TEST REPORT FIRES-FR-203-15-NUNE

Fasteners RAWLPLUG

FIRES
The Experts on Fire Safety

TEST REPORT

FIRES-FR-203-15-NUNE

Tested property:	Fire resistance
Test method:	according to sponsor requirement
Date of issue:	20. 10. 2015
Name of the product:	Fasteners RAWLPLUG
Manufacturer:	RAWLPLUG S.A. Kwidzyńska 6 51-416 Wrocław Poland
Sponsor:	BAKS Kazimierz Sielski ul. Jagodne 5 05-480 Karczew Poland
Test carried out by:	FIRES, s.r.o., Testing laboratory
Task No.:	PR-15-0379
Specimens received:	12. 10. 2015
Date of the test:	15. 10. 2015

Technician responsible for the technical side of this report: Bc. Dávid Šubert

Number of pages: 26
Test reports: 3

Copy No.: 2

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Notified Body No. 1396, Approved Body No. SK01, Member of EGOLF

1. INTRODUCTION

This test report contains the results of test carried out by FIRES, s.r.o., Testing laboratory in Batizovce. The purpose of the test was to gain information for product certification.

This test was carried out according to sponsor requirement. Technical report TR 020: 2004 was used as a supporting document.

Sponsor's representatives witnessing the test:

Mr. Jacek Kliczek	BAKS Kazimierz Sielski
Mr. Jakub Chociński	BAKS Kazimierz Sielski
Mr. Łukasz Daniel	Tele-Fonika Kable S.A.
Mr. Marcin Zywiński	Tele-Fonika Kable S.A.
Mr. Jacek Nowicki	Koelner (RAWLPLUG)
Mr. Sebastian Czekan	Koelner (RAWLPLUG)

test directed by	Ing. Marek Gorlický
test carried out by	Bc. Dávid Šubert
operator	Miroslav Hudák

2. MEASURING EQUIPMENT

Identification number	Measuring equipment	Note
F 90 004	Horizontal test furnace for fire resistance testing	-
F 69 010	PLC system for data acquisition and control TECOMAT TC 700	-
F 40 019	Visual and calculating software to PLC TECOMAT TC 700	-
F 40 017	Control and communication software to PLC TECOMAT TC 700	-
F 40 018	SW Reliance	-
F 40 020	Driver Tecomat - Reliance (SW)	-
F 71 041, F 71 042	Transducer of differential pressure (–50 to + 150) Pa	measurement of pressure inside the test furnace
F 54 027	Digital calliper (0 to 200) mm	-
F 54 056	Racking meter	-
F 69 009	PLC system for data acquisition and climate control TECOMAT TC 604	-
F 60 001 - F 60 009	Sensors of temperature and relative air humidity	measurement of climatic conditions
F 10 521 - F 10 528	Plate thermometers	measurement of temperature inside the test furnace according to EN 1363-1
F 10 701	Sheathed thermocouple type K Ø 3 mm	measurement of ambient temperature
F 57 005	Digital stop-watch	-

3. PREPARATION OF THE SPECIMENS

Testing laboratory noted down production data of specimens from certified production.
Test specimen data are listed in following table:

Place of production	RAWLPLUG S.A., Kwidzyńska 6, 51-416 Wrocław, Poland
Number of certificate ISO 9001	01 100 1331958
Issuing Body	TŰV Rheinland
Date of issuing	01. 04. 2015
Batch No.:	
R-RBP-M08/10W/25	SBC090
R-FF1-N-10K160	KJ581
R-KEM II- 300 + R-STUDS-12 + R-PLS-15125	PW927
ONS-55040	SRC170
R-KEXII-385	PW145

Specimens were delivered to the testing laboratory by test sponsor. Installation of the specimens to the supporting construction was carried out by workers of the sponsor.

4. PREPARATION OF THE TEST

4.1 DESCRIPTION OF THE SPECIMENS STRUCTURE

The following types of fasteners were used by test:

R-RBP-M08/10W/25	Expanding shield anchor - bolt
R-FF1-N-10K160	Frame fixing with collar and hex-head screw
R-KEM II- 300 + R-STUDS-12 + R-PLS-15125	Universal polyester (styrene free) resin
ONS-55040	Stainless steel self-drilling screw
R-KEXII-385	Premium pure epoxy resin

More detailed information about specimens is shown in the drawings which form an integral part of this test report. Drawings were delivered by sponsor.

All the information about technical specifications of used materials and semi-products, information about their type sign were delivered by sponsor. This information was not subject of the inspection of specimens. Parameters which were checked are quoted in paragraph 4.3.

4.2 DESCRIPTION OF THE SPECIMENS FIXATION

Three pieces of each type of fasteners are used for the test.

Specimens fixed to wall made of calcium silicate blocks SILKA,
(200x199x333) mm, bulk density 1800 kg.m^{-3}:

Specimen No.	Type of fastener	Static load applied to specimen	Direction of the loading force
1 / 2 / 3	R-RBP-M08/10W/25	15 kg	acc. to drawing
4 / 5 / 6	R-FF1-N-10K160	10 kg	
7 / 8 / 9	R-KEM II- 300 + R-STUDS-12 + R-PLS-15125	15 kg	

Specimens fixed to wall made of bricks Porotherm 25 Profi:

Specimen No.	Type of fastener	Static load applied to specimen	Direction of the loading force
10 / 11 / 12	R-RBP-M08/10W/25	10 kg	acc. to drawing
13 / 14 / 15	R-FF1-N-10K160	7 kg	
16 / 17 / 18	R-KEM II- 300 + R-STUDS-12 + R-PLS-15125	15 kg	

Specimens fixed to wall made of aerated concrete blocks YTONG, (250x249x599) mm, bulk density 613 kg.m^{-3}:

Specimen No.	Type of fastener	Static load applied to specimen	Direction of the loading force
19 / 20 / 21	R-RBP-M08/10W/25	15 kg	acc. to drawing
22 / 23 / 24	R-FF1-N-10K160	10 kg	
25 / 26 / 27	R-KEM II- 300 + R-STUDS-12 + R-PLS-15125	15 kg	

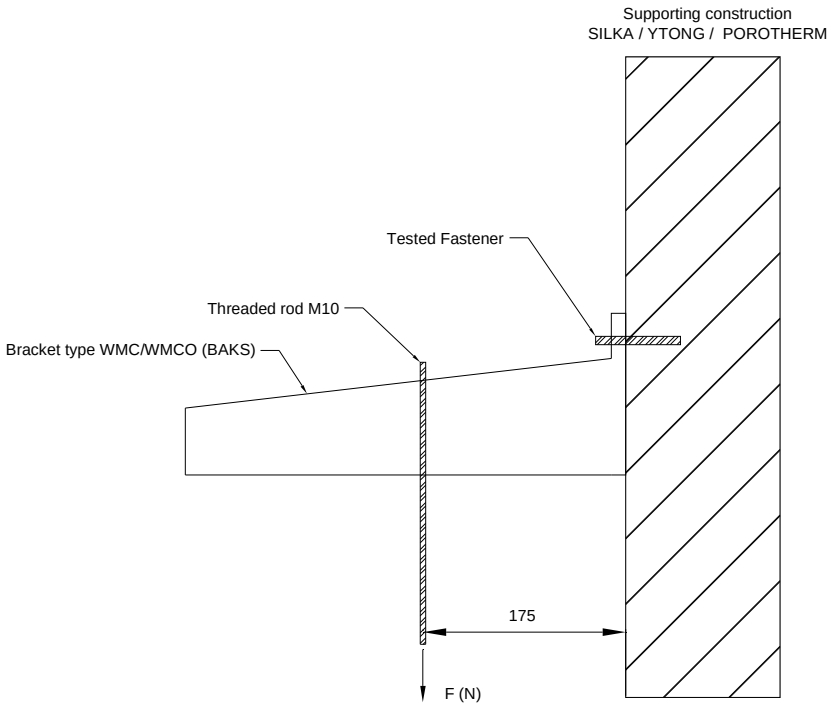
Specimens fixed to rectangular steel profile on ceiling (thickness of profile wall 3,0 mm):

Specimen No.	Type of fastener	Static load applied to specimen	Direction of the loading force
28 / 29 / 30	ONS-55040	2 kg	vertical, parallel to the anchor center line

Specimens fixed to ceiling made of concrete panel (C16/20), 150 mm thick:

Specimen No.	Type of fastener	Static load applied to specimen	Direction of the loading force
31 / 32 / 33	R-KEXII-385	50 kg	vertical, parallel to the anchor center line

Way of loading of fasteners fixed to side wall:



Steel chain and loads were used as the equivalent load.

