RAWLPLUG®

Bonded Anchors & Mechanical Anchors

Trust & Innovation

1887- 1897
RAWLINGS BROTHERS started out in London as a small firm of plumbers

1910
JOHN RAWLINGS invented the world's first expansion plug

1911
THE WORLD'S FIRST EXPANSION PLUG
Patent filed by Rawlings Brothers

1912
RAWLPLUG® Trademark registration

1919
Rawlings Brothers changed company name to THE RAWLPLUG COMPANY LTD

1930's
Invention of the first ever mechanical anchor - RAWLBOLT®

1948
The world's first metal anchor for drywall

1969
First production of expansion plastic plugs in GLASGOW factory

1980's
Extension of the offer of Safety Plus and R-HPT mechanical anchors

1993
First hammer-in fixing in Central Europe

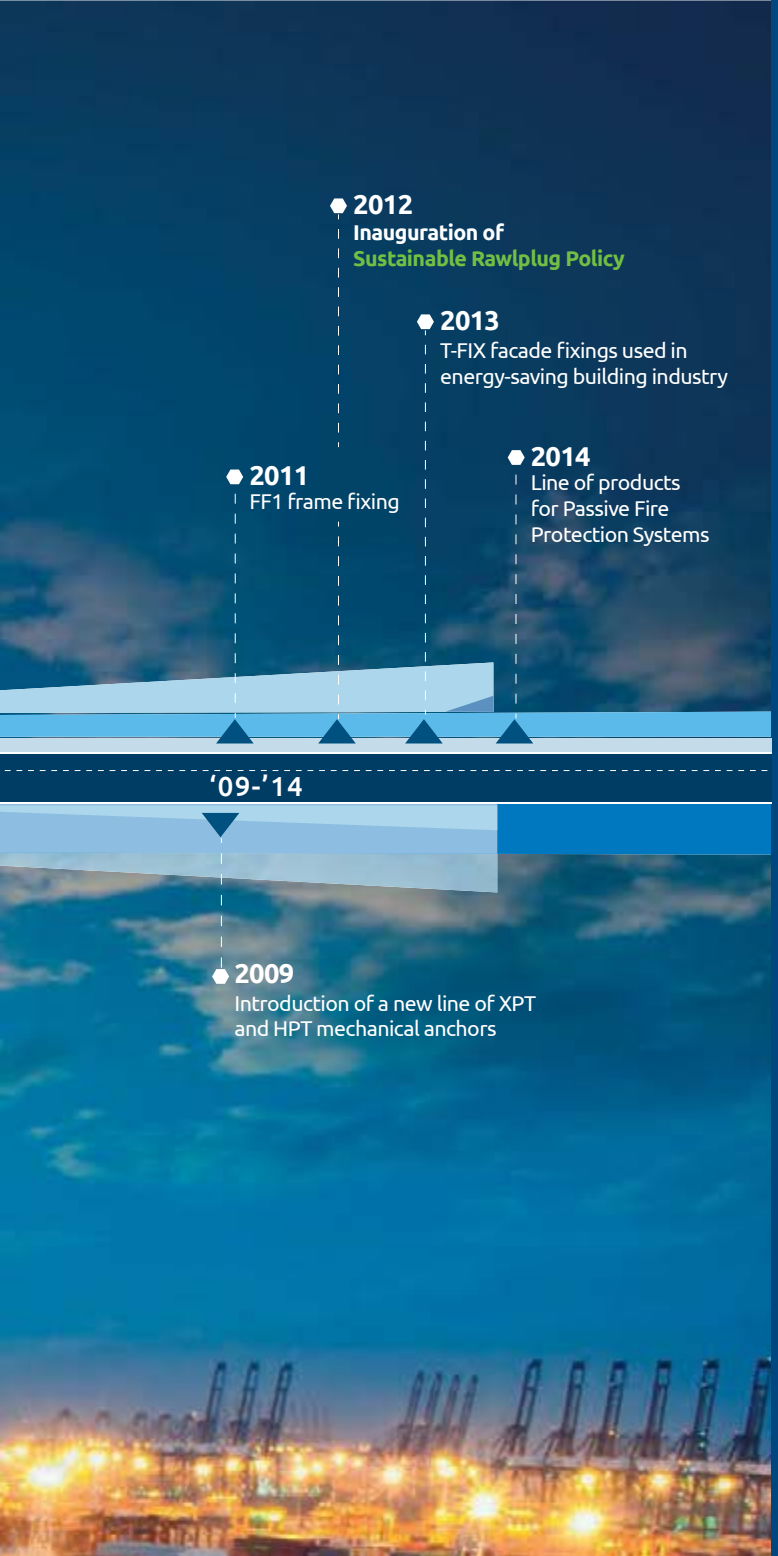
1998
RAWLPLUG became first UK manufacturer with ETA

2004
Debut on Warsaw Stock Exchange

2005
Uno® Plug no. 1 in UK

2007
Rawlplug Cartridge Free System

1887 | 1912-'20 | '20-'50 | '50-'80 | '80-'07



- Since 1911, when John Rawlings invented and filed an application to patent the world's first wall plug, the history of fixings has been inextricably linked with the RAWLPLUG® brand. Following the tremendous success of this revolutionary product in Europe, the RAWLPLUG company was founded in 1919 and quickly became renowned across the world for its innovative and reliable fixings.

  Over the years, a small family company became an international organisation whose power is reflected in **13 companies** on four continents, over **1.900 employees** and almost **30.000 lines**, making up our diverse range of products. The Group's present-day know-how is a synergy of knowledge and experience based on the best practices of its subsidiaries whose main activity is developing innovative solutions in the field of fixing technologies, including their **design, production and distribution.**

  Since it was founded, Rawlplug has placed great emphasis on the **quality and innovation** of its products, developing research centres in Glasgow, Wroclaw and Lancut. R&D teams consisting of experienced engineers, in the quest to find innovative solutions, design products intended for a wide range of substrates and applications. Pioneering Rawlplug solutions, imitated all over the world, have been defining the direction for the entire fixings industry for over 100 years.

- Nowadays Rawlplug's® products are used in construction, automotive, machine and electro-machine, mining, shipyard, road, timber and power industries, including around 30.000 product listings divided into 3 key groups:

  Fixings & Anchors

  Thermal insulation fixings for facades and roofs, self- drilling screws, lightweight & domestic fixings, frame fixings, medium & heavy-duty anchors, resin-bonded anchors and many others.

  Fasteners

  DIN bolts, nuts & washers, special bolts and many others (including bespoke solutions).

  Tools

  Hand & power tools, power tool accessories (drills, saws, chisels, etc.) and direct fastening systems.

Today Rawlplug continues in its fine tradition of innovation through constant research and development of technologies and processes that minimise the company's impact on the natural environment, making sustainable development one of the pillars of its existence.

Sustainable Rawlplug:

- employs a strategy of successful management and ethical business practices;
- builds long-lasting relationships based on common respect and trust with customers, suppliers and business partners thanks to an effectively designed and operated supply chain;
- cares for its employees and provides help and support to develop local communities;
- is concerned for the natural environment, focusing on areas involving production processes, employee education and cooperation with experts in the field of waste management.

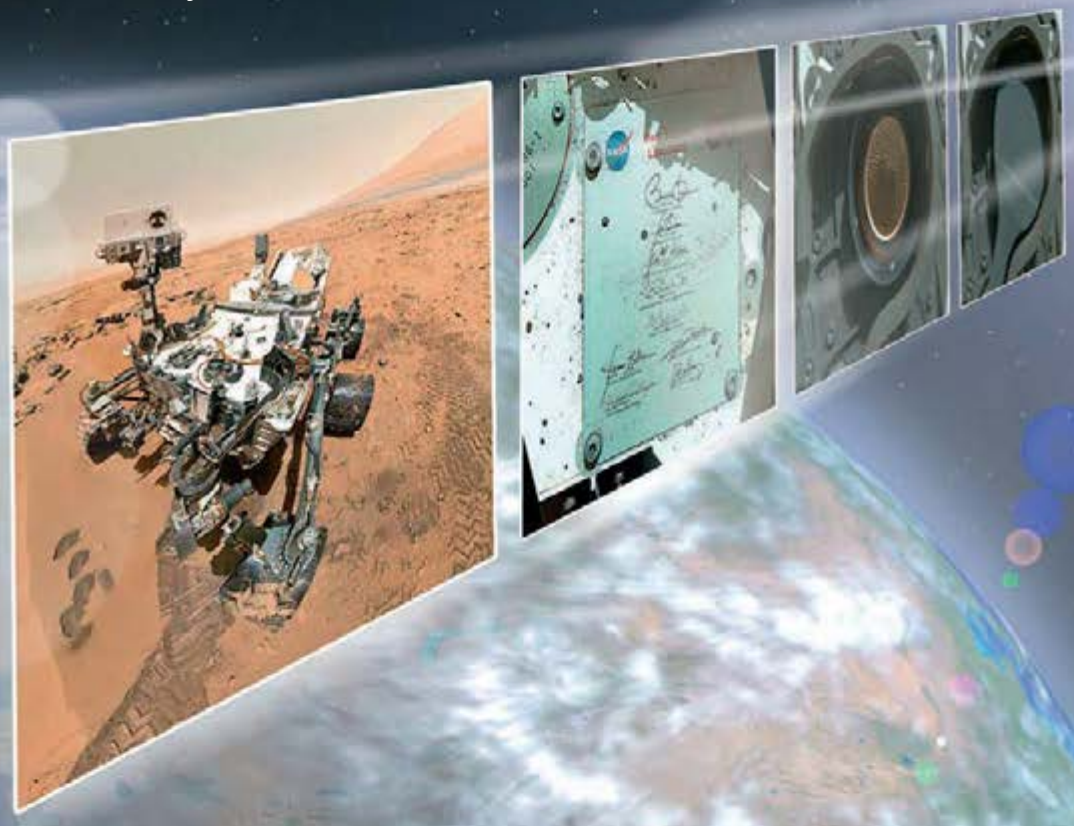
Thanks to its constant emphasis on innovative solutions and customer care together with keen concern over sustainable development and environmental issues, RAWLPLUG'S® products continue to be acknowledged around the globe making them a world-class, first choice for the fixings industry.

Sustainable RAWLPLUG

Rawlplug
Way above ordinary solutions…

Uncompromised quality of Rawlplug Fasteners enabled them to be used in the Curiosity, a robotic rover exploring the surface of MARS since 2012 in terms of Mars Science Laboratory program.

The same highest quality control standards apply to Rawlplug mechanical anchors, manufactured in the same facility.



- Factory of Anchors and Fasteners in Lancut is one of rare fasteners production plants with over 50 years of history. Since the beginning of its activity in 1957 keeping world's highest quality of products has been its key priority.

  Fulfillment of this objective enabled continuous development over decades and attaining a position of one of the most renowned facilities of this kind in the world. Its reputation was confirmed on February, 26th 2004 by receiving a membership in European Industrial Fasteners Institute, the biggest European organization of producers of fasteners. However, a real milestone in the history of the factory was January, 1st of 2009 when it joined Rawlplug Group as one of its key production plants.

- Factory's basic assortment is bolts and nuts produced accordingly to PIN, DIN, ISO, BS, ANSI standards, mechanical anchors and screws, including:
  - M4 to M24 bolts
  - M4 to M20 nuts
  - zinc-plated, zinc-coated and stainless steel R-XPT anf R-HPT throughbolts
  - expansion sleeve anchors, including RAWLBOLT(R) - first ever mechanical anchor in the world invented by Rawlplug in 1969
  - Heavy Duty anchors

  Wide array of products and advanced technical possibilities in terms of thermal treatment and coating application enable the factory to fulfill the needs of any customer.

  Apart from use in high-tech prestigious projects, the best confirmation of the quality of Factory's products are rich references from numerous companies operating across various trades, such as:
  - automotive,
  - construction
  - machine and power-machine industry,
  - mining,
  - furniture,
  - power industry,
  - shipbuilding and road construction

  70% of products from Łańcut plant is assigned for export.

- **Lancut Factory is the largest producer of fasteners in Central-East Europe. LF trademark is recognized all around the world and is associated with highest quality fixings and fasteners.**

RAWLPLUG®

Trust & Innovation. Since 1919.

Complete anchoring solutions

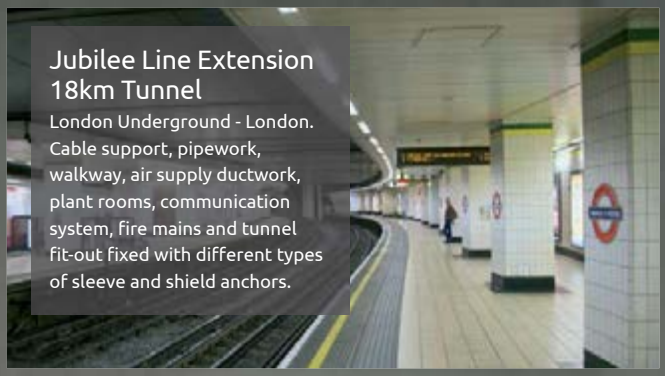
For almost 100 years, RAWLPLUG® has been renowned for innovations in fixing and fastening technologies, as well as the importance we place on quality.

We understand, like no other, that a perfectly performed task depends not only on the fixings themselves, but also on the equipment used during work. In order to supply our customers with complete solutions, we our existing line of mechanical and bonded anchors with a range of professional accessories that facilitate their application.

This range is still in development and will be strengthened further. Additional specialized accessories will ensure the continued success of applications, resulting in yet more professional anchorages bearing the RAWLPLUG® brand.

Twickenham Rugby Stadium

London. 20,000 seats fixed with stainless steel sleeve anchors and facades fixed with stainless steel throughbolt anchors.



Jubilee Line Extension 18km Tunnel

London Underground - London. Cable support, pipework, walkway, air supply ductwork, plant rooms, communication system, fire mains and tunnel fit-out fixed with different types of sleeve and shield anchors.

Formula 1 Race Track

Abu Dhabi. All seating around the circuit fixed with lipped wedge anchors.

Thanks to decades of experience, our customer-orientated approach, quality products and client relationships built on trust, RAWLPLUG® are proud to have been involved in many high-profile projects, including:

Dubai Metro

Fixing of louvers with resin capsules.

AL Mazaya Avenue

Dubai. Facades of 3 tower blocks (44 floors high) secured with stainless steel throughbolt anchors.

Wembley Stadium

London. 90,000 seats fixed with throughbolt anchors.

Mixed Use Complex

Sheikh Zayeed Road – Dubai. Marble cladding secured with resin and studs into hollow blockwork.

Emirates Stadium

Arsenal F.C. – London. 60,000 seats fixed with lipped wedge anchors.

Lower Lea Valley Cable Tunnels

National Grid – London. Cable brackets and access monorail (for transit of engineers and/or cameras) fixed with throughbolt anchors.

Copernicus Science Centre

Warsaw. Installation of curtain walling with R-KER vinylester resin.

Municipal Stadium and Sky Tower

Wroclaw. Elevators installed with Rawlbolt anchors. Facades secured with R-HPT Throughbolts and suspended ceilings mounted using R-DCA wedge anchors.

Bucharest Metro

Bucharest. Construction elements supported by R-KEX II epoxy resin.

Katowice Shopping Centre

Katowice. Installations and ventilation system suspended using wedge anchors. Shop window frames secured using throughbolts.

Kraków Airport - multilevel parking

Throughbolts used to secure steel structures.

And many more…

RAWLPLUG®

Trust & Innovation. Since 1919.

Contents

Contents

Overview of our range - Bonded anchor selector

	BONDED ANCHOR SYSTEM:	R-KEX II with threaded rods	R-KEX II with ITS	R-KEX II with rebar as an anchor	R-KEX II with post -installed rebar	R-KER with threaded rods	R-KER with ITS	R-KER with rebar as an anchor	R-KER with post -installed rebar
ANCHOR MATERIAL	5.8 STEEL CLASS, ZINC PLATED	☑	-	-	-	☑	-	-	-
	8.8 STEEL CLASS, ZINC PLATED	☑	-	-	-	☑	-	-	-
	STAINLESS STEEL	☑	-	-	-	☑	-	-	-
	REBAR	-	-	☑	☑	-	-	☑	☑
	R-ITS	-	☑	-	-	-	☑	-	-
SUBSTRATES	CONCRETE	☑	☑	☑	☑	☑	☑	☑	☑
	CRACKED CONCRETE	☑	-	-	-	☑	-	-	-
	SILICATE BRICK	-	-	-	-	-	-	-	-
	SOLID BRICK	-	-	-	-	-	-	-	-
	HOLLOW BRICK	-	-	-	-	-	-	-	-
	LIGHTWEIGHT CONCRETE BLOCKS	-	-	-	-	-	-	-	-
APPROVALS	CE	☑ ETAG 001 Option 1	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7	☑ ETAG 001 TR023	☑ ETAG 001 Option 1	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7	☑ ETAG 001 TR023
	IBDIM	☑	☑	☑	☑	☑	☑	☑	☑

TENSION LOADS IN kN								
[kN]	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}
10	M8 for 5.8	M6 for 5.8	Ø8 for A-II	Ø8 for A-II	M8 for 5.8	M6 for 5.8	Ø8 for A-II	Ø8 for A-II
20								
30								
40		M16				M16		
50								
60								
70								
80								
90								
100								
110					M30			
120								
130							Ø32	
140								
150								
160								
170			Ø32	Ø32				Ø32
180								
190								
200								
210								
220								
230	M30							

Overview of our range - Bonded anchor selector

												
R-KEM II in concrete	**R-KEM II** in masonry	**R-KF2** with threaded rods	**RV200** with threaded rods	**RV200** with ITS	**RV200** with rebar as an anchor	**RV200** with post -installed rebar	**RM50** in concrete	**RM50** in masonry	**RP30** with threaded rods	**R-CAS-V** with threaded rods	**R-HAC-V** with threaded rods	**R-HAC-V** with rebar as an anchor
☑	☑	☑	☑	-	-	-	☑	☑	☑	☑	☑	-
☑	☑	☑	☑	-	-	-	☑	☑	☑	☑	☑	-
☑	☑	☑	☑	-	-	-	☑	☑	☑	☑	☑	-
-	-	-	-	-	☑	☑	-	-	-	-	-	☑
-	-	-	-	☑	-	-	-	-	-	-	-	-
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
-	-	-	☑	-	-	-	-	-	-	-	-	-
-	☑	-	-	-	-	-	-	☑	-	-	-	-
-	☑	-	-	-	-	-	-	☑	-	-	-	-
-	☑	-	-	-	-	-	-	☑	-	-	-	-
-	☑	-	-	-	-	-	-	☑	-	-	-	-
☑ ETAG 001 Option 7	☑ ETAG 029	☑ ETAG 001 Option 7	☑ ETAG 001 Option 1	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7	☑ ETAG 001 TR023	☑ ETAG 001 Option 7	☑ ETAG 029	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7	☑ ETAG 001 Option 7
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}	N_{Rd}
M8 for 5.8	M8-M16 for 5.8	M8 for 5.8	M8 for 5.8	M6 for 5.8	Ø8 for A-II	Ø8 for A-II	M8 for 5.8	M8-M16 for 5.8	M8 for 5.8	M8 for 5.8	M8 for 5.8	Ø8 for 5.8
				M16								Ø25
		M30			32	Ø32	M30		M30		M30	
M30			M30							M30		

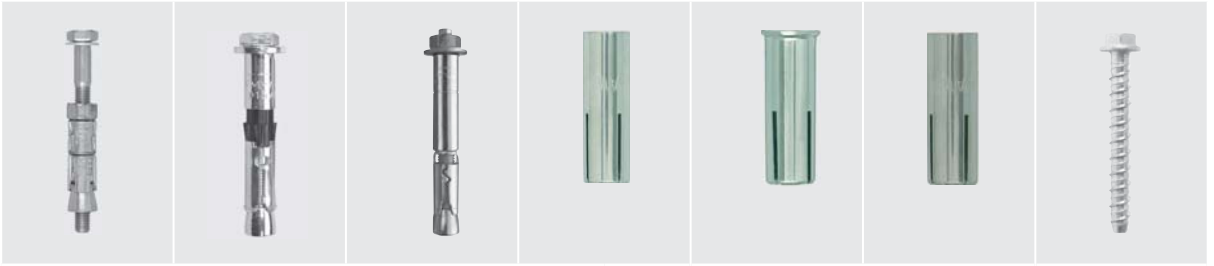
Overview of our range - Mechanical anchor selector

	MECHANICAL ANCHORS:	R-HPTIIA4	R-HPTIIZF	R-XPTIIA4	R-XPT	R-XPT-HD
ANCHOR MATERIAL	5.8 STEEL CLASS, ZINC PLATED	-	☑	-	☑	☑
	8.8 STEEL CLASS, ZINC PLATED	-	-	-	-	-
	STAINLESS STEEL	☑	-	☑	-	-
SUBSTRATES	CONCRETE	☑	☑	☑	☑	☑
	CRACKED CONCRETE	☑	☑	-	-	-
	STONE	-	-	-	-	-
	SOLID BRICK	-	-	-	-	-
	SILIKATE HOLLOW BRICK	-	-	-	-	-
	HOLLOW CORE SLAB	-	-	-	-	-
APPROVALS	CE	☑ ETAG 001-2 Option 1	☑ ETAG 001-2 Option 1	☑ ETAG001-2 Option 7	☑ ETAG001-2 Option 7	-
		☑	☑	-	☑	-
		-	-	-	-	-
		-	-	-	☑ for M6 and M24	☑

TENSION AND SHEAR IN kN

[kN]	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}
5	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
10										
15									M24	
20							M24			
25	M16				M16					
30			M20							M24
35		M16				M16				
40										
45										
50								M24		
60				M20						
70										
80										
90										
100										

Overview of our range - Mechanical anchor selector

						
RAWLBOLT	**SAFETY PLUS II**	**SAFETY PLUS**	**R-DCA**	**R-DCL**	**R-DCA-A4**	**R-LX**
☑	-	-	☑	☑	-	-
-	☑	☑	-	-	-	☑
-	-	-	-	-	☑	-
☑	☑	☑	☑	☑	☑	☑
☑	☑	-	☑	☑	☑	☑
☑	-	-	-	-	-	-
☑	-	-	-	-	-	-
☑	-	-	-	-	-	-
☑ AT-15-7280/2014	-	-	-	-	-	-
☑ ETAG001-2 Option 1	☑ ETAG001-2 Option 1	☑ ETAG001-2 Option 7	☑ ETAG001, part 6	☑ ETAG001, part 6	☑ ETAG001, part 6	PENDING
☑	☑	-	☑	☑	☑	-
-	☑ C1, C2	-	-	-	-	-
-	-	-	-	-	-	-

N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}	N_{Rd}	V_{Rd}
M6	M8	M8	M8	M8	M8	M6	M6	M6	M6	M6-M20	M6-M20		
						M20	M20	M20	M20				
				M20								PENDING	PENDING
M20													
		M16			M20								
	M24												
			M16										

Development, Testing, Approvals, Quality Assurance & Technical Support

RAWLPLUG's® newest additions to the bonded, mechanical and plastic anchor ranges are developed and tested in our comprehensively equipped research and development centres in Glasgow (Scotland) and Wroclaw/Lancut (Poland).

The resultant technical data has been approved in various European Member States and by the following organisations: BBA (UK), CSTB (France), DIBT (Germany), FM Global (USA), SINTEF (Norway) and ITB (Poland).

Our extensive set of European Technical Approvals and Assessments (ETAs) cover our bonded anchors (used with studs, rebar and/or internally threaded sockets) for use in cracked and non-cracked concrete, as well as masonry and hollow substrates. (See individual products for approved uses.) Meanwhile our mechanical anchor range also holds several ETAs indicating their suitability for applications in cracked and non-cracked concrete, stone and brick.

Furthermore, we are proud that our production is subject to the control of a quality assurance system approved by the following bodies: BSI (UK), TÜV Rheinland (Germany), AFNOR (France) and ITB (Poland).

Our team of technical consultants are at your disposal for advice, seminars and on-site installer training to support our extensive range of fasteners and fixings. On-site product testing can also be arranged.

Ultimately, the RAWLPLUG® team will help you to ensure that you choose the best solution for your application.

APPLICATIONS - CONSTRUCTION		THROUGHBOLTS	SHIELD ANCHORS	HEAVY-DUTY EXPANSION ANCHORS	WEDGE ANCHORS	SCREW ANCHOR	POLYESTER SF RESINS	POLYESTER RESINS	VINYLESTER RESINS	PURE-EPOXY RESINS	SPIN-IN CAPSULES	HAMMER-IN CAPSULES
	ANCHOR TYPE:	MECHANICAL ANCHORS					BONDED ANCHORS					
	BALUSTRADING	☑	☑			☑	☑	☑	☑	☑	☑	☑
	BARRIERS	☑					☑	☑	☑	☑	☑	☑
	CABLE TRAYS	☑			☑		☑	☑	☑			
	CLADDING	☑		☑		☑	☑	☑	☑	☑	☑	☑
	CONDUITS	☑			☑		☑	☑	☑			
	CURTAIN WALLING	☑				☑	☑	☑	☑	☑		
	DOORS & WINDOWS					☑	☑	☑	☑		☑	☑
	FACADES	☑							Copy eco ☑			
	FENCING & GATES	☑	☑				☑	☑	☑		☑	☑
	LIFTS & ESCALATORS	☑	☑	☑		☑			☑	☑	☑	☑

☑ main application

APPLICATIONS - CONSTRUCTION		THROUGHBOLTS	SHIELD ANCHORS	HEAVY-DUTY EXPANSION ANCHORS	WEDGE ANCHORS	SCREW ANCHOR	POLYESTER SF RESINS	POLYESTER RESINS	VINYLESTER RESINS	PURE-EPOXY RESINS	SPIN-IN CAPSULES	HAMMER-IN CAPSULES
	ANCHOR TYPE:	MECHANICAL ANCHORS					BONDED ANCHORS					
	MACHINERY 	☑	☑	☑				☑	☑	☑	☑	☑
	MASONRY SUPPORT 		☑	☑			☑	☑	☑			
	PIPEWORK 	☑	☑		☑		☑	☑	☑			
	PLATFORMS 	☑							☑	☑	☑	☑
	PUBLIC SEATING 	☑			☑	☑			☑		☑	☑
	RACKING SYSTEMS 	☑	☑	☑		☑	☑	☑	☑	☑		
	RAINSCREENS 	☑							☑			
	REBAR 								☑	☑		☑
	SIGNS 			☑					☑	☑	☑	
	SCAFFOLDING 	☑			☑	☑			☑	☑	☑	☑

☑ main application

	ANCHOR TYPE:		THROUGHBOLTS	SHIELD ANCHORS	HEAVY-DUTY EXPANSION ANCHORS	WEDGE ANCHORS	SCREW ANCHOR	POLYESTER SF RESINS	POLYESTER RESINS	VINYLESTER RESINS	PURE-EPOXY RESINS	SPIN-IN CAPSULES	HAMMER-IN CAPSULES
			MECHANICAL ANCHORS					BONDED ANCHORS					
APPLICATIONS - CONSTRUCTION	STRUCTURAL STEELWORK		☑	☑	☑		☑			☑	☑	☑	
	SUSPENDED CEILINGS		☑	☑		☑							
	TEMPORARY WORK					☑	☑			☑	☑	☑	☑
APPLICATION - DOMESTIC	HANDRAILS		☑				☑	☑	☑	☑		☑	☑
	BATHROOM FITTINGS						☑	☑					
	KITCHEN UNITS						☑	☑	☑				
	MIRRORS						☑	☑	☑				
	AWNINGS		☑	☑				☑	☑				
	SHUTTERS		☑	☑	☑			☑	☑				
	TV BRACKETS		☑				☑	☑	☑				

☑ main application

Overview of our range

BONDED ANCHORS - RESIN TYPES

PURE EPOXY	VINYLESTER	POLYESTER STYRENE FREE	POLYESTER
• Most suitable for construction, as well as for deep anchorages. • Designed for heavy-duty anchorages in cracked and non-cracked concrete. • Suitable for use in dry and wet substrates as well as holes and substrates covered with water.	• Most common product for construction. • Intended for medium and heavy -duty anchorages in cracked and non-cracked concrete. • Suitable for use in low tempera-tures (down to -20°C for winter option) enables use throughout the year • Suitable for use in dry and wet substrates as well as holes and substrates covered with water	• The most contemporary general use bonded anchor. • Intended for medium-duty fixings in 15 types. • Low odour suitable for indoor applications. • Product with wide spectrum of use in the medium load capacity area.	• Recommended for outdoor applications. • Suitable for medium-duty fixings in non-cracked concrete.




BONDED ANCHORS ARE OFFERED IN A WIDE RANGE OF SYSTEMS:

GLASS CAPSULES	CARTRIDGES	FOILS
Glass capsules containing both the resin and hardener, which mix and set after the stud or socket is driven in to the hole.	Tubular plastic cartridges containing resin. Various formats depending on resin compo-nents, which are kept separate within cartridge until delivered via mixer nozzle. ▪ foil cartridge system CHUBAPAC ▪ coaxial cartridge system COX ▪ cartridge system side by side SBS	CFS+ (Cartridge Free System) Innovative resin dispensing system with unique packaging solution, which reduces overall waste. Resin components contained separately within foil until delivered via mixer nozzle.



FEATURES & BENEFITS OF DELIVERY SYSTEMS:

▪ Quick and easy to install ▪ Only solid substrates ▪ Minimal packaging waste - Whole capsule installed in hole ▪ No waste resin ▪ No special tools required ▪ No time limitations - resin only begins to set after stud, rod or rebar is inserted	▪ For all substrates, including deep anchorages ▪ Many applications from one cartridge ▪ Ability to resume use after stoppages ▪ Small cartridges are compatible with standard, low-cost silicone guns ▪ Simple to store and transport	▪ For all substrates, including deep anchorages ▪ Easy to dispense ▪ Less waste - Recyclable packaging ▪ The cost-effective solution for many customers

RESIN PRODUCTS AVAILABLE IN EACH SYSTEM:

VINYLESTER: R-HAC-V, R-CAS-V	PURE EPOXY: R-KEX II VINYLESTER: R-KER POLYESTER: R-KEM II, R-KF2	POLYESTER: RM50, RP30 VINYLESTER: RV200

BONDED ANCHORS - ACCESSORIES

STUDS & SOCKETS (ITS)	HOLE BRUSHES	DISPENSERS & HOLEPUMP	TENSION TESTER




Overview of our range

MECHANICAL ANCHORS - OUR RANGE

THROUGHBOLTS

Throughbolt anchors designed for use in cracked and non-cracked concrete

FEATURES AND BENEFITS

- High performance in cracked and non-cracked concrete confirmed by ETA Option 1 or ETA Option 7
- Stainless steel material for the highest corrosion resistance
- New generation of throughbolt with unique corrosion-resistant coating
- Throughbolts are suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation
- Design allows drilling and installation directly through the fixture and reduces overall installation effort

ANCHOR PRODUCTS AVAILABLE:

R-HPTIIA4, R-HPTIIZF, R-XPTIIA4, R-XPT, R-XPT-HD

SHIELD ANCHORS

World's most popular all-purpose expanding shield anchor for use in cracked and non-cracked concrete and other substrates

FEATURES AND BENEFITS

- For use in cracked and non-cracked concrete (ETA option 1), hollow-core slabs, flooring blocks and ceramics
- Shield anchor (shield also available separately)
- Product recommended for applications requiring fire resistance
- Bolt lengths suitable for fixture thicknesses of up to 150 mm
- Ferrule marked with hole diameter to ensure correct installation
- Optimum geometry for maximum expansion in all recommended substrates
- Excellent tolerance to variation in hole size

ANCHOR PRODUCTS AVAILABLE:

RAWLBOLT: R-RBL, R-RBP, R-RBl-PF, R-RBP-PF R-RBL-E, R-RBL-H, R-RB

HEAVY-DUTY EXPANSION ANCHORS

Heavy-duty expansion anchor, suitable for demanding safety-critical applications

FEATURES AND BENEFITS

- Mechanical anchor for highest tension and shear loads
- Seismic category C2 for Structural applications. Seismic category C1 for non-structural use in areas with low seismic risk
- For usage with required fire resistance
- Option 1 ETA for Cracked and Non-Cracked Concrete

ANCHOR PRODUCTS AVAILABLE:

SAFETY PLUS: R-SPLII-L, R-SPLII-P, R-SPLII-C, R-SPL, R-SPL-BP, R-SPL-C

WEDGE ANCHORS

Internally threaded wedge anchors for simple hammer-set installation

FEATURES AND BENEFITS

- High performance in multiple use in non-structural application confirmed by ETA
- Product recommended for applications requiring fire resistance
- Internally threaded to be used with threaded studs, rods or bolts
- Easy to install by hammer action
- Slotted sleeve and internal wedge component together facilitate easy setting and expansion
- Allows bolts or studs to be installed or removed without damaging the anchorage
- High performance in cracked and non-cracked concrete

ANCHOR PRODUCTS AVAILABLE:

R-DCA, R-DCL, R-DCA-A4

SCREW ANCHORS

Self-tapping and removable concrete screw anchor for through-fixing installation

FEATURES AND BENEFITS

- Time-efficient installation through streamlined procedure - simply drill and drive
- Completely removable, allows repeatable use
- Unique design with patented threadform ensures high performance for relatively small hole diameter
- Integral washer ensures a neat overall appearance
- Non-expansion functioning ensures low risk of damage to base material and makes R-LX ideal for installation near edges and adjacent anchors
- Performance data at two embedment depths (reduced embedment to avoid contact with reinforcement)

ANCHOR PRODUCTS AVAILABLE:

R-LX-HF-ZP, R-LX-H-ZP, R-LX-CS-ZP, R-LX-HF-ZF, R-LX-H-ZF, R-LX-CS-ZF,

Basics of anchoring - Types of anchors

Torque-controlled expansion anchors

Applied loads are transferred to the substrate via friction between the anchor and the wall of the drilled hole. Friction is the result of expansion force, achieved by applying torque to the bolt or nut, thus drawing a cone component in to an expanding sleeve to create the anchorage.

Undercut anchors

Applied load is transferred to the substrate by mechanical interlock – the result of interaction between the anchor form and the cavity form. The required cavity (or undercut) may be pre-formed within the substrate.

Deformation-controlled expansion anchors

Applied loads are transferred to the substrate via friction between the anchor and the wall of the drilled hole. Friction is the result of expansion force, achieved by displacement of a wedge component, deforming the anchor body and creating the anchorage.

Bonded (injection) anchors

Applied loads are transferred to the substrate by adhesion at the anchor/resin and resin/substrate interfaces. Anchors are supplied as a two-piece set, containing resin (in capsule or cartridge form) and a steel element. In cases involving hollow substrates, a plastic or metal mesh sleeve may be introduced as a third system component. Bonded anchors minimise the introduction of stresses in the substrate material, due to the absence of expansion forces.

Basics of anchoring - Anchor selection factors

In order to select and install an anchor correctly, the user should consider the following factors:

- Environmental conditions (humidity, chemicals, etc.), which are the most important factor for selection of the material and coating type of the fastener (corrosion resistance)
- Base material (type of concrete, solid or hollow masonry structures) – some products (R-KEM II, for example) are suitable for a wide range of substrates, whilst others are recommended for only one
- Anchor spacing and edge distances - Consideration must be given to the minimum distances required to avoid damaging the substrate
- Load-bearing capacity - Data (much of which stems from technical approvals) is provided for each product presented in this catalogue
- Loading type (static/dynamic) and direction (tension/shear /combined)
- Setting data – embedment depths, installation guidelines, etc.

Expanded detail of each of these main selection factors is presented in the following sections.

Corrosion Protection

The only way to provide corrosion protection for steel fasteners is through the use of specialized protective coatings. The coating processes are especially important to us, therefore we perform them ourselves.

The modern Rawlplug processing lines guarantee corrosion protection in accordance with the highest requirements of our clients. This is achieved by means of galvanizing processes, zinc flake systems, or comprehensive multilayer coatings.

Production of anchors

Corrosion Protection of Anchors

Anchors are used in a wide range of applications and may be utilized indoors or outdoors. Metal corrosion takes place everywhere, regardless of the application.

The progress of corrosion depends on concentrations of chemical compounds in the air, on electrochemical processes, and on air humidity. These are processes of deterioration of metals and alloys, which result from reactions with their surroundings (corrosive environment).

In order to understand the essence of protective coatings, one must first understand the phenomenon of corrosion.

HDG 504 hrs

Zinc flake coating 504 hrs

Corrosion Process

Corrosion is divided in respect of the corrosive environment in which the given metal or alloy is placed, of the mechanism of corrosion processes, and of the nature of metal deterioration.

Types of Corrosion Depending on the Corrosive Environment

- **atmospheric corrosion** - related to precipitation, air humidity, atmospheric pollution,
- **gaseous corrosion** - in dry and mostly hot gases,
- **water corrosion** e.g. in sea water or in river water,
- **earth corrosion** e.g. in soil,
- **microbiological corrosion** (biocorrosion),
- **corrosion occurring under the influence of microorganisms** (mostly bacteria and fungi) and products of their metabolism (these products create a corrosive environment),
- **corrosion caused by stray currents** - this occurs mostly in cities, where many electrical appliances are earthed (current flows through soil).

after 960 hrs

ZINC FLAKE COATING
Zinc electroplated expander HPT-II-ZF

HDG
Stainless steel expander XPT-HDG

Production of anchors

Types of Corrosion Depending on the Mechanism of Corrosion Processes

Electrochemical corrosion

Occurs in electrolyte environments, in fresh and salt water, in wet gases, and in soil containing moisture.

Chemical corrosion

Occurs mostly in dry gases and non-conductive liquids (non-electrolytes), e.g. in some liquid organic substances. The result of corrosion processes is the deterioration of metal, which is observed mostly on surfaces as an accumulation of solid products of reaction, e.g. oxides, rust, scale. If the products of reaction fall off the metallic substrate, irregularities or pitting of the originally smooth surface can be observed.

Types of Corrosion Depending on the Nature of Corrosive Deterioration

Pitting corrosion

One of the most commonly found types of local corrosion, occurring in relation to the presence of aggressive anions in a corrosive environment.

Uniform or non-uniform general corrosion

Comprises attacks on and the deterioration of the entire surface.

Fatigue corrosion

Occurs due to a combination of an aggressive corrosive environment and cyclical or variable stresses, which causes the metal to break. The influence of stress infringes the protective layer (passive layer), which results in the unprotected (exposed) metal being attacked. Fatigue corrosion may occur in any water environment (steam, hot water, natural salt water, fresh water, condensation water, chemical solutions, moist air).

Intergranular corrosion

One of the most dangerous types of corrosion. Attacks stainless steels along grain boundaries. It is caused by chemical egregation, e.g. of chromium on the grain boundary during heat treatment or during welding. These eductions constitute anodic areas of reduced corrosion resistance, and the centre of the grain performs the role of a cathode. Pitting corrosion disturbs the cohesion between grains, resulting in the reduction of mechanical properties.

Stress corrosion

Is caused by stresses resulting from external forces, as well as internal stresses e.g. from cold bending or welding. Stress corrosion is characterized by strong branching directed perpendicularly to the stress. It manifests itself by formation of cracks, which usually run through grains in stainless steels.

Local corrosion

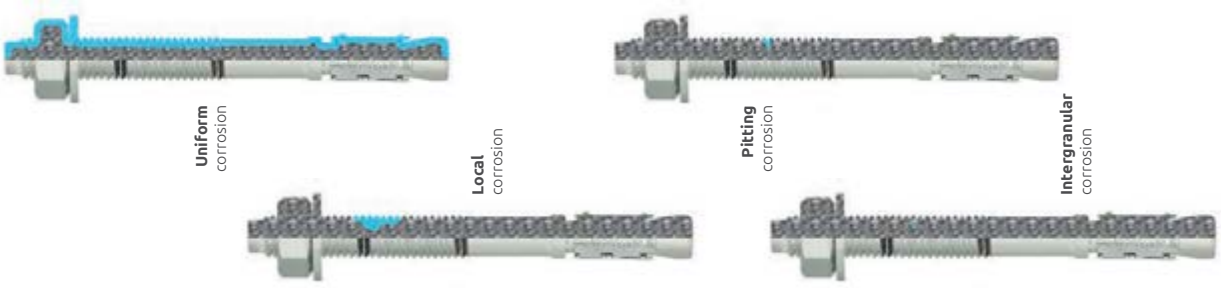
Including stain corrosion, point corrosion, pitting corrosion, intergranular corrosion, or crevice corrosion.

Contact (galvanic) corrosion

Caused by contact of two metals or alloys of different potentials, resulting in the creation of a galvanic cell. Effectiveness of operation of the cell increases with the potential difference between the two contacting metals in a corrosive environment. Connection of two metals of different electrochemical potential results in the less noble metal being subject to intensive dissolving.

Crevice corrosion

Appears in crevices and structural recesses, under seals, bolt and rivet heads, under sediments and scale, and in all kinds of cracks. Crevice corrosion occurs as a result of gradual decay of the passive layer in crevices in which this layer cannot regenerate due to hindered aeration and obstructed oxygen inflow.



Production of anchors

Environmental corrosion categories

Selection of anti-corrosion protection of a product is strongly simplified by the ISO 12944 norm. It is a source of information on corrosion protection of steel constructions and use of appropriate coatings.

CORROSION CATEGORY	WEIGHT LOSS PER SURFACE UNIT / THICKNESS REDUCTION (AFTER FIRST YEAR)				EXAMPLES OF TYPICAL ENVIRONMENTS	
	NON-ALLOY STEEL		ZINC		EXTERIOR	INTERIOR
	WEIGHT LOSS IN g/m²	THICKNESS REDUCTION IN µm	WEIGHT LOSS IN g/m²	THICKNESS REDUCTION IN µm		
C1 VERY LOW	<10	<1,3	<0,7	<0,1	-	Interior of air-conditio-ned premises with clean atmosphere (e.g. shops, offices, hotels)
C2 LOW	>10 do 200	>1,3 do 25	>0,7 do 5	>0,1 do 0,7	Atmosphere with low pollution and dry climate; mainly rural areas	Unheated buildings where condensation may occur
C3 AVERAGE	>200 do 400	>25 do 50	>5 do 15	>0,7 do 2,1	Residential and industrial atmosphere with mode-rate pollution of SO2. Coastal areas; low salinity atmosphere	Light industry with hu-midity and air pollution (food production, laundry facilities, etc.)
C4 HIGH	>400 do 650	>50 do 80	>15 do 30	>2,1 do 4,2	Industrial and coastal areas; medium salinity atmosphere	Chemical factories, swimming pools, offshore ships, etc.
C5I VERY HIGH (industrial)	>650 do 1500	>80 do 200	>30 do 60	>4,2 do 8,4	Industrial areas with highly-aggressive at-mospheric conditions and high humidity	Buildings and areas with condensation of water and high pollution
C5M VERY HIGH (marine)	>650 do 1500	>80 do 200	>30 do 60	>4,2 do 8,4	Coastal and offshore areas with atmospheric conditions of high salinity	Buildings and areas with condensation of water and high pollution

Electrochemical corrosion

Processes of electrochemical corrosion occur when metal or alloy is present in an environment constituting an electrolyte, i.e. mostly in water solutions. River water and lake water contain sufficient amounts of inorganic compounds, and sea water contains up to 3% of dissolved salts, therefore they are good electrolytes.

Corrosion Macrocells and Microcells

Local microcells are created as a result of contact of metal and electrolyte. Even the cleanest metal surface is not uniform at the microscopic level. Metals have a grainy crystalline microstructure, and grain boundaries have a less ordered structure than grain interiors. The energy of grain boundaries is higher than the energy of the grain itself, therefore on contact with an electrolyte the grain boundaries become an anodic area, while the grain area, having lower energy, becomes a cathodic area.

Corrosion macrocells are created by the contact of two metals or alloys of different stationary electrode potential which are present in an electrolyte environment (contact corrosion). Galvanic effect in such cells occurs at potential difference greater than 0.05 V.

Corrosion microcells are different from galvanic cells in that they operate as short-circuited immediately upon contact with an electrolyte. Metal deterioration always occurs in an anodic area.

During the operation of a corrosion cell, a current is flowing in metal, and cell poles are subject to polarization. Polarization inhibits the corrosion process and is a desirable phenomenon. However, some depolarizers, such as oxygen from air or hydrogen ions, are acting in electrochemical corrosion processes.

Products created in an electrochemical corrosion process are reacting with one another. If some sparingly soluble products are created as a result of this reaction, the corrosion process is inhibited.

Production of anchors

The table below presents a summary of the most common metal types - fastener material and substrate material - and the direction of the expected corrosion centres. Metal of the fastened element is not subject to galvanic corrosion and benefits from the phenomenon of galvanic protection (low when the difference of electrochemical potential is small, and getting higher with increasing potential difference).

Galvanic effect is influenced by the surface area of the elements constituting the macrocell. If the surface area of the substrate material (sheet metal or structure) is smaller, corrosion is accelerated, and if the surface area of the substrate material is greater, corrosion is slower. The greater the potential difference, the more pronounced this effect is.

Corrosion Cells and Directions of Corrosion Centres

FASTENER METAL / METAL OF ELEMENT FASTENED	STAINLESS STEEL	GALVANIZED STEEL	ZINC-PLATED STEEL	ZINC ALLOYS	LEAD	BRASS
STAINLESS STEEL	○	▲	▲	▲	▲	▲
GALVANIZED STEEL	◀	○	○	○	◀	◀
ZINC-PLATED STEEL	◀	○	○	○	○	◀
LOW-CARBON STEEL	◀	▲	▲	▲	○	◀
ALUMINIUM ALLOYS	◀	▲	▲	▲	○	○
ZINC ALLOYS	◀	○	○	○	◀	◀

○ contact between these metals is possible ▲ fastener metal is attacked ◀ fastened element metal is attacked

Protective Coatings

Under the influence of corrosion, steel elements are subject to gradual deterioration and embrittlement, losing their technical parameters and putting the user at risk of hazardous operation or, at least, damage. Therefore the key parameter for Rawlplug fasteners is the highest quality of their corrosion protection.

Care for the quality of the final product requires us to control every stage of the coating process. In our factory we have facilities that allow us to obtain any type of corrosion protection in accordance with the requirements or specifications of our clients. The wide range of corrosion protections offered by Rawlplug, and the accompanying manufacturing processes, guarantee the highest quality of the final product.

Systematics of Protective Coatings

In respect of composition, protective coatings can be divided into

Metallic coatings

a) Electrolytic
- zinc-based

b) Non-electrolytic
- zinc flake system (Geomet / Deltatone)
- hot galvanizing

Non-metallic coatings

a) Thermal blackening
b) Oxidizing
c) Phosphatizing

Organic coatings

a) Delta-Seal
b) Deltacoll
c) Poly-seal
d) KTL (cathodic dip lacquering)

Layered coatings

covering metallic coatings with anticorrosive organic layers

Production of anchors

When preparing a product specification, the limited application of protective coatings executed using Cr(VI) must be taken into account. In accordance with the directive of the European Parliament and the European Council 2000/53/EC, it is forbidden to use hexavalent chromium Cr(VI) as corrosion protection in all passenger automobiles that will be approved for marketing after 01 July 2007.

In accordance with the regulation, the same prohibition has been in force for nearly all products of the electromechanical and electronic industries since 01 July 2006. The trend to limit Cr(VI) in its application is expanding to all branches and fields of life.

The following corrosion protection layers contain Cr (VI) and therefore are covered by the above mentioned prohibition of application:

- yellow chromatizing, galvanic zinc and zinc-alloy coatings
- black chromatizing, galvanic zinc coatings
- DACROMET® zinc-alloy coatings

Note: anticorrosive coatings in Europe rarely contain Cr(VI) anymore, while chromatizing containing Cr(VI) is still being used in Asia!

Characteristics of Rawlplug Coatings

1. Electrolytic Zinc Coatings

Standard - as always
Various capabilities of customization

Galvanizing is still the standard for most fasteners. Galvanically deposited zinc coatings are classified as protective, i.e. aimed exclusively at providing corrosion protection for the substrate metal.

Zinc coatings protect the substrate metal as a result of their anodic dissolution in a corrosion cell. Therefore it can be easily concluded that the thicker the executed zinc coating layer is, the longer it will effectively protect the covered item.

In order to approximately determine the average period of effective protection of the zinc coating, assuming that the coating has no defects, it is necessary to know the coating thickness (from 5 to 30 micrometres on average) and the type of natural atmosphere in which the product will be present. There are four types of natural atmospheres which can be assigned different rates of corrosion of the zinc coating:

- **industrial** - corrosion rate 5-7 micrometres per year,
- **urban** - corrosion rate 3-5 micrometres per year,
- **coastal** - corrosion rate 3-7 micrometres per year,
- **rural** - corrosion rate 1-2 micrometres per year.

The described average reductions of coatings do not take into account any additional corrosion factors occurring locally.

The daily capacity of our zinc works exceeds 60 tons of products. The zinc works at the Rawlplug factory in Łańcut are equipped with mechanical cleaning machines, product zinc-plating lines with more than 40 baths, and a dehydrogenation oven. The technological process of product zinc-coating takes approximately 2.5 hours and, contrary to the common opinion, is a comprehensive multi-staged process consisting of as many as 14 processes. Omitting or shortening any of the operations results in losing the quality of the protective coating.

The galvanizing process comprises the following operations:
Chemical degreasing - occurring in an alkaline bath, duration is 8min. at temperature of 45^{0}C - 50^{0}C
Rinsing - with constant water inflow, duration approx imately 30s.
Etching - this process prepares the product surface for coating with zinc, duration approximately 16min.
Rinsing - in three successive baths, duration approximately 20s.
Electrochemical degreasing - the last precise degreasing process before application of the zinc coating.
Rinsing - in three successive baths, duration approximately 20s.
Activation before galvanizing.
Rinsing - in three successive baths, duration approximately 20s.
Galvanizing - duration of application of the zinc coating varies, depending on the coating thickness, from 40 minutes (5µm thick coating) to 120 minutes (15µm thick coating).
Rinsing.
Brightening in nitric acid.
Passivation of the product.
Rinsing.
Drying.

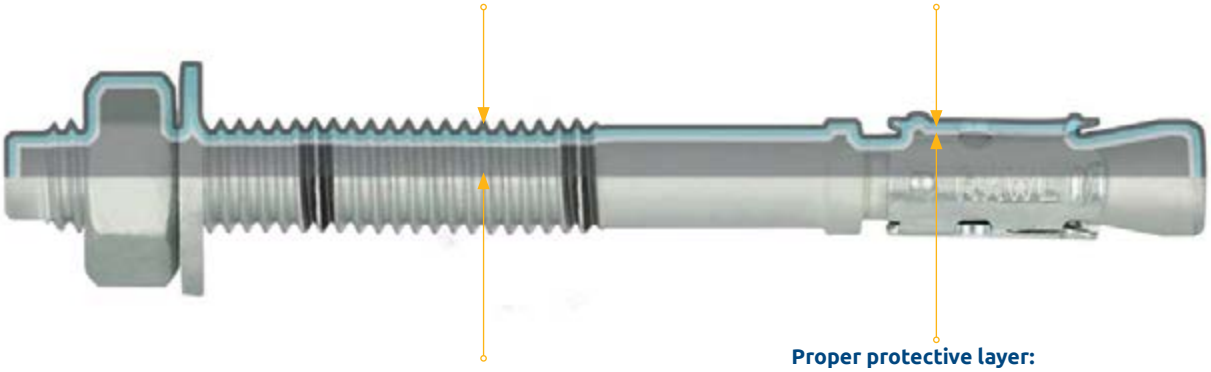
Production of anchors

Harmful hydrogen penetrating into steel during the galvanizing process may cause a subsequent loss of plasticity or cracks, even at the recommended design load. The phenomenon of hydrogen embrittlement is related to fasteners from class 10.9 up, i.e. products of high tensile strength, high hardness, and surface-hardened. The process reducing the quantity of harmful hydrogen in steel during galvanizing is "dehydrogenation" by soaking. This process is performed in the Rawlplug factory in accordance with the standard ISO 4042. Products are soaked in the oven at a specific temperature for approximately 6 hours. In order to avoid defects related to hydrogen embrittlement, products are placed in the oven within no more than two hours from the moment of being covered with zinc. After soaking the products are cooled down, then they are subjected to quality control, where specialized and experienced staff ensure only the highest quality products are approved for sale.

In the Rawlplug factory in Łańcut we execute the following type of galvanizing in accordance with the standard ISO 4042.

- **thin-layer galvanizing** – coating thickness is from 5 µm to 15 µm in yellow, blue, and colourless passivation, and corrosion resistance of such coatings, depending on their thickness, lasts between 6 and 72 hours until white corrosion is obtained, and from 24 to 144 hours for red corrosion

Schematic construction of galvanic coating



Top layer

(optionally)
Transparent sealing: approx. 2 µm Black TopCoat: approx. 10 µm

Passivation

Passivation approx. 0.1 µm;
Thick-layer passivation approx. 0.5 µm;

Basic metal

(anchor/steel)

Proper protective layer: zinc or zinc alloy

(Zinc/Iron or Zinc/Nickel)
Layer thickness as necessary:
5 µm-20 µm

Production of anchors

2. Hot Dip Galvanizing Zinc Coating

Increased corrosion resistance

Hot dip galvanizing is applied to products with the use of immersion method. Previously prepared products are placed in liquid Zinc, which allows to cover even fixings of the most complicated shape with a homogenous protective layer.

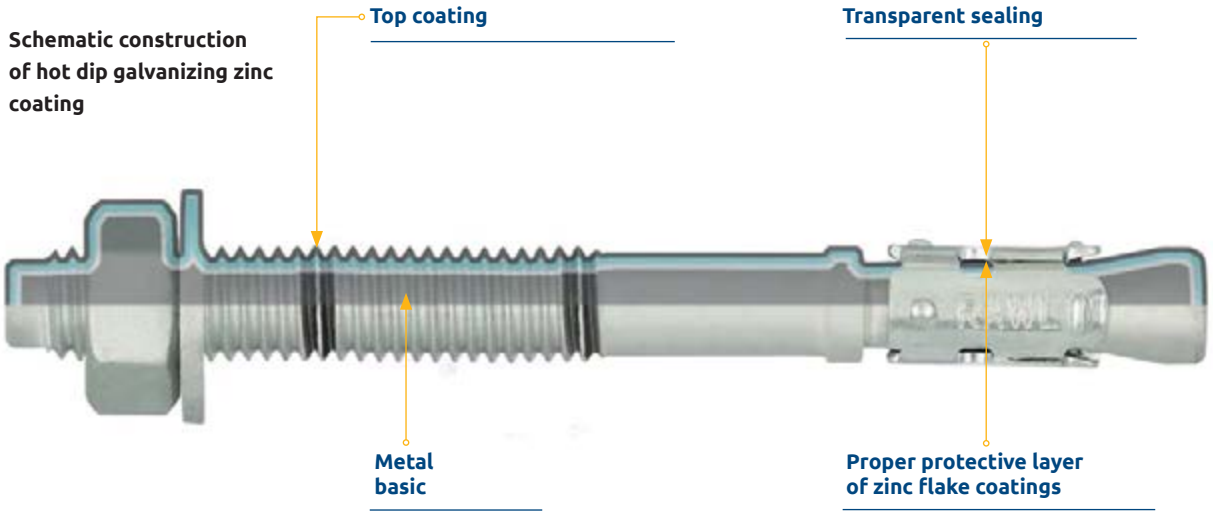
Product of the hot dip galvanizing process is a layer resistant to corrosion, abrasion or mechanical damage. Depending on the layer thickness, environmental conditions, and mechanical erosion such layer can stand 10 – 100 years.

An advantage of such solution is greater metal protection than in case of standard zinc-plating, with same minimal negative environmental impact and lack of significant cost increase. Effect of such action is receiving aesthetic anti-corrosion layer with excellent technical parametres.

Hot Dip Galvanizing benefits from the diffusion effect. Zinc atoms penetrate external layer of the steel. As the dip is performed in high temperature (ca. 450°C), a zinc-steel alloy is created on the surface of the product. Such coating is characterized with multilayer structure, including a layer of zinc, zinc-iron and alloy phases. It guarantees inseparability of the coating with its substrate.

HDG coatings for Rawlplug are created with use of modern zinc coating furnaces in accordance in compliance with regulations of PN EN ISO 10684 and 1461.

Schematic construction of hot dip galvanizing zinc coating



3. Non-Electrolytically Applied Zinc Flake Coatings

Very good corrosion resistance
Elimination of hydrogen embrittlement

Zinc Flake Coatings

Zinc-aluminium flake coatings have gained worldwide recognition in specialized automobile, aviation, and construction industries. Various basic products and topcoat lacquers with a wide range of properties are applied e.g. on connecting parts and pressed parts. They satisfy the high requirements imposed by industry. Organic and inorganic top coatings have been improved in respect of specific properties of lamellar zinc coatings. Combination of basic coating and top coating has largely matched the requirements imposed by industry which could not have been satisfied before.

Production of anchors

Non-electrolytically applied zinc coatings have found wide application in industry, due to their very good anticorrosive properties (resistance to salt spray mist considerably above 1000 hours, according to PN-EN ISO 9227), very good resistance to temperature, ability to select the required friction coefficient, and the ability to use modern methods of application in the coating process. Non-electrolytically applied zinc flake coatings belong to the most modern methods of corrosion protection.

Zinc coatings consist mostly of a mixture of zinc and aluminium (generally in proportion of 95:5), an electrically conductive binding agent and, depending on the requirements, an integrated lubricant - in order to adjust the friction coefficient.

The basic properties of non-electrolytically applied zinc flake coatings:

- contain no substances harmful to health - not only chromium but also lead and cadmium;
- have special resistance to high temperature;
- have exceptional resistance to mechanical loads and chemicals;
- exhibit no hydrogen embrittlement;
- allow the selection of the required friction coefficient;
- can be applied using common methods such as: dipping, centrifugation, or spraying.
- are ecological - satisfy the environmental protection requirements in automobile industry and the requirements of the European Directive 2000/53/EC on end-of-life vehicles.

Schematic construction of zinc flake system

Coatings of zinc flakes have a thickness in the range of 5-12 micrometres and, as opposed to galvanic coatings, are thicker on threads and in recesses, and thinner on peaks and edges. For fine threads up to M4 it is more difficult to pass the gauge but in most situations it will not hinder the assembly with nuts and in internal holes.

As a result of dipping application of zinc flake coatings, a thicker coating can be formed in recesses of elements, (e.g. in cavities and sockets of fasteners and on elements with a complex shape), thus providing a better corrosion protection than in the case of galvanic coating, because galvanic coatings are thinner in these areas. However, in some cases the increase of coating thickness in cavities and sockets may pose a problem.

Production of anchors

Basic Coatings

The primary goal of basic coatings to is protect the steel substrate from corrosion by active dissolution of zinc. Since zinc is less noble than steel, it corrodes first, when both metals stay in electrical contact. When the coating becomes damaged, e.g. by scratching, then zinc, and not steel, is subject to corrosion. This happens until the entire matrix is destroyed. Zinc is built into the coating in the form of fine flakes, several micrometres thick.

Small flake size makes it possible to obtain very thin coatings of thickness, approximately 4 µm. These flakes are in contact with one another, and as a result they constitute a layer acting as a zinc matrix. In order to obtain a corrosion protection level comparable to conventional coatings containing chromium (VI), the zinc flake coatings - which contain no compounds of chromium (VI) - are covered with top coatings as a complement to the basic coatings.

Top Coatings

Top coatings should protect the metals (iron, zinc) from corrosion. The corrosion process is accelerated by the presence of water coming from the surroundings (air humidity, influence of the environment, etc.). Therefore the top coatings constitute a barrier isolating the metal from the influence of corrosive factors.

The top coatings extend the period of electrochemical action of zinc coatings, and thus increase the durability of the protection. The hardening temperature for the top coatings is within the same range as for the basic lacquers.

R-XPTIIA4

Protective Coating Application Technology

Pretreatment of Parts

Coatings, as in the case of most applications, are applied onto clean and dry steel surfaces free from dust and grease. Depending on the history, purpose, and geometry of the parts, various pretreatment methods are used.

However, care should be taken so that the chosen pretreatment method does not cause hydrogen embrittlement. An example may be etching leading to diffusion of hydrogen into steel.

Dipping and Centrifugation

Coatings on elements with a large surface area are usually applied using the dipping method. Elements are placed in a basket which is dipped in a specially designed container. Paint covers the entire surface of the elements. The movement caused by slow rotation of the basket may improve the quality of the painting process and lead to the elimination of air bubbles.

After application, the coating should be subjected to hardening. Several parameters influence the dipping process. The most important ones are: dipping time, rotation speed, rotation time, and load size.

Dipping in paint and drying, while maintaining appropriate conditions, is especially suitable in the case of parts with exceptional geometry, such as screws, bolts, or other complex elements.

Production of anchors

Hardening

Another operation is hardening of the coating. Hardening of coatings is performed in various types of ovens. Painted elements are transported from the basket on a slowly moving belt.

The first part of the oven is the so-called evaporation zone, where the solvents, or water in the case of water-based systems, evaporate at a temperature of approximately. 80-100°C. Then the coatings are hardened at a specific temperature, depending on the applied coating. After hardening, the elements are cooled down to an ambient temperature (25°C or lower).

Zinc Flake Coating Systems Applied on Rawlplug Fasteners

Products manufactured in the Rawlplug factory are coated using zinc flake coating systems of the highest quality:

R-HPTIIZF

GEOMET®

Geomet® is a water-based zinc flake coating that replaces Dacromet®. It has been developed by the combined resources of the Dacral Group of companies located in France, USA, and Japan. Geomet® is known and accepted worldwide, and it satisfies the requirements of all major OEMs across the world.

Appearance

The coating looks silvery-grey on the surface, and may be covered with colourful organic coatings.

Efficiency Information

We can say that Geomet® provides fourfold protection against corrosion.

- Barrage protection: overlapping zinc and aluminium flakes constitute an excellent barrier between the steel substrate and the corrosive medium.
- Galvanic protection: zinc corrodes in order to protect steel.
- Passivation: metal oxides slow down corrosion reactions of zinc and steel, providing three times better corrosion protection than pure zinc.
- Self-regeneration: zinc oxides and carbonates move to the damaged coating areas, repair them actively, and renew the protective layer. Thanks to this phenomenon, thin layers provide corrosion protection for a period ranging from 600 to over 1000 hours.

