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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

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European Technical Assessment

ETA-17/0806 of 29/12/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	R-LX
Product family to which the construction product belongs	Concrete Screw for use in cracked and non cracked concrete
Manufacturer	RAWLPLUG S.A. ul. Kwidzyńska 6 51-416 Wrocław Poland
Manufacturing plant	Manufacturing Plant no. 2
This European Technical Assessment contains	18 pages including 3 Annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 330232-00-0601 “Mechanical fasteners for use in concrete” and 330011-00-0601 “Adjustable concrete screw”

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Specific Part

1 Technical description of the product

The R-LX concrete screw is an anchor made of heat treated and zinc plated (ZP) or zinc flaked (ZF) steel. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into a concrete member while setting. The anchorage is characterized by mechanical interlock in the special thread.

The description of the product is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

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

The performances given 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 or the Technical Assessment Body, but are to be regarded only as a means for choosing the right 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance under static and quasi-static loading	See Annex C1 and C2
Displacements under tension and shear loads	See Annex C2

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	See Annex C3

3.1.3 Safety and accessibility in use (BWR 4)

For Basic Requirement Safety and accessibility in use are included under Basic Requirement Mechanical resistance and stability (BWR 1).

3.2 Methods used for the assessment

The assessment of fitness of the anchors for the declared intended use has been made in accordance with the EAD 330232-00-0601 "*Mechanical fasteners for use in concrete*" and 330011-00-0601 "*Adjustable concrete screw*".

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

According to Decision 96/582/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete structural elements (which contributes to the stability of the works) or heavy units	–	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

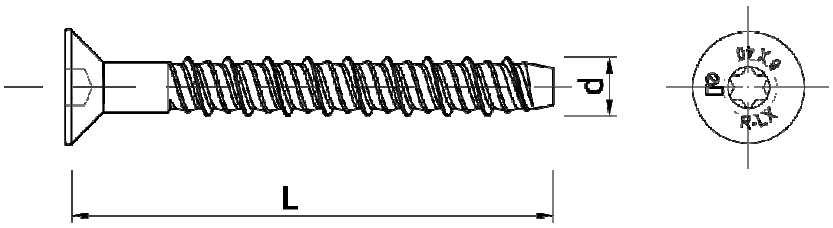
Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

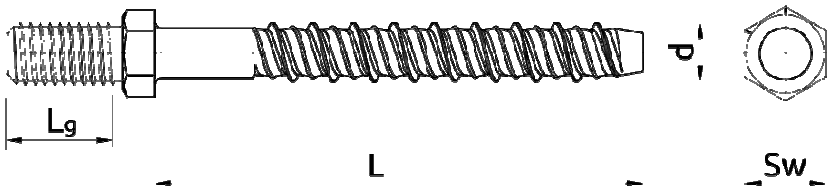
Issued in Warsaw on 29/12/2017 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB

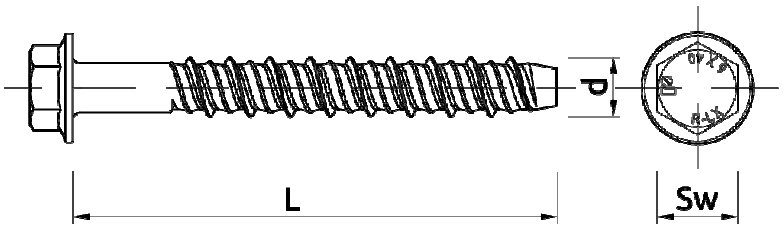
R-LX-CS



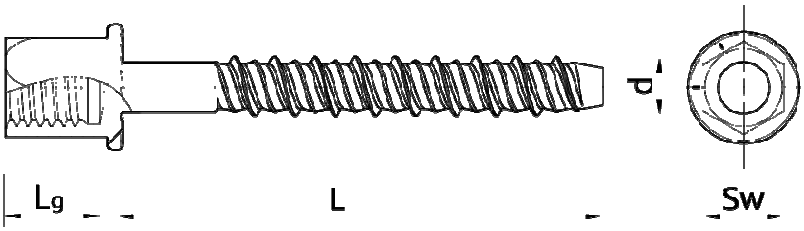
R-LX-E



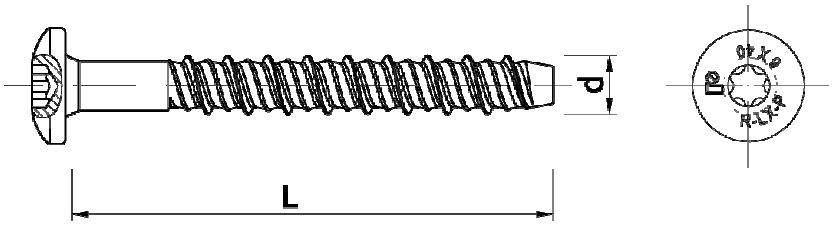
R-LX-HF



R-LX-I



R-LX-P



R-LX	**Annex A1** of European Technical Assessment ETA-17/0806
Product description Characteristic of the product	

Table A1: Dimensions and materials for R-LX-HF, R-LX-CS and R-LX-P

Anchor size			**R-LX-05**	**R-LX-06**	**R-LX-08**	**R-LX-10**	**R-LX-14**
Thread size	d	mm	6,3	7,5	10,0	12,5	17,0
Length of anchor	L	mm	45 - 75	45 - 150	60 - 150	65 - 160	80 - 135
Nominal hole diameter	d_0	mm	5	6	8	10	14
Tip chamfer	h_s	mm	2,5	3	4	4,5	6
Pitch	h_t	mm	5	6	7	8	12
Material: Carbon steel	f_{uk}	N/mm^2	1300	1250	1200	1050	1020
	f_{yk}	N/mm^2	1150	1100	1050	950	800
Coating			Zinc Plated (ZP ≥ 5 µm) or Zinc Flaked (ZF ≥ 5 µm)				

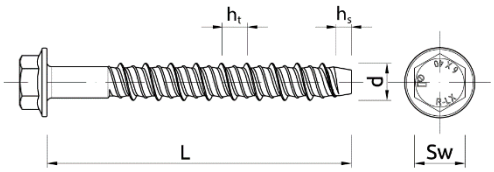
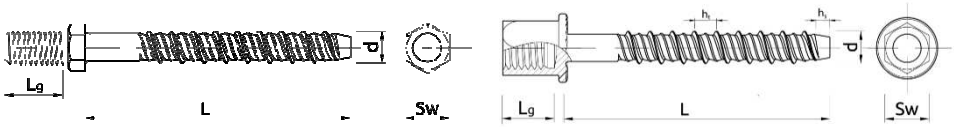


Table A2: Dimensions and materials for R-LX-I and R-LX-E

Anchor size			**R-LX-05**	**R-LX-06**	**R-LX-08**	**R-LX-10**
Thread size	d	mm	6,3	7,5	10,0	12,5
Length of anchor	L	mm	45 - 75	45 - 150	60 - 150	65 - 160
Nominal hole diameter	d_0	mm	5	6	8	10
Tip chamfer	h_s	mm	2,5	3	4	4,5
Pitch	h_t	mm	5	6	7	8
Minimum thread length	L_g ≥	mm	8	8	8	8
Interial/exterial thread		-	M6	M8 or M10	M10	M12
Material: Carbon steel	f_{uk}	N/mm^2	1300	1250	1200	1050
	f_{yk}	N/mm^2	1150	1100	1050	950
Coating			Zinc Plated (ZP ≥ 5 µm) or Zinc Flaked (ZF ≥ 5 µm)			



R-LX

Product description
Dimensions and materials

Annex A2

of European Technical Assessment ETA-17/0806

Intended use

Anchorages subject to:

- Static and quasi-static loads: all sizes and all embedment depth.
- Anchorages with requirements related to resistance to fire: all sizes and all embedment depth.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1:2000.
- Non cracked concrete: all sizes.
- Cracked concrete: all sizes.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

