Trutek Fasteners Polska Sp. z o.o.
Al. Krakowska 38, Janki
05-090 Raszyn
NIP: PL 5342256188 REGON: 015722173

Declaration of Performance

Nr: TCM_A ARCTIC/01/20200930/ETA-20/0148

Revision No:	1
Revision carried out by:	Tomasz Golon
Revision date:	30. 09. 2020

1.	**Unique identyfiaction code of product-type:**	
	TCM A Arctic Injection system for concrete	
2.	**Indended use/es:**	
	The anchors are intended to be used for anchorages in non-cracked concrete for static and quasi-static loads: M8 to M24, Rebar Ø8 to Ø25, reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.	
3.	**Manufacturer:**	
	Name:	Trutek Fasteners Polska Sp. z o.o.
	Address:	Al. Krakowska 38, Sękocin Janki 05-090 Raszyn, Polska
4.	**System/s of AVCP:**	
	System:	1
5.	**European Assessment Document:**	
	In accordance with regulation (EU) No 305/2011 on the basis of European Assessment Document EAD EOTA 330499-01-0601, “Bonded fasteners for use in concrete”	
	European Technical Assessment	ETA-20/0148 of 7th of February 2020
	Issued by:	ETA-DANMARK A/S
6.	**Notyfied body/ies:**	
	Name:	ZAG ZAWOD ZA GRADBENIŠTVO SLOWENIJE
	Notified body/ies No:	1404
	No of Certificate of Constancy of Performance:	1404-CPR-3335
7.	**Declared performance/es:**	
	Mechanical resistance and stability (BWR 1)	
	Essential chracteristic	**Performance**
	Design method A, characteristic tension load values	Table C1
	Displacements under tension load	Table C2
	Design method A, Characteristic shear load values	Table C3
	Displacements under shear load	Table C4
	Design method A, characteristic tension load values	Table C5
	Displacements under tension load	Table C6
	Design method A, Characteristic shear load values	Table C7
	Displacements under shear load	Table C8
	Safety in case of fire (BWR 2)	**Safety in case of fire (BWR 2)**
	Essential chracteristic	**Essential chracteristic**
	Resistance to fire	Table C9
	Reaction to fire	Table C10

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

Janki, 30th of September 2020
Signed for and on behalf of the manufacturer by:

Tomasz Golon

Kierownik Produktu / Product Manager

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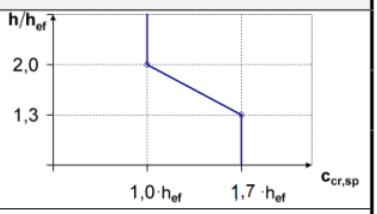
Table C1: Design method A, characteristic tension load values

TCM A ARCTIC with threaded rods			M8	M10	M12	M16	M20	M24
Steel failure								
Characteristic resistance, class 4.6 and 4.8	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Characteristic resistance, class 5.6 and 5.8	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Characteristic resistance, class 8.8	$N_{Rk,s}$	[kN]	29	46	67	125	196	282
Characteristic resistance, class 10.9	$N_{Rk,s}$	[kN]	38	60	87	163	255	367
Characteristic resistance, class 12.9	$N_{Rk,s}$	[kN]	44	70	103	190	299	431
Characteristic resistance, A2, A4 and HCR, Property class 50	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Characteristic resistance, A2, A4 and HCR, Property class 70	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Characteristic resistance, A4 and HCR, Property class 80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor 4.6 and 5.6	$\gamma_{Ms,N}$ [1]	[-]	2					
Partial safety factor 4.8, 5.8, 8.8, 10.9 and 12.9	$\gamma_{Ms,N}$ [1]	[-]	1,5					
Partial safety factor A2, A4 and HCR class 70	$\gamma_{Ms,N}$ [1]	[-]	1,87					
Partial safety factor A2, A4 and HCR class 80	$\gamma_{Ms,N}$ [1]	[-]	1,60					
Combined Pull-out and Concrete cone failure [2]								
Diameter of threaded rod	d	[mm]	8	10	12	16	20	24
Characteristic bond resistance in non-cracked concrete C20/25 – dry or wet concrete								
Temperature range a [3] : 40°C/24°C	$\tau_{Rk,ucr}$	[N/mm²]	7	7	6.5	6.5	6	5.5
Partial safety factor – dry or wet concrete	γ_{inst}	[-]	1,2			1,4		
Characteristic bond resistance in non-cracked concrete C20/25 – flooded holes								
Temperature range a [3] : 40°C/24°C	$\tau_{Rk,ucr}$	[N/mm²]	7	7	6.5	6	5	4.5
Partial safety factor – flooded holes	$\gamma_{Mp} = \gamma_{Mc}$ [1]	[-]	1,2		1,4			
Increasing factor for $\tau_{Rk,ucr}$ in non-cracked concrete	ψ_c	C30/37	1,0					
		C40/50	1,0					
		C50/60	1,0					
Factor for determination of the concrete cone failure	$k_{ucr,N}$	[-]	11,0 (based on concrete cylinder strength f_{ck}) 10,1 (based on concrete strength $f_{ck,cube}$)					
Splitting failure[2]								
Edge distance $c_{cr,sp}$ [mm] for	h / h_{ef} [4] ≥ 2,0		1,0 h_{ef}					
	2,0 > h / h_{ef} [4] > 1,3		3 h_{ef} - 1 h					
	h / h_{ef} [4] ≤ 1,3		1.7 h_{ef}					
Spacing	$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$					



