

# TOGE TSM BC SB

## Noise barrier anchor



### Approval

Approval of the Federal Railway Authority for alternating fatigue loading up to 5 million load cycles as defined in DB Ril 804.

Approved for outdoor use with a service life of 50 years.

### Low edge distances

Low edge distances allow noise barrier uprights to be anchored to narrow components while simultaneously absorbing high forces.

### Load Transmission

Transfer of fatigue-relevant actions even with installation-related inclination of the anchors up to 3°.

Transmission of shear load even with lever arm.

Transmission of forces in the existing concrete by the undercutting technique in combination with composite mortar.

### Installation

Fast and secure installation.

## Approvals

### Approvals

General design type approval / General technical approval Z-21.1-1799.

Federal Railway Authority approval 213.3-213izbia/005-2101#009

Federal Railway Authority approval 213.3-213izbia/005-2101#011

### Base Materials

Application in cracked and non-cracked concrete of strength classes from C20/25 to C50/60.



## Headshapes & Materials

Steel,  
zinc-plated

Steel,  
anti-corrosion  
coated

Stainless steel  
A4



Noise barrier anchor  
TSM BC SB M18 resp. 24



TOGE KORR



Composite mortar  
and accessories

## Application Examples



Fastening of noise barriers on structures of the Deutsche Bahn

## Product Overview

### Steel - anti-corrosion coated, TOGE KORR corrosiveness category C5 high



Item Nr.	Designation	Depth of drill hole $h_o$	Embedment depth of anchor $h_{nom}$	Max. thickness of fixture $t_{fix}$	Packing Unit
204 162 300	TSM BC SB 16x230 L M18 SW12	170 mm	160 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

## Composite Mortar CF-T 300V

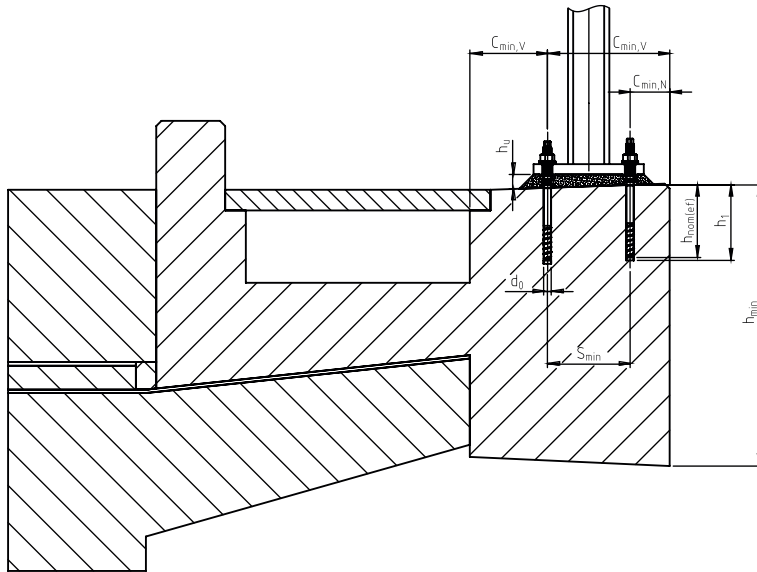
Chemical special mortar, vinylester styrene-free, suitable for concrete screws



Item Nr.	Designation	Packing Unit
222 222 003	Kartusche CF-T 300 V	1
222 223 001	Mischdüse für CF-T 300 V	1
222 222 004	Auspresspistole für CF-T 300 V	1

## Processing Instructions Composite Mortar

Temperature in ground	Processing time	Min. curing time in dry borehole	Min. curing time in wet borehole
$\geq -5^{\circ}\text{C}$	60 min	360 min	720 min
$\geq 0^{\circ}\text{C}$	60 min	180 min	360 min
$\geq 5^{\circ}\text{C}$	60 min	120 min	240 min
$\geq 10^{\circ}\text{C}$	45 min	80 min	160 min
$\geq 20^{\circ}\text{C}$	15 min	45 min	90 min
$\geq 30^{\circ}\text{C}$	5 min	25 min	50 min
$\geq 35^{\circ}\text{C}$	4 min	20 min	40 min



