



DECLARATION OF PERFORMANCE

DoP no. 2873-08470/1 EN

Version: 1

Print date: 04.01.2021

1. Unique identification code of the product-type: **TOX Liquix Plus 7, TOX Liquix Plus 7 Desert, TOX Liquix Plus 7 Snow**

2. Intended use/es:

Product	Intended use
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the construction works) or heavy units

3. Manufacturer: **TOX-Dübel-Technik GmbH, Brunnenstraße 31, D-72505 Krauchenwies**

4. Authorised representative: --

5. System/s of AVCP: 1

6. a) Harmonised standard: --

Notified body/ies: --

6. b) European Assessment Document: **ETAG 001-Part 1 and part 5; 2013**

European Technical Assessment: **ETA-13/0052; 31.01.2016**

Technical Assessment Body: **TZÚS Praha**

Notified body/ies: **2873 TU Darmstadt**

7. Declared performance/s:

Mechanical resistance and stability (BWR1)

Essential characteristics	Performances
Characteristic resistance for tension loads	See Annex C1
Characteristic resistance for shear loads	See Annex C2
Displacement	See Annex C3

Safety in case of fire (BWR 2)

Essential characteristics	Performances
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	No performance assessed

8. Appropriate Technical Documentation and/or Specific Technical Documentation: --

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

i.A. Daniel Wilhelm (Applications Engineering)

Krauchenwies-Ablach, 04.01.2021

Table C1: Characteristic values of resistance for threaded rods under tension loads in non-cracked concrete

Anchor size threaded rod				M 8	M 10	M 12	M 16	M 20	M 24
Steel failure									
Characteristic tension resistance,		$N_{Rk,s}$	[kN]	$A_e \times f_{uk}$					
Combined pull-out and concrete failure									
Characteristic bond resistance in non-cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	8,5	8,0	8,0	8,0	8,0	8,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	8,5	8,0	8,0	8,0	8,0	8,0
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	6,5	6,0	6,0	6,0	6,0	6,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	6,5	6,0	6,0	6,0	6,0	6,0
Increasing factors for concrete ψ_c		C25/30		1,04					
		C30/37		1,08					
		C35/45		1,13					
		C40/50		1,15					
		C45/55		1,17					
		C50/60		1,19					
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3		k_8	[-]	10,1					
Concrete cone failure									
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1		k_{ucr}	[-]	10,1					
Edge distance		$c_{cr,N}$	[mm]	1,5 h_{ef}					
Axial distance		$s_{cr,N}$	[mm]	3,0 h_{ef}					
Splitting failure									
Edge distance		$c_{cr,sp}$	[mm]	$1,0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right) \leq 2,4 \cdot h_{ef}$					
Axial distance		$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$					
Installation safety factor (dry and wet concrete)		$\gamma_2 = \gamma_{inst}$		1,2					
Installation safety factor (flooded bore hole)		$\gamma_2 = \gamma_{inst}$		1,2					
TOX Injection system for concrete Liquix Plus 7, Liquix Plus 7 Desert, Liquix Plus 7 Snow								Annex C 1	
Performances Characteristic values of resistance for threaded rods under tension loads in non-cracked concrete									

Table C2: Characteristic values of resistance for threaded rods under shear loads in non-cracked concrete

Anchor size threaded rod		M 8	M 10	M 12	M 16	M 20	M24	
Steel failure without lever arm								
Characteristic shear resistance,	$V_{Rk,s}$	[kN]	$0,5 \times A_s \times f_{uk}$					
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	k_2		0,8					
Steel failure with lever arm								
Characteristic bending moment,	$M^0_{Rk,s}$	[Nm]	$1.2 \cdot W_{el} \cdot f_{uk}$					
Concrete pry-out failure								
Factor k in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k in equation (5.7) of Technical Report TR 029	$k_{(3)}$	[-]	2,0					
Installation safety factor	$\gamma_2 = \gamma_{inst}$		1,0					
Concrete edge failure								
Effective length of anchor	l_f	[mm]	$l_f = \min(h_{ef}, 8 d_{nom})$					
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24
Installation safety factor	$\gamma_2 = \gamma_{inst}$		1,0					
TOX Injection system for concrete Liquix Plus 7, Liquix Plus 7 Desert, Liquix Plus 7 Snow						Annex C 2		
Performances Characteristic values of resistance for threaded rods under shear loads in non-cracked concrete								

Table C3: Displacement under tension load¹⁾ (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24
Non-cracked concrete C20/25								
Temperature range I: 40°C/24°C	δ_{N0} -factor	[mm/(N/mm ²)]	0,03	0,04	0,05	0,07	0,08	0,10
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,07	0,08	0,08	0,08	0,08	0,10
Temperature range II: 80°C/50°C	δ_{N0} -factor	[mm/(N/mm ²)]	0,02	0,03	0,03	0,04	0,04	0,05
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,15	0,17	0,17	0,17	0,17	0,17

¹⁾ Calculation of the displacement

$$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau;$$

$$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau;$$

Table C4: Displacement under shear load¹⁾ (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24
For non-cracked concrete C20/25								
All temperature ranges	δ_{V0} -factor	[mm/(kN)]	0,02	0,02	0,01	0,01	0,01	0,01
	$\delta_{V\infty}$ -factor	[mm/(kN)]	0,03	0,02	0,02	0,01	0,01	0,01

¹⁾ Calculation of the displacement

$$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V;$$

$$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V;$$

**TOX Injection system for concrete
Liquix Plus 7, Liquix Plus 7 Desert, Liquix Plus 7 Snow**

Performances
Displacement (threaded rod)

Annex C 3