The test sponsor chose supporting construction, its thickness, way of specimen fixation to the supporting construction and value and way of loading.

4.3 INSPECTION OF THE SPECIMENS

The conformity of the drawings and the test specimens was checked before and after the fire resistance test. It was possible to carry out this check on the test specimen. The specimens corresponded to the drawings which are part of this test report. The visual review of the test specimens, the used materials as well as the size verification (basic dimensions) and also the way of specimens fixation to supporting construction were subject of this inspection.

4.4 CLIMATIC CONDITIONING OF THE SPECIMENS

Test specimens were stored in the hall of testing laboratory and were conditioned according to EN 1363-1 under the following climatic conditions:

Ambient air temperature [°C]

mean	21,1
standard deviation	1,1

Relative air humidity [%]

mean	42,4
standard deviation	1,5

The humidity equilibrium state of test specimens was not determined. Test specimens did not comprise hygroscopic materials.

5. CARRYING OUT OF THE TEST

5.1 CONDITIONS OF THE TEST

Conditions in the test furnace (temperature – standard temperature/time curve, pressure, content of O_2) as well as in the testing room (ambient temperature) corresponded to EN 1363-1 during the test. Detailed information is part of this test report, or in record from the test.

Values characterizing environment in the testing room directly before the test:

Relative air humidity [%]	**Ambient air temperature [°C]**
43,9	22,7

5.2 RESULTS OF THE TEST

Measured values are stated in this test report.

6. CLOSING

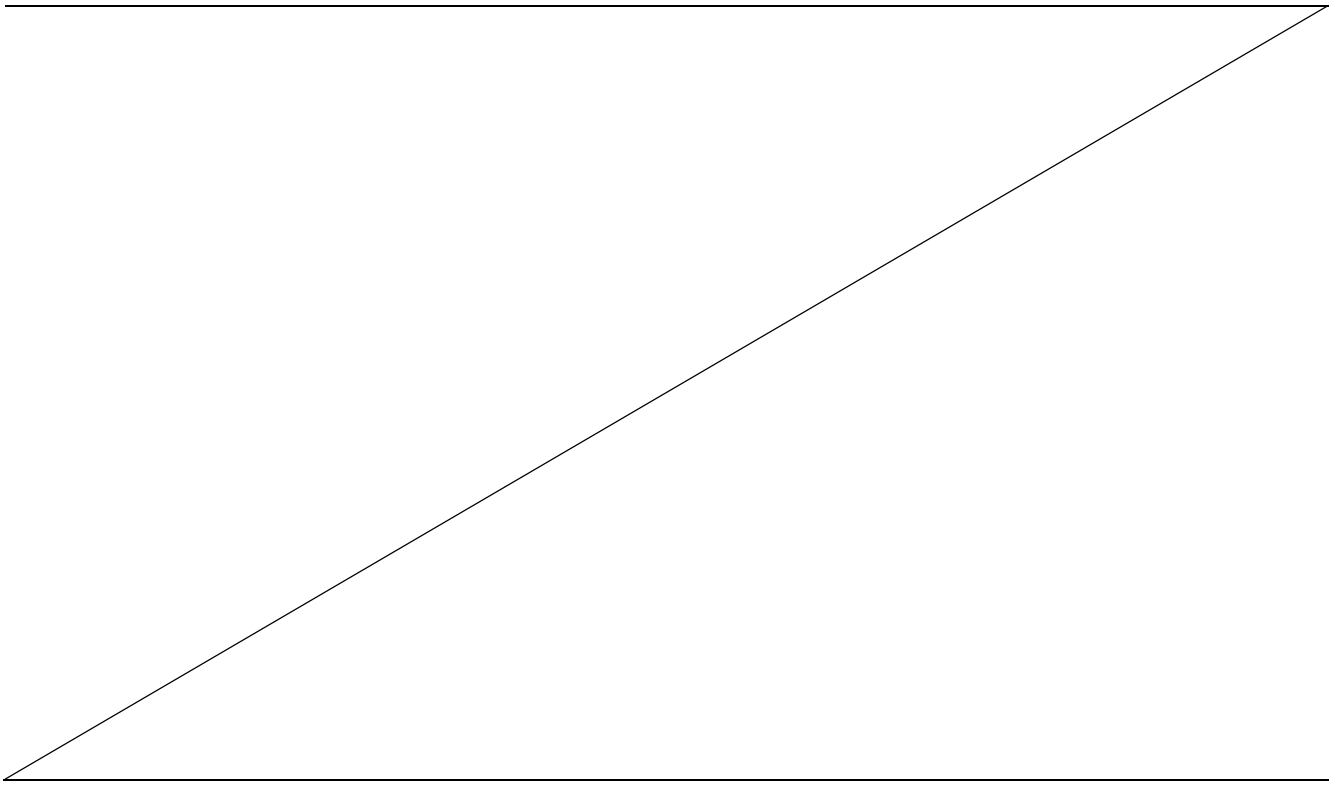
Evaluation of the test:

Type of material	Specimen No.	Type of anchor	Static load applied to specimen	Fire resistance – time till the performance criterion achieved	Type of failure
Wall made of SILKA	1 / 2 / 3	R – RBP	15 kg	90 minutes no failure / 90 minutes no failure / 30 minutes	- / - / P
	4 / 5 / 6	FF1	10 kg	90 minutes no failure	-
	7 / 8 / 9	R-KEM II – 300	15 kg	90 minutes no failure	-
Wall made of Porotherm 25 Profi	10 / 11 / 12	R – RBP	10 kg	90 minutes no failure	-
	13 / 14 / 15	FF1	7 kg	30 minutes	P
	16 / 17 / 18	R-KEM II – 300	15 kg	30 minutes	P
Wall made of YTONG	19 / 20 / 21	R – RBP	15 kg	90 minutes no failure	-
	22 / 23 / 24	FF1	10 kg	90 minutes no failure / 90 minutes no failure / 30 minutes	- / - / P
	25 / 26 / 27	R-KEM II – 300	15 kg	90 minutes no failure	-
Rectangular steel profile with wall 3,0 mm thick	28 / 29 / 30	ONS-55040	2 kg	90 minutes no failure	-
Ceiling made of concrete panels C16/20, 150 mm	31 / 32 / 33	R-KEXII-385	50 kg	90 minutes no failure / 90 minutes no failure / 30 minutes	- / - / P

Explanation:

P pull-out failure

The fire test was terminated in the 94th minute at the request of test sponsor.