## Installation parameters and load values for design according to EN 1992-4 Noise barrier anchor TSM BC SB L

Anchor size			TSM BC SB 16	TSM BC SB 22	
	Screw length	L [mm]	230	315	345
Nominal diameter of drill bit	$d_0$	[mm]	16	22	
Depth of drill hole	$h_0 \geq$	[mm]	100	100	
Effective embedment depth of anchor	$h_{nom} = h_{ef} \geq$	[mm]	100	100	
Clearance hole in the base plate	$d_f \leq$	[mm]	26	32	
Diameter metric connection thread	$d_{Gew}$	[mm]	M18	M24	
Length metric connection thread	$L_{Gew}$	[mm]	55	100	120
Grouting height	$h_u \leq$	[mm]	40	40	
Installation torque	$T_{inst}$	[Nm]	100	200	
Minimum edge distance	$C_{min} \geq$	[mm]	70	80	
Minimum spacing	$S_{min} \geq$	[mm]	70	80	
Minimum base material thickness	$h_{min,alt} \geq$	[mm]	$h_{ef} + 70$	$h_{ef} + 100$	
Hexagonal drive for installation of the screws	SW	[mm]	12	17	
Design value of tension load in cracked concrete C20/25 <sup>1) 2)</sup>	$N_{Rd,c} \geq$	[kN]	26,5	26,5	
Design value of shear force for steel failure without lever arm <sup>1) 2)</sup>	$V_{Rd,s}$	[kN]	76,8	85,6	
Design value of shear load for steel failure with lever arm <sup>1) 2)</sup>	$V_{Rd,s,M}$	[kN]	11,5 <sup>3)</sup>	19,2 <sup>4)</sup>	16,8 <sup>5)</sup>
Nominal torque of tangential screwdriver		[Nm]	$\leq 600$	$\leq 1000$	
<b>Fatigue verification per individual anchor</b>					
Design value of the amplitude of the normal stress resulting from the tension load <sup>2)</sup>	$\Delta\sigma_{SMio}$	[N/mm <sup>2</sup> ]	52,17		
Design value of the amplitude of the shear stress resulting from the shear load <sup>2)</sup>	$\Delta\tau_{SMio}$	[N/mm <sup>2</sup> ]	26,1		
Design value of the amplitude of the flexural stress resulting from normal tension load and shear load with lever arm <sup>2)</sup>	$\Delta\sigma_{B,SMio}$	[N/mm <sup>2</sup> ]	113,04		

<sup>1)</sup> For the determination of the design values, the partial safety factor from the approval was taken into account on the resistance side.

<sup>2)</sup> These values apply without the influence of the spacing and edge distances.

<sup>3)</sup> The specified values apply only under the following conditions:  $\alpha_M = 2,0$ ;  $h_u = 40$  mm;  $t_{fix} = 15$  mm;  $a_3 = 0$ .

<sup>4)</sup> The specified values apply only under the following conditions:  $\alpha_M = 2,0$ ;  $h_u = 40$  mm;  $t_{fix} = 25$  mm;  $a_3 = 0$ .

<sup>5)</sup> The specified values apply only under the following conditions:  $\alpha_M = 2,0$ ;  $h_u = 40$  mm;  $t_{fix} = 40$  mm;  $a_3 = 0$ .