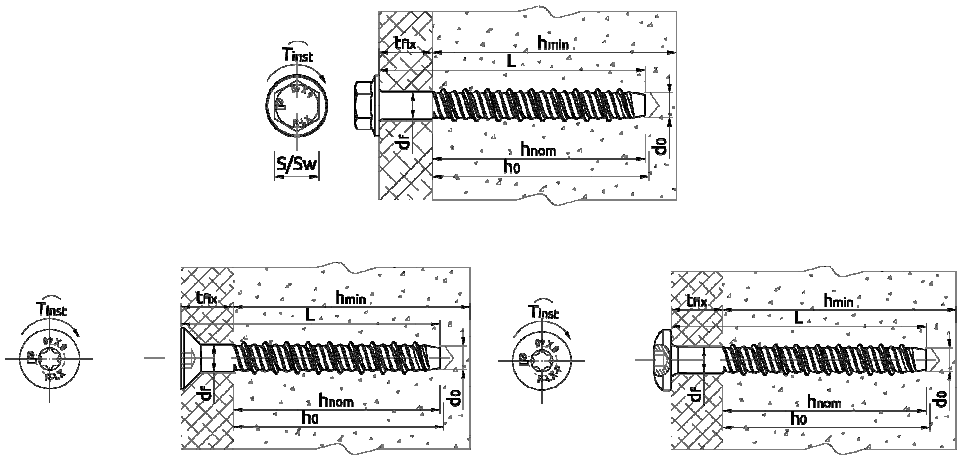
Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be transmitted. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static loads are designed in accordance with EOTA Technical Report TR 055 (ETAG 001 Annex C, Design method A, CEN/TS 1992-4-4:2009 and pr EN 1992-4).
- Anchorages under fire exposure are designed in accordance with EOTA Technical Report TR 020 and CEN/TS 1992-4-4:2009, Annex D (it has to be ensured that local spalling of the concrete cover does not occur).

Installation:

- Rotary hammer drilling only: all sizes and all embedment depth.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.
- Adjustability according to Annex B4 to B9: all sizes, anchorage depths acc. to Table C1.

R-LX	**Annex B1** of European Technical Assessment ETA-17/0806
Intended use Specification	



Installed anchor R-LX-HF, R-LX-CS and R-LX-P

Table B1: Installation parameters – **standard** embedment depth

Anchor size			**R-LX-05**	**R-LX-06**	**R-LX-08**	**R-LX-10**	**R-LX-14**
Nominal drill bit diameter	d_0	mm	5	6	8	10	14
Cutting diameter of drill bit	$d_{cut} \leq$	mm	5,40	6,40	8,45	10,45	14,50
Depth of drill hole	$h_0 \geq$	mm	50	65	80	95	130
Nominal embedment depth	h_{nom}	mm	43	55	70	85	120
Effective embedment depth	h_{ef}	mm	32	42	53	65	92
Torque moment	T_{inst}	Nm	10	20	40	80	100
Clearance hole in the fixture	d_f	mm	7	9	12	14	18
Minimum thickness of member	h_{min}	mm	100	100	110	130	190
Thickness of the fixture, max.	t_{fix}	mm	$L - h_{nom}$				

Table B2: Installation parameters – **reduced** embedment depth

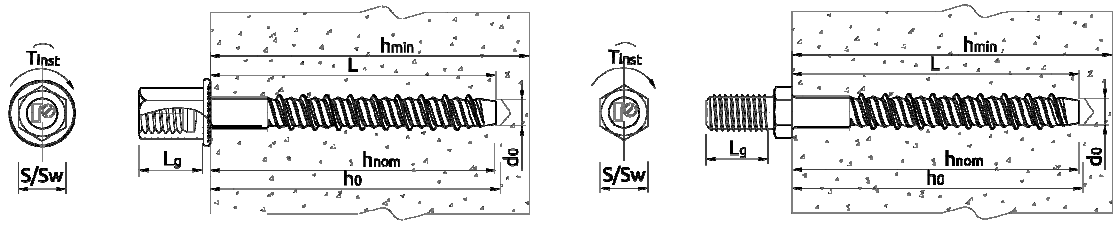
Anchor size			**R-LX-06**	**R-LX-08**	**R-LX-10**	**R-LX-14**
Nominal drill bit diameter	d_0	mm	6	8	10	14
Cutting diameter of drill bit	$d_{cut} \leq$	mm	6,40	8,45	10,45	14,50
Depth of drill hole	$h_0 \geq$	mm	50	60	65	85
Nominal embedment depth	h_{nom}	mm	43	50	55	75
Effective embedment depth	h_{ef}	mm	32	36	40	54
Torque moment	T_{inst}	Nm	20	40	80	100
Clearance hole in the fixture	d_f	mm	9	12	14	18
Minimum thickness of member	h_{min}	mm	100	100	100	110
Thickness of the fixture, max.	t_{fix}	mm	$L - h_{nom}$			