Production of anchors

Most Important Advantages of the Coating

- Aesthetically pleasing appearance.
- Material cohesion.
- Adherence to substrate.
- Possible application for parts with plastic or glued additions.
- More than 600 hours protection when tested in inert salt spray mist.
- If necessary, execution of additional covering with specialized top coatings is possible.
- Electrically conductive, suitable for earthing applications (top coating is not an insulator).

- Thin layer of coating application, approximately 5-7 µm, allows its use for smaller parts, with low risk of filling recesses and with no problems related to thread tolerance, there is no need to reduce the thread size below the standard size.
- Compatible with co-operating parts, also covered with Geomet® 500.
- Cost-effective.
- For small elements (M3-M6 without filling recesses).
- No hydrogen embrittlement.
- Water-based.
- Excellent bi-metallic protection (especially with aluminium).
- BMW GS 90 requirements.

Types of Materials

Geomet® is available in three similar varieties. These are:

Geomet® 500

Designed especially for the covering of fasteners and small details in order to obtain the corrosion resistance of 600 hours and the ability to control lubricity. It can be modified by adding a surface lubricant. It is a direct successor of Dacromet® 500.

Geomet® 321

This coating can be applied to pressed elements, fasteners, and large elements. It is usually applied where a corrosion resistance above 720 hours is required, and it has a sealed top coating that can be lubricated if necessary.

Geomet® 720

This material is applied where high resistance in inert salt spray mist is required at low thickness, even up to 1500 hours.

Influence on Environment

Water-based zinc flake coatings require no separate solvents or other equipment for cleaning, therefore they are the most environmentally friendly of all zinc flake coatings. This coating, while having a thin layer, provides good corrosion resistance and simultaneously has low impact on the environment.

DIFFERENS CORROSION PROTECTION VARIANTS

STAINLESS STEL	ZINK FLAKE	HOT DIP GALVANIZING	ZINK PLATED
R-HPTIIA4	**R-HPTIIZF**	**R-XPT-HD**	**R-XPT**

Production of anchors

Selection of Optimal Protective Coating

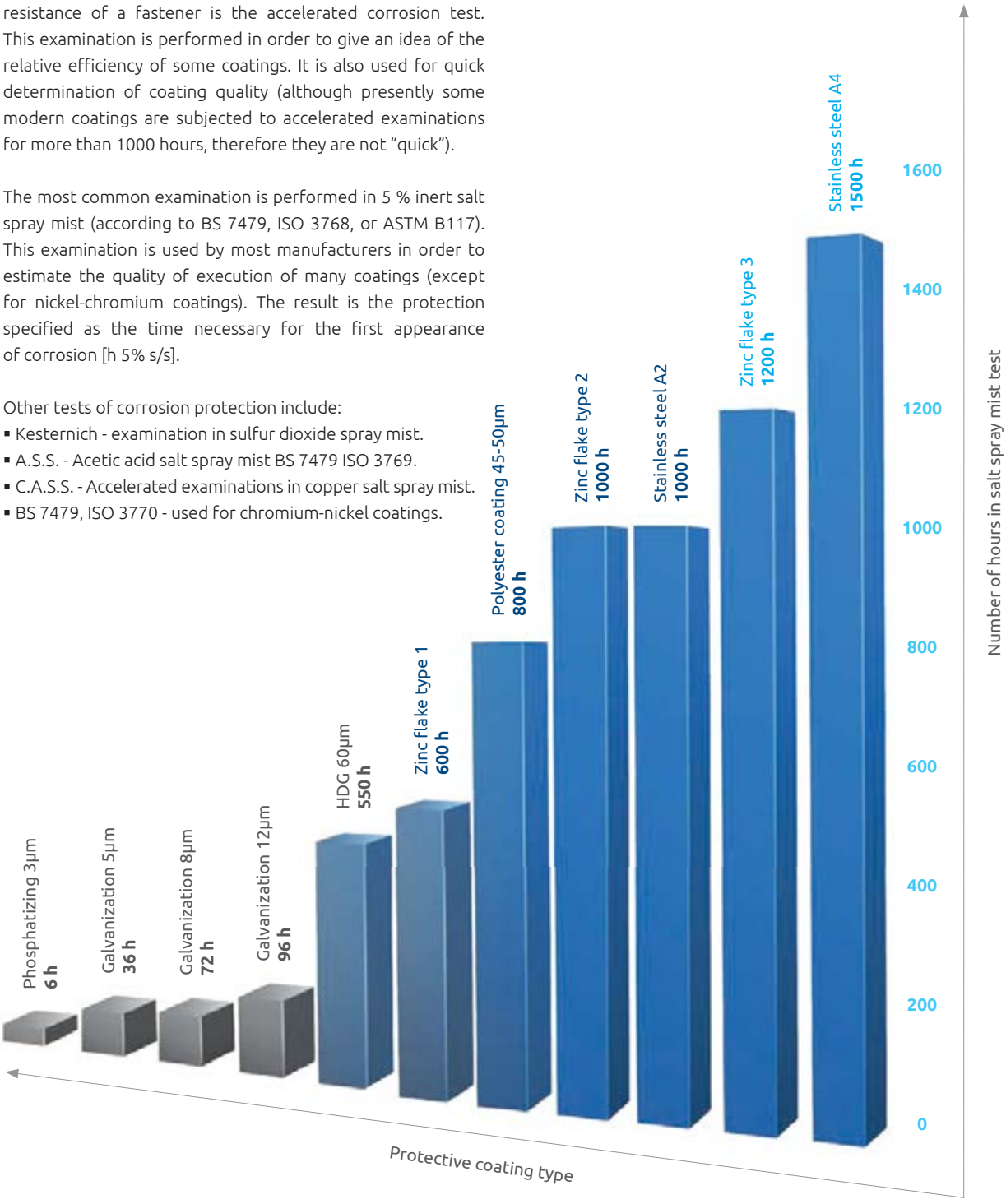
Having a wide range of available corrosion protections, it is of critical importance to optimally select the type of protection for a product application. Having in mind the appropriate relation of product quality and cost, our research and development department optimizes the coating quality adequately to the product specification provided by the client.

A test illustrating the difference in quality of corrosion resistance of a fastener is the accelerated corrosion test. This examination is performed in order to give an idea of the relative efficiency of some coatings. It is also used for quick determination of coating quality (although presently some modern coatings are subjected to accelerated examinations for more than 1000 hours, therefore they are not "quick").

The most common examination is performed in 5 % inert salt spray mist (according to BS 7479, ISO 3768, or ASTM B117). This examination is used by most manufacturers in order to estimate the quality of execution of many coatings (except for nickel-chromium coatings). The result is the protection specified as the time necessary for the first appearance of corrosion [h 5% s/s].

Other tests of corrosion protection include:
- Kesternich - examination in sulfur dioxide spray mist.
- A.S.S. - Acetic acid salt spray mist BS 7479 ISO 3769.
- C.A.S.S. - Accelerated examinations in copper salt spray mist.
- BS 7479, ISO 3770 - used for chromium-nickel coatings.

The component material of a coating is selected due to its mechanical properties, malleability, plasticity, strength properties, etc. Subsequent coatings of different materials provide protection and contribute to a long period of usable life. A coating often has more than one property, and in order to give it various properties, covering with many coatings is used, i.e. one layer is applied onto another.



Production of anchors

Coating layers quality control

In order to ensure highest quality of our products, samples are taken from every part of products covered with coating for detailed examination to check its structure and thickness. Tests are performed with use of Daltoscopes and special matrix.

In order to maintain 100% control over process, everyday tests of regents concentration and process paremetres are performed in our chemical lab. Rawlplug factory cooperates only with carefully selected suppliers of substances and coatings. Moreover due to cooperation with scientifical institutions we represent highest level of knowledge, allowing us to fulfill customers' expectations in terms of corrosion protection of anchors.

Rawlplug protection layers environmental impact

Rawlplug protection layers meet requirements of following EU industrial directives:

- 2000/53/EC (ELV) - automotive industry,
- 2011/65/UE (ROHS 2) - electrical and electronic devices production industry,
- 1907/2006/WE (REACH) candidate list for dangerous substances (SVHC).

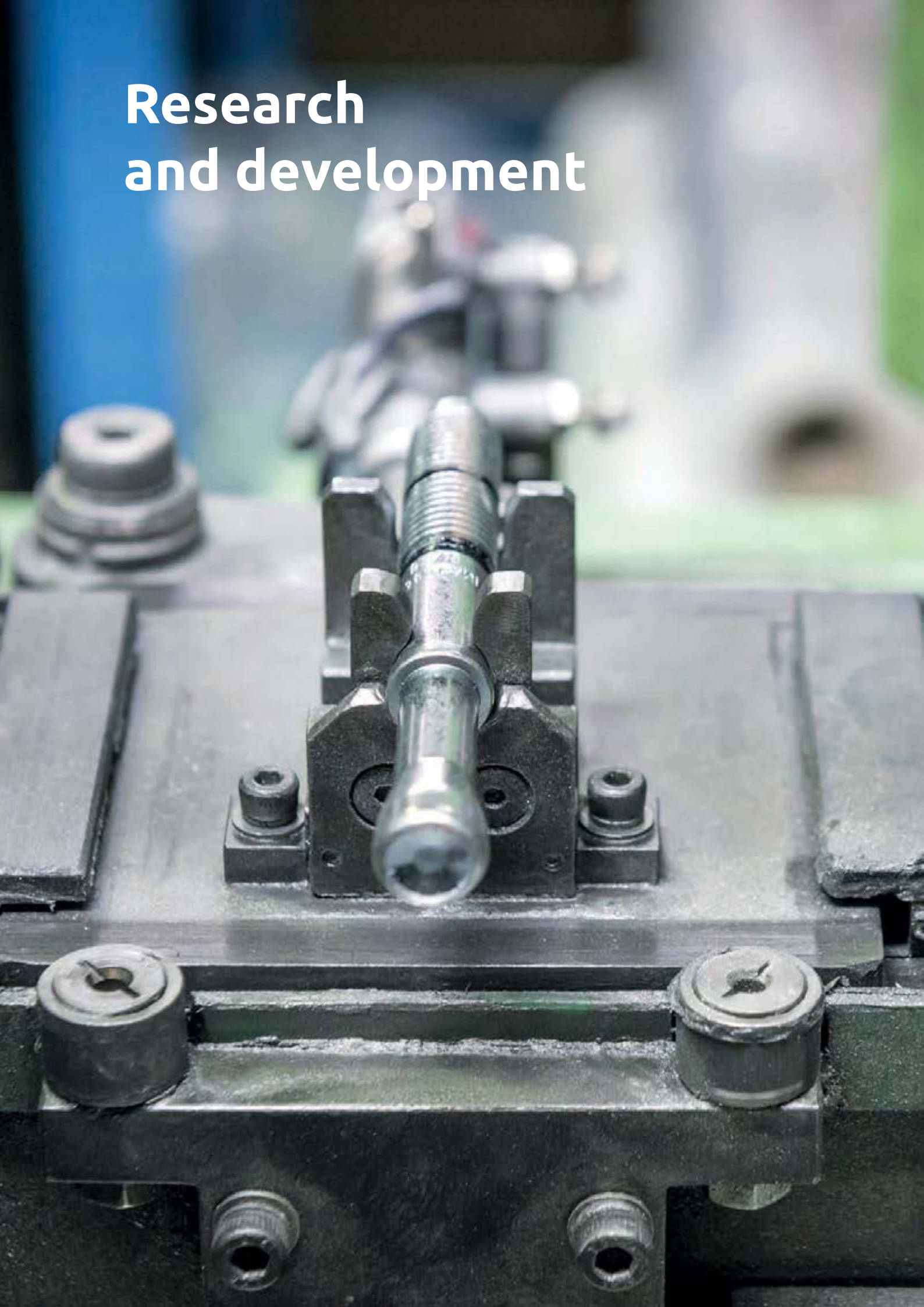
Protection layers used in Rawlplug products are secure for environment. We strive to ensure high effectiveness and lowest negative environmental impact of galvanizing process. We removed cobalt salts from zinc electroplating baths in order to reduce use of substances dangerous for health and natural environment. Through optimization of working concentration thanks to laboratory analysis we reduce amount of substances and chemical compounds used for particular stages. Lower operating concentration in comparison with other galvanic processes used to ensure corrosion protection of alloy and carbon steel. The process of zinc-electroplating itself is performed in the ambient temperature, which is another benefit due to lower energy consumption.

Being responsible for the environment, the dangerous waste originating from zinc-electroplating processes is being sent to specialist recycling and utilization companies. Other waste is processed by factory's sewage treatment plant. Parametres of waste is controlled in order to ensure accordance to legal requirements in this area according to regulations.

We understand the relationship between the products we build and the environments that they are used in, and have built environmental awareness into the entire lifecycle of our products and operations.

Sustainable RAWLPLUG Environment

Research and development



Research & development and quality control background

- Analysis of customer's expectations is the foundation of our activity. Recognition of needs and identification of solutions leading to their fulfillment is a starting point for our product development activities. The operation model involves practical knowledge about product use and expertise in terms of fixing assortment production technology.

  In order to achieve the most efficient and functional products, Rawlplug anchors product development process is performed in close cooperation with production plant. Consideration of all of the aspects of their design in accordance to appropriate departments of the production plant leads to a synergy which can be obtained only directly by a producer.

  From sourcing suppliers who can provide appropriate materials, though design of geometry, mechanical and heat treatment, through quality control and even appropriate packaging considering sustainable development, excellence is our aim. Even if the way to reach it involves going the extra mile.

- Own production plant with an array of advanced technologies of material treatment and laboratory examination potential enables us to thoroughly develop our product range. Taking the advantage of testing numerous variants of anchors with different modifications and comparison enables us to achieve highest quality and uncompromised parametres.

RAWLPLUG®

Trust & Innovation. Since 1919.

Research and development

Research & development

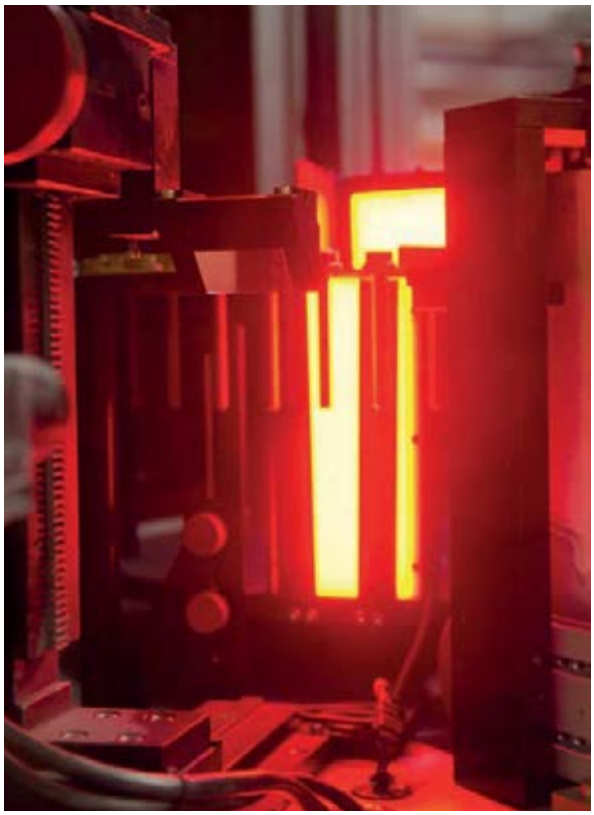
Rawlplug R&D department consists of a number of facilities specialized in various areas located in company's headquarters or production units. Proximity to areas where particular processes take place enables provide constant control of quality and effects of innovations implemented in the production process. Research and development department plays crucial role in the continuous process of upgrading Rawlplug Bonded and Mechanical Anchors range.

Measurment lab:

- Geometric measurements of products accordingly to technical specifications or norms
- Preparation of MSA measurement systems analysis
- Performance of machine and process capabilities examinations (SPC)
- Testing of minimum breaking loads MB min
- Friction coefficient measurement
- Optimum tightening tourque level for special parts

Chemical lab

- Chemical composition analysis
- Measurement of layers thickness with magnetic, weight and X-ray methods
- Corrossion resistance salt spray testing
- Chemical and physics-chemical analysis of various substances
- Climate chamber cycles examination accordingly to specification
- Examination of paint layers adherence



Research and development

Metallography lab:

- Measurement of core microhardness HV10, surface HV3,0
- Microscopic steel structure assessment, microstructure examination
- Examination of fibre layout, decarburization, material faults
- Difussion layers quality check
- Layers thickness microscope measurement accordingly to ISO 1463
- Hardenability of materials examination

Production quality control team performs examinations derived from ISO 898 norm, such as;

- Rm resistance
- HV, HRC hardness
- Rp yield strength
- Tension under proof load
- Extention A%
- Narrowing Z%
- Head solidity / test on wedge
- Impact performance (up to 60*C)
- Surface integrity accroding to ISO 6157
- Sets tests accordingly to ISO 15048
- Hydrogen embrittlement setting accordgingly to ISO 15330
- Swelling proofs to detect material faults

Norms, certificates, insurances

EN ISO 9001:2008
Certificate of compliance with quality management system including process approach in management

ISO/TS 16949:2009
Certificate of compliance of system quality management with technical specification requirements in terms of production and sales of automotive industry products

ISO 14001:2004
Certificate of compliance with requirements of system environmental management

EN 15048-1:2007
Plant quality control department certificate of compliance of non-preloaded structural bolting assembles for construction industry use according to 89/106/EWG directive

AD 2000
Certificate of compliance with directive 97/23/EG and AD2000 instruction - Merkblatt W0 for bolt products used for pressure devices

TÜV
Certificate of compliance for production of bolt products used in construction industry on German market

OHSAS 18001:2007
Certificate of compliance with system management in terms of safety at work regulations accordingly to OHSAS 18001:2007 standard

Rawlplug Support

Europejskie Aprobaty Techniczne ETA


British Board of Agrément
BBA
European Technical Approval ETA-12/0021
EOTA
European Organisation for Technical Approvals


British Board of Agrément
BBA
European Technical Approval ETA-12/0309
EOTA
European Organisation for Technical Approvals


British Board of Agrément
BBA
European Technical Approval ETA-08/0339
EOTA
European Organisation for Technical Approvals


British Board of Agrément
BBA
European Technical Approval ETA-12/0384
EOTA
European Organisation for Technical Approvals


European Technical Assessment ETA-13/0584 of 24/09/2014
General Part


European Technical Approval ETA-11/0126
EOTA


European Technical Approval ETA-13/0584
EOTA


European Technical Assessment ETA-10/0055 of 19/08/2014
General Part


European Technical Approval ETA-10/0055
EOTA

Rawlplug Support

Europejskie Aprobaty Techniczne ETA

Rawlplug Support

Rawlplug Service

As a reliable producer we stand at our business partner's side and address their individual requirements with advice and actions. Therefore our customers may benefit from a complete range of services that we have developed for them:

- Global presence and active sales service in over 40 countries.
- Gualified, technical support and advice regarding economical fixing solutions, taking the latest building materials, standards and guidelines into account, including support on construction site.
- Training sessions in Rawlplug Academy.
- Convenient calculations with modern software.
- Marketing support.

Abovementioned services are parts of our Technical Development Services and Rawlplug Academy, important elements of the Rawlplug Offer. We provide our customers not only with modern products but also full technical backup, knowledge database and marketing and support. Below you may find a description of key services offered by Rawlplug to its customers.

Customer Service

Customer Service delivers individual customer solutions by providing professional consulting and expert advice to product- and application-specific questions, whether on the phone, via e-mail and fax:

- We will be happy to provide you with information on deliveries and on the availability of our products.
- Contact us if your tool needs repair or maintenance.
- Do you want to speak to your account manager on site? Do you have specific questions for our technical team? Customer Service representative will be pleased to help.

We look forward to your comments and will be pleased to respond to any questions or complaints you may have. This gives us the opportunity to consistently improve our service.

Software

User friendly programs offer easy and flexible way of designing and dimensioning fastening solutions. As a part of Rawlplug Technical Development Services they exceed international standards, fulfiling the requirements of users worldwide. Design and development hasnever been so easy!

The new modular structure of the program includes engineering software and special application modules. These features enable you to plan complete projects or individual applications in a structured and cost-effective way.
The software package includes following programs:

- Easy Fix – Anchors and Frame fixings acc. ETAG 001.
- Roofix- Roofing Insulation Fixings acc. ETAG 006.
- Façade Software – Façade Insulation Fixings acc ETAG 004.

The software is written to international design standards, with muti language dictionary, and including national application documents, uses the existing commonly used forces (e.g.wind zones).

Rawlplug Support

Logistics

Our customers expect our products and services to meet the highest quality standards. We are aware that they expect the same from our logistics service.

Even tough packaging and logistics may not seem to be particularly sophisticated areas, they require highly developed organizational culture, precision, punctuality, and use of advanced operating systems. Applying these rules enables us to deliver our client services at the highest level and guarantee successfull delivery of any order. Regardless of the quantity, placement channel or collection way, we deliver your order on time and intact. We take care of your order no matter how big or small. Irrespective of which channel you use to place your order, we get the items to you in good time.

Technical Consulting

End users of our products have been in the centre of Rawlplug's business model ever since the company was established. This enables our organisation to understand how our products are used, use this insight to develop our products and deliver on our brand promise of premium quality.

Our Technical Sales Support offer:

- Technical advice and product recommendation.
- Support for engineers, consultants and craftsmen.
- Special solutions in the scope of fixing technology.
- Bespoke seminars for engineers, consultants, architects.
- Access to Rawlplug Academy extensive product training resource.

Marketing Support

It is part of our global business philosophy to build good partnerships and trading relationships with our Customers. Expanding and developing attributes to our core business philosophy include:

- Marketing support base:
  - In-house Marketing Team and Design Studio.
  - Technical support catalogues and product literature.
  - POS display, planogram and merchandising solutions tailored to your own needs.
  - Editorial & Press Support inclusive of a Product Library.
  - Guidebooks enabling creation of promotional activities using Rawlplug's products and corporate identity.

Application of anchors

Basics of anchoring - Loading considerations

Loads

▪ **Static loads**

The load is static if its value remains constant over time.

Static load examples:

– Dead weight – Constant load resulting from weight of construction element

– Permanent action resulting from element function

– Variable actions - For example snow or temperature loading

Static Load

▪ **Oscillating loads**

Variable loading with low amplitude and high frequency (e.g. engine vibrations)

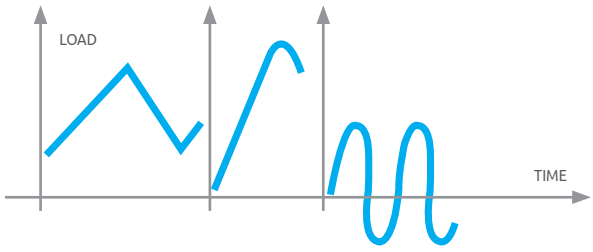
▪ **Dynamic load**

Variable loading over time, with medium or high amplitude, with or without negative load (e.g. wind activity)

▪ **Impact (shock) load**

Load, often high, acting over a very short period of time

Dynamic/Shock/Oscillating Loads



The four listed types of load may be either short or long term. Short-term loads may act once or repeatedly within a limited period of time. Long-term loads act on a permanent basis.

Loading directions:

1. Axial tensile load – Load application is in the direction of the connector axis, acting to pull the connector away from the substrate.
2. Axial compressive load – Load application is in the direction of the connector axis, acting to clamp the connector onto the substrate.
3. Shear (transverse) load – Loading direction is perpendicular to connector axis, with the load applied at the substrate surface (fixture tightened against the substrate).
4. Combined load (resultant) occurs when axial and shear loads are acting simultaneously.
5. Bending moment occurs when a shear load is applied offset from the substrate surface. Magnitude of bending moment is dependent on applied load and lever arm length.

Anchor design - Safety factor concepts

Two safety concepts can be applied in the design of anchorages:

▪ Global safety factor concept

▪ Partial safety factor concept (recommended for anchors with European Technical Approvals or Assessments (ETA)).

Basics of anchoring - Safety factor concepts

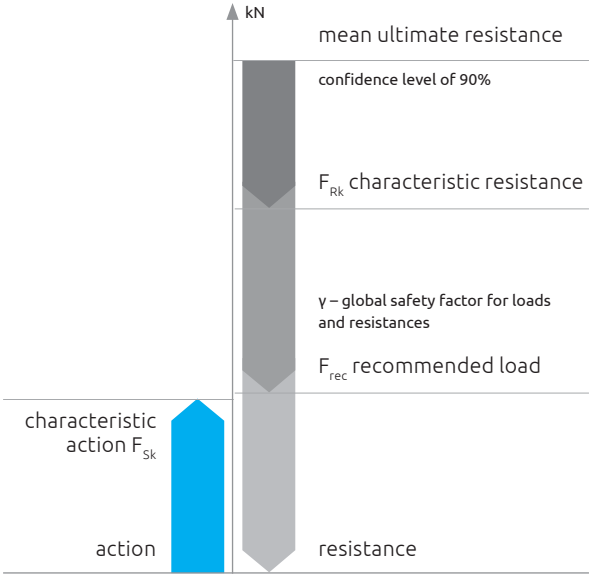
Global safety factor concept

Using the global safety factor concept, it must be proven that the recommended allowable load, F_{rec} of the anchor shall be greater than characteristic action F_{Sk}

$$F_{Sk} \leq F_{rec}$$

$$F_{rec} = \frac{F_{Rk}}{\gamma} [N]$$

F_{Rk} – characteristic resistance, γ – global safety factor



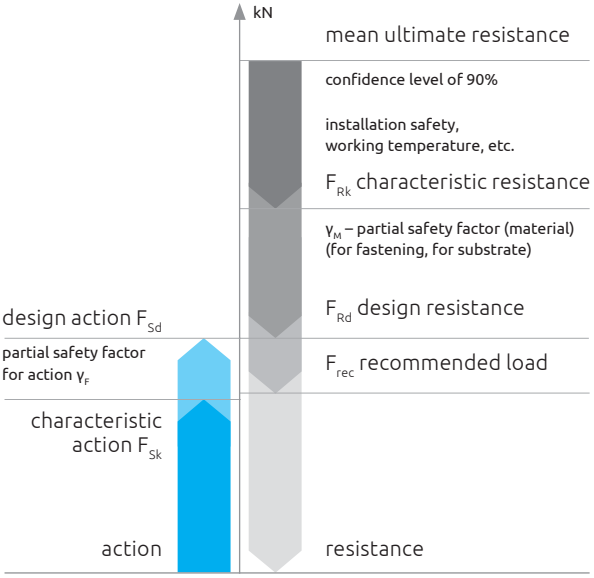
Partial safety factor concept

General principle:

Every potential failure mode should be considered, using appropriate partial safety factors for each. Loading in all directions must be calculated, ultimately taking the worst case scenario as being decisive.

Using the partial safety factor concept, it must be proven that the design resistance, F_{Rd} of the anchor shall be greater than design action, F_{Sd}

$$F_{Sd} \leq F_{Rd}$$



Design action:

$$F_{Sd} = F_{Sk} \cdot Y_F [N]$$

F_{Sk} – characteristic action, γ_F – partial safety factor for actions
γ_F = 1.35 – for permanent actions, 1.50 – for variable actions.
National regulations may be used.

Design resistance:

$$F_{Rd} = \frac{F_{Rk}}{\gamma_M} [N]$$

F_{Rk} – characteristic resistance
γ_M – partial safety factor (material)

Calculation of partial safety factors

In case of concrete cone failure mode (according to ETAG 001 Annex C, 3rd Amendment August 2010):

$$\gamma_{Mc} = \gamma_c \cdot \gamma_2 [N]$$

γ_c – partial safety factor for concrete: γ_c=1.5
γ_2 – partial safety factor accounting for the installation safety of an anchor system (determined from test results)

Tension loading
– for systems with high level of installation safety γ_2=1.0
– for systems with normal level of installation safety γ_2=1.2
– for systems with low, but still acceptable level of installation safety γ_2=1.4
Shear loading (pry-out failure and concrete edge failure) γ_2=1.0

Basics of anchoring - Safety factors & calculations

In case of steel failure: γ_{Ms}

Tensile load:

$$\gamma_{Ms} = \frac{1.2}{F_{\gamma k}/F_{uk}}$$

Shear loading with and without lever arm:

If $f_{uk} \leq 800 N/mm^2$ and $f_{\gamma k}/f_{uk} \leq 0.8$

$$\gamma_{Ms} = \frac{1.0}{F_{\gamma k}/F_{uk}} \geq 1.25$$

If $f_{uk} > 800 N/mm^2$ or $f_{\gamma k}/f_{uk} > 0.8$

$$\gamma_{Ms} = 1.5$$

If $\gamma_{Ms} > 1.5$ it shall be assumed that

$$\gamma_{Ms} = 1.5$$

Calculation of design resistance:

In case of concrete cone, pull out and concrete pry-out failure:

Tensile force

$$N_{Rd} = \frac{N_{Rk}}{\gamma_{Mc}} [N]$$

Shear force:

$$V_{Rd} = \frac{V_{Rk}}{\gamma_{Mc}} [N]$$

Combined force:

$$\left(\frac{N_{Sd}}{N_{Rd}}\right)^{1.5} + \left(\frac{V_{Sd}}{V_{Rd}}\right)^{1.5} \leq 1$$

In case of steel failure:

Tensile force

$$N_{Rd,s} = \frac{N_{Rk,s}}{\gamma_{Ms}} [N]$$

Shear force:

$$V_{Rd,s} = \frac{V_{Rk,s}}{\gamma_{Ms}} [N]$$

Combined force:

$$\left(\frac{N_{Sd}}{N_{Rd,s}}\right)^{2.0} + \left(\frac{V_{Sd}}{V_{Rd,s}}\right)^{2.0} \leq 1$$

Characteristic resistance (load bearing capacity)

Characteristic resistance of an anchor, in any direction, with regard to concrete cone failure is calculated from a mean ultimate failure load for an individual anchor not influenced by edge distances and spacing effects. This characteristic resistance corresponds to the 5% fractile of ultimate loads, calculated according to statistical procedures for a confidence level of 90%.

$$F_{Rk} = (1 - k \cdot v) \cdot F_{Ru,m} [N]$$

The calculation depends on the number of tests (influencing the k factor) and the coefficient of variation (v). In cases where the number of tests is higher than 40 anchors, k = 2 can be assumed.

Calculation of characteristic resistance in the case of steel failure:

Characteristic resistance of steel for tension:

$$N_{Rk,s} = A_s \cdot f_{uk} [N]$$

Characteristic resistance of steel for shear:

$$V_{Rk,s} = 0.5 \cdot A_s \cdot f_{uk} [N]$$

A_s – cross-sectional area [mm^2], f_{uk} – nominal tensile strength [MPa]

Note: For anchors with a sleeve, A_s is based on the diameter of the sleeve, as it is assumed that the load bearing capacity of the bolt and sleeve are combined.

Recommended loads

For the concept of global safety factors:

$$F_{Sk} \leq \frac{F_{Rk}}{\gamma} [N]$$

For the concept of partial safety factors:

Recommended load can be calculated from: $F_{Sd} \leq F_{Rd}$:

$$F_{Sd} = F_{Sk} \cdot \gamma_F \leq F_{Rd}$$

$$F_{Sk} = \frac{F_{Rk}}{\gamma_F \cdot \gamma_M} [N]$$

Thus F_{Sk} based on the concept of global safety factor and the above inequality:

$$F_{Sk} \leq F_{rec} = \frac{F_{Rk}}{\gamma_F \cdot \gamma_M} [N]$$

F_{rec} load is, therefore, calculated based on characteristic resistance F_{Rk} divided by two partial safety factors γ_F and γ_M, assumed for the anchor's load and material, respectively. Thus $\gamma = \gamma_F \cdot \gamma_M$

Basics of anchoring - Materials

The base material/substrate

Consideration of the base material (and its associated properties) is critical in the selection of an anchor or connector technology. It is therefore important to correctly define the material in order to ensure correct anchor installation without substrate damage, as well as safe and reliable subsequent performance under load.

Concrete


concrete

Concrete, in its standard form, is a compound of cement, aggregates and water. It usually possesses high compressive strength, while tensile strength is comparatively low.


cracked concrete

Lightweight concrete is another derivative, in which case heavy aggregate is replaced by light additives like pumice, slag or Styrofoam. Due to the lower compressive strength of these materials, lightweight concrete shows lower strength parameters in general when compared to plain concrete.

This document presents anchor performance data for the following concrete grades: C20/25, C30/37, C40/50 and C50/60 (according to ENV 206 standard). In this format, the values before and after the oblique signify characteristic compressive strengths measured for cylinders (150mm diameter, 300mm height) and cubes (150mm edge), respectively.

The table below lists concrete compressive strengths traditionally applied in different countries.

As a measure to increase the low tensile strength of concrete, steel reinforcing elements (bars, mesh, etc.) may be cast into the concrete member. Their function is to withstand tensile loads within the structure, which may otherwise lead to extensive crack formation within the tensile zone. Reinforcement does not guarantee elimination of cracking in this so-called crack zone. It does, however, limit the size of cracks significantly, ultimately leading to an admissable crack size of no greater than 0.3 mm. Cracks usually assume a wedge form, terminating in the region of the neutral axis within the concrete structure cross-section.

Products approved for use in cracked concrete:
R-HPTII-A4, R-HPTII-ZF, R-SPLII, R-DCA, R-DCL, R-RBL, R-RBP, R-KER, R-KEX II, R-SPLII

Grade CE	Characteristic compressive strength F_{ck} (cylinder)	Characteristic compressive strength F_{ck} (cube)	Great Britain	Germany	France	Poland
			Mean compressive strength, tested (150mm cube)	Mean compressive strength, tested (200mm cube)	Mean resistance, tested (cylinder 16×32cm)	PN-B-03264:2002
C12/15	12	15	20	19	17	B15
C16/20	16	20	25	24	21	B20
C20/25	20	25	30	29	25	B25
C25/30	25	30	35	33	30	B30
C30/37	30	37	42	40	35	B37
C35/45	35	45	50	48	40	B45
C40/50	40	50	55	54	45	B50
C45/55	45	55	60	57	50	B55
C50/60	50	60	65	62	55	B60

Masonry

Masonry walls are multi-layer substrates consisting of blocks of heterogeneous material, built in to the desired structure using mortar.

The compressive strength of the block material is usually higher than that of the mortar. Thus the connectors should, as a rule, be installed within the body of the block.

Blocks may take several forms:

- Solid blocks with compact structure. Blocks of various dimensions, without internal cavities, made from ceramic (ceramic or clinker bricks) or sand-lime (silica) materials. These possess relatively high compressive strength.
- Hollow blocks with compact structure. Blocks of various dimensions and shapes, with several internal cavities. Blocks possess reasonably low compressive strength, despite being made from relatively high compressive strength materials (ceramic or silica).
- Solid blocks with porous structure. Blocks of various dimensions, without internal cavities but with high concentrations of pores or inclusions of other materials. Examples include aerated concrete or solid blocks of lightweight concrete. Materials of this category possess low compressive strengths.

Basics of anchoring - Materials

- Hollow blocks with porous structure. Similarly to solid porous blocks these elements have low compressive strength, weakened further by internal cavities. In most cases these blocks are made from lightweight concrete.

Products with Approval for masonry and hollow walls:
R-KEM II and RM50


solid brick (ceramic or silica)


lightweight concrete


hollow brick


hollow block

Anchor material

Steel

Durability characteristics of screws and bolts are determined by appropriate mechanical property classes from 3.6 to 12.9.

This classification system consists of two numbers separated with a dot, e.g.:

5.6

The first number corresponds to the value of 0.01 R_m of the finished part in MPa. The second number determines the value of 0.1 of R_e/R_m percentage ratio, as follows:

R_m = 500 MPa | R_e/R_m = 60% | R_e = 300 MPa

The strength classes of nuts are marked 4, 5, 6, 7, 8, 10 & 12 which corresponds with the value of 0.01 of R_m of nut steel in MPa.

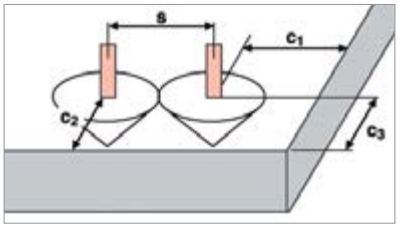
Nut classes shall correspond to screw or bolt classes; therefore, for class 5.6 screws or bolts, class 5 (or greater) nuts shall be used.

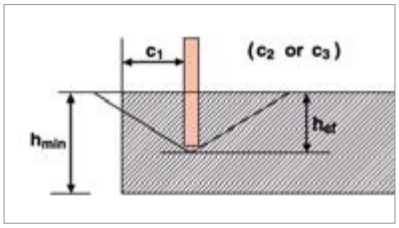
Anchor spacing and edge distances

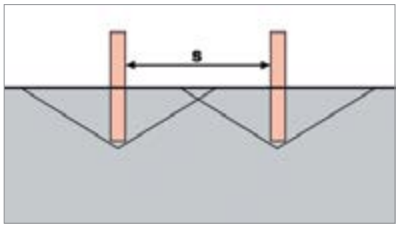
Due to the expansion forces induced by the functioning of anchorage connections, the following parameters shall be taken into account while determining load bearing capacity for a particular product:

- thickness of base material (determined by fixing's effective embedment depth h_{ef})
- spacing of anchored joints (s)
- distance of connections from the edge (c_1, c_2) and corners (c_3) of the base material.

Overlapping of tension cones of neighbouring anchorages in concrete reduces the load bearing capacity of such fasteners.







Basics of anchoring - Spacing & edge distances

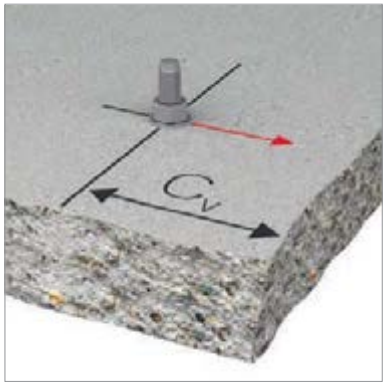
Reduction of anchor spacing and edge distances
In some cases the anchor spacing and distance from edges and corners can be reduced. Such a reduction will impact the anchor's load bearing capacity and, in order to account for the impact, one or more reduction factors will have to be applied.

Effective embedment of fixing h_{ef}
For each connection the minimum fixing depth is determined, which ensures safe load resistance. Some types of anchors can be fixed at greater depth, which increases the load bearing capability (R-SPL, in particular). For more information, please contact RAWLPLUG® technical consultant.

Reduction factors related to the anchor spacing: fs

Reduction factor related to the distance c_N of the anchor from the edge, in cases where load is not being applied towards a free edge: fc_N

Reduction factor related to the distance c_V of the anchor from the edge, in cases where load is being applied towards a free edge: fc_V



Reduction factor related to the distance $c_{cr,sp}$ of the anchor from a corner: $fc_{cr,sp}$

In case of a group of anchors, it is necessary to consider the connection which is located in the most unfavourable place.

tensile

shear

Reduced design resistance of anchor

$$F_{Rd,rec} = F_{Rd} \cdot fs \cdot fc_N \cdot fc_V$$

$$F_{Rd,red} \geq F_{Sd}$$

F_{Rd} – design resistance according to the technical data tables herein,
fs, fc_N, fc_V – reduction factors of axial spacing of anchors and distance to the edge of the base material.

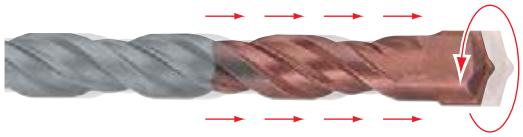
Basics of anchoring - Anchor installation

Drilling

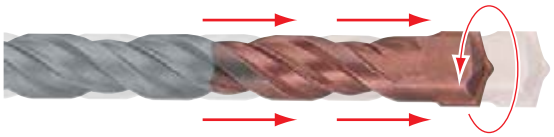
The method of drilling a hole for the installation of an anchor depends on the type of substrate material. There are drilling techniques:

- rotary drilling – drilling by rotation and without percussion (or hammer action), recommended for drilling in materials of low mechanical strength such as bricks & aerated concrete due to the fact that it does not enlarge the hole, nor damage the structure of the material;

- percussive drilling – drilling by rotation with multiple light strikes with the drill bit into the substrate; recommended for drilling materials with high mechanical strength and solid structure such as concrete & solid brick;



- hammer drilling – drilling by rotation with a small number of high energy strikes with the drill bit into the substrate; recommended for drilling in extremely hard structures such as concrete;



A drill bit is a tool, which is subject to wear – its degree and frequency is a derivative of the hardness of the substrate material. The harder the substrate, the greater the wear of the drill bit. Be sure to monitor wear and replace the drill bit whenever necessary.

In the process of drilling a hole for embedding an anchor it is important to be aware of and achieve the correct diameter and depth of the hole.

After the drilling is finished it is essential to clear the hole of dust and drill debris. Failure to do this can be the cause of improper anchoring of the fastener in the substrate.

Anchor installation methods:

1. Push-through installation – convenient and time-efficient method, which allows user to drill and install directly through the fixture without marking out hole locations and pre-positioning anchors. If the fixture is pre-drilled then it may be used as a drilling template, before the anchors are installed directly through the clearance holes. RAWLPLUG® R-XPT, R-XPTII and R-HPTII throughbolt families are all examples of push-through fixings.

2. Pre-positioning installation – this method requires the installation of the anchors in the base material, before the fixture is moved into place. In this case the anchor diameter and the drill hole diameter are different. Our RAWLBOLT (R-RBP) and all bonded anchors are examples of products that require pre-positioning.

3. Stand-off installation – attachment of the fixture at an offset distance from the surface of the base material. One common offset application is the use of internally threaded anchors with long rods, studs or bolts. The anchor is installed in the base material before assembling with threaded rod or bolt. The RAWLPLUG® internally threaded wedge anchors - R-DCA, R-DCA-A4 & R-DCL - may be used for stand-off applications.

Basics of anchoring - Torque & bending moments

Tightening torque

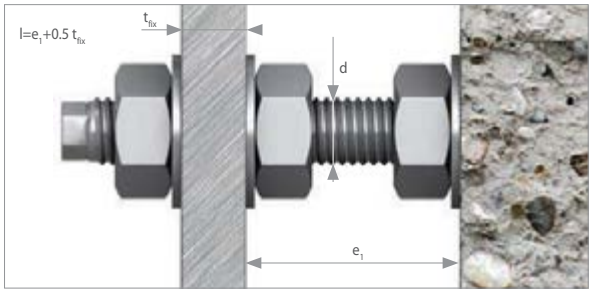
When using expanding anchors, it is necessary to apply a required tightening torque of the magnitude given herein, in order to ensure optimal expansion and achieve the load-bearing capacities given in tables in the next chapter (we recommend using a calibrated torque wrench). Torque transmits to a pre-tensioning force, influencing the initial expansion of the anchor. Moreover, the tightening torque applied will clamp the fixed element to the base material.

The values of tightening torque given in the specification and design guide should not be exceeded.

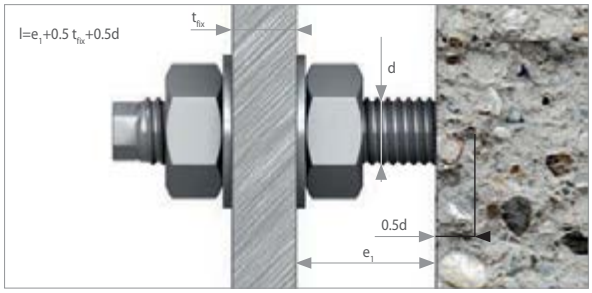
After initial application of the tightening torque, relaxation occurs causing a reduction in tension and therefore clamping force. All data related to a load bearing capacity given in the present specification and design guide account for this torque relaxation behaviour.

Bending moment

In the case of some applications, anchored connections are subject to the influence of bending moments. Generally, this applies when fixed elements are offset from the base material. Applied load is, as a result, not purely in the shear direction - significant tension is also present. It is necessary to ensure the bending moment induced by such loads is not higher than allowable bending moment (given for each type and diameter of anchor).

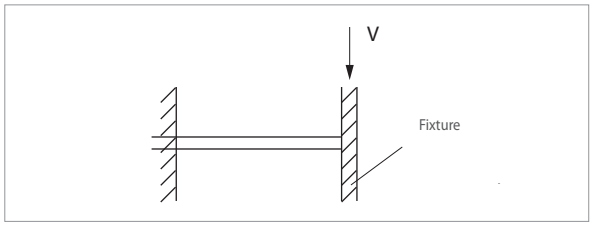


with clamping to the base material

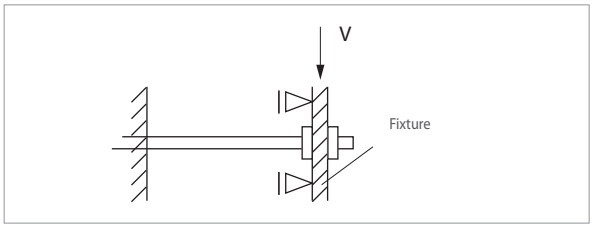


without clamping to the base material

$$M_V = V \times \frac{l}{\alpha_M} \text{ [Nm]}$$



α_M = 1.0 when element (fixture) is not fixed and can rotate freely



α_M = 2.0 when element (fixture) is fixed and cannot rotate

Installation of anchors

Installation guidelines are attached to all packaging for our anchors. We recommend strict adherence to all of the instructions contained therein. Debris and dust must always be removed from the hole before the anchor is installed in order to avoid risk of limiting the anchorage depth. Hole cleaning is particularly important for bonded anchors, because any debris or dust will decrease the load bearing capacity of the anchorage.

Basics of anchoring - Rebar connections

Post-installed rebar connections

Using chemical resin, rebar can be post-installed in concrete to act as structural reinforcement or, alternatively, to create an anchorage. The role depends on the application, installation type and also the feasibility of use of a specified resin.

RAWLPLUG® offer resin products that can provide a solution in both scenarios.

Rebar installed with chemical resin as an anchor

In many applications rebar installed with chemical resin must be designed to act as an anchorage. This scenario may arise for a number of reasons: the rebar may not be carrying the full tensile load as it would in structural reinforcement (i.e. the concrete must resist an element of the tensile loading), there may be an absence of existing cast-in reinforcement (i.e. no overlap splice to take up tensile loads), or the rebar anchorage may be subject to shear loading.

The characteristic failure mode for this type of anchorage - similarly to chemical anchors using threaded rods - is concrete cone failure, or a combination of concrete cone failure and pull-out. It is therefore important to keep appropriate spacing and edge distances.

Embedment depths are generally smaller, compared with cases of rebar acting as structural reinforcement. They can, however, vary and for some types of RAWLPLUG® resins deeper embedments can be employed, facilitating higher performance.

Depending on the type of resin, various diameters of rebar and grades of steel can be applied.

Rebar installed with chemical resin as structural reinforcement

Introduction

Both for new reinforced concrete construction requiring connection with an existing structure, and for the reinforcement, modernisation or upgrading of an existing structure, there can be a requirement to create permanent connections between new and existing construction elements. In these applications post-installed rebar connections are very useful. The aforementioned scenarios can arise when joining slabs, beams and columns, reinforcing nodes, walls and when building balconies and cantilevers.

Depending on the type of existing construction and its reinforcement, two different types of connections can be described - anchorage (Figure 1.1), and overlap splice with existing construction rebar (Figure 1.2)

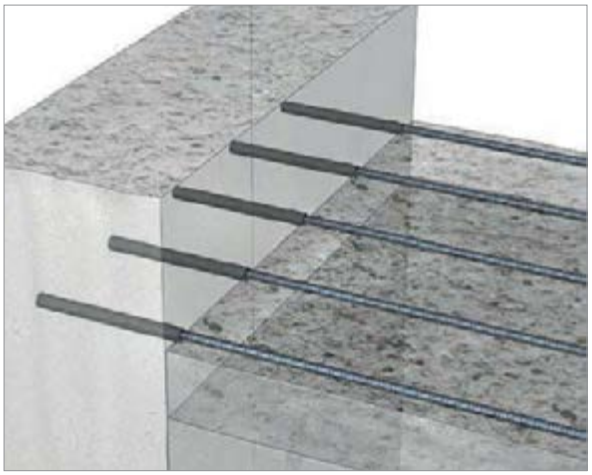


Figure 1.1: Anchorage

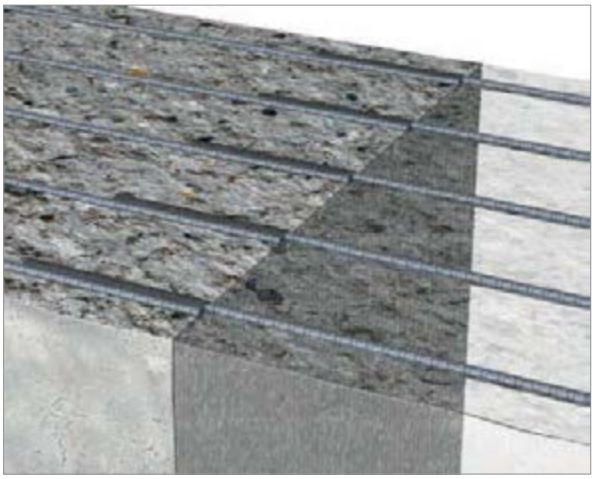


Figure 1.2: Overlap splice

Basics of anchoring - Rebar connections

Various applications (Figures 1-5) are covered by Technical Report TR 023 "Assessment of post-installed rebar connections", which, alongside European standard Eurocode 2 "Design of concrete structures" Part 1-1 "General rules and rules for buildings", is a fundamental document for the design and testing of these types of anchorages.

Figures 1-5 (below) show applications in which resins with rebar can be used successfully.

Examples of post-installed rebar applications

Figure 1
Overlap joint for rebar connections of slabs and beams

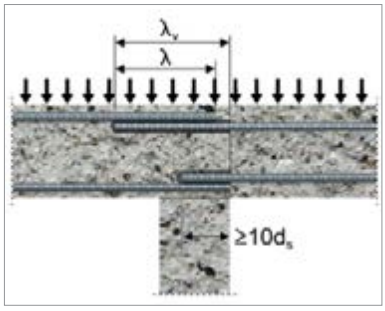


Figure 2
Overlap joint at a foundation of a column or wall where the rebars are stressed in tension

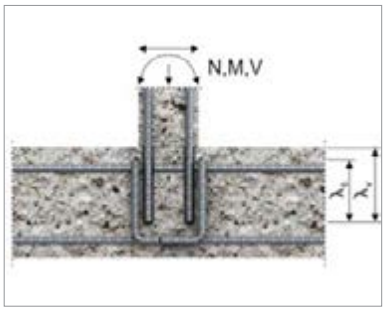


Figure 3
End anchoring of slabs or beams designed as simply supported

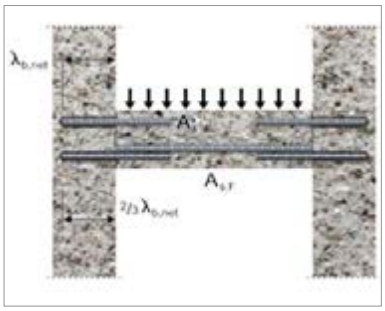


Figure 4
Rebar connection for components stressed primarily in compression. The rebars are stressed in compression

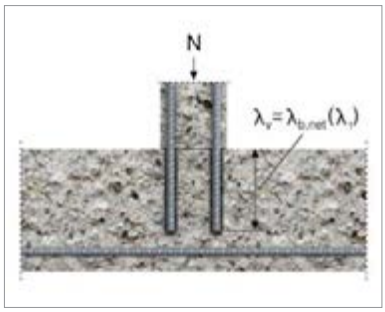
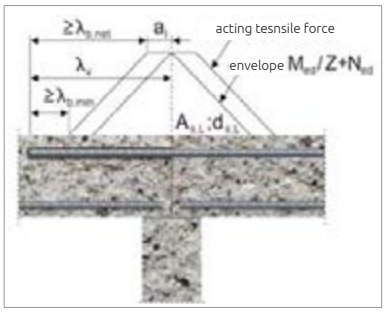


Figure 5
Anchoring of reinforcement to cover the line of acting tensile force.



Note to Figure 1-5
In the figures transverse reinforcement is not shown, however, the transverse reinforcement as required by EC2 shall be present.

The shear transfer between old and new concrete shall be designed according to EC2.

Rebars

Rebars are key elements of reinforced concrete constructions. Their role is to bear tension loads due to the fact that concrete possesses high compressive strength but very low tensile strength.

In the applications previously described, depending on construction type and implementation, rebars can form either an overlap splice effect, where new bars will extend the effect of existing rebar, or an anchorage.

In the case of post-installed rebar, loads are transferred into the concrete via the adhesion of the resin, which simultaneously dovetails with the ribs of the rebar (equivalent to the effect at the rebar-concrete interface in cast-in rebar solutions). The resin reacts like compressive struts at an angle of 45° in a strut-and-tie model.

Cooperation between bars in overlap splice is possible because of load transference between them based on a 45° truss model. Similarly to the above scenario, resin and concrete act as compressive struts.

One possible failure mode in the case of post-installed rebar is pull out failure, when resin wedges are sheared causing the rebar to act like a smooth bar (performance is determined only by friction and adhesion, as the dovetailing effect is eliminated). Another is concrete splitting failure caused by naturally occurring cracks, which run from the rebar ribs in the direction of the concrete surface. Consequently, it is important to ensure correct concrete cover and rebar spacing.

Basics of anchoring - Rebar connections

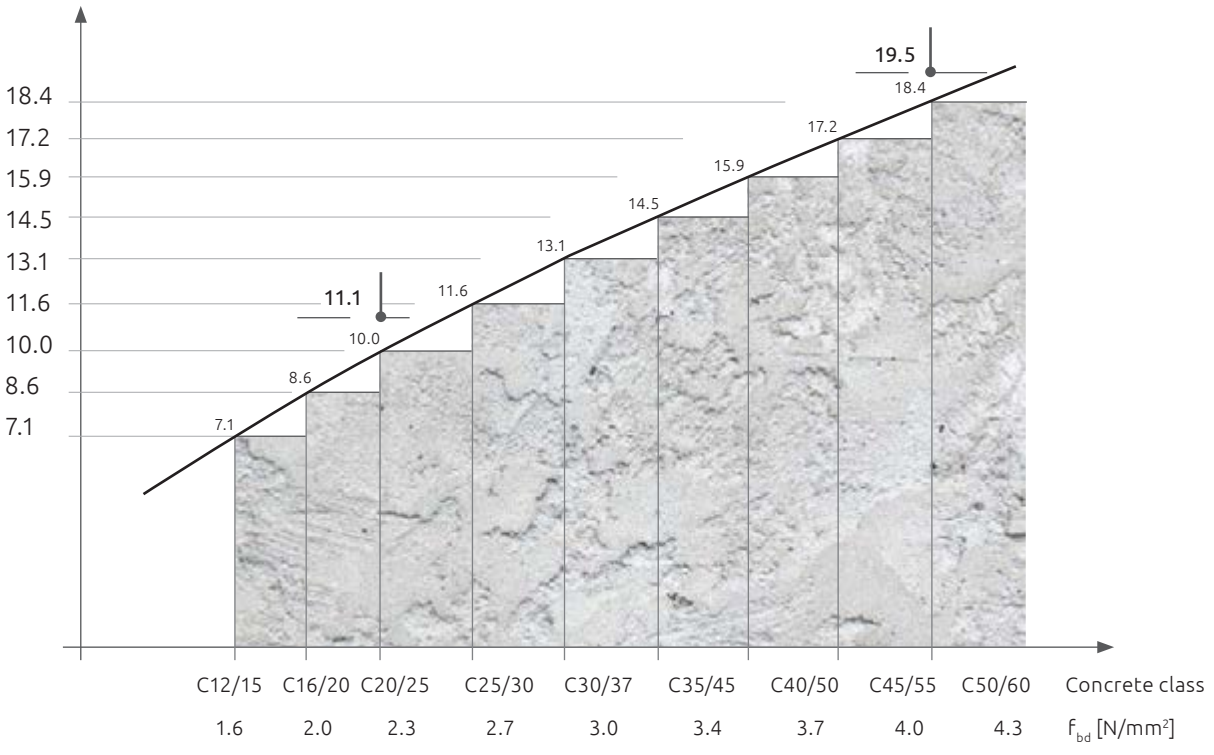
Resin characteristics

Load bearing capacity is determined by adhesion forces at the rebar-resin and resin-concrete interfaces, as well as the strength characteristics of the steel elements used. Of subsequent importance is the resin bond strength, which should be equal to or greater in strength than the concrete. Accordingly, to permit the use of a given resin in the applications described previously, it needs to be tested according to TR 023 "Assessment of post-installed rebar connections" to obtain Technical Approval. TR 023 covers post-installed rebar connections designed in accordance with the EN standard Eurocode 2 "Design of concrete structures", Part 1-1 "General rules and rules for buildings", on the assumption that only tension loads can be transferred, shear loads are not considered and transverse reinforcement should be designed in addition, based on Eurocode 2. The base material is non-carbonated concrete of class C12/15 – C50/60. Post-installed rebar are straight reinforcing bar with properties according to Eurocode 2, Annex C, with classes B and C recommended. The Technical Report does not cover fire resistance, fatigue, dynamic or seismic loading of post-installed rebar connection.

Among others, tests include: tests for bond resistance in C20/25 and C50/60, installation safety tests in dry and wet concrete, functioning under sustained loads, functioning under freeze/thaw conditions, installation at maximum embedment depth, and correct injection. Proof is required that post-installed rebar connections function like cast-in rebar – with comparable load transference and displacement behaviour.

This is demonstrated by achieving appropriate bond resistance f_{bd}, compared with cast-in rebar bond strength. The necessary bond resistance for connections designed according to Eurocode 2 for different concrete classes is shown in Figure 6. For resins having a bond resistance smaller than that assumed, values based on testing and decreased according to levels from TR 023 should be included in the technical approval.

Figure 6: Design according to EC2 without limitation



Basics of anchoring - Rebar connections

Design of anchorage and splice overlap connections

Connections should be designed in accordance with obligatory rules for the design of reinforced concrete structures, taking into account the load distribution on the construction and its nodes. It is very important to determine and factor in the existing reinforcement layout.

Technical Approvals, obtained based on Technical Report TR 023, and Eurocode 2, Part 1-1 are the primary reference documents for determining internal load distribution in sections and for the design of these types of connections.

An approval contains bond resistance values depending on concrete class and rebar diameter, data for concrete cover, minimum and maximum embedment depth and lap splice, as well as general rules for rebar arrangement.

Meanwhile Eurocode 2 covers the design of reinforced concrete structures, facilitating determination of internal load distribution and calculation of embedment depth or overlap splice, taking into account factors such as: bond conditions, rebar shape, concrete cover and transverse reinforcement.

The first value calculated in the design process, according to Eurocode 2, is basic anchorage length:

$$l_{b,rqd} = \left(\frac{Ø}{4}\right) \cdot \left(\frac{\sigma_{sd}}{f_{bd}}\right)$$

where:
Ø – anchorage rebar diameter
σ_{sd} – design stress of the bar
f_{bd} – design value of the ultimate bond resistance according to corresponding ETA

Design anchorage length for anchorages

The next value to consider is the design anchorage length calculated as follows.

$$l_{bd} = \alpha_1 \alpha_2 \alpha_3 \alpha_4 \alpha_5 l_{b,rqd}$$

$\alpha_1 - \alpha_5$ – coefficients acc. to EC2, Tab. 8.2
α_1 – effect of the form of the bars assuming adequate cover (1.0 for straight bar in tension and in compression)
α_2 – effect of concrete minimum cover (acc. to EC2, Figure 8.3)

$$0.7 \le \alpha_2 \le 1.00$$

$$\alpha_2 = 1 - 0.15\,\frac{c_d - Ø}{Ø} \text{ – rebar in tension}$$

$$\alpha_2 = 1.0 \text{ – rebar in compression}$$

$$c_d = \min\{0.5a;\ c_1;\ c\} \text{ – for straight bars (acc. to EC2, Figure 8.3)}$$

α_3 – the effect of confinement by transverse reinforcement not welded to main reinforcement
α_3 = 1.0 when no transverse reinforcement or no influence

$$0.7 \le \alpha_3 \le 1.00$$

$$\alpha_3 = 1 - K \times \lambda \text{ – rebar in tension}$$

$$\alpha_3 = 1.0 \text{ – rebar in compression}$$

K – values for beams and slabs acc. to EC2, Figure 8.4

$$\lambda = \frac{\sum A_{st} - \sum A_{st,min}}{A_s}$$

$\sum A_{st}$ – cross-sectional area of the transverse reinforcement along the design anchorage length l_{bd}
$\sum A_{st,\,min}$ – cross-sectional area of the minimum transverse reinforcement

A_s – area of a single anchored bar with maximum bar diameter
α_4 – influence of one or more welded transverse bars along the design anchorage length,
α_4 = 1.0 when no transverse reinforcement or no influence
α_5 – the effect of the pressure transverse to the plane of splitting along the design anchorage length

$$0.7 \le \alpha_5 \le 1.0$$

$$\alpha_5 = 1 - 0.04\,p \text{ (only rebar in tension)}$$

p – transverse pressure at ultimate limit state along l_{bd}

Product of $\alpha_2\alpha_3\alpha_5$ must fulfil: $\alpha_2\alpha_3\alpha_5 \ge 0.7$
Design anchorage length must be in the range between minimum and maximum anchorage length:

$$l_{b,min} \le l_{bd} \le l_{v,max}$$

$l_{b,min}$ – minimum anchorage length
$l_{b,min} = \max\{0.3l_{b,rqd};\ 10Ø;\ 100\text{ mm}\}$ – rebar in tension
$l_{b,min} = \max\{0.6l_{b,rqd};\ 10Ø;\ 100\text{ mm}\}$ – rebar in compression
$l_{v,max}$ = maximum embedment depth, from ETA

Basics of anchoring - Rebar connections

Design embedment length for overlap splice

$$l_0 = \alpha_1\alpha_2\alpha_3\alpha_5\alpha_6 l_{b,rqd}$$

α_1 – α_5 – as above
α_6 – influence of overlap splice relative to the total cross-section area

$$\alpha_6 = \sqrt{\frac{\rho_1}{25}} \quad 1.0 \le \alpha_6 \le 1.5$$

ρ_1 – percentage of reinforcement lapped within 0.65 l_0 from the centre of the lap length considered, acc. to EC2, Tab.8.3
Design lap splice length must be in the range between minimum and maximum lap splice length:

$$l_{0,min} \le l_0 \le l_{v,max} - c_1$$

$l_{0,min}$ – minimum lap splice length
$l_{0,min}$ = max {$0.3\alpha_6 l_{b,rqd}$; 15Ø ; 200 mm}
$l_{v,max}$ – maximum embedment depth, from ETA
c_1 – concrete cover at frontal concrete surface

Embedment depth for lap splice connections:

$$l_v \ge l_0 + c_1$$

- The clear distance between lapped bars should not be greater than 4ø, or else the lap length should be increased by a length equal to the difference between the clear space and 4ø
- Minimum concrete cover is stated in appropriate ETA, whilst minimum cover should also be kept acc. to EC2, chapter 4.4.1.2
- Transverse reinforcement should be designed acc. to EC2, chapter 8.7.4
- Connections between existing and new concrete should be designed according to EC2
- Minimum clear spacing between bars is kept according to ETA requirements

Connections between existing and new concrete

Connections between existing and new concrete should be designed according to EC2.

