

Technical values with fire exposure for individual fastening: TSM (steel, A4 and HCR)

TSM high performance screw size			TSM 6			TSM 8			TSM 10			TSM 12			TSM 14			
Nominal embedment depth	h_{nom}	[mm]	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	$h_{nom,1}$	$h_{nom,2}$	$h_{nom,3}$	
			40	55		45	55	65	55	75	85	65	85	100	75	100	115	
Permissible tensile- and shear loads ($F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$)																		
Fire resistance class																		
R 30	Permissible resistance	$F_{zul,fi,30}$	[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		$M^0_{zul,fi,30}$	[kN]	0,7			2,4			5,9			12,3			20,4		
R 60		$M^0_{zul,fi,60}$	[kN]	0,6			1,8			4,5			9,7			15,9		
R 90		$M^0_{zul,fi,90}$	[kN]	0,5			1,2			3,0			7,0			11,6		
R 120		$M^0_{zul,fi,120}$	[kN]	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 ≥ 300 mm if the exposure to fire is from more than one side																		
Spacing																		
R 30 to R 120	$S_{cr,fi}$	[mm]	$2 \times C_{cr,fi}$															
Concrete edge failure																		
R 30 to R 120	k	[-]	1,0															
For damp concrete the anchorage depth must be increased by at least 30 mm																		

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

Technical values with fire exposure for multiple fastening: TSM / TSM A4 / TSM HCR

TSM high performance screw size			TSM 6		TSM 6 A4 / HCR		
Nominal length of engagement	h_{nom}	[mm]	35	55	35	55	
Permissible tensile- and shear loads ($F_{zul,fi} = N_{zul,fi} = V_{zul,fi}$)							
Fire resistance class							
R 30	Permissible resistance	$F_{zul,fi,30}$	[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		$M^0_{zul,fi,30}$	[kN]	0,7		0,9	
R 60		$M^0_{zul,fi,60}$	[kN]	0,6		0,9	
R 90		$M^0_{zul,fi,90}$	[kN]	0,5		0,9	
R 120		$M^0_{zul,fi,120}$	[kN]	0,3		0,6	
Edge distance							
R 30 to R 120	$C_{cr,fi}$	[mm]	$2 \times h_{ef}$				
The edge distance must be ≥ 300 mm if the exposure to fire is from more than one side							
Spacing							
R 30 to R 120	$S_{cr,fi}$	[mm]	$2 \times C_{cr,fi}$				
Concrete edge failure							
R 30 to R 120	k	[-]	1,0				
For damp concrete the anchorage depth must be increased by at least 30 mm							

¹⁾ For determining the permissible load the partial safety factor from the permit for the resistance side $\gamma_{M,fi} = 1.0$ and a partial safety factor on the load side $\gamma_F = 1.0$ were considered.