[1] In absence of national regulations
[2] Calculation of concrete and splitting, see annex B1
[3] Explanations, see annex B1
[4] h= concrete member thickness, h_{ef} = effective embedment depth

SYSTEM TCM A ARCTIC	**Annex C1** of European Technical Assessment ETA-20/0148
Performance for static and quasi-static loads: Resistances	

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Table C2: Displacements under tension load

TCM A ARCTIC with threaded rods			M8	M10	M12	M16	M20	M24
Temperature range a [5]: 40°C / 24°C								
Displacement	δ_{N0}	[mm/(N/mm²)]	0.03	0,04	0,04	0,04	0,09	0,30
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	-	-	0,15	-	-	-

[5] Explanation see annex B1

SYSTEM TCM A ARCTIC	**Annex C2** of European Technical Assessment ETA-20/0148
Performance for static, quasi-static: Displacements	

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Table C3: Design method A, Characteristic shear load values

TCM A ARCTIC with threaded rods			M8	M10	M12	M16	M20	M24
Steel failure without lever arm								
Characteristic resistance, class 4.6 and 4..8	$V_{Rk,s}$	[kN]	7	12	17	31	49	70
Characteristic resistance, class 5.6 and 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Characteristic resistance, class 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Characteristic resistance, class 10.9	$V_{Rk,s}$	[kN]	19	30	43	81	127	183
Characteristic resistance, class 12.9	$V_{Rk,s}$	[kN]	22	35	51	95	149	215
Characteristic resistance, A2, A4 and HCR, Property class 50	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Characteristic resistance, A2, A4 and HCR, Property class 70	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Characteristic resistance, A4 and HCR, Property class 80	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Steel failure with lever arm								
Characteristic resistance, class 4.6 and 4.8	$M^0_{Rk,s}$	[Nm]	15	30	52	133	260	449
Characteristic resistance, class 5.6 and 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	560
Characteristic resistance, class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	896
Characteristic resistance, class 10.9	$M^0_{Rk,s}$	[Nm]	37	75	131	333	649	1123
Characteristic resistance, class 12.9	$M^0_{Rk,s}$	[Nm]	45	90	157	400	779	1347
Characteristic resistance, A2, A4, HCR -50	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	560
Characteristic resistance, A2, A4, HCR -70	$M^0_{Rk,s}$	[Nm]	26	52	95	232	454	784
Characteristic resistance, A4, HCR - 80	$M^0_{Rk,s}$	[Nm]	30	59	105	266	519	896
Partial safety factor steel failure								
Steel, Property class 4.6 or 5.6	$\gamma_{Ms,V}$ [1)]	[-]	1,67					
Steel, Property class 4.8, 5.8 or 8.8	$\gamma_{Ms,V}$ [1)]	[-]	1,25					
Steel, Property class 10.9 or 12.9	$\gamma_{Ms,V}$ [1)]	[-]	1,50					
Stainless steel A2, A4 or HCR Property class 50	$\gamma_{Ms,V}$ [1)]	[-]	2,38					
Stainless steel A2, A4 or HCR Property class 70	$\gamma_{Ms,V}$ [1)]	[-]	1,56					
Stainless steel A4 or HCR Property class 80	$\gamma_{Ms,V}$ [1)]	[-]	1,33					
Concrete pryout failure								
Factor	k_8	[-]	1,0 for h_{ef} < 60mm 2,0 for h_{ef} ≥ 60mm					
Partial safety factor	γ_{Mc} [1)]	[-]	1,5					
Concrete edge failure								
Partial safety factor	γ_{Mc} [1)]	[-]	1,5					

1) In absence of national regulations

Table C4: Displacements under shear load

TCM A ARCTIC with threaded rods			M8	M10	M12	M16	M20	M24
Displacement	δ_{V0}	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03
Displacement	$\delta_{V\infty}$	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05

SYSTEM TCM A ARCTIC	**Annex C3** of European Technical Assessment ETA-20/0148
Performance for static, quasi-static: Resistances, Displacements	

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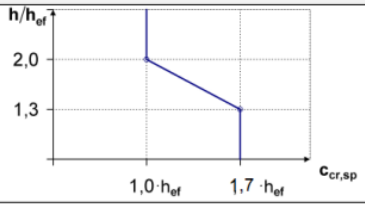
Table C5: Design method A, characteristic tension load values