R-LX

Annex B2

of European Technical Assessment ETA-17/0806

Intended use
Installation parameters



Installed anchor R-LX-I and R-LX-E

Table B3: Installation parameters – **standard** embedment depth

Anchor size			**R-LX-05**	**R-LX-06**	**R-LX-08**	**R-LX-10**
Nominal drill bit diameter	d_0	mm	5	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	mm	5,40	6,40	8,45	10,45
Depth of drill hole	$h_0 \geq$	mm	50	65	80	95
Nominal embedment depth	h_{nom}	mm	43	55	70	85
Effective embedment depth	h_{ef}	mm	32	42	53	65
Torque moment	T_{inst}	Nm	10	20	40	80
Minimum thickness of member	h_{min}	mm	100	100	110	130

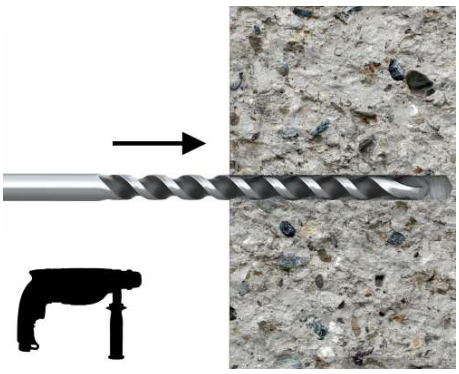
Table B4: Installation parameters – **reduced** embedment depth

Anchor size			**R-LX-06**	**R-LX-08**	**R-LX-10**
Nominal drill bit diameter	d_0	mm	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	mm	6,40	8,45	10,45
Depth of drill hole	$h_0 \geq$	mm	50	60	65
Nominal embedment depth	h_{nom}	mm	39	50	55
Effective embedment depth	h_{ef}	mm	32	36	40
Torque moment	T_{inst}	Nm	20	40	80
Minimum thickness of member	h_{min}	mm	100	100	100

Table B5: Minimum spacing and edge distance

Anchor size			**R-LX-05**	**R-LX-06**	**R-LX-08**	**R-LX-10**	**R-LX-14**
Minimum edge distance	c_{min}	mm	40	45	50	60	100
Minimum spacing	s_{min}	mm	40	45	50	60	100

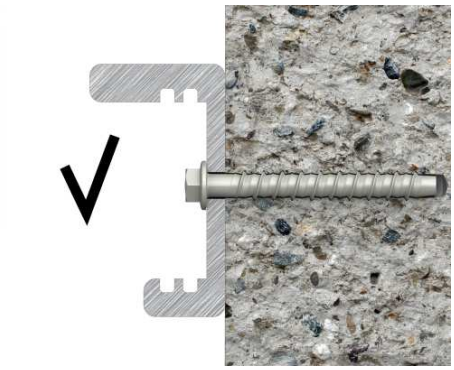
R-LX	**Annex B3** of European Technical Assessment ETA-17/0806
Intended use Installation parameters	



Drill the hole with rotary hammer drilling machine.
Drill to a required depth.

Blow out dust at least 4 times with a hand pump.

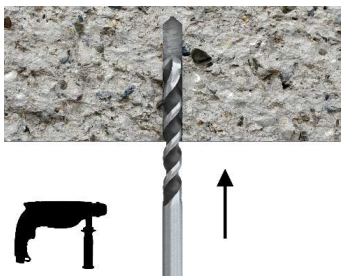
Install the anchor with a torque wrench or impact screw driver.



After installation.

R-LX	**Annex B4** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **without adjustment**	

R-LX-E



Drill the hole with rotary hammer drilling machine. Drill to a required depth.

