

Declaration of Performance

No. **DPGEB1009 v3**

1. Unique identification code of the product-type: **Gebofix EPO PLUS RE**

2. Intended uses:

Intended use of the construction product according to ETA 17/0347	
Generic type:	Bonded injection type anchor for use in non-cracked and cracked concrete
Anchorage subject to:	Static and quasi-static loads: threaded rod M8, M10, M12, M16, M20, M24, M27, M30 reinforcing bar Ø8, Ø10, Ø12, Ø16, Ø20, Ø25, Ø32
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 threaded rod M8, M10, M12, M16, M20, M24, M27, M30 reinforcing bar Ø8, Ø10, Ø12, Ø16, Ø20, Ø25, Ø32 - Cracked concrete threaded rod M12, M16, M20, M24, M27, M30 reinforcing bar Ø12, Ø16, Ø20, Ø25, Ø32
Service temperature range:	I: -40 °C to +40 °C (max. short term temperature +40 °C and max. long term temperature +24 °C) II: -40 °C to +60 °C (max. short term temperature +60 °C and max. long term temperature +43 °C) III: -40 °C to +72 °C (max. short term temperature +72 °C and max. long term temperature +43 °C)
Environmental conditions:	<ul style="list-style-type: none"> - Elements made of zinc coated or hot-dip galvanized steel, class 4.6, 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 2: Flooded holes Perforation by hammer drilling 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 17/0368	
Generic type:	Injection system for post-installed connections of reinforcing bars in existing structures
Anchorage subject to:	Static and quasi-static loads, reinforcing bar Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32, Ø40
Base materials:	<ul style="list-style-type: none"> - Reinforced or unreinforced normal weight concrete according to EN 206-1:2000 - Strength class C12/15 to C50/60 according to EN 206-1:2000 - Non-carbonated concrete - Maximum chloride content 0.40% (CL 0.40) according to EN 206-1:2000

Intended use of the construction product according to ETA 17/0368	
Service temperature range:	-40 °C to +80 °C (max. short term temperature +80 °C and max. long term temperature +50 °C)
Installation:	Dry or wet concrete Perforation by hammer drilling, compressed air drilling or diamond core drilling. The installation of post-installed rebars shall be done only by suitable trained installer and under supervision on site. The conditions under which an installer may be considered as suitable trained and the conditions for supervision on site are up to the Member States in which the installation is done. Check the position of the existing rebars.

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

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 17/0347

European Technical Assessment: ETA 17/0368

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 17/0347 (Design method Technical Report TR 029)

Threaded rod diameter			M8	M10	M12	M16	M20	M24	M27	M30
Essential characteristics			Performance							
Installation parameters										
d	Nominal diameter of bar	[mm]	8	10	12	16	20	24	27	30
d ₀	Hole diameter	[mm]	10	12	14	18	22	26	30	35
d _{fix}	Diameter of clearance hole in the fixture	[mm]	9	12	14	18	22	26	30	33
h _{ef,min}	Minimum effective anchorage depth	[mm]	60	60	70	80	90	96	108	120
h _{ef,max}	Maximum effective anchorage depth	[mm]	160	200	240	320	400	480	540	600
h ₁	Depth of the drilling hole	[mm]	h _{ef}							
h _{min}	Minimum thickness of the concrete member	[mm]	h _{ef} + 30 ≥ 100			h _{ef} + 2d ₀				
T _{inst}	Maximum installation torque	[Nm]	10	20	40	80	120	160	180	200
t _{fix}	Thickness of fixture	[mm]	0 to 1500							
s _{min}	Minimum spacing	[mm]	max (h _{ef} /2; 5d)							
c _{min}	Minimum edge distance	[mm]	max (h _{ef} /2; 5d)							
Tension steel failure mode										
N _{Rk,s}	Characteristic tension resistance of steel, class 4.6	[kN]	15	23	34	63	98	141	184	224
N _{Rk,s}	Characteristic tension resistance of steel, class 5.8	[kN]	18	29	42	78	122	176	230	280
N _{Rk,s}	Characteristic tension resistance of steel, class 8.8	[kN]	29	46	67	125	196	282	368	449
N _{Rk,s}	Characteristic tension resistance of steel, A2, A4 and HCR stainless steel	[kN]	26	41	59	110	171	247	321	392

