}	[mm]	$4xh_{ef}$		
		s_{min}		50	60	70
	edge distance	c_{fi}		$2xh_{ef}$		
		c_{min}				

[1] The partial safety factor for material resistance from the approval γ_M = 1.0 as well a partial safety factor for load actions γ_F = 1.0 were considered for determining the load.

Installation instructions:



1) Set drill hole at right angle to concrete surface
2) Blow out drill hole from the base
3) Inject composite mortar
4) Screw in the screw with an impact screwdriver; after reaching the specified anchor embedment depth, the chemical mortar must extrude from the concrete surface
5) Apply installation torque; the curing time of the chemical mortar need not be taken into account

More information about the composite mortar can be found on page 84

Shear connector TSM BC

TSM BC12 SW22 AB

Perforated corrugated disc (optional)

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TOGE Z-21.8-1880 Institut für Massivbau Technische Universität Darmstadt

Material:
- bare steel

ETA-15/0514
for anchoring in cracked and non-cracked concrete

Base materail:
- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

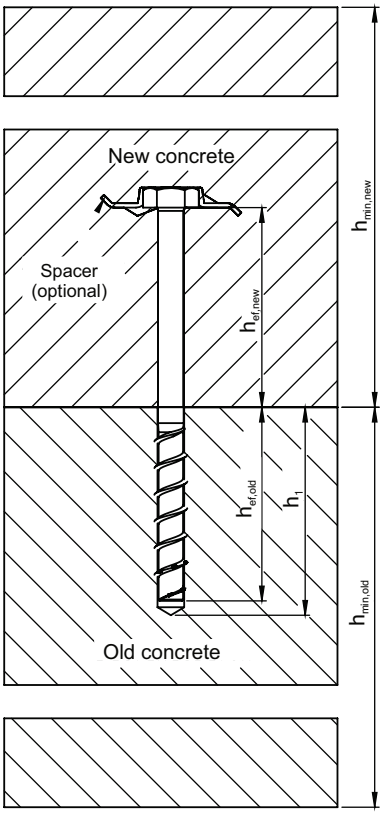
Product features:

- construction approval as shear connector
- quick installation
- transmission of force in old concrete via undercut technology
- transmission of force in new concrete via shear stud
- optional perforated disc serves for support/fastening of reinforcement bars

Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
742 121 500	TSM BC 12x155 SW22 AB	110 mm	100 mm	-	25
742 121 800	TSM BC 12x180 SW22 AB	110 mm	100 mm	-	25

Technical data:



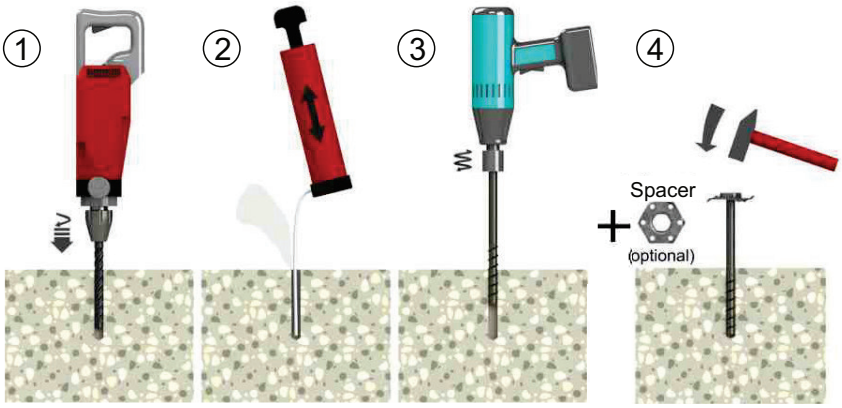
Technical characteristics in old concrete			
			TSM BC12
drill bit diameter	d_0	[mm]	12
depth of drill hole	$h_1 \geq$	[mm]	110
embedment depth of anchor	h_{nom}	[mm]	100
effective anchorage depth	$h_{ef} \geq$	[mm]	80
minimum thickness of member	h_{min}	[mm]	150
minimum edge distance	c_{min}	[mm]	80
minimum spacing	s_{min}	[mm]	80
characteristic edge distance	$c_{cr,N}$	[mm]	120
characteristic spacing	$s_{cr,N}$	[mm]	240
design value of tension load in cracked C20/25[1)3)]	N_{Rd}	[kN]	17.2
design value of tension load in non-cracked C20/25[1)3)]	N_{Rd}	[kN]	23.9
design value of shear load in cracked and non-cracked concrete C20/25 to C50/60[1)3)]	V_{rd}	[kN]	28.0
permissible tension load in crakced concrete C 20/25[2)3)]	N_{per}	[kN]	12.3
permissible tension load in non-crakced concrete C 20/25[2)3)]	N_{per}	[kN]	17.1
permissible shear load in cracked and non-crakced concrete C 20/25[2)3)]	V_{per}	[kN]	20,0

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics in new concrete			
			TSM BC12
effective anchorage depth	$h_{ef,neu}$	[mm]	40 to 210
minimum thickness of member	h_{min}	[mm]	$h_{ef,new}$ + concrete cover
minimum edge distance	c_{min}	[mm]	$0,5xh_{ef,new}$
minimum spacing	s_{min}	[mm]	80
characteristic edge distance	$c_{cr,N}$	[mm]	$1.5xh_{ef,new}$
characteristic spacing	$s_{cr,N}$	[mm]	$3xh_{ef,nwe}$
design value of tension load in cracked concrete C 20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	7.1 17.6
design value of tension load in non-cracked concrete C 20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	10.1 24.8
design value of shear load in cracked and non-cracked concrete C20/25 to C50/60[1)3)]	V_{Rd}	[kN]	42.7
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	5.1 12.6
permissible tension load in cracked crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	7.1 17.6
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	23.3

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Installation intsructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Screw in concrete screw
4) Knock spacer onto the screw head (optional)

Bridge cap anchor TSM for new construction

TSM BS/BSH 16 SW 27

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TOGE Z-21.8-1880 Institut für Massivbau Technische Universität Darmstadt

Material:

- A4 stainless steel - TSM BS
- HCR high corrosion-resistant steel - TSM BSH

Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

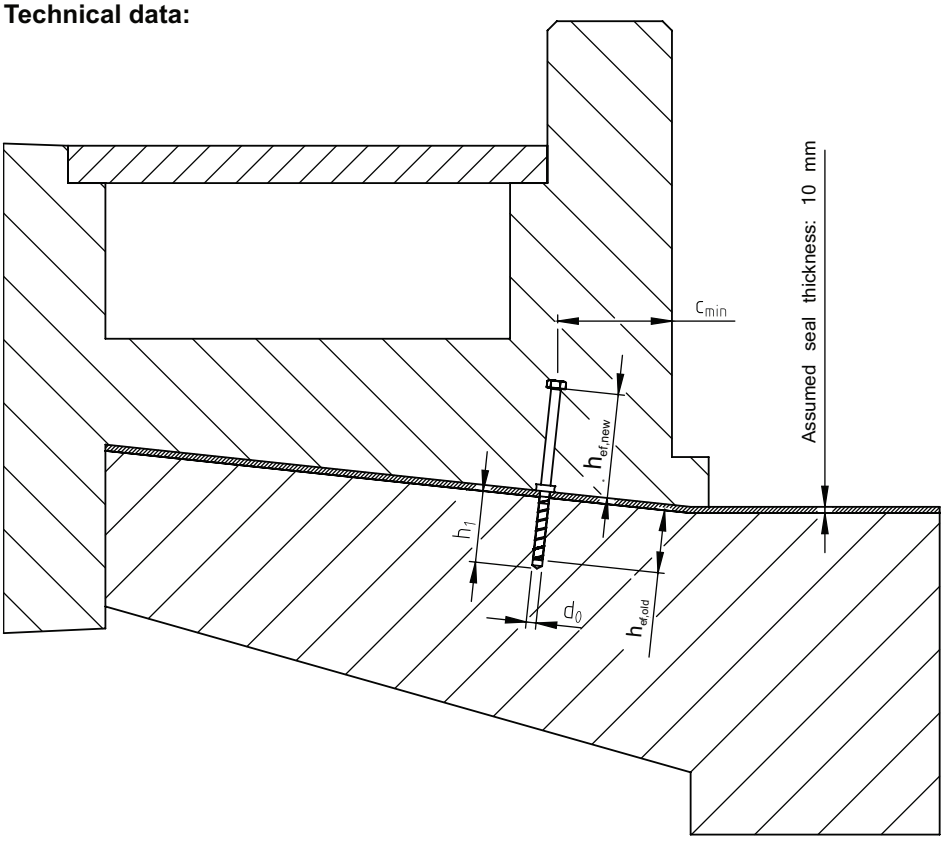
- construction approval as shear connector
- quick installation
- transmission of force in old concrete via undercut technology in conjunction with chemical mortar
- transmission of force in new concrete via shear studs
- verification of system seal without/after alternating strain

