

Declaration of Performance

No. **DPGEB1006** v2.1

1. Unique identification code of the product-type: **MA Green Plus**

2. Intended uses:

Intended use of the construction product according to ETA 16/0596	
Generic type:	Bonded injection type anchor for use in non-cracked concrete
Anchorage subject to:	Static and quasi-static loads: threaded rod M8, M10, M12, M16, M20, M24
Base materials:	<ul style="list-style-type: none"> - Reinforced or unreinforced normal weight concrete according to EN 206-1:2000 - Strength class C20/25 to C50/60 according to EN 206-1:2000 - Non-cracked concrete
Service temperature range:	I: -40 °C to +40 °C (max. short term temperature +40 °C, max. long term temperature +24 °C) II: -40 °C to +80 °C (max. short term temperature +80 °C, max. long term temperature +50 °C)
Environmental conditions:	<ul style="list-style-type: none"> - Elements made of zinc coated or hot-dip galvanized steel, class 5.8 or 8.8 dry internal conditions - Elements made of stainless steel A2-70, A4-70 or A4-80 dry internal conditions, external atmospheric exposure (including industrial and marine environment) or exposure to permanently damp internal conditions if no particular aggressive conditions exist - Elements made of high corrosion resistant steel, property class 70 dry internal conditions, external atmospheric exposure, permanently damp internal conditions or in other particular aggressive conditions, e.g. permanent, alternating immersion in seawater, splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used)
Installation:	1: Dry or wet concrete Perforation by hammer drilling or compressed air drill mode Overhead installation is allowed Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on job site

Intended use of the construction product according to ETA 16/0595	
Generic type:	Bonded injection type anchor for use in masonry
Anchorage subject to:	Static and quasi-static loads
Base materials:	Anchor rod in solid masonry with or without plastic sieve sleeve Internal threaded socket in solid masonry with plastic sieve sleeve Anchor rod in hollow or perforated masonry with plastic sieve sleeve Internal threaded socket in hollow or perforated masonry with plastic sieve sleeve threaded rod M8, M10, M12
Service temperature range:	-40 °C to +40 °C (max. short term temperature +40 °C, max. long term temperature +24 °C)
Environmental conditions:	<ul style="list-style-type: none"> - Elements made of zinc coated, hot-dip galvanized or zinc diffusion coated steel, class 5.8, 8.8 or 10.9 - Elements made of stainless steel A2-70, A4-70 or A4-80 - Elements made of high corrosion resistant steel dry internal conditions

Intended use of the construction product according to ETA 16/0595					
Use categories	Base material				
	b: solid masonry				
		type acc. to EN 771	L/W/H [mm]	min. density ρ [kg/dm³]	min. compr. strength f_b [N/mm²]
	b1. solid clay brick	MZ 12-2,0-NF	240/116/71	2.0	12
	b2. solid calcium silicate brick	KS 12-2,0-NF	240/115/70	2.0	12
	c: hollow or perforated masonry				
		type acc. to EN 771	L/W/H [mm]	min. density ρ [kg/dm³]	min. compr. strength f_b [N/mm²]
	c1. hollow clay brick	HLZ 12-1,0-2DF	235/112/115	1.0	12
	c2. hollow clay brick	HLZW 6-0,7-8DF	250/240/240	0.8	6
	c3. hollow calcium silicate brick	KSL 12-1,4-3DF	240/175/113	1.4	12
	c4. hollow calcium silicate brick	KSL 12-1,4-8DF	250/240/237	1.4	12
	c5. lightweight concrete hollow block	HBL 2-0,45-10DF	250/300/248	0.45	2
	c6. lightweight concrete hollow block	HBL 4-0,7-8DF	250/240/248	0.7	4
	c7. concrete masonry unit	HBN 4-12DF	370/240/238	1.2	4
	Installation and use				
d/d: Installation and use in structures subject to dry, internal conditions					
w/d: Installation in dry or wet substrate and use in structures subject to dry, internal conditions					

3. Manufacturer: **G&B Fissaggi S.r.l.** C.so Savona 22, Villastellone (TO), Italy

5. System of AVCP: 1

6b.

European Assessment Document: ETAG 001 Part 1 and Part 5, edition 2013, used as EAD

European Technical Assessment: ETA 16/0596

Technical Assessment Body: TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.

Notified body: 1020 TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.

European Assessment Document: ETAG 029, edition 2013, used as EAD

European Technical Assessment: ETA 16/0595

Technical Assessment Body: TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.

Notified body: 1020 TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.

