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European Technical Assessment

**ETA 18/0818
of 26/05/2020**

Technical Assessment Body issuing the ETA: Technical and Test Institute
for Construction Prague

Trade name of the construction product

R-FFS

**Product family to which the construction
product belongs**

Plastic anchors for multiple use in concrete
and masonry for non-structural applications

Manufacturer

Rawplug S.A.
Ul. Kwidzyńska 6
51-416 Wrocław
Poland

Manufacturing plant(s)

Plant No.3

**This European Technical Assessment
contains**

16 pages including 13 Annexes which form
an integral part of this assessment.

**This ETA is issued in accordance
with Regulation (EU) No 305/2011,
on the basis of**

ETAG 020, edition 2012, used as European
Assessment Document (EAD) according to
Article 66 Paragraph 3 of regulation (EU)
No 305/2011

This version is a corrigendum to

ETA 18/0818 of 26/05/2020

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1. Technical description of the product

The anchor R-FFS consists of a plastic sleeve made of polyamide and specific screw made of steel with electroplated zinc coating, zinc flake coating or stainless steel as expansion element.

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against the wall of the drilled or punched hole.

The illustration and the description of the product are given in Annex A.

2. Specification of the intended use in accordance with the applicable EAD

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the products in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR1)

Requirements with respect to the mechanical resistance and stability of non load bearing parts of the works are included under the Essential Requirement safety in use (BWR 4).

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A 1
Resistance to fire	See Annex C2

3.3 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annex C2, C3, C4
Characteristic resistance for bending moment	See Annex C1
Displacements under shear and tension loads	See Annex C2, C3, C4
Edge distances and spacing	See Annex B2, B3, B4

3.4 Sustainable use of natural resources (BWR 7)

No performance assessed.

3.5 General aspects

Durability and serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4. Assessment and verification of constancy of performance (AVCP) system applied with reference to its legal base

According to the Decision 97/463/EC of the European Commission¹, the system 2+ of assessment verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Plastic anchors for use in concrete and masonry	For use in systems, such as façade systems, for fixing or supporting elements which contribute to the stability of the systems	-	2+

¹ Official Journal of the European Communities L 198/31 25.7.1997

5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Technical and Test Institute for Construction Prague.

Issued in Prague on 26.05.2020

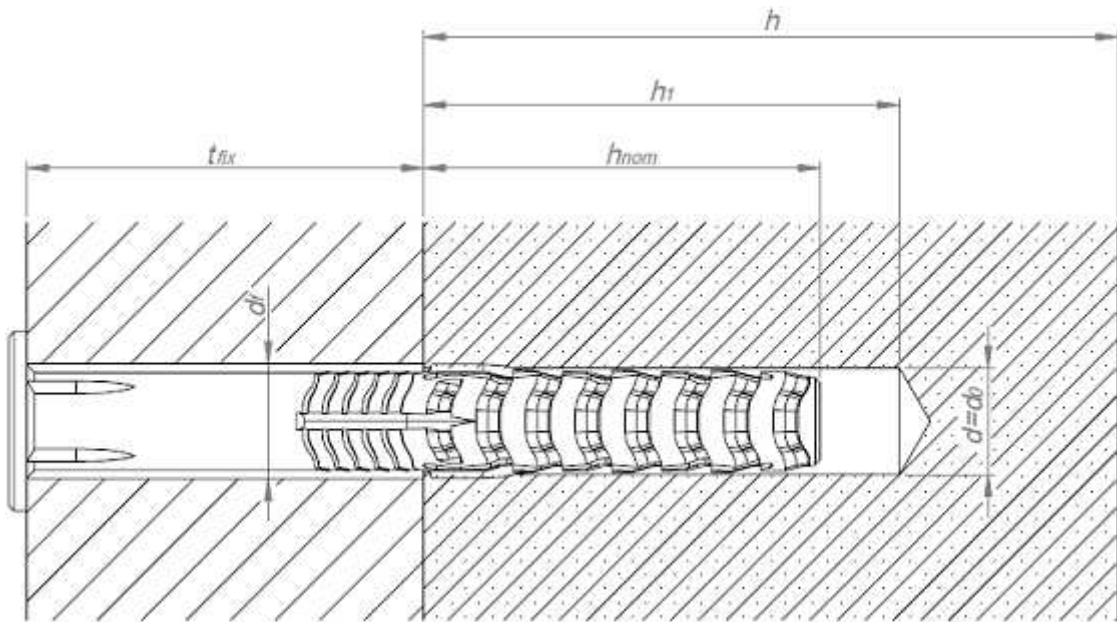
By

Ing. Mária Schaan

Head of the Technical Assessment Body



R-FFS



- d_0 = sleeve diameter (drill hole diameter)
- h_{nom} = overall plastic anchor embedment depth in the base material
- h = thickness of member (wall)
- h_1 = depth of drilled hole to deepest point
- t_{fix} = thickness of fixture
- d_f = diameter if clearance in the hole