Product overview:

Stainless steel A4 / high corrosion-resistant steel HCR

item nr.	Designation					Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	max. thicknes of fixt. [mm] t_{fix}	Box Qty.
	size		L		drive					
741 162 300	TSM BS	16	x 230		SW27	16	100 - 160	≥ 100	130	25
741 162 750	TSM BS	16	x 275		SW27	16	100 - 160	≥ 100	175	25
740 162 751	TSM BSH	16	x 275		SW27 (HCR)	16	100 - 160	≥ 100	175	25
741 222 500	TSM BS	22	x 250		SW17	22	100 - 160	≥ 100	110	20

Technical data:



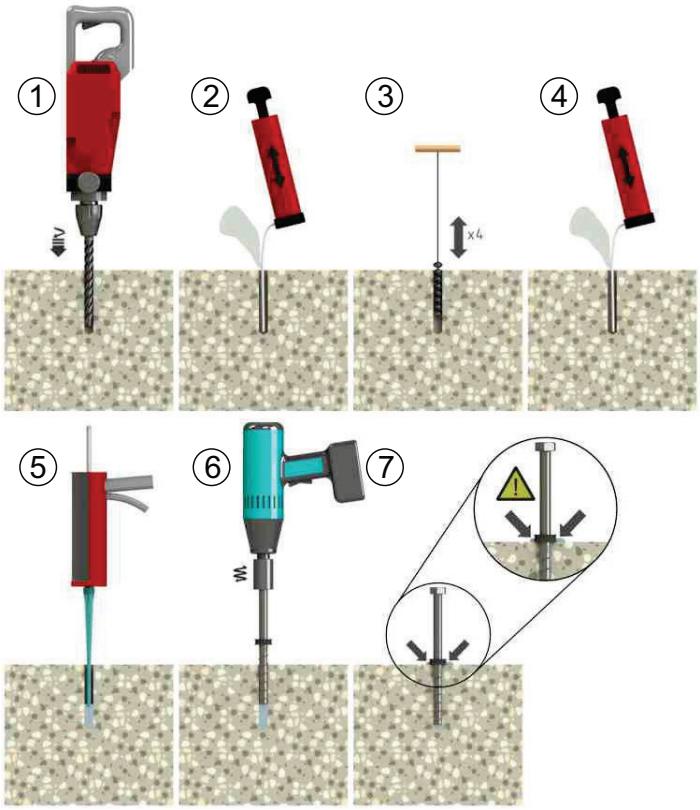
Technical characteristics for anchoring in superstructure			
			TSM BC, BS, BSH
			16
drill bit diameter	d_0	[mm]	16
depth of drill hole	h_1	[mm]	110 bis 170
embedment depth of anchor	h_{nom}	[mm]	100 bis 160
effective anchorage depth	$h_{ef,alt}$	[mm]	100 bis 160
minimum thickness of member	$h_{min,alt}$	[mm]	h_{ef} + 70
minimum edge distance	c_{min}	[mm]	70
minimum spacing	s_{min}	[mm]	70
characteristic edge distance	$c_{cr,N}$	[mm]	1.5x$h_{ef,old}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,old}$
design value of tension load in cracked and non-cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 57.4
design value of shear load in cracked and non-cracked concrete C20/25[1)3)]	V_{Rd}	[kN]	64.0
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 41.0
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	45.7

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics for anchoring in the cap			
			TSM BC, BS, BSH
			16
effective anchorage depth	$h_{ef,new}$	[mm]	40 to 205
minimum thickness of member	h_{min}	[mm]	$h_{ef,new}$+concrete cover
minimum edge distance	c_{min}	[mm]	0,5x$h_{ef,new}$
characteristic edge distance	$c_{cr,N}$	[mm]	1,5x$h_{ef,new}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,new}$
design value of tension load in cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	7,1 31,4
design value of tension load in non-cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	10,1 44,0
design value of shear load in cracked and non-cracked concrete C 20/25 to C50/60[1)3)]	V_{Rd}	[kN]	64,0
permissible tension load in cracked concrete C20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	5,1 22,4
permissible tension load in non-cracked concrete C20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	7,2 31,4
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	45,7

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Installation instructions



1) Set drill hole
2) Clean out drill hole from the base
3) Brush out drill hole four times
4) Clean out drill hole from the base again
5) Inject chemical mortar
6) Screw in concrete screw
7) After reaching the anchor embedment depth, the chemical mortar must extrude from the concrete surface

More information about the composite mortar can be found on page 84

Bridge cap anchor TSM for subsequent installation

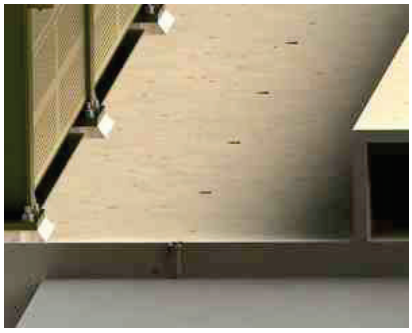
TSM BS/BSH 16 SW 27
with filler washer

TOGE Z-21.1-1799 Institut für Massivbau Technische Universität Darmstadt

TOGE Z-21.8-1880 Institut für Massivbau Technische Universität Darmstadt

Material:

- A4 stainless steel - TSM BS
- HCR high corrosion-resistant steel - TSM BSH



Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- construction approval as shear connector
- quickt installation
- transmission of force in old concrete via undercut technology in conjunction with chemical mortar
- transmission of force in new concrete via shear studs (hexagonal head/shear stud washer)
- verification of system seal without/after alternating strain
- application as subsequent anchor of the bridge cap on the superstructure – enormous cost savings, as the existing cap is retained

Product overview:

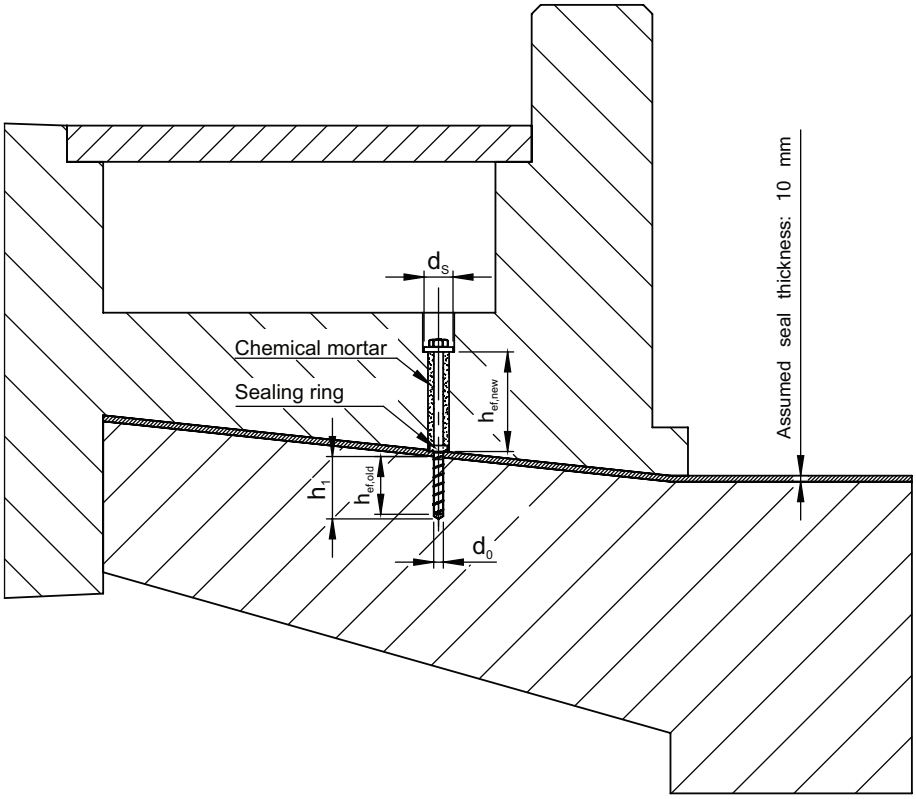
A4 stainless steel

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickenss of fixture	Qty.
741 162 301	TSM BS 16x230 SW27 VS	135 mm	125 mm	-	20
741 162 751	TSM BS 16x275 SW27 VS	135 mm	125 mm	-	20

HCR high corrosion-resistant steel

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickenss of fixture	Qty.
740 162 752	TSM BSH 16x275 SW27 VS	135 mm	125 mm	-	20

Technical data:



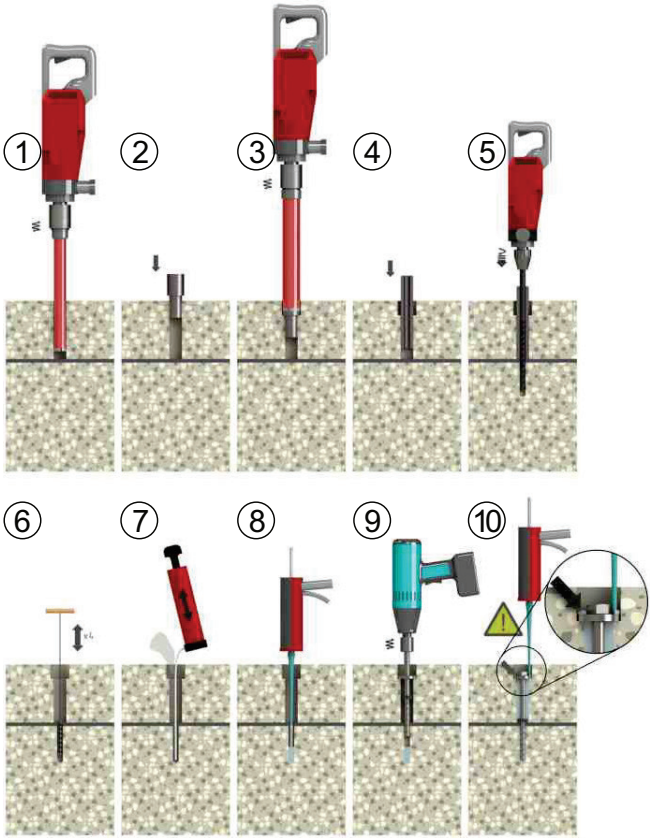
Technical characteristics for anchoring in superstructure			
			TSM BC, BS, BSH
			16
drill bit diameter	d_0	[mm]	16
depth of drill hole	h_1	[mm]	110 bis 170
embedment depth of anchor	h_{nom}	[mm]	100 bis 160
effective anchorage depth	$h_{ef,alt}$	[mm]	100 bis 160
minimum thickness of member	$h_{min,alt}$	[mm]	h_{ef} + 70
minimum edge distance	c_{min}	[mm]	70
minimum spacing	s_{min}	[mm]	70
characteristic edge distance	$c_{cr,N}$	[mm]	1.5x$h_{ef,old}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,old}$
design value of tension load in cracked and non-cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 57.4
design value of shear load in cracked and non-cracked concrete C20/25[1)3)]	V_{Rd}	[kN]	64.0
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 41.0
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	45.7

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Technical characteristics for anchoring in the cap			
			TSM BC, BS, BSH
			16
effective anchorage depth	$h_{ef,new}$	[mm]	40 to 205
minimum thickness of member	h_{min}	[mm]	$h_{ef,new}$+concrete cover
minimum edge distance	c_{min}	[mm]	0,5x$h_{ef,new}$
characteristic edge distance	$c_{cr,N}$	[mm]	1,5x$h_{ef,new}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,new}$
design value of tension load in cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	7,1 31,4
design value of tension load in non-cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	10,1 44,0
design value of shear load in cracked and non-cracked concrete C 20/25 to C50/60[1)3)]	V_{Rd}	[kN]	64,0
permissible tension load in cracked concrete C20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	5,1 22,4
permissible tension load in non-cracked concrete C20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	7,2 31,4
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	45,7

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Installation instructions:

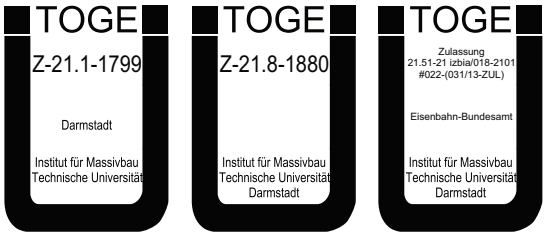


1) Set drill hole with 35 mm diameter
2) Insert drilling aid for 52 mm diameter drill hole into the 35 mm drill hole
3) Set drill hole with 52 mm diameter
4) Insert guide sleeve for the 16 mm drill hole into the 35 mm drill hole
5) Create 16 mm drill hole
6) Brush out 16 mm drill hole
7) Clean all drill holes
8) Inject chemical mortar into the 16 mm drill hole
9) Screw in concrete screw until the filling washer contacts the edges of the 52 mm drill hole
10) Fill in 35 mm drill hole with the chemical mortar via the filling washer.
Fill the 52 mm drill hole with a suitable grouting mortar

Mehr Information über den Verbundmörtel finden Sie auf der Seite 84

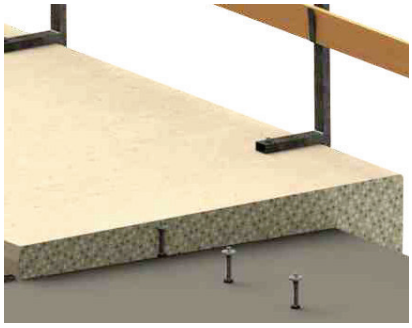
Bridge cap anchor for dynamic loading

TSM BC SB 22
M24 SW17
with shear stud washer



Material:

- corrosion-resistant steel as per corrosiveness category C5-I medium TOGE-KORR

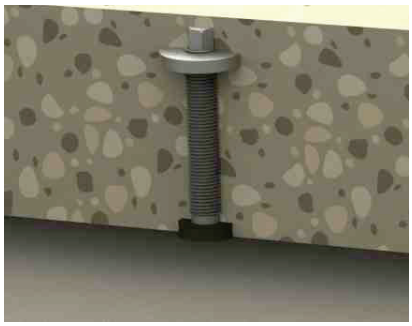


Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- construction approval as shear connector
- approval from the German Federal Railway Authority for alternating fatigue stress up to 5 million loading cycles as per DB Ril 804 for HMS SB 22 M24
- transmission of force in old concrete via undercut technology in conjunction with chemical mortar
- transmission of force in new concrete via shear studs (hexagonal head/shear stud washer)
- verification of system seal without/after alternating strain