Blow out dust at least 4 times with a hand pump.

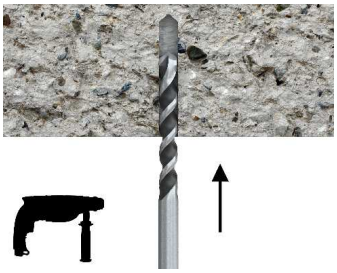
Tighten to the recommended torque.

Possibility of unscrewing and re-screwing.

After installation.

R-LX	**Annex B5** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **R-LX-E with adjustment**	

R-LX-I



Drill the hole with rotary hammer drilling machine.
Drill to a required depth.

Blow out dust at least 4 times with a hand pump.

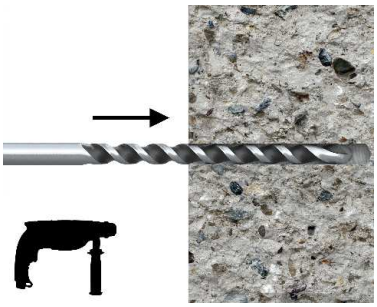
Tighten to the recommended torque.

Possibility of unscrewing and re-screwing.

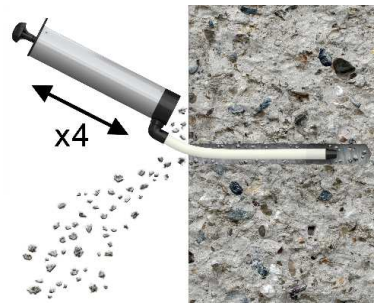
After installation.

R-LX	**Annex B6** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **R-LX-I with adjustment**	

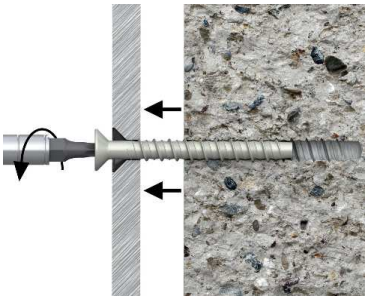
R-LX-CS



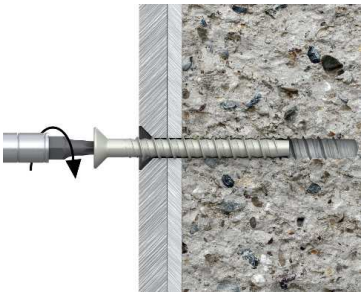
Drill the hole with rotary hammer drilling machine. Drill to a required depth.



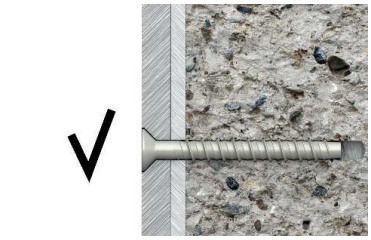
Blow out dust at least 4 times with a hand pump.



Possibility of unscrewing and re-screwing.



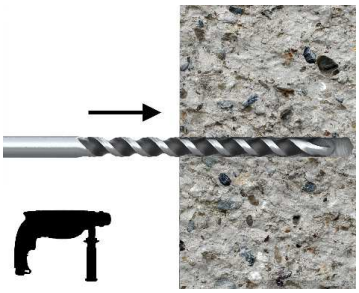
Tighten to the recommended torque.



After installation.

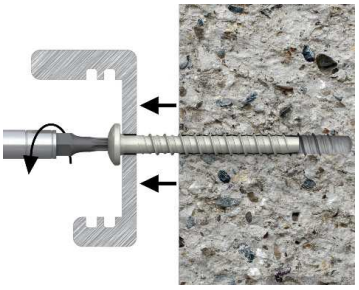
R-LX	**Annex B7** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **R-LX-CS with adjustment**	

R-LX-P

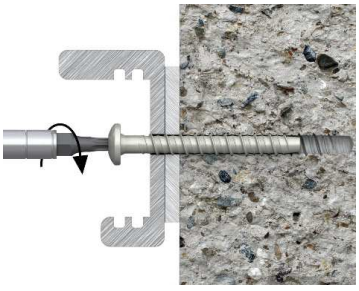


Drill the hole with rotary hammer drilling machine. Drill to a required depth.