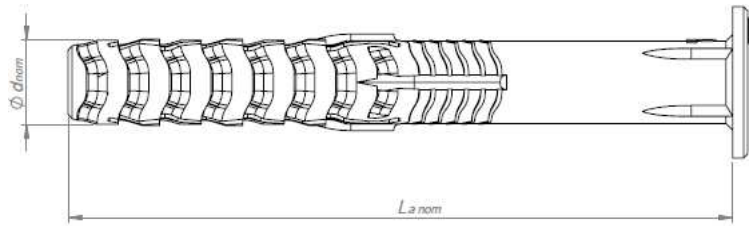
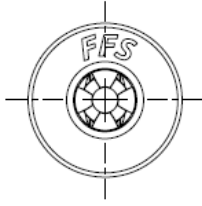
R-FFS

Product description
Installed conditions

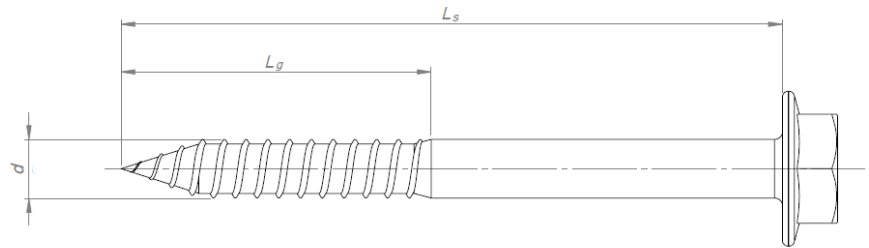
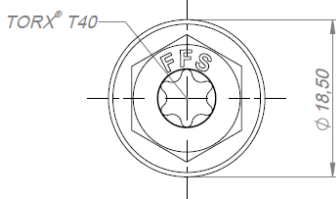
Annex A1

R-FFS

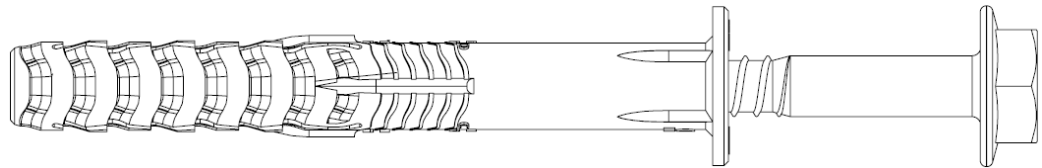
Plastic sleeve



Screw



Pre-assembled



R-FFS

Product description
Plastic sleeve and screw

Annex A2

Table A1: Dimensions

Anchor type	Anchor sleeve ¹⁾		Screw ¹⁾		
	d _{nom} [mm]	l _{a1, nom} [mm]	l _{s, min} [mm]	l _{g, min} [mm]	d _s [mm]
R-FFS10	10	50	59 _{±1}	37 _{±0,2}	7 _{-0,2}
	10	60	69 _{±1}	37 _{±0,2}	7 _{-0,2}
	10	80	89 _{±1}	37 _{±0,2}	7 _{-0,2}
	10	100	109 _{±1}	37 _{±0,2}	7 _{-0,2}
	10	120	129 _{±1}	37 _{±0,2}	7 _{-0,2}

¹⁾ The anchor (plastic sleeve and specific screw) shall only be packaged and supplied as a complete unit

Table A2: Materials

Element	
Anchor sleeve	Polyamide, PA6 colour blue
Specific screw	Steel grade 6.8 ($f_{y,k} \geq 480$ MPa, $f_{u,k} \geq 600$ MPa) according EN ISO 898-1 a) electroplated zinc coating $\geq 5\mu\text{m}$ according to EN ISO 4042 or b) zinc flake coated ≥ 36 g/m ² according to EN ISO 10683
	Stainless steel grade according to EN 10088

R-FFS

Product description
Dimensions
Materials

Annex A3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads.
- Multiple fixing of non-structural applications.