The surface of the joint should be prepared, for example roughened to expose aggregate. If the surface of the existing concrete is carbonated, the layer should be removed in the area of the new reinforcing bar prior to installation.

The above directions may be disregarded in cases where building components are new, not carbonated and the environment conforms to dry condition criteria.

Design process using RAWLPLUG® EasyFix software

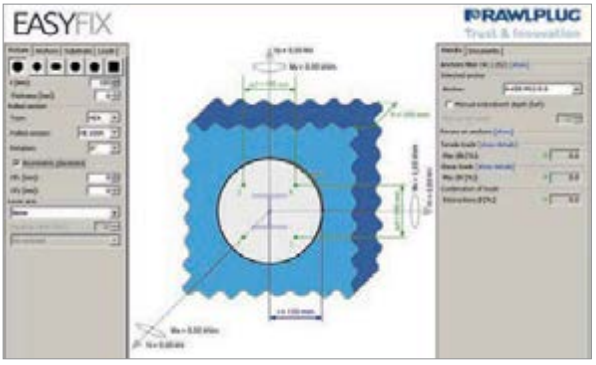
The EasyFix program functions as a helpful tool in the design of post-installed rebar connections, both in cases of chemical anchorage and structural reinforcement. The program includes a Calculator for calculation and selection of anchors, a Resin Consumption Calculator for chemical resins and a Post-Installed Connection module for anchorage and lap splices, for use in both new and existing structures.

Anchor design software - EasyFix II

It is with pleasure that we present an improved and updated version of our popular anchor design software EasyFix.
EasyFix II is more intuitive and enables a simplified and faster anchor selection process for specialised constructions, providing different variants of anchors depending on the fixture geometry.

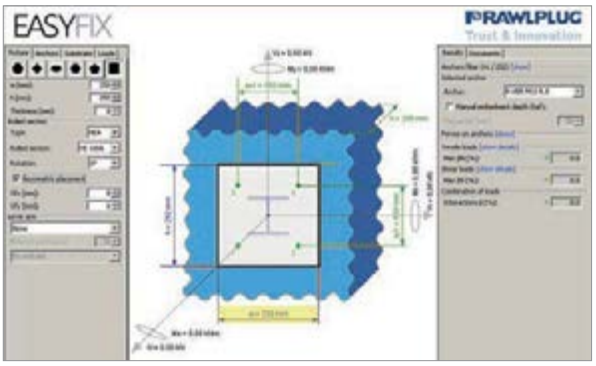
Main features of EasyFix II:

1. Enter different base plate geometries.
2. Attach a variety of different sections to the base element.
3. Add eccentricity to the anchorage by moving the point where the applied loads are acting to any point on the base element.
4. Design stand off applications by offsetting the base element from the surface of the substrate.
5. Make use of slotted holes to increase performance by preventing shear forces acting on anchors close to an edge.
6.Input data through a simple graphical user interface.
7. Enter loads using characteristic or design values.
8. Pre-filter results by anchor group, anchor material and diameter.
9. View the load distribution across the anchorage and the percentage of capacity utilized by each anchor.

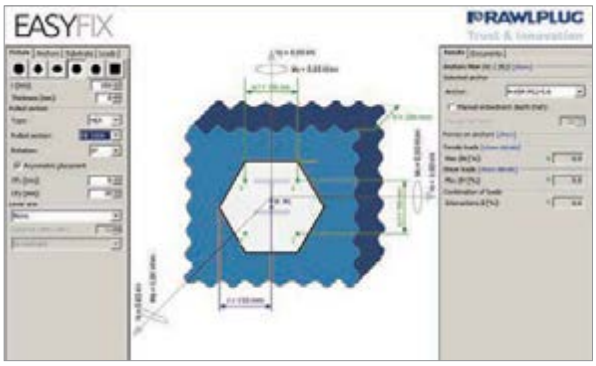


Choose baseplate shape (circular)

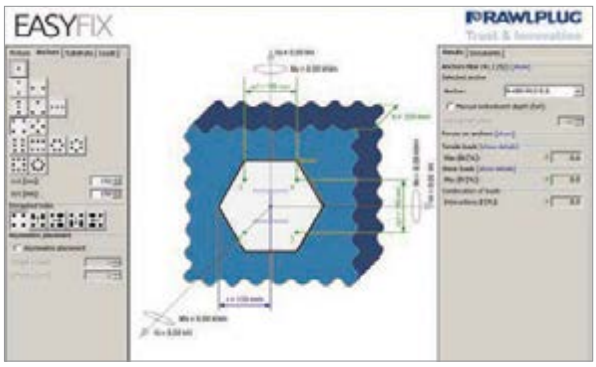
Basics of anchoring - Design software



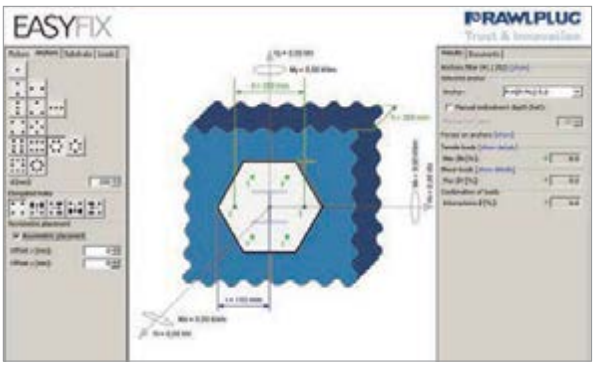
Choose baseplate shape (square/rectangular)



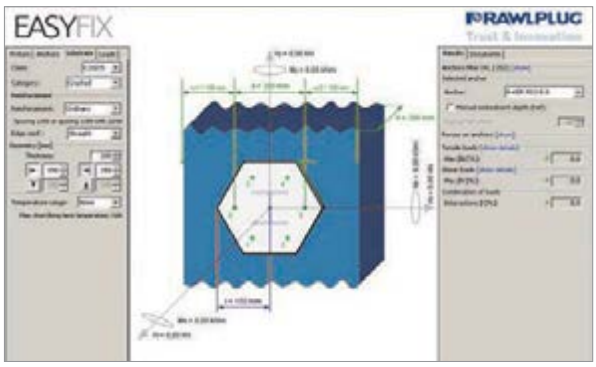
Asymmetric loading - default position is center of baseplate



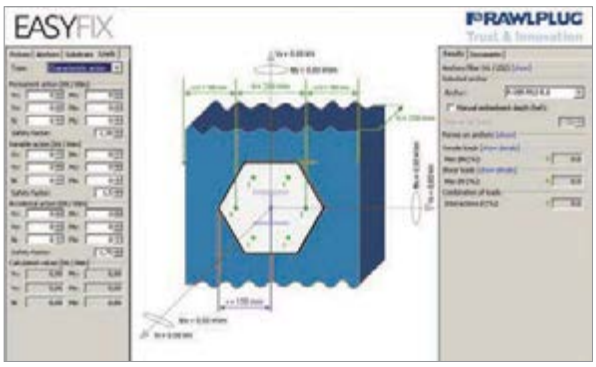
Choose hole positions and quantity (rectangular pattern)



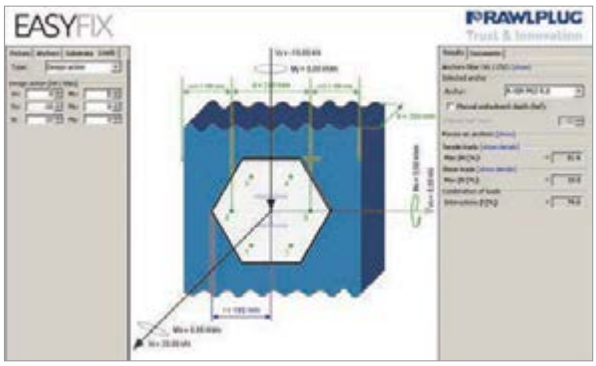
Choose hole positions and quantity (circular pattern)



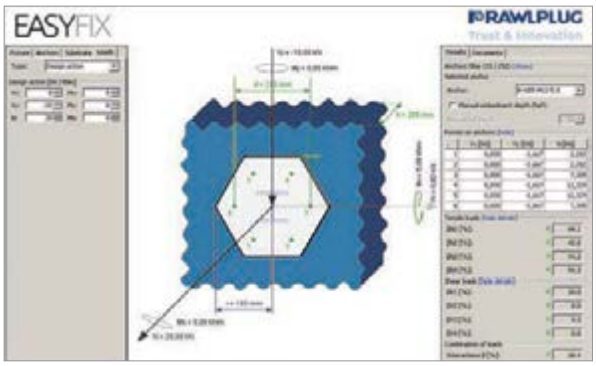
Add concrete edges and substrate details



Add loads by characteristic action



Alternatively add loads by design action



Calculates and displays suitable anchors

Basics of anchoring - Terminology & symbols

The notations and symbols frequently used in the catalogue are given below. Further notations are given in the text.

Approved Body Symbols

	European Technical Approval (ETA)
	CE Marking (conformity with ETA or harmonised standard)
	Polish Construction Sign (Poland, Warsaw)
	Resistance to Fire Exposure
	Factory Mutual Research Corporation (FM) Approved
	Earthquake resistant
	Prufgemeinschaft Mauerbahrer (PGM) SicherSafe Certyfikat

Indices

c	Concrete
cp	Concrete pry-out
d	Design value
k	Characteristic value
M	Material
p	Pull-out
R	Resistance
s	Steel
S	Action
sp	Splitting
u	Ultimate
y	Yield

Loads

N	Normal force (positive: tension load, negative: compression load)
N_{Rk}	Characteristic value of resistance of a single anchor or an anchor group (tension load)
$N_{Rk,p}$	Characteristic resistance in case of failure by pull-out (tension load)
$N_{Rk,c}$	Characteristic resistance in case of concrete cone failure (tension load)
$N_{Rk,s}$	Characteristic resistance of an anchor in case of steel failure (tension load)
N_{Rd}	Design value of resistance of a single anchor or an anchor group (tension load)
$N_{Rd,p}$	Design resistance of an anchor in case of failure by pull-out (tension load)
$N_{Rd,c}$	Design resistance for an anchor or an group of anchors in the case of concrete cone failure (tension load)
$N_{Rd,s}$	Design resistance of an anchor in case of steel failure (tension load)
V	Shear force
V_{Rk}	Characteristic resistance of a single anchor or an anchor group (shear load)
$V_{Rk,c}$	Characteristic resistance in case of concrete edge failure (shear load)
$V_{Rk,cp}$	Characteristic resistance in case of failure by pry-out (shear load)
$V_{Rk,s}$	Characteristic resistance in case of steel failure (shear load)
V_{Rd}	Design resistance of a single anchor or an anchor group (shear load)
$V_{Rd,c}$	Design resistance in case of concrete edge failure (shear load)
$V_{Rd,cp}$	Design resistance of an anchor in case of failure by pry-out (shear load)
$V_{Rd,s}$	Design resistance in case of steel failure (shear load)

Safety factors

γ_{Mc}	Partial safety factor for concrete cone failure
γ_{Ms}	Partial safety factor for steel failure

Concrete and steel (mechanical properties)

f_{yk}	Characteristic steel yield strength (nominal value)
f_{uk}	Characteristic steel ultimate tensile strength (nominal value)
A_s	Stressed cross-sectional area of steel
W_{el}	Elastic section modulus calculated from the stressed cross-sectional area of steel
$M^0_{Rk,s}$	Characteristic bending resistance of an individual anchor
M	Allowable bending moment

Characteristic values of anchors

c	Edge distance
c_N	Edge distance (tensile resistance)
c_V	Edge distance (shear resistance)
c_{cr}	Edge distance for ensuring the transmission of the characteristic resistance
$c_{cr,N}$	Edge distance for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects.
$c_{cr,V}$	Edge distance for ensuring the transmission of the characteristic shear resistance of a single anchor without spacing and edge effects.
c_{min}	Minimum allowable edge distance
d	Diameter of anchor bolt or thread diameter
d_f	Drill hole diameter in fixture
d_0	Drill hole diameter in substrate
h	Thickness of substrate
h_{min}	Minimum thickness of substrate
h_{ef}	Effective anchorage depth
h_{nom}	Embedment depth
h_0	Minimum drilled hole depth
k	Factor to be taken from the relevant ETA (pry-out failure)
L	Anchor length
s	Spacing of anchors in a group
s_{cr}	Spacing for ensuring the transmission of the characteristic resistance
s_{min}	Minimum allowable spacing
$s_{cr,N}$	Spacing for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects.
t_{fix}	Fixture thickness
T_{inst}	Installation torque

RAWLPLUG

Trust & Innovation

Bonded Anchors

The following section provides detailed information and technical data on the range of Rawlplug® Bonded Anchors.

The range includes:
Bonded Anchors in Cartridges | CFS+ Cartridge Free System
Glass Capsules | Accessories

BONDED ANCHORS IN CARTRIDGES

- R-KEX II
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- R-KER
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- R-KEM II
  - with Threaded Rods for Concrete
  - with Threaded Rods for Masonry
- R-KF2
  - with Threaded Rods

R-KEX II with Threaded Rods

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

Installation movie

Approvals and Reports

- ETA-13/0455; ETAG 001-05 Option 1

Product overview

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 the option to use in diamond drilled holes and over-sized holes.
- Extended bonding time ensures easy installation of metal components (up to 35 min in +20°C)
- For use in temperatures above 0°C

Applications

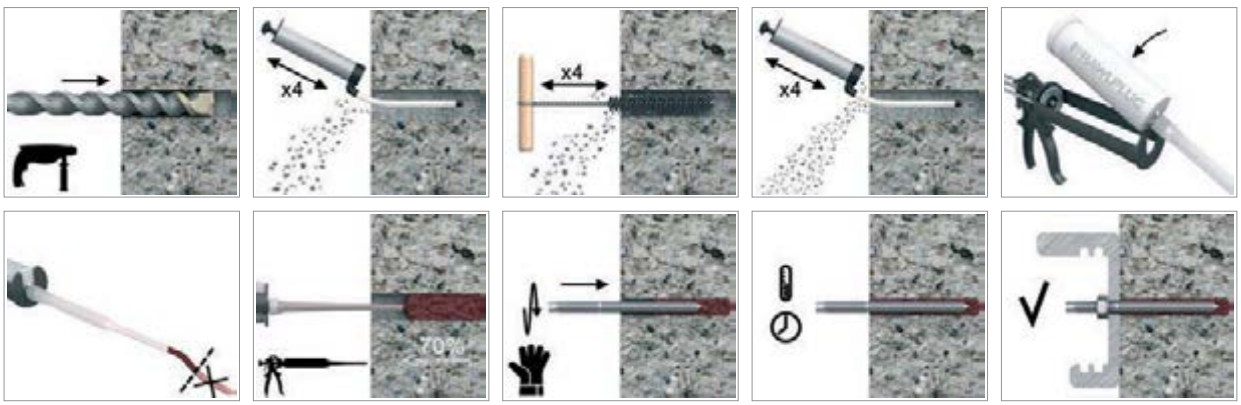
- Safety barriers
- Formworks support systems
- Structural steelwork
- Street lamps
- Curtain walling
- Racking systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

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. Attach nozzle and insert cartridge into gun.
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 information

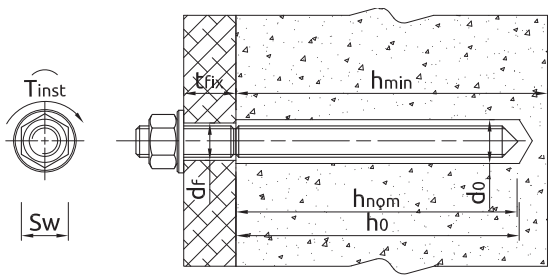
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



Installation data (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in fixture	d_f	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

* For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
Substrate		Non-cracked concrete							Cracked concrete			
MEAN ULTIMATE LOAD												
TENSION LOAD $N_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	21.6	34.8	50.4	78	102.5	129.1	165	32.6	54.3	73	97.7
Standard embedment depth	[kN]	21.6	34.8	50.4	93.8	146.7	211.6	289.6	44.8	67.9	115.3	146.5
Maximum embedment depth	[kN]	21.6	34.8	50.4	93.8	146.7	211.6	336.6	50.4	93.8	146.7	202.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	34.9	45.7	55.6	78	102.5	129.1	165	32.6	54.3	73	97.7
Standard embedment depth	[kN]	34.9	55.3	80.5	108.9	172.6	237.1	289.6	44.8	67.9	115.3	146.5
Maximum embedment depth	[kN]	34.9	55.3	80.5	151.5	235.6	339	532	59	103.2	162.8	202.3
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	31.3	45.7	55.6	78	102.5	129.1	165	32.6	54.3	73	97.7
Standard embedment depth	[kN]	31.3	49.3	70.9	108.9	172.6	237.1	289.6	44.8	67.9	115.3	146.5
Maximum embedment depth	[kN]	31.3	49.3	70.9	132.2	205.6	296.9	532	59	103.2	162.8	202.3
SHEAR LOAD $V_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.2	78.5	122.5	176.5	280.5	42.2	78.5	122.5	176.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.3	46.4	67.4	125.6	196	282.4	448.8	67.4	125.6	196	282.4
R-STUDS METRIC THREADED RODS - A4	[kN]	25.6	40.6	59	109.9	171.5	247.1	392.7	59	109.9	171.5	247.1
CHARACTERISTIC LOAD												
TENSION LOAD N_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	18	29	36.1	50.5	66.4	83.7	107	21.1	35.2	47.3	59.6
Standard embedment depth	[kN]	18	29	42	70.6	111.9	153.7	187.8	29	44	74.8	95
Maximum embedment depth	[kN]	18	29	42	78	122	176	280	38.3	66.9	105.6	131.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	23.5	29.6	36.1	50.5	66.4	83.7	107	21.1	35.2	47.3	59.6
Standard embedment depth	[kN]	29	43.1	58.3	70.6	111.9	153.7	187.8	29	44	74.8	95
Maximum embedment depth	[kN]	29	46	67	126	187.8	249.4	344.9	38.3	66.9	105.6	131.2
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	23.5	29.6	36.1	50.5	66.4	83.7	107	21.1	35.2	47.3	59.6
Standard embedment depth	[kN]	26	41	58.3	70.6	111.9	153.7	187.8	29	44	74.8	95
Maximum embedment depth	[kN]	26	41	59	110	171	247	344.9	38.3	66.9	105.6	131.2
SHEAR LOAD V_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140	21	39	61	88
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224	34	63	98	141
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196	29	55	86	124
DESIGN LOAD												
TENSION LOAD N_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	12	19.3	24.1	33.7	44.3	55.8	71.3	14.1	23.5	31.5	39.8
Standard embedment depth	[kN]	12	19.3	28	47.1	74.6	102.5	125.2	19.4	29.3	49.8	63.3
Maximum embedment depth	[kN]	12	19.3	28	52	81.3	117.3	186.7	25.5	44.6	70.4	87.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	15.7	19.7	24.1	33.7	44.3	55.8	71.3	14.1	23.5	31.5	39.8
Standard embedment depth	[kN]	19.3	28.7	38.9	47.1	74.6	102.5	125.2	19.4	29.3	49.8	63.3
Maximum embedment depth	[kN]	19.3	30.7	44.7	84	125.2	166.3	229.9	25.5	44.6	70.4	87.5

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	13.9	19.7	24.1	33.7	44.3	55.8	71.3	14.1	23.5	31.5	39.8
Standard embedment depth	[kN]	13.9	21.9	31.6	47.1	74.6	102.5	125.2	19.4	29.3	49.8	63.3
Maximum embedment depth	[kN]	13.9	21.9	31.6	58.8	91.4	132.1	210.2	25.5	44.6	70.4	87.5
SHEAR LOAD V_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112	16.8	31.2	48.8	70.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2	27.2	50.4	78.4	112.8
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6	18.6	35.3	55.1	79.5
RECOMMENDED LOAD												
TENSION LOAD N_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	8.57	13.8	17.2	24	31.6	39.9	51	10	16.8	22.5	28.4
Standard embedment depth	[kN]	8.57	13.8	20	33.6	53.3	73.2	89.4	13.8	21	35.6	45.2
Maximum embedment depth	[kN]	8.57	13.8	20	37.1	58.1	83.8	133.3	18.2	31.9	50.3	62.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	11.2	14.1	17.2	24	31.6	39.9	51	10	16.8	22.5	28.4
Standard embedment depth	[kN]	13.8	20.5	27.8	33.6	53.3	73.2	89.4	13.8	21	35.6	45.2
Maximum embedment depth	[kN]	13.8	21.9	31.9	60	89.4	118.8	164.2	18.2	31.9	50.3	62.5
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	9.93	14.1	17.2	24	31.6	39.9	51	10	16.8	22.5	28.4
Standard embedment depth	[kN]	9.93	15.7	22.6	33.6	53.3	73.2	89.4	13.8	21.0	35.6	45.2
Maximum embedment depth	[kN]	9.93	15.7	22.5	42	65.3	94.3	150.1	18.2	31.9	50.3	62.5
SHEAR LOAD V_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.3	34.9	50.3	80	12	22.3	34.9	50.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36	56	80.6	128	19.4	36	56	80.6
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7	13.3	25.2	39.4	56.8

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	40	480	10.0	40.0	510.0	5906675028538	18
R-KEX-II-600	600	7	7	441	10.0	10.0	510.0	5906675293721	18

R-KEX II with Sockets

Premium pure epoxy resin approved for use with internally threaded sockets

Approvals and Reports

- ETA-13/0454; ETAG 001-05 Option 7

Product overview

Features and benefits

- Allows removal of bolt to leave a re-usable socket in place
- Approved for use with Sockets in non-cracked concrete (ETAG001 Option 7)
- 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 the option to use in diamond drilled holes and over-sized holes
- Extended bonding time ensures easy installation of metal components (up to 35 min in +35°C)
- For use in temperatures above 0°C

Applications

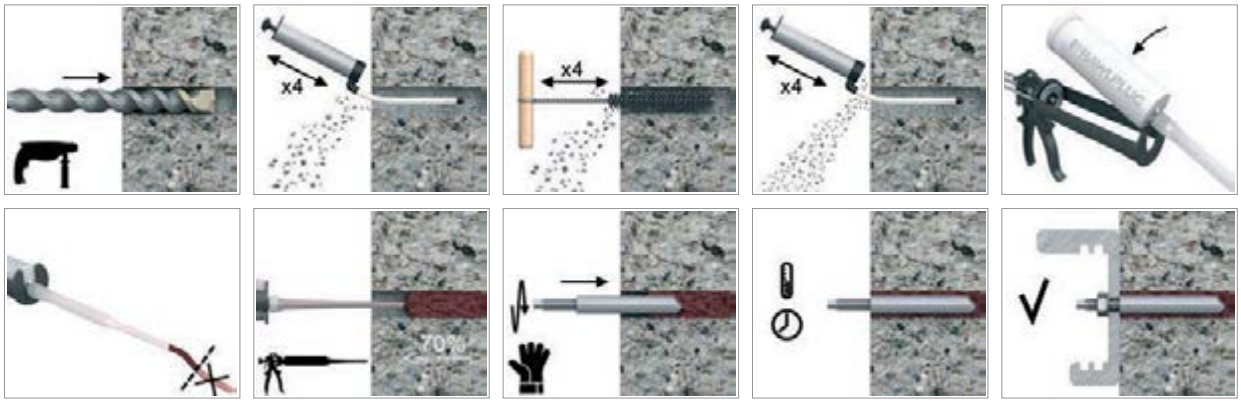
- Safety barriers
- Temporary works/formworks support systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms
- Steelwork

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket 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. Attach nozzle and insert cartridge into gun.
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 socket, slowly and with slight twisting motion. Remove any access resin around the hole before it sets and leave it undisturbed until the curing time elapses.
7. Attach fixture and tighten the bolt to the required torque.

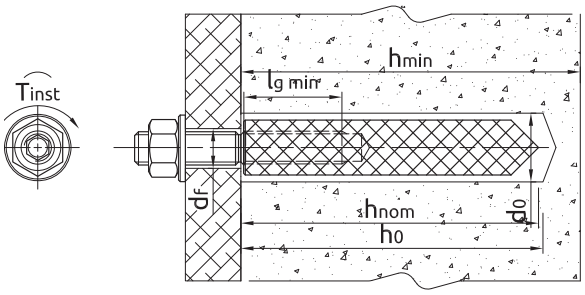
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d	L	l_g	d_f
			[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



SOCKETS

Size			M6	M8		M10		M12	M16
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Thread engagement length	h_s	[mm]	6-24	8-25	8-25	10-30	10-30	12-35	16-50
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
Effective Installation depth	h_{ef}	[mm]	75	75	90	75	100	100	125
Min. substrate thickness	h_{min}	[mm]	105	105	120	115	140	140	181
Min. spacing	s_{min}	[mm]	40	40	45	40	50	50	63
Min. edge distance	c_{min}	[mm]	40	40	45	40	50	50	63

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

* For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	75	90		75	100		125
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12.5	21.6	21.6	34.8	34.8	50.4	93.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	19.2	34.8	34.8	50.6	55.2	77.9	108.9
R-STUDS METRIC THREADED RODS - A4	[kN]	16.8	31.2	31.2	49.2	49.2	70.9	108.9
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.0	10.8	10.8	16.8	16.8	25.2	46.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.6	18.0	18.0	27.6	27.6	40.8	75.6
R-STUDS METRIC THREADED RODS - A4	[kN]	8.4	15.6	15.6	24.0	24.0	34.8	66.0

Basic performance data (cont.)

SOCKETS

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

Size		M6	M8		M10		M12	M16
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.0	18.0	18.0	29.0	29.0	42.0	70.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	29.0	29.0	32.8	46.0	50.5	70.6
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	26.0	26.0	32.8	41.0	50.5	70.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.0	9.0	9.0	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.0	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.0	13.0	13.0	20.0	20.0	29.0	55.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.67	12.0	12.0	18.2	19.3	28.0	39.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	10.5	18.2	19.3	18.2	28.1	28.1	39.2
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	28.1	39.2
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.0	7.2	7.2	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.4	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.76	8.57	8.57	13.0	13.8	20.0	28.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.50	13.0	13.8	13.0	20.1	20.0	28.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	20.0	28.0
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.0	8.0	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	40	480	10.0	40.0	510.0	5906675028538	18
R-KEX-II-600	600	7	7	441	10.0	10.0	510.0	5906675293721	18

R-KEX II with Rebar as an Anchor

Premium pure epoxy resin approved for use with reinforcement bars

Installation movie

Approvals and Reports

- ETA-13/0454; ETAG 001-05, Option 7

Product overview

Features and benefits

- The strongest resin in the epoxy resin class
- Approved for use with rebar as in anchor in non-cracked concrete (ETAG001 Option 7)
- 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 the option to use in diamond drilled holes and over-sized holes
- Extended bonding time ensures easy installation of metal components (up to 35 min in +35°C)
- For use in positive temperatures

Applications

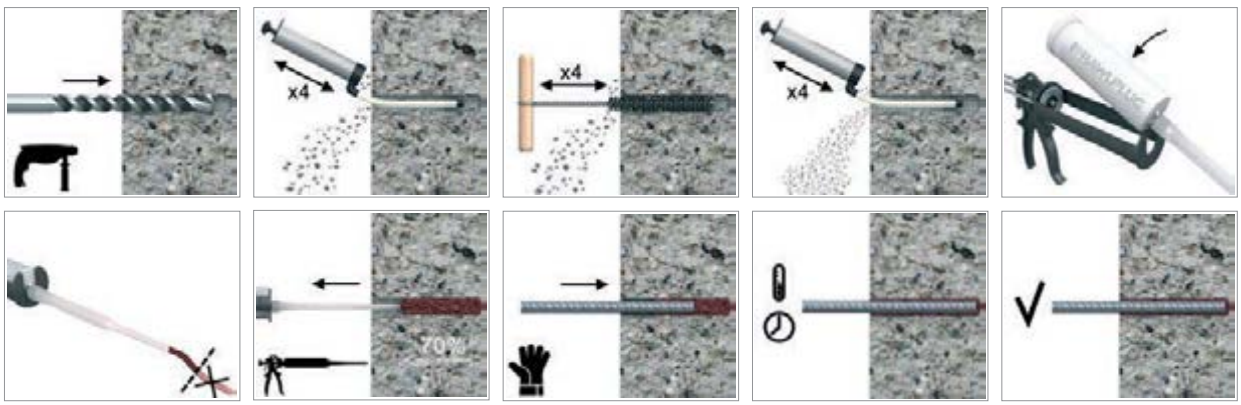
- Safety barriers
- Temporary works/formworks support systems
- Rebar
- Curtain walling
- Formwork supports
- Masonry support
- Platforms
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



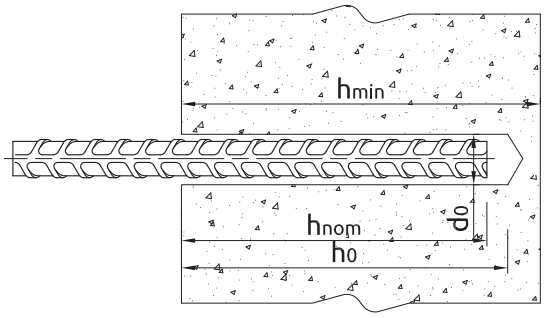
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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. Attach nozzle and insert cartridge into gun.
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 rebar, 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.

Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

Installation data



REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Thread diameter	d	[mm]	8	10	12	14	16	20	25	32
Hole diameter in substrate	d_0	[mm]	12	14	18		22	26	32	40
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5							
MINIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, min}$	[mm]	60	70	80		100	120	140	165
STANDARD EMBEDMENT DEPTH										
Installation depth	$h_{nom, s}$	[mm]	80	90	110		125	170	210	240
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	100	120	145		190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100		h_{ef} + 2*d_0					
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40							
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40							

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
18G2										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	29	57	98	155	232	452	884	1853
Design bending resistance	M	[Nm]	19	38	65	103	154	302	589	1235
Allowable bending resistance	M_{rec}	[Nm]	14	27	47	74	110	215	421	882
34GS										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	59	102	162	241	471	920	1930
Design bending resistance	M	[Nm]	20	39	68	108	161	314	614	1287
Allowable bending resistance	M_{rec}	[Nm]	14	28	48	77	115	224	438	919
B500SP										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	35	68	117	186	277	542	1059	2220
Design bending resistance	M	[Nm]	23	45	78	124	185	361	706	1480
Allowable bending resistance	M_{rec}	[Nm]	17	32	56	89	132	258	504	1057
RB500/BSt500S										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	33	65	112	178	265	518	1012	2123
Design bending resistance	M	[Nm]	22	43	75	119	177	346	675	1415
Allowable bending resistance	M_{rec}	[Nm]	16	31	53	85	126	247	482	1011

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
CHARACTERISTIC LOAD									
TENSION LOAD N_{Rk}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107
Standard embedment depth	[kN]	22.1	33.9	49.8	48.4	70.6	111.9	153.7	187.8
Maximum embedment depth	[kN]	24.1	37.7	54.3	63.8	96.5	150.8	216.4	307.6
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107
Standard embedment depth	[kN]	22.1	33.9	49.8	48.4	70.6	111.9	153.7	187.8
Maximum embedment depth	[kN]	25.1	39.3	56.5	63.8	100.5	157.1	216.4	307.6
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	16.6	26.4	36.1	35.2	50.5	66.4	83.7	107
Standard embedment depth	[kN]	22.1	33.9	49.8	48.4	70.6	111.9	153.7	187.8
Maximum embedment depth	[kN]	27.6	43.2	62.2	63.8	110.6	172.8	216.4	307.6

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
SHEAR LOAD V_{Rk}									
A-II (e.g. 18G2)	[kN]	12.1	18.8	27.1	36.9	48.3	75.4	117.8	193
A-III (e.g. 34GS)	[kN]	12.6	19.6	28.3	38.5	50.3	78.5	122.7	201.1
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135	221.2
DESIGN LOAD									
TENSION LOAD N_{Rd}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	9.2	14.7	20.1	19.5	28.1	36.9	46.5	59.5
Standard embedment depth	[kN]	12.3	18.8	27.6	26.9	39.2	62.2	85.4	104.3
Maximum embedment depth	[kN]	15.4	25.1	36.2	35.4	63.7	100.5	120.2	170.9
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	9.2	14.7	20.1	19.5	28.1	36.9	46.5	59.5
Standard embedment depth	[kN]	12.3	18.8	27.6	26.9	39.2	62.2	85.4	104.3
Maximum embedment depth	[kN]	15.4	25.1	36.4	35.4	63.7	100.5	120.2	170.9
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	9.2	14.7	20.1	19.5	28.1	36.9	46.5	59.5
Standard embedment depth	[kN]	12.3	18.8	27.6	26.9	39.2	62.2	85.4	104.3
Maximum embedment depth	[kN]	15.4	25.1	36.4	35.4	63.7	100.5	120.2	170.9
SHEAR LOAD V_{Rd}									
A-II (e.g. 18G2)	[kN]	8	12.6	18.1	24.6	32.2	50.3	78.5	128.7
A-III (e.g. 34GS)	[kN]	8.4	13.1	18.8	25.7	33.5	52.4	81.8	134
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	9.2	14.4	20.7	28.2	36.9	57.6	90	147.4
RECOMMENDED LOAD									
TENSION LOAD N_{rec}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	6.58	10.5	14.3	14	20	26.3	33.2	42.5
Standard embedment depth	[kN]	8.78	13.5	19.7	19.2	28	44.4	61	74.5
Maximum embedment depth	[kN]	11	17.9	25.9	25.3	45.5	71.8	85.9	122.1
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	6.58	10.5	14.3	14	20	26.3	33.2	42.5
Standard embedment depth	[kN]	8.78	13.5	19.7	19.2	28	44.4	61	74.5
Maximum embedment depth	[kN]	11	17.9	26	25.3	45.5	71.8	85.9	122.1
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	6.58	10.5	14.3	14	20	26.3	33.2	42.5
Standard embedment depth	[kN]	8.78	13.5	19.7	19.2	28	44.4	61	74.5
Maximum embedment depth	[kN]	11	17.9	26	25.3	45.5	71.8	85.9	122.1
SHEAR LOAD V_{rec}									
A-II (e.g. 18G2)	[kN]	5.7	9	12.9	17.6	23	35.9	56.1	91.9
A-III (e.g. 34GS)	[kN]	5.98	9.35	13.5	18.3	23.9	37.4	58.4	95.7
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	6.58	10.3	14.8	20.2	26.3	41.1	64.3	105.3

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	40	480	10.0	40.0	510.0	5906675028538	18
R-KEX-II-600	600	7	7	441	10.0	10.0	510.0	5906675293721	18

R-KEX II with Post-Installed Rebar

Premium pure epoxy resin approved for use with post-installed rebar connections

Installation movie

Approvals and Reports

- ETA-13/0585; ETAG 001-05, TR023

Product overview

Features and benefits

- The strongest resin in the epoxy resin class
- Approved for use with post-installed rebars in non-cracked concrete (ETAG001)
- Suitable for use in dry and wet substrates including under water
- High depth of anchoring – 2,5 m for rebar applications
- Very high chemical resistance – suitable for applications exposed to influence of various agents (industrial or marine environment)
- Minimal shrinkage provides the option to use in diamond drilled holes and over-sized holes
- Extended bonding time ensures easy installation of metal components (up to 35 min in +35°C)
- For use in positive temperatures

Applications

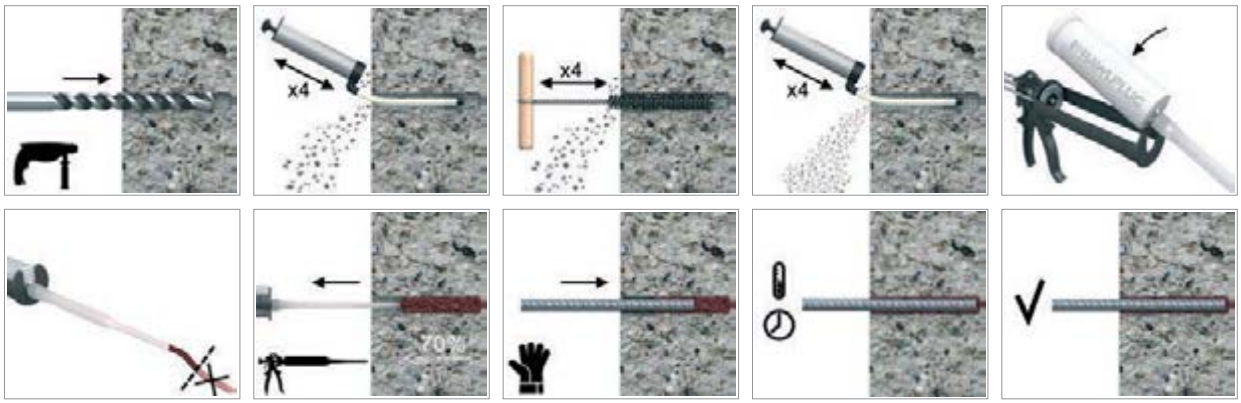
- Post-installed rebar connections
- Rebar
- Temporary works/formworks support systems
- Safety barriers
- Barriers
- Platforms

Base materials

Approved for use in:

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

Installation guide



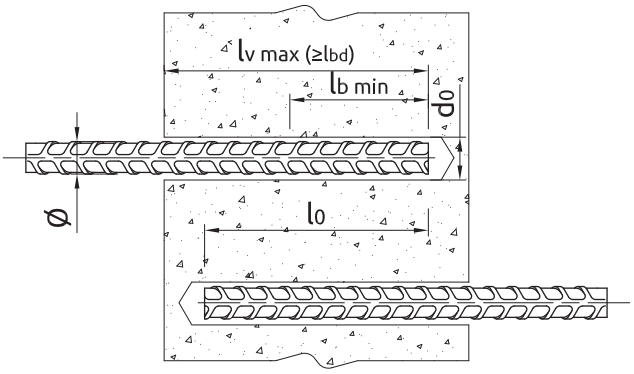
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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. Attach nozzle and insert cartridge into gun.
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 rebar, 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.

Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-II-385	R-KEX II	Epoxy Resin	385
R-KEX-II-600	R-KEX II	Epoxy Resin	600

Installation data



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	32
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	40
Brush diameter	-	[mm]	14	16	18	20	22	27	32	37	42
A-II C20/25 Min. anchorage length	$l_{b,min.}$	[mm]	100	101	121	141	161	201	252	282	322
A-II C50/60 Min. anchorage length	$l_{b,min.}$	[mm]	100	100	120	140	160	200	250	280	320
A-III C20/25 Min. anchorage length	$l_{b,min.}$	[mm]	100	116	140	163	186	233	291	326	372
A-III C50/60 Min. anchorage length	$l_{b,min.}$	[mm]	100	100	120	140	160	200	250	280	320
A-IIIN C20/25 Min. anchorage length	$l_{b,min.}$	[mm]	113	142	170	198	227	284	354	397	454
A-IIIN C50/60 Min. anchorage length	$l_{b,min.}$	[mm]	100	100	120	140	160	200	250	280	348
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200	200	200	210	240	300	375	420	480
Max. anchorage length	$l_{v,max.}$	[mm]	700	900	1100	1300	1400	1800	2200	2500	2500

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	5	150	2880
10	10	120	1080
20	20	35	480
25	30	12	300

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
18G2											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
34GS											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
B500SP											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
RB500/BSt500S											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, STEEL A-II (18G2) [kN]

d_s [mm] \ l_{bd} [mm]	100	105	125	145	165	185	205	230	255	285	300	325	350	400	450	500	550	600	700	800	850	900	950	1000	1100	Steel failure
8	5.8	6.1	7.2	8.4	9.5	10.7	11.9	13.3	14.7	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	-	7.6	9.0	10.5	11.9	13.4	14.8	16.6	18.4	20.6	21.7	23.5	24.2	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	-	10.8	12.6	14.3	16.0	17.8	19.9	22.1	24.7	26.0	28.2	30.3	34.7	34.9	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	-	14.7	16.7	18.7	20.7	23.3	25.8	28.8	30.3	32.9	35.4	40.5	45.5	47.5	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	-	19.1	21.4	23.7	26.6	29.5	32.9	34.7	37.6	40.5	46.2	52.0	57.8	62.0	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	29.6	33.2	36.9	41.2	43.4	47.0	50.6	57.8	65.0	72.3	79.5	86.7	96.9	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	46.1	51.5	54.2	58.7	63.2	72.3	81.3	90.3	99.4	108.4	126.4	144.5	151.5	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	57.7	60.7	65.8	70.8	80.9	91.0	101.2	111.3	121.4	141.6	161.9	172.0	182.1	190.0	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	75.1	80.9	92.5	104.0	115.6	127.2	138.7	161.9	185.0	196.5	208.1	219.7	231.2	248.1	248.14

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-II (18G2) [kN]

l_{bd} [mm] \ d_s [mm]	100	120	140	160	170	180	200	230	250	280	290	320	350	400	450	500	550	600	650	700	725	750	775	800	825	Steel failure
8	10.1	12.1	14.1	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	12.6	15.1	17.6	20.1	21.4	22.6	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	18.1	21.1	24.1	25.6	27.1	30.2	34.7	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	24.6	28.1	29.9	31.7	35.2	40.5	44.0	47.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	32.2	34.2	36.2	40.2	46.2	50.3	56.3	58.3	62.0	-	-	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	46.5	53.5	58.1	65.1	67.4	74.4	81.4	93.0	96.9	-	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	72.6	81.4	84.3	93.0	101.7	116.2	130.8	145.3	151.5	-	-	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	83.7	86.7	95.7	104.7	119.6	134.6	149.5	164.5	179.4	190.0	-	-	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	96.5	105.6	120.6	135.7	150.8	165.9	181.0	196.0	211.1	218.7	226.2	233.7	241.3	248.1	248.14

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25, STEEL A-II (18G2) [kN]																										
l_0 [mm] / d_s [mm]	200	210	240	250	260	300	330	375	400	420	440	460	480	500	530	550	600	670	750	800	830	900	930	1000	1100	Steel failure
8	11.6	12.1	13.9	14.5	15.0	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	14.5	15.2	17.3	18.1	18.8	21.7	23.8	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	17.3	18.2	20.8	21.7	22.5	26.0	28.6	32.5	34.7	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	21.2	24.3	25.3	26.3	30.3	33.4	37.9	40.5	42.5	44.5	46.5	47.5	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	27.7	28.9	30.1	34.7	38.2	43.4	46.2	48.6	50.9	53.2	55.5	57.8	61.3	62.0	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	43.4	47.7	54.2	57.8	60.7	63.6	66.5	69.4	72.3	76.6	79.5	86.7	96.8	96.9	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	67.7	72.3	75.9	79.5	83.1	86.7	90.3	95.7	99.4	108.4	121.0	135.5	144.5	149.9	151.5	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	85.0	89.0	93.1	97.1	101.2	107.2	111.3	121.4	135.6	151.7	161.9	167.9	182.1	188.2	190.0	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	-	111.0	115.6	122.5	127.2	138.7	154.9	173.4	185.0	191.9	208.1	215.0	231.2	248.1	248.14

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60, STEEL A-II (18G2) [kN]																										
l_0 [mm] / d_s [mm]	200	210	240	270	300	325	350	375	400	420	450	480	500	525	550	575	600	625	650	675	700	725	750	800	825	Steel failure
8	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	30.2	31.7	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	36.9	42.2	47.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	48.3	54.3	60.3	62.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	69.7	75.6	81.4	87.2	93.0	96.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	109.0	116.2	122.1	130.8	139.5	145.3	151.5	-	-	-	-	-	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	125.6	134.6	143.6	149.5	157.0	164.5	172.0	179.4	186.9	190.0	-	-	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	144.8	150.8	158.3	165.9	173.4	181.0	188.5	196.0	203.6	211.1	218.7	226.2	241.3	248.1	248.14

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, STEEL A-III (34GS) [kN]																										
l_{bd} [mm] / d_s [mm]	100	120	140	165	190	210	235	290	310	330	375	400	450	500	550	600	650	700	750	800	900	1000	1100	1200	1300	Steel failure
8	5.8	6.9	8.1	9.5	11.0	12.1	13.6	16.8	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	-	8.7	10.1	11.9	13.7	15.2	17.0	21.0	22.4	23.8	27.1	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	-	12.1	14.3	16.5	18.2	20.4	25.1	26.9	28.6	32.5	34.7	39.0	40.3	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	-	-	16.7	19.2	21.2	23.8	29.3	31.4	33.4	37.9	40.5	45.5	50.6	54.9	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	-	-	22.0	24.3	27.2	33.5	35.8	38.2	43.4	46.2	52.0	57.8	63.6	69.4	71.7	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	-	34.0	41.9	44.8	47.7	54.2	57.8	65.0	72.3	79.5	86.7	93.9	101.2	108.4	112.0	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	52.4	56.0	59.6	67.7	72.3	81.3	90.3	99.4	108.4	117.4	126.4	135.5	144.5	162.6	174.9	-	-	-	174.92
28	-	-	-	-	-	-	-	-	-	66.8	75.9	80.9	91.0	101.2	111.3	121.4	131.5	141.6	151.7	161.9	182.1	202.3	219.4	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	86.7	92.5	104.0	115.6	127.2	138.7	150.3	161.9	173.4	185.0	208.1	231.2	254.3	277.5	286.6	286.59

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-III (34GS) [kN]																										
l_{bd} [mm] / d_s [mm]	100	120	140	160	190	200	240	250	280	290	300	320	350	400	450	500	550	600	700	750	800	850	900	950	1000	Steel failure
8	10.1	12.1	14.1	16.1	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	12.6	15.1	17.6	20.1	23.9	25.1	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	18.1	21.1	24.1	28.7	30.2	36.2	37.7	40.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	-	24.6	28.1	33.4	35.2	42.2	44.0	49.3	51.0	52.8	54.9	-	-	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	-	32.2	38.2	40.2	48.3	50.3	56.3	58.3	60.3	64.3	70.4	71.7	-	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	46.5	55.8	58.1	65.1	67.4	69.7	74.4	81.4	93.0	104.6	112.0	-	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	72.6	81.4	84.3	87.2	93.0	101.7	116.2	130.8	145.3	159.8	174.4	174.9	-	-	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	83.7	86.7	89.7	95.7	104.7	119.6	134.6	149.5	164.5	179.4	209.4	219.4	-	-	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	96.5	105.6	120.6	135.7	150.8	165.9	181.0	211.1	226.2	241.3	256.4	271.4	286.5	286.6	286.59

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25, STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	550	600	650	700	750	800	850	900	1000	1100	1200	1300	Steel failure
8	11.6	12.1	13.9	14.5	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	14.5	15.2	17.3	18.1	21.7	22.4	27.1	27.5	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	40.3	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	21.2	24.3	25.3	30.3	31.4	37.9	38.4	40.5	42.5	46.5	48.6	50.6	54.9	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	27.7	28.9	34.7	35.8	43.4	43.9	46.2	48.6	53.2	55.5	57.8	63.6	69.4	71.7	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	43.4	44.8	54.2	54.9	57.8	60.7	66.5	69.4	72.3	79.5	86.7	93.9	101.2	108.4	112.0	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	67.7	68.6	72.3	75.9	83.1	86.7	90.3	99.4	108.4	117.4	126.4	135.5	144.5	153.5	162.6	174.9	-	-	-	174.92
28	-	-	-	-	-	-	-	-	-	85.0	93.1	97.1	101.2	111.3	121.4	131.5	141.6	151.7	161.9	172.0	182.1	202.3	219.4	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	111.0	115.6	127.2	138.7	150.3	161.9	173.4	185.0	196.5	208.1	231.2	254.3	277.5	286.6	286.59

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60, STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	260	280	300	330	350	375	400	420	450	480	500	525	550	600	650	700	750	800	850	900	950	1000	Steel failure
8	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	25.1	26.4	28.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	30.2	31.7	36.2	39.2	40.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	36.9	42.2	45.7	49.3	52.8	54.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	48.3	52.3	56.3	60.3	66.4	70.4	71.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	69.7	76.7	81.4	87.2	93.0	97.6	104.6	111.6	112.0	-	-	-	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	-	109.0	116.2	122.1	130.8	139.5	145.3	152.6	159.8	174.4	174.9	-	-	-	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	-	-	125.6	134.6	143.6	149.5	157.0	164.5	179.4	194.4	209.4	219.4	-	-	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	-	144.8	150.8	158.3	165.9	181.0	196.0	211.1	226.2	241.3	256.4	271.4	286.5	286.6	286.59

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_{bd} [mm] / d_s [mm]	115	145	160	170	200	230	250	285	300	355	375	400	455	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	Steel failure
8	6.6	8.4	9.2	9.8	11.6	13.3	14.5	16.5	17.3	20.5	21.7	21.8	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	-	10.5	11.6	12.3	14.5	16.6	18.1	20.6	21.7	25.7	27.1	28.9	32.9	34.1	-	-	-	-	-	-	-	-	-	-	-	34.13
12	-	-	-	14.7	17.3	19.9	21.7	24.7	26.0	30.8	32.5	34.7	39.5	43.4	49.2	-	-	-	-	-	-	-	-	-	-	49.15
14	-	-	-	-	20.2	23.3	25.3	28.8	30.3	35.9	37.9	40.5	46.0	50.6	60.7	66.9	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	-	-	26.6	28.9	32.9	34.7	41.0	43.4	46.2	52.6	57.8	69.4	80.9	87.4	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	-	-	41.2	43.4	51.3	54.2	57.8	65.8	72.3	86.7	101.2	115.6	130.1	136.5	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	-	64.1	67.7	72.3	82.2	90.3	108.4	126.4	144.5	162.6	180.6	198.7	213.3	-	-	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	-	80.9	92.1	101.2	121.4	141.6	161.9	182.1	202.3	222.6	242.8	263.0	267.6	-	-	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	105.2	115.6	138.7	161.9	185.0	208.1	231.2	254.3	277.5	300.6	323.7	346.8	349.5	349.50

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	220	250	280	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1200	Steel failure
8	10.1	12.1	14.1	16.1	18.1	20.1	21.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	12.6	15.1	17.6	20.1	22.6	25.1	27.6	31.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	-	18.1	21.1	24.1	27.1	30.2	33.2	37.7	42.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	-	24.6	28.1	31.7	35.2	38.7	44.0	49.3	52.8	61.6	66.9	-	-	-	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	32.2	36.2	40.2	44.2	50.3	56.3	60.3	70.4	80.4	87.4	87.4	-	-	-	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	46.5	51.1	58.1	65.1	69.7	81.4	93.0	104.6	116.2	127.9	136.5	-	-	-	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	72.6	81.4	87.2	101.7	116.2	130.8	145.3	159.8	174.4	188.9	203.4	213.3	-	-	-	-	-	-	213.32
28	-	-	-	-	-	-	-	-	83.7	89.7	104.7	119.6	134.6	149.5	164.5	179.4	194.4	209.4	224.3	239.3	254.2	267.6	-	-	-	267.58
32	-	-	-	-	-	-	-	-	-	-	105.6	120.6	135.7	150.8	165.9	181.0	196.0	211.1	226.2	241.3	256.4	271.4	286.5	301.6	349.5	349.50

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C20/25, STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	270	300	330	375	420	480	500	550	600	650	700	750	800	850	900	1000	1100	1200	1300	1400	1500	1600	Steel failure
8	11.6	12.1	13.9	15.6	17.3	19.1	21.7	21.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	14.5	15.2	17.3	19.5	21.7	23.8	27.1	30.3	34.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	17.3	18.2	20.8	23.4	26.0	28.6	32.5	36.4	41.6	43.4	47.7	49.2	-	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	21.2	24.3	27.3	30.3	33.4	37.9	42.5	48.6	50.6	55.6	60.7	65.8	66.9	-	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	27.7	31.2	34.7	38.2	43.4	48.6	55.5	57.8	63.6	69.4	75.1	80.9	86.7	87.4	-	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	43.4	47.7	54.2	60.7	69.4	72.3	79.5	86.7	93.9	101.2	108.4	115.6	122.8	130.1	136.5	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	67.7	75.9	86.7	90.3	99.4	108.4	117.4	126.4	135.5	144.5	153.5	162.6	180.6	198.7	213.3	-	-	-	-	213.32
28	-	-	-	-	-	-	-	85.0	97.1	101.2	111.3	121.4	131.5	141.6	151.7	161.9	172.0	182.1	202.3	222.6	242.8	263.0	267.6	-	-	267.58
32	-	-	-	-	-	-	-	-	111.0	115.6	127.2	138.7	150.3	161.9	173.4	185.0	196.5	208.1	231.2	254.3	277.5	300.6	323.7	346.8	349.5	349.50

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_0 [mm] / d_s [mm]	200	210	230	240	290	300	330	350	375	390	410	420	470	480	550	600	650	700	750	800	850	900	1000	1100	1200	Steel failure
8	20.1	21.1	21.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	25.1	26.4	28.9	30.2	34.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	30.2	31.7	34.7	36.2	43.7	45.2	49.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	36.9	40.5	42.2	51.0	52.8	58.1	61.6	66.0	66.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	48.3	58.3	60.3	66.4	70.4	75.4	78.4	82.4	84.4	87.4	-	-	-	-	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	69.7	76.7	81.4	87.2	90.7	95.3	97.6	109.3	111.6	127.9	136.5	-	-	-	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	109.0	113.3	119.1	122.1	136.6	139.5	159.8	174.4	188.9	203.4	213.3	-	-	-	-	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	-	125.6	140.6	143.6	164.5	179.4	194.4	209.4	224.3	239.3	254.2	267.6	-	-	-	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	-	144.8	165.9	181.0	196.0	211.1	226.2	241.3	256.4	271.4	301.6	331.8	349.5	349.50

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEX-II-385	385	10	40	480	10.0	40.0	510.0	5906675028538	18
R-KEX-II-600	600	7	7	441	10.0	10.0	510.0	5906675293721	18

R-KER with Threaded Rods

High performance vinylester resin approved for use in cracked and non-cracked concrete

Installation movie

Approvals and Reports

- ETA-10/0055; ETAG 001-05, Option 1

Product overview

Features and benefits

- Approved for use with threaded rods in cracked and non-cracked concrete (ETAG001 Option 1)
- Suitable for use in low temperatures (down to -20°C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

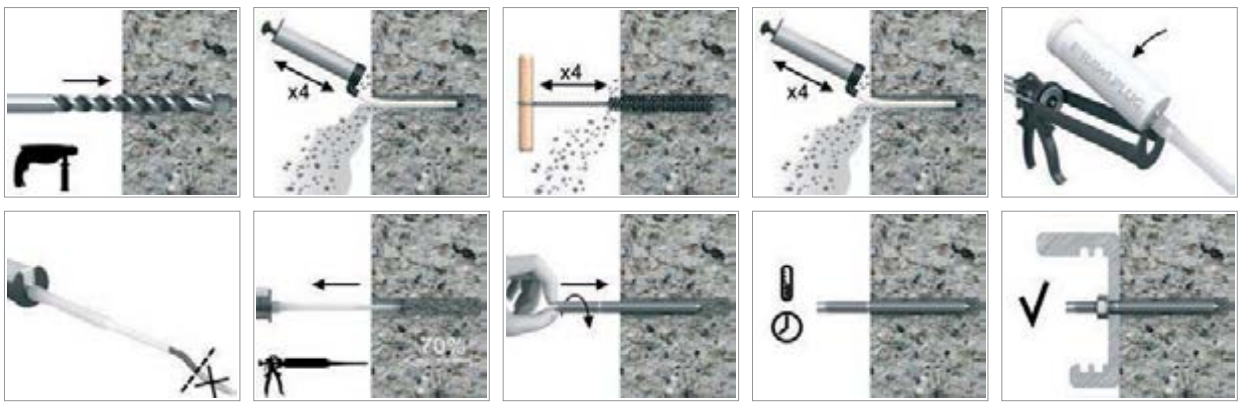
- Pipeline systems
- Curtain walling
- Balustrading
- Handrails
- Canopies
- Large panel reinforcing system -Copy Eco
- Cable conduits and trays
- Fencing & gates
- Pipework/ductwork supports
- Platforms
- Passenger lifts

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

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. Attach nozzle and insert cartridge into gun.
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 information

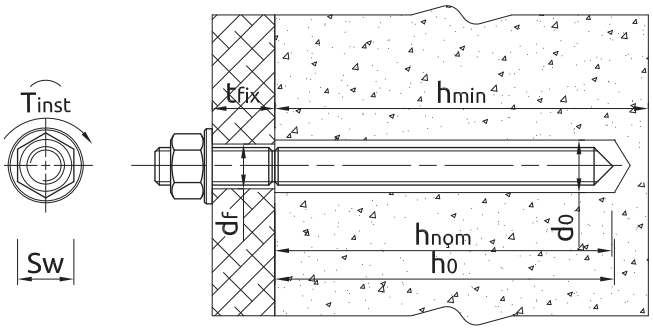
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-380-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-380-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
Substrate		Non-cracked concrete							Cracked concrete			
MEAN ULTIMATE LOAD												
TENSION LOAD $N_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	21.6	34.8	50.4	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	21.6	34.8	50.4	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	21.6	34.8	50.4	93.6	146.4	211.2	256.7	50.4	66.3	93	135
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	30.2	44.1	55.6	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	34.8	55.2	56.6	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	34.8	55.2	76	114.4	156.6	215.5	256.7	54.8	66.3	93	135
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	30.2	44.1	55.6	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	31.2	49.2	56.6	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	31.2	49.2	70.8	114.4	156.6	215.5	256.7	54.8	66.3	93	135
SHEAR LOAD $V_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5	42.15	78.5	122.5	176.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8	67.44	125.6	196	282.4
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7	59.01	109.9	171.5	247.1

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
CHARACTERISTIC LOAD												
TENSION LOAD N_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	18	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	18	29	42	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	18	29	42	78	122	176	237.5	35.53	42.98	60.32	87.46
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	26.1	36.8	53.9	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	29	46	67	105.1	143.3	196.8	237.5	35.53	42.98	60.32	87.46
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	26	36.8	53.9	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	26	41	59	105.1	143.3	196.8	237.5	35.53	42.98	60.32	87.46
SHEAR LOAD V_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140	21	39	61	88
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224	34	63	98	141
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196	29	55	86	124
DESIGN LOAD												
TENSION LOAD N_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	12	19.33	28	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	12	19.33	28	52	79.61	93.71	113.1	19.74	23.88	33.51	41.65
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	14.5	20.44	29.94	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	18.17	27.22	39.5	58.39	79.61	93.71	113.1	19.74	23.88	33.51	41.65
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	13.9	20.44	29.94	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	13.9	21.93	31.55	58.39	79.61	93.71	113.1	19.74	23.88	33.51	41.65
SHEAR LOAD V_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112	16.8	31.2	48.8	70.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2	27.2	50.4	78.4	112.8
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.82	18.59	35.26	55.13	79.49	125.64	18.59	35.26	55.13	79.49
RECOMMENDED LOAD												
TENSION LOAD N_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	8.57	13.81	20	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	8.57	13.81	20	37.14	56.87	66.94	80.78	14.1	17.06	23.94	29.75
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	10.36	14.6	21.39	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	12.98	19.44	28.21	41.71	56.87	66.94	80.78	14.1	17.06	23.94	29.75

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	9.93	14.6	21.39	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	9.93	15.66	22.54	41.71	56.87	66.94	80.78	14.1	17.06	23.94	29.75
	SHEAR LOAD V_{rec}											
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.29	34.86	50.29	80	12	22.29	34.86	50.29
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.14	19.43	36	56	80.57	128	19.43	36	56	80.57
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.28	25.18	39.38	56.78	89.74	13.28	25.18	39.38	56.78

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KER-280	280	10	50	600	6.3	31.5	378	5906675049663	18
R-KER-380	380	10	50	600	6.3	31.5	378	5906675290379	18
R-KER-380-W	380	10	40	480	8.31	33.24	399	5906675290379	12
R-KER-380-S	380	10	10	630	6.3	6.3	427	5906675222981	12

R-KER with Sockets

High performance vinylester resin approved for use with internally threaded sockets

Approvals and Reports

- ETA-13/0805; ETAG 001-05, Option 7

Product overview

Features and benefits

- Approved for use with sockets in non-cracked concrete (ETAG001 Option 7)
- Allows removal of bolt to leave a re-usable socket in place
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the sub-strate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

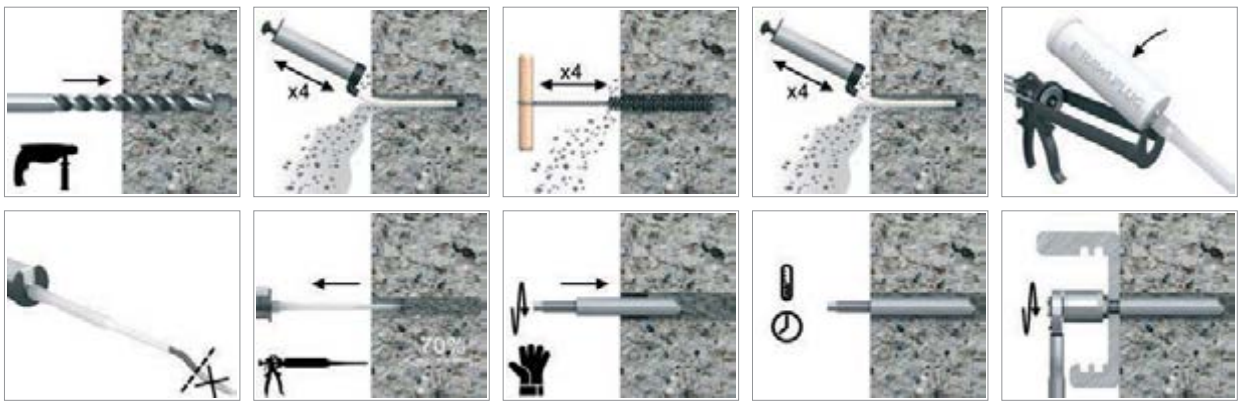
- Curtain walling
- Balustrading
- Handrails
- Canopies

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for socket 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. Attach nozzle and insert cartridge into gun.
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 socket, 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 bolt to the required torque.

