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DECLARATION of PERFORMANCE
No 03/CA-X/X/0284/2022

CE

1. *Unique identification code of the product-type*: **CA-XX**
2. *Intended use:* **Torgue controlled expansion wedge anchor CA-H/X are intended to be used for fastening construction structure to concrete**
3. *Name, registered trade name or registered trade mark and contact address of the manufacturer:* **Marcopol Sp. z o.o. Producer of Bolts str. Oliwska 100, 80-209 Chwaszczyno Poland**
4. *System or systems of assessment and verification of constancy of performance of the construction product:* **System "1" of assessment**
5. *European Technical Assessment:* **ETA 19/0284 issued 21.03.2022**

   Technical Assessment Body: **Instituto de Ciencias de la Construccion Eduardo Torroja**
   Notified Body: **Number: 1219 - Instituto de Ciencias de la Construccion Eduardo Torroja**
   Certificate of Constancy of Performance: **1219-CPR-0223**
6. *Declared performance:*

	Essential characteristic	Performance	Technical Specification
3.1 BWR 1: Mechanical resistance and stability			
3.1.1.	Essential characteristic under static or quasi static loading	see table C4 and C6 below	ETA 19/0284
3.1.2.	Displacements under tension and shear loads	see table C7 and C8 below	ETA 19/0284
3.1.3	Essential characteristic under seismic loading categories C1 and C2	NPD	ETA 19/0284
3.2 BWR 2: Safety in case of fire			
3.2.1.	Reaction to fire	Anchorages satisfy requirements for class A1	EN 13501-1
3.2.2	Resistance to fire	see table C12 below	ETA 19/0284

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Table C4: Essential characteristics under static or quasi-static tension loads according to design method A according to EN 1992-4 for CA-X/X anchor

Essential characteristics under static or quasi-static tension loads according to design method A				Performances				
				M8	M10	M12	M16	M20
Tension loads: steel failure								
$N_{Rk,s}$	Characteristic resistance:		[kN]	18.5	30.9	45.5	71.5	122.5
γ_{Ms}	Partial safety factor:		[-]	1.4	1.4	1.4	1.4	1.4
Tension loads: pull-out failure in concrete								
$N_{Rk,p,ucr}$	Characteristic resistance in uncracked concrete:		[kN]	12	16	22	--[1)]	--[1)]
ψ_c	Increasing factor for $N^0_{Rk,p}$:	C30/37	[-]	1.22	1.22	1.22	1.22	1.09
		C40/50	[-]	1.41	1.41	1.41	1.41	1.16
		C50/60	[-]	1.58	1.58	1.58	1.58	1.22
$N_{Rk,p,cr}$	Characteristic resistance in cracked concrete:		[kN]	8.5	14	19	--[1)]	--[1)]
ψ_c	Increasing factor for $N^0_{Rk,p}$:	C30/37	[-]	1.01	1.00	1.09	1.09	1.17
		C40/50	[-]	1.02	1.00	1.15	1.16	1.32
		C50/60	[-]	1.02	1.00	1.20	1.22	1.44
γ_{Ins}	Installation safety factor:		[-]	1.0	1.0	1.2	1.2	1.2
Tension loads: concrete cone and splitting failure								
h_{ef}	Effective embedment depth:		[mm]	48	60	70	85	100
$k_{ucr,N}$	Factor for uncracked concrete:		[-]	11.0				
$k_{cr,N}$	Factor for cracked concrete:		[-]	7,7				
γ_{Ins}	Installation safety factor:		[-]	1.0	1.0	1.2	1.2	1.2
$S_{cr,N}$	Concrete cone failure:		[mm]	3 x h_{ef}				
$C_{cr,N}$			[mm]	1.5 x h_{ef}				
$S_{cr,sp}$	Splitting failure:		[mm]	164	204	238	290	380
$C_{cr,sp}$			[mm]	82	102	119	145	190

1) Pull out failure is not decisive

Table C6 Essential characteristics under static or quasi-static shear loads of design method A according to EN 1992-4 for CA-X/X anchor

Essential characteristics under static or quasi-static shear loads according to design method A			Performances				
			M8	M10	M12	M16	M20
Shear loads: steel failure without lever arm							
$V_{Rk,s}$	Characteristic resistance:	[kN]	11.9	18.9	27.4	55.0	85.9
k_7	Ductility factor:	[-]	1.00				
γ_{Ms}	Partial safety factor:	[-]	1.25	1.25	1.25	1.25	1.25
Shear loads: steel failure with lever arm							
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	26.2	52.3	91.7	233.1	454.3
γ_{Ms}	Partial safety factor:	[-]	1.25	1.25	1.25	1.25	1.25
Shear loads: concrete pryout failure							
k_8	Pryout factor:	[-]	1	2	2	2	2
γ_{Ins}	Installation safety factor:	[-]	1.00				
Shear loads: concrete edge failure							
l_f	Effective length of anchor under shear loads:	[mm]	48	60	70	85	100
d_{nom}	Outside anchor diameter:	[mm]	8	10	12	16	20
γ_{Ins}	Installation safety factor:	[-]	1.00				

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Table C7: Displacements under tension loads for CA-Z/X, CA-H/X, CA-Z/H, CA-X/X anchors