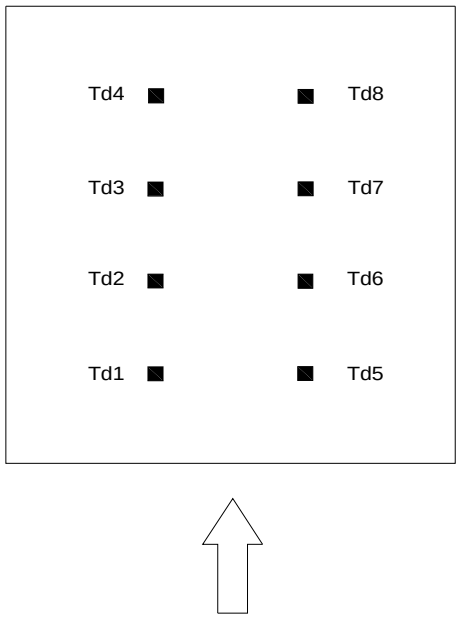


Measured values inside the test furnace

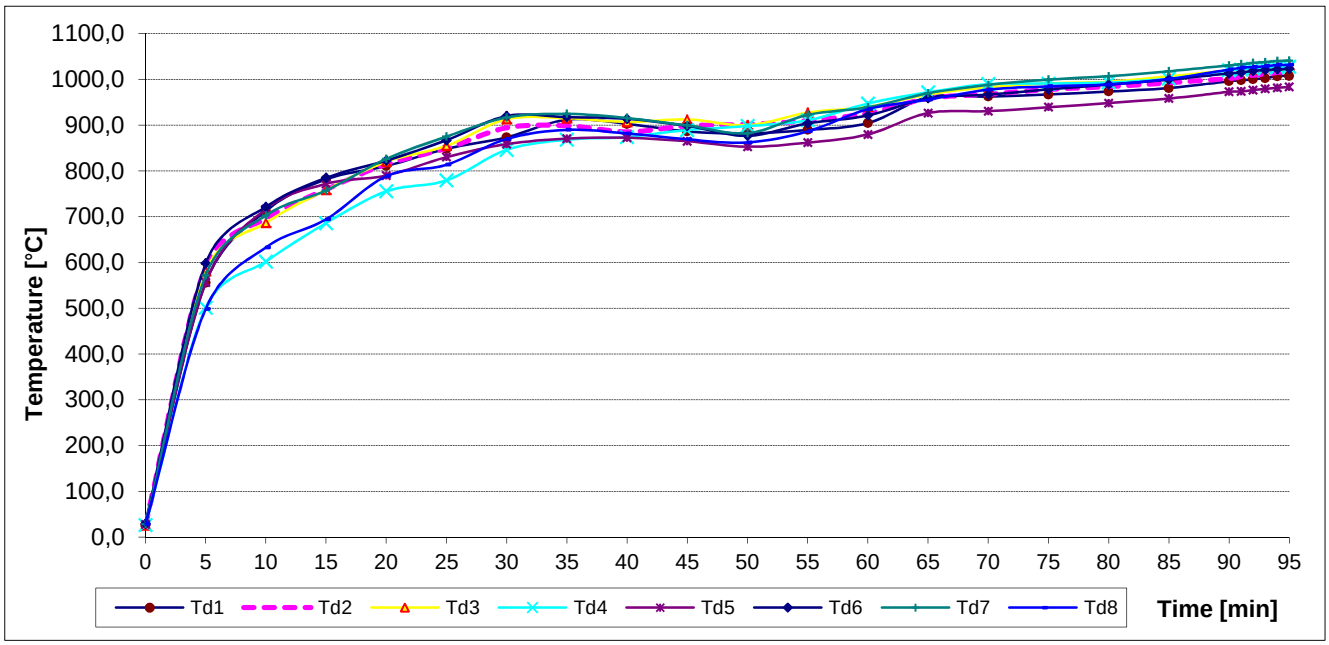
Time	Temperature [°C]											Deviation	Pressure
t [min]	Td1	Td2	Td3	Td4	Td5	Td6	Td7	Td8	Tave	Tn	To	d_e [%]	p [Pa]
0	25,6	26,6	25,8	26,5	27,8	28,8	28,1	28,4	27,2	20,0	22,7	0,0	17,1
5	555,4	590,8	581,2	501,2	556,1	598,0	572,1	498,6	556,7	576,0	22,8	-13,1	17,6
10	712,5	696,3	686,5	602,0	716,4	721,3	702,7	632,9	683,8	678,0	22,8	-4,5	18,2
15	781,5	759,4	758,6	686,1	771,9	784,9	757,3	694,3	749,3	739,0	22,9	-2,4	18,3
20	810,8	814,7	820,3	755,5	790,0	822,6	826,3	788,6	803,6	781,0	22,9	-0,9	18,8
25	848,2	849,2	854,9	779,5	830,3	867,1	875,1	813,5	839,7	815,0	23,0	-0,1	19,8
30	873,4	894,3	913,0	846,2	858,6	919,9	916,8	870,0	886,5	842,0	23,0	0,7	18,1
35	911,9	898,8	915,1	868,2	870,6	917,7	924,6	889,9	899,6	865,0	23,1	1,4	17,6
40	902,8	885,5	907,0	874,2	872,5	914,0	915,5	881,8	894,2	885,0	23,1	1,6	18,2
45	886,4	898,5	912,6	889,4	864,8	898,3	899,6	869,0	889,8	902,0	23,2	1,2	19,4
50	881,7	902,0	900,1	898,1	853,0	876,9	882,6	862,2	882,1	918,0	23,2	0,8	17,3
55	889,7	909,8	927,4	910,7	861,9	904,0	922,5	886,4	901,6	932,0	23,3	0,2	19,6
60	904,5	926,2	940,4	947,3	879,8	921,1	939,0	935,0	924,2	945,0	23,3	0,0	17,2
65	960,8	958,3	966,9	971,9	926,5	958,9	969,7	955,8	958,6	957,0	23,4	-0,1	17,4
70	962,6	967,6	982,8	989,7	930,7	967,0	987,9	977,5	970,7	968,0	23,4	-0,1	19,6
75	967,0	978,0	991,4	990,9	939,3	978,1	999,7	984,9	978,7	979,0	23,5	-0,1	18,8
80	973,6	984,4	994,9	993,1	948,3	988,6	1006,9	988,9	984,8	988,0	23,6	-0,1	17,6
85	980,9	992,7	1006,8	1001,6	958,2	999,4	1017,8	1001,0	994,8	997,0	23,6	-0,1	18,2
90	996,1	1001,9	1019,5	1020,0	973,0	1013,1	1030,7	1021,5	1009,5	1006,0	23,6	-0,1	19,2
91	998,2	1006,6	1021,5	1021,5	973,9	1015,0	1033,1	1025,5	1011,9	1008,0	23,6	-0,1	19,3
92	1000,2	1009,3	1022,4	1023,7	976,7	1018,7	1036,0	1027,0	1014,3	1009,0	23,7	-0,1	18,9
93	1002,6	1012,0	1024,7	1025,6	979,2	1020,5	1037,7	1029,0	1016,4	1011,0	23,7	-0,1	18,2
94	1007,0	1015,1	1028,4	1026,9	981,7	1022,0	1040,2	1031,6	1019,1	1012,0	23,7	-0,1	19,3
95	1007,6	1017,0	1029,9	1027,4	983,4	1023,5	1041,3	1031,8	1020,2	1014,0	23,7	-0,1	19,3