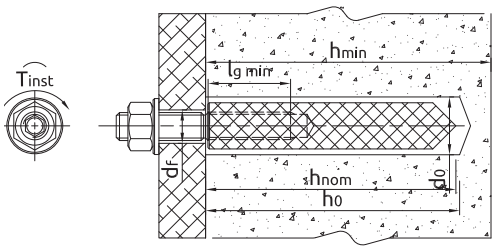
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-380-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-380-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d	L	l_g	d_f
			[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



SOCKETS

Size			M6	M8		M10		M12	M16
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Thread engagement length	h_s	[mm]	6-24	8-25	8-25	10-30	10-30	12-35	16-50
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
Effective Installation depth	h_{ef}	[mm]	75	75	90	75	100	100	125
Min. substrate thickness	h_{min}	[mm]	105	105	120	115	140	140	181
Min. spacing	s_{min}	[mm]	40	40	45	40	50	50	63
Min. edge distance	c_{min}	[mm]	40	40	45	40	50	50	63

Installation data

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	75		90	75	100		125
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12.5	21.6	21.6	34.8	34.8	50.4	93.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	19.2	34.8	34.8	50.6	55.2	63.0	97.4
R-STUDS METRIC THREADED RODS - A4	[kN]	16.8	31.2	31.2	49.2	49.2	63.0	97.4
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.0	10.8	10.8	16.8	16.8	25.2	46.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.6	18.0	18.0	27.6	27.6	40.8	75.6
R-STUDS METRIC THREADED RODS - A4	[kN]	8.4	15.6	15.6	24.0	24.0	34.8	66
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.0	18.0	18.0	29.0	29.0	42.0	66.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	25.4	29.0	32.8	46.0	42.7	66.0
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	25.4	26.0	32.8	41.0	42.7	66.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.0	9.0	9.0	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.0	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.0	13.0	13.0	20.0	20.0	29.0	55.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.7	12.0	12.0	18.2	19.3	23.7	36.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.82	14.1	17.0	18.2	26.5	23.7	36.7
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	23.7	36.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.0	7.2	7.2	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.4	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.79	8.57	8.57	13.0	13.8	16.9	26.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.01	10.1	12.1	13.0	18.9	16.9	26.2
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	16.9	26.2
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.0	8.0	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36.0
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KER-280	280	10	50	600	6.3	31.5	378	5906675049663	18
R-KER-380	380	10	50	600	6.3	31.5	378	5906675290379	18
R-KER-380-W	380	10	40	480	8.31	33.24	399	5906675290379	12
R-KER-380-S	380	10	10	630	6.3	6.3	427	5906675222981	12

R-KER with Rebar as an Anchor

High performance vinylester resin approved for use with reinforcement bars

Installation movie

Approvals and Reports

- ETA-13/0805; ETAG 001-05, Option 7

Product overview

Features and benefits

- Approved for use with rebar as an anchor in non-cracked concrete (ETAG001 Option 7)
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the substrate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

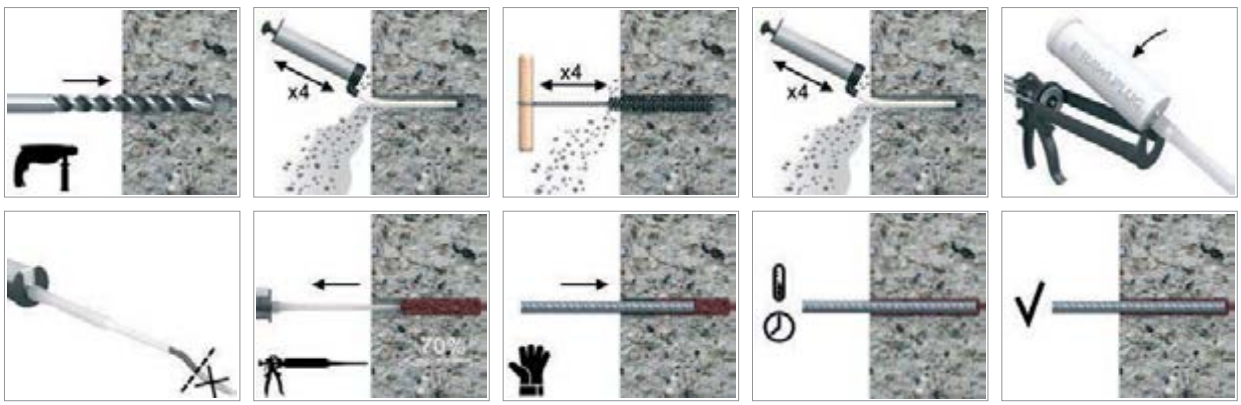
- Curtain walling
- Balustrading
- Barriers
- Cable trays
- Cladding restraints
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



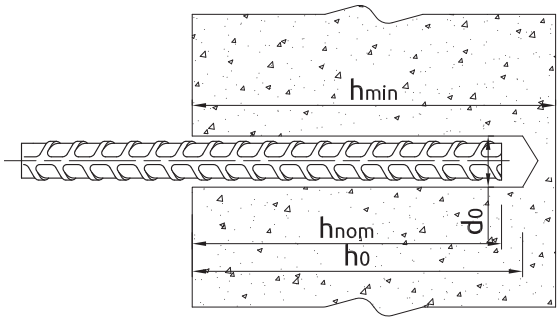
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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. Attach nozzle and insert cartridge into gun.
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 rebar, slowly and with slight twisting motion. Remove any access 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 information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-380-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-380-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	

Installation data



REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Thread diameter	d	[mm]	8	10	12	14	16	20	25	32
Hole diameter in substrate	d_0	[mm]	12	14	18		22	26	32	40
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5							
MINIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, min}$	[mm]	60	70	80		100	120	140	165
STANDARD EMBEDMENT DEPTH										
Installation depth	$h_{nom, s}$	[mm]	80	90	110		125	170	210	240
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	100	120	145		190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100		h_{ef} + 2*d_0					
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40							
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40							

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
18G2										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	29	57	98	155	232	452	884	1853
Design bending resistance	M	[Nm]	19	38	65	103	154	302	589	1235
Allowable bending resistance	M_{rec}	[Nm]	14	27	47	74	110	215	421	882
34GS										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	59	102	162	241	471	920	1930
Design bending resistance	M	[Nm]	20	39	68	108	161	314	614	1287
Allowable bending resistance	M_{rec}	[Nm]	14	28	48	77	115	224	438	919
B500SP										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	35	68	117	186	277	542	1059	2220
Design bending resistance	M	[Nm]	23	45	78	124	185	361	706	1480
Allowable bending resistance	M_{rec}	[Nm]	17	32	56	89	132	258	504	1057
RB500/BSt500S										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	33	65	112	178	265	518	1012	2123
Design bending resistance	M	[Nm]	22	43	75	119	177	346	675	1415
Allowable bending resistance	M_{rec}	[Nm]	16	31	53	85	126	247	482	1011

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
CHARACTERISTIC LOAD									
TENSION LOAD N_{Rk}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	24.1	37.7	54.3	57.4	86	113.1	159.4	235.2
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	25.1	37.7	54.7	57.4	86	113.1	159.4	235.2
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	27.6	37.7	54.7	57.4	86	113.1	159.4	235.2
SHEAR LOAD V_{Rk}									
A-II (e.g. 18G2)	[kN]	12.1	18.8	27.1	36.9	48.3	75.4	117.8	193
A-III (e.g. 34GS)	[kN]	12.6	19.6	28.3	38.5	50.3	78.5	122.7	201.1
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135	221.2
DESIGN LOAD									
TENSION LOAD N_{Rd}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
SHEAR LOAD V_{Rd}									
A-II (e.g. 18G2)	[kN]	8	12.6	18.1	24.6	32.2	50.3	78.5	128.7
A-III (e.g. 34GS)	[kN]	8.4	13.1	18.8	25.7	33.5	52.4	81.8	134
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	9.2	14.4	20.7	28.2	36.9	57.6	90	147.4

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
RECOMMENDED LOAD									
TENSION LOAD N_{rec}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4
SHEAR LOAD V_{rec}									
A-II (e.g. 18G2)	[kN]	5.74	8.98	12.93	17.59	22.98	35.9	56.1	91.91
A-III (e.g. 34GS)	[kN]	5.98	9.35	13.46	18.33	23.94	37.4	58.44	95.74
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	6.58	10.28	14.81	20.16	26.33	41.14	64.28	105.32

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KER-280	280	10	50	600	6.3	31.5	378	5906675049663	18
R-KER-380	380	10	50	600	6.3	31.5	378	5906675290379	18
R-KER-380-W	380	10	40	480	8.31	33.24	399	5906675290379	12
R-KER-380-S	380	10	10	630	6.3	6.3	427	5906675222981	12

R-KER with Post-Installed Rebar

High performance vinylester resin approved for use with post-installed rebar connections

Installation movie

Approvals and Reports

- ETA-12/0319; ETAG 001-05, TR023

ETA CE

Product overview

Features and benefits

- Approved for use with post-installed rebar in non-cracked concrete (ETAG001)
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year
- Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Very high load capacity
- Anchor does not generate tensions in the sub-strate which enables R-KER to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

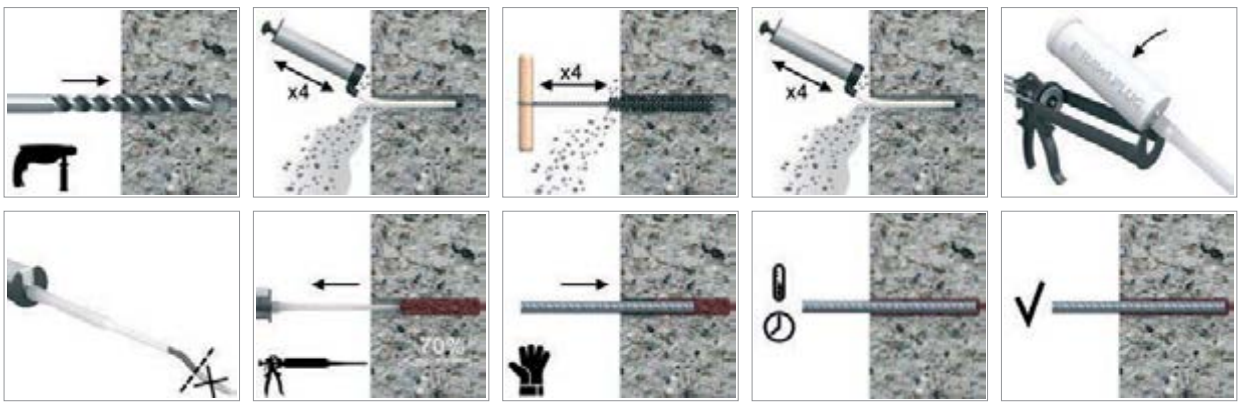
- Curtain walling
- Balustrading
- Handrails
- Canopies

Base materials

Approved for use in:

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

Installation guide



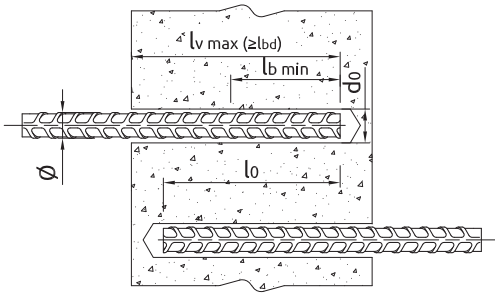
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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. Attach nozzle and insert cartridge into gun.
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 rebar, 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. Attach fixture and tighten the nut to the required torque.

Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-380-W	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-380-S	R-KER-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	

Installation data



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	32
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	40
Brush diameter	-	[mm]	14	16	18	20	22	27	32	37	42
Min. anchorage length	$l_{b,min.}$	[mm]	115	145	170	200	230	285	355	400	455
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200			210	240	300	375	420	480
Max. anchorage length	$l_{v,max.}$	[mm]	400	500	600	700	800	1000			

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	R-KER-S	R-KER	R-KER-W	R-KER-S	R-KER	R-KER-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
18G2											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
34GS											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
B500SP											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
RB500/BSt500S											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-II (18G2) [kN]

d_s [mm] \ l_{bd} [mm]	100	110	130	150	170	190	210	230	260	280	290	330	360	400	460	530	670	750	800	830	850	900	930	1000	Steel failure
8	5.8	6.4	7.5	8.7	9.8	11.0	12.1	13.3	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	-	7.9	9.4	10.8	12.3	13.7	15.2	16.6	18.8	20.2	20.9	23.8	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	-	11.3	13.0	14.7	16.5	18.2	19.9	22.5	24.3	25.1	28.6	31.2	34.7	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	-	15.2	17.2	19.2	21.2	23.3	26.3	28.3	29.3	33.4	36.4	40.4	46.5	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	-	19.6	22.0	24.3	26.6	30.0	32.4	33.5	38.1	41.6	46.2	53.2	61.2	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	30.3	33.2	37.6	40.4	41.9	47.7	52.0	57.8	66.4	76.6	96.8	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	46.9	50.6	52.4	59.6	65.0	72.2	83.1	95.7	121.0	135.4	144.4	149.9	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	-	58.6	66.7	72.8	80.9	93.0	107.2	135.5	151.7	161.8	167.8	171.9	182.0	188.1	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	76.3	83.2	92.4	106.3	122.5	154.8	173.3	184.9	191.8	196.4	208.0	214.9	231.1	248.14

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-II (18G2) [kN]

d_s [mm] \ l_{bd} [mm]	100	120	140	160	170	180	200	230	250	280	290	320	330	400	450	500	550	640	700	720	850	910	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	11.6	13.9	16.3	18.6	19.8	20.9	23.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	16.7	19.5	22.3	23.7	25.1	27.9	32.1	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	22.8	26.0	27.7	29.3	32.5	37.4	40.7	45.5	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	29.7	31.6	33.5	37.2	42.8	46.5	52.0	53.9	59.5	61.3	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	42.7	49.1	53.4	59.8	61.9	68.3	70.5	85.4	96.1	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	58.9	65.9	68.3	75.4	77.7	94.2	106.0	117.8	129.5	150.7	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	73.9	76.5	84.4	87.0	105.5	118.7	131.9	145.1	168.8	184.6	189.9	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	108.5	122.1	135.6	149.2	173.6	189.9	195.3	230.6	246.9	-	-	248.14

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-II (18G2) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	250	260	300	330	375	400	420	440	460	480	500	530	550	600	670	750	800	830	900	930	1000	Steel failure
8	11.6	12.1	13.9	14.4	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	14.4	15.2	17.3	18.1	18.8	21.7	23.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	17.3	18.2	20.8	21.7	22.5	26.0	28.6	32.5	34.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	21.2	24.3	25.3	26.3	30.3	33.4	37.9	40.4	42.5	44.5	46.5	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	27.7	28.9	30.0	34.7	38.1	43.3	46.2	48.5	50.8	53.2	55.5	57.8	61.2	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	43.3	47.7	54.2	57.8	60.7	63.6	66.4	69.3	72.2	76.6	79.4	86.7	96.8	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	67.7	72.2	75.8	79.4	83.1	86.7	90.3	95.7	99.3	108.3	121.0	135.4	144.4	149.9	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	84.9	89.0	93.0	97.1	101.1	107.2	111.2	121.3	135.5	151.7	161.8	167.8	182.0	188.1	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	122.5	127.1	138.7	154.8	173.3	184.9	191.8	208.0	214.9	231.1	248.14

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60. STEEL A-II (18G2) [kN]																									
l_0 [mm] / d_s [mm]	200	208	210	240	250	290	300	330	375	400	420	450	480	500	550	600	640	700	720	800	850	900	910	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	23.2	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	27.9	29.0	29.3	33.5	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	34.2	39.0	40.7	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	44.6	46.5	53.9	55.8	61.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	64.1	70.5	80.1	85.4	89.7	96.1	-	-	-	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	88.3	94.2	98.9	106.0	113.0	117.8	129.5	141.3	150.7	-	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	-	110.8	118.7	126.6	131.9	145.1	158.3	168.8	184.6	189.9	-	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	149.2	162.8	173.6	189.9	195.3	217.0	230.6	244.2	246.9	-	248.14

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
l_{bd} [mm] / d_s [mm]	100	120	140	170	190	210	240	300	310	320	330	380	400	440	460	500	540	620	700	770	850	900	960	1000	Steel failure
8	5.8	6.9	8.1	9.8	11.0	12.1	13.9	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	-	8.7	10.1	12.3	13.7	15.2	17.3	21.7	22.4	23.1	23.8	27.4	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	-	12.1	14.7	16.5	18.2	20.8	26.0	26.9	27.7	28.6	32.9	34.7	38.1	39.9	-	-	-	-	-	-	-	-	-	40.30
14	-	-	-	17.2	19.2	21.2	24.3	30.3	31.3	32.4	33.4	38.4	40.4	44.5	46.5	50.6	54.6	-	-	-	-	-	-	-	54.85
16	-	-	-	-	22.0	24.3	27.7	34.7	35.8	37.0	38.1	43.9	46.2	50.8	53.2	57.8	62.4	71.6	-	-	-	-	-	-	71.65
20	-	-	-	-	-	-	34.7	43.3	44.8	46.2	47.7	54.9	57.8	63.6	66.4	72.2	78.0	89.6	101.1	111.2	-	-	-	-	111.95
25	-	-	-	-	-	-	-	54.2	56.0	57.8	59.6	68.6	72.2	79.4	83.1	90.3	97.5	111.9	126.4	139.0	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	-	66.7	76.8	80.9	89.0	93.0	101.1	109.2	125.4	141.6	155.7	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	87.8	92.4	101.7	106.3	115.6	124.8	143.3	161.8	178.0	196.4	208.0	221.9	231.1	286.59

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-III (34GS) [kN]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	190	200	240	250	280	290	300	320	330	380	450	520	550	600	700	740	830	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	11.6	13.9	16.3	18.6	22.1	23.2	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	16.7	19.5	22.3	26.5	27.9	33.5	34.9	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	-	22.8	26.0	30.9	32.5	39.0	40.7	45.5	47.2	48.8	52.0	53.7	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	-	29.7	35.3	37.2	44.6	46.5	52.0	53.9	55.8	59.5	61.3	70.6	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	42.7	51.2	53.4	59.8	61.9	64.1	68.3	70.5	81.1	96.1	111.0	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	58.9	65.9	68.3	70.7	75.4	77.7	89.5	106.0	122.5	129.5	141.3	164.9	174.3	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	73.9	76.5	79.1	84.4	87.0	100.2	118.7	137.2	145.1	158.3	184.6	195.2	218.9	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	103.1	122.1	141.1	149.2	162.8	189.9	200.8	225.2	244.2	257.7	271.3	286.59

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	540	600	620	700	750	770	800	850	900	960	1000	Steel failure
8	11.6	12.1	13.9	14.4	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	14.4	15.2	17.3	18.1	21.7	22.4	27.1	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	21.2	24.3	25.3	30.3	31.3	37.9	38.4	40.4	42.5	46.5	48.5	50.6	54.6	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	27.7	28.9	34.7	35.8	43.3	43.9	46.2	48.5	53.2	55.5	57.8	62.4	69.3	71.6	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	43.3	44.8	54.2	54.9	57.8	60.7	66.4	69.3	72.2	78.0	86.7	89.6	101.1	108.3	111.2	-	-	-	-	-	111.95
25	-	-	-	-	-	-	67.7	68.6	72.2	75.8	83.1	86.7	90.3	97.5	108.3	111.9	126.4	135.4	139.0	144.4	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	84.9	93.0	97.1	101.1	109.2	121.3	125.4	141.6	151.7	155.7	161.8	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	124.8	138.7	143.3	161.8	173.3	178.0	184.9	196.4	208.0	221.9	231.1	286.59

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60. STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	260	280	300	330	350	375	380	400	420	480	500	520	600	650	700	740	800	830	900	950	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	23.2	24.4	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	27.9	29.3	33.5	36.2	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	34.2	39.0	42.3	45.5	48.8	53.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	44.6	48.3	52.0	55.8	61.3	65.1	69.7	70.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	64.1	70.5	74.7	80.1	81.1	85.4	89.7	102.5	106.8	111.0	-	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	-	88.3	89.5	94.2	98.9	113.0	117.8	122.5	141.3	153.1	164.9	174.3	-	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	-	-	-	110.8	126.6	131.9	137.2	158.3	171.4	184.6	195.2	211.0	218.9	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	141.1	162.8	176.3	189.9	200.8	217.0	225.2	244.2	257.7	271.3	286.59

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_{bd} [mm] / d_s [mm]	120	150	160	180	200	230	250	290	300	360	370	400	460	470	560	600	660	700	750	800	850	900	940	1000	Steel failure
8	6.9	8.7	9.2	10.4	11.6	13.3	14.4	16.8	17.3	20.8	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	-	10.8	11.6	13.0	14.4	16.6	18.1	20.9	21.7	26.0	26.7	28.9	33.2	33.9	-	-	-	-	-	-	-	-	-	-	34.13
12	-	-	-	15.6	17.3	19.9	21.7	25.1	26.0	31.2	32.1	34.7	39.9	40.7	48.5	-	-	-	-	-	-	-	-	-	49.15
14	-	-	-	-	20.2	23.3	25.3	29.3	30.3	36.4	37.4	40.4	46.5	47.5	56.6	60.7	66.7	-	-	-	-	-	-	-	66.90
16	-	-	-	-	-	26.6	28.9	33.5	34.7	41.6	42.8	46.2	53.2	54.3	64.7	69.3	76.3	80.9	86.7	-	-	-	-	-	87.37
20	-	-	-	-	-	-	-	41.9	43.3	52.0	53.4	57.8	66.4	67.9	80.9	86.7	95.3	101.1	108.3	115.6	122.8	130.0	135.8	-	136.52
25	-	-	-	-	-	-	-	-	-	65.0	66.8	72.2	83.1	84.9	101.1	108.3	119.2	126.4	135.4	144.4	153.5	162.5	169.7	180.6	213.32
28	-	-	-	-	-	-	-	-	-	-	-	80.9	93.0	95.0	113.2	121.3	133.5	141.6	151.7	161.8	171.9	182.0	190.1	202.2	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	106.3	108.6	129.4	138.7	152.5	161.8	173.3	184.9	196.4	208.0	217.2	231.1	349.50

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	220	230	280	290	310	350	390	410	450	470	500	630	750	800	850	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	16.7	18.6	20.4	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	11.6	13.9	16.3	18.6	20.9	23.2	25.6	26.7	32.5	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	-	16.7	19.5	22.3	25.1	27.9	30.7	32.1	39.0	40.4	43.2	48.8	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	-	22.8	26.0	29.3	32.5	35.8	37.4	45.5	47.2	50.4	56.9	63.4	66.7	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	29.7	33.5	37.2	40.9	42.8	52.0	53.9	57.6	65.1	72.5	76.2	83.6	87.4	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	42.7	47.0	49.1	59.8	61.9	66.2	74.7	83.3	87.5	96.1	100.4	106.8	134.5	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	65.9	68.3	73.0	82.4	91.8	96.6	106.0	110.7	117.8	148.4	176.6	188.4	200.2	212.0	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	81.8	92.3	102.9	108.1	118.7	124.0	131.9	166.2	197.8	211.0	224.2	237.4	250.6	263.8	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	105.8	111.2	122.1	127.5	135.6	170.9	203.5	217.0	230.6	244.2	257.7	271.3	349.50

Basic performance data (cont.)

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	540	600	620	700	750	770	800	850	900	960	1000	Steel failure
8	11.6	12.1	13.9	14.4	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	14.4	15.2	17.3	18.1	21.7	22.4	27.1	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	21.2	24.3	25.3	30.3	31.3	37.9	38.4	40.4	42.5	46.5	48.5	50.6	54.6	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	27.7	28.9	34.7	35.8	43.3	43.9	46.2	48.5	53.2	55.5	57.8	62.4	69.3	71.6	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	43.3	44.8	54.2	54.9	57.8	60.7	66.4	69.3	72.2	78.0	86.7	89.6	101.1	108.3	111.2	-	-	-	-	-	111.95
25	-	-	-	-	-	-	67.7	68.6	72.2	75.8	83.1	86.7	90.3	97.5	108.3	111.9	126.4	135.4	139.0	144.4	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	84.9	93.0	97.1	101.1	109.2	121.3	125.4	141.6	151.7	155.7	161.8	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	124.8	138.7	143.3	161.8	173.3	178.0	184.9	196.4	208.0	221.9	231.1	286.59

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_0 [mm] / d_s [mm]	200	210	230	240	290	300	330	350	375	390	410	420	470	480	550	600	630	700	750	800	850	900	950	1000	Steel failure
8	18.6	19.5	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	23.2	24.4	26.7	27.9	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	27.9	29.3	32.1	33.5	40.4	41.8	46.0	48.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	34.2	37.4	39.0	47.2	48.8	53.7	56.9	61.0	63.4	66.7	-	-	-	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	44.6	53.9	55.8	61.3	65.1	69.7	72.5	76.2	78.1	87.4	-	-	-	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	64.1	70.5	74.7	80.1	83.3	87.5	89.7	100.4	102.5	117.4	128.1	134.5	-	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	88.3	91.8	96.6	98.9	110.7	113.0	129.5	141.3	148.4	164.9	176.6	188.4	200.2	212.0	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	-	110.8	124.0	126.6	145.1	158.3	166.2	184.6	197.8	211.0	224.2	237.4	250.6	263.8	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	-	130.2	149.2	162.8	170.9	189.9	203.5	217.0	230.6	244.2	257.7	271.3	349.50

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KER-280	280	10	50	600	6.3	31.5	378	5906675049663	18
R-KER-380	380	10	50	600	6.3	31.5	378	5906675290379	18
R-KER-380-W	380	10	40	480	8.31	33.24	399	5906675290379	12
R-KER-380-S	380	10	10	630	6.3	6.3	427	5906675222981	12

R-KEM II with Threaded Rods for Concrete

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

Installation movie

Approvals and Reports

- ETA-12/0394; ETAG 001-05, Option 7

Product overview

Features and benefits

- The most convenient bonded anchor for general purpose 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 using standard manual silicone gun
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

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

Base materials

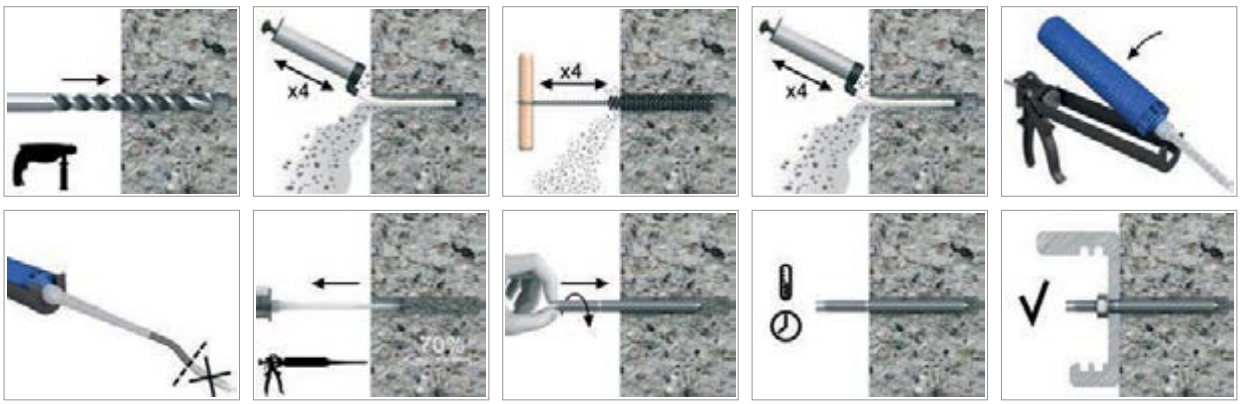
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.
2. Solid substartes: 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. Attach nozzle and insert cartridge into gun.
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 information

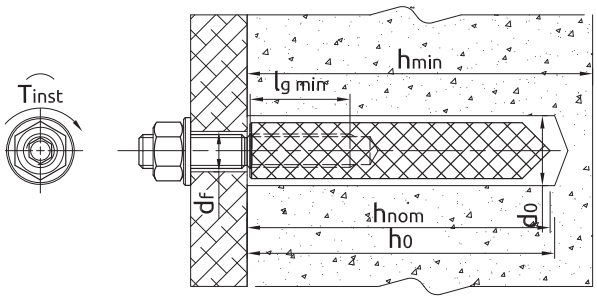
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEM-II-175	R-KEMII	Styrene Free Polyester Resin	175
R-KEM-II-175-SET		Set with 4 studs and plastic sleeves	
R-KEM-II-300		Styrene Free Polyester Resin	300
R-KEM-II-300-SET		Set with 4 studs and plastic sleeves	
R-KEM-II-380	R-KEMII	Styrene Free Polyester Resin	380

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	13	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	R-KEMII-S	R-KEMII	R-KEMII-W	R-KEMII-S	R-KEMII	R-KEMII-W
5	-20	-	-	45	-	-	24h
5	-15	-	-	30	-	-	18h
5	-10	-	-	20	-	-	8h
5	-5	4h	70	11	24h	8h	5h
5	0	2h	45	7	18h	4h	2h
5	5	60	25	5	12h	2h	60
10	10	45	15	2	8h	90	45
15	15	25	9	1,5	6h	60	30
20	20	15	5	1	4h	45	15
25	30	7	2	-	90	30	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	18	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	18	29	42	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	19.1	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	19.1	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	6.8	11.61	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.3	27.3	42.4	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.4	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	6.80	11.6	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.4	67.0	79.0	103.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.50	10.7	14.8	20.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	13.8	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	4.9	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.5	10.7	14.8	120.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	14.2	19.5	30.3	47.9	56.4	74.1

Basic performance data (cont.)

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
RECOMMENDED LOAD								
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.50	10.7	14.8	20.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	14.2	19.5	30.3	47.9	56.4	74.1
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.0	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEM-II-175	175	10	50	600	6	30	360	5906675050249	18
R-KEM-II-175-SET	175	5	5	315	7.1	7.1	447.3	5906675057866	18
R-KEM-II-300	300	10	50	600	6	30	360	5906675050256	18
R-KEM-II-300-SET	300	5	5	315	7.1	7.1	447.3	5906675057859	18
R-KEM-II-380	380	10	40	480	7.70	32	384	5906675097770	18

R-KEM II with Threaded Rods for Masonry

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

Installation movie

Approvals and Reports

- ETA-12/0528; ETAG 029

Product overview

Features and benefits

- The most convenient bonded anchor for general purpose use
- Approved for 15 substrates
- 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 using standard manual silicone gun
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Gates
- Window elements
- Canopies
- Sanitary appliances
- Railings
- Handrails
- Consoles
- Ladders
- Cable trays

Base materials

Approved for use in:

- Solid Concrete Block
- Solid Brick
- Solid Sand-lime Brick
- Hollow Sand-lime Brick
- Hollow Brick
- Hollow Lightweight Concrete Block
- Hollow-core Slab

Installation guide

Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.

2a. Solid substrates: Clean the hole with brush and hand pump at least four times each. It is very important and necessary before installation.

2b. Hollow substrates: Insert mesh sleeve into the hole.

3. Attach nozzle and insert cartridge into gun.

4. Dispense to waste until even colour is obtained.

5a. Solid Substrates: 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.

5b. Hollow substrate: Insert the mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle as the hole is filled to the surface.

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 information

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-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	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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

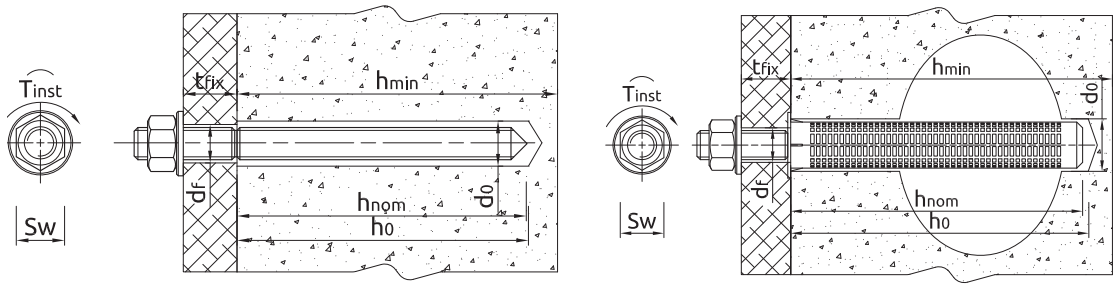
* Make to order

Product information (cont.)

R-PLS Plastic Mesh Sleeves and SP-CE Wire Mesh Sleeves

Product Code	Size		Ilość [szt]		Waga [kg]		Bar Code
	Sleeve [mm]	Stud	Box	Outer	Box	Outer	
R-PLS-12050-10	12x50	M8	10	480	0.6	0.6	5906675377520
R-PLS-16085-10	16x85	M10-M12	10	6000	0.6	0.6	5906675347547
R-PLS-16130-10	16x130	M10-M12	10	6000	0.8	0.8	5906675347554
R-PLS-20085-10	20x85	M16	10	4800	0.8	0.8	5906675291864
SP-CE-R08	10X1000	M8	10	5430	1.29	1.29	5906675266138
SP-CE-R10	12x1000	M10	10	1500	1.29	1.29	5906675610122
SP-CE-R12	16x1000	M12	10	1110	1.29	1.29	5906675610320
SP-CE-R16	22x1000	M16	10	384	1.29	1.29	5906675610528
SP-CE-R20	28x1000	M20	5	280	2.58	2.58	5906675610726

Installation data



SOLID SUBSTRATES

Size			M8	M10	M12	M16	M8	M10	M12	M16
Substrate			Ceramic solid substrates				Aerated concrete			
Thread diameter	d	[mm]	8	10	12	16	8	10	12	16
Hole diameter in substrate	d_0	[mm]	10	12	14	18	10	12	14	18
Installation torque	T_{inst}	[Nm]	5	8	10	15	3	4	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5							
Installation depth	$h_{nom,min}$	[mm]	80	85	95	105	80	85	95	105
Min. spacing	s_{min}	[mm]	50	50	50	54	50	50	50	54
Min. edge distance	c_{min}	[mm]	50	50	50	54	50	50	50	54

HOLLOW SUBSTRATES

Size			M10		M10		M12		M16
Substrate			Hollow substrates						
Thread diameter	d	[mm]	8	8	10	10	12	12	16
Plastic mesh sleeve size	dxl	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
Hole diameter in substrate	d_0	[mm]	12	12	16	16	16	16	20
Installation torque	T_{inst}	[Nm]	3	3	4	4	6	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Installation depth	$h_{nom,std}$	[mm]	50	-	85	-	85	-	85
	$h_{nom,max}$	[mm]	-	80	-	125	-	125	-
Min. spacing	s_{min}	[mm]	100	100	100	100	100	100	120
Min. edge distance	c_{min}	[mm]	100	100	100	100	100	100	120

Installation data

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	R-KEMII-S	R-KEMII	R-KEMII-W	R-KEMII-S	R-KEMII	R-KEMII-W
5	-20	-	-	45	-	-	1440
5	-15	-	-	30	-	-	1080
5	-10	-	-	20	-	-	480
5	-5	180	70	11	1440	480	360
5	0	120	45	7	1080	240	120
5	5	60	25	5	720	120	60
10	10	45	15	2	480	90	45
15	15	25	9	1,5	360	60	30
20	20	15	5	1	240	45	15
25	30	7	2	-	90	30	-
25	35	6	-	-	60	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16
R-STUDS METRIC THREADED RODS - steel class 5.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166
Design bending resistance	M	[Nm]	15	30	52	133
R-STUDS METRIC THREADED RODS - steel class 8.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266
Design bending resistance	M	[Nm]	24	48	84	213
R-STUDS METRIC THREADED RODS - A4						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233
Design bending resistance	M	[Nm]	17	34	59	149

Basic performance data

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
Substrate		Solid substrates			
Plastic mesh sleeve (dxl)	[mm]	-	-	-	-
MEAN ULTIMATE LOAD					
TENSION LOADS $N_{Ru,m}$					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	8.78	10.9	11.3	11.5
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	2.65	3.24	4.11	4.68
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	7.54	8.00	8.30	8.50

Basic performance data (cont.)

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
SHEAR LOADS VRu,m					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	5.79	8.35	11.6	11.5
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	2.43	3.41	4.36	4.48
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	5.86	8.11	7.91	8.23
CHARACTERISTIC LOAD*					
TENSION LOADS N_{Rk}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	6.0	7.0	7.0	7.0
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	1.5	2.0	2.5	3.0
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	5.0	5.0	5.0	5.0
SHEAR LOADS VRk					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	3.5	5.0	7.0	7.0
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	1.5	2.0	2.5	2.5
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	3.5	5.0	5.0	5.0
DESIGN LOAD					
TENSION LOAD N_{Rd}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	2.40	2.80	2.80	2.80
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.75	1.00	1.25	1.50
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	2.00	2.00	2.00	2.00
SHEAR LOAD V_{Rd}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.40	2.00	2.80	2.80
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.75	1.00	1.25	1.25
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.40	2.00	2.00	2.00
RECOMMENDED LOAD**					
TENSION LOAD N_{rec}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.71	2.00	2.00	2.00
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.54	0.71	0.89	1.07
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.43	1.43	1.43	1.43
SHEAR LOAD V_{rec}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.00	1.43	2.00	2.00
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.54	0.71	0.89	0.89
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.00	1.43	1.43	1.43

*According to ETAG 029, **Partial safety factor 1.4

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
Substrate		Hollow substrates						
Plastic mesh sleeve (dxl)	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
MEAN ULTIMATE LOAD								
TENSION AND SHEAR LOADS $F_{Ru,m}$								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	3.42	3.50	3.73	5.11	4.16	4.48	4.24
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	3.21	3.54	3.87	4.03	3.97	4.16	3.69
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	2.04	2.84	3.07	3.68	3.74	3.99	3.51
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	2.08	2.98	3.19	3.78	3.68	4.03	3.77
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	2.86	3.43	3.74	3.59	3.71	3.94	3.80
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	1.24	1.25	2.49	2.74	2.82	2.78	2.14
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	1.73	1.60	2.37	2.51	2.41	2.68	2.10
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	1.30	1.39	1.99	2.06	2.05	2.12	2.05
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	1.45	1.45	2.22	2.17	2.19	2.24	2.25
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	1.51	1.60	1.39	1.45	1.86	2.07	1.75
Lightweight concrete hollow block min 2.0MPa	[kN]	1.73	2.38	3.52	3.00	3.93	3.75	3.92

Basic performance data (cont.)

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
CHARACTERISTIC LOAD*								
TENSION AND SHEAR LOADS F_{Rk}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	2.5	2.5	2.5	3.5	3.0	3.0	3.0
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	2.0	2.5	2.5	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	1.5	2.0	2.0	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	1.5	2.0	2.0	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	2.0	2.5	2.5	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.9	0.9	1.5	2.0	2.0	2.0	2.0
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.9	1.2	1.5	1.5	1.5	2.0	2.0
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.9	0.9	1.2	1.5	1.5	1.5	1.5
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.9	0.9	1.5	1.5	1.5	1.5	1.5
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.9	1.2	0.9	0.9	1.2	1.5	1.5
Lightweight concrete hollow block min 2.0MPa	[kN]	1.2	1.5	2.5	2.0	2.5	2.5	2.5
DESIGN LOAD								
TENSION AND SHEAR LOADS F_{Rd}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	1.0	1.0	1.0	1.4	1.2	1.2	1.2
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.88	1.0	1.2	1.4	1.4	1.6	1.6
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.6	0.8	1.0	1.0	1.4	1.4	1.0
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.6	0.8	0.8	1.0	1.0	1.4	1.2
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.8	1.0	1.4	1.4	1.6	1.6	1.6
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.36	0.36	0.8	0.8	0.8	0.8	0.6
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.48	0.48	0.6	0.6	0.8	0.8	0.6
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.36	0.36	0.6	0.6	0.6	0.6	0.6
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.36	0.36	0.6	0.6	0.6	0.6	0.6
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.48	0.48	0.48	0.48	0.48	0.60	0.48
Lightweight concrete hollow block min 2.0MPa	[kN]	0.48	0.6	1.0	1.0	1.0	1.4	1.4
RECOMMENDED LOAD**								
TENSION AND SHEAR LOADS F_{rec}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	0.71	0.71	0.71	1.0	0.86	0.86	0.86
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.63	0.71	0.86	1.0	1.0	1.14	1.14
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.43	0.57	0.71	0.71	1.0	1.0	0.71
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.43	0.57	0.57	0.71	0.71	1.0	0.86
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.57	0.71	1.0	1.0	1.14	1.14	1.14
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.26	0.26	0.57	0.57	0.57	0.57	0.43
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.34	0.34	0.43	0.43	0.57	0.57	0.43
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.34	0.34	0.34	0.34	0.34	0.43	0.34
Lightweight concrete hollow block min 2.0MPa	[kN]	0.34	0.43	0.71	0.71	0.71	1.0	1.0

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KEM-II-175	175	10	50	600	6	30	360	5906675050249	18
R-KEM-II-175-SET	175	5	5	315	7.1	7.1	447.3	5906675057866	18
R-KEM-II-300	300	10	50	600	6	30	360	5906675050256	18
R-KEM-II-300-SET	300	5	5	315	7.1	7.1	447.3	5906675057859	18
R-KEM-II-300-S	300	10	50	600	6	30	360	5906675064642	12
R-KEM-II-380	380	10	40	480	7.70	32	384	5906675097770	18

R-KF2 with Threaded Rods

Economy polyester resin approved for use in non-cracked concrete

Approvals and Reports

- ETA-11/0141; ETAG 001-05, Option 7

Product overview

Features and benefits

- Economical fixings resin for medium duty load applications
- Can be used in damp conditions and underwater applications
- Wide range of steel studs with different lengths and diameters
- Small edge and spacing distances
- Suitable for repetitive use. Partly used product can be reused by fitting a new mixing nozzle

Applications

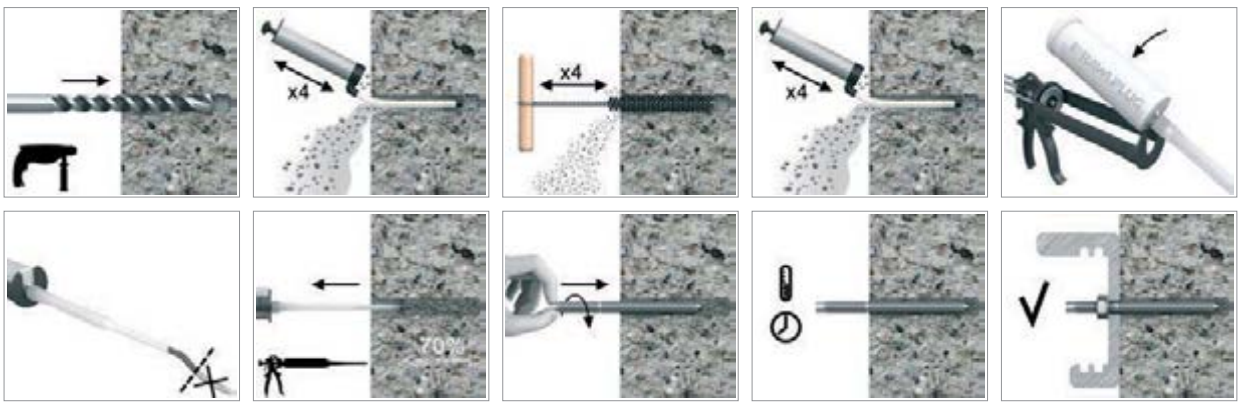
- Guard rails
- Handrails
- Canopies
- Masonry support
- Balustrading
- Cable trays
- Curtain walling
- Fencing & gates

Base materials

Approved for use in:

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

Installation guide



Installation guide (cont.)

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 information

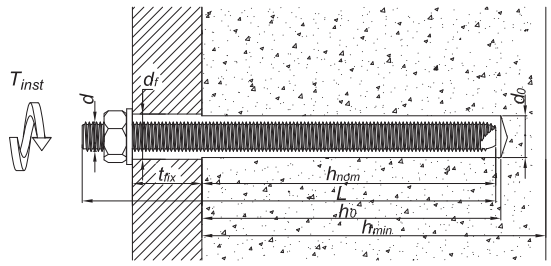
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KF2-380	R-KF2	Polyester Resin	380

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	13	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	60	360
5	0	40	180
5	5	20	120
10	10	12	80
15	15	8	60
20	20	5	45
25	30	2	20

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439

Mechanical properties (cont.)

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	18.2	28	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	21.6	34.8	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	21.6	34.8	50.4	93.6	146.4	189.8	217.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	18.2	28	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	22.7	38	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	30.3	48	63.6	108.6	159.1	189.8	217.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	18.2	28	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	22.7	38	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	30.3	48	63.6	108.6	159.1	189.8	217.6
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	18	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	18	29	42	78	122	153.1	169.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	19.1	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	22	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	19.1	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.94	12.22	15.94	25.11	35.61	35.19	37.05
Standard embedment depth	[kN]	10.61	15.72	21.89	31.39	50.44	52.76	53.86
Maximum embedment depth	[kN]	12	19.33	28	47.78	71.22	72.9	80.76
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	7.94	12.22	15.94	25.11	35.61	35.19	37.05
Standard embedment depth	[kN]	10.61	15.72	21.89	31.39	50.44	52.76	53.86
Maximum embedment depth	[kN]	13.28	20.94	28.83	47.78	71.22	72.9	80.76
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	7.94	12.22	15.94	25.11	35.61	35.19	37.05
Standard embedment depth	[kN]	10.61	15.72	21.89	31.39	50.44	52.76	53.86
Maximum embedment depth	[kN]	13.28	20.94	28.83	47.78	71.22	72.9	80.76
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.82	18.59	35.26	55.13	79.49	125.64
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.67	8.73	11.39	17.94	25.44	25.14	26.46
Standard embedment depth	[kN]	7.58	11.23	15.63	22.42	36.03	37.69	38.47
Maximum embedment depth	[kN]	8.57	13.81	20	34.13	50.87	52.07	57.69
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	5.67	8.73	11.39	17.94	25.44	25.14	26.46
Standard embedment depth	[kN]	7.58	11.23	15.63	22.42	36.03	37.69	38.47
Maximum embedment depth	[kN]	8.57	13.81	20	34.13	50.87	52.07	57.69
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.67	8.73	11.39	17.94	25.44	25.14	26.46
Standard embedment depth	[kN]	7.58	11.23	15.63	22.42	36.03	37.69	38.47
Maximum embedment depth	[kN]	8.57	13.81	20	34.13	50.87	52.07	57.69
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.29	34.86	50.29	80
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.14	19.43	36	56	80.57	128
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.28	25.18	39.38	56.78	89.74

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-KF2-380	380	10	40	480	10.0	40.0	510.0	5010445602009	18

CFS+
CARTRIDGE FREE SYSTEM

- RV200
  - with Threaded Rods
  - with Sockets
  - with Rebar as an Anchor
  - with Post-Installed Rebar
- RM50
  - with Threaded Rods for Concrete
  - with Threaded Rods for Masonry
- RP30

Patented self-opening clip

Cartridge-free system for less waste

Effortless extrusion with manual or pneumatic dispenser guns

RV200 with Threaded Rods (CFS+)

High performance vinylester resin approved for use in cracked and non-cracked concrete - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-10/0055; ETAG 001-05, Option 1

Installation movie

Product overview

Features and benefits

- Approved for use with threaded rods in cracked and non-cracked concrete (ETAG001 Option 1)
- Suitable for most solid and hollow substrates including overhead applications
- Very high load capacity
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year; Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Anchor does not generate tensions in the sub-strate which enables RV200 to be specified where closer edge and spacing distances are required
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

- Curtain walling
- Balustrading
- Handrails
- Canopies
- Cable trays
- Formwork supports
- Heavy machinery
- Lighting columns
- Public seating
- Large panel reinforcing system -Copy Eco

Base materials

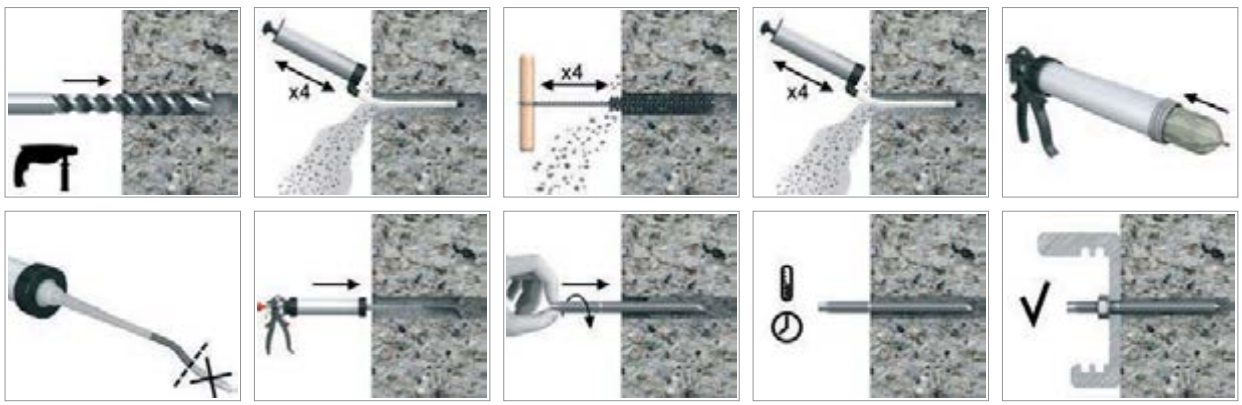
Approved for use in:

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

Also suitable for use in:

- High-Density Natural Stone
- Natural Stone
- Solid Brick
- Solid Concrete Block
- Solid Sand-lime Brick
- Reinforced concrete

Installation guide



Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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 foil 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 rebar, 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 information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

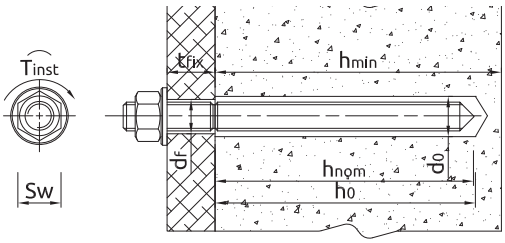
R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data

R-STUDS



Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800

Mechanical properties (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
Substrate		Non-cracked concrete							Cracked concrete			
MEAN ULTIMATE LOAD												
TENSION LOAD $N_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	21.6	34.8	50.4	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	21.6	34.8	50.4	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	21.6	34.8	50.4	93.6	146.4	211.2	256.7	50.4	66.3	93	135
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	30.2	44.1	55.6	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	34.8	55.2	56.6	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	34.8	55.2	76	114.4	156.6	215.5	256.7	54.8	66.3	93	135
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	30.2	44.1	55.6	78	102.5	129.1	165	30.2	34.8	46.6	65.1
Standard embedment depth	[kN]	31.2	49.2	56.6	87.3	115.2	156.1	185.4	41.7	43.7	65.9	97.6
Maximum embedment depth	[kN]	31.2	49.2	70.8	114.4	156.6	215.5	256.7	54.8	66.3	93	135
SHEAR LOAD $V_{Ru,m}$												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5	42.15	78.5	122.5	176.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8	67.44	125.6	196	282.4
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7	59.01	109.9	171.5	247.1
CHARACTERISTIC LOAD												
TENSION LOAD N_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	18	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	18	29	42	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	18	29	42	78	122	176	237.5	35.53	42.98	60.32	87.46
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	26.1	36.8	53.9	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	29	46	67	105.1	143.3	196.8	237.5	35.53	42.98	60.32	87.46
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	19.6	28.6	36.1	50.5	66.4	83.7	107	19.6	22.62	30.16	42.22
Standard embedment depth	[kN]	26	36.8	53.9	69.1	101.5	142.5	158.3	26.95	28.27	42.73	63.33
Maximum embedment depth	[kN]	26	41	59	105.1	143.3	196.8	237.5	35.53	42.98	60.32	87.46

Basic performance data (cont.)

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30	M12	M16	M20	M24
Substrate		Non-cracked concrete							Cracked concrete			
SHEAR LOAD V_{Rk}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140	21	39	61	88
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224	34	63	98	141
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196	29	55	86	124
DESIGN LOAD												
TENSION LOAD N_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	12	19.33	28	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	12	19.33	28	52	79.61	93.71	113.1	19.74	23.88	33.51	41.65
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	14.5	20.44	29.94	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	18.17	27.22	39.5	58.39	79.61	93.71	113.1	19.74	23.88	33.51	41.65
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	10.89	15.89	20.06	28.06	36.89	39.86	50.95	10.89	12.57	16.76	20.1
Standard embedment depth	[kN]	13.9	20.44	29.94	38.39	56.39	67.86	75.38	14.97	15.71	23.74	30.16
Maximum embedment depth	[kN]	13.9	21.93	31.55	58.39	79.61	93.71	113.1	19.74	23.88	33.51	41.65
SHEAR LOAD V_{Rd}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112	16.8	31.2	48.8	70.4
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2	27.2	50.4	78.4	112.8
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.82	18.59	35.26	55.13	79.49	125.64	18.59	35.26	55.13	79.49
RECOMMENDED LOAD												
TENSION LOAD N_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	8.57	13.81	20	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	8.57	13.81	20	37.14	56.87	66.94	80.78	14.1	17.06	23.94	29.75
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	10.36	14.6	21.39	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	12.98	19.44	28.21	41.71	56.87	66.94	80.78	14.1	17.06	23.94	29.75
R-STUDS METRIC THREADED RODS - A4												
Minimum embedment depth	[kN]	7.78	11.35	14.33	20.04	26.35	28.47	36.39	7.78	8.98	11.97	14.36
Standard embedment depth	[kN]	9.93	14.6	21.39	27.42	40.28	48.47	53.84	10.69	11.22	16.96	21.54
Maximum embedment depth	[kN]	9.93	15.66	22.54	41.71	56.87	66.94	80.78	14.1	17.06	23.94	29.75
SHEAR LOAD V_{rec}												
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.29	34.86	50.29	80	12	22.29	34.86	50.29
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.14	19.43	36	56	80.57	128	19.43	36	56	80.57
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.28	25.18	39.38	56.78	89.74	13.28	25.18	39.38	56.78

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RV200-4	300	4	32	384	2.44	7.32	263.52	5906675205830	18
R-CFS+RV200W-4	300	4	32	384	2.44	7.32	263.52	5906675375762	12
R-CFS+RV200S-4	300	4	32	384	2.44	7.32	263.52	5906675201375	12
R-CFS+RV200-600-8	600	8	-	288	8.30	8.30	298.8	5906675119045	18
R-CFS+RV200TW-600-8	600	8	-	288	8.30	8.30	298.8	5906675328270	12

RV200 with Sockets (CFS+)

High performance vinylester resin approved for use with internally threaded sockets - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-13/0805; ETAG 001-05, Option 7

Product overview

Features and benefits

- Approved for use with sockets in non-cracked concrete (ETAG001 Option 7)
- Suitable for most solid and hollow substrates including overhead applications
- Very high load capacity
- Allows removal of bolt to leave a re-usable sockets in place
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year; Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Rapid bonding time enables quick execution of works
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

- Curtain walling
- Balustrading
- Handrails
- Canopies
- Cable trays
- Formwork supports
- Heavy machinery
- Lighting columns
- Public seating

Base materials

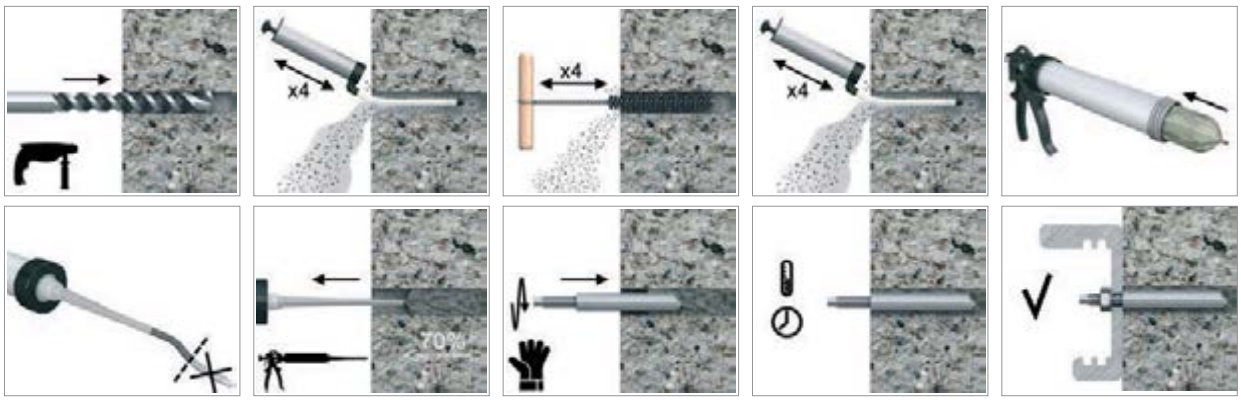
Approved for use in:

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

Also suitable for use in:

- Natural Stone
- Solid Concrete Block
- Solid Brick

Installation guide



Installation guide (cont.)

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 foil 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.

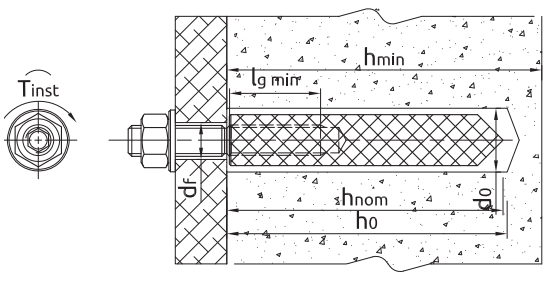
Product information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d	L	l_g	d_f
			[mm]	[mm]	[mm]	[mm]
M6	R-ITS-Z-06075	R-ITS-A4-06075	10	75	24	7
M8	R-ITS-Z-08075	R-ITS-A4-08075	12	75	25	9
	R-ITS-Z-08090	R-ITS-A4-08090	12	90	25	9
M10	R-ITS-Z-10075	R-ITS-A4-10075	16	75	30	12
	R-ITS-Z-10100	R-ITS-A4-10100	16	100	30	12
M12	R-ITS-Z-12100	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-Z-16125	R-ITS-A4-16125	24	125	50	18

Installation data



SOCKETS

Size			M6	M8		M10		M12	M16
Thread diameter	d	[mm]	6	8	8	10	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	14	20	20	20	28
Hole diameter in fixture	d_f	[mm]	7	9	9	12	12	14	18
Installation torque	T_{inst}	[Nm]	3	5	5	10	10	20	40
Thread engagement length	h_s	[mm]	6-24	8-25	8-25	10-30	10-30	12-35	16-50
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						

Installation data (cont.)