Threaded rod diameter					M8	M10	M12	M16	M20	M24	M27	M30
Essential characteristics					Performance							
Combined pull-out and concrete failure mode												
Characteristic bond resistance												
non-cracked concrete	temp. I	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	15	15	15	12	12	12	11	9.5
		flooded holes	$\tau_{Rk,ucr}$	[N/mm ²]	15	14	13	10	9.5	8.5	7.5	7.0
	temp. II	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	9.5	9.5	9.0	8.5	8.0	7.5	7.5	7.5
		flooded holes	$\tau_{Rk,ucr}$	[N/mm ²]	9.5	9.5	9.0	8.5	7.5	7.0	6.5	6.0
	temp. III	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	8.5	8.5	8.0	7.5	7.0	7.0	6.5	6.5
		flooded holes	$\tau_{Rk,ucr}$	[N/mm ²]	8.5	8.5	8.0	7.5	7.0	6.0	5.5	5.5
cracked concrete	temp. I	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	NPD		7.5	6.5	6.0	5.5	5.5	5.5
		flooded holes	$\tau_{Rk,cr}$	[N/mm ²]	NPD		7.5	6.0	5.0	4.5	4.0	4.0
	temp. II	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	NPD		4.5	4.0	3.5	3.5	3.5	3.5
		flooded holes	$\tau_{Rk,cr}$	[N/mm ²]	NPD		4.5	4.0	3.5	3.5	3.5	3.5
	temp. III	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	NPD		4.0	3.5	3.0	3.0	3.0	3.0
		flooded holes	$\tau_{Rk,cr}$	[N/mm ²]	NPD		4.0	3.5	3.0	3.0	3.0	3.0
$\Psi_{c,C30/37}$	Increasing factor for concrete C30/37			[-]	1.04							
$\Psi_{c,C40/50}$	Increasing factor for concrete C40/50			[-]	1.07							
$\Psi_{c,C50/60}$	Increasing factor for concrete C50/60			[-]	1.09							
k_8	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.2.3 in non-cracked concrete			[-]	10.1							
k_8	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.2.3 in cracked concrete			[-]	NPD		7.2					
Concrete cone failure mode												
k_{ucr}	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.3.1 in non-cracked concrete			[-]	10.1							
k_{cr}	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.3.1 in cracked concrete			[-]	NPD		7.2					
$s_{cr,N}$	Critical spacing			[mm]	3.0 h_{ef}							
$c_{cr,N}$	Critical edge distance			[mm]	1.5 h_{ef}							
Splitting failure mode												
$s_{cr,sp}$	Critical spacing			[mm]	2 $c_{cr,sp}$							
$c_{cr,sp}$	Critical edge distance for $h/h_{ef} \geq 2.0$			[mm]	1.0 h_{ef}							
	Critical edge distance for $2.0 > h/h_{ef} > 1.3$			[mm]	4.6 h_{ef} - 1.8 h							
	Critical edge distance for $h/h_{ef} \leq 1.3$			[mm]	2.26 h_{ef}							
Installation safety factor												
γ_{inst}	Safety factor, dry and wet concrete			[-]	1.0							
	Safety factor, flooded holes			[-]	1.0							