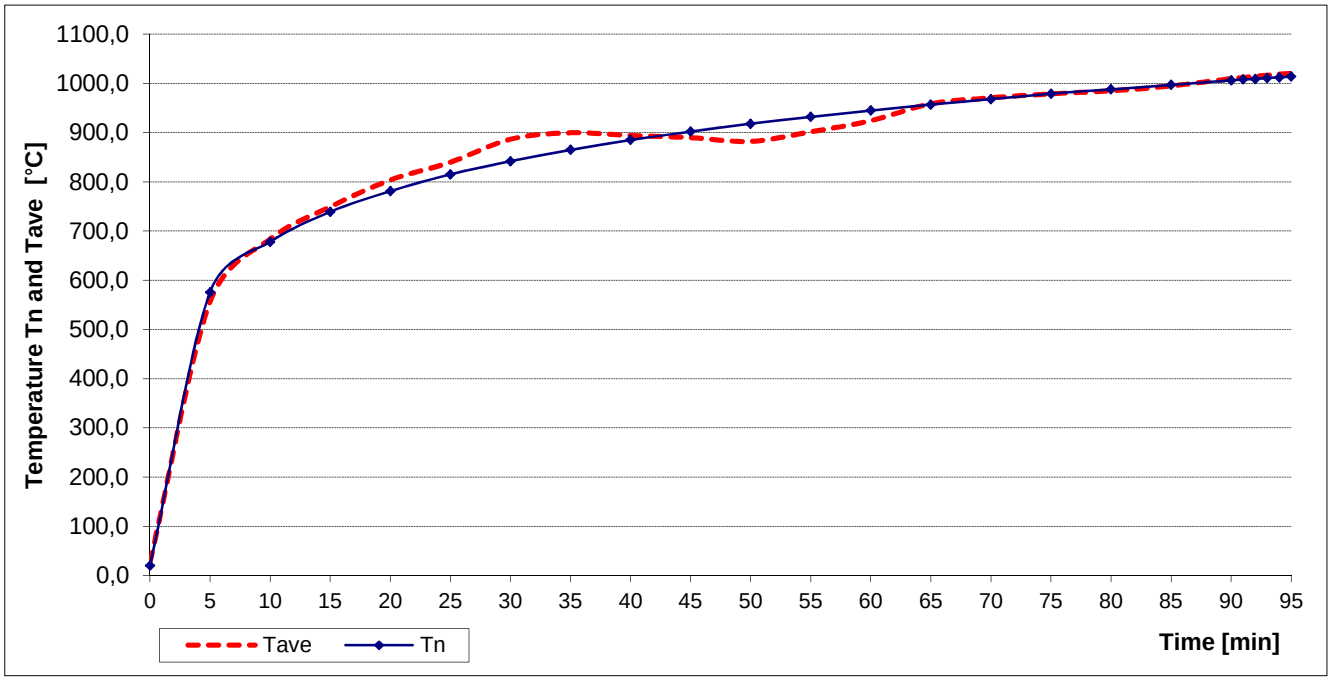
Tave Average temperature in the test furnace calculated from plate thermometers
Tn Standard temperature in the test furnace laid down to test guideline
To Ambient temperature
d_e Deviation of the average temperature from the standard temperature calculated according to test guideline
p Pressure inside the test furnace measured under the ceiling of the test furnace

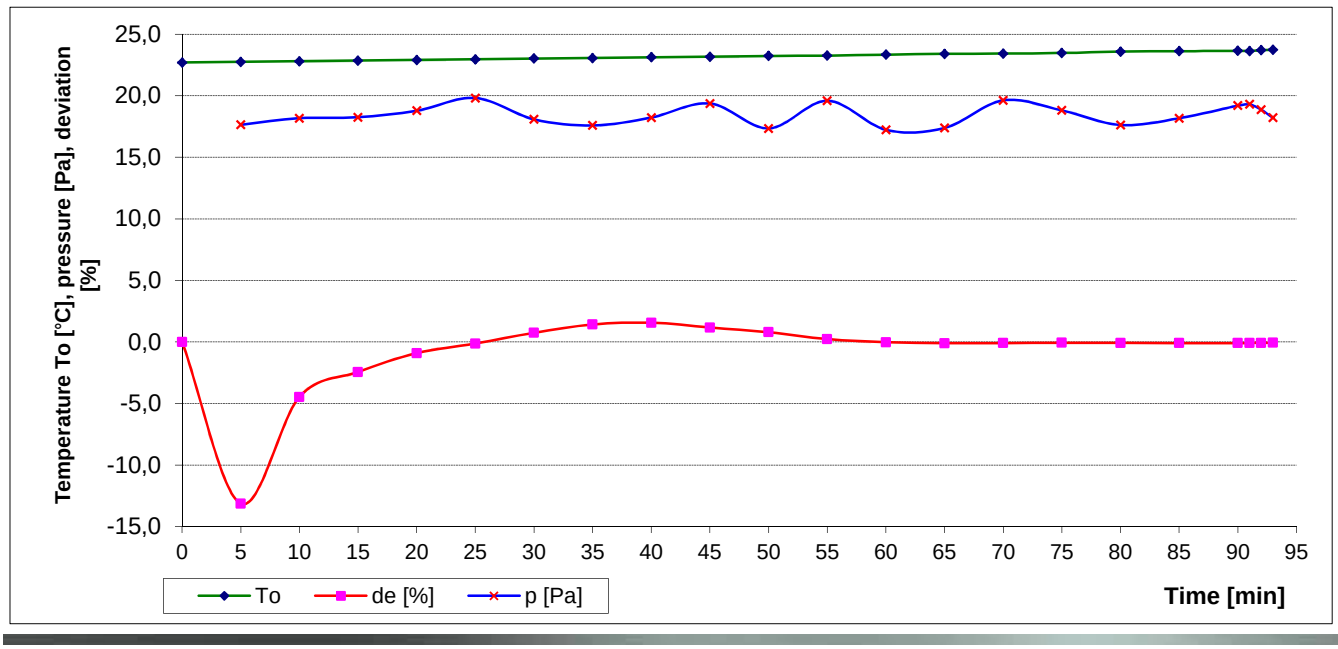
Layout of measuring points inside the test furnace:



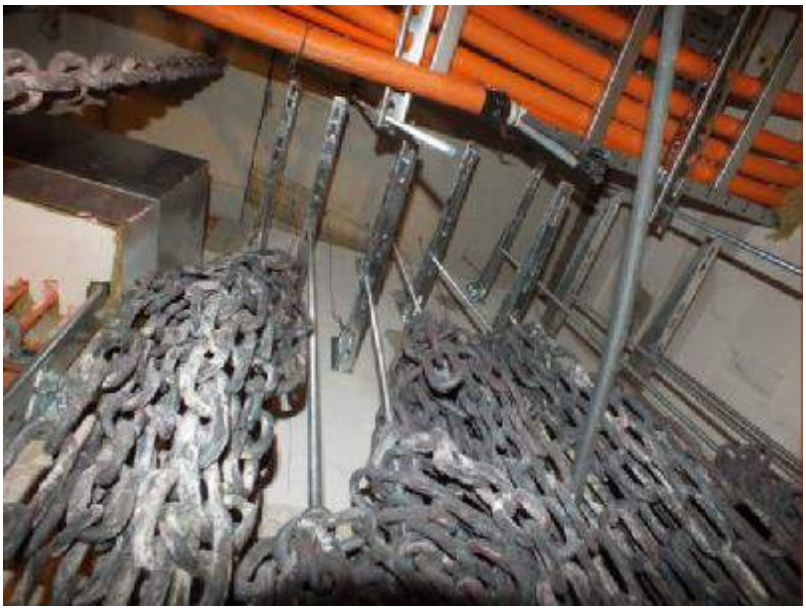
Measured values inside the test furnace /graph