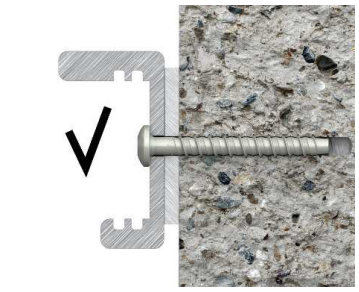
Blow out dust at least 4 times with a hand pump.



Possibility of unscrewing and re-screwing.



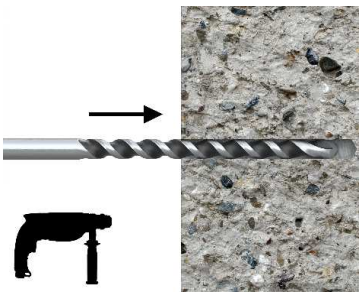
Tighten to the recommended torque.



After installation.

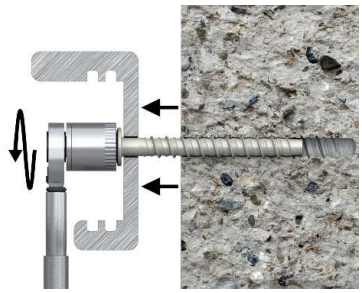
R-LX	**Annex B8** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **R-LX-P with adjustment**	

R-LX-HF



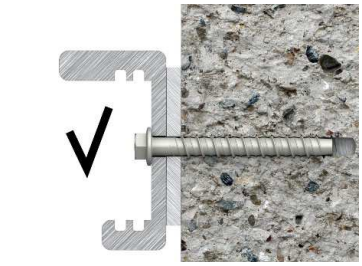
Drill the hole with rotary hammer drilling machine. Drill to a required depth.

Blow out dust at least 4 times with a hand pump.



Possibility of unscrewing and re-screwing.

Tighten to the recommended torque.



After installation.

R-LX	**Annex B9** of European Technical Assessment ETA-17/0806
Intended use Installation instruction and tools – **R-LX-HF with adjustment**	

Table C1: Characteristic resistance in cracked and non-cracked concrete C20/25 to C50/60, design method A

Anchor size			**R-LX-05**	**R-LX-06**		**R-LX-08**		**R-LX-10**		**R-LX-14**	
Nominal embedment depth	h_{nom}	[mm]	43	43	55	50	70	55	85	75	120
Adjustment											
Total max. thickness of adjustment layers	t_{adj}	[mm]	10	-	10	-	10	-	10	-	10
Max. number of adjustments	n_s	[-]	2	-	2	-	2	-	2	-	2
Steel failure											
Characteristic resistance	$N_{Rk,s}$	[kN]	25,5	35,4		60,4		82,4		157,0	
Partial safety factor	γ_{Ms} [1]	[-]	1,4	1,4		1,4		1,4		1,5	
Pull-out failure											
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	7,0	-) [5]	12,0	-) [5]	-) [5]	-) [5]	-) [5]	-) [5]	-) [5]
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	4,5	-) [5]	7,0	7,5	13,0	8,0	-) [5]	13,0	-) [5]
Installation safety factor	γ_2 [2] = γ_{inst} [3][4]	[-]	1,2	1,0		1,0		1,0		1,0	
Increasing factor: concrete C30/37	ψ_c	[-]	1,08	1,08		1,08		1,08		1,08	
Increasing factor: concrete C40/50	ψ_c	[-]	1,15	1,15		1,15		1,15		1,15	
Increasing factor: concrete C50/60	ψ_c	[-]	1,19	1,19		1,19		1,19		1,19	
Concrete cone failure and splitting failure											
Effective embedment depth	h_{ef}	[mm]	32	32	42	36	53	40	65	54	92
Factor for non cracked concrete	k_1 [2] = k_{ucr} [3]	[-]	10,1	10,1		10,1		10,1		10,1	
Factor for non cracked concrete	$k_{ucr,N}$ [4]	[-]	11,0	11,0		11,0		11,0		11,0	
Factor for cracked concrete	k_1 [2] = k_{cr} [3]	[-]	7,2	7,2		7,2		7,2		7,2	
Factor for cracked concrete	$k_{cr,N}$ [4]	[-]	7,7	7,7		7,7		7,7		7,7	
Installation safety factor	γ_2 [2] = γ_{inst} [3][4]	[-]	1,2	1,0		1,0		1,0		1,0	
Increasing factor: concrete C30/37	ψ_c	[-]	1,08	1,08		1,08		1,08		1,08	
Increasing factor: concrete C40/50	ψ_c	[-]	1,15	1,15		1,15		1,15		1,15	
Increasing factor: concrete C50/60	ψ_c	[-]	1,19	1,19		1,19		1,19		1,19	
Characteristic resistance for splitting in non-cracked concrete	$N^0_{Rk,sp}$	[kN]	7,0	8,0	12,0	11,0	24,0	13,0	30,0	20,0	50,0
Characteristic resistance for splitting in cracked concrete	$N^0_{Rk,sp}$	[kN]	4,5	5,5	7,0	7,5	13,0	8,0	19,0	13,0	34,0
Characteristic spacing: concrete cone failure	$s_{cr,N}$	[mm]	90	90	126	112	160	120	196	165	276
Characteristic spacing: splitting failure	$s_{cr,sp}$	[mm]	90	90	126	112	160	136	222	188	312
Characteristic edge distance: concrete cone failure	$c_{cr,N}$	[mm]	45	45	63	56	80	60	98	83	138
Characteristic edge distance: splitting failure	$c_{cr,sp}$	[mm]	45	45	63	56	80	68	111	94	156