SOCKETS

Size			M6	M8		M10		M12	M16
Effective Installation depth	h_{ef}	[mm]	75	75	90	75	100	100	125
Min. substrate thickness	h_{min}	[mm]	105	105	120	115	140	140	181
Min. spacing	s_{min}	[mm]	40	40	45	40	50	50	63
Min. edge distance	c_{min}	[mm]	40	40	45	40	50	50	63

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

SOCKETS

Size			M6	M8	M10	M12	M16
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	21.21	50.27	98.17	169.65	402.12
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	8	19	37	65	166
Design bending resistance	M	[Nm]	6	15	30	52	133
Allowable bending resistance	M_{rec}	[Nm]	5	11	21	37	95
R-STUDS METRIC THREADED RODS - steel class 8.8							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	10	24	48	84	213
Allowable bending resistance	M_{rec}	[Nm]	7	17	34	60	152
R-STUDS METRIC THREADED RODS - A4							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11	26	52	92	233
Design bending resistance	M	[Nm]	7	17	34	59	149
Allowable bending resistance	M_{rec}	[Nm]	5	12	24	42	107

Basic performance data

SOCKETS

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

Size		M6	M8		M10		M12	M16
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	75	75	90	75	100	100	125
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12.5	21.6	21.6	34.8	34.8	50.4	93.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	19.2	34.8	34.8	50.6	55.2	63.0	97.4
R-STUDS METRIC THREADED RODS - A4	[kN]	16.8	31.2	31.2	49.2	49.2	63.0	97.4
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.0	10.8	10.8	16.8	16.8	25.2	46.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.6	18.0	18.0	27.6	27.6	40.8	75.6
R-STUDS METRIC THREADED RODS - A4	[kN]	8.4	15.6	15.6	24.0	24.0	34.8	66.0
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	10.4	18.0	18.0	29	29.0	42.0	66.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	16.0	25.4	29.0	32.8	46.0	42.7	66.0
R-STUDS METRIC THREADED RODS - A4	[kN]	14.0	25.4	26.0	32.8	41.0	42.7	66.0
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.0	9.0	9.0	14.0	14.0	21.0	39.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.0	15.0	15.0	23.0	23.0	34.0	63.0
R-STUDS METRIC THREADED RODS - A4	[kN]	7.0	13.0	13.0	20.0	20.0	29.0	55.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.7	12.0	12.0	18.2	19.3	23.7	36.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.82	14.1	17.0	18.2	26.5	23.7	36.7
R-STUDS METRIC THREADED RODS - A4	[kN]	7.49	13.9	13.9	18.2	21.9	23.7	36.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.0	7.20	7.20	11.2	11.2	16.8	31.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.40	12.0	12.0	18.4	18.4	27.2	50.4
R-STUDS METRIC THREADED RODS - A4	[kN]	4.49	8.33	8.33	12.8	12.8	18.6	35.3
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	4.79	8.57	8.57	13.0	13.8	16.9	26.2
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	7.01	10.1	12.1	13.0	18.9	16.9	26.2
R-STUDS METRIC THREADED RODS - A4	[kN]	5.35	9.93	9.93	13.0	15.6	16.9	26.2
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	2.86	5.14	5.14	8.0	8.0	12.0	22.3
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	4.57	8.57	8.57	13.1	13.1	19.4	36.0
R-STUDS METRIC THREADED RODS - A4	[kN]	3.21	5.95	5.95	9.16	9.16	13.3	25.2

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RV200-4	300	4	32	384	2.44	7.32	263.52	5906675205830	18
R-CFS+RV200W-4	300	4	32	384	2.44	7.32	263.52	5906675375762	12
R-CFS+RV200S-4	300	4	32	384	2.44	7.32	263.52	5906675201375	12
R-CFS+RV200-600-8	600	8	-	288	8.30	8.30	298.8	5906675119045	18
R-CFS+RV200TW-600-8	600	8	-	288	8.30	8.30	298.8	5906675328270	12

RV200 with Rebar as an Anchor (CFS+)

High performance vinylester resin approved for use with reinforcement bars - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-13/0805; ETAG 001-05, Option 7

Product overview

Features and benefits

- Approved for use with rebar as an anchor in non-cracked concrete (ETAG001 Option 7)
- Suitable for most solid and hollow substrates including overhead applications
- Very high load capacity
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year; Winter version can be used in warmer temperatures for faster curing
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Rapid bonding time enables quick execution of works
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

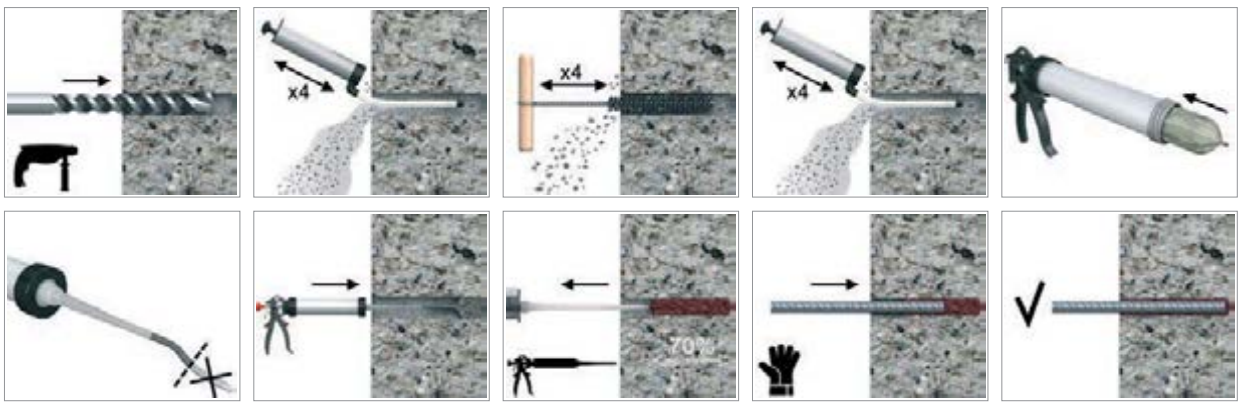
- Curtain walling
- Canopies
- Cable trays
- Formwork supports
- Heavy machinery

Base materials

Approved for use in:

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

Installation guide



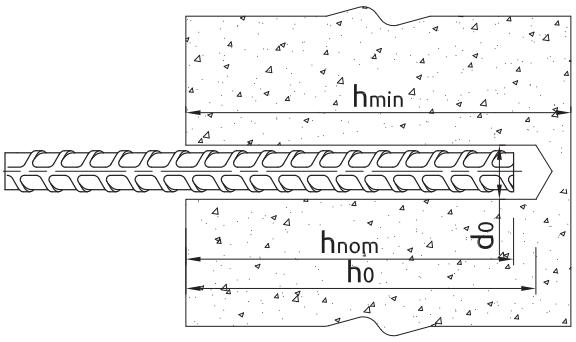
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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 foil 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 rebar, 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 information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

Installation data



REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Thread diameter	d	[mm]	8	10	12	14	16	20	25	32
Hole diameter in substrate	d_0	[mm]	12	14	18		22	26	32	40
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5							
MINIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, min}$	[mm]	60	70	80		100	120	140	165
STANDARD EMBEDMENT DEPTH										
Installation depth	$h_{nom, s}$	[mm]	80	90	110		125	170	210	240
MAXIMUM EMBEDMENT DEPTH										
Installation depth	$h_{nom, max}$	[mm]	100	120	145		190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100		h_{ef} + 2*d_0					
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40							
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40							

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
18G2										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	29	57	98	155	232	452	884	1853
Design bending resistance	M	[Nm]	19	38	65	103	154	302	589	1235
Allowable bending resistance	M_{rec}	[Nm]	14	27	47	74	110	215	421	882
34GS										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	59	102	162	241	471	920	1930
Design bending resistance	M	[Nm]	20	39	68	108	161	314	614	1287
Allowable bending resistance	M_{rec}	[Nm]	14	28	48	77	115	224	438	919
B500SP										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	35	68	117	186	277	542	1059	2220
Design bending resistance	M	[Nm]	23	45	78	124	185	361	706	1480
Allowable bending resistance	M_{rec}	[Nm]	17	32	56	89	132	258	504	1057
RB500/BSt500S										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	33	65	112	178	265	518	1012	2123
Design bending resistance	M	[Nm]	22	43	75	119	177	346	675	1415
Allowable bending resistance	M_{rec}	[Nm]	16	31	53	85	126	247	482	1011

Basic performance data

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Substrate		Non-cracked concrete							
CHARACTERISTIC LOAD									
TENSION LOAD N_{Rk}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	24.1	37.7	54.3	57.4	86	113.1	159.4	235.2
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	25.1	37.7	54.7	57.4	86	113.1	159.4	235.2
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	16.6	22	30.2	31.7	45.2	56.5	77	107
Standard embedment depth	[kN]	22.1	28.3	41.5	43.5	56.5	80.1	115.5	156.8
Maximum embedment depth	[kN]	27.6	37.7	54.7	57.4	86	113.1	159.4	235.2
SHEAR LOAD V_{Rk}									
A-II (e.g. 18G2)	[kN]	12.1	18.8	27.1	36.9	48.3	75.4	117.8	193
A-III (e.g. 34GS)	[kN]	12.6	19.6	28.3	38.5	50.3	78.5	122.7	201.1
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135	221.2
DESIGN LOAD									
TENSION LOAD N_{Rd}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	9.2	12.2	16.8	17.6	25.1	31.4	42.8	59.5
Standard embedment depth	[kN]	12.3	15.7	23	24.2	31.4	44.5	64.1	87.1
Maximum embedment depth	[kN]	15.4	20.9	30.4	31.9	47.8	62.8	88.6	130.7
SHEAR LOAD V_{Rd}									
A-II (e.g. 18G2)	[kN]	8	12.6	18.1	24.6	32.2	50.3	78.5	128.7
A-III (e.g. 34GS)	[kN]	8.4	13.1	18.8	25.7	33.5	52.4	81.8	134
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	9.2	14.4	20.7	28.2	36.9	57.6	90	147.4
RECOMMENDED LOAD									
TENSION LOAD N_{rec}									
A-II (e.g. 18G2)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4
A-III (e.g. 34GS)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4

Basic performance data (cont.)

REBARS AS ANCHORS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
A-III-N (e.g. RB500, BST500S, B500SP)									
Minimum embedment depth	[kN]	6.57	8.71	12	12.6	17.9	22.4	30.6	42.5
Standard embedment depth	[kN]	8.79	11.2	16.4	17.3	22.4	31.8	45.8	62.2
Maximum embedment depth	[kN]	11	14.9	21.7	22.8	34.1	44.9	63.3	93.4
SHEAR LOAD V_{rec}									
A-II (e.g. 18G2)	[kN]	5.74	8.98	12.93	17.59	22.98	35.9	56.1	91.91
A-III (e.g. 34GS)	[kN]	5.98	9.35	13.46	18.33	23.94	37.4	58.44	95.74
A-III-N (e.g. RB500, BST500S, B500SP)	[kN]	6.58	10.28	14.81	20.16	26.33	41.14	64.28	105.32

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RV200-4	300	4	32	384	2.44	7.32	263.52	5906675205830	18
R-CFS+RV200W-4	300	4	32	384	2.44	7.32	263.52	5906675375762	12
R-CFS+RV200S-4	300	4	32	384	2.44	7.32	263.52	5906675201375	12
R-CFS+RV200-600-8	600	8	-	288	8.30	8.30	298.8	5906675119045	18
R-CFS+RV200TW-600-8	600	8	-	288	8.30	8.30	298.8	5906675328270	12

RV200 with Post-Installed Rebar (CFS+)

High performance vinylester resin approved for use with post-installed rebar connections - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-12/0319; ETAG 001-05, TR023

Product overview

Features and benefits

- Approved for use with post-installed rebar in non-cracked concrete (ETAG001)
- Suitable for most solid and hollow substrates including overhead applications
- Very high load capacity
- Suitable for use in low temperatures (down to -20° C for winter option) enables use throughout the year; Winter version can be used in warmer temperatures for faster curing
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Suitable for use in dry and wet substrates as well as holes and substrates covered with water
- Rapid bonding time enables quick execution of works
- Suitable for multiple use. Partly used cartridge can continue to be used after fitting new nozzle

Applications

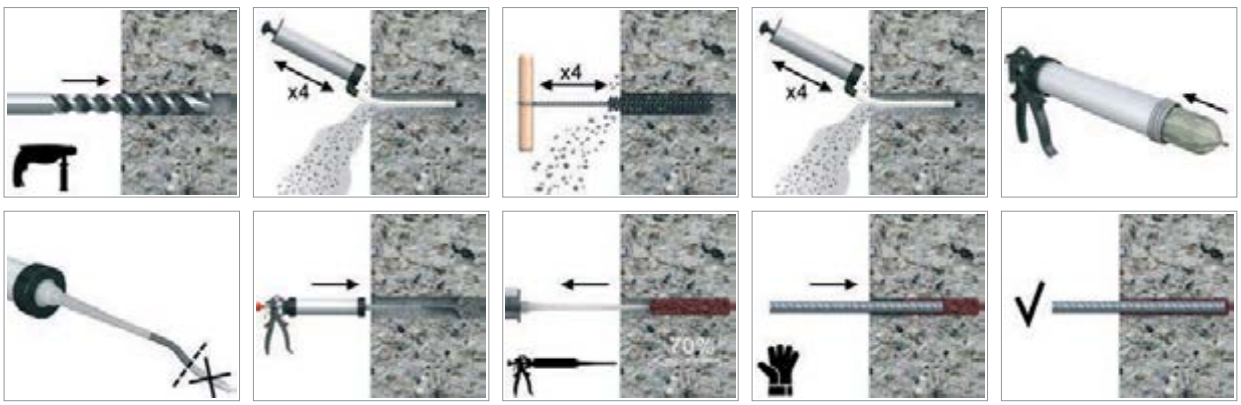
- Shear dowel connections
- Foundation wall connections

Base materials

Approved for use in:

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

Installation guide



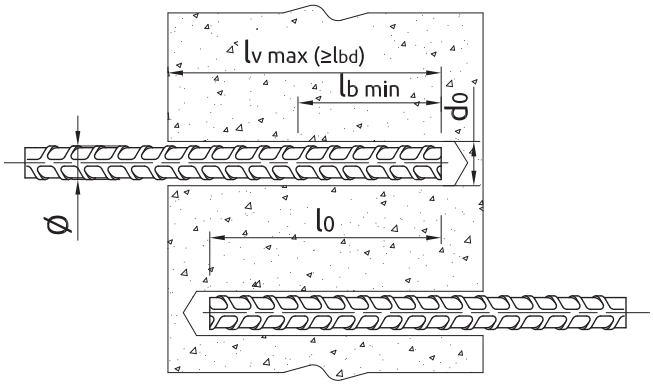
Installation guide (cont.)

1. Drill hole to the required diameter and depth for rebar 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 foil 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 rebar, 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 information

Product Code	Resin	Description / Resin Type	Volume [ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8	RV200	Styrene Free Vinylester Resin	600
R-CFS+RV200TW-6008	RV200TW	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	

Installation data



POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25	28	32
Hole diameter in substrate	d_0	[mm]	12	14	16	18	20	25	30	35	40
Brush diameter		[mm]	14	16	18	20	22	27	32	37	42
Min. anchorage length	$l_{b,min.}$	[mm]	115	145	170	200	230	285	355	400	455
Min. lap length (overlap splice)	$l_{0,min.}$	[mm]	200			210	240	300	375	420	480
Max. anchorage length	$l_{v,max.}$	[mm]	400	500	600	700	800	1000			

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min.]			Curing time* [min.]		
°C	°C	RV200-S	RV200	RV200-W	RV200-S	RV200	RV200-W
5	-20	-	-	100	-	-	1440
5	-15	-	-	60	-	-	960
5	-10	-	-	30	-	-	480
5	-5	65	60	16	1440	360	240
5	0	50	40	12	960	180	120
5	5	35	20	8	720	120	60
10	10	20	12	5	480	80	45
15	15	12	8	3	360	60	30
20	20	9	5	2	240	45	10
25	25	7	3	-	180	30	-
25	30	6	2	-	120	20	-
25	40	4	0.5	-	45	10	-
25	45	3	-	-	35	-	-
25	50	2	-	-	25	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

POST INSTALLED REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
18G2											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
34GS											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
B500SP											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
RB500/BSt500S											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2

Basic performance data

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25, STEEL A-II (18G2) [kN]																									
l_{bd} [mm] / d_s [mm]	100	110	130	150	170	190	210	230	260	280	290	330	360	400	460	530	670	750	800	830	850	900	930	1000	Steel failure
8	5.8	6.4	7.5	8.7	9.8	11.0	12.1	13.3	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	-	7.9	9.4	10.8	12.3	13.7	15.2	16.6	18.8	20.2	20.9	23.8	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	-	11.3	13.0	14.7	16.5	18.2	19.9	22.5	24.3	25.1	28.6	31.2	34.7	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	-	15.2	17.2	19.2	21.2	23.3	26.3	28.3	29.3	33.4	36.4	40.4	46.5	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	-	19.6	22.0	24.3	26.6	30.0	32.4	33.5	38.1	41.6	46.2	53.2	61.2	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	30.3	33.2	37.6	40.4	41.9	47.7	52.0	57.8	66.4	76.6	96.8	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	46.9	50.6	52.4	59.6	65.0	72.2	83.1	95.7	121.0	135.4	144.4	149.9	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	-	58.6	66.7	72.8	80.9	93.0	107.2	135.5	151.7	161.8	167.8	171.9	182.0	188.1	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	76.3	83.2	92.4	106.3	122.5	154.8	173.3	184.9	191.8	196.4	208.0	214.9	231.1	248.14

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-II (18G2) [kN]																								
l_{bd} [mm] / d_s [mm]	100	120	140	160	170	180	200	230	250	280	290	320	330	400	450	500	550	640	700	720	850	910	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	11.6	13.9	16.3	18.6	19.8	20.9	23.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	-	16.7	19.5	22.3	23.7	25.1	27.9	32.1	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	22.8	26.0	27.7	29.3	32.5	37.4	40.7	45.5	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	29.7	31.6	33.5	37.2	42.8	46.5	52.0	53.9	59.5	61.3	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	42.7	49.1	53.4	59.8	61.9	68.3	70.5	85.4	96.1	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	58.9	65.9	68.3	75.4	77.7	94.2	106.0	117.8	129.5	150.7	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	73.9	76.5	84.4	87.0	105.5	118.7	131.9	145.1	168.8	184.6	189.9	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	108.5	122.1	135.6	149.2	173.6	189.9	195.3	230.6	246.9	-	-	248.14

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-II (18G2) [kN]																								
l_0 [mm] / d_s [mm]	200	210	240	250	260	300	330	375	400	420	440	460	480	500	530	550	600	670	750	800	830	900	930	1000	Steel failure
8	11.6	12.1	13.9	14.4	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	14.4	15.2	17.3	18.1	18.8	21.7	23.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	17.3	18.2	20.8	21.7	22.5	26.0	28.6	32.5	34.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	21.2	24.3	25.3	26.3	30.3	33.4	37.9	40.4	42.5	44.5	46.5	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	27.7	28.9	30.0	34.7	38.1	43.3	46.2	48.5	50.8	53.2	55.5	57.8	61.2	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	43.3	47.7	54.2	57.8	60.7	63.6	66.4	69.3	72.2	76.6	79.4	86.7	96.8	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	67.7	72.2	75.8	79.4	83.1	86.7	90.3	95.7	99.3	108.3	121.0	135.4	144.4	149.9	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	84.9	89.0	93.0	97.1	101.1	107.2	111.2	121.3	135.5	151.7	161.8	167.8	182.0	188.1	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	122.5	127.1	138.7	154.8	173.3	184.9	191.8	208.0	214.9	231.1	248.14

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60. STEEL A-II (18G2) [kN]																								
l_0 [mm] / d_s [mm]	200	208	210	240	250	290	300	330	375	400	420	450	480	500	550	600	640	700	720	800	850	900	910	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.51
10	23.2	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.23
12	27.9	29.0	29.3	33.5	34.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.89
14	-	-	34.2	39.0	40.7	47.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.50
16	-	-	-	44.6	46.5	53.9	55.8	61.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.04
20	-	-	-	-	-	-	64.1	70.5	80.1	85.4	89.7	96.1	-	-	-	-	-	-	-	-	-	-	-	-	96.93
25	-	-	-	-	-	-	-	-	88.3	94.2	98.9	106.0	113.0	117.8	129.5	141.3	150.7	-	-	-	-	-	-	-	151.45
28	-	-	-	-	-	-	-	-	-	-	110.8	118.7	126.6	131.9	145.1	158.3	168.8	184.6	189.9	-	-	-	-	-	189.98
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	149.2	162.8	173.6	189.9	195.3	217.0	230.6	244.2	246.9	-	248.14

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
l_{bd} [mm] / d_s [mm]	100	120	140	170	190	210	240	300	310	320	330	380	400	440	460	500	540	620	700	770	850	900	960	1000	Steel failure
8	5.8	6.9	8.1	9.8	11.0	12.1	13.9	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	-	8.7	10.1	12.3	13.7	15.2	17.3	21.7	22.4	23.1	23.8	27.4	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	-	12.1	14.7	16.5	18.2	20.8	26.0	26.9	27.7	28.6	32.9	34.7	38.1	39.9	-	-	-	-	-	-	-	-	-	40.30
14	-	-	-	17.2	19.2	21.2	24.3	30.3	31.3	32.4	33.4	38.4	40.4	44.5	46.5	50.6	54.6	-	-	-	-	-	-	-	54.85
16	-	-	-	-	22.0	24.3	27.7	34.7	35.8	37.0	38.1	43.9	46.2	50.8	53.2	57.8	62.4	71.6	-	-	-	-	-	-	71.65
20	-	-	-	-	-	-	34.7	43.3	44.8	46.2	47.7	54.9	57.8	63.6	66.4	72.2	78.0	89.6	101.1	111.2	-	-	-	-	111.95
25	-	-	-	-	-	-	-	54.2	56.0	57.8	59.6	68.6	72.2	79.4	83.1	90.3	97.5	111.9	126.4	139.0	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	-	66.7	76.8	80.9	89.0	93.0	101.1	109.2	125.4	141.6	155.7	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	87.8	92.4	101.7	106.3	115.6	124.8	143.3	161.8	178.0	196.4	208.0	221.9	231.1	286.59

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-III (34GS) [kN]																									
d_s [mm] \ l_{bd} [mm]	100	120	140	160	190	200	240	250	280	290	300	320	330	380	450	520	550	600	700	740	830	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	11.6	13.9	16.3	18.6	22.1	23.2	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	-	16.7	19.5	22.3	26.5	27.9	33.5	34.9	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	-	22.8	26.0	30.9	32.5	39.0	40.7	45.5	47.2	48.8	52.0	53.7	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	-	29.7	35.3	37.2	44.6	46.5	52.0	53.9	55.8	59.5	61.3	70.6	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	42.7	51.2	53.4	59.8	61.9	64.1	68.3	70.5	81.1	96.1	111.0	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	58.9	65.9	68.3	70.7	75.4	77.7	89.5	106.0	122.5	129.5	141.3	164.9	174.3	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	73.9	76.5	79.1	84.4	87.0	100.2	118.7	137.2	145.1	158.3	184.6	195.2	218.9	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	86.8	89.5	103.1	122.1	141.1	149.2	162.8	189.9	200.8	225.2	244.2	257.7	271.3	286.59

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
d_s [mm] \ l_0 [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	540	600	620	700	750	770	800	850	900	960	1000	Steel failure
8	11.6	12.1	13.9	14.4	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	14.4	15.2	17.3	18.1	21.7	22.4	27.1	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	21.2	24.3	25.3	30.3	31.3	37.9	38.4	40.4	42.5	46.5	48.5	50.6	54.6	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	27.7	28.9	34.7	35.8	43.3	43.9	46.2	48.5	53.2	55.5	57.8	62.4	69.3	71.6	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	43.3	44.8	54.2	54.9	57.8	60.7	66.4	69.3	72.2	78.0	86.7	89.6	101.1	108.3	111.2	-	-	-	-	-	111.95
25	-	-	-	-	-	-	67.7	68.6	72.2	75.8	83.1	86.7	90.3	97.5	108.3	111.9	126.4	135.4	139.0	144.4	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	84.9	93.0	97.1	101.1	109.2	121.3	125.4	141.6	151.7	155.7	161.8	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	124.8	138.7	143.3	161.8	173.3	178.0	184.9	196.4	208.0	221.9	231.1	286.59

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C50/60. STEEL A-III (34GS) [kN]																									
d_s [mm] \ l_0 [mm]	200	210	240	260	280	300	330	350	375	380	400	420	480	500	520	600	650	700	740	800	830	900	950	1000	Steel failure
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	23.2	24.4	27.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	27.9	29.3	33.5	36.2	39.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	34.2	39.0	42.3	45.5	48.8	53.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	44.6	48.3	52.0	55.8	61.3	65.1	69.7	70.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	-	64.1	70.5	74.7	80.1	81.1	85.4	89.7	102.5	106.8	111.0	-	-	-	-	-	-	-	-	-	111.95
25	-	-	-	-	-	-	-	-	88.3	89.5	94.2	98.9	113.0	117.8	122.5	141.3	153.1	164.9	174.3	-	-	-	-	-	174.92
28	-	-	-	-	-	-	-	-	-	-	-	110.8	126.6	131.9	137.2	158.3	171.4	184.6	195.2	211.0	218.9	-	-	-	219.42
32	-	-	-	-	-	-	-	-	-	-	-	-	130.2	135.6	141.1	162.8	176.3	189.9	200.8	217.0	225.2	244.2	257.7	271.3	286.59

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C20/25. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
d_s [mm] \ l_{bd} [mm]	120	150	160	180	200	230	250	290	300	360	370	400	460	470	560	600	660	700	750	800	850	900	940	1000	Steel failure
8	6.9	8.7	9.2	10.4	11.6	13.3	14.4	16.8	17.3	20.8	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	-	10.8	11.6	13.0	14.4	16.6	18.1	20.9	21.7	26.0	26.7	28.9	33.2	33.9	-	-	-	-	-	-	-	-	-	-	34.13
12	-	-	-	15.6	17.3	19.9	21.7	25.1	26.0	31.2	32.1	34.7	39.9	40.7	48.5	-	-	-	-	-	-	-	-	-	49.15
14	-	-	-	-	20.2	23.3	25.3	29.3	30.3	36.4	37.4	40.4	46.5	47.5	56.6	60.7	66.7	-	-	-	-	-	-	-	66.90
16	-	-	-	-	-	26.6	28.9	33.5	34.7	41.6	42.8	46.2	53.2	54.3	64.7	69.3	76.3	80.9	86.7	-	-	-	-	-	87.37
20	-	-	-	-	-	-	-	41.9	43.3	52.0	53.4	57.8	66.4	67.9	80.9	86.7	95.3	101.1	108.3	115.6	122.8	130.0	135.8	-	136.52
25	-	-	-	-	-	-	-	-	-	65.0	66.8	72.2	83.1	84.9	101.1	108.3	119.2	126.4	135.4	144.4	153.5	162.5	169.7	180.6	213.32
28	-	-	-	-	-	-	-	-	-	-	-	80.9	93.0	95.0	113.2	121.3	133.5	141.6	151.7	161.8	171.9	182.0	190.1	202.2	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	106.3	108.6	129.4	138.7	152.5	161.8	173.3	184.9	196.4	208.0	217.2	231.1	349.50

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																								
l_{bd} [mm] / d_s [mm]	100	120	140	160	180	200	220	230	280	290	310	350	390	410	450	470	500	630	750	800	850	900	950	1000	Steel failure
8	9.3	11.2	13.0	14.9	16.7	18.6	20.4	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	11.6	13.9	16.3	18.6	20.9	23.2	25.6	26.7	32.5	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	-	16.7	19.5	22.3	25.1	27.9	30.7	32.1	39.0	40.4	43.2	48.8	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	-	22.8	26.0	29.3	32.5	35.8	37.4	45.5	47.2	50.4	56.9	63.4	66.7	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	29.7	33.5	37.2	40.9	42.8	52.0	53.9	57.6	65.1	72.5	76.2	83.6	87.4	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	42.7	47.0	49.1	59.8	61.9	66.2	74.7	83.3	87.5	96.1	100.4	106.8	134.5	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	65.9	68.3	73.0	82.4	91.8	96.6	106.0	110.7	117.8	148.4	176.6	188.4	200.2	212.0	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	81.8	92.3	102.9	108.1	118.7	124.0	131.9	166.2	197.8	211.0	224.2	237.4	250.6	263.8	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	105.8	111.2	122.1	127.5	135.6	170.9	203.5	217.0	230.6	244.2	257.7	271.3	349.50

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
l_0 [mm] / d_s [mm]	200	210	240	250	300	310	375	380	400	420	460	480	500	540	600	620	700	750	770	800	850	900	960	1000	Steel failure
8	11.6	12.1	13.9	14.4	17.3	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.91
10	14.4	15.2	17.3	18.1	21.7	22.4	27.1	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.99
12	17.3	18.2	20.8	21.7	26.0	26.9	32.5	32.9	34.7	36.4	39.9	-	-	-	-	-	-	-	-	-	-	-	-	-	40.30
14	-	21.2	24.3	25.3	30.3	31.3	37.9	38.4	40.4	42.5	46.5	48.5	50.6	54.6	-	-	-	-	-	-	-	-	-	-	54.85
16	-	-	27.7	28.9	34.7	35.8	43.3	43.9	46.2	48.5	53.2	55.5	57.8	62.4	69.3	71.6	-	-	-	-	-	-	-	-	71.65
20	-	-	-	-	43.3	44.8	54.2	54.9	57.8	60.7	66.4	69.3	72.2	78.0	86.7	89.6	101.1	108.3	111.2	-	-	-	-	-	111.95
25	-	-	-	-	-	-	67.7	68.6	72.2	75.8	83.1	86.7	90.3	97.5	108.3	111.9	126.4	135.4	139.0	144.4	153.5	162.5	173.3	-	174.92
28	-	-	-	-	-	-	-	-	-	84.9	93.0	97.1	101.1	109.2	121.3	125.4	141.6	151.7	155.7	161.8	171.9	182.0	194.1	202.2	219.42
32	-	-	-	-	-	-	-	-	-	-	-	110.9	115.6	124.8	138.7	143.3	161.8	173.3	178.0	184.9	196.4	208.0	221.9	231.1	286.59

OVERLAP SPLICE – DESIGN RESISTANCE – CONCRETE C50/60, STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																									
l_0 [mm] / d_s [mm]	200	210	230	240	290	300	330	350	375	390	410	420	470	480	550	600	630	700	750	800	850	900	950	1000	Steel failure
8	18.6	19.5	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.84
10	23.2	24.4	26.7	27.9	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34.13
12	27.9	29.3	32.1	33.5	40.4	41.8	46.0	48.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.15
14	-	34.2	37.4	39.0	47.2	48.8	53.7	56.9	61.0	63.4	66.7	-	-	-	-	-	-	-	-	-	-	-	-	-	66.90
16	-	-	-	44.6	53.9	55.8	61.3	65.1	69.7	72.5	76.2	78.1	87.4	-	-	-	-	-	-	-	-	-	-	-	87.37
20	-	-	-	-	-	64.1	70.5	74.7	80.1	83.3	87.5	89.7	100.4	102.5	117.4	128.1	134.5	-	-	-	-	-	-	-	136.52
25	-	-	-	-	-	-	-	-	88.3	91.8	96.6	98.9	110.7	113.0	129.5	141.3	148.4	164.9	176.6	188.4	200.2	212.0	-	-	213.32
28	-	-	-	-	-	-	-	-	-	-	-	110.8	124.0	126.6	145.1	158.3	166.2	184.6	197.8	211.0	224.2	237.4	250.6	263.8	267.58
32	-	-	-	-	-	-	-	-	-	-	-	-	-	130.2	149.2	162.8	170.9	189.9	203.5	217.0	230.6	244.2	257.7	271.3	349.50

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RV200-4	300	4	32	384	2.44	7.32	263.52	5906675205830	18
R-CFS+RV200W-4	300	4	32	384	2.44	7.32	263.52	5906675375762	12
R-CFS+RV200S-4	300	4	32	384	2.44	7.32	263.52	5906675201375	12
R-CFS+RV200-600-8	600	8	-	288	8.30	8.30	298.8	5906675119045	18
R-CFS+RV200TW-600-8	600	8	-	288	8.30	8.30	298.8	5906675328270	12

RM50 with Threaded Rods for Concrete (CFS+)

Universal polyester (styrene free) resin - European Approval for 15 substrates - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-12/0394, ETAG 001-05, Option 7

Product overview

Features and benefits

- The most contemporary general use bonded anchor
- Quick, secure and simple installation
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications without the possibility of mechanical anchorage
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Balustrading
- Handrails
- Canopies
- Curtain walling

Base materials

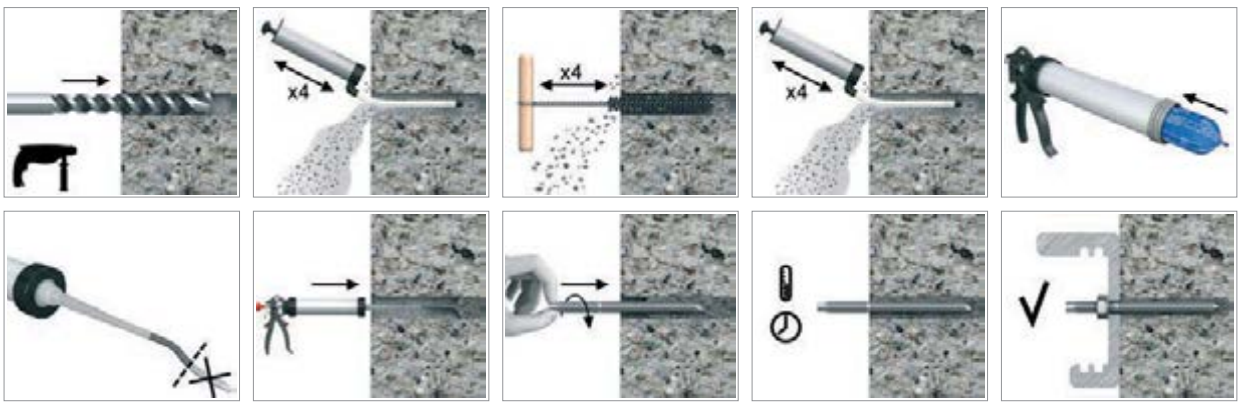
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

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 before injection.
3. Insert foil 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 information

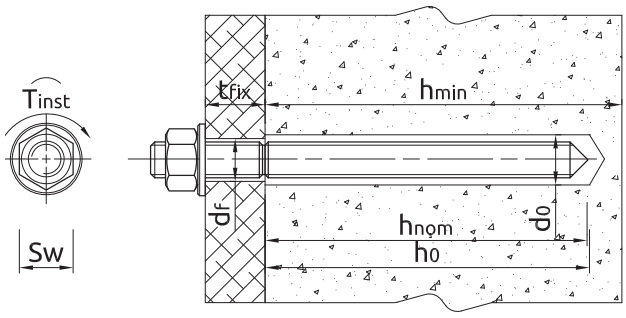
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RM50-4	RM50	Styrene Free Polyester Resin	300
R-CFS+RM50S-4	RM50-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RM50W-4	RM50-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	
R-CFS+RM50-600-8	RM50	Styrene Free Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	13	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RM50-S	RM50	RM50-W	RM50-S	RM50	RM50-W
5	-20	-	-	45	-	-	24h
5	-15	-	-	30	-	-	18h
5	-10	-	-	20	-	-	8h
5	-5	4h	70	11	24h	8h	5h
5	0	2h	45	7	18h	4h	2h
5	5	60	25	5	12h	2h	60
10	10	45	15	2	8h	90	45
15	15	25	9	1,5	6h	60	30
20	20	15	5	1	4h	45	15
25	30	7	2	-	90	30	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	16.3	23.7	31	47.3	68.4	76.9	95.7
Standard embedment depth	[kN]	20.4	32.2	42.6	68.6	102.6	115.4	150.8
Maximum embedment depth	[kN]	21.6	34.8	50.4	89.9	136.7	159.4	208.8
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	18	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	18	29	42	76.4	120.6	142.1	186.6

Basic performance data (cont.)

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	19.1	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	20.9	27.1	40.2	60.3	68.6	85.5
Standard embedment depth	[kN]	19.1	26.9	37.3	50.3	85.5	102.9	124.4
Maximum embedment depth	[kN]	23.9	35.8	49.2	76.4	120.6	142.1	186.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	6.8	11.61	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.3	27.3	42.4	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	6.82	11.6	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.4	67.0	79.0	103.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	6.80	11.6	15.1	22.3	33.5	38.1	47.5
Standard embedment depth	[kN]	9.10	14.9	20.7	27.9	47.5	57.2	69.1
Maximum embedment depth	[kN]	11.4	19.9	27.3	42.4	67.0	79.0	103.7
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.20	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.50	10.7	14.8	20.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	13.8	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	4.9	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.5	10.7	14.8	120.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	14.2	19.5	30.3	47.9	56.4	74.1
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	4.87	8.29	10.8	16.0	23.9	27.2	33.9
Standard embedment depth	[kN]	6.50	10.7	14.8	20.0	33.9	40.9	49.4
Maximum embedment depth	[kN]	8.14	14.2	19.5	30.3	47.9	56.4	74.1
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.0	12.0	22.3	34.9	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RM50-4	300	1	3	108	2.44	7.32	263.52	5906675205892	18
R-CFS+RM50W-4	300	1	3	108	2.44	7.32	263.52	-	12
R-CFS+RM50S-4	300	1	3	108	2.44	7.32	263.53	-	12
R-CFS+RM50-600-8	600	1	1	36	8.30	8.30	298.8	5906675078823	18

RM50 with Threaded Rods for Masonry (CFS+)

Universal polyester (styrene free) resin - European Approval for 15 substrates - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-12/0528; ETAG 029

Product overview

Features and benefits

- The most contemporary general use bonded anchor for masonry
- Approved for 15 substrates
- Quick, secure and simple installation
- Unique soft foil pack for less waste
- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Product with wide spectrum of use in the medium load capacity area
- Ideal for applications without the possibility of mechanical anchorage
- Suitable for multiple use. Partly used product can be reused after fitting spare nozzle

Applications

- Balustrading
- Handrails
- Canopies
- Curtain walling
- Bathroom fittings
- Cable trays
- Barriers
- Cladding restraint
- Fencing & gates
- Pipework

Base materials

Approved for use in:

- Solid Concrete Block
- Lightweight Concrete Block
- Solid Brick
- Concrete Slab
- Solid Sand-lime Brick
- Aerated Concrete Block
- Hollow Sand-lime Brick
- Hollow Brick
- Hollow Lightweight Concrete Block

Installation guide

Installation guide (cont.)

1. Drill hole to the required diameter and depth for stud size being used.

2a. Solid substrates: Clean the hole with brush and hand pump at least four times each. It is very important and necessary before installation.

2b. 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.

5a. Solid Substrates: 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.

5b. Hollow substrate: Insert the mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle as the hole is filled to the surface.

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 information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RM50-4	RM50	Styrene Free Polyester Resin	300
R-CFS+RM50S-4	RM50-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RM50W-4	RM50-W	Low Temperature (Winter) / Rapid Cure Styrene Free Polyester Resin	
R-CFS+RM50-600-8	RM50	Styrene Free Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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

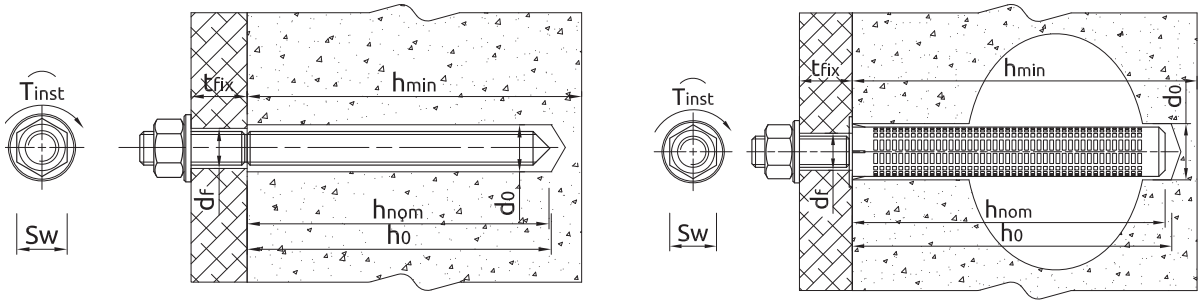
* Make to order

Product information (cont.)

R-PLS Plastic Mesh Sleeves and SP-CE Mesh Sleeves

Product Code	Size		Quantity [pcs]		Weight [kg]		Bar Code
	Sleeve [mm]	Stud	Outer	Pallet	Box	Outer	
R-PLS-12050-10	12x50	M6-M8	10	480	0.6	0.6	5906675377520
R-PLS-15085-10	16x85	M8-M10	10	6000	0.6	0.6	5906675291840
R-PLS-15125-10	16x125	M8-M10	10	6000	0.8	0.8	5906675291857
R-PLS-20085-10	20x85	M12	10	4800	0.8	0.8	5906675291864
SP-CE-R08	10X1000	M6-M8	10	5430	1.29	1.29	5906675266138
SP-CE-R10	12x1000	M8-M10	10	1500	1.29	1.29	5906675610122
SP-CE-R12	16x1000	M12	10	1110	1.29	1.29	5906675610320
SP-CE-R16	22x1000	M16	10	384	1.29	1.29	5906675610528
SP-CE-R20	28x1000	M20	5	280	2.58	2.58	5906675610726
SP-CE-ED-1M	-	-	10	20 000	0.02	0.02	5906675601120

Installation data



SOLID SUBSTRATES

Size			Mw8	M10	M12	M16	M8	M10	M12	M16
Substrate			Ceramic solid substrates				Aerated concrete			
Thread diameter	d	[mm]	8	10	12	16	8	10	12	16
Hole diameter in substrate	d_0	[mm]	10	12	14	18	10	12	14	18
Installation torque	T_{inst}	[Nm]	5	8	10	15	3	4	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5							
Installation depth	$h_{nom,min}$	[mm]	80	85	95	105	80	85	95	105
Min. spacing	s_{min}	[mm]	50	50	50	54	50	50	50	54
Min. edge distance	c_{min}	[mm]	50	50	50	54	50	50	50	54

HOLLOW SUBSTRATES

Size			M10		M10		M12		M16
Substrate			Hollow substrates						
Thread diameter	d	[mm]	8	8	10	10	12	12	16
Plastic mesh sleeve size	dxl	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
Hole diameter in substrate	d_0	[mm]	12	12	16	16	16	16	20
Installation torque	T_{inst}	[Nm]	3	3	4	4	6	6	10
Min. hole depth in substrate	h_0	[mm]	h_{nom} + 5						
Installation depth	$h_{nom,std}$	[mm]	50	-	85	-	85	-	85
	$h_{nom,max}$	[mm]	-	80	-	125	-	125	-
Min. spacing	s_{min}	[mm]	100	100	100	100	100	100	120
Min. edge distance	c_{min}	[mm]	100	100	100	100	100	100	120

Installation data (cont.)

Minimum working and curing time

Resin temperature	Concrete temperature	Working time [min]			Curing time* [min]		
[°C]	[°C]	RM50-S	RM50	RM50-W	RM50-S	RM50	RM50-W
5	-20	-	-	45	-	-	1440
5	-15	-	-	30	-	-	1080
5	-10	-	-	20	-	-	480
5	-5	180	70	11	1440	480	360
5	0	120	45	7	1080	240	120
5	5	60	25	5	720	120	60
10	10	45	15	2	480	90	45
15	15	25	9	1,5	360	60	30
20	20	15	5	1	240	45	15
25	30	7	2	-	90	30	-
25	35	6	-	-	60	-	-
25	40	5	-	-	45	-	-

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16
R-STUDS METRIC THREADED RODS - steel class 5.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166
Design bending resistance	M	[Nm]	15	30	52	133
R-STUDS METRIC THREADED RODS - steel class 8.8						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266
Design bending resistance	M	[Nm]	24	48	84	213
R-STUDS METRIC THREADED RODS - A4						
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233
Design bending resistance	M	[Nm]	17	34	59	149

Basic performance data

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
Substrate		Solid substrates			
Plastic mesh sleeve (dxl)	[mm]	-	-	-	-
MEAN ULTIMATE LOAD					
TENSION LOADS $N_{Ru,m}$					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	8.78	10.9	11.3	11.5
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	2.65	3.24	4.11	4.68
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	7.54	8.00	8.30	8.50

Basic performance data (cont.)

SOLID SUBSTRATES

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

Size		M8	M10	M12	M16
SHEAR LOADS $V_{Ru,m}$					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	5.79	8.35	11.6	11.5
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	2.43	3.41	4.36	4.48
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	5.86	8.11	7.91	8.23
CHARACTERISTIC LOAD*					
TENSION LOADS N_{Rk}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	6.0	7.0	7.0	7.0
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	1.5	2.0	2.5	3.0
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	5.0	5.0	5.0	5.0
SHEAR LOADS V_{Rk}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	3.5	5.0	7.0	7.0
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	1.5	2.0	2.5	2.5
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	3.5	5.0	5.0	5.0
DESIGN LOAD					
TENSION LOAD N_{Rd}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	2.40	2.80	2.80	2.80
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.75	1.00	1.25	1.50
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	2.00	2.00	2.00	2.00
SHEAR LOAD V_{Rd}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.40	2.00	2.80	2.80
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.75	1.00	1.25	1.25
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.40	2.00	2.00	2.00
RECOMMENDED LOAD**					
TENSION LOAD N_{rec}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.71	2.00	2.00	2.00
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.54	0.71	0.89	1.07
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.43	1.43	1.43	1.43
SHEAR LOAD V_{rec}					
Solid clay brick min 20MPa (eg Mz20/2.0)	[kN]	1.00	1.43	2.00	2.00
Autoclaved aerated concrete block min 6.0MPa (AAC7)	[kN]	0.54	0.71	0.89	0.89
Solid silicate brick min 20MPa (eg KS NF 20/2.0)	[kN]	1.00	1.43	1.43	1.43

*According to ETAG 029, **Partial safety factor 1.4

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
Substrate		Hollow substrates						
Plastic mesh sleeve (dxl)	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
MEAN ULTIMATE LOAD								
TENSION AND SHEAR LOADS $F_{Ru,m}$								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	3.42	3.50	3.73	5.11	4.16	4.48	4.24
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	3.21	3.54	3.87	4.03	3.97	4.16	3.69
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	2.04	2.84	3.07	3.68	3.74	3.99	3.51
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	2.08	2.98	3.19	3.78	3.68	4.03	3.77
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	2.86	3.43	3.74	3.59	3.71	3.94	3.80
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	1.24	1.25	2.49	2.74	2.82	2.78	2.14
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	1.73	1.60	2.37	2.51	2.41	2.68	2.10
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	1.30	1.39	1.99	2.06	2.05	2.12	2.05

Basic performance data (cont.)

HOLLOW SUBSTRATES

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

Size		M8		M10		M12		M16
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	1.45	1.45	2.22	2.17	2.19	2.24	2.25
Perrforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	1.51	1.60	1.39	1.45	1.86	2.07	1.75
Lightweight concrete hollow block min 2.0MPa	[kN]	1.73	2.38	3.52	3.00	3.93	3.75	3.92
CHARACTERISTIC LOAD*								
TENSION AND SHEAR LOADS F_{Rk}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	2.5	2.5	2.5	3.5	3.0	3.0	3.0
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	2.0	2.5	2.5	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	1.5	2.0	2.0	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	1.5	2.0	2.0	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	2.0	2.5	2.5	2.5	2.5	2.5	2.5
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.9	0.9	1.5	2.0	2.0	2.0	2.0
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.9	1.2	1.5	1.5	1.5	2.0	2.0
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.9	0.9	1.2	1.5	1.5	1.5	1.5
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.9	0.9	1.5	1.5	1.5	1.5	1.5
Perrforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.9	1.2	0.9	0.9	1.2	1.5	1.5
Lightweight concrete hollow block min 2.0MPa	[kN]	1.2	1.5	2.5	2.0	2.5	2.5	2.5
DESIGN LOAD								
TENSION AND SHEAR LOADS F_{Rd}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	1.0	1.0	1.0	1.4	1.2	1.2	1.2
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.88	1.0	1.2	1.4	1.4	1.6	1.6
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.6	0.8	1.0	1.0	1.4	1.4	1.0
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.6	0.8	0.8	1.0	1.0	1.4	1.2
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.8	1.0	1.4	1.4	1.6	1.6	1.6
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.36	0.36	0.8	0.8	0.8	0.8	0.6
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.48	0.48	0.6	0.6	0.8	0.8	0.6
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.36	0.36	0.6	0.6	0.6	0.6	0.6
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.36	0.36	0.6	0.6	0.6	0.6	0.6
Perrforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.48	0.48	0.48	0.48	0.48	0.60	0.48
Lightweight concrete hollow block min 2.0MPa	[kN]	0.48	0.6	1.0	1.0	1.0	1.4	1.4
RECOMMENDED LOAD**								
TENSION AND SHEAR LOADS F_{rec}								
Silicate hollow block min 12MPa (eg KS Ratio Block 8 DF)	[kN]	0.71	0.71	0.71	1.0	0.86	0.86	0.86
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.63	0.71	0.86	1.0	1.0	1.14	1.14
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.43	0.57	0.71	0.71	1.0	1.0	0.71
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.43	0.57	0.57	0.71	0.71	1.0	0.86
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.57	0.71	1.0	1.0	1.14	1.14	1.14
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.26	0.26	0.57	0.57	0.57	0.57	0.43
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.34	0.34	0.43	0.43	0.57	0.57	0.43
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.26	0.26	0.43	0.43	0.43	0.43	0.43
Perrforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.34	0.34	0.34	0.34	0.34	0.43	0.34
Lightweight concrete hollow block min 2.0MPa	[kN]	0.34	0.43	0.71	0.71	0.71	1.0	1.0

*According to ETAG 029, **Partial safety factor 1.4

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RM50-4	300	1	3	108	2.44	7.32	263.52	5906675205892	18
R-CFS+RM50W-4	300	1	3	108	2.44	7.32	263.52	-	12
R-CFS+RM50S-4	300	1	3	108	2.44	7.32	263.53	-	12
R-CFS+RM50-600-8	600	1	1	36	8.30	8.30	298.8	5906675078823	18

RP30 (CFS+)

Economy polyester resin approved for use in non-cracked concrete - Cartridge Free System (CFS+)

Approvals and Reports

- ETA-11/0141; ETAG 001-05, Option 7

Product overview

Features and benefits

- Effortless extrusion due to patented self-opening system with manual or pneumatic dispenser guns
- Medium load capacity in non-cracked concrete
- Wide range of steel studs with different lengths and diameters
- Small edge and space distances
- Partly- used product can be reused after a break after fitting a new mixing nozzle. Suitable for repetitive and frequent use
- Suitable for repetitive use. Partly used product can be reused by fitting a new mixing nozzle

Applications

- Fixing into tarmac
- Cable trays
- Handrails
- Fencing & gates
- Pipework

Base materials

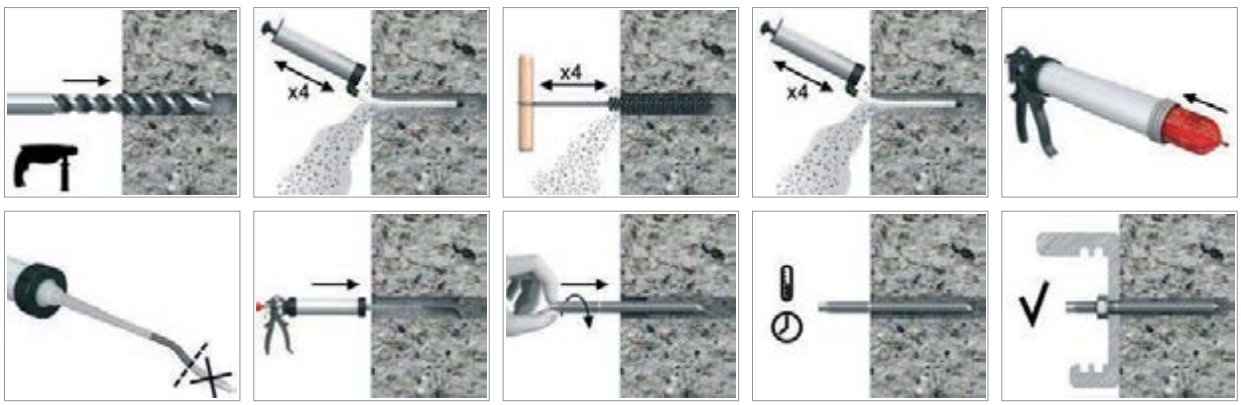
Approved for use in:

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

Also suitable for use in:

- Natural Stone
- Solid Concrete Block
- Solid Brick

Installation guide



Installation guide (cont.)

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 foil 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 information

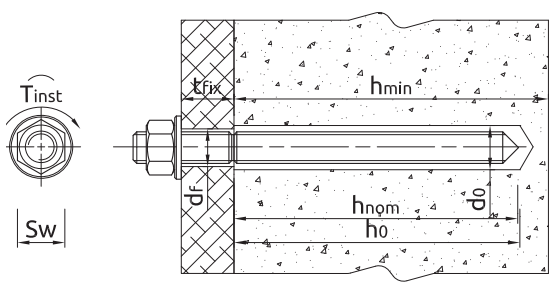
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RP30-4	RP30	Polyester Resin	300
R-CFS+RP30-600-8	RP30	Polyester Resin	600

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



Installation data (cont.)

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
MINIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, min}$	[mm]	60	70	80	100	120	140	165
STANDARD EMBEDMENT DEPTH									
Installation depth	$h_{nom, s}$	[mm]	80	90	110	125	170	210	240
MAXIMUM EMBEDMENT DEPTH									
Installation depth	$h_{nom, max}$	[mm]	100	120	145	190	240	290	360
Min. substrate thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100				h_{ef} + 2*d_0		
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	60	360
5	0	40	180
5	5	20	120
10	10	12	80
15	15	8	60
20	20	5	45
25	30	2	20

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541.0	935.0	1868.0
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
Allowable bending resistance	M_{rec}	[Nm]	11	21	37	95	185	321	642
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541.0	935.0	1868.0
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
Allowable bending resistance	M_{rec}	[Nm]	17	34	60	152	297	513	1028
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541.0	935.0	1868.0
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009
Allowable bending resistance	M_{rec}	[Nm]	12	24	42	107	208	360	721

Basic performance data

R-STUDS

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	18.2	28.0	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	21.6	34.8	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	21.6	34.8	50.4	93.6	146.4	189.8	217.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	18.2	28	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	22.7	38	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	30.3	48	63.6	108.6	159.1	189.8	217.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	18.2	28	35.1	57.1	79.5	91.6	99.7
Standard embedment depth	[kN]	22.7	38	48.3	82.9	119.3	137.4	157.1
Maximum embedment depth	[kN]	30.3	48	63.6	108.6	159.1	189.8	217.6
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29.0	42.2	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.3	46.4	67.4	125.6	196.0	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.6	40.6	59.0	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	18.0	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	18.0	29.0	42.0	78.0	122	153.1	169.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	19.1	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	14.3	22.0	28.7	45.2	64.1	73.9	77.8
Standard embedment depth	[kN]	19.1	28.3	39.4	56.5	90.8	110.8	113.1
Maximum embedment depth	[kN]	23.9	37.7	51.9	86	128.2	153.1	169.6
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.0	14.0	21.0	39.0	61.0	88.0	140.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15.0	23.0	34.0	63.0	98.0	141.0	224.0
R-STUDS METRIC THREADED RODS - A4	[kN]	13.0	20.0	29.0	55.0	86.0	124.0	196.0
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	7.9	12.2	15.9	25.1	35.6	35.2	37.1
Standard embedment depth	[kN]	10.6	15.7	21.9	31.4	50.4	52.8	53.9
Maximum embedment depth	[kN]	12.0	19.3	28.0	47.8	71.2	72.9	80.78
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	7.94	12.2	15.9	25.1	35.6	35.2	37.1
Standard embedment depth	[kN]	10.6	15.7	21.9	31.4	50.4	52.8	53.9
Maximum embedment depth	[kN]	13.3	20.9	28.8	47.8	71.2	72.9	80.8
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	7.9	12.2	15.9	25.1	35.6	35.2	37.1
Standard embedment depth	[kN]	10.6	15.7	21.9	31.4	50.4	52.8	53.9
Maximum embedment depth	[kN]	13.3	20.9	28.8	47.8	71.2	72.9	80.8

Basic performance data (cont.)

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

Size		M8	M10	M12	M16	M20	M24	M30
DESIGN LOAD								
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12.0	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.3	12.8	18.6	35.3	55.1	79.5	125.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8								
Minimum embedment depth	[kN]	5.67	8.73	11.4	17.9	25.4	25.1	26.5
Standard embedment depth	[kN]	7.58	11.2	15.6	22.4	36.0	37.7	38.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8								
Minimum embedment depth	[kN]	5.67	8.73	11.4	17.9	25.4	25.1	26.5
Standard embedment depth	[kN]	7.58	11.2	15.6	22.4	36.0	37.7	38.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.9	52.1	57.7
R-STUDS METRIC THREADED RODS - A4								
Minimum embedment depth	[kN]	5.67	8.73	11.4	17.9	25.4	25.1	26.5
Standard embedment depth	[kN]	7.58	11.2	15.6	22.4	36.0	37.7	38.5
Maximum embedment depth	[kN]	8.57	13.8	20.0	34.1	50.8	52.1	57.7
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8.0	12	22.3	34.7	50.3	80.0
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.1	19.4	36.0	56.0	80.6	128.0
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.3	25.2	39.4	56.8	89.7

Product commercial data

Product Code	Volume [ml]	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CFS+RP30-4	300	1	3	108	2.44	7.32	263.52	5906675205861	18
R-CFS+RP30-600-8	600	1	1	36	8.30	8.30	298.8	5906675085876	18

Resin consumption for bonded anchors

Cartridge size	Stud diameter	d	[mm]	M8	M10	M12	M16	M20	M24	M30
	Hole diameter in substrate	**d_0**	**[mm]**	**10**	**12**	**14**	**18**	**24**	**28**	**35**
175ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**42**	**28**	**19**	**11**	**4,7**	**3,2**	**1,8**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**32**	**22**	**14**	**9**	**3,4**	**4**	**2,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**26**	**17**	**11**	**6**	**2,4**	**1,6**	**0,8**
280 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**73**	**49**	**34**	**19**	**8,3**	**5,6**	**3,1**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**57**	**39**	**26**	**16**	**6,0**	**3,8**	**2,2**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**46**	**30**	**20**	**10**	**4,3**	**2,8**	**1,5**
300 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**79**	**53**	**37**	**21**	**9,0**	**6,0**	**3,4**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**61**	**42**	**28**	**17**	**6,5**	**4,1**	**2,4**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**50**	**32**	**21**	**11**	**4,6**	**3,0**	**1,6**
310 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**82**	**55**	**38**	**22**	**9,3**	**6,3**	**3,5**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**64**	**44**	**29**	**18**	**6,7**	**4,3**	**2,4**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**52**	**33**	**22**	**12**	**4,8**	**3,1**	**1,6**
345 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**93**	**62**	**43**	**24**	**10,5**	**7,1**	**4,0**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**72**	**49**	**32**	**20**	**7,6**	**4,8**	**2,8**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**59**	**38**	**25**	**13**	**5,4**	**3,5**	**1,9**
380 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**104**	**69**	**48**	**27**	**11,7**	**7,9**	**4,4**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**80**	**55**	**36**	**22**	**8,4**	**5,4**	**3,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**65**	**42**	**28**	**15**	**6,1**	**3,9**	**2,1**
385 ml	Reduced Embedment	h_{nom}	[mm]	60	70	80	100	120	140	165
	Quantity of anchored studs			**105**	**70**	**49**	**28**	**11,8**	**8,0**	**4,5**
	Standard Embedment	h_{nom}	[mm]	80	90	110	125	170	210	240
	Quantity of anchored studs			**81**	**56**	**37**	**22**	**8,5**	**5,4**	**3,1**
	Maximum Embedment	h_{nom}	[mm]	100	120	145	190	240	290	360
	Quantity of anchored studs			**66**	**43**	**28**	**15**	**6,1**	**4,0**	**2,1**

GLASS CAPSULES

- R-CAS-V
  - Spin-In Capsule with Threaded Rods
- R-HAC-V
  - Hammer-In with Threaded Rods
  - Hammer-In with Rebar

R-CAS-V Spin-In Capsule with Threaded Rods

High-performance, quick-setting, styrene-free vinylester resin for concrete

Approvals and Reports

- ETA-10/0108; ETAG 001-05, Option 7

Installation movie

Product overview

Features and benefits

- Approved for use with threaded rods in non-cracked concrete (ETAG001 Option 7)
- High performance for use safety critical application - heavy-duty fastenings with small spacing and edge distances
- The system relies on the adhesion between the concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains a precise volume of constituents making it a very consistent product
- Suitable for making fixings underwater. Adhesive strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Styrene free - odourless

Applications

- Threaded rods
- Balustrading
- Railings
- Heavy machinery
- Structural steel
- Steel columns
- Cladding restraints
- Curtain walling
- Fencing & gates
- Formwork supports
- Garage doors
- Guard rails

Base materials

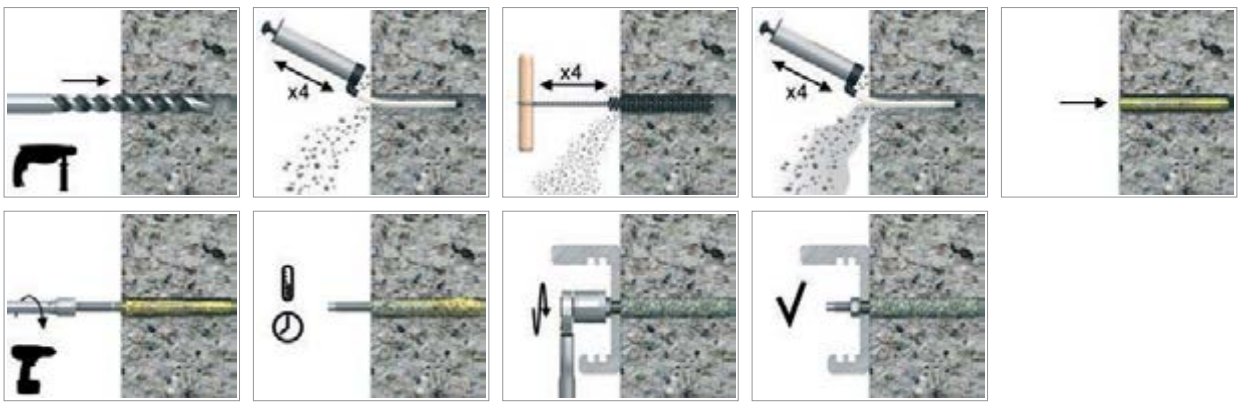
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

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 capsule into the hole. Connect stud to drilling machine using appropriate driver system.
4. Position the stud into the glass capsule then switch on the drilling machine and drive stud into the capsule. Switch off the drilling machine as soon as the bottom of hole is reached.
5. Leave the anchor undisturbed unitl the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Product information

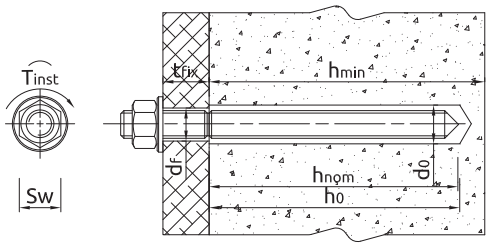
Product Code	Size	Description / Resin Type
R-CAS-V-08	M8	Styrene Free Vinylester Resin
R-CAS-V-10	M10	
R-CAS-V-12	M12	
R-CAS-V-16	M16	
R-CAS-V-20	M20	
R-CAS-V-24	M24	
R-CAS-V-30	M30	

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
Installation depth	h_{nom}	[mm]	80	90	110	125	170	210	270
Min. substrate thickness	h_{min}	[mm]	120	130	140	180	230	270	340
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	480
5	0	-	240
5	5	-	150
10	10	-	120
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009

Basic performance data

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

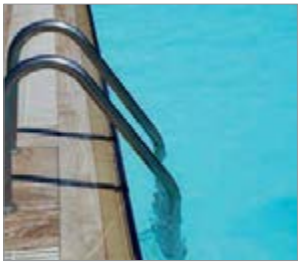
Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	80	90	110	125	170	210	270
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	21.6	34.8	50.4	75.5	119.2	158.4	239.6
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	28.9	35.9	55.7	75.5	119.2	158.4	239.6
R-STUDS METRIC THREADED RODS - A4	[kN]	28.9	35.9	55.7	75.5	119.2	158.4	239.6
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18	29	42	60	95	140	200
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	25	30	50	60	95	140	200
R-STUDS METRIC THREADED RODS - A4	[kN]	25	30	50	60	95	140	200
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	12	16.67	27.78	33.33	52.78	77.78	111.11
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	13.89	16.67	27.78	33.33	52.78	77.78	111.11
R-STUDS METRIC THREADED RODS - A4	[kN]	13.89	16.67	27.78	33.33	52.78	77.78	111.11
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.82	18.59	35.26	55.13	79.49	125.64
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	8.57	11.9	19.84	23.81	37.7	55.56	79.37
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.92	11.9	19.84	23.81	37.7	55.56	79.37
R-STUDS METRIC THREADED RODS - A4	[kN]	9.92	11.9	19.84	23.81	37.7	55.56	79.37
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.29	34.86	50.29	80
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.14	19.43	36	56	80.57	128
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.28	25.18	39.38	56.78	89.74

Product commercial data

Product Code	Size	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-CAS-V-08	M8	10	480	5760	0.13	6.5	133.2	5906675280189	18
R-CAS-V-10	M10	10	480	5760	0.16	8.1	158.8	5906675280196	18
R-CAS-V-12	M12	10	480	5760	0.24	12.0	222.0	5906675280202	18
R-CAS-V-16	M16	10	480	5760	0.38	18.8	255.6	5906675280219	18
R-CAS-V-20	M20	6	108	1296	0.78	7.8	155.2	5906675280226	18
R-CAS-V-24	M24	6	108	1296	1.09	10.9	160.9	5906675280233	18
R-CAS-V-30	M30	4	32	384	0.85	8.5	166.2	5906675280240	18

R-HAC-V Hammer-In with Threaded Rods

Heavy duty anchor with small spacing and edge distances, simply installed by hammering the threaded rods



Approvals and Reports

- ETA-11/0002; ETAG 001-05, Option 7

Installation movie

Product overview

Features and benefits

- High performance anchor, for use in safety critical applications
- Approved for use with threaded rods in non-cracked concrete (ETAG001 Option 7)
- The system relies on the adhesion between concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains a precise volume of constituents making it a very consistent product
- Adhesive bond strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Low cost tooling required for installation, quick and easy to install
- Styrene free - virtually odourless

Applications

- Balustrading & handrails
- Cable trays
- Guard rails
- Machinery
- Threaded rods
- Cladding restraints
- Curtain walling
- Fencing & gates
- Reinforcement bars

Base materials

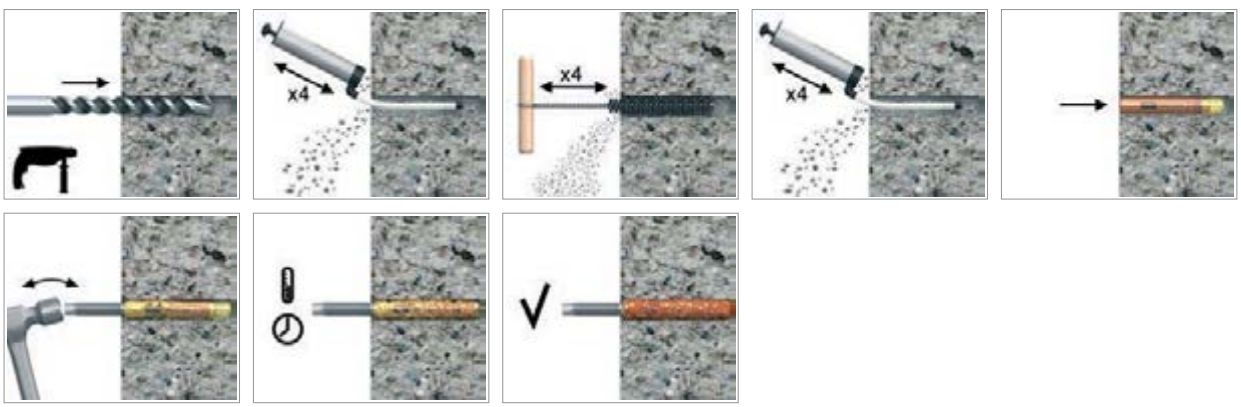
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



Installation guide (cont.)