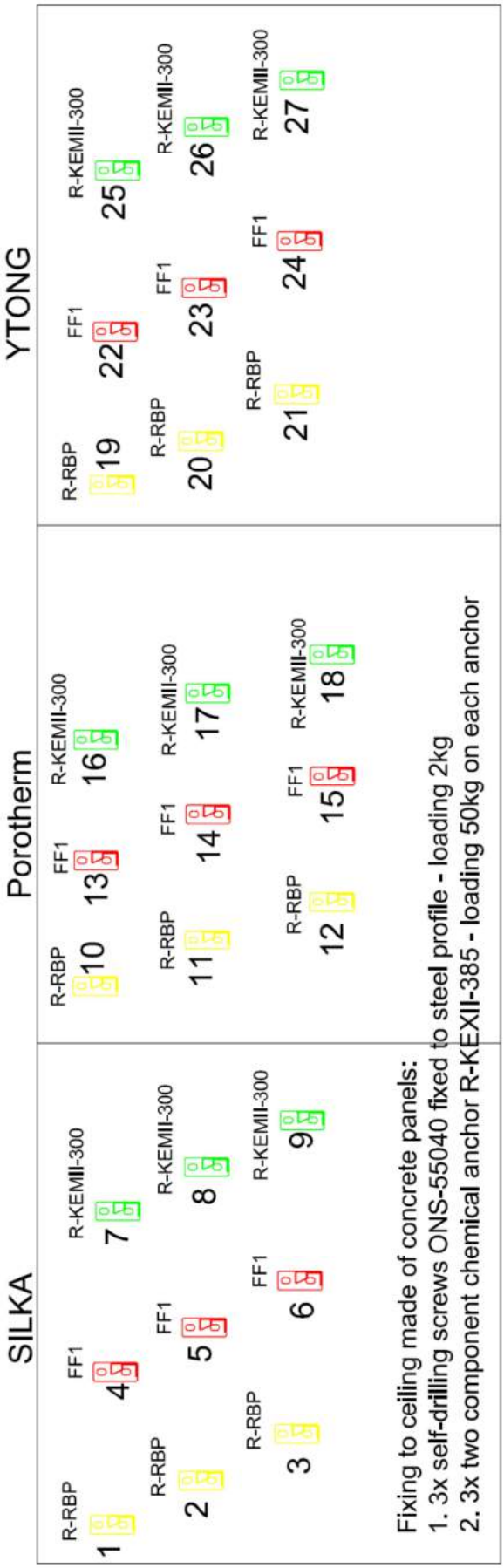


PHOTOS TAKEN BEFORE THE TEST



PHOTOS TAKEN AFTER THE TEST

DRAWINGS


SILKA
Porotherm
YTONG
R-RBP
FF1
R-KEMII-300
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Fixing to ceiling made of concrete panels:
1. 3x self-drilling screws ONS-55040 fixed to steel profile - loading 2kg
2. 3x two component chemical anchor R-KEXII-385 - loading 50kg on each anchor

DRAWINGS

Self-drilling screws

RAWLPLUG

ONS Stainless steel self-drilling screws

Stainless steel self drilling screw with the special drill bit shape designed to provide quick and trouble-free installation in metal constructions made from hot rolled sections

Approvals and Reports

- ETA-10/0183

Product information

Features and benefits

- Stainless steel self drilling screw made with BIMETAL
- Hardened surface of the thread (flexible core). Corrosion resistant zinc coating of thickness not less than 12 um. The shape of the thread and its height is closely related to the intended use of self drilling fixing into steel construction.
- Self vulcanizing EPDM washer. Temperature and UV resistant. The special shape of the washer ensures proper seating of the sealing material on the outer cladding material fixture which guarantees a proper seal.
- The drill bit is designed to provide quick and trouble-free installation in the steel. Sharp point of the drill prevents movement of the surface of the fixture.

Applications

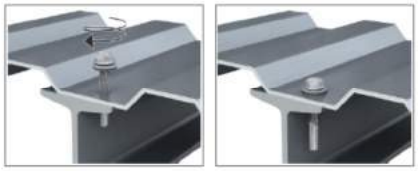
- For fixing of: Za pričvršćivanje: Nosných a krycích plechů pro střešní a fasádní konstrukce

Base materials

Approved for use in:

- Structural Steel

Installation guide



1. Screw must be installed at 90 degrees to substrate.
2. Special driver must be used.
3. Lowest torque setting on impact screwdriver to start.
4. Reduce speed when the washer starts to deform.
5. Use a cordless Impact screwdriver. Note: Never use a power drill.
6. For installation please use screwdriver of load capacity 1600 - 2000 rpm with regulated trogue.

DRAWINGS

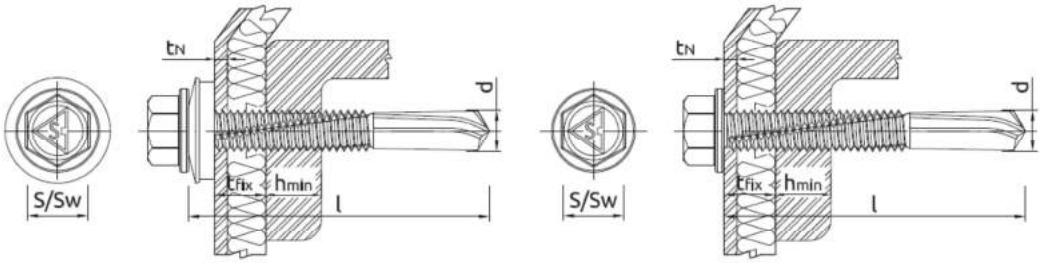
Self-drilling screws

RAWLPLUG

Product information

Size	Product Code	Screw			Fixture		Max. drilling thickness	Washer size
		Diameter	Length	Head size	Max. thickness with washer	Max. thickness without washer		
		d	l	S	t_{fix}			
		[mm]						
Ø5.5	ONS-55040	5.5	40	8	17	20	12	14, 16, 19

Installation data



Size			Ø5.5
Screw diameter	d	[mm]	5.5
Hole diameter in substrate	d_0	[mm]	-
Min. hole depth in substrate	h_0	[mm]	-
Installation depth	h_{nom}	[mm]	-
Min. substrate thickness	h_{min}	[mm]	4
Min. spacing	s_{min}	[mm]	30
Min. edge distance	c_{min}	[mm]	10
Wrench size	Sw	[mm]	8

Basic performance data

Performance data for single screw without influence of edge distance and spacing

Size		TENSION LOAD	SHEAR LOAD
		Ø5.5 (S16)	Ø5.5
MEAN ULTIMATE LOAD			
Substrate thickness 4,00mm	[kN]	2.23	-
Substrate thickness 4mm	[kN]	-	2.17
CHARACTERISTIC LOAD			
Substrate thickness 4,00mm	[kN]	1.67	-
Substrate thickness 4mm	[kN]	-	1.38
DESIGN LOAD			
Substrate thickness 4,00mm	[kN]	1.26	-
Substrate thickness 4mm	[kN]	-	1.04
RECOMMENDED LOAD			
Substrate thickness 4,00mm	[kN]	0.90	-
Substrate thickness 4mm	[kN]	-	0.74

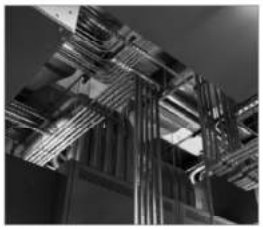
DRAWINGS

Lightweight fixings

RAWLPLUG

FF1-N-K FRAME FIXING WITH COLLAR - HEX HEAD - ZINC PLATED

Universal frame fixing with collar and hex head screw for many applications



Approvals and Reports

- ETA-12/0398 (Ø10)

ETA CE

Product information

Features and benefits

- The FF1 blue plug is collared for fixing of hard materials such as steel
- Specially-formulated Ultramid nylon allows best performance installation for use in all base material categories according to ETAG 020 (A, B, C, D)
- The zinc plated flanged hex head screw (also with T40) can be installed using a hex socket
- Internal plug geometry designed to fit the screw head
- Embedment depth markings facilitate precise installation