Base materials:

- Reinforced or unreinforced normal weight concrete with strength classes \geq C12/15 (Use category a), according to EN 206.
- Solid masonry (Use category b), according to Annex C3.
Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength of the masonry unit.
- Hollow or perforated masonry (Use category c), according to Annex C3.
- Autoclaved aerated concrete (Use category d), according to Annex C3.
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2.
- For other base materials of the use categories a, b, c and d the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B, edition March 2012.

Temperature range:

- a) -30°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C)
- b) -30°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)

Use conditions:

- Structures subject to dry internal conditions (electroplated zinc coating steel, zinc flake coated steel or stainless steel).
- The specific screw made of zinc coated or zinc flake coated steel may also be used in structures subject to external atmospheric exposure if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore there shall be an external cladding or a ventilated rain screen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating.
- Structures subject to external atmospheric exposure including industrial and marine environment (stainless steel).
- Structures subject to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel).
Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- The anchorages are designed in accordance with the ETAG 020, Annex C, edition March 2012, under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings shall be prepared taking account the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- Anchors are only to be used for multiple fixings for non-structural application, according to ETAG 020, edition March 2012.

Installation:

- Hole shall be drilled by the drill methods given in Annexes C2 and C3 for use categories a, b, c and d; the influence of other drilling methods may be determined by job side tests according to ETAG 020, edition March 2012, Annex B.
- Anchor installation shall be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation shall be executed in temperature from -10°C to +40°C.
- Exposure to UV due to solar radiation of the anchor not protected by the mortar shall not exceed 6 weeks.

R-FFS

Intended use
Specifications

Annex B1

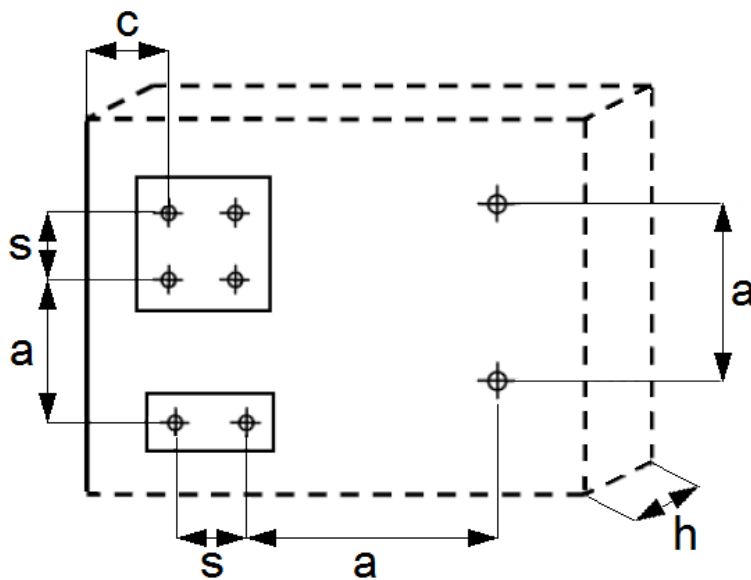
Table B1: Installation parameters

Anchor type		R-FFS10	
Use category		a	b, c, d
Nominal drill hole diameter	d_o [mm]	10	
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	10,3	
Depth of drill hole to deepest point	$h_1 \geq$ [mm]	50	60
Overall embedment depth in the base material	$h_{nom} \geq$ [mm]	40	50
Diameter of clearance hole in the fixture	d_f [mm]	12,5	
Torque wrench		SW13 TX40	

Table B2: Minimum thickness of member, edge distance and anchor spacing in concrete

Anchor type	Base material	h_{min} [mm]	$C_{cr,N}$ [mm]	C_{min} [mm]	S_{min} [mm]
R-FFS10	Concrete \geq C12/15	100	98	70	98
	Concrete \geq C16/20	100	70	50	70

Scheme of edge distance and spacing in concrete



R-FFS

Intended use

Installation parameters
Edge distance and anchor spacing in concrete

Annex B2

Table B3: Minimum thickness of member, edge distance and anchor spacing in masonry

