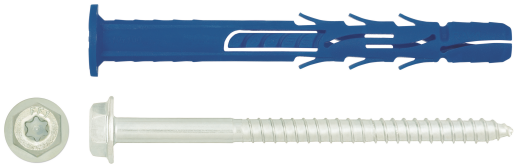
Декларация эксплуатационных свойств
DoP-12/0398-FF1

1. Уникальный идентификационный код продукта:

FF1



Фотография представляет пример данного типа продукта

2. Планируемое применение или применения:

общий тип	Пластмассовые соединители
для применения в	Пластиковые соединители для многоточечных неконструкционных креплений в бетонном и кирпичном основании
опция / категория	ETAG 020
Нагрузка	статическая или квазистатическая
Материалы	Дюбели FF1 представляют собой пластиковые дюбели, состоящие из пластиковой втулки и стального болта. Пластиковые втулки FF1 PP изготовлены из полипропилена, а пластиковые втулки FF1 PA из полиамида. Стальные болты изготовлены из оцинкованной стали или нержавеющей стали.

3. Производитель:

Rawlplug S.A.
ul. Kwidzyńska 6, 51-416 Wrocław, PL
www.rawlplug.com

4. Система оценки и проверки стабильности свойств:

Система 2+

5. Европейский документ оценки:

ETAG 020 Пластиковые соединители для многоточечных неконструкционных креплений в бетонном и кирпичном основании, Часть 1 Общие принципы, Часть 2 Пластиковые соединители для применения в основании из обыкновенного бетона, Часть 3 Пластиковые соединители для применения в кирпичном основании из полнотелых элементов, Часть 4 Пластиковые соединители для применения в кирпичном основании из пустотелых или перфорированных элементов, Часть 5 Пластиковые соединители для применения в основании из автоклавного ячеистого бетона (AAC)
Категории применения: A, B, C, D

6. Европейская техническая оценка:

ETA-12/0398 издание от 2020-06-30

7. Орган, проводящий техническую оценку:

Instytut Techniki Budowlanej

8. Нотифицированный орган:

Instytut Techniki Budowlanej на основании:

- предварительной инспекции завода и заводского производственного контроля
- продолжения надзора, оценки и оценки заводского производственного контроля

выдала сертификат **1488-CPR-0527/Z**

9. Декларируемые потребительские свойства:

Основная характеристика:

Техническая спецификация	**Основные требования согласно CPR**		**Примечания:**
ETA-12/0398	[1]	Механическая прочность и стабильность	Декларируемые свойства на странице 2
	[4]	Безопасность применения	Такие же критерии, как действующие для [1]

Characteristic bending resistance of the screw in concrete and masonry

Anchor diameter		Ø8		Ø10		Ø14	
		carbon steel[1)]	stainless steel	carbon steel[1)]	stainless steel	carbon steel[1)]	stainless steel
Characteristic bending resistance	$M_{Rk,s}$ [Nm]	5,1[3)] 7,1[4)]	7,3	9,2[3)] 12,6[4)] 17,4[5)]	13,1	39,8[3)] 54,9[4)]	56,8
Partial safety factor	γ_{Ms}[2)]	1,61[3)] 1,38[4)]	1,42	1,61[3)] 1,38[4)] 1,25[5)]	1,42	1,61[3)] 1,38[4)]	1,42

[1)] Steel with electroplated zinc coating or steel with zinc flake coating
[2)] In absence of other national regulations
[3)] Type a: $f_{y,k} \geq 260$ MPa, $f_{u,k} \geq 420$ MPa, with "●" on the head marking
[4)] Type b: $f_{y,k} \geq 420$ MPa, $f_{u,k} \geq 580$ MPa
[5)] High-load: $f_{y,k} \geq 640$ MPa, $f_{u,k} \geq 800$ MPa, with "H" on the head marking

Characteristic resistance of the screw for use in concrete, failure of expansion element (screw)