Threaded rod diameter			M8	M10	M12	M16	M20	M24	M27	M30
Essential characteristics			Performance							
Shear steel failure mode without lever arm										
V _{Rk,s}	Characteristic shear resistance of steel, class 4.6	[kN]	7	12	17	31	49	71	92	112
V _{Rk,s}	Characteristic shear resistance of steel, class 5.8	[kN]	9	15	21	39	61	88	115	140
V _{Rk,s}	Characteristic shear resistance of steel, class 8.8	[kN]	15	23	34	63	98	141	184	224
V _{Rk,s}	Characteristic shear resistance of steel, A2, A4 and HCR stainless steel	[kN]	13	20	30	55	86	124	160	196
k ₂	Ductility factor acc. to CEN/TS 1992-4-5 sect. 6.3.2.1	[-]	0.8							
Shear steel failure mode with lever arm										
M ⁰ _{Rk,s}	Characteristic bending resistance of steel, class 4.6	[Nm]	15	30	52	133	260	449	666	900
M ⁰ _{Rk,s}	Characteristic bending resistance of steel, class 5.8	[Nm]	19	37	65	166	324	560	833	1123
M ⁰ _{Rk,s}	Characteristic bending resistance of steel, class 8.8	[Nm]	30	60	105	266	519	896	1333	1797
M ⁰ _{Rk,s}	Characteristic bending resistance of steel, A2, A4 and HCR stainless steel	[Nm]	26	53	92	232	454	784	1165	1574
Concrete pry-out failure mode										
k / k ₃	Factor in eq. (5.7) of TR029 / in eq. (27) of CEN/TS 1992-4-5 sect.. 6.3.3	[mm]	2.0							
γ _{inst}	Installation safety factor	[-]	1.0							
Concrete edge failure mode										
l _f	Effective length of anchor	[mm]	min(h _{ef} ; 8 d)							
d _{nom}	Outside diameter of anchor	[mm]	8	10	12	16	20	24	27	30
γ _{inst}	Installation safety factor	[-]	1.0							
Displacement on tension load, non-cracked concrete										
N	Service tension load	[kN]	11.9	14.3	19.0	23.8	35.7	35.7	45.2	45.2
δ _{N0}	Short term displacement under tension load	[mm]	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5
δ _{N∞}	Long term displacement under tension load	[mm]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Displacement on tension load, cracked concrete										
N	Service tension load	[kN]	NPD		14.3	16.7	23.8	28.6	28.6	28.6
δ _{N0}	Short term displacement under tension load	[mm]	NPD		0.4	0.5	0.5	0.6	0.6	0.7
δ _{N∞}	Long term displacement under tension load	[mm]	NPD		2.0	2.0	2.0	2.0	2.0	2.0
Displacement on shear load, non-cracked and cracked concrete										
V	Service shear load	[kN]	3.5	5.5	8.0	15.0	23.3	33.6	43.7	53.4
δ _{V0}	Short term displacement under shear load	[mm]	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
δ _{V∞}	Long term displacement under shear load	[mm]	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7

Reinforcing bar diameter				Ø8	Ø10	Ø12	Ø16	Ø20	Ø25	Ø32	
Essential characteristics				Performance							
Installation parameters											
d	Nominal diameter of bar		[mm]	8	10	12	16	20	25	32	
d ₀	Hole diameter		[mm]	12	14	16	20	24	32	37	
h _{ef,min}	Minimum effective anchorage depth		[mm]	60	60	70	80	90	100	128	
h _{ef,max}	Maximum effective anchorage depth		[mm]	160	200	240	320	400	500	640	
h ₁	Depth of the drilling hole		[mm]	h _{ef}							
h _{min}	Minimum thickness of the concrete member		[mm]	h _{ef} + 30 ≥ 100			h _{ef} + 2d ₀				
s _{min}	Minimum spacing		[mm]	max(h _{ef} /2; 40)				max(h _{ef} /2; 50)		max(h _{ef} /2; 70)	
c _{min}	Minimum edge distance		[mm]	max(h _{ef} /2; 40)				max(h _{ef} /2; 50)		max(h _{ef} /2; 70)	
Tension steel failure mode											
N _{Rk,s}	Characteristic tension resistance of steel		[kN]	A _s x f _{uk}							
Combined pull-out and concrete failure mode											
Characteristic bond resistance											
non-cracked concrete	temp. I	dry and wet concrete	τ _{Rk,ucr}	[N/mm ²]	13	13	13	12	12	11	8.0
		flooded holes	τ _{Rk,ucr}	[N/mm ²]	13	13	11	9.5	8.5	7.5	6.0
	temp. II	dry and wet concrete	τ _{Rk,ucr}	[N/mm ²]	8.5	8.5	8.0	7.5	7.0	7.0	6.5
		flooded holes	τ _{Rk,ucr}	[N/mm ²]	8.5	8.5	8.0	7.5	7.0	6.0	5.0
	temp. III	dry and wet concrete	τ _{Rk,ucr}	[N/mm ²]	7.5	7.5	7.5	7.0	6.5	6.0	6.0
		flooded holes	τ _{Rk,ucr}	[N/mm ²]	7.5	7.5	7.5	7.0	6.0	5.5	4.5
cracked concrete	temp. I	dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		7.5	6.5	6.0	5.5	5.5
		dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		7.5	6.0	5.0	4.5	4.0
	temp. II	dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		4.5	4.0	3.5	3.5	3.5
		dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		4.5	4.0	3.5	3.5	3.0
	temp. III	dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		4.0	3.5	3.0	3.0	3.0
		dry and wet concrete	τ _{Rk,cr}	[N/mm ²]	NPD		4.0	3.5	3.0	3.0	3.0
ψ _{c,C30/37}	Increasing factor for concrete C30/37		[-]	1.04							
ψ _{c,C40/50}	Increasing factor for concrete C40/50		[-]	1.07							
ψ _{c,C50/60}	Increasing factor for concrete C50/60		[-]	1.09							