TCM A ARCTIC with rebar			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Steel failure								
Characteristic tension resistance	$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$ [1]					
Cross section area	A_s	[mm²]	50	79	113	201	314	491
Partial safety factor	$\gamma_{Ms,N}$ [2]	[-]	1,4					
Combined Pull-out and Concrete cone failure [3]								
Diameter of rebar	d	[mm]	8	10	12	16	20	25
Characteristic bond resistance in non-cracked concrete C20/25 – dry or wet concrete								
Temperature range a [4] : 40°C/24°C	$\tau_{Rk,ucr}$	[N/mm²]	5.5	5.5	5.5	5	5	5
Partial safety factor – dry or wet concrete	γ_{inst} [2]	[-]	1,2			1,4		
Characteristic bond resistance in non-cracked concrete C20/25 – flooded holes								
Temperature range a [4] : 40°C/24°C	$\tau_{Rk,ucr}$	[N/mm²]	5.5	5.5	5.5	5	4.5	4
Partial safety factor – flooded holes	γ_{inst}	[-]	1,2		1,4			
Increasing factor for $\tau_{Rk,ucr}$ in non-cracked concrete	ψ_c	C30/37	1,0		1,1			
		C40/50	1,0	1,1				1,2
		C50/60	1,0	1,1	1,2			1,3
Splitting failure [3]								
Edge distance $c_{cr,sp}$ [mm] for		h / h_{ef} [5] ≥ 2,0	$1,0\ h_{ef}$					
		2,0 > h / h_{ef} [5] > 1,3	$3\ h_{ef} - 1\ h$					
		h / h_{ef} [5] ≤ 1,3	$1.7\ h_{ef}$					
Spacing	$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$					



[1] f_{uk} shall be taken from the specifications of reinforcing bars
[2] in absence of national regulation
[3] Calculation of concrete and splitting, see annex B1
[4] Explanations, see annex B1
[5] h = concrete member thickness, h_{ef} = effective embedment depth

Table C6: Displacements under tension load

TCM A ARCTIC with rebar			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Temperature range a [4]: 40°C / 24°C								
Displacement	δ_{N0}	[mm/(N/mm²)]	0,03	0,03	0,04	0,07	0,07	0,10
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	-	-	0,15	-	-	-

SYSTEM TCM A ARCTIC	Annex C4 of European Technical Assessment ETA-20/0148
Performance for static and quasi-static loads: Resistances, Displacements	

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Table C7: Design method A, Characteristic shear load values

TCM A ARCTIC with rebar			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Steel failure without lever arm								
Characteristic shear resistance	$V_{Rk,s}$	[kN]	$0{,}50 \cdot A_s \cdot f_{uk}$ [1)]					
Cross section area	A_s	[mm²]	50	79	113	201	314	491
Partial safety factor	$\gamma_{Ms,N}$ [2)]	[-]	1,5					
Steel failure with lever arm								
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	$1.2 \cdot W_{el} \cdot f_{uk}$ [1)]					
Elastic section modulus	W_{el}	[Nm]	50	98	170	402	785	1534
Partial safety factor	$\gamma_{Ms,N}$ [2)]	[-]	1,5					
Concrete pryout failure								
Factor	k_8	[-]	1,0 for h_{ef} < 60mm 2,0 for $h_{ef} \geq$ 60mm					
Partial safety factor	γ_{MC}	[-]	1,5					
Concrete edge failure								
Partial safety factor	γ_{Mc} [1)]	[-]	1,5					

[1)] f_{uk} shall be taken from the specifications of reinforcing bars
[2)] In absence of national regulations

Table C8: Displacements under shear load

TCM A ARCTIC with rebar			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25
Displacement	δ_{V0}	[mm/kN]	0,05	0,05	0,05	0,04	0,04	0,03
Displacement	$\delta_{V\infty}$	[mm/kN]	0,08	0,08	0,07	0,06	0,05	0,05

SYSTEM TCM A ARCTIC	**Annex C5** of European Technical Assessment ETA-20/0148
Performance for static and quasi-static loads: Resistances, Displacements	

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Table C9: Resistance to fire

ESSENTIAL CHARACTERISTICS	PERFORMANCE
Resistance to fire	NPD

Table C10: Reaction to fire

ESSENTIAL CHARACTERISTICS	PERFORMANCE
Reaction to fire	In the final application, the thickness of the mortar layer is about 1 to 2 mm and most of the mortar is material classified class A1 according to EC Decision 96/603/EC. Therefore, it may be assumed that the bonding material (synthetic mortar or a mixture of synthetic mortar and cementitious mortar) in connection with the metal anchor in the end use application do not contribute to fire growth or to the fully developed fire and they have no influence to the smoke hazard.

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