

# Declaration of Performance 1404-CPR-2657

valid from lot no 909809 to lot no \*\*\*\*\*

## m1tr Throughbolt

(Torque controlled expansion anchor made of stainless steel)

Intended use or uses of the construction product according to ETAG 001 parts 1 and 2	
Generic type	torque controlled expansion anchor
Base material	cracked and un-cracked concrete C20/25 to C50/60 acc. to EN 206-1:2003
Material	stainless steel AISI316, grade A4 70 for bolt acc.to EN ISO 3506-1
Durability	Internal dry conditions and external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist.
Loading	Static and quasi-static
Fire Resistance	F120
Fire Reaction	A1 according to EN13501-1
ETA - 12/0375 issued by	ZAG, Ljubljana
On the basis of	ETAG 001 Part 1 & 2
Certificate of Conformity 1404-CPD-1908 issued by	ZAG, Ljubljana
Under AVCP System	1

Declared performances according to ETAG 001 parts 1 and 2 and TR020 for fire resistance						
Essential characteristics		Performance				
		M8	M10	M12	M16	
<b>Installation parameters</b>						
$d_0$	Nominal diameter of drill bit	[mm]	8	10	12	16
$h_{ef}$	Effective anchorage depth	[mm]	48	60	72	86
$h_{nom}$	Minimum installation depth	[mm]	54	67	81	97
$h_{min}$	Minimum thickness of the concrete member	[mm]	100	120	150	170
$T_{inst}$	Nominal torque moment	[Nm]	20	40	60	120
$s_{min}$	Minimum spacing	[mm]	50	55	60	70
for $c \geq$	Edge distance	[mm]	50	70	80	100
$c_{min}$	Minimum edge distance	[mm]	50	50	60	70
for $s \geq$	Anchor spacing	[mm]	50	110	120	130
<b>Tension Steel failure mode</b>						
$N_{Rk,s}$	Tension Steel characteristic failure	[kN]	21	34	49	88
$\gamma_{m,sN}$	Partial safety factor for tension steel failure	[-]	1,5			
<b>Pull-out failure mode</b>						
$N_{Rk,p,cr}$	Tension characteristic load in uncracked concrete	[kN]	9	16	20	35
$N_{Rk,p,ucr}$	Tension characteristic load in cracked concrete	[kN]	5	9	12	25
$\gamma_2$	Partial safety factor	[-]	1,0			
$s_{cr,N}$	Critical spacing	[mm]	144	180	220	260
$c_{cr,N}$	Critical edge distance	[mm]	72	90	110	130
$\psi_c$ C30/37	Increasing factor for concrete C30/37	[-]	1,22			
$\psi_c$ C40/50	Increasing factor for concrete C40/50	[-]	1,41			
$\psi_c$ C50/60	Increasing factor for concrete C50/60	[-]	1,55			
<b>Splitting failure mode</b>						
$s_{cr,sp}$	Critical spacing (splitting)	[mm]	144	180	220	260
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	72	90	110	130

Displacement on Tension Load							
$N_{cr}$	Service tension load in cracked concrete	[kN]	2,4	4,3	5,7	11,9	
$\delta_{N0,cr}$	Short term displacement under tension load	[mm]	0,7	0,6	0,7	0,7	
$\delta_{N\infty,cr}$	Long term displacement under tension load	[mm]	1,4	1,5	0,9	1,4	
$N_{ucr}$	Service tension load in un-cracked concrete	[kN]	4,3	7,6	9,5	16,7	
$\delta_{N0,ucr}$	Short term displacement under tension load	[mm]	0,3	0,4	0,4	0,3	
$\delta_{N\infty,ucr}$	Long term displacement under tension load	[mm]	1,4	1,5	0,9	1,4	
Shear Steel failure mode			M8	M10	M12	M16	
$V_{Rk,s}$	Shear Steel characteristic failure	[kN]	11,9	18,8	27,4	51,0	
$M^0_{Rk,s}$	Bending Moment characteristic failure	[Nm]	24	49	85	216	
$\gamma_{m,sV}$	Partial safety factor for shear steel failure	[-]	1,3				
Shear Concrete Edge failure mode							
$l_{ef}$	Effective anchorage length	[mm]	48	60	72	86	
Concrete pryout failure							
k	Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3	[-]	1,0	2,0			
Displacement on Shear Load							
V	Service shear load in concrete	[kN]	6,5	10,4	15,1	28,0	
$\delta_{V0}$	Short term displacement under shear load	[mm]	0,8	0,9	1,2	2,5	
$\delta_{V\infty}$	Long term displacement under shear load	[mm]	1,3	1,3	1,8	3,8	
Char. tension resistance in cracked and non-cracked concrete under fire exposure for design method A acc. ETAG001							
Steel failure			M8	M10	M12	M16	
$F_{Rk,s,fi}$	Fire resistance duration = 30 min	[kN]	0,5	1,1	1,8	3,3	
$F_{Rk,s,fi}$	Fire resistance duration = 60 min	[kN]	0,4	0,9	1,5	2,7	
$F_{Rk,s,fi}$	Fire resistance duration = 90 min	[kN]	0,3	0,7	1,2	2,2	
$F_{Rk,s,fi}$	Fire resistance duration = 120 min	[kN]	0,3	0,6	1,0	1,8	
Pullout failure			M8	M10	M12	M16	
$F_{Rk,p,fi}$	Fire resistance duration in concrete $\geq 20/25 = 30$ min	[kN]	1,3	2,3	3,0	6,3	
$F_{Rk,p,fi}$	Fire resistance duration in concrete $\geq 20/25 = 60$ min	[kN]	1,3	2,3	3,0	6,3	
$F_{Rk,p,fi}$	Fire resistance duration in concrete $\geq 20/25 = 90$ min	[kN]	1,3	2,3	3,0	6,3	
$F_{Rk,p,fi}$	Fire resistance duration in concrete $\geq 20/25 = 120$ min	[kN]	1,0	1,8	2,4	1,8	
Concrete cone and splitting failure <sup>2)</sup>							
$F^0_{Rk,c,fi}$	Fire resistance duration in concrete $\geq 20/25 = 30$ min	[kN]	2,9	5,0	7,9	12,3	
$F^0_{Rk,c,fi}$	Fire resistance duration in concrete $\geq 20/25 = 60$ min	[kN]	2,9	5,0	7,9	12,3	
$F^0_{Rk,c,fi}$	Fire resistance duration in concrete $\geq 20/25 = 90$ min	[kN]	2,9	5,0	7,9	12,3	
$F^0_{Rk,c,fi}$	Fire resistance duration in concrete $\geq 20/25 = 120$ min	[kN]	2,3	4,0	6,3	9,9	
$s_{cr,N,fi}$	Characteristic spacing	[mm]	4 x $h_{ef}$				
$c_{cr,N,fi}$	Characteristic edge distance	[mm]	2 x $h_{ef}$				
<sup>2)</sup> As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed							
Char. shear resistance in cracked and non-cracked concrete under fire exposure for design method A acc. ETAG001							
Steel failure without lever arm			M8	M10	M12	M16	
$V_{Rk,s,fi}$	Fire resistance duration = 30 min	[kN]	0,7	1,5	2,5	4,7	
$V_{Rk,s,fi}$	Fire resistance duration = 60 min	[kN]	0,6	1,2	2,1	3,9	
$V_{Rk,s,fi}$	Fire resistance duration = 90 min	[kN]	0,4	0,9	1,7	3,1	
$V_{Rk,s,fi}$	Fire resistance duration = 120 min	[kN]	0,4	0,8	1,4	2,5	
Steel failure with lever arm							
$M^{ORk,s,fi}$	Characteristic Bending Moment	[Nm]	0,7	1,9	3,9	10,0	
$M^{ORk,s,fi}$	Characteristic Bending Moment	[Nm]	0,6	1,5	3,3	8,3	
$M^{ORk,s,fi}$	Characteristic Bending Moment	[Nm]	0,4	1,2	2,6	6,7	
$M^{ORk,s,fi}$	Characteristic Bending Moment	[Nm]	0,4	1,0	2,1	5,3	