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Performances
Characteristic resistance for tension loads. Displacements

Annex C1

of European Technical Assessment ETA-17/0806

Table C2: Characteristic resistance in cracked and non-cracked concrete C20/25 to C50/60, design method A

Anchor size			**R-LX-05**	**R-LX-06**		**R-LX-08**		**R-LX-10**		**R-LX-14**	
Nominal embedment depth	h_{nom}	[mm]	43	43	55	50	70	55	85	75	120
Steel failure without lever arm											
Characteristic resistance	$V_{Rk,s}$	[kN]	12,7	17,7		30,2		41,2		78,5	
Factor considering ductility	k [2] = k_2 [3] = k_7 [4]	[-]	0,8	0,8		0,8		0,8		0,8	
Partial safety factor	γ_{Ms} [1]	[-]	1,5	1,5		1,5		1,5		1,5	
Steel failure with lever arm											
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19,0	31,8		72,4		123,6		329,6	
Partial safety factor	γ_{Ms} [1]	[-]	1,5	1,5		1,5		1,5		1,5	
Concrete pry-out failure											
Factor	k [2] = k_3 [3] = k_8 [4]	[-]	1,0	1,0		1,0		1,0	2,0	1,0	2,0
Partial safety factor	γ_{Mc} [1]	[-]	1,5	1,5		1,5		1,5		1,5	
Concrete edge failure											
Outside diameter on anchor	d_{nom}	[mm]	6	6		8		10		14	
Effective length of anchor under shear loads	l_f	[mm]	32	32	42	36	53	40	65	54	92
Partial safety factor	γ_{Mc} [1]	[-]	1,5	1,5		1,5		1,5		1,5	
Minimum member thickness	h_{min}	[mm]	100	100	100	100	110	100	130	110	190
Displacements											
Tension load in non-cracked concrete C20/25 to C50/60											
Tension load	N	[kN]	2,9	5,6		11,0		14,9		23,1	
Short term tension displacement	δ_{N0}	[mm]	0,3	0,3		0,4		0,4		0,5	
Long term tension displacement	$\delta_{N\infty}$	[mm]	0,85	0,9		1,0		1,0		1,25	
Tension load in cracked concrete C20/25 to C50/60											
Tension load	N	[kN]	2,3	4,4		6,7		10,2		17,7	
Short term tension displacement	δ_{N0}	[mm]	0,4	0,4		0,5		0,5		0,7	
Long term tension displacement	$\delta_{N\infty}$	[mm]	2,0	2,0		2,0		2,0		2,0	
Shear load in non cracked concrete C20/25 to C50/60											
Shear load	V	[kN]	5,6	8,1		11,9		18,7		35,2	
Short term shear displacement	δ_{V0}	[mm]	1,4	1,5		2,5		2,5		2,5	
Long term shear displacement	$\delta_{V\infty}$	[mm]	2,1	2,25		3,75		3,75		3,75	