Product overview:
for new construction

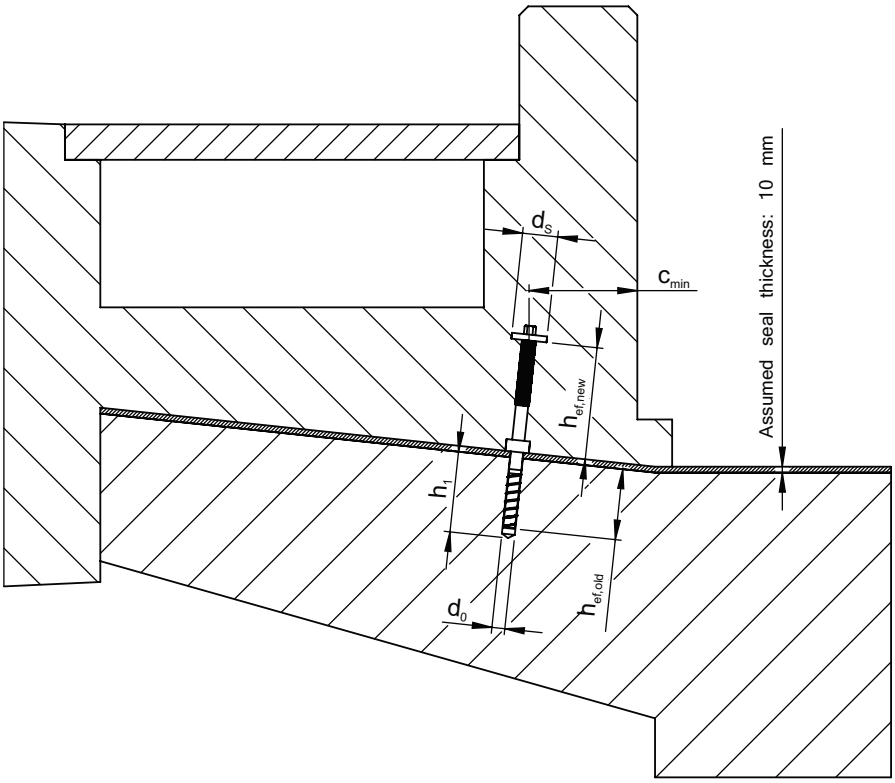
item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	Box Qty.
204 222 704	TSM BC SB 22 x	270	K M24 SW17	22	200	210	20
204 223 151	TSM BC SB 22 x	315	K M24 SW17	22	200	210	20
204 223 450	TSM BC SB 22 x	345	K M24 SW17	22	200	210	20
204 224 501	TSM BC SB 22 x	450	K M24 SW17	22	200	210	20

for subsequent anchorage

item nr.	Designation size	L	drive	Drill bit Ø [mm]	Embed. Depth of anchor [mm] h_{nom}	Depth of drill hole [mm] h_1	Box Qty.
204 222 701	TSM BC SB 22 x	270	KVS M24 SW17	22	200	210	20
204 223 152	TSM BC SB 22 x	315	KVS M24 SW17	22	200	210	20
204 223 452	TSM BC SB 22 x	345	KVS M24 SW17	22	200	210	20
204 224 502	TSM BC SB 22 x	450	KVS M24 SW17	22	200	210	20

*Special lengths can be manufactured for individual projects.

Technical data:



Technical characteristics for anchoring in superstructure			
			TSM BC, BS, BC SB
			22
drill bit diameter	d_0	[mm]	22
depth of drill hole	h_1	[mm]	110 bis 210
embedment depth of anchor	h_{nom}	[mm]	100 bis 200
effective anchorage depth	$h_{ef,alt}$	[mm]	100 bis 200
minimum thickness of member	$h_{min,alt}$	[mm]	h_{ef} + 100
minimum edge distance	c_{min}	[mm]	80
minimum spacing	s_{min}	[mm]	80
characteristic edge distance	$c_{cr,N}$	[mm]	1.5x$h_{ef,old}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,old}$
design value of tension load in cracked and non-cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	28.3 80.1
design value of shear load in cracked and non-cracked concrete C20/25[1)3)]	V_{Rd}	[kN]	71.3
permissible tension load in cracked and non-crakced concrete C 20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	20.2 57.2
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	51.0

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

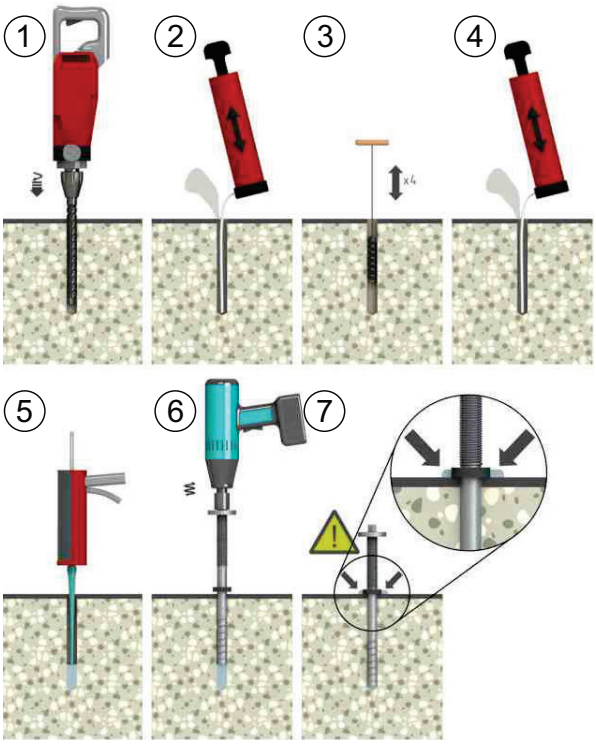
Technical characteristics for anchoring in the cap			
			TSM BC, BS, BSH
			22
effective anchorage depth	$h_{ef,neu}$	[mm]	40 bis 205
minimum thickness of member	h_{min}	[mm]	$h_{ef,new}$+concrtet cover
minimum edge distance	c_{min}	[mm]	0.5x$h_{ef,new}$
characteristic edge distance	$c_{cr,N}$	[mm]	1.5x$h_{ef,new}$
characteristic spacing	$s_{cr,N}$	[mm]	3x$h_{ef,new}$
design value of tension load in cracked concrete C20/25[1)3)]	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	7.1 54.9
design value of tension load in non-cracked concrete C20/25$_{1)3)}$	$N_{Rd,min}$ $N_{Rd,max}$	[kN]	10.1 76.9
design value of shear load in cracked and non-cracked concrete C 20/25 to C50/60$_{1)3)}$	V_{Rd}	[kN]	71.3
permissible tension load in cracked concrete C20/25$_{2)3)}$	$N_{per,min}$ $N_{per,max}$	[kN]	5.1 39.2
permissible tension load in non-cracked concrete C20/25[2)3)]	$N_{per,min}$ $N_{per,max}$	[kN]	7.2 54.9
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[2)3)]	V_{per}	[kN]	51.0

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[3)] These values apply without influence of the spacings and edge distances.

Fatigue verification			
design value of the amplitude of the normal stress resulting from the tension load[1)2)]	$\Delta\sigma_{5Mio}$	[N/mm²]	52.17
design value of the amplitude of the flexural stress resulting from normal tension load and shear load with lever arm[1)2]	$\Delta\sigma_{B,5Mio}$	[N/mm²]	143.5
design value of the amplitude of the shear stress resulting from the shear load[1)2)]	$\Delta\tau_{B,5Mio}$	[N/mm]	26.1

[1)] The partial safety factor from the approval γ_M = 1.15 was considered for determining the design value.
[2)] These values apply for an edge distance of 80 mm.