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 capsule into the hole
4. The stud is simply hammered through the capsule using a manual hammer (M8-M12) or mechanical hammer (M16-M30)
5. Leave the anchor undisturbed unitl the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Product information

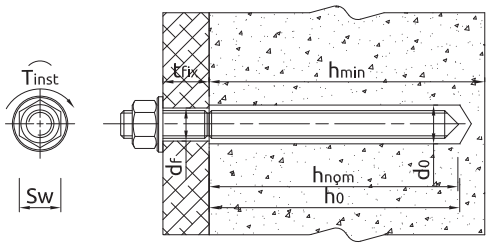
Product Code	Size	Description / Resin Type
R-HAC-V-08	M8	Styrene Free Vinylester Resin
R-HAC-V-10	M10	
R-HAC-V-12	M12	
R-HAC-V-16	M16	
R-HAC-V-20	M20	
R-HAC-V-24	M24	
R-HAC-V-30	M30	

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	Hole diameter	Max. thickness		
				d	L	d_f	t_{fix} for $h_{ef,min}$	t_{fix} for $h_{ef,std}$	t_{fix} for $h_{ef,max}$
				[mm]	[mm]	[mm]	[mm]	[mm]	[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-16220-88	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-20300-88	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	-

* Make to order

Installation data



R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	12	16	20	24	30
Hole diameter in substrate	d_0	[mm]	10	12	14	18	24	28	35
Installation torque	T_{inst}	[Nm]	10	20	40	80	120	180	300
Min. hole depth in substrate	h_0	[mm]	h_{ef} + 5						
Installation depth	h_{nom}	[mm]	80	90	110	125	170	210	270
Min. substrate thickness	h_{min}	[mm]	120	130	140	180	230	270	340
Min. spacing	s_{min}	[mm]	0.5 * h_{ef} ≥ 40						
Min. edge distance	c_{min}	[mm]	0.5 * h_{ef} ≥ 40						

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	1440
5	0	-	840
5	5	-	240
10	10	-	180
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M12	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	20	39	68	173	338	583	1166
Design bending resistance	M	[Nm]	15	30	52	133	259	449	899
R-STUDS METRIC THREADED RODS - steel class 8.8									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1793
Design bending resistance	M	[Nm]	24	48	84	213	416	718	1439
R-STUDS METRIC THREADED RODS - A4									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785	1569
Design bending resistance	M	[Nm]	17	34	59	149	291	504	1009

Basic performance data

R-STUDS

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

Size		M8	M10	M12	M16	M20	M24	M30
Substrate		Non-cracked concrete						
Embedment depth h_{ef}	[mm]	80	90	110	125	170	210	270
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	21.6	31.7	46	64.7	107.6	146.8	207.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	22.1	31.7	46	64.7	107.6	146.8	207.8
R-STUDS METRIC THREADED RODS - A4	[kN]	22.1	31.7	46	64.7	107.6	146.8	207.8
SHEAR LOAD $V_{Ru,m}$								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18.3	29	42.15	78.5	122.5	176.5	280.5
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	29.28	46.4	67.44	125.6	196	282.4	448.8
R-STUDS METRIC THREADED RODS - A4	[kN]	25.62	40.6	59.01	109.9	171.5	247.1	392.7
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	18	25	40	50	95	115	170
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	20	25	40	50	95	115	170
R-STUDS METRIC THREADED RODS - A4	[kN]	20	25	40	50	95	115	170
SHEAR LOAD V_{Rk}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9	14	21	39	61	88	140
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	15	23	34	63	98	141	224
R-STUDS METRIC THREADED RODS - A4	[kN]	13	20	29	55	86	124	196
DESIGN LOAD								
TENSION LOAD N_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	9.52	11.9	22.22	23.81	45.24	54.76	80.95
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	9.52	11.9	22.22	23.81	45.24	54.76	80.95
R-STUDS METRIC THREADED RODS - A4	[kN]	9.52	11.9	22.22	23.81	45.24	54.76	80.95
SHEAR LOAD V_{Rd}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	7.2	11.2	16.8	31.2	48.8	70.4	112
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	12	18.4	27.2	50.4	78.4	112.8	179.2
R-STUDS METRIC THREADED RODS - A4	[kN]	8.33	12.82	18.59	35.26	55.13	79.49	125.64
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	6.8	8.5	15.87	17.01	32.31	39.12	57.82
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.8	8.5	15.87	17.01	32.31	39.12	57.82
R-STUDS METRIC THREADED RODS - A4	[kN]	6.8	8.5	15.87	17.01	32.31	39.12	57.82
SHEAR LOAD V_{rec}								
R-STUDS METRIC THREADED RODS - STEEL CLASS 5.8	[kN]	5.14	8	12	22.29	34.86	50.29	80
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.57	13.14	19.43	36	56	80.57	128
R-STUDS METRIC THREADED RODS - A4	[kN]	5.95	9.16	13.28	25.18	39.38	56.78	89.74

Product commercial data

Product Code	Size	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
		Box	Outer	Pallet	Box	Outer	Pallet		
R-HAC-V-08	M8	10	480	5760	0.13	6.6	135.3	5906675377827	18
R-HAC-V-10	M10	10	480	5760	0.14	6.8	138.0	5906675379913	18
R-HAC-V-12	M12	10	480	5760	0.19	9.5	181.2	5906675379920	18
R-HAC-V-16	M16	10	480	5760	0.30	15.1	210.6	5906675379937	18
R-HAC-V-20	M20	6	108	1296	0.57	5.7	120.8	5906675379944	18
R-HAC-V-24	M24	6	108	1296	0.76	6.9	152.0	5906675379951	18
R-HAC-V-30	M30	4	32	384	0.57	5.7	121.2	5906675379968	18

R-HAC-V Hammer-In with Rebar

Heavy duty anchor with small spacing and edge distances, simply installed by hammering the rebar

Approvals and Reports

- ETA-11/0002; ETAG 001-05, Option 7

Product overview

Features and benefits

- Approved for use with rebar in non-cracked concrete (ETAG001 Option 7)
- High performance anchor, for use in safety critical applications
- The system relies on the adhesion between concrete and resin, which is free from expansion forces. This makes it an ideal choice where close edge and spacing distances are required
- Capsule contains a precise volume of constituents making it a very consistent product
- Adhesive bond strength is not affected by unpolluted water
- Suitable for dry or wet non-cracked concrete
- Ideal for starter bar applications
- Low cost tooling required for installation, quick and easy to install
- Styrene free - virtually odourless

Applications

- Reinforcement bars
- Cable trays
- Machinery
- Fencing & gates
- Formwork supports

Base materials

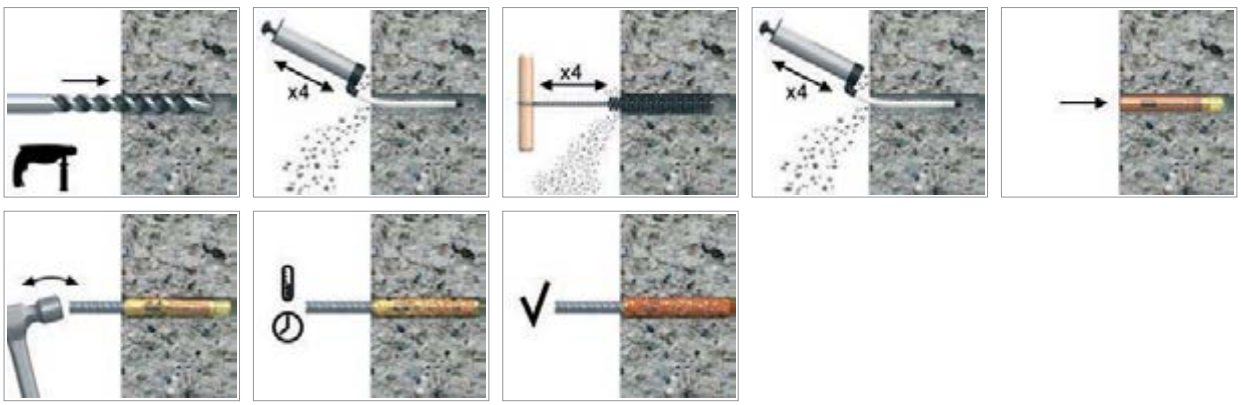
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



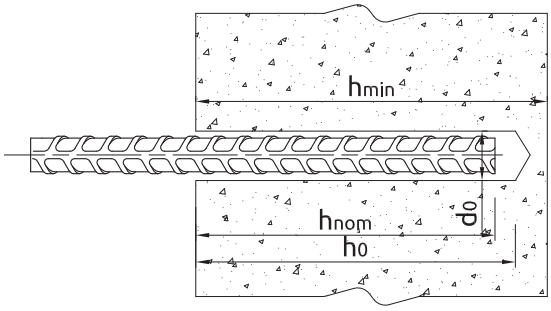
Product information

1. Drill hole to the required diameter and depth for rebar 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 capsule into the hole
4. The stud is simply hammered through the capsule using a manual hammer (M8-M12) or mechanical hammer (M16-M30)
5. Leave the anchor undisturbed unitl the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Installation guide (cont.)

Product Code	Size	Description / Resin Type
R-HAC-V-10	M8	Styrene Free Vinylester Resin
R-HAC-V-12	M10	
R-HAC-V-16	M12	
R-HAC-V-16	M14	
R-HAC-V-20	M16	
R-HAC-V-24	M20	
R-HAC-V-30	M25	

Installation data



REBARS

Size			Ø08	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Rebar diameter	d_s	[mm]	8	10	12	14	16	20	25
Hole diameter in substrate	d_0	[mm]	12	14	16	18	22	26	35
Min. hole depth in substrate	h_0	[mm]	85	95	115	130	175	215	275
Embedment depth	l_v	[mm]	80	90	110	125	170	210	270
Min. spacing	s_{min}	[mm]	40	45	55	62	85	105	135
Min. edge distance	c_{min}	[mm]	40	45	55	62	85	105	135

Minimum working and curing time

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	-	1440
5	0	-	840
5	5	-	240
10	10	-	180
15	15	-	90
20	20	-	45
25	30	-	20
25	40	-	10

*For wet concrete the curing time must be doubled

Mechanical properties

REBARS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
18G2									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm²]	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	29	57	98	155	232	452	884
Design bending resistance	M	[Nm]	19	38	65	103	154	302	589
Allowable bending resistance	M_{rec}	[Nm]	14	27	47	74	110	215	421
34GS									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30	59	102	162	241	471	920
Design bending resistance	M	[Nm]	20	39	68	108	161	314	614
Allowable bending resistance	M_{rec}	[Nm]	14	28	48	77	115	224	438
B500SP									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	35	68	117	186	277	542	1059
Design bending resistance	M	[Nm]	23	45	78	124	185	361	706
Allowable bending resistance	M_{rec}	[Nm]	17	32	56	89	132	258	504
RB500/BSt500S									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	269.4	402.1	785.4	1534
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	33	65	112	178	265	518	1012
Design bending resistance	M	[Nm]	22	43	75	119	177	346	675
Allowable bending resistance	M_{rec}	[Nm]	16	31	53	85	126	247	482

Basic performance data

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

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Substrate		Non-cracked concrete						
CHARACTERISTIC LOAD								
TENSION LOADS N_{Rk}								
A-II (18G2)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
A-III (34GS)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	16.0	20.0	30.0	40.0	50.0	60.0	95.0
SHEAR LOADS V_{Rk}								
A-II (18G2)	[kN]	12.1	18.8	27.1	36.9	48.3	75.4	117.8
A-III (34GS)	[kN]	12.6	19.6	28.3	38.5	50.3	78.5	122.7
A-IIIN (RB500, BSt500S, B500SP)	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135.0

Basic performance data (cont.)

R-STUDS

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25
Substrate		Non-cracked concrete						
DESIGN LOAD								
TENSION LOADS N_{Rd}								
A-II (18G2)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
A-III (34GS)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	8.9	11.1	16.7	22.2	27.8	33.3	52.8
SHEAR LOADS V_{Rd}								
A-II (18G2)	**[kN]**	8.0	12.6	18.1	24.6	32.2	50.3	78.5
A-III (34GS)	**[kN]**	8.4	13.1	18.8	25.7	33.5	52.4	81.8
A-IIIN (RB500, BSt500S, B500SP)	**[kN]**	9.2	14.4	20.7	28.2	36.9	57.6	90.0
RECOMMENDED LOAD*								
TENSION LOADS N_{rec}								
A-II (18G2)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
A-III (34GS)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
A-IIIN (RB500, BSt500S, B500SP)								
Standard Embedment Depth	[kN]	6.35	7.9	11.9	15.9	19.8	23.8	37.7
SHEAR LOADS V_{rec}								
A-II (18G2)	[kN]	5.74	8.98	12.9	17.6	23.0	35.9	56.1
A-III (34GS)	[kN]	5.98	9.35	13.5	18.3	23.9	37.4	58.4
A-IIIN (RB500, BSt500S, B500SP)	[kN]	6.58	10.3	14.8	20.2	26.3	41.1	64.3

Product commercial data

Product Code	Size	Diamater size	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
			Box	Outer	Pallet	Box	Outer	Pallet		
R-HAC-V-08	M8	Ø8	10	480	5760	0.13	6.6	135.3	5906675377827	18
R-HAC-V-10	M10	Ø10	10	480	5760	0.14	6.8	138.0	5906675379913	18
R-HAC-V-12	M12	Ø12	10	480	5760	0.19	9.5	181.2	5906675379920	18
R-HAC-V-16	M16	Ø16	10	480	5760	0.30	15.1	210.6	5906675379937	18
R-HAC-V-20	M20	Ø20	6	108	1296	0.57	5.7	120.8	5906675379944	18
R-HAC-V-24	M24	Ø24	6	108	1296	0.76	6.9	152.0	5906675379951	18
R-HAC-V-30	M30	Ø30	4	32	384	0.57	5.7	121.2	5906675379968	18

ACCESSORIES

- R-STUDS
- R-ITS
- R-BRUSH
- R-BLOWPUMP
- Plastic and Wire Mesh Sleeves
- R-NOZ Mixer Nozzles
- R-GUN Dispenser Guns

R-STUDS Threaded Rods with Hexagonal or Flat Head

Threaded rod with hexagonal or flat head for use with bonded anchors.

Hexagonal Head

Flat Head

Product overview

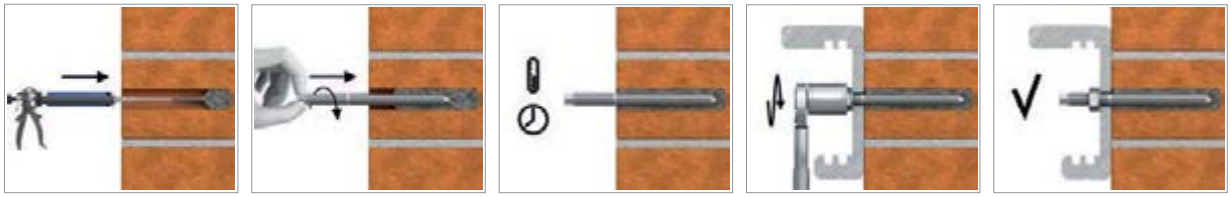
Features and benefits

- High load-bearing capacities when used with Rawlplug high-performance bonded anchor resins
- Hexagonal head for convenient use with torque wrench
- Flat head for quick manual installation
- A4 stainless steel version for use outdoors and in damp conditions
- Class 8.8 carbon steel version offers improved load-bearing capacities (relative to standard carbon steel)
- Suitable for use with special mesh sleeves in hollow substrates
- Can be post-installed through fixture in some cases. (Consult technical advisory service)
- Possibility of removal when used with internally threaded socket

Applications

- Balustrading & handrails
- Supports
- Barriers
- Racking systems
- Consoles
- Railings
- Window elements
- Scaffolding
- Machinery
- Facades
- Copy-eco systems
- Cable trays
- Curtain walling
- Formwork supports
- Heavy machinery
- Lamps
- Safety barriers
- Road Signs
- Railings
- Public seating

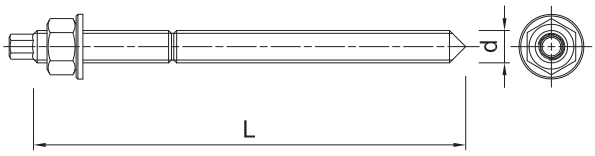
Installation guide



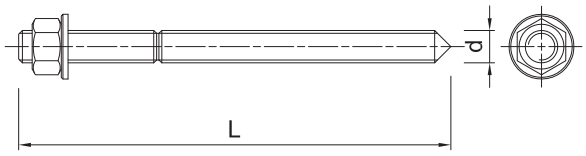
1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole thoroughly with hand pump and hole brush
3. If required, insert the mesh sleeve into position
4. Fill hole with the required resin to the recommended fill level. (Follow the relevant instructions for the resin product)
5. Insert the threaded stud slowly and with a slight twisting motion, until the required embedment depth is reached
6. Leave undisturbed until curing time of resin has elapsed
7. Attach fixture and tighten the nut to the required installation torque

Product information

Hexagonal Head



Flat Head



Size	Product Code	Anchor		Fixture			
		Diameter	Length	Max. thickness			Hole diameter
		d	L	$t_{fix,\ min}$	$t_{Fix,\ s}$	$t_{fix,\ max}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
R-STUDS Metric Threaded Rods - Steel Class 5.8							
M8	R-STUDS-08110 / R-STUDS-08110-FL	8	110	40	20	-	9
	R-STUDS-08160 / R-STUDS-08160-FL	8	160	90	70	50	9
M10	R-STUDS-10130 / R-STUDS-10130-FL	10	130	48	28	-	12
	R-STUDS-10170 / R-STUDS-10170-FL	10	170	88	68	38	12
	R-STUDS-10190 -	10	190	108	88	58	12
M12	R-STUDS-12160 / R-STUDS-12160-FL	12	160	65	35	-	14
	R-STUDS-12190 / R-STUDS-12190-FL	12	190	95	65	30	14
	R-STUDS-12220 / R-STUDS-12220-FL	12	220	125	95	60	14
	R-STUDS-12260 / R-STUDS-12260-FL	12	260	165	135	100	14
	R-STUDS-12300 -	12	300	205	175	140	14
M16	R-STUDS-16190 / R-STUDS-16190-FL	16	190	71	46	-	18
	R-STUDS-16220 / R-STUDS-16220-FL	16	220	101	76	11	18
	R-STUDS-16260 / R-STUDS-16260-FL	16	260	141	116	51	18
	R-STUDS-16300 -	16	300	181	156	91	18
	R-STUDS-16380 -	16	380	261	236	171	18
M20	R-STUDS-20260 / R-STUDS-20260-FL	20	260	117	67	-	22
	R-STUDS-20300 / R-STUDS-20300-FL	20	300	157	107	37	22
	- R-STUDS-20350-FL	20	350	207	157	87	22
M24	R-STUDS-24300 / R-STUDS-24300-FL	24	300	132	62	-	26
M30	R-STUDS-30380 / R-STUDS-30380-FL	30	380	181	76	-	32
R-STUDS Metric Threaded Rods - Steel Class 8.8							
M8	R-STUDS-08110-88 -	8	110	40	20	-	9
	R-STUDS-08130-88 -	8	130	48	40	-	9
M10	R-STUDS-10130-88 -	10	130	48	28	-	12
M12	R-STUDS-12160-88 -	12	160	65	35	-	14
M16	R-STUDS-16190-88 -	16	190	71	46	-	18
	R-STUDS-16220-88 -	16	220	101	76	11	18
M20	R-STUDS-20260-88 -	20	260	117	67	-	22
	R-STUDS-20300-88 -	20	300	157	107	37	22
M24	R-STUDS-24300-88 -	24	300	132	62	-	26
M30	R-STUDS-30380-88 -	30	380	181	76	-	32
R-STUDS Metric Threaded Rods - A2							
M12	- R-STUDS-12200-A2FL	12	200	150	75	40	14
	- R-STUDS-12210-A2FL	12	210	115	85	50	14
	- R-STUDS-12220-A2FL	12	220	125	95	60	14
	- R-STUDS-12330-A2FL	12	330	235	205	170	14
	- R-STUDS-12350-A2FL	12	350	255	225	190	14
	- R-STUDS-12380-A2FL	12	380	285	255	220	14
	- R-STUDS-12400-A2FL	12	400	305	275	240	14
	- R-STUDS-12440-A2FL	12	440	345	315	280	14

Product information (cont.)

Size	Product Code	Anchor		Fixture			
		Diameter	Length	Max. thickness			Hole diameter
		d	L	$t_{fix,\,min}$	$t_{fix,\,s}$	$t_{fix,\,max}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
R-STUDS Metric Threaded Rods - A4							
M8	R-STUDS-08110-A4 / R-STUDS-08110-A4FL	8	110	40	20	-	9
M10	R-STUDS-10130-A4 / R-STUDS-10130-A4FL	10	130	48	28	-	12
	- R-STUDS-10170-A4FL	10	170	88	68	38	12
M12	R-STUDS-12160-A4 / R-STUDS-12160-A4FL	12	160	65	35	-	14
	- R-STUDS-12190-A4FL	12	190	95	65	30	14
	R-STUDS-12220-A4 -	12	220	125	95	60	14
R-STUDS Metric Threaded Rods - A4							
M16	R-STUDS-16190-A4/ R-STUDS-16190-A4FL	16	190	71	46	-	18
	R-STUDS-16260-A4/ R-STUDS-16260-A4FL	16	260	141	116	51	18
M20	R-STUDS-20260-A4/ R-STUDS-20260-A4FL	20	260	117	67	-	22
M24	R-STUDS-24300-A4/ R-STUDS-24300-A4FL	24	300	132	62	-	26
M30	R-STUDS-30380-A4/ R-STUDS-30380-A4FL	30	380	181	76	-	32

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	
R-STUDS Metric Threaded Rods - Steel Class 5.8 with Hexagonal Head							
M8	R-STUDS-08110	8	110	10	10	4200	5906675127477
	R-STUDS-08160	8	160	10	10	4200	5906675234649
M10	R-STUDS-10130	10	130	10	250	9000	5906675127484
	R-STUDS-10170	10	170	10	10	4200	5906675234663
M12	R-STUDS-12160	12	160	10	120	5400	5906675127491
	R-STUDS-12190	12	190	10	120	5760	5906675234694
	R-STUDS-12220	12	220	10	120	5760	5906675234700
	R-STUDS-12260	12	260	10	10	4200	5906675234717
	R-STUDS-12300	12	300	5	125	4500	5906675234731
M16	R-STUDS-16190	16	190	10	60	3600	5906675130903
	R-STUDS-16220	16	220	10	60	2880	5906675234748
	R-STUDS-16260	16	260	10	60	1920	5906675234755
M20	R-STUDS-20260	20	260	5	40	1584	5906675234786
	R-STUDS-20300	20	300	5	5	870	5906675379463
M24	R-STUDS-24300	24	300	1	1	1000	5906675260433
M30	R-STUDS-30380	30	380	1	4	132	5010445001611
R-STUDS Metric Threaded Rods - Steel Class 5.8 with Flat Head							
M8	R-STUDS-08110-FL	8	110	10	10	4200	5010445001468
	R-STUDS-08160-FL	8	160	10	10	7040	5906675260372
M10	R-STUDS-10130-FL	10	130	10	250	9000	5010445001482
	R-STUDS-10170-FL	10	170	10	10	3780	5906675260389
M12	R-STUDS-12160-FL	12	160	10	100	7200	5010445001512
	R-STUDS-12190-FL	12	190	10	120	5760	5906675262338
	R-STUDS-12220-FL	12	220	10	10	3200	5906675261706
	R-STUDS-12260-FL	12	260	10	10	1100	5906675260396
M16	R-STUDS-16190-FL	16	190	10	60	3840	5010445001550
	R-STUDS-16220-FL	16	220	10	10	1920	5906675260402
	R-STUDS-16260-FL	16	260	10	10	1920	5906675260419

* Made to order

Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	
M20	R-STUDS-20260-FL	20	260	6	36	1728	5010445001598
	R-STUDS-20300-FL	20	300	5	5	1040	5906675262468
	R-STUDS-20350-FL	20	350	10	10	960	5906675234793
M24	R-STUDS-24300-FL	24	300	1	1	770	5906675240794
M30	R-STUDS-30380-FL	30	380	10	10	132	5906675234816
R-STUDS Metric Threaded Rods - Steel Class 8.8 with Hexagonal Head							
M8	R-STUDS-08110-88	8	110	10	10	*	5906675076171
	R-STUDS-08130-88	8	130	10	10	*	5906675083902
M10	R-STUDS-10130-88	10	130	10	250	*	5906675076188
	R-STUDS-10190-88	10	190	10	120	*	5906675089225
M12	R-STUDS-12160-88	12	160	10	120	*	5906675076195
M16	R-STUDS-16190-88	16	190	10	60	*	5906675076201
	R-STUDS-16220-88	16	220	10	60	*	5906675060514
M20	R-STUDS-20260-88	20	260	5	40	*	5906675076218
	R-STUDS-20300-88	20	300	5	40	*	5906675085562
M24	R-STUDS-24300-88	24	300	1	1	*	5906675076225
M30	R-STUDS-30380-88	30	380	1	1	*	5906675076232
R-STUDS Metric Threaded Rods - A2 with Flat Head							
M12	R-STUDS-12200-A2FL	12	200	10	-	3200	5906675262505
	R-STUDS-12210-A2FL	12	210	10	-	3200	5906675265070
	R-STUDS-12220-A2FL	12	220	10	-	3200	5906675262512
	R-STUDS-12330-A2FL	12	330	10	-	2200	5906675262529
	R-STUDS-12350-A2FL	12	350	10	-	2200	5906675267395
	R-STUDS-12380-A2FL	12	380	10	-	2200	5906675262536
	R-STUDS-12400-A2FL	12	400	10	-	2600	5906675034256
	R-STUDS-12440-A2FL	12	440	10	-	2400	5906675011486
R-STUDS Metric Threaded Rods - A4 with Hexagonal Head							
M8	R-STUDS-08110-A4	8	110	10	10	4200	5010445001642
M10	R-STUDS-10130-A4	10	130	10	10	900	5906675234823
M12	R-STUDS-12160-A4	12	160	10	120	5760	5906675234830
	R-STUDS-12220-A4	12	220	10	10	5760	5906675089416
M16	R-STUDS-16190-A4	16	190	10	10	4200	5906675234847
	R-STUDS-16260-A4	16	260	10	60	1920	5906675089249
M20	R-STUDS-20260-A4	20	260	5	5	1584	5906675234854
M24	R-STUDS-24300-A4	24	300	1	1	1000	5906675089263
M30	R-STUDS-30380-A4	30	380	1	4	132	5906675089263
R-STUDS Metric Threaded Rods - A4 with Flat Head							
M8	R-STUDS-08110-A4FL	8	110	10	10	4200	5906675260440
M10	R-STUDS-10130-A4FL	10	130	10	10	9600	5906675260457
	R-STUDS-10170-A4FL	10	170	10	10	4800	5906675261409
M12	R-STUDS-12160-A4FL	12	160	10	10	1800	5906675260464
	R-STUDS-12190-A4FL	12	190	10	10	5760	5906675261393
M16	R-STUDS-16190-A4FL	16	190	10	10	960	5906675260471
	R-STUDS-16260-A4FL	16	260	10	10	1920	5906675089256
M24	R-STUDS-24300-A4FL	24	300	1	1	770	5906675260495
M30	R-STUDS-30380-A4FL	30	380	10	10	132	5906675089287

* Made to order

R-ITS Internally Threaded Sockets

Internally threaded socket for the attachment of suitable bolt or threaded rod.

Product overview

Features and benefits

- Allows removal of bolt to leave a re-usable socket in place
- High load-bearing capacity
- Close edge and spacing distances
- Expansion free functioning
- Available in zinc plated and stainless steel versions

Applications

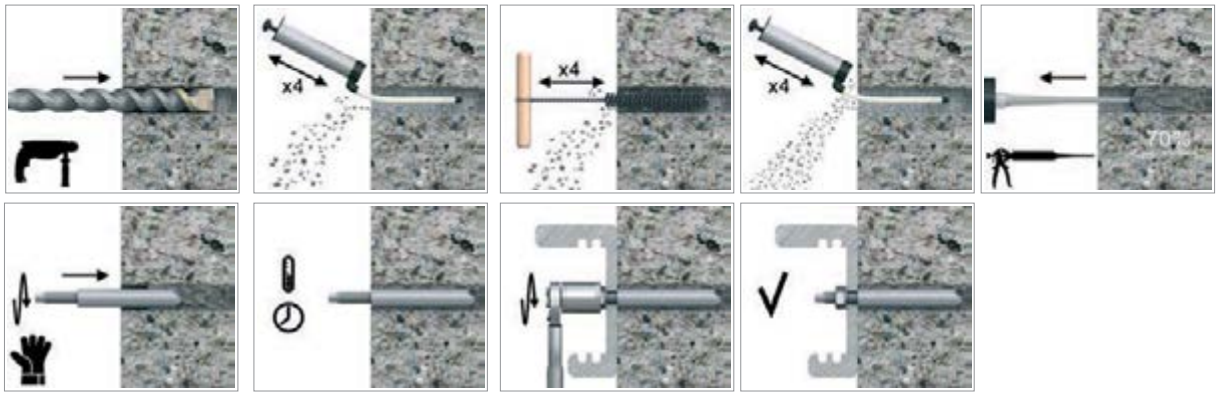
- For fastening of threaded rods or bolts
- Safety barriers
- Temporary works/formworks support systems

Base materials

Approved for use in:

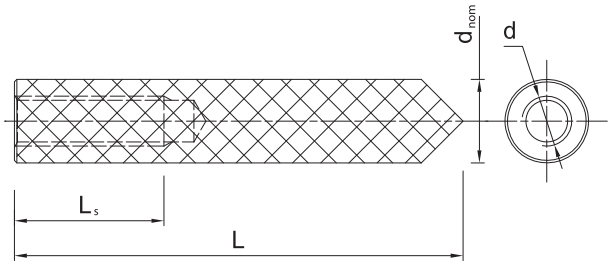
- Non-cracked concrete C20/25-C50/60

Installation guide



1. After injecting resin, immediately insert the socket anchor, slowly and with a slight twisting motion until flush with surface
2. Remove excess resin, then leave anchorage undisturbed until curing time has elapsed

Product information



Size	Product Code	Anchor			Fixture
		Diameter	Length	Internal thread length	Hole diameter
		d_{nom}	L	L_s	d_f
		[mm]	[mm]	[mm]	[mm]
R-ITS-Z					
M6	R-ITS-Z-06075	10	75	24	7
M8	R-ITS-Z-08075	12	75	25	9
	R-ITS-Z-08090	12	90	25	9
M10	R-ITS-Z-10075	16	75	30	12
	R-ITS-Z-10100	16	100	30	12
M12	R-ITS-A4-12100	16	100	35	14
M16	R-ITS-A4-16125	24	125	50	18
R-ITS-A4					
M6	R-ITS-A4-06075	11	75	24	7
M8	R-ITS-A4-08075	12.5	75	25	9
	R-ITS-A4-08090	12.5	90	25	9
M10	R-ITS-A4-10075	16.5	75	30	12
	R-ITS-A4-10100	16.5	100	30	12
M12	R-ITS-A4-12100	18	100	35	14
M16	R-ITS-A4-16125	22	125	50	18

Product commercial data

	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter	Length	Box	Outer	Pallet	Box	Outer	Pallet	
R-ITS-Z										
M6	R-ITS-Z-06075	11	75	10	10	5600	0.40	0.40	254.00	5010445606205
M8	R-ITS-Z-08075	12.5	75	10	10	5600	0.65	0.65	394.00	5906675087719
	R-ITS-Z-08090	12.5	90	10	10	5600	0.65	0.65	394.00	5010445606236
M10	R-ITS-Z-10075	16.5	75	10	10	5600	0.77	0.77	461.20	5010445606243
	R-ITS-Z-10100	16.5	100	10	10	3360	1.50	1.50	534.00	5010445606267
M12	R-ITS-Z-12100	18	100	6	6	2016	0.69	0.69	261.84	5906675087726
M16	R-ITS-Z-16125	22	125	6	6	2016	2.0	2.0	699.31	5906675087733
R-ITS-A4										
M6	R-ITS-A4-06075	11	75	10	10	5600	0.40	0.40	254.00	5906675087740
M8	R-ITS-A4-08075	12.5	75	10	10	5600	0.62	0.62	394.00	5906675087757
	R-ITS-A4-08090	12.5	90	10	10	5600	0.62	0.62	394.00	5906675087764
M10	R-ITS-A4-10075	16.5	75	10	10	5600	1.29	1.29	461.20	5010445609893
	R-ITS-A4-10100	16.5	100	10	10	3360	1.04	1.04	534.00	5010445609923
M12	R-ITS-A4-12100	18	100	6	6	2016	1.92	1.92	261.84	5010445609930
M16	R-ITS-A4-16125	22	125	6	6	2016	2.62	2.62	699.31	5906675087771

R-BRUSH Manual Wire Brushes

Brush accessory for cleaning out holes prior to anchor installation

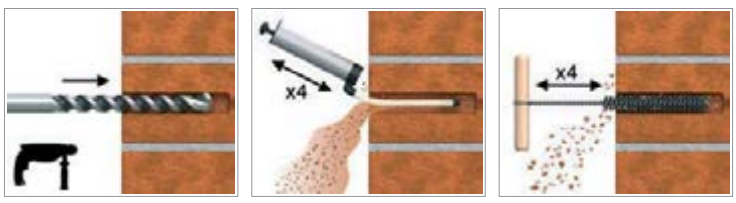
Product Code	Drill diameter [mm]	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-BRUSH-M08/M	M8	1	10	300	0.10	1.01	60.3	5906675249759
R-BRUSH-M10/M	M10	1	10	500	0.10	1.01	80.6	5906675249766
R-BRUSH-M12/M	M12	1	10	500	0.10	1.01	80.6	5906675249773
R-BRUSH-M16/M	M16	1	10	400	0.10	1.01	70.5	5906675249780
R-BRUSH-M20/M	M20	1	10	250	0.10	1.01	55.3	5906675249797
R-BRUSH-M24/M	M24	1	10	250	0.10	1.01	55.3	5906675249803
R-BRUSH-M30/M	M30	1	10	300	0.10	1.01	60.3	5906675249810

R-BLOWPUMP Blow Pump

Manual blow pump ideal for cleaning dust from drilled holes prior to applying bonded anchors or installing mechanical anchors

Product Code	Quantity [pcs]	Weight [kg]		Bar Code
		Box	Outer	
R-BLOWWPUMP	1	12.0	12.0	5906675102412

Installation guide for brushes and blow pump



1. Before inserting anchor, clear debris from hole
2. Insert pipe to bottom of hole and pump air repeatedly four times
3. Additional use of hole brush is recommended, four times

Plastic and Wire Mesh Sleeves

Mesh sleeves for reduced mortar consumption and optimal mechanical interlock

Product overview

Features and benefits

- Plastic version ensures the anchor rod is properly centred
- Reduces consumption of resin
- User-friendly installation in hollow substrates
- Wire mesh must be cut to suit required hole depth
- Hole cleaning is not necessary

Applications

- For use with R-STUDS threaded rods in hollow base materials

Base materials

Approved for use in:

- Hollow Brick
- Hollow Lightweight Concrete Block
- Hollow Sand-lime Brick
- Hollow-core Slab

Installation guide

1. Simply insert the sleeve into pre-drilled hole before injection of the resin.

Product commercial data

Product Code	Size		Ilość [szt]		Waga [kg]		Bar Code
	Sleeve [mm]	Stud	Box	Outer	Box	Outer	
R-PLS-12050-10	12x50	M8	10	480	0.6	0.6	5906675377520
R-PLS-16085-10	16x85	M10-M12	10	6000	0.6	0.6	5906675347547
R-PLS-16130-10	16x130	M10-M12	10	6000	0.8	0.8	5906675347554
R-PLS-20085-10	20x85	M16	10	4800	0.8	0.8	5906675291864
SP-CE-R08	10X1000	M8	10	5430	1.29	1.29	5906675266138
SP-CE-R10	12x1000	M10	10	1500	1.29	1.29	5906675610122
SP-CE-R12	16x1000	M12	10	1110	1.29	1.29	5906675610320
SP-CE-R16	22x1000	M16	10	384	1.29	1.29	5906675610528
SP-CE-R20	28x1000	M20	5	280	2.58	2.58	5906675610726

R-NOZ Mixer Nozzles

Static mixer for bonded anchors in cartridges and CFS+ system

Product overview

Features and benefits

- Convenient extrusion and mixing of resin and hardener
- Available with or without hanger
- Ideal for serial applications: rebar or anchoring
- One type of nozzle fits: R-KF2, R-KEMII, R-KER, R-CFS+
- Specially dedicated nozzles for epoxy R-KEX II
- Possibility to attach an extension SP-CE-ED-1m extension nozzle

Installation guide

1. Simply screw the mixer nozzle onto the resin cartridge (after removing cap) or CFS+ adapter
2. Before inserting nozzle to the hole inject resin until even colour is obtained
3. Insert mixing nozzle to the far end of the hole and inject resin, slowly withdrawing the nozzle

Product commercial data

Product Code	Suitable for	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-NOZ-10	R-KEM-II, R-KF2, R-KER (all except the epoxy mix)	10	200	0.01	0.01	5906675127460
R-NOZ-100/100	R-KEM-II, R-KF2, R-KER (all except the epoxy mix)	100	800	0.008	0.008	5010445606427
R-NOZ-KEX-II-10	R-KEX-II	10	100	0.01	0.01	5906675078373
R-NOZ-KEX-II-100	R-KEX-II	100	1000	0.008	0.008	5906675078380
SP-CE-ED-1M	Extension for every nozzle 1 m	10	10	0.002	0.002	5906675601120

R-GUN Dispenser Guns

Professional manual dispensing system for resin anchors in cartridges

R-GUN 175-310 ml

R-GUN 345 ml

R-GUN 380 ml

Applications

- Dispenser gun suitable for: 175ml, 280ml, 300ml, 310ml 345ml, 380ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-300-N	Cartridge Gun 300 ml	1	12	960	1.0	12.0	987.1	5906675280141
R-GUN-345-N	Cartridge Gun 345 ml	1	12	300	1.0	12.0	329.1	5906675280158
R-GUN-380-N	Cartridge Gun 380 ml	1	12	180	1.03	12.4	215.4	5906675280165

R-GUN 385 ml

R-GUN 600 ml

Applications

- Dispenser guns suitable for 345ml, 600ml cartridges

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-GUN-385-P	Cartridge Gun 385 ml for R-KEX II	1	150	1.7	255	5906675217482
R-GUN-600-P	Cartridge Gun 600 ml for R-KEX II	1	150	2.00	300	5906675314044

R-GUN Pneumatic Dispenser Guns

Professional pneumatic dispensing system for resin anchors in cartridges

R-GUN 380 ml

Applications

- Pneumatic dispenser gun suitable for: 380ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-380-PNEU	Cartridge Pneumatic Gun suitable for R-KF2, R-KER	1	1	584	1.30	1.30	789.2	5906675286068

R-GUN Dispenser Gun CFS+

Professional dispensing system for resin anchors in CFS+ foils

R-CFS+-GUN 300 ml

Applications

- Dispenser gun suitable for: 300 ml CFS+ system

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-CFS+-GUN	300 ml Cartridge Gun for RV200, RM50 & RP30	1	12	180	1.00	12.0	210.0	5906675239804

R-CFS+GUN 600 ml

Applications

- Dispenser gun suitable for: 600 ml CFS+ system

Produkt	Opis	Ilość [szt]		Waga [kg]		Kody ean
		Opakowanie jednostkowe	Paleta	Opakowanie jednostkowe	Paleta	
R-CFS+GUN-600	600 ml Cartridge Gun	1	150	0.8	120	5906675379289

R-GUN Electric Dispenser Gun CFS+

Professional electric dispensing gun for resin anchors in CFS+ foils

R-CFS+GUN 600 ml

Applications

- Battery-powered dispenser suitable for 600ml CFS+ foils

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-CFS+GUN-600-AKU	Electric Dispenser for 600ml cfs+ foils	1	100	2.0	200	5906675620022

R-GUN Electric Dispenser Gun for cartridges

Professional battery-powered cartridge bonded anchors dispenser gun

R-GUN 380 ml

Applications

- Battery-powered dispenser suitable for 380ml cartridges

Product Code	Description	Quantity [pcs]		Weight [kg]		Bar Code
		Box	Outer	Box	Outer	
R-GUN-380-AKU	380ml Cartridges Electric Dispenser	1	50	2.2	110	5906675317250

RAWLPLUG®

Trust & Innovation

Mechanical Anchors

The following pages provide detailed information and technical data for our range of Rawlplug® Mechanical Anchors.

These products have been designed to perform in demanding high-load and technical applications, but are equally suitable for your everyday anchoring requirements.

The range includes:
Throughbolts | Shield Anchors | Heavy-Duty Expansion Anchors
Wedge Anchors | Screw Anchors

THROUGHBOLTS

- R-HPTIIA4
  - Stainless Steel Throughbolt
- R-HPTIIZF
  - Zinc Flake Throughbolt
- R-XPTIIA4
  - Stainless Steel Throughbolt
- R-XPT
  - Throughbolt
- R-XPT-HD
  - Hot Dip Galvanized Throughbolt

R-HPTIIA4 Stainless Steel Throughbolt

Stainless steel throughbolt anchor for cracked and non-cracked concrete

Approvals and Reports

- ETA-12/0021; ETAG 001-2, Option 1

Installation movie

Product overview

Features and benefits

- Stainless steel material for the highest corrosion resistance
- High performance in cracked and non-cracked concrete confirmed by ETA Option 1
- Highest quality ensures maximum load capacity
- For applications requiring fire resistance up to 120 minutes
- Suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design of R-HPTII allows drilling and installing directly through the fixture and helps to reduce installation time
- Suitable for installation in corrosive environments category C1, C2, C3 and C4

Applications

- Cladding restraints
- Barriers
- Structural steel
- Curtain walling
- Hand rails
- Heavy plant
- Balustrading
- Passenger lifts
- Facades
- Fencing & gates
- Masonry support
- Platforms
- Public seating
- Racking systems

Base materials

Approved for use in:

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

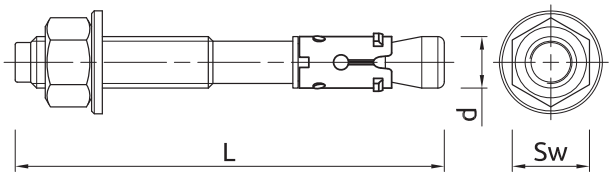
Also suitable for use in:

- Natural stone (after site testing)

Installation guide

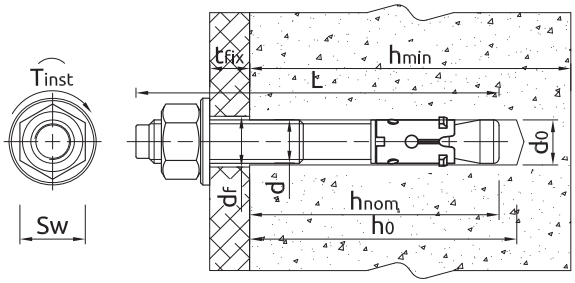
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-HPTIIA4-08060/10	8	60	10	-	9
	R-HPTIIA4-08075/10	8	75	25	10	9
	R-HPTIIA4-08085/20	8	85	35	20	9
	R-HPTIIA4-08095/30	8	95	45	30	9
	R-HPTIIA4-08105/40	8	105	55	40	9
	R-HPTIIA4-08115/50	8	115	65	50	9
M10	R-HPTIIA4-10065/5	10	65	5	-	11
	R-HPTIIA4-10080/20	10	80	20	-	11
	R-HPTIIA4-10095/15	10	95	35	15	11
	R-HPTIIA4-10115/35	10	115	55	35	11
	R-HPTIIA4-10130/50	10	130	70	50	11
	R-HPTIIA4-10140/60	10	140	80	60	11
M12	R-HPTIIA4-12080/5	12	80	5	-	13
	R-HPTIIA4-12100/5	12	100	25	5	13
	R-HPTIIA4-12125/30	12	125	50	30	13
	R-HPTIIA4-12150/55	12	150	75	55	13
	R-HPTIIA4-12180/85	12	180	105	85	13
M16	R-HPTIIA4-16125/5	16	125	25	5	18
	R-HPTIIA4-16140/20	16	140	40	20	18
	R-HPTIIA4-16150/30	16	150	50	30	18
	R-HPTIIA4-16180/60	16	180	80	60	18

Installation data



Size			M8	M10	M12	M16
Thread diameter	d	[mm]	8	10	12	16
Hole diameter in substrate	d_0	[mm]	8	10	12	16
Installation torque	T_{inst}	[Nm]	15	30	50	100
Wrench size	S_w	[mm]	13	17	19	24
STANDARD EMBEDMENT DEPTH						
Min. hole depth in substrate	$h_{0,s}$	[mm]	60	65	85	105
Installation depth	$h_{nom,s}$	[mm]	55	69	80	100
Min. substrate thickness	$h_{min,s}$	[mm]	100	120	140	170
Min. spacing (Non-cracked concrete)	$s_{min,s}$	[mm]	55	70	90	135

Installation data (cont.)

Size			M8	M10	M12	M16
Min. spacing (Cracked concrete)	$s_{min,s}$	[mm]	55	70	90	135
Min. edge distance (Non-cracked concrete)	$c_{min,s}$	[mm]	40	50	55	80
Min. edge distance (Cracked concrete)	$c_{min,s}$	[mm]	40	45	55	70
REDUCED EMBEDMENT DEPTH						
Min. hole depth in substrate	$h_{0,r}$	[mm]	45	55	65	85
Installation depth	$h_{nom,r}$	[mm]	40	49	60	80
Min. substrate thickness	$h_{min,r}$	[mm]	100	100	100	130
Min. spacing (Non-cracked concrete)	$s_{min,r}$	[mm]	50	70	120	150
Min. spacing (Cracked concrete)	$s_{min,r}$	[mm]	50	70	120	150
Min. edge distance (Non-cracked concrete)	$c_{min,r}$	[mm]	50	70	95	100
Min. edge distance (Cracked concrete)	$c_{min,r}$	[mm]	40	50	70	85

Mechanical properties

Size			M8	M10	M12	M16
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	545	545	500	500
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	600	600	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	436	436	400	400
Nominal yield strength - shear	f_{yk}	[N/mm²]	480	480	440	440
Cross sectional area - tension	A_s	[mm²]	38.9	61.7	89.6	165.2
Cross sectional area - shear	A_s	[mm²]	38.9	61.7	89.6	165.2
Elastic section modulus	W_{el}	[mm³]	34.3	68.3	119.6	299.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	22.0	45.0	72.0	180.0
Design bending resistance	M	[Nm]	18.0	36.0	57.0	144.0

Basic performance data

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

Size		M8	M10	M12	M16
NON-CRACKED CONCRETE					
Standard embedment depth h_{ef}	[mm]	47	59	68	85
Reduced embedment depth h_{ef}	[mm]	32	39	48	65
CRACKED CONCRETE					
Standard embedment depth h_{ef}	[mm]	47	59	68	85
Reduced embedment depth h_{ef}	[mm]	32	39	48	65
MEAN ULTIMATE LOAD					
TENSION LOAD $N_{Ru,m}$					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	15.	22.8	29.2	55.8
Reduced embedment depth	[kN]	10.4	16.0	22.1	37.9
CRACKED CONCRETE					
Standard embedment depth	[kN]	9.70	11.5	18.6	30.4
Reduced embedment depth	[kN]	5.60	9.80	13.4	22.2
SHEAR LOAD $V_{Ru,m}$					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	14.0	22.2	29.6	54.5
Reduced embedment depth	[kN]	14.0	19.2	29.6	54.5
CRACKED CONCRETE					
Standard embedment depth	[kN]	14.0	22.2	29.6	54.5
Reduced embedment depth	[kN]	14.0	19.2	29.6	54.5

Basic performance data (cont.)

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

Size		M8	M10	M12	M16
CHARACTERISTIC LOAD					
TENSION LOAD N_{Rk}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	9.00	16.0	25.0	39.5
Reduced embedment depth	[kN]	7.50	12.0	16.8	26.4
CRACKED CONCRETE					
Standard embedment depth	[kN]	6.00	9.00	12.0	25.0
Reduced embedment depth	[kN]	3.00	7.50	9.00	16.0
SHEAR LOAD V_{Rk}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	11.7	18.5	24.6	45.4
Reduced embedment depth	[kN]	11.7	14.7	24.6	45.4
CRACKED CONCRETE					
Standard embedment depth	[kN]	6.00	9.00	24.0	45.4
Reduced embedment depth	[kN]	3.00	7.50	9.00	32.0
DESIGN LOAD					
TENSION LOAD N_{Rd}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	5.00	10.7	16.7	26.3
Reduced embedment depth	[kN]	4.17	6.67	11.2	17.6
CRACKED CONCRETE					
Standard embedment depth	[kN]	3.33	6.00	8.00	16.7
Reduced embedment depth	[kN]	1.67	4.17	6.00	10.7
SHEAR LOAD V_{Rd}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	9.40	14.8	19.7	36.3
Reduced embedment depth	[kN]	9.40	8.20	19.7	36.3
CRACKED CONCRETE					
Standard embedment depth	[kN]	3.30	6.00	16.0	33.3
Reduced embedment depth	[kN]	1.70	4.20	6.00	21.3
RECOMMENDED LOAD					
TENSION LOAD N_{rec}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	3.57	7.62	11.9	18.8
Reduced embedment depth	[kN]	2.98	4.76	8.00	12.6
CRACKED CONCRETE					
Standard embedment depth	[kN]	2.38	4.29	5.71	11.9
Reduced embedment depth	[kN]	1.19	2.98	4.29	7.62
SHEAR LOAD V_{rec}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	6.69	10.6	14.1	25.9
Reduced embedment depth	[kN]	6.69	5.83	14.1	25.9
CRACKED CONCRETE					
Standard embedment depth	[kN]	2.38	4.29	11.4	23.8
Reduced embedment depth	[kN]	1.19	2.98	4.29	15.2

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M8	R-HPTIIA4-08060/10	8	60	100	100	21000	2.2	2.2	492.0	5906675046419
	R-HPTIIA4-08075/10	8	75	100	100	12000	2.8	2.8	366.0	5906675046426
	R-HPTIIA4-08085/20	8	85	100	100	12000	3.3	3.3	426.0	5906675046433
	R-HPTIIA4-08095/30	8	95	100	100	12000	3.3	3.3	426.0	5906675046440
	R-HPTIIA4-08105/40	8	105	50	50	12000	2.2	2.2	558.0	5906675046457
	R-HPTIIA4-08115/50	8	115	100	100	12000	4.8	4.8	606.0	5906675046464
M10	R-HPTIIA4-10065/5	10	65	50	50	11000	3.0	3.0	690.0	5906675046471
	R-HPTIIA4-10080/20	10	80	50	50	6000	3.0	3.0	390.0	5906675046488
	R-HPTIIA4-10095/15	10	95	50	50	6000	3.7	3.7	468.0	5906675046495
	R-HPTIIA4-10115/35	10	115	50	50	6000	4.0	4.0	510.0	5906675046501
	R-HPTIIA4-10130/50	10	130	50	50	6000	5.0	5.0	630.0	5906675046518
	R-HPTIIA4-10140/60	10	140	50	50	6000	5.0	5.0	630.0	5906675046532
M12	R-HPTIIA4-12080/5	12	80	50	50	6000	5.6	5.6	702.0	5906675046549
	R-HPTIIA4-12100/5	12	100	50	50	6000	6.0	6.0	750.0	5906675046556
	R-HPTIIA4-12125/30	12	125	50	50	6000	7.0	7.0	870.0	5906675046563
	R-HPTIIA4-12150/55	12	150	50	50	4000	10.0	10.0	830.0	5906675046570
	R-HPTIIA4-12180/85	12	180	50	50	3000	12.0	12.0	750.0	5906675046587
M16	R-HPTIIA4-16125/5	16	125	25	25	3000	6.0	6.0	750.0	5906675046594
	R-HPTIIA4-16140/20	16	140	25	25	2000	6.0	6.0	510.0	5906675034898
	R-HPTIIA4-16150/30	16	150	25	25	2000	5.7	5.7	488.0	5906675046600
	R-HPTIIA4-16180/60	16	180	25	25	2000	6.0	6.0	513.0	5906675046617

R-HPTIIZF Zinc Flake Throughbolt

Throughbolt anchor with corrosion-resistant coating for cracked and non-cracked concrete

Approvals and Reports

- ETA-12/0309; ETAG 001-2, Option 1
- AT-15-9327/2014

Installation movie

Product overview

Features and benefits

- New generation of throughbolt with unique corrosion-resistant coating
- High performance in cracked and non-cracked concrete confirmed by ETA Option 1
- Highest quality to receive optimal load capability
- For applications requiring fire resistance up to 120 minutes
- Suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design of R-HPTII allows drilling and installing directly through the fixture and helps to reduce installation time

Applications

- Cladding restraints
- Consoles
- Barriers
- Structural steel
- Curtain walling
- Hand rails
- Heavy Plant
- Balustrading
- Passenger lifts
- Facades

Base materials

Approved for use in:

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

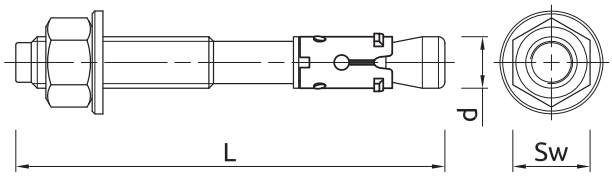
Also suitable for use in:

- Natural stone (after site testing)

Installation guide

1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

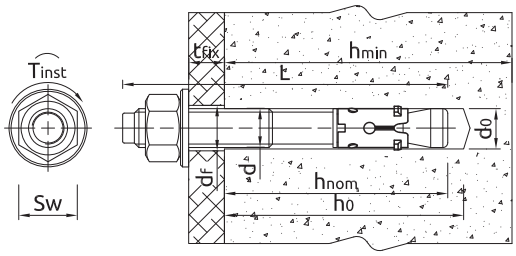
Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-HPTIIZF-08065/15*	8	65	15	-	9
	R-HPTIIZF-08080/15	8	80	30	15	9
	R-HPTIIZF-08085/20	8	85	35	20	9
	R-HPTIIZF-08100/35	8	100	50	35	9
	R-HPTIIZF-08115/50	8	115	65	50	9
M10	R-HPTIIZF-10065/5	10	65	5	-	11
	R-HPTIIZF-10080/20	10	80	20	-	11
	R-HPTIIZF-10095/15	10	95	35	15	11
	R-HPTIIZF-10115/35	10	115	55	35	11
	R-HPTIIZF-10130/50	10	130	70	50	11
M12	R-HPTIIZF-12080/5	12	80	5	-	13
	R-HPTIIZF-12100/5	12	100	25	5	13
	R-HPTIIZF-12120/25	12	120	45	25	13
	R-HPTIIZF-12135/40	12	135	60	40	13
	R-HPTIIZF-12150/55	12	150	75	55	13
M16	R-HPTIIZF-16100/5	16	100	5	-	18
	R-HPTIIZF-16105/10	16	105	10	-	18
	R-HPTIIZF-16140/20	16	140	40	20	18
	R-HPTIIZF-16160/40	16	160	60	40	18
	R-HPTIIZF-16180/60	16	180	80	60	18
M20	R-HPTIIZF-20125/5	20	125	5	-	22
	R-HPTIIZF-20160/20	20	160	40	20	22

* AT-ITB Polish Technical Approval AT-15-9327/2014

Installation data



Size			M8	M10	M12	M16	M20
Thread diameter	d	[mm]	8	10	12	16	20
Hole diameter in substrate	d_0	[mm]	8	10	12	16	20
Installation torque	T_{inst}	[Nm]	10	20	40	100	180
STANDARD EMBEDMENT DEPTH							
Min. hole depth in substrate	$h_{0,s}$	[mm]	55	69	80	100	119
Installation depth	$h_{nom,s}$	[mm]	55	69	80	100	119
Min. substrate thickness	$h_{min,s}$	[mm]	100	120	140	170	200
Min. spacing (Non-cracked concrete)	$s_{min,r}$	[mm]	50	70	90	160	180

Installation data (cont.)

Size			M8	M10	M12	M16	M20
Min. spacing (Cracked concrete)	$s_{min,r}$	[mm]	50	70	90	160	180
Min. edge distance (Non-cracked concrete)	$c_{min,r}$	[mm]	40	50	65	100	120
Min. edge distance (Cracked concrete)	$c_{min,r}$	[mm]	40	45	65	90	100
REDUCED EMBEDMENT DEPTH							
Min. hole depth in substrate	$h_{0,r}$	[mm]	40	49	60	80	100
Installation depth	$h_{nom,r}$	[mm]	40	49	60	80	100
Min. substrate thickness	$h_{min,r}$	[mm]	100			130	160
Min. spacing (Non-cracked concrete)	$s_{min,r}$	[mm]	55	75	150	190	300
Min. spacing (Cracked concrete)	$s_{min,r}$	[mm]	55	75	150	190	300
Min. edge distance (Non-cracked concrete)	$c_{min,r}$	[mm]	45	60	100	125	200
Min. edge distance (Cracked concrete)	$c_{min,r}$	[mm]	40	50	80	110	120

Mechanical properties

Size			M8	M10	M12	M16	M20
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	620	620	620	620	620
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm²]	531	531	531	531	531
Nominal yield strength - shear	f_{yk}	[N/mm²]	416	416	416	416	416
Cross sectional area - tension	A_s	[mm²]	25.5	40.7	60.1	106.6	162.9
Cross sectional area - shear	A_s	[mm²]	38.9	61.7	89.6	165.2	259.1
Elastic section modulus	W_{el}	[mm³]	34.3	68.3	119.6	299.5	588.3
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	19.0	38.0	67.0	167.0	328.0
Design bending resistance	M	[Nm]	15.0	31.0	53.0	134.0	263.0

Basic performance data

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

Size		M8	M10	M12	M16	M20
CRACKED CONCRETE						
Standard embedment depth h_{ef}	[mm]	47	59	68	85	99
Reduced embedment depth h_{ef}	[mm]	32	39	48	65	80
NON-CRACKED CONCRETE						
Standard embedment depth h_{ef}	[mm]	47	59	68	85	99
Reduced embedment depth h_{ef}	[mm]	32	39	48	65	80
MEAN ULTIMATE LOAD						
TENSION LOAD $N_{Ru,m}$						
CRACKED CONCRETE						
Standard embedment depth	[kN]	7.50	12.5	19.9	27.3	41.9
Reduced embedment depth	[kN]	4.80	8.60	12.8	26.8	32.7
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	12.4	20.6	27.7	45.5	64.8
Reduced embedment depth	[kN]	9.60	13.6	17.6	34.5	47.1
SHEAR LOAD $V_{Ru,m}$						
CRACKED CONCRETE						
Standard embedment depth	[kN]	12.2	19.2	28.0	51.5	80.9
Reduced embedment depth	[kN]	12.2	19.2	28.0	51.5	80.9
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	12.2	19.2	28.0	51.5	80.9
Reduced embedment depth	[kN]	12.2	19.2	28.0	51.5	80.9

Basic performance data (cont.)