7. Declared performances:

Declared performances according to ETAG 001:2013 Part 1 and Part 5, ETA 16/0596 (Design method Technical Report TR 029 or CEN/TS 1992-4:2009)

Threaded rod diameter			M8	M10	M12	M16	M20	M24
Essential characteristics			Performance					
<i>Installation parameters</i>								
d	Nominal diameter of bar	[mm]	8	10	12	16	20	24
d ₀	Nominal diameter of drill bit	[mm]	10	12	14	18	22	28
d _{fix}	Diameter of clearance hole in the fixture	[mm]	9	12	14	18	22	26
h _{ef,min}	Minimum effective anchorage depth	[mm]	64	80	96	128	160	192
h _{ef,max}	Maximum effective anchorage depth	[mm]	96	120	144	192	240	288

Threaded rod diameter			M8	M10	M12	M16	M20	M24
Essential characteristics			Performance					
h_1	Depth of the drilling hole	[mm]	h_{ef}					
h_{min}	Minimum thickness of the concrete member	[mm]	$h_{ef} + 30 \geq 100$				$h_{ef} + 2d_0$	
T_{inst}	Maximum installation torque	[Nm]	10	20	40	80	150	200
t_{fix}	Fixable thickness	[mm]	0 to 1500					
s_{min}	Minimum spacing	[mm]	50	60	70	95	120	145
c_{min}	Minimum edge distance	[mm]	50	60	70	95	120	145
<i>Tension steel failure mode</i>								
$N_{Rk,s}$	Characteristic tension resistance of steel	[kN]	$A_s \times f_{uk}$					
<i>Combined pull-out and concrete failure mode</i>								
$\tau_{Rk,ucr}$	Characteristic bond resistance, temperature range I, dry and wet concrete	[N/mm ²]	8.0	7.0	7.0	7.0	7.0	6.0
$\tau_{Rk,ucr}$	Characteristic bond resistance, temperature range II, dry and wet concrete	[N/mm ²]	6.5	6.0	6.0	6.0	6.0	6.0
$\psi_{c,C25/30}$	Increasing factor for concrete C25/30	[-]	1.04					
$\psi_{c,C30/37}$	Increasing factor for concrete C30/37	[-]	1.08					
$\psi_{c,C35/45}$	Increasing factor for concrete C35/45	[-]	1.13					
$\psi_{c,C40/50}$	Increasing factor for concrete C40/50	[-]	1.15					
$\psi_{c,C45/55}$	Increasing factor for concrete C45/55	[-]	1.17					
$\psi_{c,C50/60}$	Increasing factor for concrete C50/60	[-]	1.19					
k_8	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.2.3	[-]	10.1					
<i>Concrete cone failure mode</i>								
k_{ucr}	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.3.1	[-]	10.1					
$s_{cr,Np}$	Critical spacing	[mm]	$3.0 h_{ef}$					
$c_{cr,Np}$	Critical edge distance	[mm]	$1.5 h_{ef}$					
<i>Splitting failure mode</i>								
$s_{cr,sp}$	Critical spacing	[mm]	$2 c_{cr,sp}$					
$c_{cr,sp}$	Critical edge distance	[mm]	$2.0 h_{ef}$			$1.5 h_{ef}$		
<i>Installation safety factor</i>								
γ_{inst}	Safety factor, dry and wet concrete	[-]	1.0					
<i>Shear steel failure mode without lever arms</i>								
$V_{Rk,s}$	Characteristic shear resistance of steel	[kN]	$0.5 \times A_s \times f_{uk}$					
k_2	Ductility factor acc. to CEN/TS 1992-4-5 sect. 6.3.2.1	[-]	0.8					
<i>Shear steel failure mode with lever arm</i>								
$M^0_{Rk,s}$	Characteristic bending resistance of steel	[Nm]	$1.2 \times W_{el} \times f_{uk}$					
<i>Concrete pry-out failure mode</i>								
k / k_3	Factor in eq. (5.7) of TR029 / in eq. (27) of CEN/TS 1992-4-5 sect. 6.3.3	[-]	2.0					
γ_{inst}	Installation safety factor	[-]	1.0					
<i>Concrete edge failure mode</i>								
l_f	Effective length of anchor	[mm]	$\min(h_{ef}, 8 d_{nom})$					
d_{nom}	Outside diameter of anchor	[mm]	8	10	12	16	20	24
γ_{inst}	Installation safety factor	[-]	1.0					