Anchor diameter		Ø8		Ø10		Ø14	
		carbon steel[1)]	stainless steel	carbon steel[1)]	stainless steel	carbon steel[1)]	stainless steel
Characteristic tension resistance	$N_{Rk,s}$ [kN]	7,3[3)] 10,0[4)]	10,4	10,7[3)] 14,8[4)] 20,4[5)]	15,3	28,5[3)] 39,4[4)]	40,7
Partial safety factor	γ_{Ms}[2)]	1,94[3)] 1,66[4)]	1,71	1,94[3)] 1,66[4)] 1,5[5)]	1,71	1,94[3)] 1,66[4)]	1,71
Characteristic shear resistance	$V_{Rk,s}$ [kN]	3,6[3)] 5,0[4)]	5,2	5,4[3)] 7,4[4)] 10,2[5)]	7,7	14,3[3)] 19,7[4)]	20,4
Partial safety factor	γ_{Ms}[2)]	1,61[3)] 1,38[4)]	1,42	1,61[3)] 1,38[4)] 1,25[5)]	1,42	1,61[3)] 1,38[4)]	1,42

[1)] Steel with electroplated zinc coating or steel with zinc flake coating
[2)] In absence of other national regulations
[3)] Type a: $f_{y,k} \geq 260$ MPa, $f_{u,k} \geq 420$ MPa, with "●" on the head marking
[4)] Type b: $f_{y,k} \geq 420$ MPa, $f_{u,k} \geq 580$ MPa
[5)] High-load: $f_{y,k} \geq 640$ MPa, $f_{u,k} \geq 800$ MPa, with "H" on the head marking

Characteristic resistance for use in cracked and non-cracked concrete, pull-out failure (plastic sleeve); hammer drilling

Anchor diameter		Ø8	Ø10	Ø14
Concrete ≥ C16/20				
Characteristic resistance	$N_{Rk,p}$ [kN]	0,9[1)3)] 2,0[2)3)]	0,9[1)3)] 1,2[1)4)] 2,0[2)3)] 5,5[2)4)]	2,5[1)4)] 5,5[2)4)]
Partial safety factor	γ_{Mc}[5)]	1,8		
Concrete ≥ C12/15				
Characteristic resistance	$N_{Rk,p}$ [kN]	0,6[1)3)] 1,5[2)3)]	0,5[1)3)] 0,9[1)4)] 1,2[2)3)] 4,0[2)4)]	2,0[1)4)] 4,0[2)4)]
Partial safety factor	γ_{Mc}[5)]	1,8		

Valid for all ranges of temperatures according to Annex B1
[1)] FF1 PP; [2)] FF1 PA [3)] h_{nom} = 50 mm; [4)] h_{nom} = 70 mm
[5)] In absence of other national regulations

Displacements under tension and shear loading in concrete[5)6)]

Anchor diameter	Tension load			Shear load		
	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
Ø8	0,36[1)3)] 0,79[2)3)]	0,95[1)3)] 1,11[2)3)]	1,90[1)3)] 2,22[2)3)]	0,36[1)3)] 0,79[2)3)]	0,18	0,27
Ø10	0,36[1)3)] 0,47[1)4)] 0,79[2)3)] 3,37[2)4)]	0,38[1)3)] 0,55[1)4)] 0,67[2)3)] 1,95[2)4)]	0,76[1)3)] 1,10[1)4)] 1,34[2)3)] 3,90[2)4)]	0,36[1)3)] 0,47[1)4)] 0,79[2)3)] 3,37[2)4)]	0,11	0,16
Ø14	0,99[1)4)] 2,18[2)4)]	1,56[1)4)] 1,70[2)4)]	3,12[1)4)] 3,40[2)4)]	0,99[1)4)] 2,18[2)4)]	0,43	0,64

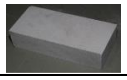
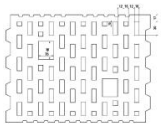
[1)] FF1 PP; [2)] FF1 PA; [3)] h_{nom} = 50 mm; [4)] h_{nom} = 70 mm
[5)] Valid for all ranges of temperatures
[6)] Intermediate values by linear interpolation

Characteristic values F_{Rk} in any load direction under fire exposure in concrete C20/25 to C50/60, no permanent centric tension load and shear load with lever arm

Anchor diameter	Fire resistance class	F_{Rk} [kN]
Ø10[1)2)3)] Ø14[1)2)3)]	R90	0,8