## Installation parameters for anchor design according to simplified method - TSM BC SB 22 M24L

Anchor size	L [mm]		315	345
Nominal diameter of drill bit	$d_o$	[mm]	22	
Depth of drill hole	$h_o \geq$	[mm]	210	
Effective embedment depth of anchor	$h_{nom} = h_{ef} \geq$	[mm]	200	
Clearance hole in the base plate	$d_f \leq$	[mm]	32	
Diameter metric connection thread	$d_{Gew}$	[mm]	M24	
Length metric connection thread	$L_{Gew}$	[mm]	100	120
Grouting height	$h_u \leq$	[mm]	40	
Installation torque	$T_{inst}$	[Nm]	200	
Minimum edge distance for tension load	$C_N$	[mm]	80	
Minimum edge distance for shear load in load direction	$C_1 \geq$	[mm]	230	
Minimum edge distance in longitudinal direction at the end of the bridge cap	$C_2 \geq$	[mm]	345	
Minimum spacing parallel to the track	$S_1 \geq$	[mm]	150	
Minimum spacing transverse to the track	$S_2 \geq$	[mm]	150	
Minimum spacing between anchor groups	$S_3 \geq$	[mm]	600	
Minimum base material thickness	$h_{min,alt} \geq$	[mm]	300	
Hexagonal drive for installation of the screws	SW	[mm]	17	
Nominal torque of tangential screwdriver		[Nm]	$\leq 1000$	

## Load values for anchor design according to simplified method - TSM BC SB 22 M24L

Anchor size	L [mm]		315	345
Design value of tension load for a group of 4 anchors <sup>1) 3)</sup>	$N_{Rd,4}$	[kN]	98,7	
Design value of tension load for a group of 6 anchors <sup>1) 4)</sup>	$N_{Rd,6}$	[kN]	114,7	
Design value of tension load for a group of 8 anchors <sup>1) 5)</sup>	$N_{Rd,8}$	[kN]	162,0	
Design value of shear load for a group of 4 anchors <sup>1) 3)</sup>	$V_{Rd,4}$	[kN]	40,6	
Design value of shear load for a group of 6 anchors <sup>1) 4)</sup>	$V_{Rd,6}$	[kN]	48,0	
Design value of shear load for a group of 8 anchors <sup>1) 5)</sup>	$V_{Rd,8}$	[kN]	55,3	
<b>Fatigue verification per individual anchor</b>				
Design value of the amplitude of the normal stress resulting from the tension load <sup>2)</sup>	$\Delta\sigma_{SMio}$	[N/mm <sup>2</sup> ]	52,17	
Design value of the amplitude of the shear stress resulting from the shear load <sup>2)</sup>	$\Delta\tau_{SMio}$	[N/mm <sup>2</sup> ]	26,1	
Design value of the amplitude of the flexural stress resulting from normal tension load and shear load with lever arm <sup>2)</sup>	$\Delta\sigma B_{SMio}$	[N/mm]	143,47	

<sup>1)</sup> For the determination of the design values, the partial safety factor from the approval  $\gamma_{inst} = 1.5$  was taken into account on the resistance side.