Threaded rod diameter			M8	M10	M12	M16	M20	M24
Essential characteristics			Performance					
<i>Displacement on tension load, non-cracked concrete C20/25</i>								
N	Service tension load	[kN]	6.3	6.3	9.9	19.8	29.8	37.7
δ_{N0}	Short term displacement under tension load	[mm]	0.1	0.1	0.2	0.5	0.6	0.8
$\delta_{N\infty}$	Long term displacement under tension load	[mm]	0.4	0.4	0.4	0.4	0.4	0.4
<i>Displacement on shear load, non-cracked concrete C20/25</i>								
V	Service shear load	[kN]	5.2	8.3	12.0	22.4	35.0	50.4
δ_{V0}	Short term displacement under shear load	[mm]	0.1	0.2	0.3	0.5	0.8	0.9
$\delta_{V\infty}$	Long term displacement under shear load	[mm]	0.2	0.3	0.5	0.8	1.2	1.4

Declared performances according to ETAG 029:2013, ETA 16/0595 (Design method A - ETAG 029 Annex C)

Threaded rod diameter			M8	M10	M12	
Essential characteristics			Performance			
<i>Installation parameters</i>						
Anchor rod in solid masonry without sleeve						
d_0	Nominal diameter of drill bit	[mm]	15	15	20	
h_{ef}	Effective anchorage depth	[mm]	85	85	85	
Anchor rod in solid and hollow or perforated masonry with sleeve						
d_s	Sleeve diameter	[mm]	15 or 16	15 or 16	20	
l_s	Sleeve length	[mm]	85	85	85	
d_0	Nominal diameter of drill bit	[mm]	15 or 16	15 or 16	20	
h_{ef}	Effective anchorage depth	[mm]	85	85	85	
h_{nom}	Installation depth of sleeve	[mm]	85	85	85	
Internal threaded socket in solid and hollow or perforated masonry with sleeve						
d_t	Internal threaded socket diameter	[mm]	12	14	16	
l_t	Internal threaded socket length	[mm]	80	80	80	
d_s	Sleeve diameter	[mm]	15 or 16	20	20	
l_s	Sleeve length	[mm]	85	85	85	
d_0	Nominal diameter of drill bit	[mm]	15 or 16	20	20	
h_{ef}	Effective anchorage depth	[mm]	80	80	80	
h_{nom}	Installation depth of sleeve	[mm]	85	85	85	
Other installation parameters						
d_{fix}	Diameter of clearance hole in the fixture	[mm]	9	12	14	
h_1	Depth of the drilling hole	[mm]	90	90	90	
T_{inst}	Maximum installation torque	[Nm]	2	2	2	
<i>Edge distances and spacings – anchor rod</i>						
C_{min} C_{cr}	Minimum and critical edge distance	b1 brick	[mm]	128	128	128
		b2 brick	[mm]	128	128	128
		c1 brick	[mm]	100	100	120
		c2 brick	[mm]	100	100	120
		c3 brick	[mm]	100	100	120
		c4 brick	[mm]	100	100	120
		c5 brick	[mm]	100	100	NPD
		c6 brick	[mm]	100	100	120
		c7 brick	[mm]	100	100	120

Threaded rod diameter				M8	M10	M12
Essential characteristics				Performance		
S _{min,II} S _{cr,II}	Minimum and critical spacing, parallel to horizontal joint	b1 brick	[mm]	255	255	255
		b2 brick	[mm]	255	255	255
		c1 brick	[mm]	235	235	235
		c2 brick	[mm]	250	250	250
		c3 brick	[mm]	240	240	240
		c4 brick	[mm]	250	250	250
		c5 brick	[mm]	250	250	NPD
		c6 brick	[mm]	250	250	250
		c7 brick	[mm]	370	370	370
S _{min,I} S _{cr,I}	Minimum and critical spacing, perpendicular to horizontal joint	b1 brick	[mm]	255	255	255
		b2 brick	[mm]	255	255	255
		c1 brick	[mm]	115	115	115
		c2 brick	[mm]	240	240	240
		c3 brick	[mm]	113	113	113
		c4 brick	[mm]	237	237	237
		c5 brick	[mm]	248	248	NPD
		c6 brick	[mm]	248	248	248
		c7 brick	[mm]	238	238	238
<i>Edge distances and spacings – internal threaded socket</i>						
C _{min} C _{cr}	Minimum and critical edge distance	b1 brick	[mm]	128	128	128
		b2 brick	[mm]	128	128	128
		c1 brick	[mm]	100	120	120
		c2 brick	[mm]	100	120	120
		c3 brick	[mm]	100	120	120
		c4 brick	[mm]	NPD	120	120
		c5 brick	[mm]	100	120	120
		c6 brick	[mm]	NPD	120	120
		c7 brick	[mm]	100	120	120
S _{min,II} S _{cr,II}	Minimum and critical spacing, parallel to horizontal joint	b1 brick	[mm]	255	255	255
		b2 brick	[mm]	255	255	255
		c1 brick	[mm]	235	235	235
		c2 brick	[mm]	250	250	250
		c3 brick	[mm]	240	240	240
		c4 brick	[mm]	NPD	250	250
		c5 brick	[mm]	250	250	250
		c6 brick	[mm]	NPD	250	250
		c7 brick	[mm]	370	370	370