[1)] FF1 PA; [2)] h_{nom} = 50 mm; [3)] h_{nom} = 70 mm

Characteristic resistance F_{Rk} [kN] of FF1-08 anchor in masonry

Base material	Bulk density class [kg/dm³]	Compressive strength class [N/mm²]	Picture	Drill method	F_{Rk} [14] [kN]
Clay brick HD[5]	≥ 1,80	≥ 20		hammer	1,2[1] / 1,5[3] – / –[4] [2]
Sand-lime brick HD[6]	≥ 1,80	≥ 20		hammer	0,75[1] / 1,5[2] – [3] / –[4]
Perforated ceramic brick[7]	≥ 0,80	≥ 15		rotary drilling only	0,5[1] / 0,75[2] – [3] / –[4]
Perforated ceramic brick[8]	≥ 0,80	≥ 15		rotary drilling only	0,3[1] / 0,4[2] –[3] / –[4]
Calcium silicate hollow block[9]	≥ 1,60	≥ 20		rotary drilling only	0,4[1] / 0,5[3] – / –[4] [2]
Hollow lightweight aggregate concrete element[10]	≥ 0,80	≥ 2		rotary drilling only	0,5[1] / 0,9[2] –[3] / –[4]
Perforated ceramic brick[11]	≥ 0,90	≥ 12		rotary drilling only	0,4[1] / 0,6[2] –[3] / –[4]
Perforated ceramic brick[12]	≥ 0,90	≥ 15		rotary drilling only	0,75[1] / 1,2[2] – [3] / –[4]
Autoclaved aerated concrete AAC 2[13]	≥ 0,35	≥ 2	–	rotary drilling only	–[1] / –[2] 0,5[3] / 0,4[4]
Autoclaved aerated concrete AAC 6[13]	≥ 0,65	≥ 6	–	rotary drilling only	–[1] / –[2] 1,2[3] / 0,9[4]
Partial safety factor[15]	γ_{Mm} / γ_{MACC}	2,5 / 2,0			

[1] FF1-08 PP (h_{nom} = 50 mm); [2] FF1-08 PA (h_{nom} = 50 mm); [3] FF1-08 PP (h_{nom} = 70 mm); [4] FF1-08 PA (h_{nom} = 70 mm) [5] According to EN 771-1; [6] According to EN 771-2

[7] For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm

[8] For example perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm

[9] For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm

[10] For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm

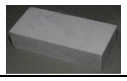
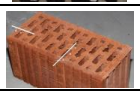
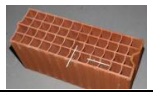
[11] For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm

[12] For example perforated brick HLZ 15 according to DIN 105 and EN 771-1; a = 17 mm [13] According to EN 771-4

[14] Characteristic resistance F_{Rk} for tension, shear or combined tension and shear loading
The characteristic resistance is valid for single plastic anchor or for a group of two or four plastic anchors with a spacing equal or larger than the minimum spacing s_{min} according to table B3 (Annex B4)

[15] Partial safety factor for use in masonry γ_{Mm} = 2,5 and partial safety factor for use in autoclaved aerated concrete γ_{MAAC} = 2,0 in absence of
other national regulations

