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.

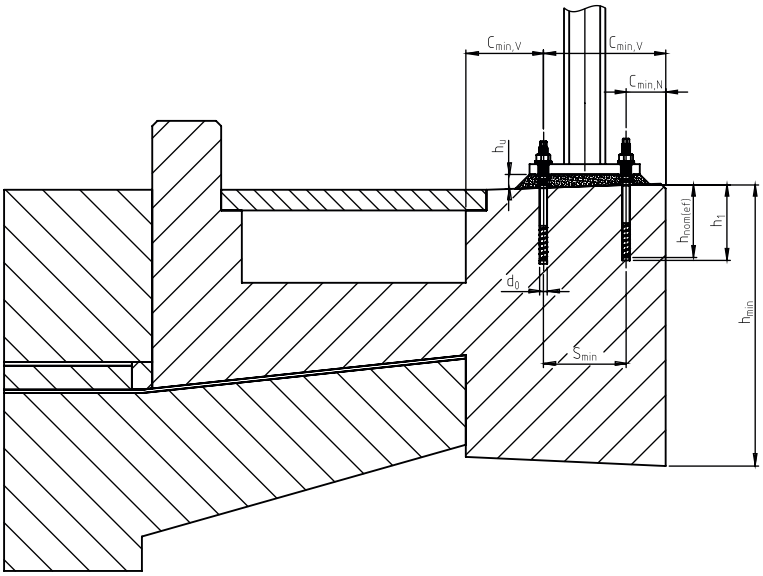
Federal Railway Authority approval 213.3-213izbia/005-2101#009

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.

Technical Characteristics



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 ≥	[mm]	100	100	
Effective embedment depth of anchor	$h_{nom} = h_{ef}$ ≥	[mm]	100	100	
Clearance hole in the base plate	d_f ≤	[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 ≤	[mm]	40	40	
Installation torque	T_{inst}	[mm]	100	200	
Minimum egde distance	C_{min} ≥	[mm]	70	80	
Minimum spacing	S_{min} ≥	[mm]	70	80	
Minimum base material thickness	$h_{min,alt}$ ≥	[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 [1) 2)]	$N_{Rd,c}$ ≥	[kN]	26,5	26,5	
Design value of shear force for steel failure without lever arm [1) 2)]	$V_{Rd,s}$	[kN]	76,8	85,6	
Design value of shear load for steel failure with lever arm [1) 2)]	$V_{Rd,s,M}$	[kN]	11,5 [3)]	19,2 [4)]	16,8 [5)]
Nominal torque of tangential screwdriver		[Nm]	≤ 600	≤ 1000	
Fatigue verification per individual anchor					
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 shear stress resulting from the shear load. [2)]	$\Delta\tau_{5Mio}$	[N/mm²]	26,1		
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/mm]	113,04		

[1)] For the determination of the design values, the partial safety factor from the approval was taken into account on the resistance side.
[2)] These values apply without the influence of the spacing and edge dstances.
[3)] The specified values apply only under the following conditions: α_M = 2,0 ; h_u = 40 mm ; t_{fix} = 15 mm ; a_3 = 0.
[4)] The specified values apply only under the following conditions: α_M = 2,0 ; h_u = 40 mm ; t_{fix} = 25 mm ; a_3 = 0.
[5)] The specified values apply only under the following conditions: α_M = 2,0 ; h_u = 40 mm ; t_{fix} = 40 mm ; a_3 = 0.

Technical Characteristics

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

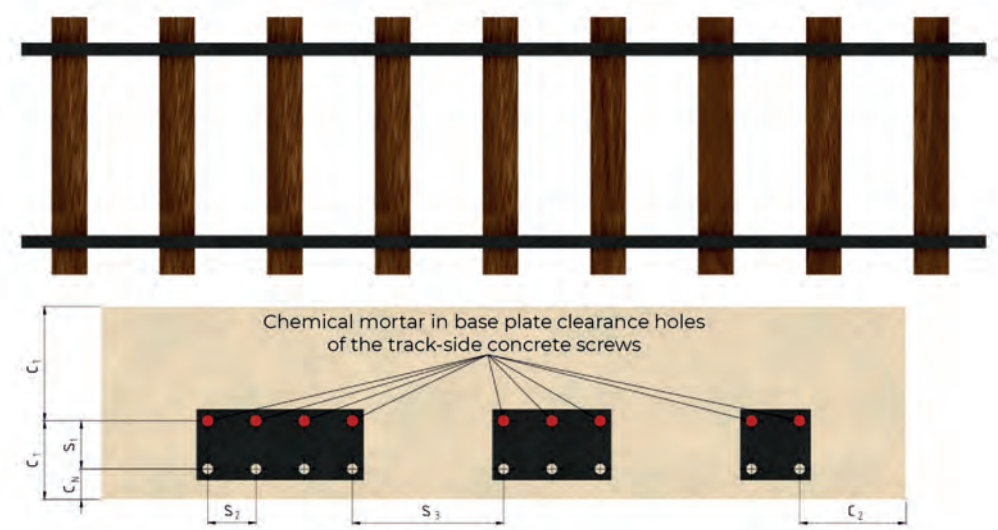
Anchor size	L	[mm]	315	345
Nominal diameter of drill bit	d_0	[mm]	22	
Depth of drill hole	h_0 ≥	[mm]	210	
Effective embedment depth of anchor	$h_{nom} = h_{ef}$ ≥	[mm]	200	
Clearance hole in the base plate	d_f ≤	[mm]	32	
Diameter metric connection thread	d_{Gew}	[mm]	M24	
Length metric connection thread	L_{Gew}	[mm]	100	120
Grouting height	h_u ≤	[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 ≥	[mm]	230	
Minimum edge distance in longitudinal direction at the end of the bridge cap	C_2 ≥	[mm]	345	
Minimum spacing parallel to the track	S_1 ≥	[mm]	150	
Minimum spacing transverse to the track	S_2 ≥	[mm]	150	
Minimum spacing between anchor groups	S_3 ≥	[mm]	600	
Minimum base material thickness	$h_{min, alt}$ ≥	[mm]	300	
Hexagonal drive for installation of the screws	SW	[mm]	17	
Nominal torque of tangential screwdriver		[Nm]	≤ 1000	