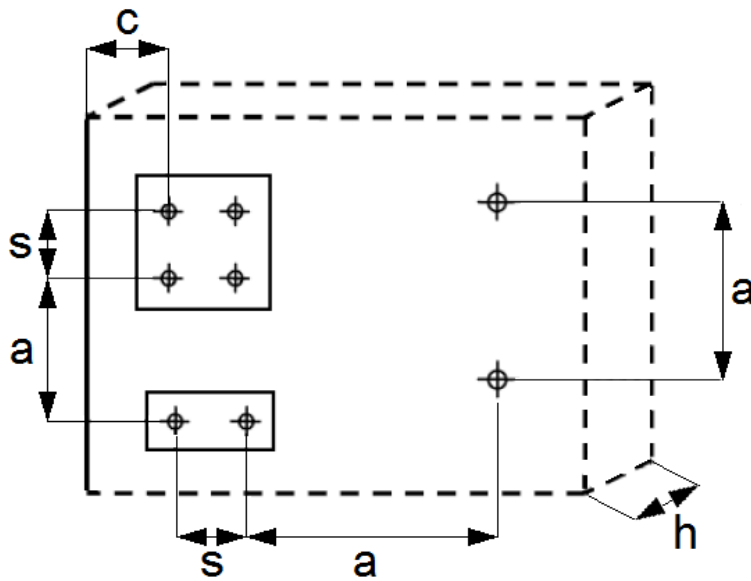
Anchor type	Base material	Single anchor			Anchor group ¹⁾	
		h_{min} [mm]	c_{min} [mm]	a_{min} [mm]	$s_{1,min}^{2)}$ [mm]	$s_{2,min}^{3)}$ [mm]
R-FFS10	Clay brick Mz-DF	115	100	250	200	100
	Calcium silicate brick KS-NF	115	100	250	200	100
	Calcium silicate brick KS20	200	100	250	200	100
	Perforated ceramic brick HLzB 12-0,9	175	100	250	100	100
	Hollow calcium silicate block KSL12	198	100	250	100	100
	Hollow calcium silicate block SENDWIX 8DF-LD	240	100	250	100	100
	Hollow lightweight aggregate concrete Bloc creux B40	200	100	250	100	100
	Autoclaved aerated concrete according to EN 771-4	100	70	250	80	80

¹⁾ The design method valid for single anchor and anchor groups with two or four anchors

²⁾ In direction perpendicular to free edge

³⁾ In direction parallel to free edge

Scheme of edge distance and spacing in masonry



R-FFS

Intended use

Installation parameters

Edge distance and anchor spacing in masonry

Annex B3

Table B4: Minimum thickness of member, edge distance and anchor spacing in autoclaved aerated concrete for installation with punch-tool

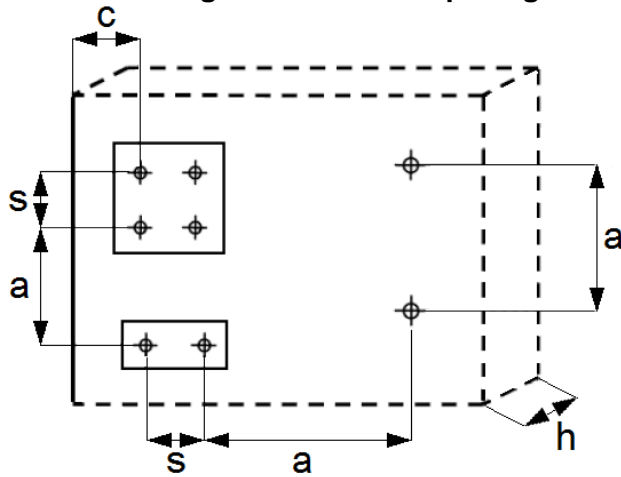
Anchor type	Base material	Single anchor			Anchor group ¹⁾	
		h_{min} [mm]	c_{min} [mm]	a_{min} [mm]	$s_{1,min}^{2)}$ [mm]	$s_{2,min}^{3)}$ [mm]
R-FFS10	Autoclaved aerated concrete according to EN 771-4	120	100	250	80	80

1) The design method valid for single anchor and anchor groups with two or four anchors