Characteristic resistance F_{Rk} [kN] of FF1-10 anchor in masonry

Base material	Bulk density class [kg/dm^3]	Compressive strength class [N/mm^2]	Picture	Drill method	$F_{Rk15)}$ [kN]
Clay brick HD[5)]	≥ 1,80	≥ 50		hammer	1,5[1)] / –[2)] 2,5[3)] / 5,0[4)]
Sand-lime brick HD[6)]	≥ 1,80	≥ 30		hammer	1,2[1)] / 1,5[2)] –[3)] / –[4)]
Perforated ceramic brick[7)]	≥ 0,80	≥ 15		rotary drilling only	–[1)] / –[2)] 0,5[3)] / 1,5[4)]
Perforated ceramic brick[8)]	≥ 0,80	≥ 15		rotary drilling only	–[1)] / –[2)] 0,6[3)] / 1,5[4)]
Calcium silicate hollow block[9)]	≥ 1,60	≥ 20		rotary drilling only	–[1)] / –[2)] 0,75[3)] / 3,5[4)]
Hollow lightweight aggregate concrete element[10)]	≥ 0,80	≥ 2		rotary drilling only	–[1)] / –[2)] 0,3[3)] / 0,9[4)]
Perforated ceramic brick[11)]	≥ 0,90	≥ 12		rotary drilling only	–[1)] / –[2)] 0,5[3)] / 0,9[4)]
Perforated ceramic brick[12)]	≥ 0,91	≥ 15		rotary drilling only	–[1)] / –[2)] 0,6[3)] / 0,75[4)]
Hollow ceramic brick[13)]	≥ 0,60	≥ 7,5		rotary drilling only	–[1)] / –[2)] 0,3[3)] / 0,75[4)]
Autoclaved aerated concrete AAC 2[14)]	≥ 0,35	≥ 2		rotary drilling only	–[1)] / –[2)] 0,5[3)] / 0,4[4)]
Autoclaved aerated concrete AAC 6[14)]	≥ 0,65	≥ 6		rotary drilling only	–[1)] / –[2)] 1,2[3)] / 0,9[4)]
Autoclaved aerated concrete AAC 2[14)]	≥ 0,35	≥ 2		punch tool	–[1)] / –[2)] –[3)] / 0,4[4)17)]
Autoclaved aerated concrete AAC 4[14)]	≥ 0,70	≥ 4		punch tool	–[1)] / –[2)] –[3)] / 0,9[4)17)]
Autoclaved aerated concrete AAC 5[14)]	≥ 0,70	≥ 5		punch tool	–[1)] / –[2)] –[3)] / 1,2[4)17)]
Partial safety factor[16)]	γ_{Mm} / γ_{MACC}	2,5 / 2,0			

1) FF1-10 PP (h_{nom} = 50 mm); 2) FF1-10 PA (h_{nom} = 50 mm); 3) FF1-10 PP (h_{nom} = 70 mm); 4) FF1-10 PA (h_{nom} = 70 mm)

5) According to EN 771-1; 6) According to EN 771-2

7) For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm

8) For example perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm

9) For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm

10) For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm

11) For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm

12) For example perforated brick Doppio uni according to EN 771-1; a = 11 mm, b = 24 mm, c = 10 mm

13) For example perforated brick Optibric PV according to EN 771-1; a = 10 mm, b = 39 mm, c = 7, d = 38 mm, e = 6,5 mm [14)]

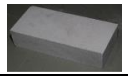
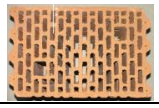
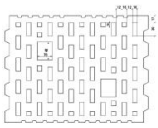
14) According to EN 771-4

15) Characteristic resistance F_{Rk} for tension, shear or combined tension and shear loading
The characteristic resistance is valid for single plastic anchor or for a group of two or four plastic anchors with a spacing equal or larger than the minimum spacing s_{min} according to table B3 (Annex B4)

16) Partial safety factor for use in masonry γ_{Mm} = 2,5 and partial safety factor for use in autoclaved aerated concrete γ_{MAAC} = 2,0 in absence of other national regulations

17) Drill method: punch tool (see Annex A)

Characteristic resistance F_{Rk} [kN] of FF1-14 anchor in masonry

Base material	Bulk density class [kg/dm^3]	Compressive strength class [N/mm^2]	Picture	Drill method	$F_{Rk12)}$ [kN]
Clay brick HD[3)]	≥ 1,80	≥ 20		hammer	4,0[1)] / 4,5[2)]
Sand-lime brick HD[4)]	≥ 1,80	≥ 20		hammer	3,0[1)] / 3,5[2)]
Perforated ceramic brick[5)]	≥ 0,80	≥ 15		rotary drilling only	0,9[1)] / 1,2[2)]
Perforated ceramic brick[6)]	≥ 0,80	≥ 15		rotary drilling only	0,9[1)] / 1,2[2)]
Calcium silicate hollow block[7)]	≥ 1,60	≥ 20		rotary drilling only	0,9[1)] / 1,2[2)]
Hollow lightweight aggregate concrete element[8)]	≥ 0,80	≥ 2		rotary drilling only	1,2[1)] / 1,2[2)]
Perforated ceramic brick[9)]	≥ 0,90	≥ 12		rotary drilling only	1,5[1)] / 0,9[2)]
Perforated ceramic brick[10)]	≥ 0,90	≥ 15		rotary drilling only	1,5[1)] / 1,5[2)]
Autoclaved aerated concrete AAC 2[11)]	≥ 0,35	≥ 2		rotary drilling only	0,75[1)] / 0,6[2)]
Autoclaved aerated concrete AAC 6[11)]	≥ 0,65	≥ 6		rotary drilling only	2,5[1)] / 1,5[2)]
Partial safety factor[13)]	γ_{Mm} / γ_{MACC}	2,5 / 2,0			