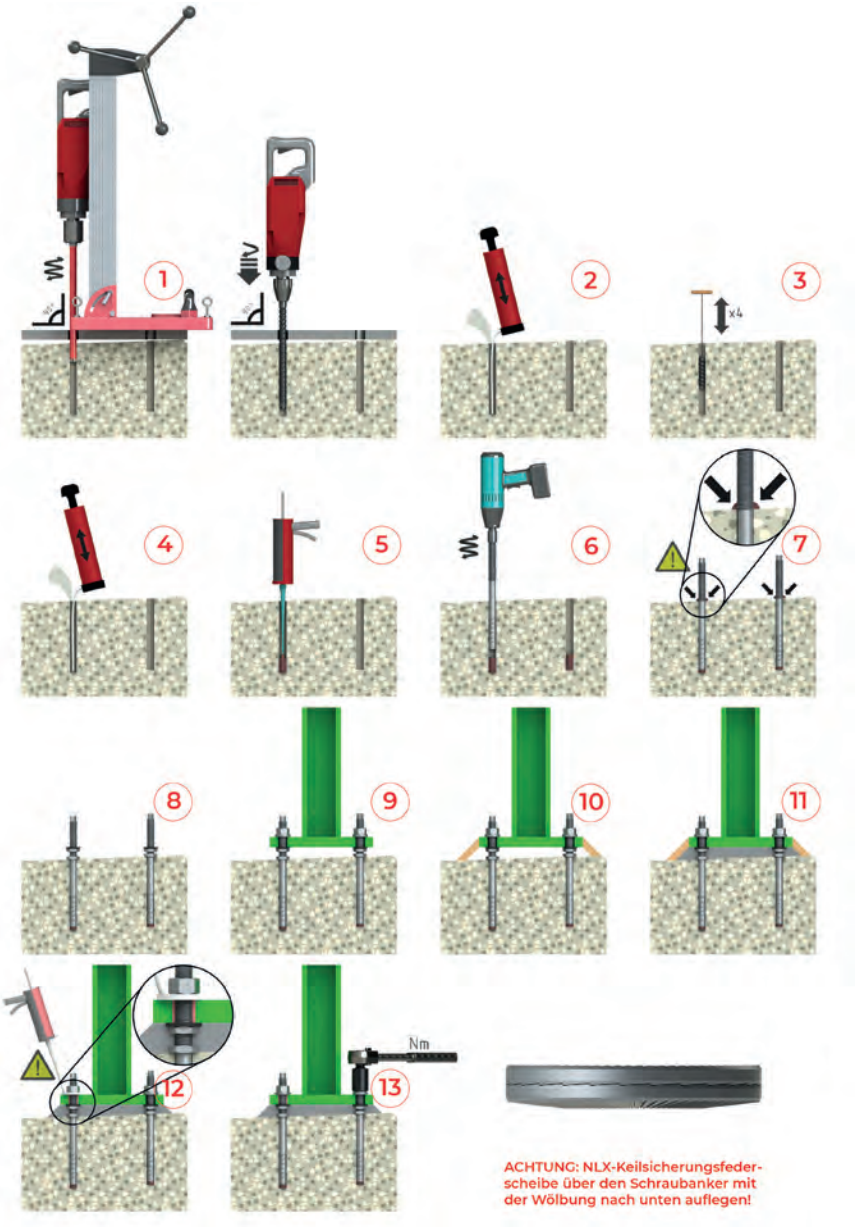
Load values for anchor design according to simplified method - TSM BC SB 22 M24L

Anchor size	L	[mm]	315	345
Design value of tension load for a group of 4 anchors [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) 3)]	$V_{Rd,4}$	[kN]	40,6	
Design value of shear load for a group of 6 anchors [1) 4)]	$V_{Rd,6}$	[kN]	48,0	
Design value of shear load for a group of 8 anchors [1) 5)]	$V_{Rd,8}$	[kN]	55,3	
Fatigue verification per individual anchor				
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 shear stress resulting from the shear load. [2)]	$\Delta\tau_{5Mio}$	[N/mm²]	26,1	
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/mm]	143,47	

[1)] For the determination of the design values, the partial safety factor from the approval γ_{inst} = 1.5 was taken into account on the resistance side.
[2)] For the determination of the design values, the partial safety factor from the approval γ_{inst} = 1.15was taken into account on the resistance side.
[3)] 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.
[4)] The load applies in total to 3 pulled anchors of a group of 6. The other 3anchors must receive compressive forces in this case.
[5)] 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.

Installation Instructions





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.