Reinforcing bar diameter			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25	Ø32
Essential characteristics			Performance						
k ₈	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.2.3 in non-cracked concrete	[-]	10.1						
k ₈	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.2.3 in cracked concrete	[-]	NPD		7.2				
Concrete cone failure mode									
k _{ucr}	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.3.1 in non-cracked concrete	[-]	10.1						
k _{cr}	Factor acc. to CEN/TS 1992-4-5 sect. 6.2.3.1 in cracked concrete	[-]	NPD		7.2				
s _{cr,N}	Critical spacing	[mm]	3.0 h _{ef}						
c _{cr,N}	Critical edge distance	[mm]	1.5 h _{ef}						
Splitting failure mode									
s _{cr,sp}	Critical spacing	[mm]	2 c _{cr,sp}						
c _{cr,sp}	Critical edge distance for h/h _{ef} ≥ 2.0	[mm]	1.0 h _{ef}						
	Critical edge distance for 2.0 > h/h _{ef} > 1.3	[mm]	4.6 h _{ef} - 1.8 h						
	Critical edge distance for h/h _{ef} ≤ 1.3	[mm]	2.26 h _{ef}						
Installation safety factor									
γ _{inst}	Safety factor, dry and wet concrete	[-]	1.0						
	Safety factor, flooded holes	[-]	1.2						
Shear steel failure mode without lever arm									
V _{Rk,s}	Characteristic shear resistance of steel	[kN]	0.50 · A _s · f _{uk}						
k ₂	Ductility factor acc. to CEN/TS 1992-4-5 sect. 6.3.2.1	[-]	0.8						
Shear steel failure mode with lever arm									
M ⁰ _{Rk,s}	Characteristic bending resistance of steel	[Nm]	1.2 · W _{el} · f _{uk}						
Concrete pry-out failure mode									
k / k ₃	Factor in eq. (5.7) of TR029 / in eq. (27) of CEN/TS 1992-4-5 sect.. 6.3.3	[mm]	2.0						
γ _{inst}	Installation safety factor	[-]	1.0						
Concrete edge failure mode									
l _f	Effective length of anchor	[mm]	min(h _{ef} ; 8 d)						
d _{nom}	Outside diameter of anchor	[mm]	8	10	12	16	20	25	32
γ _{inst}	Installation safety factor	[-]	1,0						
Displacement on tension load, non-cracked concrete									
N	Service tension load	[kN]	7.6	11.9	16.7	28.6	35.7	45.2	66.7
δ _{N0}	Short term displacement under tension load	[mm]	0.3	0.3	0.4	0.4	0.4	0.5	0.5
δ _{N∞}	Long term displacement under tension load	[mm]	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Displacement on tension load, cracked concrete									
N	Service tension load	[kN]	NPD		11.9	19.0	23.8	28.6	35.7
δ _{N0}	Short term displacement under tension load	[mm]	NPD		0.4	0.5	0.5	0.6	0.6