Displacements under tension loads			Performances					
			M8	M10	M12	M16	M20	M24
CA-Z/X anchor								
N	Service tension load:	[kN]	2.5	4.3	6.3	10.4	13.9	18.0
δ_{N0}	Short term displacement:	[mm]	1.1	0.7	1.0	0.4	1.6	0.4
$\delta_{N\infty}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	2.0
CA-H/X anchor								
N	Service tension load:	[kN]	2.5	4.3	6.3	10.4	13.9	--
δ_{N0}	Short term displacement:	[mm]	1.0	1.1	0.9	1.5	1.2	--
$\delta_{N\infty}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	--
CA-Z/H anchor								
N	Service tension load:	[kN]	2.5	4.3	7.6	11.9	14.3	--
δ_{N0}	Short term displacement:	[mm]	1.0	1.1	0.9	1.5	1.3	--
$\delta_{N\infty}$	Long term displacement:	[mm]	1.6	1.6	1.6	1.6	1.6	--
CA-X/X anchor								
N	Service tension load in non cracked concrete:	[kN]	5.7	7.6	8.7	15.3	19.5	--
δ_{N0}	Short term displacement:	[mm]	1.4	1.4	1.4	1.8	1.8	--
$\delta_{N\infty}$	Long term displacement:	[mm]	1.9	1.9	1.9	1.9	1.9	--
CA-X/X anchor								
N	Service tension load in cracked cocnrete:	[kN]	4.0	6.7	7.5	10.7	13.7	--
δ_{N0}	Short term displacement:	[mm]	1.2	1.3	1.3	1.3	1.3	--
$\delta_{N\infty}$	Long term displacement:	[mm]	1.7	1.7	1.7	1.7	1.7	--

Table C8: Displacements under shear load for CA-Z/X, CA-H/X, CA-Z/H, CA-X/X anchors

Displacements under shear loads			Performances					
			M8	M10	M12	M16	M20	M24
CA-Z/X anchor								
V	Service shear load:	[kN]	4.9	6.8	8.5	15.1	24.6	33.6
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	1.4
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	2.1
CA-H/X anchor								
V	Service shear load:	[kN]	4.9	6.8	8.5	15.1	24.6	-
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	--
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	--
CA-Z/H anchor								
V	Service shear load:	[kN]	4.9	6.8	8.5	15.1	24.6	--
δ_{V0}	Short term displacement:	[mm]	1.0	1.5	1.8	1.9	3.1	--
$\delta_{V\infty}$	Long term displacement:	[mm]	1.5	2.3	2.7	2.9	4.7	--
CA-X/X anchor								
V	Service shear load:	[kN]	6.8	10.8	15.7	31.4	46.9	--
δ_{V0}	Short term displacement:	[mm]	1.9	1.6	1.6	2.2	2.2	--
$\delta_{V\infty}$	Long term displacement:	[mm]	2.4	2.4	2.4	3.3	3.3	--

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Table C12: Essential characteristics under fire exposure CA-X/X anchor

Essential characteristics under fire exposure				Performances				
				M8	M10	M12	M16	M20
Steel failure								
$N_{Rk,s,fi}$	Characteristic tension resistance:	R30	[kN]	0,7	1,5	2,5	4,7	7,4
		R60	[kN]	0,6	1,2	2,1	3,9	6,1
		R90	[kN]	0,4	0,9	1,7	3,1	4,9
		R120	[kN]	0,4	0,8	1,3	2,5	3,9
$V_{Rk,s,fi}$	Characteristic shear resistance:	R30	[kN]	0,7	1,5	2,5	4,7	7,4
		R60	[kN]	0,6	1,2	2,1	3,9	6,1
		R90	[kN]	0,4	0,9	1,7	3,1	4,9
		R120	[kN]	0,4	0,8	1,3	2,5	3,9
$M^0_{Rk,s,fi}$	Characteristic bending resistance:	R30	[Nm]	0,7	1,9	3,9	10,0	19,5
		R60	[Nm]	0,6	1,5	3,3	8,3	16,2
		R90	[Nm]	0,4	1,2	2,6	6,7	13,0
		R120	[Nm]	0,4	1,0	2,1	5,3	10,4
Pull out failure								
$N_{Rk,p,fi}$	Characteristic resistance:	R30 R60 R90	[kN]	2,1	3,5	4,8	--[1]	--[1]
		R120	[kN]	1,7	2,8	3,8	--[1]	--[1]
Concrete cone failure [2]								
$N_{Rk,c,fi}$	Characteristic resistance:	R30 R60 R90	[kN]	2.7	4,8	7,1	11,5	17,2
		R120	[kN]	2,2	43,8	5,6	9,2	13,8
$S_{cr,N,fi}$	Critical spacing:	R30 to R120	[mm]	4 x h_{ef}				
$S_{min,fi}$	Minimum spacing:	R30 to R120	[mm]	42	47	57	75	100
$c_{cr,N,fi}$	Critical edge distance:	R30 to R120	[mm]	2 x h_{ef}				
$c_{min,fi}$	Minimum edge distance:	R30 to R120	[mm]	c_{min} = 2 x h_{ef}; if fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm and ≥ 2 x h_{ef}				
Concrete pry out failure								
k_8	Pryout factor:	R30 to R120	[-]	1	2	2	2	2

[1] Pull out failure is not decisive
[2] As a rule, splitting failure can be neglected since cracked concrete and reinforcement is assumed.
In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{m,fi}$ = 1,0 is recommended

7. **The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point *6***

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 3.

Signed by:

Chwaszczyno, 12.04.2022

R&D Director

Janusz Kabała

Dyrektor Działu Rozwoju Produktów

Janusz Kabała