Installation instructions:



1) Set drill hole
2) Clean out drill hole from the base
3) Brush out drill hole four times
4) Clean out drill hole from the base again
5) Inject chemical mortar
6) Screw in concrete screw
After reaching the screw-in depth,
the chemical mortar must extrude at the concrete surface

More information about the composite mortar can be found on page 84

Soundproof wall anchor HMS-SB for dynamic applications

TOGE
Z-21.1-1799
Institut für Massivbau
Technische Universität
Darmstadt

TOGE
Zulassung
21.51-21 izbia/018-2101
#022-(031/13-ZUL)
Eisenbahn-Bundesamt
Institut für Massivbau
Technische Universität
Darmstadt

Material:

- corrosion protection-coated steel as per corrosiveness category C5-I medium TOGE-KORR

Base material

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

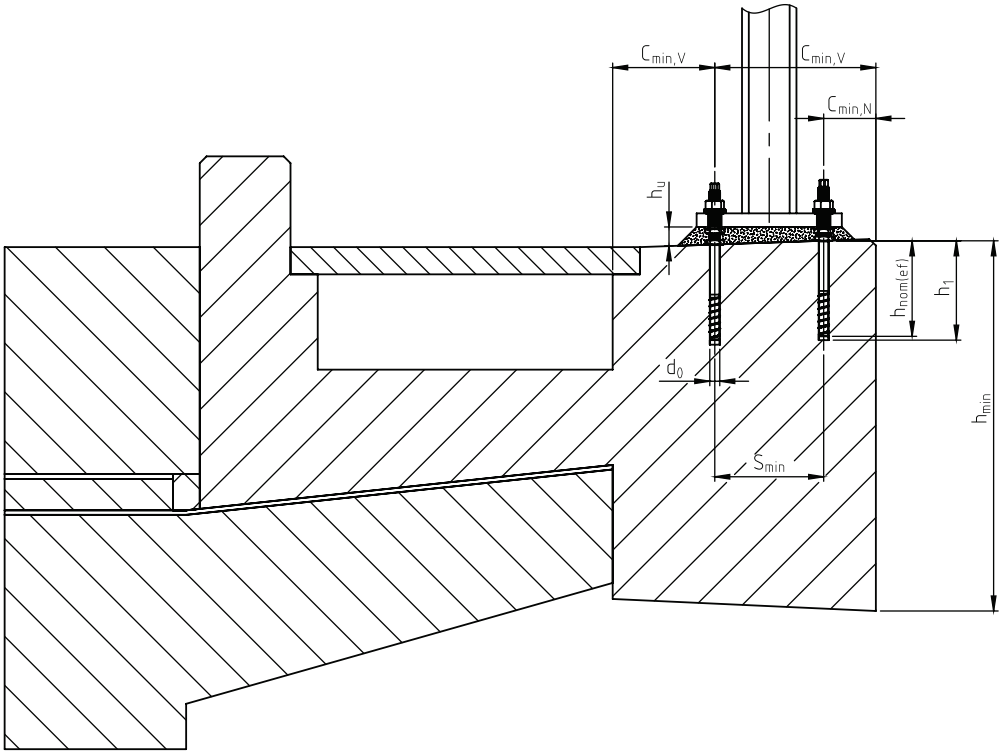
- approval from the German Federal Railway Authority for alternating fatigue stress up to 5 million loading cycles as per DB Ril 804
- transmission of fatigue-related effects, even when the anchor must be installed at an angle up to 3°
- transmission of force in old concrete via undercut technology in conjunction with chemical mortar
- minimal edge distances (c_{min} = 80 mm) enable the anchorage of soundproof wall uprights on narrow caps with simultaneously high force acceptance
- quick and safe installation

Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
204 222 700	TSM BC SB 22x270 L M24 SW17	210 mm	200 mm	55 mm	20
204 223 150	TSM BC SB 22x315 L M24 SW17	210 mm	200 mm	100 mm	20
204 223 350	TSM BC SB 22x345 L M24 SW17	210 mm	200 mm	130 mm	20

Special lengths can be manufactured for individual projects.

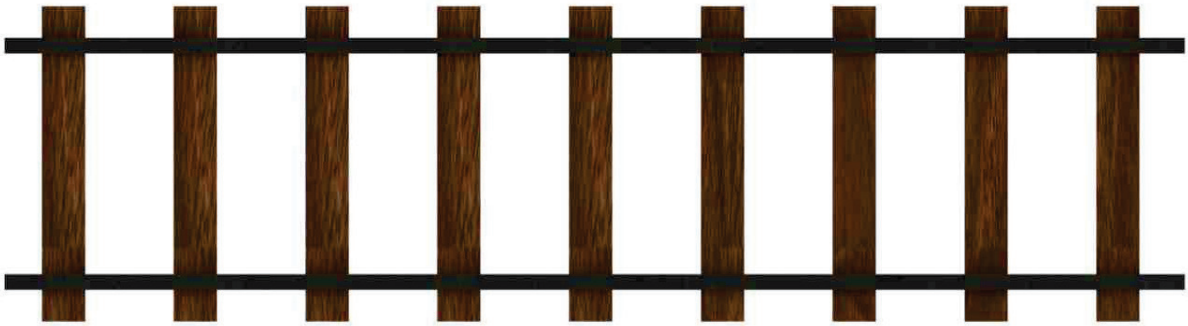
Technical data:

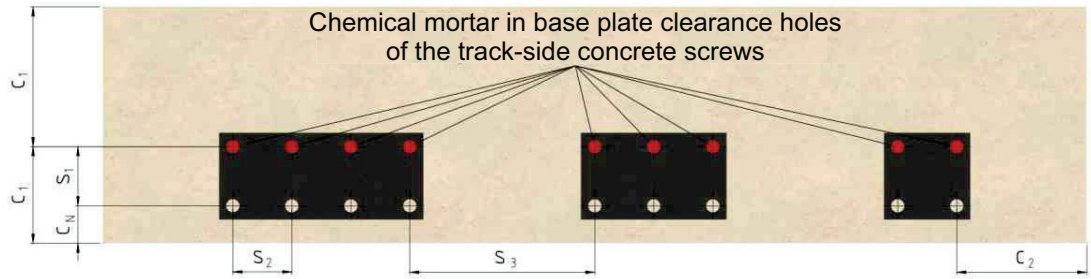


Mounting parameters			
			TSM BC SC 22 M24 L
drill bit diameter	d_0	[mm]	22
depth of drill hole	h_1 ≥	[mm]	210
embedment depth of anchor	h_{nom}	[mm]	100-200
clearance hole in the base plate	d_f	[mm]	32
minimum edge distance for tension load	c_N ≥	[mm]	80
minimum edge distance for shear load in load direction	c_1 ≥	[mm]	230
minimum edge distance longitudinally at the end of the bridge cap	c_2 ≥	[mm]	345
spacing parallel to the track	s_1 ≥	[mm]	150
spacing transverse to the track	s_2 ≥	[mm]	150
spacing between anchor groups	s_3 ≥	[mm]	600
height of the lining	h_v ≤	[mm]	40
diameter of the connection thread	d_{trh}	[mm]	24
length of the screw anchor	L ≥	[mm]	225
length of the connection thread	L_{trh} ≥	[mm]	25
installation torque	T_{inst} ≥	[Nm]	200