Applications

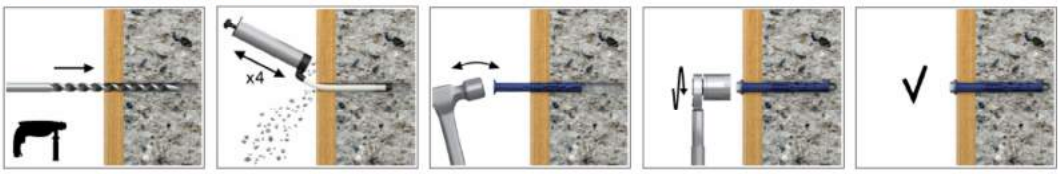
- Fixing of timber or metal battens in concrete or masonry, including solid brick, hollow brick and aerated concrete
- Cable conduits and wires
- Gates
- Industrial doors
- Satelite dishes
- Barriers
- Garage doors
- Facade (substructures made of wood and metal)

Base materials

Approved for use in:

- Concrete C12/15-C50/60 (Use category A)
- Cracked concrete C20/25-C50/60
- Solid Brick (Use category B)
- Solid Sand-lime Brick (Use category B)
- Hollow Sand-lime Brick (Use category C)
- Hollow Brick (Use category C)
- Hollow Lightweight Concrete Block (Use category C)
- Aerated Concrete Block (Use category E)

Installation guide



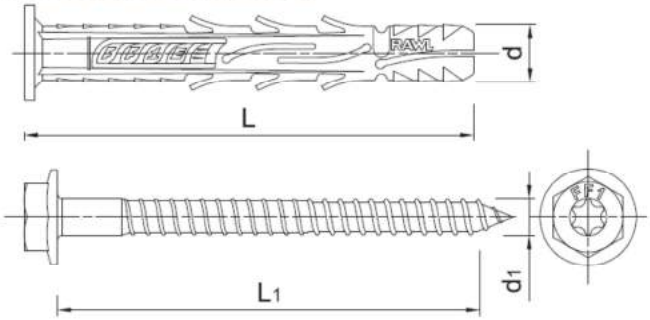
1. Drill a hole of required diameter and depth
2. With a hammer, lightly tap the plug through the fixture into hole until fixing depth is reached
3. Tighten the FF1 screw

DRAWINGS

Lightweight fixings

RAWLPLUG

Product information



Size	Product Code	Plug		Screw		Fixture		
		Diameter	Length	Diameter	Length	Max. thickness		Hole diameter
		d	l	d_1	L1	t_{fix} 50	t_{fix} 70	d_f
		[mm]						
Ø10	R-FF1-N-10K080	9.8	80	7	89	30	10	10
	R-FF1-N-10K100	9.8	100	7	109	50	30	10
	R-FF1-N-10K120	9.8	120	7	129	70	50	10
	R-FF1-N-10K140	9.8	140	7	149	90	70	10
	R-FF1-N-10K160	9.8	160	7	169	110	90	10
	R-FF1-N-10K200	9.8	200	7	209	150	130	10
	R-FF1-N-10K240	9.8	240	7	249	190	170	10
	R-FF1-N-10K300	9.8	300	7	309	250	230	10
Ø14	R-FF1-N-14K120	13.8	120	10.8	131	-	50	14
	R-FF1-N-14K160	13.8	160	10.8	171	-	90	14
	R-FF1-N-14K200	13.8	200	10.8	211	-	130	14
	R-FF1-N-14K240	13.8	240	10.8	251	-	170	14

Installation data

Size			Ø10	Ø10	Ø14
Effective embedment depth	h_{ef}	[mm]	50	70	70
Fixing diameter	d	[mm]	9.8	9.8	10.8
Hole diameter in substrate	d_0	[mm]	10	10	14
Min. hole depth in substrate	h_0	[mm]	60	80	80
Installation depth	h_{nom}	[mm]	50	70	70
Min. substrate thickness	h_{min}	[mm]	100	115	115
Min. spacing	s_{min}	[mm]	90	200	200
Min. edge distance	c_{min}	[mm]	80	100	100
Head size		[mm]	13	13	-
Screw drive		-	T40	T40	T50

DRAWINGS

Mechanical Anchors

RAWLPLUG

R-RBP Rawlbolt - Bolt Projecting for use in cracked and non-cracked concrete.

World's most popular all-purpose expanding shield anchor - bolt projecting version

Approvals and Reports

- ETA-11/0479 (M6 - M20)

Product information

Features and benefits

- RAWLBOLT® - first ever mechanical anchor in the world, forerunner of all of the later mechanical anchors
- For use in cracked and non-cracked concrete (ETA option 1), hollow-core slabs, flooring blocks and ceramics
- Product recommended for applications requiring fire resistance
- Three-pieces expanding sleeve of maximum expansion provides optimal load and safety of use in any substrate
- Wide range of diameters (M6 to M24)

Applications

- Roller shutter doors
- Fire doors
- Steelwork
- Security grills
- Heavy machinery
- Pipework/duct work support

Base materials

Approved for use in:

- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60
- Unreinforced concrete
- Reinforced concrete

Also suitable for use in:

- Solid clay bric ≥20MPa
- Hollow Sand-lime Brick ≥15MPa
- Natural Stone
- Hollow Lightweight Concrete Block
- Hollow-core Slab
- Concrete hollow floor block (eg. Teriva)

Installation guide

1. Drill a hole of required diameter and depth. Note: When fixing into brickwork, mortar joints should be avoided
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Remove nut and washer and insert anchor into hole. Tap home with hammer until flush with surface
4. Position fixture over the projecting bolt
5. Add washer and nut and tighten to recommended torque

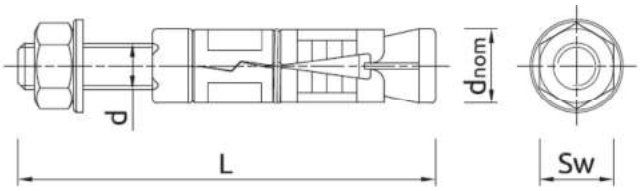
www.rawlplug.com | 1

DRAWINGS

Mechanical Anchors

RAWLPLUG

Product information



Size	Product Code	Anchor				Fixture		
		Diameter	External diameter	Length	Thread diameter	Max. thickness	Min. thickness	Hole diameter
		d	d_{sleeve}	L	d	t_{fix}		d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBP-M06/10W	6	12	65	10	10	-	6,5
	R-RBP-M06/25W	6	12	80	25	25	-	6,5
	R-RBP-M06/60W	6	12	115	60	60	-	6,5
M8	R-RBP-M08/10W	8	14	75	10	10	-	9
	R-RBP-M08/25W	8	14	90	25	25	-	9
	R-RBP-M08/60W	8	14	125	60	60	-	9
M10	R-RBP-M10/15W	10	16	90	15	15	-	11
	R-RBP-M10/30W	10	16	105	30	30	-	11
	R-RBP-M10/60W	10	16	135	60	60	-	11
M12	R-RBP-M12/15W	12	20	110	15	15	-	13
	R-RBP-M12/30W	12	20	125	30	30	-	13
	R-RBP-M12/75W	12	20	170	75	75	-	13
M16	R-RBP-M16/15W	16	25	150	15	15	-	17
	R-RBP-M16/35W	16	25	170	35	35	10	17
	R-RBP-M16/75W	16	25	210	75	75	35	17
M20	R-RBP-M20/15W	20	32	170	15	15	-	22
	R-RBP-M20/30W	20	32	185	30	30	10	22
	R-RBP-M20/100W	20	32	255	100	100	30	22
M24	R-RBP-M24/75W	24	38	255	75	75	-	26
	R-RBP-M24/150W	24	38	300	150	150	75	26

DRAWINGS

Technical Data Sheet

R-RBL, R-RBP – Shield anchors for use in hollow substrates

BASIC PRODUCT INFORMATION

SUBSTRATES:

- Hollow core slab min. C20/25
- Solid clay brick min. 20MPa acc. to EN 771-1
- Silicate hollow block min. 15MPa acc. to EN 771-2
- Lightweight concrete hollow blocks min 5MPa acc. to EN 771-3
- Concrete filler block (eg. Teriva 4.0/2) for beam-and-block flooring

FEATURES:

- Not through anchoring
- Dry internal conditions
- Carbon steel zinc electroplated, class 5.8
  coating thickness min. 5µm acc. EN ISO 4042
- Class A1 reaction to fire exposure(Directive 96/603/EC)

R-RBL – Loose bolt
R-RBP – Bolt projecting

MECHANICAL PROPERTIES

Size			M6	M8	M10	M12	M16	M20
Nominal tensile strength	f_{uk}	[N/mm²]	500	500	500	500	500	500
Nominal yield strength	f_{yk}	[N/mm²]	400	400	400	400	400	400
Cross-sectional area	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0	245.0
Section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12	785.40
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12.72	30.16	58.90	101.79	241.27	471.24
Design bending resistance	M	[Nm]	10.18	24.13	47.12	81.43	193.02	376.99

RAWLBOLT – Shield anchor for use in hollow core slab and ceramic substrates.

AT-15-7280/2014

CERTIFICATE N°		R-RBL/P-7280-14	
WRITTEN:	Marian Bober	DATA:	2014-02-19
CHECKED:	Elżbieta Rogóż	DATA:	2015-10-22
APPROVED:	Marian Bober	DATA:	2015-10-22

Last update 2015-10-22

Page **1** of **7**

DRAWINGS

Technical Data Sheet

R-RBL, R-RBP – Shield anchors for use in hollow substrates

Rozmiar	Product Code		Anchor			Fixture	
	Loose Bolt	Bolt Projecting	Thread diameter	External diameter	Length	Max. thickness	Hole diameter
			d	d_{nom}	L	t_{fix}	d_f
			[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBL-M06/10	-	6.0	12.0	55	10	6.5
	-	R-RBP-M06/10	6.0	12.0	65	10	6.5
	R-RBL-M06/25	-	6.0	12.0	70	25	6.5
	-	R-RBP-M06/25	6.0	12.0	80	25	6.5
	R-RBL-M06/40	-	6.0	12.0	85	40	6.5
	-	R-RBP-M06/60	6.0	12.0	115	60	6.5
M8	R-RBL-M08/10	-	8.0	14.0	65	10	9.0
	-	R-RBP-M08/10	8.0	14.0	75	10	9.0
	R-RBL-M08/25	-	8.0	14.0	80	25	9.0
	-	R-RBP-M08/25	8.0	14.0	90	25	9.0
	R-RBL-M08/40	-	8.0	14.0	95	40	9.0
	-	R-RBP-M8/60	8.0	14.0	125	60	9.0
M10	R-RBL-M10/10	-	10.0	16.0	75	10	11.0
	-	R-RBP-M10/15	10.0	16.0	90	15	11.0
	R-RBL-M10/25	-	10.0	16.0	90	25	11.0
	-	R-RBP-M10/30	10.0	16.0	105	30	11.0
	R-RBL-M10/50	-	10.0	16.0	115	50	11.0
	-	R-RBP-M10/60	10.0	16.0	135	60	11.0
	R-RBL-M10/75	-	10.0	16.0	140	75	11.0
M12	R-RBL-M12/10	-	12.0	20.0	90	10	13.0
	-	R-RBP-M12/15	12.0	20.0	110	15	13.0
	R-RBL-M12/25	-	12.0	20.0	105	25	13.0
	-	R-RBP-M12/30	12.0	20.0	125	30	13.0
	R-RBL-M12/40	-	12.0	20.0	120	40	13.0
	R-RBL-M12/60	-	12.0	20.0	140	60	13.0
	-	R-RBP-M12/75	12.0	20.0	170	75	13.0
M16	R-RBL-M16/15	-	16.0	25.0	135	15	17.0
	-	R-RBP-M16/15	16.0	25.0	150	15	17.0
	R-RBL-M16/30	-	16.0	25.0	150	30	17.0
	-	R-RBP-M16/35	16.0	25.0	170	35	17.0
	R-RBL-M16/60	-	16.0	25.0	180	60	17.0
	-	R-RBP-M16/75	16.0	25.0	210	75	17.0
M20	-	R-RBP-M20/15	20.0	32.0	170	15	22.0
	-	R-RBP-M20/30	20.0	32.0	185	30	22.0
	R-RBL-M20/60	-	20.0	32.0	195	60	22.0
	R-RBL-M20/100	-	20.0	32.0	235	110	22.0
	-	R-RBP-M20/100	20.0	32.0	255	100	22.0

DRAWINGS

Bonded Anchors

RAWLPLUG

R-KEX II with Threaded Rods

Premium pure epoxy resin approved for use in cracked and non-cracked concrete

Approvals and Reports

- ETA-13/0455

Product information

Features and benefits

- The strongest resin in the epoxy resin class
- Approved for use with threaded rods for use in cracked and non-cracked concrete (ETAG001 Option 1)
- Suitable for use in dry and wet substrates including under water
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides option of use in diamond-drilled holes and oversized holes
- Extended bonding time ensures easy installation of metal components (up to 30 min. in 20°C)
- For use in positive temperatures

Applications

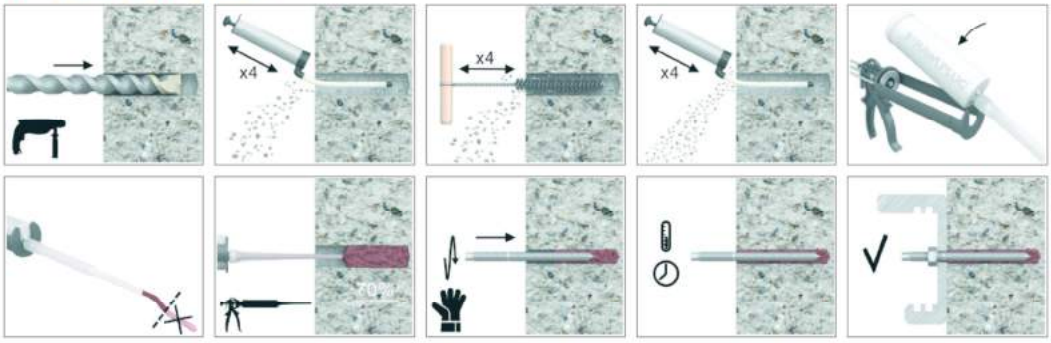
- Safety barriers
- Formwork support systems
- Structural steelwork
- Street lamps
- Curtain walling
- Racking systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Heavy machinery
- Platforms

Base materials

Approved for use in:

- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60

Installation guide



DRAWINGS

Product information

1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole with brush and hand pump at least four times each. It is very important and necessary before installation.
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until even colour is obtained.
5. Insert the mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
6. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets and leave it undisturbed until the curing time elapses.
7. Attach fixture and tighten the nut to the required torque.