[1)] FF1-14 PP (h_{nom} = 70 mm); [2)] FF1-14 PA (h_{nom} = 70 mm)
[3)] According to EN 771-1; [4)] According to EN 771-2
[5)] For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm
[6)] For example perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm
[7)] For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm
[8)] For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm
[9)] For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm
[10)] For example perforated brick HLZ 15 according to DIN 105 and EN 771-1; a = 17 mm [11)] According to EN 771-4
[12)] Characteristic resistance F_{Rk} for tension, shear or combined tension and shear loading
The characteristic resistance is valid for single plastic anchor or for a group of two or four plastic anchors with a spacing equal or larger than the minimum spacing s_{min} according to table B3 (Annex B4)
[13)] Partial safety factor for use in masonry γ_{Mm} = 2,5 and partial safety factor for use in autoclaved aerated concrete γ_{MAAC} = 2,0 in absence of other national regulations

Displacements under tension and shear loading of FF1-08 anchor in masonry

Anchor type	Base material	Tension load			Shear load		
		N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
FF1-08	Clay brick HD[5]	0,34[1] / 0,43[2] – [3] / –[4]	1,13[1] / 0,68[2] – [3] / –[4]	2,26[1] / 1,36[2] – [3] / –[4]	0,34[1] / 0,43[2] – [3] / –[4]	0,28[1] / 0,36[2] – [3] / –[4]	0,42[1] / 0,54[2] – [3] / –[4]
	Sand-lime brick HD[6]	0,21[1] / 0,43[2] – [3] / –[4]	0,48[1] / 1,14[2] – [3] / –[4]	0,96[1] / 2,28[2] – [3] / –[4]	0,21[1] / 0,43[2] – [3] / –[4]	0,17[1] / 0,36[2] – [3] / –[4]	0,26[1] / 0,54[2] – [3] / –[4]
	Perforated ceramic brick[7]	0,14[1] / 0,21[2] – [3] / –[4]	0,64[1] / 0,63[2] – [3] / –[4]	1,28[1] / 1,26[2] – [3] / –[4]	0,14[1] / 0,21[2] – [3] / –[4]	0,12[1] / 0,17[2] – [3] / –[4]	0,18[1] / 0,25[2] – [3] / –[4]
	Perforated ceramic brick[8]	0,09[1] / 0,11[2] – [3] / –[4]	0,37[1] / 0,46[2] – [3] / –[4]	0,74[1] / 0,92[2] – [3] / –[4]	0,09[1] / 0,11[2] – [3] / –[4]	0,08[1] / 0,09[2] – [3] / –[4]	0,12[1] / 0,14[2] – [3] / –[4]
	Calcium silicate hollow block[9]	0,11[1] / 0,14[2] – [3] / –[4]	0,61[1] / 0,65[2] – [3] / –[4]	1,22[1] / 1,30[2] – [3] / –[4]	0,11[1] / 0,14[2] – [3] / –[4]	0,09[1] / 0,12[2] – [3] / –[4]	0,14[1] / 0,18[2] – [3] / –[4]
	Hollow lightweight aggregate concrete element[10]	0,14[1] / 0,26[2] – [3] / –[4]	0,21[1] / 0,42[2] – [3] / –[4]	0,42[1] / 0,84[2] – [3] / –[4]	0,14[1] / 0,26[2] – [3] / –[4]	0,12[1] / 0,22[2] – [3] / –[4]	0,18[1] / 0,33[2] – [3] / –[4]
	Perforated ceramic brick[11]	0,11[1] / 0,17[2] – [3] / –[4]	0,41[1] / 0,41[2] – [3] / –[4]	0,82[1] / 0,82[2] – [3] / –[4]	0,11[1] / 0,17[2] – [3] / –[4]	0,09[1] / 0,14[2] – [3] / –[4]	0,14[1] / 0,21[2] – [3] / –[4]
	Perforated ceramic brick[12]	0,21[1] / 0,34[2] – [3] / –[4]	0,43[1] / 0,87[2] – [3] / –[4]	0,86[1] / 1,74[2] – [3] / –[4]	0,21[1] / 0,34[2] – [3] / –[4]	0,17[1] / 0,28[2] – [3] / –[4]	0,26[1] / 0,42[2] – [3] / –[4]
	Autoclaved aerated concrete AAC 2[13]	–[1] / –[2] 0,18[3] / 0,14[4]	–[1] / –[2] 0,65[3] / 0,52[4]	–[1] / –[2] 1,30[3] / 1,04[4]	–[1] / –[2] 0,18[3] / 0,14[4]	–[1] / –[2] 0,36[3] / 0,28[4]	–[1] / –[2] 0,54[3] / 0,42[4]
	Autoclaved aerated concrete AAC 6[13]	–[1] / –[2] 0,43[3] / 0,32[4]	–[1] / –[2] 1,11[3] / 0,78[4]	–[1] / –[2] 2,22[3] / 1,56[4]	–[1] / –[2] 0,43[3] / 0,32[4]	–[1] / –[2] 0,86[3] / 0,64[4]	–[1] / –[2] 1,29[3] / 0,96[4]