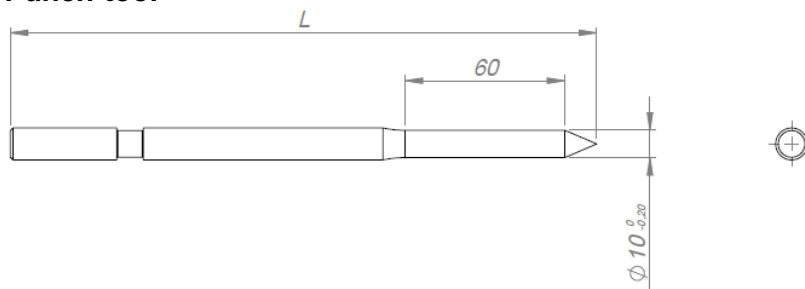
2) In direction perpendicular to free edge

3) In direction parallel to free edge

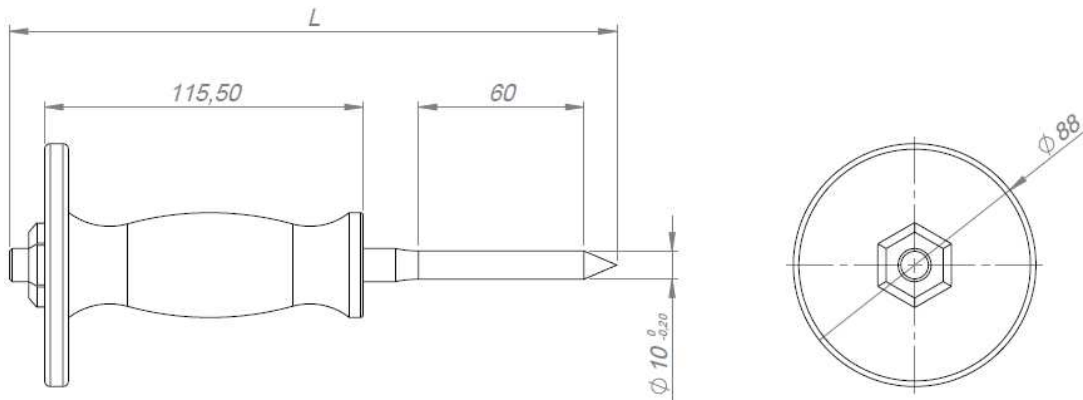
Scheme of edge distance and spacing in masonry



Punch-tool



Punch-tool with handle



R-FFS

Intended use

Installation parameters for installation with punch-tool
Edge distance and anchor spacing in autoclaved aerated concrete

Annex B4

Installation instructions

1.



2.



3.



4.



5.