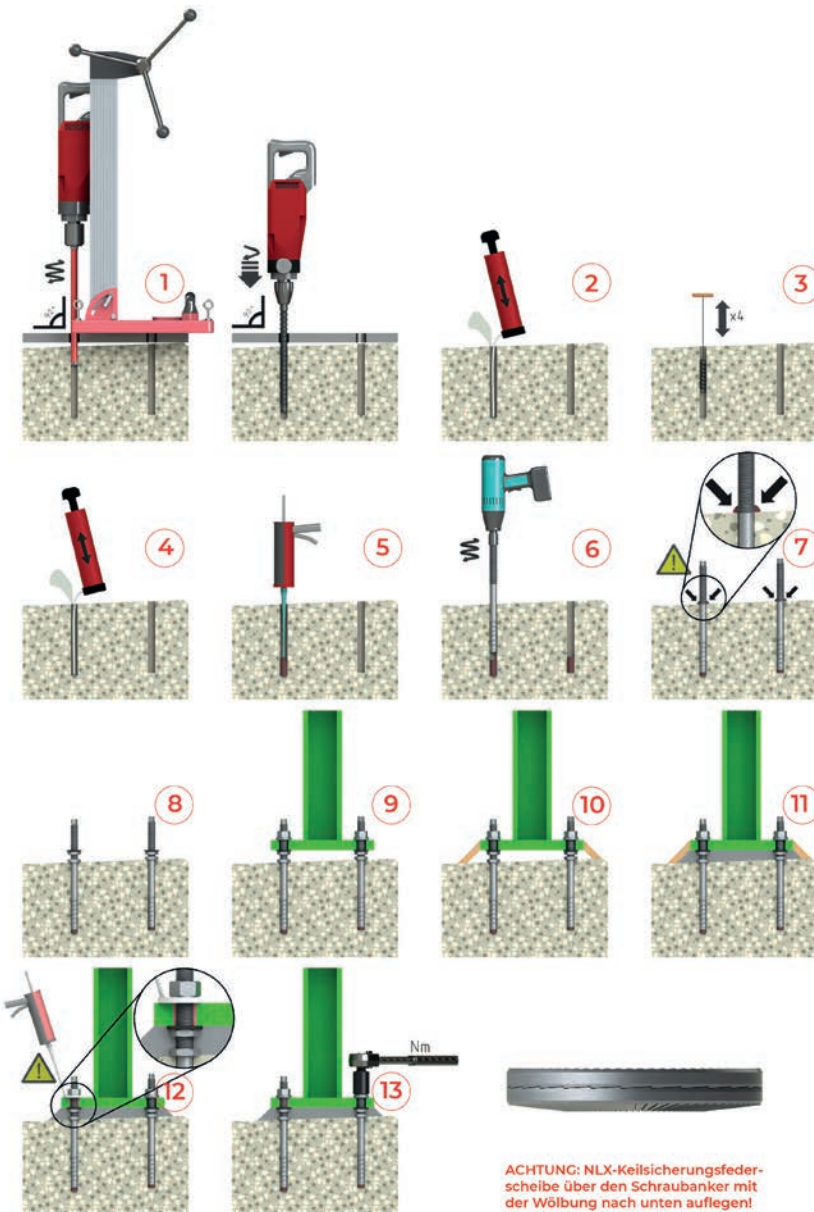
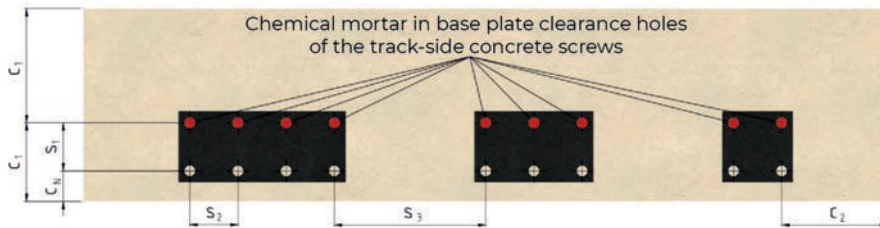
<sup>2)</sup> For the determination of the design values, the partial safety factor from the approval  $\gamma_{inst} = 1.15$  was taken into account on the resistance side.

<sup>3)</sup> The load applies in total to 2 pulled anchors of a group of 4. The other 2 anchors must receive compressive forces in this case.

<sup>4)</sup> The load applies in total to 3 pulled anchors of a group of 6. The other 3 anchors must receive compressive forces in this case.

<sup>5)</sup> The load applies in total to 4 pulled anchors of a group of 8. The other 4 anchors must receive compressive forces in this case.





- 1) Drill a hole at right angles to the base plate.
- 2) Thoroughly blow out the drill hole.
- 3) Brush the drill hole 4x.
- 4) Thoroughly clean the drill hole again.
- 5) Discard three full strokes of composite mortar – then 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) Hand-tighten the tensioning nut against the concrete. Screw on adjusting nut and place elastomer washer.
- 9) Position the post.
- 10) Build formwork.
- 11) Line base plate with suitable mortar (max. lining height 40mm).
- 12) Fill the annular gap between the screw anchor and the drill hole in the base plate.
- 13) Place the NLX wedge-lock washer with the curvature facing downwards and apply torque.

**ACHTUNG:** NLX-Keilsicherungsfeder-scheibe über den Schraubanker mit der Wölbung nach unten auflegen!