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

Size		M8	M10	M12	M16	M20
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	5.00	9.00	12.0	20.0	30.0
Reduced embedment depth	[kN]	3.00	6.00	9.00	16.0	25.8
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	9.00	12.0	20.0	35.0	49.6
Reduced embedment depth	[kN]	7.50	9.00	12.0	26.4	36.1
SHEAR LOAD V_{Rk}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	5.00	9.00	23.3	40.0	60.0
Reduced embedment depth	[kN]	3.00	6.00	9.00	32.0	51.6
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	9.00	12.0	23.3	43.0	67.4
Reduced embedment depth	[kN]	7.50	9.00	12.0	43.0	67.4
DESIGN LOAD						
TENSION LOAD N_{Rd}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	2.78	6.00	8.00	13.3	20.0
Reduced embedment depth	[kN]	1.67	3.33	6.00	10.7	17.2
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	5.00	8.00	13.3	23.3	33.1
Reduced embedment depth	[kN]	4.17	5.00	8.00	17.6	24.1
SHEAR LOAD V_{Rd}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	2.78	6.00	16.0	26.7	40.0
Reduced embedment depth	[kN]	1.67	3.33	6.00	21.3	34.5
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	5.00	8.00	18.6	34.4	53.9
Reduced embedment depth	[kN]	4.17	5.00	8.00	34.4	48.1
RECOMMENDED LOAD						
TENSION LOAD N_{rec}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	1.98	4.29	5.71	9.52	14.3
Reduced embedment depth	[kN]	1.19	2.38	4.29	7.62	12.3
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	3.57	5.71	9.52	16.7	23.6
Reduced embedment depth	[kN]	2.98	3.57	5.71	12.6	17.2
SHEAR LOAD V_{rec}						
CRACKED CONCRETE						
Standard embedment depth	[kN]	1.99	4.29	11.4	19.1	28.6
Reduced embedment depth	[kN]	1.19	2.38	4.29	15.2	24.6
NON-CRACKED CONCRETE						
Standard embedment depth	[kN]	3.57	5.71	13.3	24.6	38.5
Reduced embedment depth	[kN]	2.98	3.57	5.71	24.6	34.4

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M8	R-HPTIIZF-08065/15*	8	65	100	100	12000	2.8	2.8	366.0	5906675022840
	R-HPTIIZF-08080/15	8	80	100	100	12000	3.3	3.3	426.0	5906675022857
	R-HPTIIZF-08100/35	8	100	100	100	17000	3.4	3.4	608.0	5906675034881
	R-HPTIIZF-08115/50	8	115	100	100	12000	4.4	4.4	558.0	5906675022871
M10	R-HPTIIZF-10065/5	10	65	50	50	10500	2.4	2.4	534.0	5906675022888
	R-HPTIIZF-10080/20	10	80	50	50	6000	3.0	3.0	390.0	5906675022895
	R-HPTIIZF-10095/15	10	95	50	50	6000	3.0	3.0	390.0	5906675022901
	R-HPTIIZF-10115/35	10	115	50	50	6000	3.7	3.7	468.0	5906675022918
	R-HPTIIZF-10130/50	10	130	50	50	6000	4.0	4.0	510.0	5906675022925
M12	R-HPTIIZF-12080/5	12	80	50	50	6000	5.0	5.0	630.0	5906675022932
	R-HPTIIZF-12100/5	12	100	50	50	6000	5.0	5.0	630.0	5906675022949
	R-HPTIIZF-12120/25	12	120	50	50	6000	5.5	5.5	684.0	5906675022956
	R-HPTIIZF-12135/40	12	135	50	50	3800	6.0	6.0	486.0	5906675022963
	R-HPTIIZF-12150/55	12	150	50	50	76000	7.0	7.0	10670.0	5906675022970
M16	R-HPTIIZF-16105/10	16	105	25	25	3600	5.0	5.0	750.0	5906675022987
	R-HPTIIZF-16140/20	16	140	25	25	1900	6.0	6.0	486.0	5906675022994
	R-HPTIIZF-16180/60	16	180	25	25	1900	6.0	6.0	486.0	5906675023007
M20	R-HPTIIZF-20125/5	20	125	25	25	1900	8.0	8.0	639.9	5906675023021
	R-HPTIIZF-20160/20	20	160	25	25	1900	10.0	10.0	790.0	5906675023038

* AT-ITB Polish Technical Approval AT-15-9327/2014

R-XPTIIA4 Stainless Steel Throughbolt

Stainless steel throughbolt for non-cracked concrete

Approvals and Reports

- ETA-12/0384; ETAG 001-2, Option 7

Product overview

Features and benefits

- Stainless steel anchor for the highest corrosion resistance
- High performance in non-cracked concrete confirmed by ETA Option 7
- Highest quality to receive optimal load capability
- Suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design of R-HPTII allows drilling and installing directly through the fixture and helps to reduce installation time

Applications

- Cladding restraint
- Curtain wall
- Balustrading
- Barriers
- Handrails
- Racking
- Structural steel
- Bollards

Base materials

Approved for use in:

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

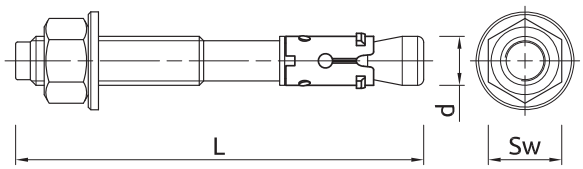
Also suitable for use in:

- Natural stone (after site testing)

Installation guide

1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

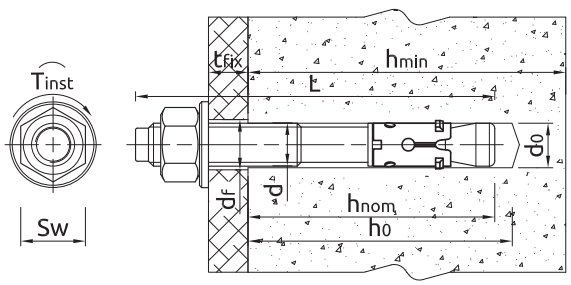
Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-XPTIIA4-06050/10	6	50	10	-	7
	R-XPTIIA4-06085/25	6	85	45	25	7
M8	R-XPTIIA4-08060/10	8	60	10	-	9
	R-XPTIIA4-08075/10	8	75	25	10	9
	R-XPTIIA4-08085/20	8	85	35	20	9
	R-XPTIIA4-08095/30	8	95	45	30	9
	R-XPTIIA4-08105/40	8	105	55	40	9
	R-XPTIIA4-08115/50	8	115	65	50	9
M10	R-XPTIIA4-10065/5	10	65	5	-	11
	R-XPTIIA4-10080/20	10	80	20	-	11
	R-XPTIIA4-10095/15	10	95	35	15	11
	R-XPTIIA4-10115/35	10	115	55	35	11
	R-XPTIIA4-10130/50	10	130	70	50	11
	R-XPTIIA4-10140/60	10	140	80	60	11
M12	R-XPTIIA4-12080/5	12	80	5	-	13
	R-XPTIIA4-12100/5	12	100	25	5	13
	R-XPTIIA4-12115/25	12	115	40	20	13
	R-XPTIIA4-12125/30	12	125	50	30	13
	R-XPTIIA4-12150/55	12	150	75	55	13
	R-XPTIIA4-12180/85	12	180	105	85	13
M16	R-XPTIIA4-16125/5	16	125	25	5	18
	R-XPTIIA4-16140/20	16	140	40	20	18
	R-XPTIIA4-16150/30	16	150	50	30	18
	R-XPTIIA4-16180/60	16	180	80	60	18
	R-XPTIIA4-16220/100*	16	220	120	100	18
M20	R-XPTIIA4-20125/5	20	125	5	-	22
	R-XPTIIA4-20160/20	20	160	40	20	22
	R-XPTIIA4-20200/60	20	200	80	60	22
	R-XPTIIA4-20300/160	20	300	180	160	22
M24	R-XPTIIA4-24260/100	24	260	115	100	26

* Made to order

Installation data



Installation data (cont.)

Size			M8	M10	M12	M16
Thread diameter	d	[mm]	8	10	12	16
Hole diameter in substrate	d_0	[mm]	8	10	12	16
Installation torque	T_{inst}	[Nm]	15	30	50	100
STANDARD EMBEDMENT DEPTH						
Min. hole depth in substrate	$h_{0,s}$	[mm]	55	69	80	100
Installation depth	$h_{nom,s}$	[mm]	55	69	80	100
Min. substrate thickness	$h_{min,s}$	[mm]	100	120	140	170
Min. spacing	$s_{min,r}$	[mm]	65	90	110	170
Min. edge distance	$c_{min,r}$	[mm]		60	85	90
REDUCED EMBEDMENT DEPTH						
Min. hole depth in substrate	$h_{0,r}$	[mm]	40	49	60	80
Installation depth	$h_{nom,r}$	[mm]	40	49	60	80
Min. substrate thickness	$h_{min,r}$	[mm]		100		130
Min. spacing	$s_{min,r}$	[mm]	65	115	150	190
Min. edge distance	$c_{min,r}$	[mm]	50	80	100	120

Mechanical properties

Size			M8	M10	M12	M16
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	545	545	500	500
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	600	600	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	436	436	400	400
Nominal yield strength - shear	f_{yk}	[N/mm²]	480	480	440	440
Cross sectional area - tension	A_s	[mm²]	38.9	61.7	89.6	165.2
Cross sectional area - shear	A_s	[mm²]	38.9	61.7	89.6	165.2
Elastic section modulus	W_{el}	[mm³]	34.3	68.3	119.6	299.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	22.0	45.0	72.0	180.0
Design bending resistance	M	[Nm]	18.0	36.0	57.0	144.0

Basic performance data

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

Size		M8	M10	M12	M16
Standard embedment depth h_{ef}	[mm]	47	59	68	85
Reduced embedment depth h_{ef}	[mm]	32	39	48	65
MEAN ULTIMATE LOAD					
TENSION LOAD $N_{Ru,m}$					
Standard embedment depth	[kN]	15.4	22.8	29.2	55.8
Reduced embedment depth	[kN]	10.4	16.0	22.1	37.9
SHEAR LOAD $V_{Ru,m}$					
Standard embedment depth	[kN]	14.0	22.2	29.6	54.5
Reduced embedment depth	[kN]	14.0	19.2	29.6	54.5
CHARACTERISTIC LOAD					
TENSION LOAD N_{Rk}					
Standard embedment depth	[kN]	9.00	16.0	25.0	39.5
Reduced embedment depth	[kN]	7.50	12.0	16.8	26.4
SHEAR LOAD V_{Rk}					
Standard embedment depth	[kN]	11.7	18.5	24.6	45.4
Reduced embedment depth	[kN]	11.7	14.7	24.6	45.4

Basic performance data (cont.)

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

DESIGN LOAD					
TENSION LOAD N_{Rd}					
Standard embedment depth	[kN]	5.00	10.7	16.7	26.3
Reduced embedment depth	[kN]	4.17	6.67	11.2	17.6
SHEAR LOAD V_{Rd}					
Standard embedment depth	[kN]	9.36	14.8	19.7	36.3
Reduced embedment depth	[kN]	9.36	8.18	19.7	36.3
RECOMMENDED LOAD					
TENSION LOAD N_{rec}					
Standard embedment depth	[kN]	3.57	7.62	11.9	18.8
Reduced embedment depth	[kN]	2.98	4.76	8.00	12.6
SHEAR LOAD V_{rec}					
Standard embedment depth	[kN]	6.69	10.6	14.1	25.9
Reduced embedment depth	[kN]	6.69	5.84	14.1	25.9

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M8	R-XPTIIA4-06050/10	6	50	100	100	21000	1.23	1.23	289.1	5906675100081
	R-XPTIIA4-06085/25	6	85	100	100	21000	1.82	1.82	413.0	5906675100104
M8	R-XPTIIA4-08075/10	8	75	100	100	12000	2.8	2.8	366.0	5906675047249
	R-XPTIIA4-08085/20	8	85	100	100	12000	3.3	3.3	426.0	5906675047256
	R-XPTIIA4-08095/30	8	95	100	100	12000	3.3	3.3	426.0	5906675047263
	R-XPTIIA4-08105/40	8	105	100	100	12000	4.4	4.4	558.0	5906675047270
	R-XPTIIA4-08115/50	8	115	100	100	12000	4.8	4.8	606.0	5906675047287
M10	R-XPTIIA4-10065/5	10	65	50	50	11000	3.0	3.0	690.0	5906675047294
	R-XPTIIA4-10080/20	10	80	50	50	6000	3.0	3.0	390.0	5906675047300
	R-XPTIIA4-10095/15	10	95	50	50	6000	3.7	3.7	468.0	5906675047317
	R-XPTIIA4-10115/35	10	115	50	50	6000	4.0	4.0	510.0	5906675047324
	R-XPTIIA4-10130/50	10	130	50	50	6000	5.0	5.0	630.0	5906675047331
	R-XPTIIA4-10140/60	10	140	50	50	6000	5.0	5.0	630.0	5906675047318
M12	R-XPTIIA4-12080/5	12	80	50	50	6000	5.6	5.6	702.0	5906675047355
	R-XPTIIA4-12100/5	12	100	50	50	6000	6.0	6.0	750.0	5906675047362
	R-XPTIIA4-12115/25	12	125	50	50	6000	7.0	7.0	750.0	5906675324548
	R-XPTIIA4-12125/30	12	125	50	50	6000	7.0	7.0	870.0	5906675047379
	R-XPTIIA4-12150/55	12	150	50	50	4000	10.0	10.0	830.0	5906675047386
	R-XPTIIA4-12180/85	12	180	50	50	3000	12.0	12.0	750.0	5906675047393
M16	R-XPTIIA4-16125/5	16	125	25	25	3000	6.0	6.0	750.0	5906675047409
	R-XPTIIA4-16140/20	16	140	25	25	2000	6.0	6.0	750.0	5906675047416
	R-XPTIIA4-16150/30	16	150	25	25	2000	5.7	5.7	488.0	5906675047430
	R-XPTIIA4-16180/60	16	180	25	25	2000	6.0	6.0	512.0	5906675047447
	R-XPTIIA4-16220/100*	16	220	25	25	2000	6.0	6.0	720.0	-
M20	R-XPTIIA4-20125/5	20	125	25	25	1500	8.2	8.2	522.2	5906675100241
	R-XPTIIA4-20160/20	20	160	25	25	1900	10.2	10.2	805.4	5906675100364
	R-XPTIIA4-20200/60	20	200	10	10	1200	5.0	5.0	631.4	5906675100401
	R-XPTIIA4-20300/160	20	300	10	10	760	7.3	7.3	555.0	5906675100418
M24	R-XPTIIA4-24260/100	24	260	10	10	710	9.5	9.5	673.0	5906675100432

* Made to order

R-XPT Throughbolt

Throughbolt for non-cracked concrete

Approvals and Reports

- ETA-08/0339; ETAG 001-2, Option 7
- AT-15-9327/2014

Installation movie

Product overview

Features and benefits

- High performance in non-cracked concrete confirmed by ETA Option 7
- Suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design allows drilling and installing directly through the fixture and helps to reduce installation time
- Cold formed body ensures consistent dimensional accuracy
- Simple through-installation (drilling and installation through fixed material)
- Optimized expander design with six grip features allows for a high load-bearing capacity
- Zinc plated passivated steel with clear CR3 zinc layer of thickness not thinner than 5um according to EN ISO 4042

Applications

- Cladding restraint
- Curtain wall
- Balustrading
- Barriers
- Handrails
- Racking
- Structural steel
- Bollards

Base materials

Approved for use in:

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

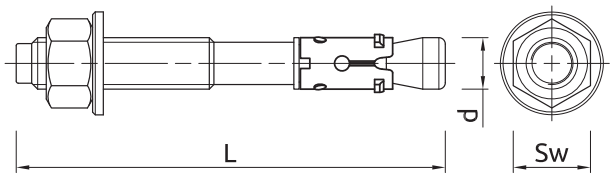
Also suitable for use in:

- Natural stone (after site testing)

Installation guide

1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-XPT-06050/10*	6	50	10	-	7
	R-XPT-06065/5*	6	65	25	5	7
	R-XPT-06085/25*	6	85	45	25	7
	R-XPT-06100/40*	6	100	60	40	7
M8	R-XPT-08050/5*	8	50	5	-	9
	R-XPT-08060/10	8	60	10	-	9
	R-XPT-08065/15	8	65	15	-	9
	R-XPT-08075/10	8	75	25	10	9
	R-XPT-08080/15	8	80	30	15	9
	R-XPT-08085/20	8	85	35	20	9
	R-XPT-08095/30	8	95	45	30	9
	R-XPT-08115/50	8	115	65	50	9
	R-XPT-08140/75	8	140	90	75	9
	R-XPT-08150/85	8	150	100	85	9
M10	R-XPT-10065/5	10	65	5	-	11
	R-XPT-10080/10	10	80	20	10	11
	R-XPT-10095/25	10	95	35	25	11
	R-XPT-10115/45	10	115	55	45	11
	R-XPT-10130/60	10	130	70	60	11
	R-XPT-10140/70	10	140	80	70	11
	R-XPT-10150/80	10	150	90	80	11
	R-XPT-10180/110	10	180	120	110	11
M12	R-XPT-12080/5	12	80	5	-	13
	R-XPT-12100/5	12	100	25	5	13
	R-XPT-12120/25	12	120	45	25	13
	R-XPT-12125/30	12	125	50	30	13
	R-XPT-12135/40	12	135	60	40	13
	R-XPT-12140/45	12	140	65	45	13
	R-XPT-12150/55	12	150	75	55	13
	R-XPT-12180/85	12	180	105	85	13
	R-XPT-12220/125*	12	220	145	125	13
	R-XPT-12300/205**	12	300	225	205	13
M16	R-XPT-16100/5	16	100	5	-	18
	R-XPT-16105/10	16	105	10	-	18
	R-XPT-16125/5	16	125	25	5	18
	R-XPT-16140/20	16	140	40	20	18
	R-XPT-16150/30	16	150	50	30	18
	R-XPT-16160/40	16	160	60	40	18
	R-XPT-16180/60	16	180	80	60	18
	R-XPT-16220/100*	16	220	120	100	18
	R-XPT-16280/160**	16	280	180	160	18

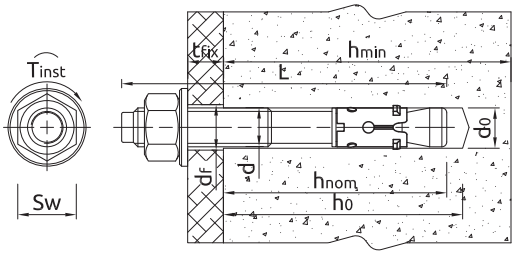
* AT-ITB Polish Technical Approval AT-15-9327/2014
** approval pending

Product information (cont.)

Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M20	R-XPT-20125/5	20	125	5	-	22
	R-XPT-20160/20	20	160	40	20	22
	R-XPT-20200/60*	20	200	80	60	22
	R-XPT-20300/160*	20	300	180	160	22
M24	R-XPT-24180/20*	24	180	35	20	26
	R-XPT-24260/100*	24	260	115	100	26
	R-XPT-24300/140*	24	300	155	140	26

* AT-ITB Polish Technical Approval AT-15-9327/2014
** approval pending

Installation data



Size			M6	M8	M10	M12	M16	M20	M24
Thread diameter	d	[mm]	6	8	10	12	16	20	24
Hole diameter in substrate	d_0	[mm]	6	8	10	12	16	20	24
Installation torque	T_{inst}	[Nm]	5	15	30	50	100	200	300
STANDARD EMBEDMENT DEPTH									
Min. hole depth in substrate	$h_{0,s}$	[mm]	50	55	59	80	100	119	135
Installation depth	$h_{nom,s}$	[mm]	50	55	59	80	100	119	135
Min. substrate thickness	$h_{min,s}$	[mm]	84	100		136	170	198	224
Min. spacing	$s_{min,s}$	[mm]	45	50	55	75	90	140	180
Min. edge distance	$c_{min,s}$	[mm]	50	40	50	65	80	100	200
REDUCED EMBEDMENT DEPTH									
Min. hole depth in substrate	$h_{0,r}$	[mm]	30	40	49	60	80	99	120
Installation depth	$h_{nom,r}$	[mm]	30	40	49	60	80	99	120
Min. substrate thickness	$h_{min,r}$	[mm]	80	100			130	158	194
Min. spacing	$s_{min,r}$	[mm]	40	45	55	100		125	160
Min. edge distance	$c_{min,r}$	[mm]	45	40	65	100		125	160

Mechanical properties

Size			M6	M8	M10	M12	M16	M20	M24
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	630	620	620	620	620	620	580
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	520	520	520	520	520	520	680
Nominal yield strength - tension	f_{yk}	[N/mm²]	539	531	531	531	531	531	496
Nominal yield strength - shear	f_{yk}	[N/mm²]	416	416	416	416	416	416	544
Cross sectional area - tension	A_s	[mm²]	15.2	25.5	40.7	60.1	106.6	162.9	311.0
Cross sectional area - shear	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W_{el}	[mm³]	12.7	31.2	62.3	109.2	277.5	540.9	935.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	7.10	17.0	35.0	61.0	155.0	302.0	651.0
Design bending resistance	M	[Nm]	5.70	14.0	28.0	49.0	124.0	241.0	521.0

Basic performance data

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

Size		M6	M8	M10	M12	M16	M20	M24
Standard embedment depth h_{ef}	[mm]	42	47	49	68	85	99	112
Reduced embedment depth h_{ef}	[mm]	22	32	39	48	65	79	97
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
Standard embedment depth	[kN]	8.70	18.1	19.8	28.0	49.7	65.3	67.6
Reduced embedment depth	[kN]	5.70	11.9	11.4	21.5	43.0	45.5	62.7
SHEAR LOAD $V_{Ru,m}$								
Standard embedment depth	[kN]	6.66	12.2	19.2	28.0	51.5	80.8	152.3
Reduced embedment depth	[kN]	6.66	12.2	16.0	28.0	51.5	80.8	152.3
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
Standard embedment depth	[kN]	6.80	12.0	12.0	25.0	40.0	40.0	50.0
Reduced embedment depth	[kN]	4.50	9.00	9.00	16.0	30.0	35.0	40.0
SHEAR LOAD V_{Rk}								
Standard embedment depth	[kN]	5.50	10.1	16.0	23.3	43.0	67.4	126.9
Reduced embedment depth	[kN]	5.50	10.1	12.0	23.3	43.0	67.4	126.9
DESIGN LOAD								
TENSION LOAD N_{Rd}								
Standard embedment depth	[kN]	3.78	6.67	6.67	13.9	22.2	22.2	27.8
Reduced embedment depth	[kN]	2.50	5.00	5.00	8.89	16.7	19.4	22.2
SHEAR LOAD V_{Rd}								
Standard embedment depth	[kN]	4.40	8.08	12.8	18.6	34.4	53.9	101.6
Reduced embedment depth	[kN]	4.40	8.08	6.67	18.6	34.4	38.2	101.6
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
Standard embedment depth	[kN]	2.70	4.76	4.76	9.92	15.9	15.9	19.8
Reduced embedment depth	[kN]	1.79	3.57	3.57	6.35	11.9	13.9	15.9
SHEAR LOAD V_{rec}								
Standard embedment depth	[kN]	3.14	5.77	9.14	13.3	24.6	38.5	72.5
Reduced embedment depth	[kN]	3.14	5.77	4.76	13.3	24.6	27.3	72.5

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M6	R-XPT-06050/10*	6	50	100	100	21000	1.22	1.22	287.0	5906675233499
	R-XPT-06065/5*	6	65	100	100	21000	1.47	1.47	339.5	5906675233505
	R-XPT-06085/25*	6	85	100	100	21000	1.81	1.81	410.1	5906675233512
	R-XPT-06100/40*	6	100	100	100	6400	2.1	2.1	163.4	5906675250311
M8	R-XPT-08050/5*	8	50	100	100	21000	2.3	2.3	513.0	5906675250328
	R-XPT-08060/10	8	60	100	100	21000	2.0	2.0	450.0	5906675234601
	R-XPT-08065/15	8	65	100	100	12000	2.8	2.8	366.0	5906675250335
	R-XPT-08075/10	8	75	100	100	12000	3.3	3.3	426.0	5906675233536
	R-XPT-08080/15	8	80	100	100	12000	3.3	3.3	426.0	5906675250342
	R-XPT-08085/20	8	85	100	100	12000	3.4	3.4	438.0	5906675249636
	R-XPT-08095/30	8	95	100	100	12000	3.7	3.7	474.0	5906675233543
	R-XPT-08115/50	8	115	100	100	12000	4.4	4.4	558.0	5906675233550
	R-XPT-08140/75	8	140	100	100	10800	2.0	2.0	246.0	5906675233567
	R-XPT-08150/85	8	150	100	100	10800	4.4	4.4	505.2	5906675250359
M10	R-XPT-10065/5	10	65	50	50	10500	2.0	2.0	450.0	5906675233574
	R-XPT-10080/10	10	80	50	50	6000	6.0	6.0	750.0	5906675233581
	R-XPT-10095/25	10	95	50	50	6000	3.3	3.3	420.6	5906675233598
	R-XPT-10115/45	10	115	50	50	6000	6.0	6.0	750.0	5906675233604
	R-XPT-10130/60	10	130	50	50	6000	4.0	4.0	510.0	5906675249643
	R-XPT-10140/70	10	140	50	50	6000	6.0	6.0	750.0	5906675233611
	R-XPT-10150/80	10	150	50	50	5400	4.2	4.2	478.7	5906675249650
	R-XPT-10180/110	10	180	50	50	5400	6.0	6.0	678.0	5906675250366
M12	R-XPT-12080/5	12	80	50	50	6000	5.0	5.0	630.0	5906675233628
	R-XPT-12100/5	12	100	50	50	6000	4.8	4.8	603.0	5906675233635
	R-XPT-12120/25	12	120	50	50	6000	5.0	5.0	630.0	5906675250373
	R-XPT-12125/30	12	125	50	50	3800	6.0	6.0	486.0	5906675233642
	R-XPT-12135/40	12	135	50	50	5400	6.0	6.0	678.0	5906675250380
	R-XPT-12140/45	12	140	50	50	5400	6.0	6.0	678.0	5906675249667
	R-XPT-12150/55	12	150	50	50	3800	6.0	6.0	486.0	5906675233659
	R-XPT-12180/85	12	180	50	50	3800	7.0	7.0	562.0	5906675233666
	R-XPT-12220/125*	12	220	50	50	3800	9.1	9.1	721.6	5906675233673
	R-XPT-12300/205**	12	300	10	10	760	2.5	2.5	222.0	5906675251424
M16	R-XPT-16100/5	16	100	25	25	3600	4.5	4.5	672.2	5906675233680
	R-XPT-16105/10	16	105	25	25	3600	6.0	6.0	894.0	5906675250403
	R-XPT-16125/5	16	125	25	25	2700	5.2	5.2	591.1	5906675233697
	R-XPT-16140/20	16	140	25	25	1900	6.0	6.0	486.0	5906675249063
	R-XPT-16150/30	16	150	25	25	1900	6.0	6.0	486.0	5906675249674
	R-XPT-16160/40	16	160	25	25	2700	6.0	6.0	678.0	5906675250410
	R-XPT-16180/60	16	180	25	25	1900	6.0	6.0	486.0	5906675249681
	R-XPT-16220/100*	16	220	25	25	1900	8.2	8.2	656.2	5906675233727
	R-XPT-16280/160**	16	280	15	15	1140	6.4	6.4	514.4	5906675250427
M20	R-XPT-20125/5	20	125	25	25	1900	10.0	10.0	790.0	5906675233734
	R-XPT-20160/20	20	160	25	25	1900	12.5	12.5	980.0	5906675233741
	R-XPT-20200/60*	20	200	10	10	1200	4.1	4.1	520.4	5906675233758
	R-XPT-20300/160*	20	300	10	10	760	7.3	7.3	585.3	5906675233765
M24	R-XPT-24180/20*	24	180	10	10	760	7.1	7.1	567.2	5906675233772
	R-XPT-24260/100*	24	260	10	10	760	9.9	9.9	783.1	5906675233789
	R-XPT-24300/140*	24	300	10	10	760	11.1	11.1	872.8	5906675233796

* AT-ITB Polish Technical Approval AT-15-9327/2014
** approval pending

R-XPT-HD Hot Dip Galvanized Throughbolt

Hot Dip Galvanized throughbolt for non-cracked concrete

Approvals and Reports

- AT-15-9326/2014

Product overview

Features and benefits

- Increased corrosion resistance due to hot dip zinc external protection layer
- R-XPT is suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design allows drilling and installing directly through the fixture and helps to reduce installation time
- High quality with cost effectiveness
- Cold formed body ensures consistent dimensional accuracy

Applications

- Cladding restraint
- Curtain wall
- Balustrading
- Barriers
- Handrails
- Racking
- Structural steel
- Bollards

Base materials

Approved for use in:

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

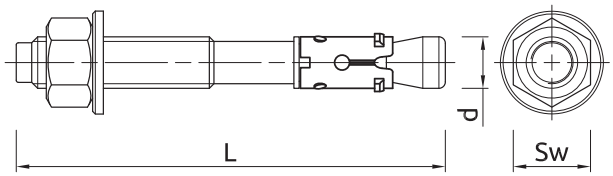
Also suitable for use in:

- Natural stone (after site testing)

Installation guide

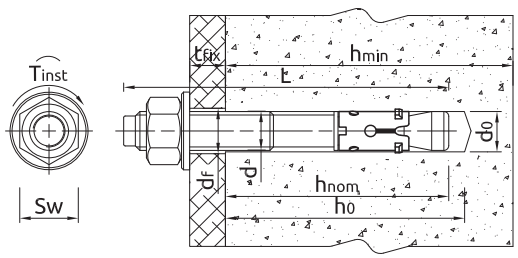
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness		Hole diameter
		d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-XPT-HD-06050/10	6	50	10	-	7
	R-XPT-HD-06085/25	6	85	45	25	7
	R-XPT-HD-06100/40	6	100	60	40	7
M8	R-XPT-HD-08050/5	8	50	5	-	9
	R-XPT-HD-08060/10	8	60	10	-	9
	R-XPT-HD-08065/15	8	65	15	-	9
	R-XPT-HD-08075/10	8	75	25	10	9
	R-XPT-HD-08080/15	8	80	30	15	9
	R-XPT-HD-08095/30	8	95	45	30	9
	R-XPT-HD-08115/50	8	115	65	50	9
	R-XPT-HD-08140/75	8	140	90	75	9
M10	R-XPT-HD-10065/5	10	65	5	-	11
	R-XPT-HD-10080/10	10	80	20	10	11
	R-XPT-HD-10095/25	10	95	35	25	11
	R-XPT-HD-10115/45	10	115	55	45	11
	R-XPT-HD-10130/60	10	130	70	60	11
	R-XPT-HD-10140/70	10	140	80	70	11
M12	R-XPT-HD-12080/5	12	80	5	-	13
	R-XPT-HD-12100/5	12	100	25	5	13
	R-XPT-HD-12120/25	12	120	45	25	13
	R-XPT-HD-12125/30	12	125	50	30	13
	R-XPT-HD-12135/40	12	135	60	40	13
	R-XPT-HD-12150/55	12	150	75	55	13
	R-XPT-HD-12180/85	12	180	105	85	13
	R-XPT-HD-12220/125	12	220	145	125	13
M16	R-XPT-HD-16100/5	16	100	5	-	18
	R-XPT-HD-16105/10	16	105	10	-	18
	R-XPT-HD-16125/5	16	125	25	5	18
	R-XPT-HD-16140/20	16	140	40	20	18
	R-XPT-HD-16150/30	16	150	50	30	18
	R-XPT-HD-16180/60	16	180	80	60	18
	R-XPT-HD-16220/100	16	220	120	100	18
M20	R-XPT-HD-20125/5	20	125	5	-	22
	R-XPT-HD-20160/20	20	160	40	20	22
	R-XPT-HD-20200/60	20	200	80	60	22
M24	R-XPT-HD-24260/100	24	260	115	100	26

Installation data



Installation data

Size			M6	M8	M10	M12	M16	M20	M24
Thread diameter	d	[mm]	6	8	10	12	16	20	24
Hole diameter in substrate	d_0	[mm]	6	8	10	12	16	20	24
Installation torque	T_{inst}	[Nm]	5	15	30	50	100	200	300
STANDARD EMBEDMENT DEPTH									
Min. hole depth in substrate	$h_{0,s}$	[mm]	55	60	65	85	105	125	140
Installation depth	$h_{nom,s}$	[mm]	50	55	59	80	100	119	135
Min. substrate thickness	$h_{min,s}$	[mm]	84	100		136	170	198	224
Min. spacing	$s_{min,s}$	[mm]	45	50	55	75	90	140	180
Min. edge distance	$c_{min,s}$	[mm]	50	40	50	65	80	100	200
REDUCED EMBEDMENT DEPTH									
Min. hole depth in substrate	$h_{0,r}$	[mm]	35	45	55	66	85	105	125
Installation depth	$h_{nom,r}$	[mm]	30	40	49	60	80	99	120
Min. substrate thickness	$h_{min,r}$	[mm]	80	100			130	158	194
Min. spacing	$s_{min,r}$	[mm]	40	45	55	100		125	160
Min. edge distance	$c_{min,r}$	[mm]	45	40	65	100		125	160

Mechanical properties

Size			M6	M8	M10	M12	M16	M20	M24
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	630	620	620	620	620	620	580
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	520	520	520	520	520	520	680
Nominal yield strength - tension	f_{yk}	[N/mm²]	539	531	531	531	531	531	496
Nominal yield strength - shear	f_{yk}	[N/mm²]	416	416	416	416	416	416	544
Cross sectional area - tension	A_s	[mm²]	15.2	25.5	40.7	60.1	106.6	162.9	311.0
Cross sectional area - shear	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W_{el}	[mm³]	12.7	31.2	62.3	109.2	277.5	540.9	935.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	7.10	17.0	35.0	61.0	155.0	302.0	651.0
Design bending resistance	M	[Nm]	5.70	14.0	28.0	49.0	124.0	241.0	521.0

Basic performance data

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

Size		M6	M8	M10	M12	M16	M20	M24
NON-CRACKED CONCRETE								
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
Standard embedment depth	[kN]	8.68	16.2	20.0	29.9	47.9	58.4	71.7
Reduced embedment depth	[kN]	4.20	9.61	12.9	20.9	34.8	46.6	61.6
SHEAR LOAD $V_{Ru,m}$								
Standard embedment depth	[kN]	6.66	12.2	19.2	28.0	51.5	80.9	152.3
Reduced embedment depth	[kN]	6.66	12.2	16.0	28.0	51.5	80.9	152.3
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
Standard embedment depth	[kN]	6.85	9.72	12.6	20.2	27.6	35.0	41.9
Reduced embedment depth	[kN]	2.98	6.05	8.87	12.9	19.4	28.0	35.4
SHEAR LOAD V_{Rk}								
Standard embedment depth	[kN]	5.50	9.72	12.6	23.3	43.0	67.4	83.8
Reduced embedment depth	[kN]	2.98	6.05	8.87	12.9	38.7	56.1	70.7
DESIGN LOAD								
TENSION LOAD N_{Rd}								
Standard embedment depth	[kN]	2.72	3.86	5.00	8.00	10.95	13.9	16.6
Reduced embedment depth	[kN]	1.18	2.40	3.52	5.11	7.68	11.1	14.0

Basic performance data (cont.)

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

Size		M6	M8	M10	M12	M16	M20	M24
SHEAR LOAD V_{Rd}								
Standard embedment depth	[kN]	2.72	3.86	5.00	16.0	21.9	27.8	33.3
Reduced embedment depth	[kN]	1.18	2.40	3.52	5.11	15.4	22.3	28.1
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
Standard embedment depth	[kN]	1.94	2.76	3.57	5.72	7.82	9.93	11.9
Reduced embedment depth	[kN]	0.84	1.71	2.51	3.65	5.49	7.95	10.0
SHEAR LOAD V_{rec}								
Standard embedment depth	[kN]	1.94	2.76	3.57	11.4	15.6	19.8	23.7
Reduced embedment depth	[kN]	0.84	1.71	2.51	3.65	10.98	15.9	20.0

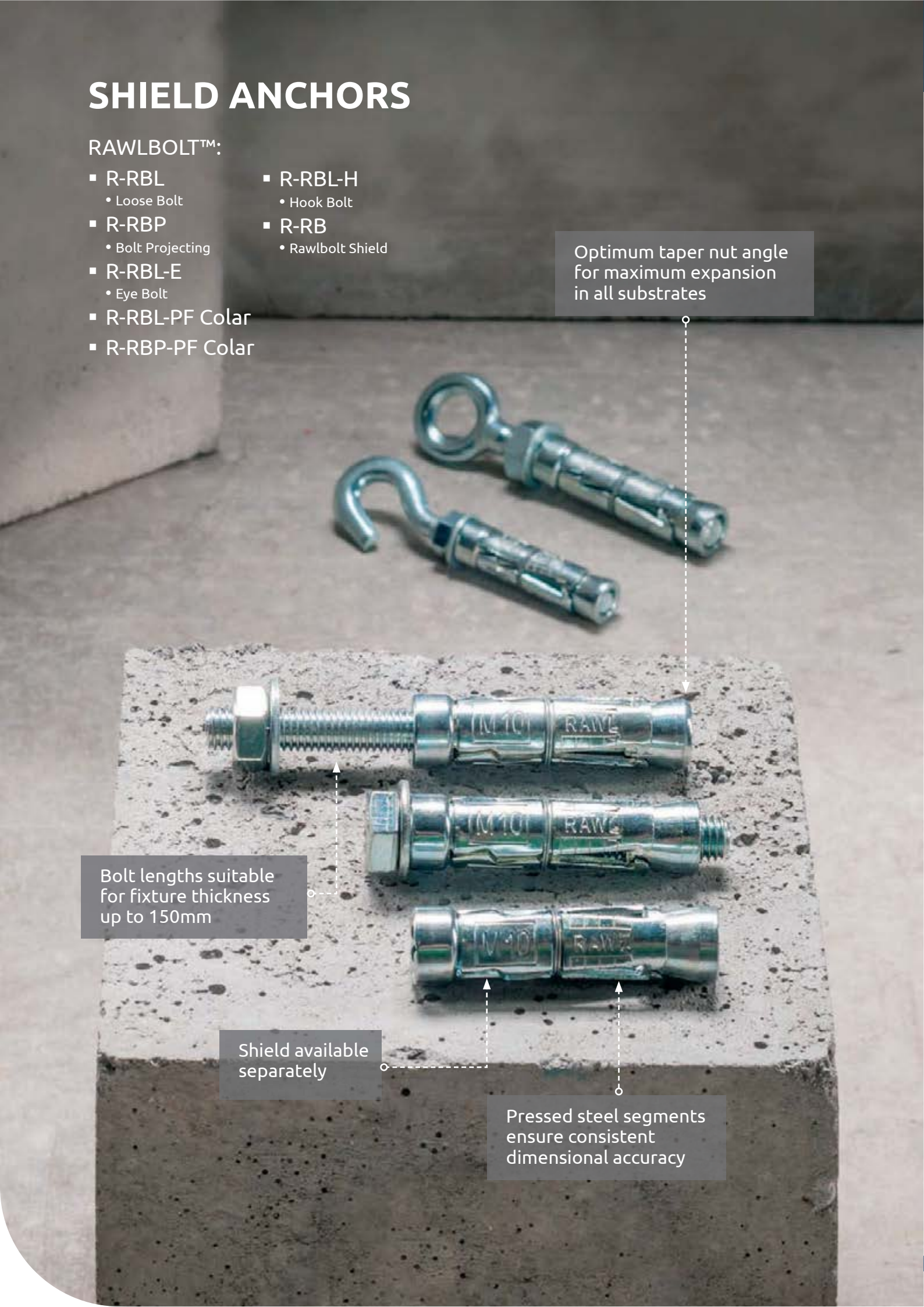
Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M6	R-XPT-HD-06050/10	6	50	100	100	58200	1.23	1.23	744.7	5906675277844
	R-XPT-HD-06085/25	6	85	100	100	39100	1.83	1.83	745.5	5906675277851
	R-XPT-HD-06100/40	6	100	100	100	6700	2.1	2.1	169.7	5906675277868
M8	R-XPT-HD-08050/5	8	50	100	100	9800	2.3	2.3	257.9	5906675277875
	R-XPT-HD-08060/10	8	60	100	100	10000	2.6	2.6	287.0	5906675234007
	R-XPT-HD-08065/15	8	65	100	100	10000	2.8	2.8	308.5	5906675277882
	R-XPT-HD-08075/10	8	75	100	100	12000	3.1	3.1	403.2	5906675234014
	R-XPT-HD-08080/15	8	80	100	100	12000	3.3	3.3	426.6	5906675277899
	R-XPT-HD-08095/30	8	95	100	100	9900	3.6	3.6	390.4	5906675234618
	R-XPT-HD-08115/50	8	115	100	100	12000	4.2	4.2	536.4	5906675234038
	R-XPT-HD-08140/75	8	140	100	100	7600	4.9	4.9	405.4	5906675234045
M10	R-XPT-HD-10065/5	10	65	50	50	10000	2.3	2.3	498.0	5906675234052
	R-XPT-HD-10080/10	10	80	50	50	6000	2.7	2.7	354.0	5906675234069
	R-XPT-HD-10095/25	10	95	50	50	6000	3.1	3.1	397.8	5906675234076
	R-XPT-HD-10115/45	10	115	50	50	6000	3.6	3.6	455.4	5906675234083
	R-XPT-HD-10130/60	10	130	50	50	6000	4.0	4.0	508.0	5906675277905
	R-XPT-HD-10140/70	10	140	50	50	6000	4.2	4.2	528.6	5906675234090
M12	R-XPT-HD-12080/5	12	80	50	50	6000	4.0	4.0	507.0	5906675234106
	R-XPT-HD-12100/5	12	100	50	50	6000	4.6	4.6	586.2	5906675234113
	R-XPT-HD-12120/25	12	120	50	50	6000	5.6	5.6	706.3	5906675277912
	R-XPT-HD-12125/30	12	125	50	50	3800	5.5	5.5	450.3	5906675234625
	R-XPT-HD-12135/40	12	135	50	50	4000	6.0	6.0	510.6	5906675277929
	R-XPT-HD-12150/55	12	150	50	50	3800	6.4	6.4	517.9	5906675234137
	R-XPT-HD-12180/85	12	180	50	50	3800	7.5	7.5	597.7	5906675234144
	R-XPT-HD-12220/125	12	220	50	50	3000	9.1	9.1	576.6	5906675234151
M16	R-XPT-HD-16100/5	16	100	25	25	3000	4.3	4.3	546.0	5906675234168
	R-XPT-HD-16105/10	16	105	25	25	2400	4.6	4.6	466.5	5906675277936
	R-XPT-HD-16125/5	16	125	25	25	2400	5.1	5.1	518.9	5906675234175
	R-XPT-HD-16140/20	16	140	25	25	1900	5.9	5.9	475.9	5906675277943
	R-XPT-HD-16150/30	16	150	25	25	2700	7.9	7.9	880.5	5906675249728
	R-XPT-HD-16180/60	16	180	25	25	1600	8.9	8.9	597.5	5906675249735
	R-XPT-HD-16220/100	16	220	25	25	1900	8.2	8.2	656.2	5906675234205
M20	R-XPT-HD-20125/5	20	125	25	25	2150	8.2	8.2	735.4	5906675234212
	R-XPT-HD-20160/20	20	160	25	25	1900	10.2	10.2	805.4	5906675234229
	R-XPT-HD-20200/80	20	200	10	10	960	4.9	4.9	501.1	5906675199849
M24	R-XPT-HD-24260/100	24	260	10	10	760	9.9	9.9	785.2	5906675249742

SHIELD ANCHORS

RAWLBOLT™:

- R-RBL
  - Loose Bolt
- R-RBP
  - Bolt Projecting
- R-RBL-E
  - Eye Bolt
- R-RBL-PF Colar
- R-RBP-PF Colar
- R-RBL-H
  - Hook Bolt
- R-RB
  - Rawlbolt Shield



R-RBL, R-RBP RAWLBOLT

World's most popular all-purpose expanding shield anchor

R-RBL

R-RBP

Approvals and Reports

- ETA-11/0479; ETAG 001-2, Option 1
- AT-15-7280/2014

Versions

- R-RBL - Loose Bolt
- R-RBP - Bolt Projecting

Installation movie

Product overview

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 up to 120 min
- Three-piece expanding sleeve provides maximum expansion to ensure optimum loads and safety are achieved in various substrates
- Wide range of diameters (M6 to M24)

Applications

- Roller shutter doors
- Fire doors
- Steelwork
- Security grills
- Machinery
- Pipework/ductwork supports

Base materials

Approved for use in:

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

Also suitable for use in:

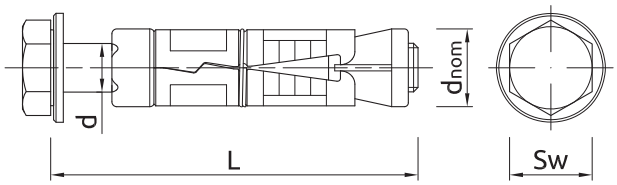
- Natural stone (after site testing)
- Hollow Brick

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 blow pump and brush or equivalent method)
3. Remove pre-assembled bolt and washer. Insert shield into hole and tap home with hammer until flush with surface
4. Insert bolt with washer through fixture into the shield
5. Tighten to the recommended torque

Product information

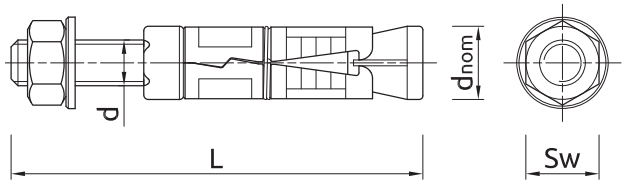
R-RBL



Size	Product Code	Anchor			Fixture		
		Bolt diameter	External diameter	Bolt length	Max. thickness	Min. thickness	Hole diameter
		d	d_1	L_1	t_{fix}		d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBL-M06/10W	6	12	55	10	0	6.5
	R-RBL-M06/25W	6	12	70	25	0	6.5
	R-RBL-M06/40W	6	12	85	40	0	6.5
M8	R-RBL-M08/10W	8	14	65	10	0	9
	R-RBL-M08/25W	8	14	80	25	0	9
	R-RBL-M08/40W	8	14	95	40	0	9
M10	R-RBL-M10/10W	10	16	75	10	0	11
	R-RBL-M10/25W	10	16	90	25	0	11
	R-RBL-M10/50W	10	16	115	50	0	11
	R-RBL-M10/75W	10	16	140	75	0	11
M12	R-RBL-M12/10W	12	20	90	10	0	13
	R-RBL-M12/25W	12	20	105	25	0	13
	R-RBL-M12/40W	12	20	120	40	0	13
	R-RBL-M12/60W	12	20	140	60	0	13
M16	R-RBL-M16/15W	16	25	135	15	0	17
	R-RBL-M16/30W	16	25	150	30	10	17
	R-RBL-M16/60W	16	25	180	60	30	17
M20	R-RBL-M20/60W	20	32	195	60	25	22
	R-RBL-M20/100W	20	32	235	110	60	22
M24*	R-RBL-M24/100W	24	38	255	100	25	26
	R-RBL-M24/150W	24	38	300	150	100	26

*M24 not covered with ETA

R-RBP



Size	Product Code	Anchor			Fixture		
		Bolt diameter	External diameter	Length	Max. thickness	Min. thickness	Hole diameter
		d	d_1	L_1	t_{fix}		d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBP-M06/10W	6	12	65	10	0	6.5
	R-RBP-M06/25W	6	12	80	25	0	6.5
	R-RBP-M06/60W	6	12	115	60	0	6.5
M8	R-RBP-M08/10W	8	14	75	10	0	9
	R-RBP-M08/25W	8	14	90	25	0	9
	R-RBP-M08/60W	8	14	125	60	0	9

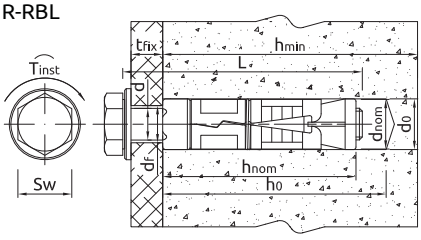
Product information (cont.)

Size	Product Code	Anchor			Fixture		
		Bolt diameter	External diameter	Length	Max. thickness	Min. thickness	Hole diameter
		d	d_1	L_1	t_{fix}		d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M10	R-RBP-M10/15W	10	16	90	15	0	11
	R-RBP-M10/30W	10	16	105	30	0	11
	R-RBP-M10/60W	10	16	135	60	0	11
M12	R-RBP-M12/15W	12	20	110	15	0	13
	R-RBP-M12/30W	12	20	125	30	0	13
	R-RBP-M12/75W	12	20	170	75	0	13
M16	R-RBP-M16/15W	16	25	150	15	0	17
	R-RBP-M16/35W	16	25	170	35	10	17
	R-RBP-M16/75W	16	25	210	75	35	17
M20	R-RBP-M20/15W	20	32	170	15	0	22
	R-RBP-M20/30W	20	32	185	30	10	22
	R-RBP-M20/100W	20	32	255	100	30	22
M24*	R-RBP-M24/75W	24	38	255	75	0	26

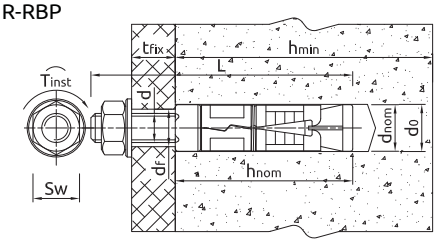
*M24 not covered with ETA

Installation data

R-RBL



R-RBP



Size			M6	M8	M10	M12	M16	M20	M24
Thread diameter	d	[mm]	6	8	10	12	16	20	24
Hole diameter in substrate	d_0	[mm]	12	14	16	20	25	32	38
Installation torque	T_{inst}	[Nm]	6.5	15	27	50	120	230	400
Min. hole depth in substrate	h_0	[mm]	50	55	65	85	125	140	160
Installation depth	h_{nom}	[mm]	45	50	60	80	120	135	155
Min. substrate thickness	h_{min}	[mm]	100				142.5	172.5	240
Min. spacing	s_{min}	[mm]	35	40	50	60	95	115	210
Min. edge distance	c_{min}	[mm]	53	60	75	90	143	173	188

Mechanical properties

Size			M6	M8	M10	M12	M16	M20	M24
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W_{el}	[mm³]	12.7	31.2	62.3	109.2	277.5	540.9	935.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	7.60	19.0	37.0	66.0	166.0	325.0	561.0
Design bending resistance	M	[Nm]	6.10	15.0	30.0	52.0	133.0	260.0	449.0

Basic performance data

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

Size		M6	M8	M10	M12	M16	M20	M24
Embedment depth h_{ef}	[mm]	35	40	50	60	95	115	125
MEAN ULTIMATE LOAD								
TENSION LOAD $N_{Ru,m}$								
NON-CRACKED CONCRETE	[kN]	6.36	8.35	15.2	18.4	48.8	56.6	94.3
CRACKED CONCRETE	[kN]	4.06	5.31	7.12	12.0	18.2	34.2	-
SHEAR LOAD $V_{Ru,m}$								
NON-CRACKED CONCRETE	[kN]	6.04	11.0	17.4	25.3	47.1	73.5	105.9
CRACKED CONCRETE	[kN]	6.04	11.0	17.4	25.3	47.1	73.5	-
CHARACTERISTIC LOAD								
TENSION LOAD N_{Rk}								
NON-CRACKED CONCRETE	[kN]	6.00	7.50	12.0	16.0	40.0	50.0	70.0
CRACKED CONCRETE	[kN]	4.00	5.00	6.00	12.0	16.0	30.0	-
SHEAR LOAD V_{Rk}								
NON-CRACKED CONCRETE	[kN]	5.03	7.50	12.0	21.1	39.3	61.2	88.3
CRACKED CONCRETE	[kN]	4.00	5.00	6.00	21.1	32.0	60.0	-
DESIGN LOAD								
TENSION LOAD N_{Rd}								
NON-CRACKED CONCRETE	[kN]	3.33	4.17	6.67	8.89	22.2	27.8	38.9
CRACKED CONCRETE	[kN]	2.22	2.78	3.33	6.67	8.89	16.7	-
SHEAR LOAD V_{Rd}								
NON-CRACKED CONCRETE	[kN]	3.33	4.17	6.67	16.9	31.4	49.0	70.6
CRACKED CONCRETE	[kN]	2.22	2.78	3.3	13.3	17.8	33.3	-
RECOMMENDED LOAD								
TENSION LOAD N_{rec}								
NON-CRACKED CONCRETE	[kN]	2.38	2.98	4.76	6.35	15.9	19.8	27.8
CRACKED CONCRETE	[kN]	1.59	1.99	2.38	4.76	6.35	11.9	-
SHEAR LOAD V_{rec}								
NON-CRACKED CONCRETE	[kN]	2.38	2.98	4.76	12.1	22.4	35.0	50.4
CRACKED CONCRETE	[kN]	1.59	1.99	2.38	9.52	12.7	23.8	-

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
Rawlbolt R-RBL Loose Bolt										
M6	R-RBL-M06/10W	6	55	50	50	15750	1.55	1.55	518.3	5906675283210
	R-RBL-M06/25W	6	70	50	50	15750	1.60	1.60	534.0	5906675283234
	R-RBL-M06/40W	6	85	50	50	9000	1.85	1.85	363.0	5906675283258
M8	R-RBL-M08/10W	8	65	50	50	15750	2.7	2.7	880.5	5906675283272
	R-RBL-M08/25W	8	80	50	50	9000	3.0	3.0	570.0	5906675283296
	R-RBL-M08/40W	8	95	50	50	9000	3.3	3.3	624.0	5906675283319
M10	R-RBL-M10/10W	10	75	50	50	9000	4.6	4.6	858.0	5906675283333
	R-RBL-M10/25W	10	90	50	50	7500	5.0	5.0	780.0	5906675283357
	R-RBL-M10/50W	10	115	50	50	4500	5.7	5.7	543.0	5906675283371
	R-RBL-M10/75W	10	140	50	50	5400	6.4	6.4	721.2	5906675283395
M12	R-RBL-M12/10W	12	90	25	25	4500	4.3	4.3	808.5	5906675283401
	R-RBL-M12/25W	12	105	25	25	2700	4.6	4.6	521.4	5906675283418
	R-RBL-M12/40W	12	120	25	25	2250	4.6	4.6	441.8	5906675283425
	R-RBL-M12/60W	12	140	25	25	2250	5.2	5.2	500.3	5906675283432

Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M16	R-RBL-M16/15W	16	135	10	10	900	4.1	4.1	401.7	5906675283449
	R-RBL-M16/30W	16	150	10	10	900	4.4	4.4	421.5	5906675283456
	R-RBL-M16/60W	16	180	10	10	900	4.8	4.8	461.1	5906675283463
M20	R-RBL-M20/60W	20	195	10	10	690	8.8	8.8	634.4	5906675283487
	R-RBL-M20/100W	20	235	10	10	360	9.8	9.8	383.5	5906675283470
M24*	R-RBL-M24/100W	24	255	5	5	144	7.3	7.3	238.8	5906675283494
	R-RBL-M24/150W	24	300	2	10	190	3.3	16.3	339.7	5906675283500
Rawlbolt R-RBP Bolt Projecting										
M6	R-RBP-M06/10W	6	65	50	50	6300	2.8	2.8	382.8	5906675283593
	R-RBP-M06/25W	6	80	50	50	15750	1.65	1.65	549.8	5906675283616
	R-RBP-M06/60W	6	115	50	50	9000	2.0	2.0	390.0	5906675283630
M8	R-RBP-M08/10W	8	75	50	50	15750	2.8	2.8	912.0	5906675283654
	R-RBP-M08/25W	8	90	50	50	9000	3.1	3.1	588.0	5906675283678
	R-RBP-M08/60W	8	125	50	50	9000	3.6	3.6	678.0	5906675283692
M10	R-RBP-M10/15W	10	90	50	50	7500	4.9	4.9	765.0	5906675283715
	R-RBP-M10/30W	10	105	50	50	7500	5.3	5.3	825.0	5906675283739
	R-RBP-M10/60W	10	135	50	50	5400	6.0	6.0	678.0	5906675283753
M12	R-RBP-M12/15W	12	110	25	25	4500	4.1	4.1	759.0	5906675283760
	R-RBP-M12/30W	12	125	25	25	2250	5.0	5.0	475.5	5906675283777
	R-RBP-M12/75W	12	170	25	25	2250	5.8	5.8	552.0	5906675283784
M16	R-RBP-M16/15W	16	150	10	10	900	4.1	4.1	397.2	5906675283791
	R-RBP-M16/35W	16	170	10	10	900	4.7	4.7	448.5	5906675283807
	R-RBP-M16/75W	16	210	10	10	690	5.3	5.3	392.3	5906675283814
M20	R-RBP-M20/15W	20	170	10	10	600	7.6	7.6	487.8	5906675283821
	R-RBP-M20/30W	20	185	10	10	690	8.3	8.3	603.4	5906675283838
	R-RBP-M20/100W	20	255	10	10	300	9.9	9.9	328.2	5906675284781
M24*	R-RBP-M24/75W	24	255	5	5	330	7.1	7.1	498.6	5906675283852

*M24 not covered with ETA

R-RBL-PF, R-RBP-PF RAWLBOLT Plastic Ferrule

World's most popular all-purpose expanding shield anchor

Approvals and Reports

- AT-15-7280/2014

Product overview

Features and benefits

- For use in concrete, hollowcore slabs, flooring blocks and ceramics
- Plastic ferrule simplifies installation in hollow substrates
- Product recommended for applications requiring fire resistance
- Wide range of diameters (M6 to M16)
- Three-piece expanding sleeve provides maximum expansion to ensure optimum loads and safety are achieved in various substrates

Applications

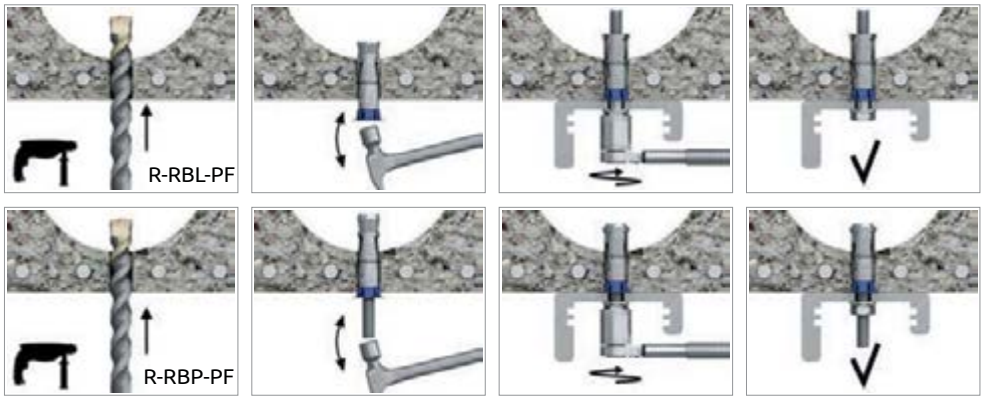
- Roller shutter doors
- Fire doors
- Steelwork
- Security grills
- Machinery
- Pipework/ductwork supports

Base materials

Approved for use in:

- Hollow core slab min. C20/25
- Solid brick
- Hollow sand-lime brick min. C20/25
- Hollow lightweight
- Concrete block

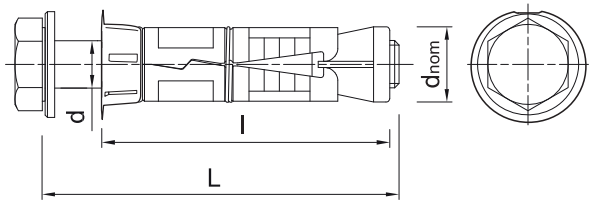
Installation guide



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 blow pump and brush or equivalent method)
3. Remove pre-assembled bolt and washer. Insert shield into hole and tap home with hammer until flush with surface
4. Insert bolt with washer through fixture into the shield
5. Tighten to the recommended torque

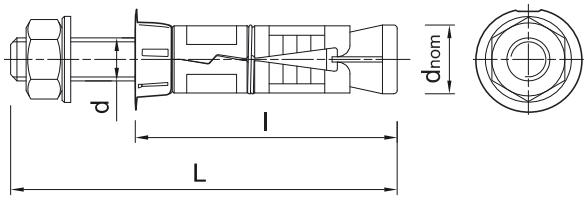
Product information

R-RBL-PF



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Bolt length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBL-PF-M06/10W	6	12	55	10	6.5
	R-RBL-PF-M06/25W	6	12	70	25	6.5
	R-RBL-PF-M06/40W	6	12	85	40	6.5
M8	R-RBL-PF-M08/10W	8	14	65	10	9
	R-RBL-PF-M08/25W	8	14	80	25	9
	R-RBL-PF-M08/40W	8	14	95	40	9
M10	R-RBL-PF-M10/10W	10	16	75	10	11
	R-RBL-PF-M10/25W	10	16	90	25	11
	R-RBL-PF-M10/50W	10	16	115	50	11
	R-RBL-PF-M10/75W	10	16	140	75	11
M12	R-RBL-PF-M12/10W	12	20	90	10	13
	R-RBL-PF-M12/25W	12	20	105	25	13
	R-RBL-PF-M12/40W	12	20	120	40	13
	R-RBL-PF-M12/60W	12	20	140	60	13
M16	R-RBL-PF-M16/15W	16	25	135	15	17
	R-RBL-PF-M16/30W	16	25	150	30	17
	R-RBL-PF-M16/60W	16	25	180	60	17

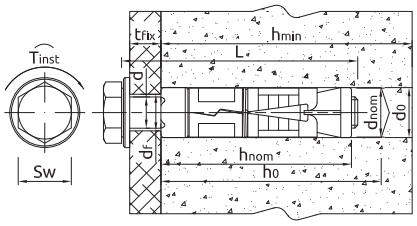
R-RBP-PF



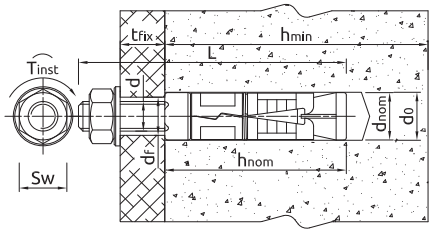
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Bolt length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBP-PF-M06/10W	6	12	65	10	6.5
	R-RBP-PF-M06/25W	6	12	80	25	6.5
	R-RBP-PF-M06/60W	6	12	115	60	6.5
M8	R-RBP-PF-M08/10W	8	14	75	10	9
	R-RBP-PF-M08/25W	8	14	90	25	9
	R-RBP-PF-M08/60W	8	14	125	60	9
M10	R-RBP-PF-M10/15W	10	16	90	15	11
	R-RBP-PF-M10/30W	10	16	105	30	11
	R-RBP-PF-M10/60W	10	16	135	60	11
M12	R-RBP-PF-M12/15W	12	20	110	15	13
	R-RBP-PF-M12/30W	12	20	125	30	13
	R-RBP-PF-M12/75W	12	20	170	75	13
M16	R-RBP-PF-M16/15W	16	25	150	15	17
	R-RBP-PF-M16/35W	16	25	170	35	17
	R-RBP-PF-M16/75W	16	25	210	75	17

Installation data

R-RBL-PF



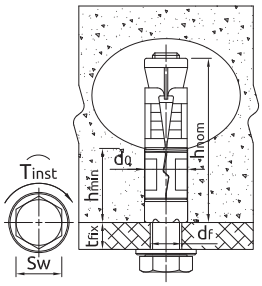
R-RBP-PF



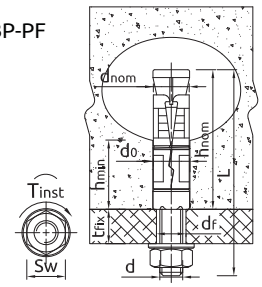
Installation data for solid material

Size			M6	M8	M10	M12	M16
Thread diameter	d	[mm]	6	8	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	16	20	25
Installation torque	T_{inst}	[Nm]	6.5	15	27	50	120
Min. hole depth in substrate	h_0	[mm]	-	-	-	-	-
Installation depth	h_{nom}	[mm]	45	50	60	80	120
Min. substrate thickness	h_{min}	[mm]	23	23	35	40	50
Min. spacing	s_{min}	[mm]	100	100	100	100	100
Min. edge distance	c_{min}	[mm]	100	100	100	100	143

R-RBL-PF



R-RBP-PF



Installation data for hollow material

Size			M6	M8	M10	M12	M16
Thread diameter	d	[mm]	6	8	10	12	16
Hole diameter in substrate	d_0	[mm]	12	14	16	20	25
Installation torque	T_{inst}	[Nm]	3	5	8	10	15
Min. hole depth in substrate	h_0	[mm]	50	55	65	85	125
Installation depth	h_{nom}	[mm]	45	50	60	80	120
Min. substrate thickness	h_{min}	[mm]	100	100	100	100	142
Min. spacing	s_{min}	[mm]	35	40	50	60	95
Min. edge distance	c_{min}	[mm]	53	60	75	90	143

Basic performance data

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

Size				M6	M8	M10	M12	M16
MEAN ULTIMATE LOAD								
TENSION and SHEAR LOAD $F_{RU,m}$								
Concrete Hollow Core Slab								
	THICKNESS	Class						
CONCRETE HOLLOW SLAB	23	C30/37	[kN]	8.91	10.40	-	-	-
		C35/45	[kN]	9.86	11.50	-	-	-
		C45/55	[kN]	10.93	12.75	-	-	-
		C50/60	[kN]	11.88	13.86	-	-	-
CONCRETE HOLLOW SLAB	35	C30/37	[kN]	9.93	16.33	18.84	-	-
		C35/45	[kN]	10.99	18.07	20.85	-	-
		C45/55	[kN]	12.18	20.03	23.11	-	-
		C50/60	[kN]	13.24	21.77	25.12	-	-

Basic performance data (cont.)