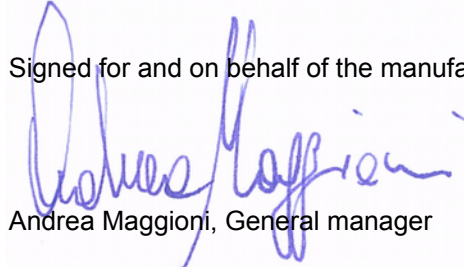
Reinforcing bar diameter			Ø8	Ø10	Ø12	Ø16	Ø20	Ø25	Ø32
$\delta_{N\infty}$	Long term displacement under tension load	[mm]	NPD		2.0	2.0	2.0	2.0	2.0
<i>Displacement on shear load, non-cracked and cracked concrete</i>									
V	Service shear load	[kN]	6.6	10.3	14.8	26.3	41.1	64.3	105.3
δ_{V0}	Short term displacement under shear load	[mm]	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$\delta_{V\infty}$	Long term displacement under shear load	[mm]	3.7	3.7	3.7	3.7	3.7	3.7	3.7

Declared performances according to ETAG 001:2013 Part 1 and Part 5, ETA 17/0368 (Design method EN 1992-1-1:2004)

Reinforcing bar diameter			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø40		
Essential Characteristics			Performance											
Installation parameters														
d _s	Nominal diameter of bar		[mm]	8	10	12	14	16	20	25	28	32	40	
d ₀	Nominal diameter of drill bit		[mm]	12	14	16	18	20	25	32	35	40	55	
min c	Minimum concrete cover	hammer drilling	[mm]	$30 + 0.06 \cdot l_v \geq 2 \cdot d_s$										
		compressed air drilling	[mm]	$50 + 0.08 \cdot l_v$										
		diamond core drilling	[mm]	$50 + 0.08 \cdot l_v$										
l _{b,min}	Minimum anchorage length for good bond conditions		[mm]	113	142	170	198	227	284	354	397	454	851	
l _{0,min}	Minimum lap length for good bond conditions		[mm]	200	200	200	210	240	300	375	420	480	900	
l _{max}	Maximum installation length for good bond conditions		[mm]	400	500	600	700	800	1000	1000	1000	1000	1000	
Bond resistance														
f _{bd}	Design ultimate bond resistance for hammer drilling methods and good conditions	C12/15	[N/mm ²]	1.6									1.5	
		C16/20	[N/mm ²]	2.0									1.8	
		C20/25	[N/mm ²]	2.3									2.1	
		C25/30	[N/mm ²]	2.7									2.1	
		C30/37	[N/mm ²]	3.0									2.1	
		C35/45	[N/mm ²]	3.4									2.1	
		C40/50	[N/mm ²]	3.7									2.1	
		C45/55	[N/mm ²]	4.0									3.7	2.1
		C50/60	[N/mm ²]	4.3									3.7	2.1
f _{bd}	Design ultimate bond resistance for diamond core drilling methods and good conditions	C12/15	[N/mm ²]	1.6									1.5	
		C16/20	[N/mm ²]	2.0									1.8	
		C20/25	[N/mm ²]	2.3									2.1	
		C25/30	[N/mm ²]	2.7									2.1	
		C30/37	[N/mm ²]	3.0									2.1	
		C35/45	[N/mm ²]	3.4									2.1	
		C40/50	[N/mm ²]	3.7									3.4	2.1
		C45/55	[N/mm ²]	4.0									3.4	2.1
		C50/60	[N/mm ²]	4.3									3.4	2.1

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, 5 May 2017



fissaggi S.r.l.
Corso Savona, n°22
10029 VILLASTELLONE (TO)
Tel. 011 9619433 - Fax 011 9619382