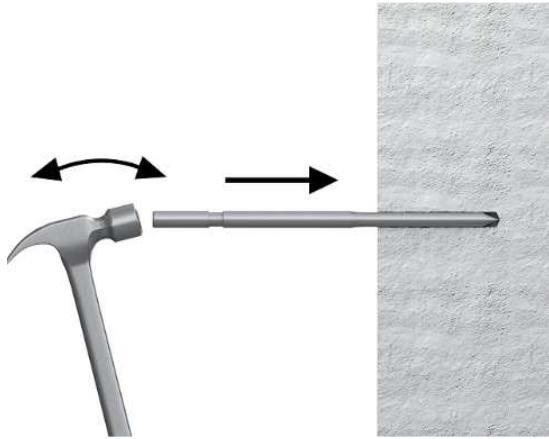
R-FFS

Intended use
Installation instructions

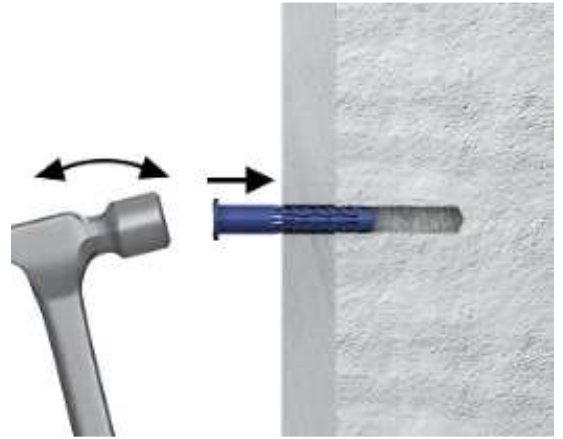
Annex B5

Installation instructions for punch-tool

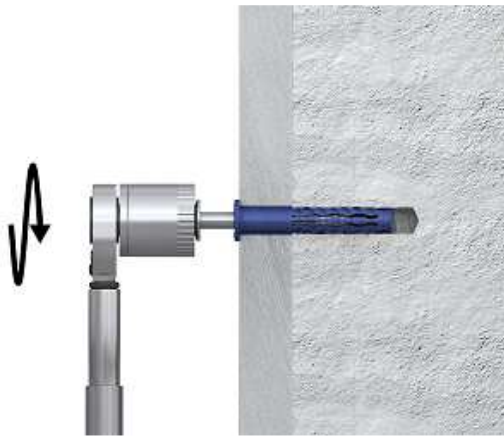
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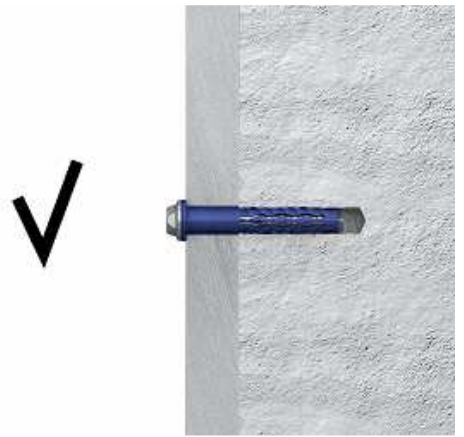
2.



3.



4.



R-FFS

Intended use
Installation instructions for punch-tool

Annex B6

Table C1: Characteristic bending resistance of the screw

Steel type	Zinc coated steel	Stainless steel
Characteristic bending resistance $M_{Rk,s}$ [Nm]	15,3	15,3
Partial safety factor $\gamma_{Ms}^{1)}$	1,25	1,58

¹⁾in the absence of other national regulations

Table C2: Characteristic resistance of the screw

Steel type	Zinc coated steel	Stainless steel
Characteristic tension resistance $N_{Rk,s}$ [kN]	17,0	17,0
Partial safety factor $\gamma_{Ms}^{1)}$	1,50	1,90
Characteristic shear resistance $V_{Rk,s}$ [kN]	8,5	8,5
Partial safety factor $\gamma_{Ms}^{1)}$	1,25	1,58

¹⁾in the absence of other national regulations

R-FFS

Performances

Characteristic resistance of the screw

Annex C1

Table C3: Characteristic resistance for use in cracked and non-cracked concrete, pull-out failure hammer drilling

Anchor type		R-FFS10	
Concrete \geq C16/20			
Temperature range	[°C]	24/40	50/80
Characteristic resistance	$N_{Rk,p}$ [kN]	4,0	3,5
Partial safety factor	$\gamma_{Mc}^{1)}$	1,8	
Concrete C12/15			
Characteristic resistance	$N_{Rk,p}$ [kN]	3,0	2,5
Partial safety factor	$\gamma_{Mc}^{1)}$	1,8	

Valid for temperature ranges according to Annex B1

¹⁾in the absence of other national regulations

Table C4: Displacement under tension and shear loading in concrete

Anchor type	Tension load			Shear load		
	N [kN]	δ_{N0} [mm]	$\delta_{N\infty}$ [mm]	V [kN]	δ_{V0} [mm]	$\delta_{V\infty}$ [mm]
R-FFS10	1,39	1,06	2,12	1,39	0,57	0,85

Valid for temperature ranges according to Annex B1

Table C5: 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 type	Fire resistance class	F_{Rk} [kN]
R-FFS10	R90	0,8



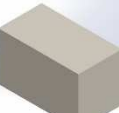
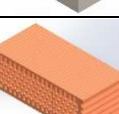
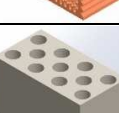
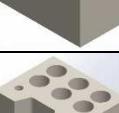
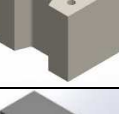
R-FFS