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter d [mm]	Length L [mm]	Hole diameter d_f [mm]	Max. thickness $t_{fix,min}$ [mm]	Max. thickness $t_{fix,1}$ [mm]	Max. thickness $t_{fix,max}$ [mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	20	-
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	90	70	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	28	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	88	68	38
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	108	88	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	35	-
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	95	65	30
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	125	95	60
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	165	135	100
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	205	175	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	46	-
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	181	156	91
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	261	236	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	67	-
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	157	107	37
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	207	157	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	132	62	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	106	-

DRAWINGS

Technical Data Sheet

R-KEMII – Polyester bonded anchor for use in masonry

BASIC PRODUCT INFORMATION

SUBSTRATE:

- Solid clay brick min 20MPa (i.e. Mz20/2.0) acc. EN 771-1
- Autoclaved aerated concrete block min 6.0MPa (AAC7) acc. EN 771-4
- Solid silicate brick min 20MPa (i.e. KS NF 20/2.0) acc. EN 771-2
- Silicate hollow block min 12MPa (i.e. KS Ratio Block 8DF)Acc. EN 771-2
- Perforated ceramic blocks min 12MPa (i.e. Proton Hlz 12/0.9 DF) acc. EN 771-1
- Perforated ceramic blocks min 15MPa (i.e. Wienerberger Porotherm) acc. EN 771-1
- Perforated ceramic blocks min 10MPa (i.e. Leiter Thermopor)acc. EN 771-1
- Perforated ceramic blocks min 15MPa (i.e. MEGA MAX) acc. EN 771-1
- Perforated ceramic blocks min 6.0MPa (i.e. LS Tableau Mono Rect) acc. EN 771-1
- Perforated ceramic blocks min 6.0MPa (i.e. Tableau Rect) acc. EN 771-1
- Perforated ceramic blocks min 6.0MPa (i.e. LS Monomur) acc. EN 771-1
- Perforated ceramic blocks min 6.0MPa (i.e. SM BGV Thermo) acc. EN 771-1
- Perforated ceramic blocks min 6.0MPa (i.e. SM BGV Thermo Plus) acc. EN 771-1
- Lightweight concrete hollow block min 2.0MPa

FEATURES:

- Styrene free resin (odourless)
- ETAG 029
- **R-KEMII** – basic version
- **R-KEMII-S** – summer version (to +40°C)
- **R-KEMII-W** – winter version (to -20°C)

R-STUDS

- R-STUD – carbon steel, class 5.8 acc. EN ISO 898-1
- R-STUD-88 – carbon steel , class 8.8 acc. EN ISO 898-1
- Coating thickness min. 5µm acc. EN ISO 4042
- R-STUD-A4 – stainless steel, grade A4-70, A4-80 acc. EN ISO 3506
- Steel material 1.4401, 1.4404, 1.4571 acc. EN 10088

DRAWINGS

Technical Data Sheet

R-KEMII – Polyester bonded anchor for use in masonry

Size	Product Code			Anchor		Fixture (Max. thickness)			
						Solid substrates	Hollowed substrates		Hole diameter
				Thread diameter	Length	For h_{stand}	For h_{stand}	For h_{max}	
	Steel class 5.8	Steel class 8.8	Steel grade A4	D	L	t_{fix}	t_{fix}	t_{fix}	d_f
				[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	20	50	15	9
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	70	100	65	9
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	33	33	-	12
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	73	73	33	12
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	93	93	53	12
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	50	60	20	14
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	80	90	50	14
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	110	120	80	14
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	150	160	120	14
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	190	200	160	14
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	66	86	-	18
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	96	116	-	18
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	136	156	-	18
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	176	196	-	18
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	256	276	-	18

DRAWINGS

Bonded Anchors

RAWLPLUG

R-KEM II with Threaded Rods for Concrete

Universal polyester (styrene free) resin - European Approval for 15 substrates

Approvals and Reports

- ETA-12/0394

Product information

Features and benefits

- The most convenient bonded anchor for general pupose use
- Quick, secure and simple installation
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications where mechanical anchors are not suitable
- Easy dosage thanks to patented self-opening system and use of manual or pneumatic gun
- Option of use standard manual silicone gun
- Suitable for multiple use. Partly used product can be reused after fitting new nozzle

Applications

- Staircases
- Gates
- High racking
- Canopies
- Sanitary appliances
- Steel constructions
- Railings
- Handrails
- Consoles
- Ladders
- Cable trays

Base materials

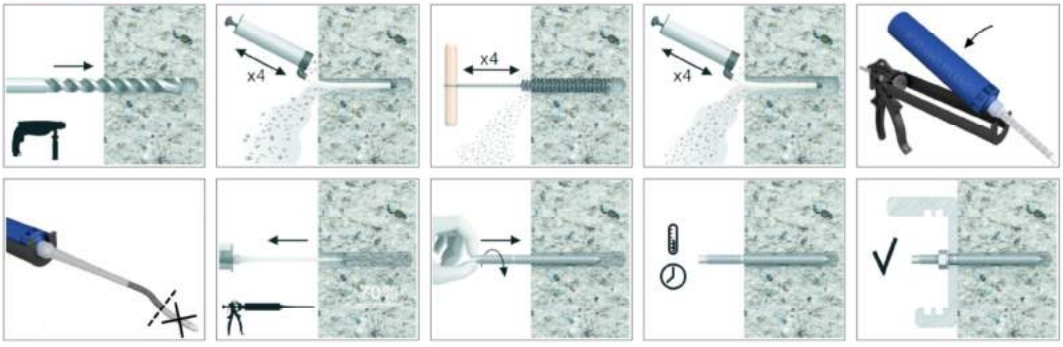
Approved for use in:

- Non-cracked concrete C20/25-C50/60

Also suitable for use in:

- Natural Stone

Installation guide



DRAWINGS

Product information

1. Drill hole to the required diameter and depth for stud size being used.
2. Solid substrates: clean the hole with brush and hand pump at least four times each. It is very important and necessary before installation. Hollow substrates: insert mesh sleeve into the hole.
3. Insert cartridge into gun and attach nozzle.
4. Dispense to waste until even colour is obtained.
5. Insert the mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
6. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets and leave it undisturbed until the curing time elapses.
7. Attach fixture and tighten the nut to the required torque.

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KEM-II-175	R-KEMII	Styrene Free Polyester Resin	175
R-KEM-II-175-SET		Set with 4 studs and plastic sleeves	
R-KEM-II-300		Styrene Free Polyester Resin	300
R-KEM-II-300-SET		Set with 4 studs and plastic sleeves	
R-KEM-II-300-S	R-KEMII-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-KEM-II-300-W	R-KEMII-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	
R-KEM-II-380	R-KEMII	Styrene Free Polyester Resin	380

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter d [mm]	Length L [mm]	Hole diameter d_f [mm]	Max. thickness $t_{fix,min}$ [mm]	$t_{fix,s}$ [mm]	$t_{fix,max}$ [mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	40	20	-
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	90	70	50
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	48	28	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	88	68	38
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	108	88	58
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	65	35	-
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	95	65	30
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	125	95	60
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	165	135	100
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	205	175	140
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	71	46	-
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	181	156	91
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	261	236	171
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	117	67	-
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	157	107	37
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	207	157	87
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	132	62	-
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	181	106	-

8. FINAL PROVISION

§ This report details the method of construction, the test conditions and results obtained when the specific element of construction described herein was following the procedure outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

§ Because of the nature of the fire resistance testing and consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

§ The test results refer only to the tested subjects. This test report is not an approval of the tested product by the test laboratory or the accreditation body overseeing the laboratory's activities. The test was carried out on testing equipment that is the property of FIRES, s.r.o., Batizovce. Without the written permission of the test laboratory this test report may be copied and/or distributed only as the whole. Any modifications of the test report can be made only by the fire resistance test laboratory FIRES, s.r.o., Batizovce.

Approved by:

Ing. Štefan Rástocký
leader of the testing laboratory

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Prepared by:

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technician of the testing laboratory

9. NORMATIVE REFERENCES

ETAG 001: 2006	Guideline for European Technical Approval of metal anchors for use in concrete. Part one: Anchors general
TR 020: 2004	Evaluation of Anchorages in Concrete concerning Resistance to Fire
EN 1363-1: 2012	Fire resistance tests. Part 1: General requirements
EN 1363-2: 1999	Fire resistance tests. Part 2: Alternative and additional procedures

THE END OF THE TEST REPORT