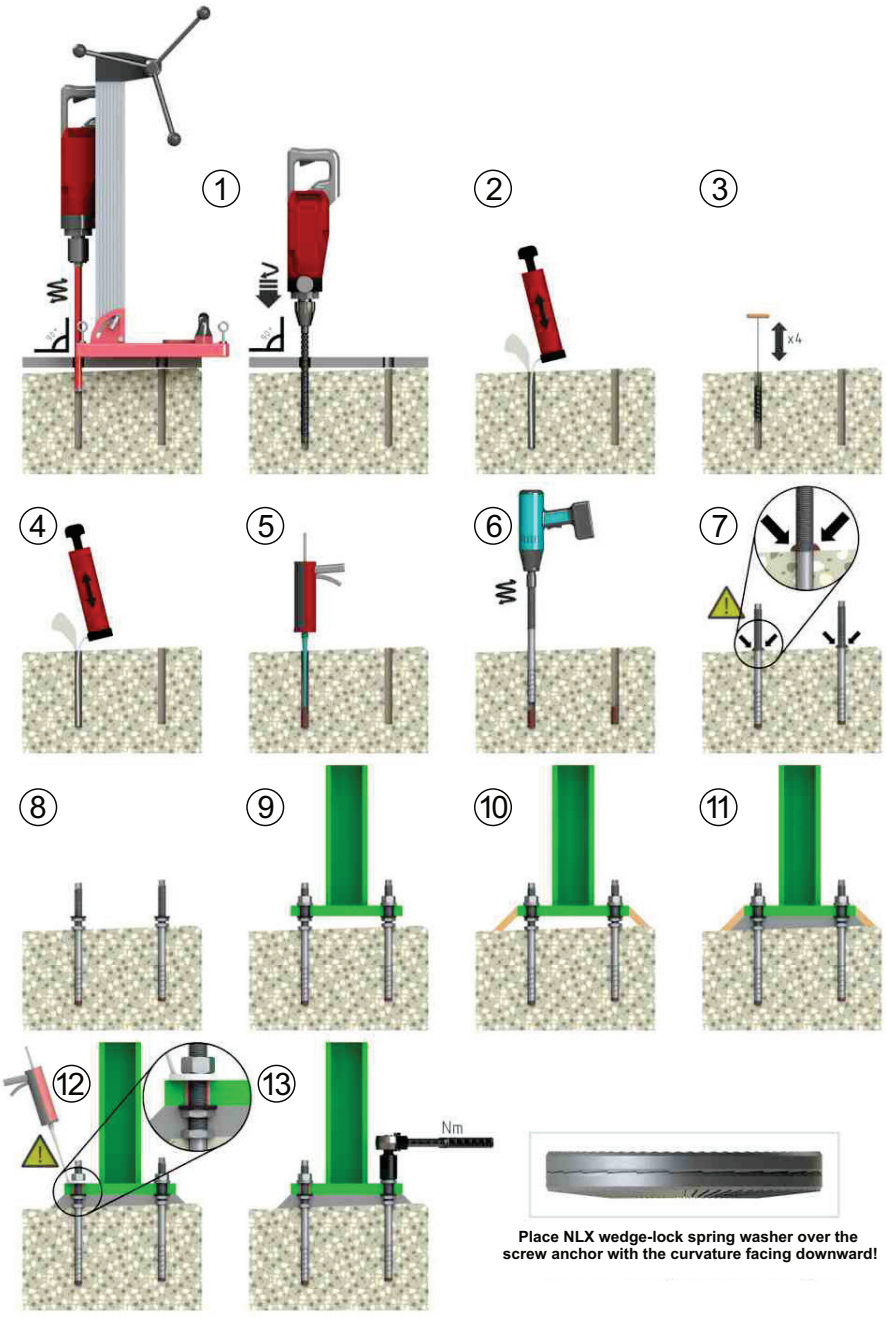
Load values for anchor design			
Proof in the limit state of the load capacity			**TSM BC SB 22 M24 L**
design value of tension load for a group of 4 anchors[1)3)]	$N_{Rd,4}$	[kN]	98.7
design value of tension load for a group of 6 anchors[1)4)]	$N_{Rd,6}$	[kN]	114.7
design value of tension load for a group of 8 anchors[1)5)]	$N_{Rd,8}$	[kN]	162.0
design value of shear load for a group of 4 anchors[1)6)]	$V_{Rd,4}$	[kN]	40.6
design value of shear load for a group of 6 anchors[1)6)]	$V_{Rd,6}$	[kN]	48.0
design value of shear load for a group of 8 anchors[1)6)]	$V_{Rd,8}$	[kN]	55.3
Fatigue verification			
design value of the amplitude of the normal stress resulting from the tension load[2)]	$\Delta\sigma_{5Mio}$	[N/mm²]	52.17
design value of the amplitude of the flexural stress resulting from normal tension load and shear load with lever arm[2)]	$\Delta\sigma_{B,5Mio}$	[N/mm²]	113,04
design value of the amplitude of the shear stress resulting from the shear load[2)]	$\Delta\tau_{B,5Mio}$	[N/mm²]	10,2

1) The partial safety factor for material resistance from the approval γ_M = 1.5 was considered for determining the design values.
2) The partial safety factor for material resistance from the approval γ_M = 1.15 was considered for determining the design values.
3) The value in total for 2 pulled anchors of a group of 4 anchors. The other 2 anchors have to receive pressure forces in this case.
4) The value in total for 3 pulled anchors of a group of 6 anchors. The other 3 anchors have to receive pressure forces in this case.
5) The value in total for 4 pulled anchors of a group of 8 anchors. The other 4 anchors have to receive pressure forces in this case.
6) The edge distance in the load direction must be at least 230 mm.





Installation instructions:



Place NLX wedge-lock spring washer over the screw anchor with the curvature facing downward!

1) Set drill hole at a right angle to the base plate
2) Clean out drill hole from the base
3) Brush out drill hole four times
4) Clean out drill hole from the base again
5) Inject chemical mortar
6) Screw in concrete screw
7) After reaching the screw-in depth, the chemical mortar must extrude at the concrete surface
8) Tighten tensioning nut against the concrete by hand, screw on adjusting nut and set elastomer washer in place
9) Position upright
10) Build formwork
11) Line base plate with suitable mortar (maximum lining height: 40 mm)
12) Fill in ring gap between the screw anchor and the drill hole in the base plate
13) Set NLX wedge-lock spring washer in place with the curvature facing downward and apply torque

More information about the composite mortar can be found on page 84

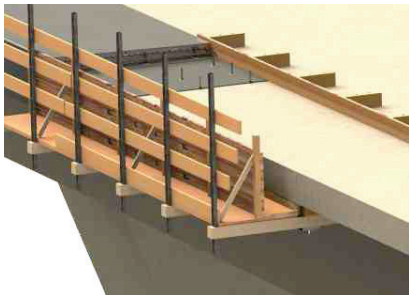
TOGE renovation anchor TSM

TOGE
Z-21.8-2048
Institut für Massivbau
Technische Universität
Darmstadt

R 30 - R 120

Material:

- corrosion protection-coated steel as per corrosiveness category C5-I medium TOGE-KORR - TSM KA

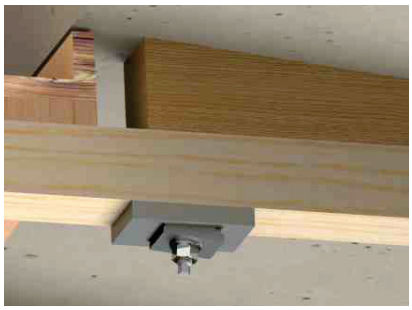


Base material:

- approved for concrete strength classes from C 20/25 to C 50/60
- cracked and non-cracked concrete

Product features:

- quick and safe installation
- high load capacity in cracked and non-cracked concrete
- load transmission via undercut
- drill hole sealed by the chemical mortar
- can be loaded immediately, regardless of the chemical mortar curing time
- reusable fastening part



Applications:

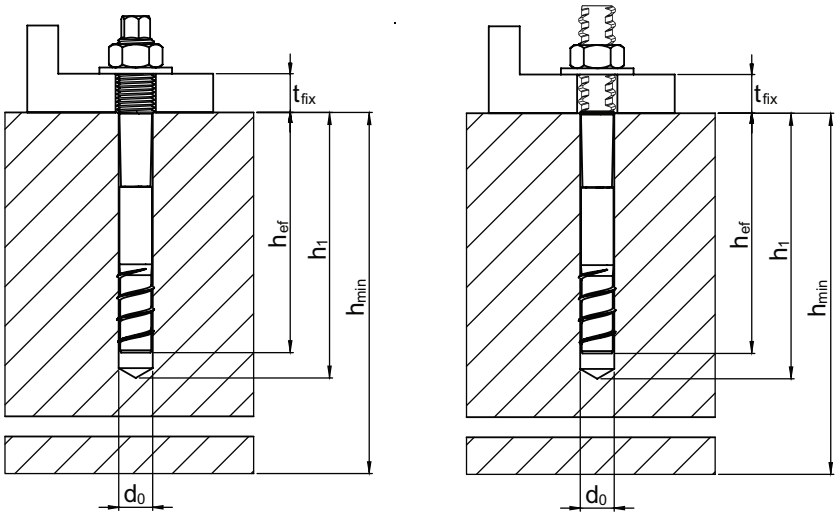
- fastening scaffolding and formwork for renovation work

Product overview:

Item number	Designation	Depth of drill hole	Embedment depth of anchor	Maximum thickness of fixture	Qty.
742 220 750	TSM BC 22x75 IM16 KA	160 mm	150 mm	-	20
742 240 500	connect elem. KA M24x50	-	-	-	20
742 150 000	connect elem. KA DW15 IG	-	-	-	20

Technical data:

Technical characteristics without fire exposure					
			TSM 22 KA		
			connecting element		
			M 24	GW 15	
drill bit diameter	d_0	[mm]	22		
depth of drill hole	h_1	[mm]	160		
embedment depth of anchor	h_{nom}	[mm]	150		
effective anchorage depth	h_{ef}	[mm]	150		
minimum thickness of member	h_{min}	[mm]	200		
minimum edge distance	c_{min}	[mm]	225		
minimum spacing	s_{min}	[mm]	450		
characteristic edge distance	$c_{cr,N}$	[mm]	225		
characteristic spacing	$s_{cr,N}$	[mm]	450		
diameter of the clearance hole in the fixture	$d_f \leq$	[mm]	28	17	
installation torque	T_{inst}	[Nm]	80		



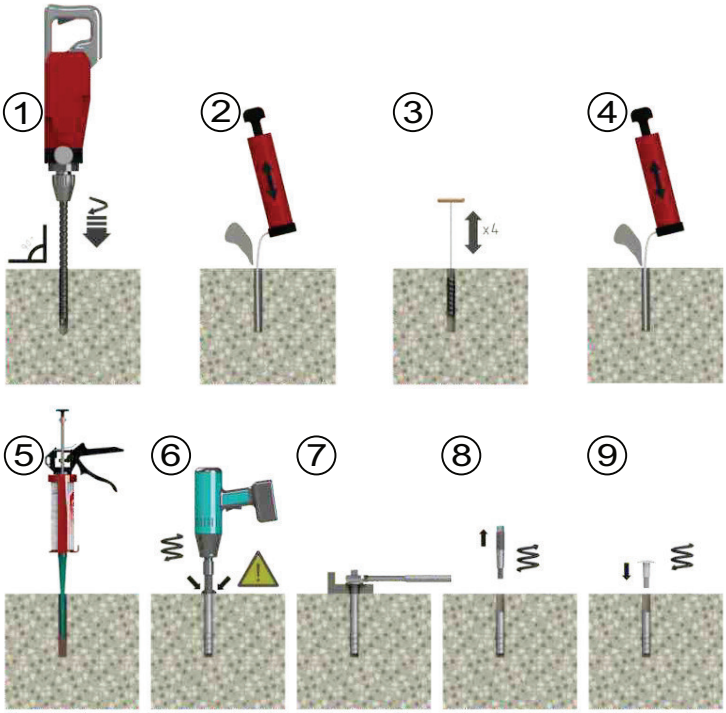
Technical characteristics without fire exposure				
			TSM 22 KA	
			connecting element	
			M 24	GW 15
permissible tension load in cracked and non-crakced concrete C20/25[1)2)]	N_{zul}	[kN]	36,7	
permissible shear load in cracked and non-cracked concrete C20/25 to C50/60[1)2)]	V_{zul}	[kN]	41,2	19,9

[1)] The partial safety factor for material resistance from the approval γ_M = 1.5 as well a partial safety factor for load actions γ_F = 1.4 were considered for determining the load.
[2)] These values apply without influence of the spacings and edge distances.

Technical characteristics without fire exposure				
			TSM 22 KA	
			connecting element	
			M 24	GW 15
design value of tension load in cracked and non-cracked concrete C 20/25[1)2)]	N_{Rd}	[kN]	51,4	
design value of shear load in cracked and non-cracked concrete C20/25 to C 50/60[1)2)]	V_{Rd}	[kN]	58,5	27,9

[1)] The partial safety factor from the approval γ_M = 1.5 was considered for determining the design value.
[2)] These values apply without influence of the spacings and edge distances.

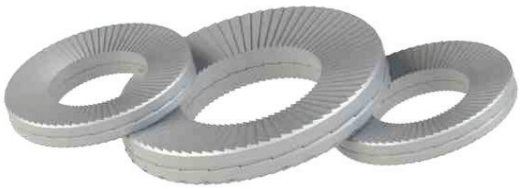
Installation instructions:



1) Set drill hole at a right angle to the concrete surface
2) Clean out drill hole from the base
3) Brush out drill hole
4) Clean out drill hole from the base again
5) Inject chemical mortar
6) Screw in screws with an impact screwdriver (nominal torque: 600 Nm); after reaching the screw-in depth, the composite mortar must extrude at the concrete surface; curing time of the composite mortar need not be taken into account
7) Attach fixture
8) When this work is complete, the screw-in aid can be easily screwed out
9) Seal hole that is left behind with the screw cover

More information about the composite mortar can be found on page 84

Nord-Lock X-series washers

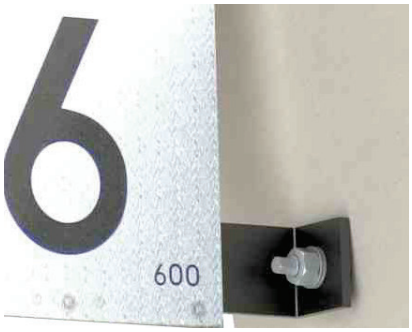


Material:

- zinc flake-coated steel
- stainless steel

Product features:

- retention of clamping force
- fast and easy installation/removal
- securing function retained even if lubricated
- consistent friction conditions
- reusable



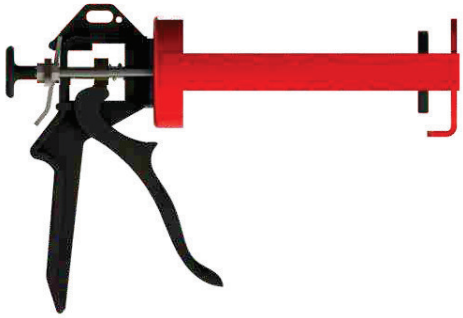
Applications:

- fastening of dynamically loaded elements to structures of DB Netz AG; e.g. soundproof wall uprights, hectometres and kilometre markers

Product overview: on request

Chemical mortar CF-T 300V

Chemical special mortar CF-T 300 V
Vinylester styrene-free, suitable for concrete screws