1) FF1-08 PP (h_{nom} = 50 mm)
2) FF1-08 PA (h_{nom} = 50 mm)
3) FF1-08 PP (h_{nom} = 70 mm)
4) FF1-08 PA (h_{nom} = 70 mm)
5) According to EN 771-1
6) According to EN 771-2
7) For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm
8) For example perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm
9) For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm
10) For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm
11) For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm
12) For example perforated brick HLZ 15 according to DIN 105 and EN 771-1; a = 17 mm
13) According to EN 771-4

Displacements under tension and shear loading of FF1-10 anchor in masonry

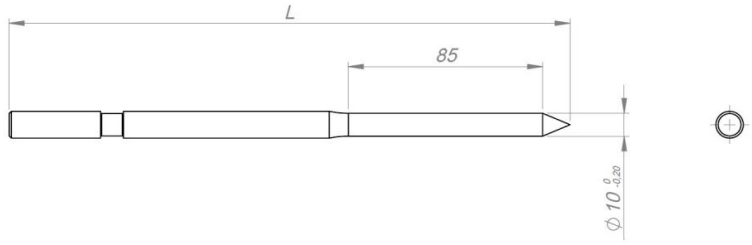
Anchor type	Base material	Tension load			Shear load		
		N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{v0} [mm]	$\delta_{v\infty}$ [mm]
FF1-10	Clay brick HD[5]	0,43[1] / 0,71[2] – [3] / 1,43[4]	0,30[1] / 0,51[2] – [3] / 1,45[4]	0,6[1] / 1,02[2] – [3] / 2,90[4]	0,43[1] / 0,71[2] – [3] / 1,43[4]	0,36[1] / 0,59[2] – [3] / 1,19[4]	0,54[1] / 0,88[2] – [3] / 1,79[4]
	Sand-lime brick HD[6]	0,34[1] / –[2] 0,43[3] / –[4]	0,69[1] / –[2] 0,33[3] / –[4]	1,38[1] / –[2] 0,66[3] / –[4]	0,34[1] / –[2] 0,43[3] / –[4]	0,28[1] / –[2] 0,36[3] / –[4]	0,42[1] / –[2] 0,54[3] / –[4]
	Perforated ceramic brick[7]	–[1] / 0,14[2] –[3] / 0,43[4]	–[1] / 0,08[2] –[3] / 0,87[4]	–[1] / 0,16[2] |–[3] / 1,74[4]	–[1] / 0,14[2] –[3] / 0,43[4]	–[1] / 0,12[2] –[3] / 0,36[4]	–[1] / 0,18[2] –[3] / 0,54[4]
	Perforated ceramic brick[8]	–[1] / 0,14[2] –[3] / 0,43[4]	–[1] / 0,11[2] –[3] / 0,62[4]	–[1] / 0,22[2] –[3] / 1,24[4]	–[1] / 0,14[2] –[3] / 0,43[4]	–[1] / 0,12[2] –[3] / 0,36[4]	–[1] / 0,18[2] –[3] / 0,54[4]
	Calcium silicate hollow block[9]	–[1] / 0,21[2] –[3] / 1,00[4]	–[1] / 0,18[2] –[3] / 0,19[4]	–[1] / 0,36[2] –[3] / 0,38[4]	–[1] / 0,21[2] –[3] / 1,00[4]	–[1] / 0,17[2] –[3] / 0,83[4]	–[1] / 0,26[2] –[3] / 1,25[4]
	Hollow lightweight aggregate concrete element[10]	–[1] / 0,09[2] –[3] / 0,26[4]	–[1] / 0,10[2] –[3] / 0,18[4]	–[1] / 0,20[2] –[3] / 0,36[4]	–[1] / 0,09[2] –[3] / 0,26[4]	–[1] / 0,08[2] –[3] / 0,22[4]	–[1] / 0,12[2] –[3] / 0,33[4]
	Perforated ceramic brick[11]	–[1] / 0,14[2] –[3] / 0,26[4]	–[1] / 0,19[2] –[3] / 0,61[4]	–[1] / 0,38[2] –[3] / 1,02[4]	–[1] / 0,14[2] –[3] / 0,26[4]	–[1] / 0,12[2] –[3] / 0,22[4]	–[1] / 0,18[2] –[3] / 0,33[4]