[1] In the absence of other national regulations

[2] Parameter for design acc. to ETAG 001 Annex C

[3] Parameter for design acc. to CEN/TS 1992-4-4:2009

[4] Parameter for design acc. to EN 1992-4

[5] Pull-out failure is not decisive

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Performances
Characteristic resistance. Displacements

Annex C2

of European Technical Assessment ETA-17/0806

Table C3: Characteristic resistance under fire exposure in cracked and non-cracked concrete C20/25 to C50/60

Anchor size				**R-LX-05**	**R-LX-06**		**R-LX-08**		**R-LX-10**		**R-LX-14**	
Nominal embedment depth		h_{nom}	[mm]	43	43	55	50	70	55	85	75	120
Steel failure for tension and shear load $F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$												
Characteristic resistance	R30	$F_{Rk,s,fi}$	[kN]	0,20	0,28	0,28	0,75	0,75	1,57	1,57	3,08	3,08
	R60	$F_{Rk,s,fi}$	[kN]	0,18	0,25	0,25	0,65	0,65	1,18	1,18	2,31	2,31
	R90	$F_{Rk,s,fi}$	[kN]	0,14	0,20	0,20	0,50	0,50	1,02	1,02	2,00	2,00
	R120	$F_{Rk,s,fi}$	[kN]	0,10	0,14	0,14	0,40	0,40	0,79	0,79	1,54	1,54
	R30	$M^0_{Rk,s,fi}$	[kNm]	0,15	0,25	0,25	0,90	0,90	2,36	2,36	6,47	6,47
	R60	$M^0_{Rk,s,fi}$	[kNm]	0,13	0,23	0,23	0,78	0,78	1,77	1,77	4,85	4,85
	R90	$M^0_{Rk,s,fi}$	[kNm]	0,10	0,18	0,18	0,60	0,60	1,53	1,53	4,20	4,20
	R120	$M^0_{Rk,s,fi}$	[kNm]	0,07	0,13	0,13	0,48	0,48	1,18	1,18	3,23	3,23
Pull-out failure												
Characteristic resistance	R30	$N_{Rk,p,fi}$	[kN]	1,13	1,38	1,75	1,88	3,25	2,00	4,75	3,25	8,50
	R60	$N_{Rk,p,fi}$	[kN]	1,13	1,38	1,75	1,88	3,25	2,00	4,75	3,25	8,50
	R90	$N_{Rk,p,fi}$	[kN]	1,13	1,38	1,75	1,88	3,25	2,00	4,75	3,25	8,50
	R120	$N_{Rk,p,fi}$	[kN]	0,90	1,10	1,40	1,50	2,60	1,60	3,80	2,60	6,80
Concrete cone failure												
Characteristic resistance	R30	$N_{Rk,c,fi}$	[kN]	0,89	0,89	2,06	1,50	3,68	1,82	6,13	4,04	14,61
	R60	$N_{Rk,c,fi}$	[kN]	0,89	0,89	2,06	1,50	3,68	1,82	6,13	4,04	14,61
	R90	$N_{Rk,c,fi}$	[kN]	0,89	0,89	2,06	1,50	3,68	1,82	6,13	4,04	14,61
	R120	$N_{Rk,c,fi}$	[kN]	0,71	0,71	1,65	1,20	2,94	1,46	4,91	3,23	11,69
Edge distance												
R30 to R120		$c_{cr,fi}$	[mm]	$2 \cdot h_{ef}$								
In case of fire attack from more than one side, the minimum edge distance shall be ≥ 300 mm.												
Anchor spacing												
R30 to R120		$s_{cr,fi}$	[mm]	$4 \cdot h_{ef}$								
Concrete pry-out failure												
R30 to R120		k	[-]	1,0	1,0	1,0	1,0	1,0	1,0	2,0	1,0	2,0