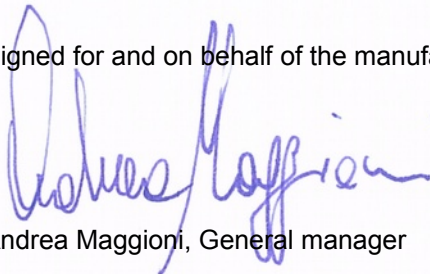
Threaded rod diameter				M8	M10	M12
Essential characteristics				Performance		
S _{min,⊥} S _{cr,⊥}	Minimum and critical spacing, perpendicular to horizontal joint	b1 brick	[mm]	255	255	255
		b2 brick	[mm]	255	255	255
		c1 brick	[mm]	115	115	115
		c2 brick	[mm]	240	240	240
		c3 brick	[mm]	113	113	113
		c4 brick	[mm]	NPD	237	237
		c5 brick	[mm]	248	248	248
		c6 brick	[mm]	NPD	248	248
		c7 brick	[mm]	238	238	238
<i>Tension and shear resistance</i>						
N _{Rk} V _{Rk}	Characteristic resistance for anchor rods under tension and shear loading	b1 brick	[kN]	1.5	1.5	3.0
		b2 brick	[kN]	0.75	0.9	1.5
		c1 brick	[kN]	2.5	2.0	2.0
		c2 brick	[kN]	1.2	1.2	0.9
		c3 brick	[kN]	0.75	1.2	0.5
		c4 brick	[kN]	0.75	1.2	0.5
		c5 brick	[kN]	0.6	0.3	NPD
		c6 brick	[kN]	0.6	1.5	1.2
		c7 brick	[kN]	2.5	1.5	2.5
N _{Rk} V _{Rk}	Characteristic resistance for internal threaded socket under tension and shear loading	b1 brick	[kN]	2.0	3.0	4.0
		b2 brick	[kN]	2.0	1.5	0.9
		c1 brick	[kN]	1.5	2.5	2.5
		c2 brick	[kN]	0.9	1.5	0.6
		c3 brick	[kN]	0.6	0.75	0.9
		c4 brick	[kN]	NPD	0.75	0.4
		c5 brick	[kN]	0.5	0.3	0.75
		c6 brick	[kN]	NPD	0.4	0.6
		c7 brick	[kN]	0.6	1.2	0.9
M _{Rk,s}	Characteristic bending resistance, steel grade 5.8		[kN]	19	37	66
	Characteristic bending resistance, steel grade 8.8		[kN]	30	60	105
	Characteristic bending resistance, steel grade 10.9		[kN]	37	75	131
	Characteristic bending resistance, stainless steel and high corrosion resistant steel grade 70		[kN]	26	52	92
	Characteristic bending resistance, stainless steel grade 80		[kN]	30	60	105
<i>Displacement on tension load</i>						
N	Service tension load		[kN]	N _{Rk} / (1.4 · γ _M)		
δ _{N0}	Short term displacement under tension load	solid bricks	[mm]	0.6		
		hollow or perforated bricks		0.14		
δ _{N∞}	Long term displacement under tension load	solid bricks	[mm]	1.2		
		hollow or perforated bricks		0.28		

Threaded rod diameter			M8	M10	M12
Essential characteristics			Performance		
<i>Displacement on shear load</i>					
V	Service shear load		[kN]	$V_{RK}/1.4 \gamma_M$	
δ_{V0}	Short term displacement under shear load ¹	solid bricks	[mm]	1.0	
		hollow or perforated bricks		1.0	
$\delta_{V\infty}$	Long term displacement under shear load ¹	solid bricks	[mm]	1.5	
		hollow or perforated bricks		1.5	
<i>β-factor for job site tests according to ETAG 029, Annex B</i>					
β	β -factor	b1 brick	[-]	0.48	
		b2 brick	[-]	0.26	
		c1 brick	[-]	0.62	
		c2 brick	[-]	0.43	
		c3 brick	[-]	0.28	
		c4 brick	[-]	0.22	
		c5 brick	[-]	0.42	
		c6 brick	[-]	0.36	
		c7 brick	[-]	0.60	

¹ the hole gap between bolt and fixture shall be considered additionally

The performance of the product identified above is in conformity with the set of declared performances. 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:



Andrea Maggioni, General manager

Villastellone, 30 November 2016



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