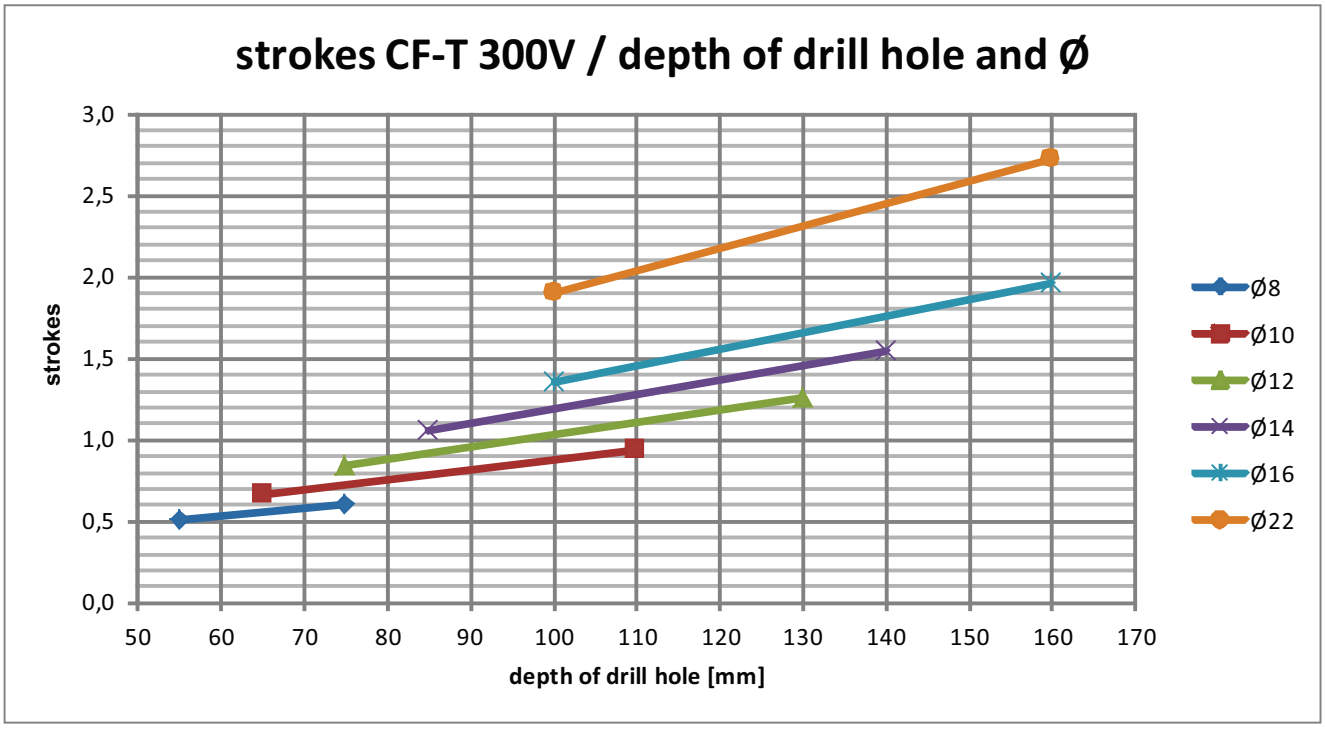


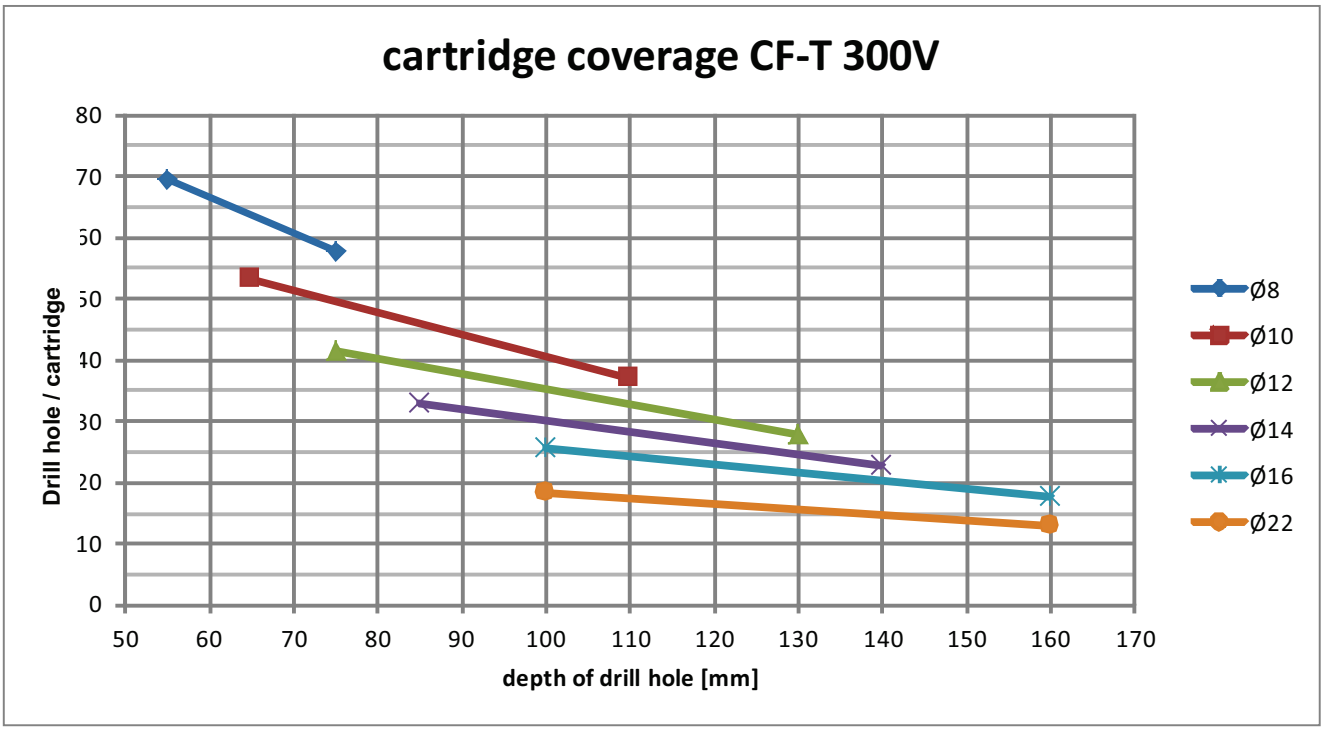
Product overview:

item nr.	Designation	Qty.
222 222 003	Cartridge CF-T 300 V	1
222 223 001	Mixing nozzle for CF-T 300 V	1
222 222 004	Cartridge gun for CF-T 300 V	1

processing instructions

Temp. im Verankerungsgrund Temperature in ground	Verarbeitungszeit Processing time	Mind. Aushärtezeit in trockenem Bohrloch Min. curing time in dry drilling hole	Mind. Aushärtezeit in nassem Bohrloch Min. curing time in wet drilling hole
≥ -5 °C	60 min	360 min	720 min
≥ 0 °C	60 min	180 min	360 min
≥ 5 °C	60 min	120 min	240 min
≥ 10 °C	45 min	80 min	160 min
≥ 20 °C	15 min	45 min	90 min
≥ 30 °C	5 min	25 min	50 min
≥ 35 °C	4 min	20 min	40 min





* The quantity of holes per cartridge depends on the hole depth.
The stated quantities are valid only if the specified drill hole depth is adhered to

Chemical mortar ATA 2004C

Chemical special mortar ATA 2004 C
Pure epoxy, suitable for asphalt screws

Product overview:

Art.-Nr.	Bezeichnung	VPE [Stk]
222 222 015	Kartusche ATA 2004 C	1
222 223 002	Mischdüse für ATA 2004 C	1
222 222 016	Auspresspistole für ATA 2004 C	1

processing instructions

Temp. im Verankerungsgrund Temperature in ground	Verarbeitungszeit Processing time	Mind. Aushärtezeit Min. curing time
0 °C	60 min	360 min
10 °C	60 min	180 min
20 °C	60 min	120 min
30 °C	45 min	80 min
40 °C	15 min	45 min