Concrete pry-out failure					
k	Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3	[-]	1,0	2,0	

**Characteristic values for resistance in case of seismic performance category C1/C2 acc. TR045**

		M8		M10		M12		M16		
Steel failure		C1	C2	C1	C2	C1	C2	C1	C2	
$N_{Rk,s,seis}$	Characteristic resistance	[kN]	21	34	49	88				
$\gamma_{Ms,seis}$	Partial safety factor	[-]	1,5							
Pull-out failure $N_{Rk,p,seis} = \psi N_{Rk,p,seis}^0$										
$N_{Rk,s,seis}^0$	Characteristic resistance	[kN]	4,1	-	9,0	2,4	12,0	8,8	25,0	21,9
$\gamma_{Mp,seis}$	Partial safety factor	[-]	1,5							
$\delta_{N,sei} (DSL)$	Displacement at DLS	[mm]	-	-	-	2,9	-	4,9	-	6,3
$\delta_{N,sei} (DSL)$	Displacement at DLS	[mm]	-	-	-	15,8	-	15,7	-	21,0
Shear loads (Steelfailure without lever arm)										
$V_{Rk,s,seis}$	Characteristic resistance	[kN]	8,0	-	12,3	15,8	36,6			
$\gamma_{Ms,seis}$	Partial safety factor	[-]	1,3							
$\delta_{V,sei} (DSL)$	Displacement at DLS	[mm]	-	-	-	2,4	-	5,2	-	6,0
$\delta_{V,sei} (DSL)$	Displacement at DLS	[mm]	-	-	-	4,1	-	9,7	-	10,7


The above performances apply for the following article numbers:

d	Marking d <sub>0</sub> /t <sub>fix</sub>	L [mm]	t <sub>fix</sub> [mm]	Art. No
M8	m1t 8/4	68	4	3700806
	m1t 8/10	75	10	3700807
	m1t-C 8/10	75	10	3710807
	m1t 8/25	90	25	3700809
	m1t 8/50	115	50	3700811
	m1t 8/70	135	70	3700813
	m1t 8/100	165	100	3700816
M10	m1t 10/10	90	10	3701009
	m1t 10/25	105	25	3701010
	m1t 10/35	115	35	3701011
	m1t 10/55	135	55	3701013
	m1t 10/75	155	75	3701015
	m1t 10/105	185	105	3701018
M12	m1t 12/10	110	10	3701211
	m1t 12/20	120	20	3701212
	m1t 12/45	145	45	3701214
	m1t 12/70	170	70	3701217
	m1t 12/100	200	100	3701220
M16	m1t 16/10	130	10	3701613
	m1t 16/30	150	30	3701615
	m1t 16/60	185	60	3701618
	m1t 16/100	220	100	3701622

The performances of the product identified by the above identification code are in conformity with the declared performance.

This declaration of performance is issued under the sole responsibility of Mungo AG.

Signed for and on behalf of the manufacturer by:

Name and functions	Place and date of issue	Signature
Roman Wyss Product Manager	Oltten, 11.08.2015	

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