	Perforated ceramic brick[12]	–[1] / 0,09[2] –[3] / 0,21[4]	–[1] / 0,07[2] –[3] / 0,26[4]	–[1] / 0,14[2] –[3] / 0,52[4]	–[1] / 0,09[2] –[3] / 0,21[4]	–[1] / 0,08[2] –[3] / 0,17[4]	–[1] / 0,12[2] –[3] / 0,26[4]
	Hollow ceramic brick[13]	–[1] / 0,17[2] –[3] / 0,21[4]	–[1] / 0,11[2] –[3] / 0,53[4]	–[1] / 0,22[2] –[3] / 1,06[4]	–[1] / 0,17[2] –[3] / 0,21[4]	–[1] / 0,17[2] –[3] / 0,17[4]	–[1] / 0,26[2] –[3] / 0,26[4]
	Autoclaved aerated concrete AAC 2[14]	–[1] / 0,18[2] –[3] / 0,14[4]	–[1] / 0,09[2] –[3] / 0,12[4]	–[1] / 0,18[2] –[3] / 0,24[4]	–[1] / 0,18[2] –[3] / 0,14[4]	–[1] / 0,36[2] –[3] / 0,28[4]	–[1] / 0,54[2] –[3] / 0,42[4]
	Autoclaved aerated concrete AAC 6[14]	–[1] / 0,43[2] –[3] / 0,32[4]	–[1] / 0,44[2] –[3] / 0,20[4]	–[1] / 0,88[2] –[3] / 0,40[4]	–[1] / 0,43[2] –[3] / 0,32[4]	–[1] / 0,86[2] –[3] / 0,64[4]	–[1] / 1,25[2] –[3] / 0,96[4]

1) FF1-10 PP (h_{nom} = 50 mm)
2) FF1-10 PA (h_{nom} = 50 mm)
3) FF1-10 PP (h_{nom} = 70 mm)
4) FF1-10 PA (h_{nom} = 70 mm)
5) According to EN 771-1
6) According to EN 771-2
7) For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm
8) For example perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm
9) For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm
10) For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm
11) For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm
12) For example perforated brick Doppio uni according to EN 771-1; a = 11 mm, b = 24 mm, c = 10 mm
13) For example perforated brick Optibric PV according to EN 771-1; a = 10 mm, b = 39 mm, c = 7, d = 38 mm, e = 6,5 mm [14] According to EN 771-4

Displacements under tension and shear loading of FF1-10 anchor in autoclaved aerated concrete installation with punch-tool

Anchor type	Base material	Tension load			Shear load		
		N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{v0} [mm]	$\delta_{v\infty}$ [mm]
FF1-10 PA (h_{nom} = 70 mm)	Autoclaved aerated concrete AAC 2[1)2)]	0,14	0,19	0,38	0,14	0,28	0,42
	Autoclaved aerated concrete AAC 4[1)2)]	0,43	0,29	0,58	0,43	0,86	1,29
	Autoclaved aerated concrete AAC 5[1)2)]	0,53	0,35	0,70	0,53	1,06	1,59

1) According to EN 771-4
2) Drill method: punch tool (see Annex A)