Performances

Characteristic resistance in concrete (use category a)
Displacement in concrete

Annex C2

Table C6: Characteristic resistance for use in masonry

Base material	Bulk density class [kg/dm ³]	Compressive strength class [N/mm ²]	Dimensions length/width/height [mm]	Picture	Drill method	F _{Rk} ¹⁾ [kN]	
						24/40	50/80
Temperature range [°C]						24/40	50/80
Clay brick Mz-DF	1,7	20	240 x 115 x 55		hammer drilling	2,0	
Calcium silicate brick KS-NF	2	40	240 x 115 x 71		hammer drilling	3,5	
Calcium silicate brick KS20	2	20	332 x 200 x 180		hammer drilling	4,0	
Perforated ceramic brick HLzB 12-0,9	1,6	5	498 x 175 x 238		rotary drilling only	0,6	0,5
Hollow calcium silicate block KSL12	1,4	12	332 x 198 x 180		rotary drilling only	2,0	1,5
Hollow calcium silicate block SENDWIX 8DF-LD	1,4	20	248 x 240 x 248		rotary drilling only	2,5	2,0
Hollow lightweight aggregate concrete Bloc creux B40	0,8	4	494 x 200 x 190		rotary drilling only	0,75	0,6
Partial safety factor $\gamma_{Mm}^{2)}$	2,5						

¹⁾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 spacing equal or larger than the minimum spacing s_{min} according to table B3 (Annex B3)

²⁾In the absence of other national regulations

Table C7: Displacement under tension and shear loading 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]
R-FFS10	Clay brick Mz-DF	0,57	0,18	0,37	0,57	0,48	0,71
	Calcium silicate brick KS-NF	1,00	0,45	0,90	1,00	0,83	1,25
	Calcium silicate brick KS20	1,14	0,48	0,95	1,14	0,95	1,43
	Perforated ceramic brick HLzB 12-0,9	0,14	0,63	1,27	0,14	0,12	0,18
	Hollow calcium silicate block KSL12	0,43	0,94	1,87	0,43	0,48	0,71
	Hollow calcium silicate block SENDWIX 8DF-LD	0,57	0,40	0,80	0,57	0,36	0,54
	Hollow lightweight aggregate concrete Bloc creux B40	0,17	0,62	1,23	0,17	0,14	0,21

R-FFS
Performances

Characteristic resistance in masonry (use category b, c)
Displacement in masonry

Annex C3

Table C8: Characteristic resistance for use in autoclaved aerated concrete

Base material	Bulk density class [kg/dm ³]	Compressive strength class [N/mm ²]	Drill method	F _{Rk} ¹⁾ [kN]	
				24/40	50/80
Temperature range	[°C]			24/40	50/80
Autoclaved aerated concrete	0,5	4	rotary drilling only	0,9	
Autoclaved aerated concrete	0,6	5	rotary drilling only	0,9	
Partial safety factor	γ _{MAAC} ²⁾	2,0			

¹⁾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 spacing equal or larger than the minimum spacing s_{min} according to table B3 (Annex B3)

²⁾In the absence of other national regulations

Table C9: Characteristic resistance for use in autoclaved aerated concrete installation with punch-tool

Base material	Bulk density class [kg/dm ³]	Compressive strength class [N/mm ²]	Drill method	F _{Rk} ¹⁾ [kN]	
				24/40	50/80
Temperature range	[°C]			24/40	50/80
Autoclaved aerated concrete	0,5	4	-	1,5	
Autoclaved aerated concrete	0,6	5	-	1,5	
Partial safety factor	γ _{MAAC} ²⁾	2,0			

¹⁾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 spacing equal or larger than the minimum spacing s_{min} according to table B4 (Annex B4)

²⁾In the absence of other national regulations

Table C10: Displacement under tension and shear loading in autoclaved aerated concrete

Base material	Bulk density class [kg/dm ³]	Compressive strength class [N/mm ²]	Tension load			Shear load		
			N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
			[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
Autoclaved aerated concrete	0,5	4	0,32	0,79	1,58	0,32	0,64	0,96
Autoclaved aerated concrete	0,6	5	0,32	0,64	1,27	0,32	0,64	0,96

Table C11: Displacement under tension and shear loading in autoclaved aerated concrete installation with punch-tool

Base material	Bulk density class [kg/dm ³]	Compressive strength class [N/mm ²]	Tension load			Shear load		
			N	δ _{N0}	δ _{N∞}	V	δ _{V0}	δ _{V∞}
			[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
Autoclaved aerated concrete	0,5	4	0,54	0,75	1,51	0,54	1,08	1,62
Autoclaved aerated concrete	0,6	5	0,54	0,98	1,95	0,54	1,08	1,62

R-FFS**Performances**

Characteristic resistance in autoclaved aerated concrete (use category d)
Displacement in masonry autoclaved aerated concrete

Annex C4