Displacements under tension and shear loading of FF1-14 anchor in masonry

Anchor type	Base material	Tension load			Shear load		
		N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{v0} [mm]	$\delta_{v\infty}$ [mm]
FF1-14	Clay brick HD[3]	1,14[1] 1,28[2]	1,35[1] 0,71[2]	2,7[1] 1,42[2]	1,14[1] 1,28[2]	0,95[1] 1,06[2]	1,42[1] 1,59[2]
	Sand-lime brick HD[4]	0,86[1] 1,00[2]	1,28[1] 0,79[2]	2,56[1] 1,58[2]	0,86[1] 1,00[2]	0,71[1] 0,83[2]	1,06[1] 1,25[2]
	Perforated ceramic brick[5]	0,26[1] 0,34[2]	0,83[1] 1,48[2]	1,66[1] 2,96[2]	0,26[1] 0,34[2]	0,22[1] 0,28[2]	0,33[1] 0,42[2]
	Perforated ceramic brick[6]	0,26[1] 0,34[2]	0,52[1] 1,24[2]	1,04[1] 2,48[2]	0,26[1] 0,34[2]	0,22[1] 0,28[2]	0,33[1] 0,42[2]
	Calcium silicate hollow block[7]	0,26[1] 0,34[2]	0,61[1] 0,80[2]	1,22[1] 1,60[2]	0,26[1] 0,34[2]	0,22[1] 0,28[2]	0,33[1] 0,42[2]
	Hollow lightweight aggregate concrete element[8]	0,34[1] 0,34[2]	1,35[1] 0,64[2]	2,70[1] 1,28[2]	0,34[1] 0,34[2]	0,28[1] 0,28[2]	0,42[1] 0,42[2]
	Perforated ceramic brick[9]	0,43[1] 0,26[2]	0,79[1] 0,86[2]	1,58[1] 1,72[2]	0,43[1] 0,26[2]	0,36[1] 0,22[2]	0,54[1] 0,33[2]
	Perforated ceramic brick[10]	0,43[1] 0,34[2]	0,68[1] 1,57[2]	1,36[1] 3,14[2]	0,43[1] 0,34[2]	0,36[1] 0,28[2]	0,54[1] 0,42[2]
	Autoclaved aerated concrete AAC 2[11]	0,27[1] 0,21[2]	1,24[1] 0,77[2]	2,48[1] 1,54[2]	0,27[1] 0,21[2]	0,54[1] 0,42[2]	0,81[1] 0,63[2]
	Autoclaved aerated concrete AAC 6[11]	0,89[1] 0,53[2]	0,74[1] 1,08[2]	1,48[1] 2,16[2]	0,89[1] 0,53[2]	1,78[1] 1,06[2]	2,67[1] 1,59[2]

[1] FF1-14 PP (h_{nom} = 70 mm)
[2] FF1-14 PA (h_{nom} = 70 mm)
[3] According to EN 771-1
[4] According to EN 771-2
[5] For example perforated brick MAX according to EN 771-1; a = 12 mm, b = 38 mm, c = 8 mm
[6] Perforated brick Porotherm P+W 25 according to EN 771-1; a = 10,2 mm, b = 38 mm, c = 7 mm
[7] For example calcium silicate hollow block KSL 6DF according to DIN 106 and EN 771-2; a = 22 mm, b = 50 mm, c = 22 mm
[8] For example hollow lightweight aggregate concrete element HBL according to EN 771-3; a = 31 mm
[9] For example perforated brick HLZ 12 according to DIN 105 and EN 771-1; a = 12 mm, b = 32 mm, c = 7 mm, d = 12 mm, e = 13 mm
[10] For example perforated brick HLZ 15 according to DIN 105 and EN 771-1; a = 17 mm
[11] According to EN 771-4

Потребительские свойства определенного выше продукта соответствуют набору декларируемых потребительских свойств. Настоящая декларация потребительских свойств выдается согласно распоряжению (ЕС) № 305/2011 на исключительную ответственность определенного выше производителя.

От имени производителя расписался(-лась):

Anna Donesz

Wrocław, 24.08.2020.

PEŁNOMOCNIK SYSTEMU
ZARZĄDZANIA JAKOŚCIĄ
Anna Donesz
dr inż. Anna Donesz