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

Size				M6	M8	M10	M12	M16
MEAN ULTIMATE LOAD								
TENSION and SHEAR LOAD $F_{RU,m}$								
Concrete Hollow Core Slab								
CONCRETE HOLLOW SLAB	40	C30/37	[kN]	9.52	18.46	28.04	34.82	-
		C35/45	[kN]	10.53	20.43	31.03	38.54	-
		C45/55	[kN]	11.67	22.64	34.39	42.72	-
		C50/60	[kN]	12.69	24.61	37.38	46.43	-
CONCRETE HOLLOW SLAB	50	C20/25	[kN]	10.31	10.96	10.96	10.96	10.96
LIGHWEIGHT CONCRETE LAC LAC		5	[kN]	8.34	8.78	8.78	8.78	8.78
SOLID BRICK		20	[kN]	9.97	9.64	9.64	9.64	9.64
SEND-LINE BRICK		15	[kN]	4.27	-	-	-	-
CHARACTERISTIC LOAD								
TENSION and SHEAR LOAD F_{RK}								
Concrete Hollow Core Slab								
	THICKNESS	Class						
CONCRETE HOLLOW SLAB	23	C30/37	[kN]	4.36	5.44	-	-	-
		C35/45	[kN]	4.82	6.02	-	-	-
		C45/55	[kN]	5.35	6.67	-	-	-
		C50/60	[kN]	5.81	7.25	-	-	-
CONCRETE HOLLOW SLAB	35	C30/37	[kN]	6.61	11.42	16.07	-	-
		C35/45	[kN]	7.31	12.64	17.78	-	-
		C45/55	[kN]	8.11	14.01	19.71	-	-
		C50/60	[kN]	8.81	15.23	21.42	-	-
CONCRETE HOLLOW SLAB	40	C30/37	[kN]	7.30	16.94	19.19	25.46	-
		C35/45	[kN]	8.08	18.75	21.23	28.18	-
		C45/55	[kN]	8.95	20.78	23.53	31.23	-
		C50/60	[kN]	9.73	22.59	25.58	33.95	-
CONCRETE HOLLOW SLAB	50	C20/25	[kN]	8.45	8.93	8.93	8.93	8.93
LIGHWEIGHT CONCRETE LAC LAC		5	[kN]	5.98	5.99	5.99	5.99	5.99
SOLID BRICK		20	[kN]	6.25	6.37	6.37	6.37	6.37
SEND-LINE BRICK		15	[kN]	1.90	-	-	-	-
DESIGN LOAD								
TENSION and SHEAR LOAD F_{Rd}								
Concrete Hollow Core Slab								
	THICKNESS	Class						
CONCRETE HOLLOW SLAB	23	C30/37	[kN]	1,73	2,16	-	-	-
		C35/45	[kN]	1,91	2,39	-	-	-
		C45/55	[kN]	2,12	2,65	-	-	-
		C50/60	[kN]	2,31	2,88	-	-	-
CONCRETE HOLLOW SLAB	35	C30/37	[kN]	2,62	4,53	6,38	-	-
		C35/45	[kN]	2,90	5,02	7,06	-	-
		C45/55	[kN]	3,22	5,56	7,82	-	-
		C50/60	[kN]	3,50	6,04	8,50	-	-
CONCRETE HOLLOW SLAB	40	C30/37	[kN]	2,90	6,72	7,62	10,10	-
		C35/45	[kN]	3,21	7,44	8,42	11,18	-
		C45/55	[kN]	3,55	8,25	9,34	12,39	-
		C50/60	[kN]	3,86	8,96	10,15	13,47	-
CONCRETE HOLLOW SLAB	50	C20/25	[kN]	3,35	3,54	3,54	3,54	3,54
LIGHWEIGHT CONCRETE LAC LAC		5	[kN]	1,95	1,96	1,96	1,96	1,96
SOLID BRICK		20	[kN]	2,16	2,20	2,20	2,20	2,20
SEND-LINE BRICK		15	[kN]	0,75	-	-	-	-

Basic performance data (cont.)

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

Size				M6	M8	M10	M12	M16
RECOMMENDED LOAD								
TENSION and SHEAR LOAD F_{Rec**}								
Concrete Hollow Core Slab								
	THICKNESS	Class						
CONCRETE HOLLOW SLAB	23	C30/37	[kN]	1,24	1,54	—	—	—
		C35/45	[kN]	1,37	1,71	—	—	—
		C45/55	[kN]	1,52	1,89	—	—	—
		C50/60	[kN]	1,65	2,05	—	—	—
CONCRETE HOLLOW SLAB	35	C30/37	[kN]	1,87	3,24	4,55	—	—
		C35/45	[kN]	2,07	3,58	5,04	—	—
		C45/55	[kN]	2,30	3,97	5,59	—	—
		C50/60	[kN]	2,50	4,32	6,07	—	—
CONCRETE HOLLOW SLAB	40	C30/37	[kN]	2,07	4,80	5,44	7,22	—
		C35/45	[kN]	2,29	5,31	6,02	7,99	—
		C45/55	[kN]	2,54	5,89	6,67	8,85	—
		C50/60	[kN]	2,76	6,40	7,25	9,62	—
CONCRETE HOLLOW SLAB	50	C20/25	[kN]	2,40	2,53	2,53	2,53	2,53
LIGHWEIGHT CONCRETE LAC LAC		5	[kN]	1,40	1,40	1,40	1,40	1,40
SOLID BRICK		20	[kN]	1,54	1,57	1,57	1,57	1,57
SEND-LINE BRICK		15	[kN]	0,54	—	—	—	—

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
Rawlbolt R-RBL-PF Loose Bolt										
M6	R-RBL-PF-M06/10W	6	55	50	400	22400	1.6	12.4	694.4	5906675117485
	R-RBL-PF-M06/25W	6	70	50	400	22400	1.6	12.8	716.8	5906675117492
	R-RBL-PF-M06/40W	6	85	50	50	20800	1.9	1.9	769.6	5906675117508
M8	R-RBL-PF-M08/10W	8	65	50	400	22400	2.7	21.6	1209.6	5906675117515
	R-RBL-PF-M08/25W	8	80	50	50	20800	3.0	3.0	1248.0	5906675117522
	R-RBL-PF-M08/40W	8	95	50	50	20800	3.3	3.3	1372.8	5906675117539
M10	R-RBL-PF-M10/10W	10	75	50	50	20800	4.6	4.6	1913.6	5906675117546
	R-RBL-PF-M10/25W	10	90	50	50	12800	5.0	5.0	1280.0	5906675117560
	R-RBL-PF-M10/50W	10	115	50	50	15600	5.7	5.7	1778.4	5906675117577
	R-RBL-PF-M10/75W	10	140	50	50	12800	6.4	6.4	1638.4	5906675117584
M12	R-RBL-PF-M12/10W	12	90	25	25	10400	4.3	4.3	1799.2	5906675117591
	R-RBL-PF-M12/25W	12	105	25	25	6400	4.6	4.6	1164.8	5906675117607
	R-RBL-PF-M12/40W	12	120	25	25	7800	4.6	4.6	1427.4	5906675117614
	R-RBL-PF-M12/60W	12	140	25	25	7800	5.2	5.2	1630.2	5906675117621
M16	R-RBL-PF-M16/15W	16	135	10	10	2560	4.1	4.1	1057.3	5906675117638
	R-RBL-PF-M16/30W	16	150	10	10	2560	4.4	4.4	1113.6	5906675117645
	R-RBL-PF-M16/60W	16	180	10	10	2560	4.8	4.8	1226.2	5906675117652

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
Rawlbolt R-RBP-PF Bolt Projecting										
M6	R-RBP-PF-M06/10W	6	65	50	400	22400	2.8	22.4	1254.4	5906675117669
	R-RBP-PF-M06/25W	6	80	50	400	22400	1.7	13.2	739.2	5906675117676
	R-RBP-PF-M06/60W	6	115	50	50	20800	2.0	2.0	832.0	5906675117683
M8	R-RBP-PF-M08/10W	8	75	50	400	22400	2.8	22.4	1254.4	5906675117690
	R-RBP-PF-M08/25W	8	90	50	50	20800	3.1	3.1	1289.6	5906675117706
	R-RBP-PF-M08/60W	8	125	50	50	20800	3.6	3.6	1497.6	5906675117713
M10	R-RBP-PF-M10/15W	10	90	50	50	12800	4.9	4.9	1254.4	5906675117720
	R-RBP-PF-M10/30W	10	105	50	50	15600	5.3	5.3	1653.6	5906675117737
	R-RBP-PF-M10/60W	10	135	50	50	12800	6.0	6.0	1536.0	5906675117744
M12	R-RBP-PF-M12/15W	12	110	25	25	10400	4.1	4.1	1684.8	5906675117751
	R-RBP-PF-M12/30W	12	125	25	25	6400	5.0	5.0	1267.2	5906675117768
	R-RBP-PF-M12/75W	12	170	25	25	7800	5.8	5.8	1809.6	5906675117775
M16	R-RBP-PF-M16/15W	16	150	10	10	2560	4.1	4.1	1044.5	5906675117782
	R-RBP-PF-M16/35W	16	170	10	10	2560	4.7	4.7	1190.4	5906675117799
	R-RBP-PF-M16/75W	16	210	10	10	2560	5.3	5.3	1344.0	5906675117805

R-RBL-E, R-RBL-H, R-RB RAWLBOLT

World's most popular all-purpose expanding shield anchor

R-RBL-E

R-RB

R-RBL-H

Approvals and Reports

- AT-15-7280/2014

Versions

- R-RBL-E Eye Bolt
- R-RBL-H Hook Bolt
- R-RB Shield

Installation movie

Product overview

Features and benefits

- Eyebolt and hook designed & manufactured for maximum performance
- Product recommended for applications requiring fire resistance
- Three-piece expanding sleeve provides maximum expansion to ensure optimum loads and safety are achieved in various substrates
- Hook and Eye Rawlbolts are not suitable for fall arrest systems or shock loading

Applications

- Supporting guy ropes, stays and cables
- Supporting ladder restraints

Base materials

Suitable for use in:

- Cracked and non-cracked concrete min. C20/25
- Hollow core slab min. C20/25
- Solid brick
- Hollow sand-lime brick min. C20/25
- Hollow lightweight
- Concrete block

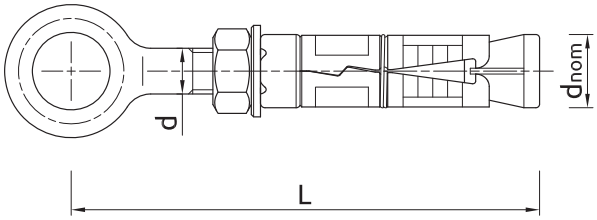
Installation guide

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 blow pump and brush or equivalent method)
3. Insert the anchor (tap home until flush with surface) and position eye/hook accordingly
4. Tighten to recommended torque, using the hex nut (not the eye/hook)

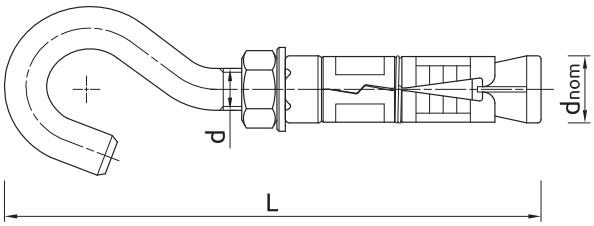
Product information

R-RBL-E



Size	Product Code	Anchor		
		Bolt diameter	External diameter	Length
		d	d_{nom}	L
		[mm]	[mm]	[mm]
M6	R-RBL-06EW	6	12	73
M8	R-RBL-08EW	8	14	87
M10	R-RBL-10EW	10	16	108
M12	R-RBL-12EW	12	20	130

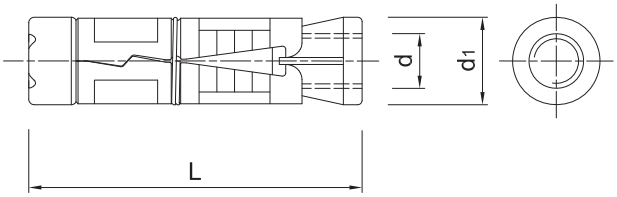
R-RBL-H



Size	Product Code	Anchor		
		Bolt diameter	External diameter	Length
		d	d_{nom}	L
		[mm]	[mm]	[mm]
M6	R-RBL-06HW	6	12	83
M8	R-RBL-08HW	8	14	98
M10	R-RBL-10HW	10	16	120
M12	R-RBL-12HW	12	20	145

Product information (cont.)

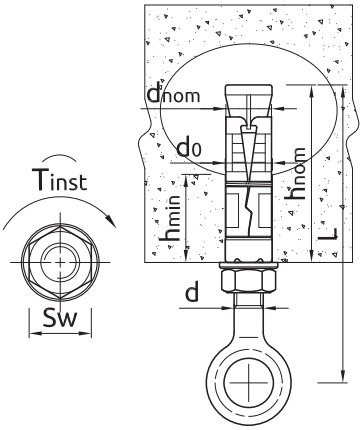
R-RB



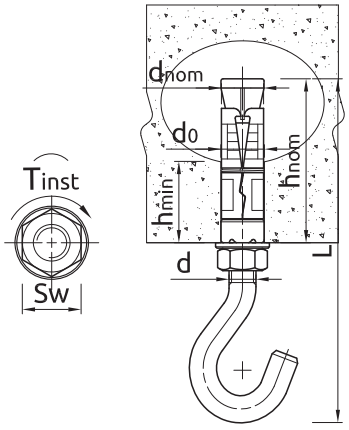
Size	Product Code	Anchor			Fixture
		Thread diameter	External diameter	Length	Hole diameter
		d	d_1	L	d_f
		[mm]	[mm]	[mm]	[mm]
M6	R-RB-M06W	6	12	45	6.5
M8	R-RB-M08W	8	14	50	9
M10	R-RB-M10W	10	16	60	11
M12	R-RB-M12W	12	20	75	13
M16	R-RB-M16W	16	25	115	17
M20	R-RB-M20W	20	32	130	22
M24	R-RB-M24W	24	38	150	26

Installation data

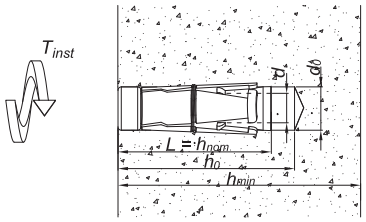
R-RBL-E



R-RBL-H



R-RB



Size			M6	M8	M10	M12	M16	M20	M24
Thread diameter	d	[mm]	6	8	10	12	16	20	24
Hole diameter in substrate	d_0	[mm]	12	14	16	20	25	32	38
Installation torque	T_{inst}	[Nm]	6.5	15	27	50	120	230	400
Min. hole depth in substrate	h_0	[mm]	50	55	65	85	125	140	160
Installation depth	h_{nom}	[mm]	45	50	60	80	120	135	155
Min. substrate thickness	h_{min}	[mm]	100				142.5	172.5	240
Min. spacing	s_{min}	[mm]	35	40	50	60	95	115	210
Min. edge distance	c_{min}	[mm]	53	60	75	90	143	173	188

Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
Rawlbolt R-RBL-E Eye Bolt										
M6	R-RBL-06HW	6	83	25	25	7875	0.95	0.95	329.3	5906675283135
M8	R-RBL-08HW	8	98	25	25	4500	1.60	1.60	318.0	5906675283159
M10	R-RBL-10HW	10	120	25	25	4500	3.1	3.1	583.5	5906675283173
M12	R-RBL-12HW	12	145	25	25	2250	5.9	5.9	561.0	5906675283197
R-RBL-H Hook Bolt										
M6	R-RBL-06EW	6	73	25	25	7875	0.95	0.95	329.3	5906675283128
M8	R-RBL-08EW	8	87	25	25	7875	1.60	1.60	534.0	5906675283142
M10	R-RBL-10EW	10	108	25	25	3750	2.9	2.9	465.0	5906675283166
M12	R-RBL-12EW	12	130	25	25	2250	5.2	5.2	500.3	5906675283180
R-RB Shield										
M6	R-RB-M06W	6	45	100	100	31500	1.74	1.74	578.3	5906675283517
M8	R-RB-M08W	8	50	100	100	18000	2.6	2.6	494.4	5906675283524
M10	R-RB-M10W	10	60	100	100	10800	4.1	4.1	472.8	5906675283531
M12	R-RB-M12W	12	75	50	50	7500	4.1	4.1	645.0	5906675283548
M16	R-RB-M16W	16	115	25	25	2250	4.3	4.3	414.8	5906675283555
M20	R-RB-M20W	20	130	15	15	1620	5.3	5.3	601.9	5906675283562
M24	R-RB-M24W	24	150	5	5	720	2.6	2.6	400.1	5906675283579

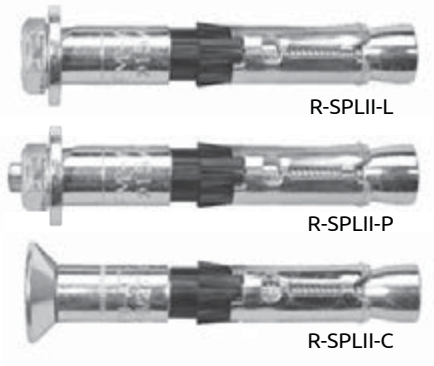
HEAVY-DUTY EXPANSION ANCHORS

SafetyPlus:

- R-SPLII-L
  - Loose Bolt
- R-SPLII-P
  - Bolt Projecting
- R-SPLII-C
  - Countersunk Bolt
- R-SPL
  - Loose Bolt
- R-SPL-BP
  - Bolt Projecting
- R-SPL-C
  - Countersunk Bolt

R-SPLII, R-SPLII-P, R-SPLII-C SafetyPlus

High performance mechanical anchor for cracked and non-cracked concrete



Approvals and Reports

- ETA-14/0345, Option 1
- C1 and C2 Seismic Approval

Versions

- R-SPLII-L - Loose Bolt
- R-SPLII-P - Bolt Projecting
- R-SPLII-C - Countersunk

Product overview

Features and benefits

- Mechanical anchor for highest tension and shear loads
- Seismic category C2 for Structural applications. Seismic category C1 for non-structural use in areas with low seismic risk
- For usage with required fire resistance
- Option 1 ETA for Cracked and Non-Cracked Concrete
- Antirotation to prevent rotation during installation
- Anchor's construction allows easy through-installation (drilling and installation through fixed material)
- Three types of tips (nut, flat or tapered bolt) allow simple fitment for installed element
- 8.8 grade steel provides maximum performance and durability

Applications

- Structural steel
- Masonry support
- Cladding restraints
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

Base materials

Approved for use in:

- Non-cracked concrete C20/25-C50/60
- Cracked concrete C20/25-C50/60
- Reinforced and non-reinforced concrete
- Concrete subjected to seismic actions cat. C1/C2

Installation guide

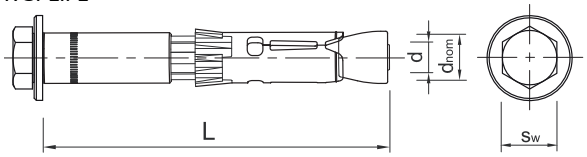
Installation guide (cont.)

R-SPLII-C

1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

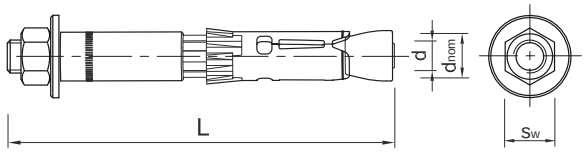
Product information

R-SPLII-L



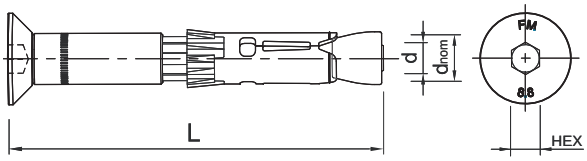
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-SPLII SafetyPlus - Loose Bolt						
M6	R-SPL-II-06080/20L	6	10	80	20	12
	R-SPL-II-06110/50L	6	10	110	20	12
M8	R-SPL-II-08080/10L	8	12	80	10	14
	R-SPL-II-08090/20L	8	12	90	20	14
	R-SPL-II-08120/20L	8	12	120	50	14
M10	R-SPL-II-10090/10L	10	15	90	10	17
	R-SPL-II-10100/20L	10	15	100	20	17
	R-SPL-II-10130/50L	10	15	130	50	17
M12	R-SPL-II-12110/10L	12	18	110	10	20
	R-SPL-II-12125/25L	12	18	125	25	20
	R-SPL-II-12150/50L	12	18	150	50	20
M16	R-SPL-II-16125/10L	16	24	125	10	26
	R-SPL-II-16140/25L	16	24	140	25	26

R-SPLII-P



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-SPLII-P SafetyPlus - Bolt Projecting						
M6	R-SPL-II-06110/50P	6	10	110	50	12
M8	R-SPL-II-08090/20P	8	12	90	20	14
M10	R-SPL-II-10100/20P	10	15	100	20	17
M12	R-SPL-II-12125/25P	12	18	125	25	20
M16	R-SPL-II-16125/10P	16	24	125	10	26

R-SPLII-C

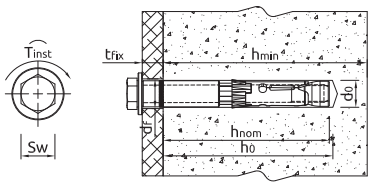


Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-SPLII-C SafetyPlus - Countersunk						
M6	R-SPL-II-06080/20C	6	10	80	25	17*/12
M8	R-SPL-II-08090/26C	8	12	90	26	21*/14
M10	R-SPL-II-10100/27C	10	15	100	27	26*/17
M12	R-SPL-II-12125/33C	12	18	125	33	31*/20

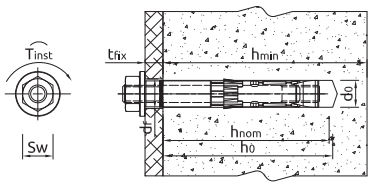
*Maximum head diameter

Installation data

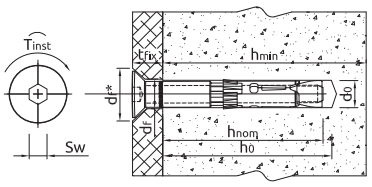
R-SPLII-L



R-SPLII-P



R-SPLII-C



Size			M6	M8	M10	M12	M16
Thread diameter	d	[mm]	6	8	10	12	16
Hole diameter in substrate	d_0	[mm]	10	12	15	18	24
Installation torque	T_{inst}	[Nm]	10	20	45	80	150
Min. hole depth in substrate	h_0	[mm]	75	85	95	115	130
Installation depth	h_{nom}	[mm]	60	70	80	100	115
Min. substrate thickness	h_{min}	[mm]	100	120	140	180	200
Min. spacing	s_{min}	[mm]	50	60	70	80	100
Min. edge distance	c_{min}	[mm]	50	60	70	80	100

Mechanical properties

Size			M6	M8	M10	M12	M16
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	830
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	660
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	9.6	24	48	84	214

Basic performance data

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

Size		M6	M8	M10	M12	M16	M6	M8	M10	M12	M16
Substrate		Non-cracked concrete					Cracked concrete				
Standard embedment depth h_{ef}	[mm]	49	59	67	88	99	49	59	67	88	99
CHARACTERISTIC LOAD											
TENSION LOAD N_{Rk}	[kN]	16.0	22.9	27.7	41.7	49.7	9.0	12.0	16.0	25.0	35.5
SHEAR LOAD V_{Rk}	[kN]	14.0	22.9	42.0	50.0	97.0	12.3	16.3	39.5	50.0	70.9

Basic performance data (cont.)

Size		M6	M8	M10	M12	M16	M6	M8	M10	M12	M16
Substrate		Non-cracked concrete					Cracked concrete				
DESIGN LOAD											
TENSION LOAD N_{Rd}	[kN]	10.7	15.3	18.5	27.8	33.2	6.00	8.0	10.7	16.7	23.6
SHEAR LOAD V_{Rd}	[kN]	11.2	15.3	33.6	40.0	66.3	8.23	10.88	26.3	39.6	47.3
RECOMMENDED LOAD*											
TENSION LOAD N_{Rec}	[kN]	7.62	10.9	13.2	19.9	23.7	4.29	5.71	7.62	11.9	16.9
SHEAR LOAD V_{Rec}	[kN]	8.00	10.9	24.0	28.6	47.4	5.88	7.77	18.8	28.3	33.8

Seismic performance data

Size		M6	M8	M10	M12	M16	M6	M8	M10	M12	M16
Seismic Performance Category		C1					C2				
Standard embedment depth h_{ef}	[mm]	49	59	67	88	99	49	59	67	88	99
CHARACTERISTIC LOAD											
TENSION STEEL FAILURE NRk.s.seis	[kN]	16.0	29.0	46.0	67.0	126.0	-	29.0	46.0	67.0	126.0
PULL-OUT FAILURE NRk.p.seis	[kN]	6.8	12.0	16.0	25.0	35.5*	-	3.9	7.8	15.3	28.8
SHEAR STEEL FAILURE VRk.s.seis	[kN]	9.8	13.0	20.0	20.0	48.5	-	10.2	17.0	17.0	43.9
DESIGN LOAD											
TENSION STEEL FAILURE NRd.s.seis	[kN]	10.7	19.3	30.7	44.7	84.0	-	19.3	30.7	44.7	84.0
PULL-OUT FAILURE NRd.p.seis	[kN]	4.5	8.0	10.7	16.7	23.7	-	2.6	5.2	10.2	19.2
SHEAR STEEL FAILURE VRd.s.seis	[kN]	7.84	6.4	16.0	16.0	38.8	-	8.16	13.6	13.6	35.1

*Pull-Out Failure not decisive

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
R-SPLII SafetyPlus - Loose Bolt										
M6	R-SPL-II-06080/20L	6	80	50	400	9600	2.2	17.2	412.8	5010445007217
	R-SPL-II-06110/50L	6	110	50	300	7200	2.9	17.4	417.6	5010445007224
M8	R-SPL-II-08080/10L	8	80	25	200	4800	1.6	13.0	312.0	5010445007231
	R-SPL-II-08090/20L	8	90	25	200	4800	1.8	14.4	345.6	5010445007248
	R-SPL-II-08120/20L	8	120	25	150	3600	2.4	14.4	345.6	5010445007255
M10	R-SPL-II-10090/10L	10	90	20	160	3840	2.3	18.7	449.3	5010445007262
	R-SPL-II-10100/20L	10	100	20	160	3840	2.6	20.5	491.5	5010445007279
	R-SPL-II-10130/50L	10	130	20	120	2880	3.4	20.2	483.8	5010445007286
M12	R-SPL-II-12110/10L	12	110	20	80	1920	4.2	17.0	407.0	5010445007293
	R-SPL-II-12125/25L	12	125	20	20	3840	4.8	4.8	917.8	5010445007309
	R-SPL-II-12150/50L	12	150	20	20	3840	5.6	5.6	1075.2	5010445007316
M16	R-SPL-II-16125/10L	16	125	10	60	1440	4.4	26.2	629.3	5010445007323
	R-SPL-II-16140/25L	16	140	10	40	960	4.8	19.2	460.8	5010445007330
R-SPLII-P SafetyPlus - Bolt Projecting										
M6	R-SPL-II-06110/50P	6	110	50	300	7200	3.0	17.7	425.2	5010445007354
M8	R-SPL-II-08090/20P	8	90	25	200	4800	1.7	13.8	331.8	5010445007361
M10	R-SPL-II-10100/20P	10	100	20	160	3840	2.6	20.6	495.4	5010445007378
M12	R-SPL-II-12125/25P	12	125	20	20	3840	4.6	4.6	874.4	5010445007385
M16	R-SPL-II-16125/10P	16	125	10	60	1440	4.3	25.9	622.7	5010445007392
R-SPLII-C SafetyPlus - Countersunk										
M6	R-SPL-II-06080/20C	6	80	50	400	9600	2.1	16.6	398.4	5010445007408
M8	R-SPL-II-08090/26C	8	90	25	200	4800	1.8	14.0	336.0	5010445007415
M10	R-SPL-II-10100/27C	10	100	20	160	3840	2.3	18.6	445.4	5010445007422
M12	R-SPL-II-12125/33C	12	125	20	80	1920	4.5	18.1	433.9	5010445007439

R-SPL, R-SPL-BP, R-SPL-C SafetyPlus

High performance mechanical anchor

Approvals and Reports

- ETA-11/0126; ETAG 001-2, Option 7

Versions

- R-SPL - Loose Bolt
- R-SPL-BP - Bolt Projecting
- R-SPL-C - Countersunk

Product overview

Features and benefits

- Design of SafetyPlus allows easy through fixing
- Integral controlled collapse and anti-rotation feature ensures fixture is firmly secured
- Unique zig-zag feature provides balanced expansion
- Ensuring secure setting and maximised load-bearing capacity
- Case-hardened nut with optimum taper angle for enhanced expansion

Applications

- Structural steel
- Masonry support
- Cladding restraints
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

Base materials

Approved for use in:

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

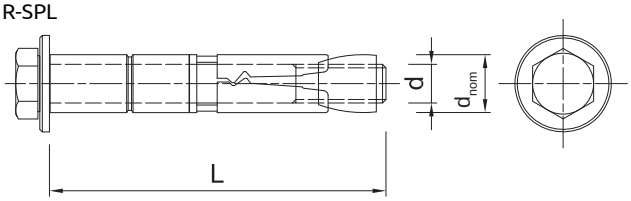
Installation guide

Installation guide

1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

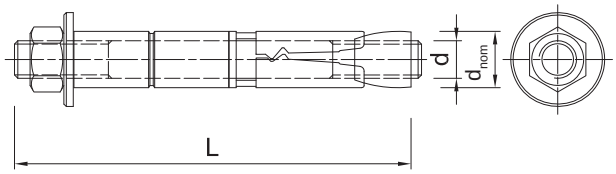
Product information

R-SPL



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-08090/15	8	12	90	15	14
	R-SPL-08110/40	8	12	110	40	14
M10	R-SPL-10105/20	10	15	105	20	17
	R-SPL-10120/40	10	15	120	40	17
	R-SPL-10140/60	10	15	140	60	17
M12	R-SPL-12120/25	12	18	120	25	20
	R-SPL-12150/50	12	18	150	50	20
M16	R-SPL-16145/25	16	24	145	25	26
	R-SPL-16170/50	16	24	170	50	26
M20	R-SPL-20175/30	20	28	175	30	30

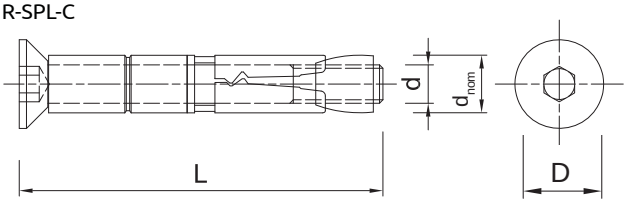
R-SPL-BP



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-BP-08095/15	8	12	95	15	14
M10	R-SPL-BP-10110/20	10	15	110	20	17
M12	R-SPL-BP-12135/25	12	18	120	25	20
	R-SPL-BP-12160/50	12	18	160	50	20
M16	R-SPL-BP-16160/25	16	24	160	25	26
	R-SPL-BP-16185/50	16	24	185	50	26
M20	R-SPL-BP-20190/30	20	28	190	30	30

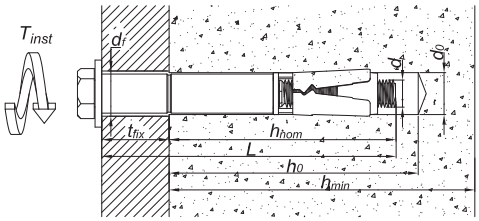
Product information (cont.)

R-SPL-C



Size	Product Code	Anchor				Fixture	
		Bolt diameter	External diameter	Head diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	D	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-C-08090/20	8	12	22	90	20	14
M10	R-SPL-C-10105/25	10	15	28	105	25	17
M12	R-SPL-C-12125/30	12	18	33	120	30	20
M16	R-SPL-C-16145/30	16	24	40	145	30	26

Installation data



Size			M8	M10	M12	M16	M20
Thread diameter	d	[mm]	8	10	12	16	20
Hole diameter in substrate	d_0	[mm]	12	15	18	24	28
Min. hole depth in substrate	h_0	[mm]	80	90	100	125	155
Installation depth	h_{nom}	[mm]	70	80	90	110	130
Min. substrate thickness	h_{min}	[mm]	100	105	120	150	188
Min. spacing	s_{min}	[mm]	60	70	80	100	125
Min. edge distance	c_{min}	[mm]	90	105	120	150	186

Mechanical properties

Size			M8	M10	M12	M16	M20
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	830
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	660
Cross sectional area - tension	A_s	[mm²]	36.6	58.0	84.3	157.0	245.0
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.6	402.1	785.4
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	45.0	88.0	152.0	366.0	729.0
Design bending resistance	M	[Nm]	36.0	70.0	122.0	293.0	583.0

Basic performance data

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

Size		M8	M10	M12	M16	M20
Embedment depth h_{ef}	[mm]	60	70	80	100	125
MEAN ULTIMATE LOAD						
TENSION LOAD $N_{Ru,m}$	[kN]	15.7	19.7	28.2	60.1	66.8
SHEAR LOAD $V_{Ru,m}$	[kN]	25.1	35.0	57.6	98.1	88.4
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}	[kN]	9.00	12.0	16.0	35.0	40.0
SHEAR LOAD V_{Rk}	[kN]	18.0	24.0	32.0	70.0	73.7
DESIGN LOAD						
TENSION LOAD N_{Rd}	[kN]	4.29	5.71	7.62	16.7	19.0
SHEAR LOAD V_{Rd}	[kN]	8.57	11.4	15.2	33.3	38.1
RECOMMENDED LOAD						
TENSION LOAD N_{rec}	[kN]	3.06	4.08	5.44	11.9	13.6
SHEAR LOAD V_{rec}	[kN]	6.12	8.16	10.9	23.8	27.2

Product commercial data

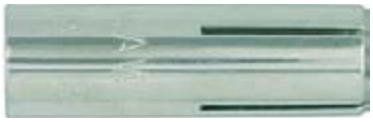
Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
R-SPL SafetyPlus - Loose Bolt										
M8	R-SPL-08090/15	8	90	50	50	9000	3.8	3.8	705.0	5010445500107
	R-SPL-08110/40	8	110	50	50	5400	4.7	4.7	532.2	5010445500152
M10	R-SPL-10105/20	10	105	50	50	5400	6.6	6.6	737.4	5010445500206
	R-SPL-10120/40	10	120	50	50	5400	7.2	7.2	802.2	5010445500251
	R-SPL-10140/60	10	140	50	50	3000	9.0	9.0	570.0	5010445500305
M12	R-SPL-12120/25	12	120	25	25	2250	5.8	5.8	547.5	5010445500350
	R-SPL-12150/50	12	150	25	25	2250	5.8	5.8	549.8	5010445500404
M16	R-SPL-16145/25	16	145	10	10	900	4.7	4.7	453.0	5010445500503
	R-SPL-16170/50	16	170	10	10	900	5.6	5.6	530.4	5010445500558
M20	R-SPL-20175/30	20	175	10	10	690	8.5	8.5	618.6	5010445500657
R-SPL-BP SafetyPlus - Bolt Projecting										
M8	R-SPL-BP-08095/15	8	95	50	50	9000	3.5	3.5	660.0	5010445501104
M10	R-SPL-BP-10110/20	10	110	50	50	5400	6.3	6.3	710.4	5010445501203
M12	R-SPL-BP-12135/25	12	120	25	25	2700	6.0	6.0	678.0	5010445501357
	R-SPL-BP-12160/50	12	160	25	25	2250	6.5	6.5	615.0	5010445501401
M16	R-SPL-BP-16160/25	16	160	10	10	900	4.6	4.6	445.8	5010445501500
	R-SPL-BP-16185/50	16	185	10	10	690	5.4	5.4	401.2	5010445501555
M20	R-SPL-BP-20190/30	20	190	10	10	690	8.0	8.0	582.0	5010445501654
R-SPL-C SafetyPlus - Countersunk										
M8	R-SPL-C-08090/20	8	90	50	50	9000	3.7	3.7	687.0	5010445502101
M10	R-SPL-C-10105/25	10	105	50	50	5400	6.6	6.6	737.4	5010445502200
M12	R-SPL-C-12125/30	12	120	25	25	2250	5.7	5.7	543.0	5010445502354
M16	R-SPL-C-16145/30	16	145	10	10	900	4.6	4.6	444.0	5010445502507

DROP-IN ANCHORS

- R-DCA
  - Drop-in Anchors
- R-DCL
  - Lipped Drop-in Anchors
- R-DCA-A4
  - Stainless Steel Drop-in Anchors

R-DCA, R-DCL Drop-in Anchors

Internally-threaded wedge anchor for simple hammer-set installation



R-DCA

R-DCL

Approvals and Reports

- ETA-13/0584; ETAG 001, Part 6
- AT-15-7280/2014

Versions

- R-DCA - Drop-in Anchors
- R-DCL - Lipped Drop-in Anchors

Installation movie

Product overview

Features and benefits

- High performance in cracked and non-cracked concrete confirmed by ETA and ITB technical approval
- Product recommended for applications requiring fire resistance
- Internally-threaded to be used with threaded stud or bolt
- Easy to install by hammer action
- Slotted sleeve and internal wedge component together facilitate easy setting and expansion
- FM Certified

Applications

- Pipelines systems
- Ventilation systems
- Sprinkler systems
- Cable conduits and wires
- Gratings
- Stadium seating

Base materials

Approved for use in:

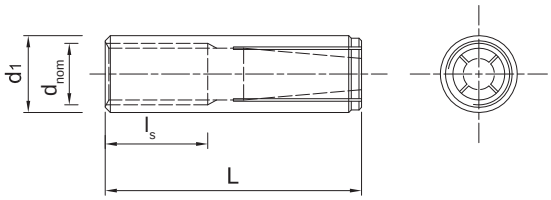
- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60
- Concrete

Installation guide

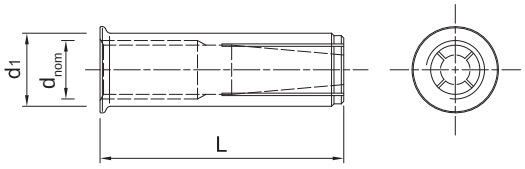
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Insert wedge anchor, slotted end first
4. Use the setting tool to drive the internal wedge into the anchor
5. Insert bolt or stud through fixture and tighten to the recommended torque

Product information

R-DCA



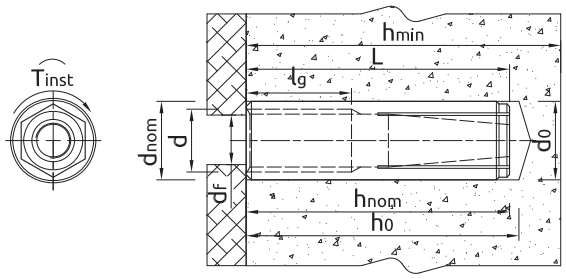
R-DCL



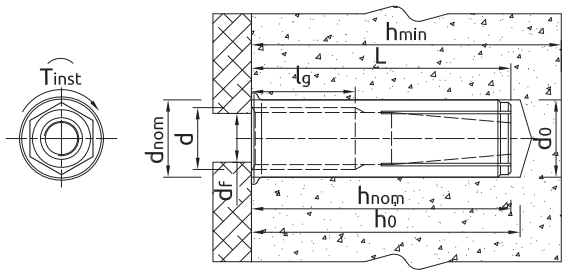
Size	Product Code	Anchor				Fixture
		Thread size	External diameter	Length	Thread length	Hole diameter
		d	d_{nom}	l_s	L_1	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-DCA-06-25/ R-DCL-06	6	8	25	11	7
M8	R-DCA-08-30/ R-DCL-08	8	10	30	13	9
M10	R-DCA-10-40/ R-DCL-10	10	12	40	15	12
M12	R-DCA-12-50/ R-DCL-12	12	15	50	20	14
M16	R-DCA-16-65/ R-DCL-16	16	20	65	25	18
M20	R-DCA-20-80	20	25	80	35	22

Installation data

R-DCA



R-DCL



Size			M6	M8	M10	M12	M16	M20
Thread diameter	d	[mm]	6	8	10	12	16	20
Hole diameter in substrate	d_0	[mm]	8	10	12	15	20	25
Installation torque	T_{inst}	[Nm]	4.5	11	22	38	98	130
Min. hole depth in substrate	h_0	[mm]	30	32	42	53	70	85
Installation depth	h_{nom}	[mm]	25	30	40	50	65	80
Min. substrate thickness	h_{min}	[mm]	80			100	130	160
Min. spacing	s_{min}	[mm]	200				260	320
Min. edge distance	c_{min}	[mm]	150				195	240

Mechanical properties

Size			M6	M8	M10	M12	M16	M20
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	450	450	450	450	450	450
Nominal yield strength - tension	f_{yk}	[N/mm²]	360	360	360	360	360	360
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0	245.0
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1	785.4
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	13.0	31.0	61.0	106.0	251.0	490.0
Design bending resistance	M	[Nm]	11.0	25.0	49.0	85.0	201.0	392.0

Basic performance data

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

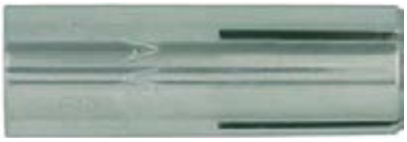
Size		M6	M8	M10	M12	M16	M20
Embedment depth h_{ef}	[mm]	25	30	40	50	65	80
CHARACTERISTIC LOAD							
TENSION LOAD N_{Rk}	[kN]	1.50	3.00	4.57	6.40	13.3	17.4
SHEAR LOAD V_{Rk}	[kN]	1.50	3.00	4.57	6.40	13.3	17.4
DESIGN LOAD							
TENSION LOAD N_{Rd}	[kN]	0.72	1.43	2.18	3.06	6.30	8.30
SHEAR LOAD V_{Rd}	[kN]	0.72	1.43	2.18	3.06	6.30	8.30
RECOMMENDED LOAD							
TENSION LOAD N_{rec}	[kN]	0.50	1.02	1.55	2.19	4.50	5.90
SHEAR LOAD V_{rec}	[kN]	0.50	1.02	1.55	2.19	4.50	5.90

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Thread size [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
R-DCA Wedge Anchor										
M6	R-DCA-06-25	6	25	100	1000	36000	0.70	7.0	282.0	5010445771088
M8	R-DCA-08-30	8	30	100	1000	60000	1.20	12.0	750.0	5010445771200
M10	R-DCA-10-40	10	40	50	50	25000	1.20	1.20	630.0	5906675151687
M12	R-DCA-12-50	12	50	50	50	18000	2.4	2.4	876.0	5906675152004
M16	R-DCA-16-65	16	65	25	100	6000	2.7	10.9	684.0	5010445771507
M20	R-DCA-20-80	20	80	15	90	3240	3.0	17.9	674.8	5010445771620
R-DCL Lipped Wedge Anchor										
M6	R-DCL-06	6	25	100	100	56000	1.60	1.60	926.0	5010445779084
M8	R-DCL-08	8	30	100	100	57600	1.60	1.60	951.6	5010445779206
M10	R-DCL-10	10	40	50	50	36000	1.60	1.60	1182.0	5010445779329
M12	R-DCL-12	12	50	50	50	6000	1.60	1.60	222.0	5010445779411
M16	R-DCL-16	16	65	25	25	6000	1.60	1.60	414.0	5010445779503

R-DCA-A4 Stainless Steel Drop-in Anchors

Internally threaded stainless steel drop-in anchors for simple hammer-set installation



Approvals and Reports

- ETA-13/0584; ETAG 001, Part 6
- AT-15-7555/2011

Product overview

Features and benefits

- High performance in cracked and non-cracked concrete confirmed by ETA
- Stainless steel material for high resistance to corrosion
- Easy to install by hammer action
- Slotted sleeve and internal wedge component together facilitate easy setting and expansion
- FM Certified

Applications

- Pipelines systems
- Ventilation systems
- Sprinkler systems
- Cable conduits and wires
- Gratings
- Stadium seating

Base materials

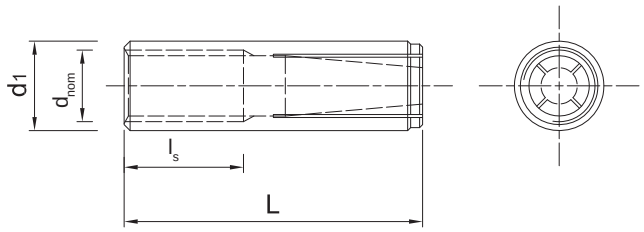
Approved for use in:

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

Installation guide

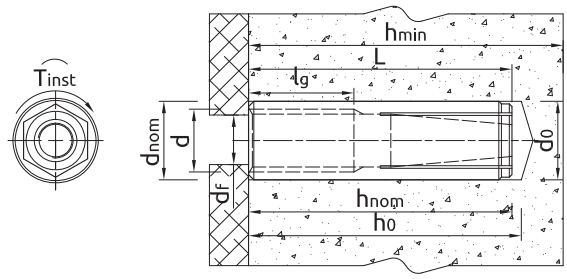
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Insert wedge anchor, slotted end first
4. Use the setting tool to drive the internal wedge into the anchor
5. Insert bolt or stud through fixture and tighten to the recommended torque

Product information



Size	Product Code	Anchor				Fixture
		Thread size	External diameter	Length	Thread length	Hole diameter
		d	d_{nom}	L	l_s	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-DCA-06-25-A4	6	8	25	11	7
M8	R-DCA-08-30-A4	8	10	30	13	9
M10	R-DCA-10-40-A4	10	12	40	15	12
M12	R-DCA-12-50-A4	12	15	50	20	14
M16	R-DCA-16-65-A4	16	20	65	25	18

Installation data



Size			M6	M8	M10	M12	M16
Thread diameter	d	[mm]	6	8	10	12	16
Hole diameter in substrate	d_0	[mm]	8	10	12	15	20
Installation torque	T_{inst}	[Nm]	4.5	11	22	38	98
Min. hole depth in substrate	h_0	[mm]	30	32	42	53	70
Installation depth	h_{nom}	[mm]	25	30	40	50	65
Min. substrate thickness	h_{min}	[mm]	80			100	130
Min. spacing	s_{min}	[mm]	200				260
Min. edge distance	c_{min}	[mm]	150				195

Mechanical properties

Size			M6	M8	M10	M12	M16
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm²]	525	525	525	525	525
Cross sectional area - tension	A_s	[mm²]	20.1	36.6	58.0	84.3	157.0
Elastic section modulus	W_{el}	[mm³]	21.2	50.3	98.2	169.7	402.1
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	11.0	26.0	52.0	92.0	233.0
Design bending resistance	M	[Nm]	8.80	20.8	41.6	73.6	186.4

Basic performance data

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

Size		M6	M8	M10	M12	M16
Embedment depth h_{ef}	[mm]	25	30	40	50	65
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}	[kN]	1.00	2.01	3.20	4.59	8.27
SHEAR LOAD V_{Rk}	[kN]	1.00	2.01	3.20	4.59	8.27
DESIGN LOAD						
TENSION LOAD N_{Rd}	[kN]	0.48	0.96	1.50	2.19	3.90
SHEAR LOAD V_{Rd}	[kN]	0.48	0.96	1.50	2.19	3.90
RECOMMENDED LOAD						
TENSION LOAD N_{rec}	[kN]	0.30	0.68	1.09	1.56	2.80
SHEAR LOAD V_{rec}	[kN]	0.30	0.68	1.09	1.56	2.80

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Thread size [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M6	R-DCA-06-25-A4	6	25	100	1000	100000	0.70	7.0	730.0	5010445776083
M8	R-DCA-08-30-A4	8	30	100	1000	64000	1.30	13.0	862.0	5010445776205
M10	R-DCA-10-40-A4	10	40	50	500	32000	1.15	11.5	766.0	5010445776328
M12	R-DCA-12-50-A4	12	50	50	400	16000	2.3	18.4	766.0	5010445776410
M16	R-DCA-16-65-A4	16	65	25	100	6000	2.7	10.9	684.0	5010445776502

R-DCA-ST-Plus/R-DCA-ST Drop-in Anchors Setting Tools

Manual setting tool

R-DCA-ST-PLUS

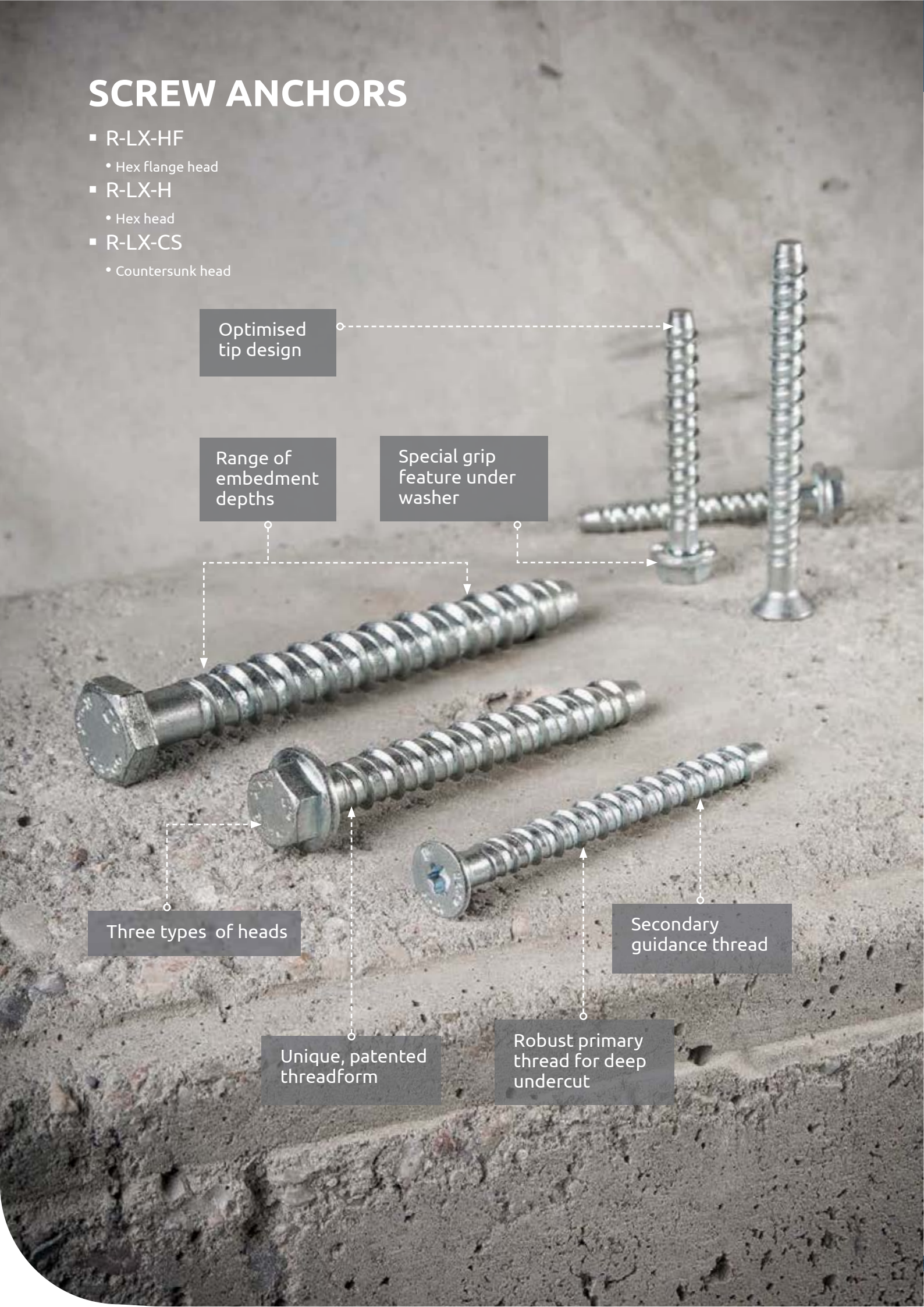
R-DCA-ST

Product commercial data

Size	Product Code	Diameter			Quantity	Weight
		d_4	d_5	l_2	[pcs]	[kg]
		[mm]	[mm]	[mm]	Box	Box
M6	R-DCA-ST-06-PLUS/R-DCA-ST-06	5.0	7.5	14.8	1	0.08
M8	R-DCA-ST-08-PLUS/R-DCA-ST-08	6.6	9.5	18.0	1	0.09
M10	R-DCA-ST-10-PLUS/R-DCA-ST-10	8.3	11.5	23.0	1	0.13
M12	R-DCA-ST-12-PLUS/R-DCA-ST-12	10.2	14.5	28.0	1	0.36
M16	R-DCA-ST-16-PLUS/R-DCA-ST-16	13.5	19.5	33.0	1	0.39
M20	R-DCA-ST-20-PLUS/R-DCA-ST-20	16.8	24.5	47.0	1	0.39

SCREW ANCHORS

- R-LX-HF
  - Hex flange head
- R-LX-H
  - Hex head
- R-LX-CS
  - Countersunk head



R-LX Concrete Screw Anchor

Self-tapping concrete screwbolt

Approvals and Reports

- ETA Pending

Versions

- R-LX-HF
- R-LX-H
- R-LX-CS

Installation movie

Product overview

Features and benefits

- Time-efficient installation through streamlined procedure - simply drill and drive
- Completely removable
- Special zinc flake corrosion-resistant coating (make to order)
- Unique design with patented threadform ensures high performance for relatively small hole diameter and low torque level during installation
- Non-expansion functioning ensures low risk of damage to base material and makes R-LX ideal for installation near edges and adjacent anchors
- Performance data at two embedment depths (reduced embedment to avoid contact with reinforcement)

Applications

- Through-fixing
- Temporary anchorages
- Formwork supports
- Balustrading & handrails
- Fencing & gates
- Racking systems
- Public seating
- Scaffolding

Base materials

Approved for use in (pending):

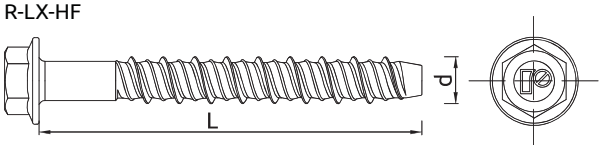
- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60

Installation guide

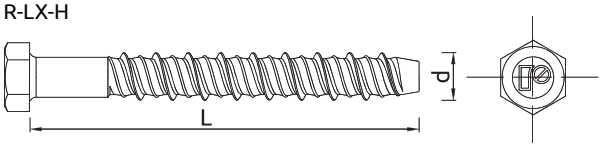
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blow pump and brush or equivalent method)
3. Insert anchor through fixture and screw into hole, until installation depth is reached and fixture is secure. Recommended installation torque may be used as a guideline (for use in concrete)

Product information

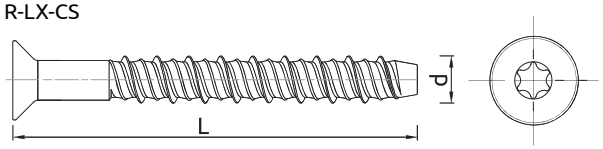
R-LX-HF



R-LX-H



R-LX-CS



Size	Product Code	Drill	Anchor		Fixture		
			Diameter	Length	Max. thickness		Hole diameter
			d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
R-LX-HF Hex with Flange Concrete Screw Anchor							
Ø6,3	R-LX-05X050-HF-ZP/R-LX-05X050-HF-ZF*	5.0	6.3	50	25	10	7
	R-LX-05X075-HF-ZP/R-LX-05X075-HF-ZF*	5.0	6.3	75	50	35	7
Ø7,5	R-LX-06X050-HF-ZP/R-LX-06X050-HF-ZF*	6.0	7.5	50	10	-	9
	R-LX-06X075-HF-ZP/R-LX-06X075-HF-ZF*	6.0	7.5	75	35	20	9
	R-LX-06X100-HF-ZP/R-LX-06X100-HF-ZF*	6.0	7.5	100	60	45	9
	R-LX-06X130-HF-ZP/R-LX-06X130-HF-ZF*	6.0	7.5	130	90	75	9
	R-LX-06X150-HF-ZP/R-LX-06X150-HF-ZF*	6.0	7.5	150	110	95	9
Ø10	R-LX-08X060-HF-ZP/R-LX-08X060-HF-ZF*	8.0	10	60	10	-	12
	R-LX-08X075-HF-ZP/R-LX-08X075-HF-ZF*	8.0	10	75	25	5	12
	R-LX-08X090-HF-ZP/R-LX-08X090-HF-ZF*	8.0	10	90	40	20	12
	R-LX-08X100-HF-ZP/R-LX-08X100-HF-ZF*	8.0	10	100	50	30	12
	R-LX-08X130-HF-ZP/R-LX-08X130-HF-ZF*	8.0	10	130	80	60	12
	R-LX-08X150-HF-ZP/R-LX-08X150-HF-ZF*	8.0	10	150	100	80	12
Ø12,5	R-LX-10X065-HF-ZP/R-LX-10X065-HF-ZF*	10.0	12.5	65	10	-	14
	R-LX-10X075-HF-ZP/R-LX-10X075-HF-ZF*	10.0	12.5	75	20	-	14
	R-LX-10X085-HF-ZP/R-LX-10X085-HF-ZF*	10.0	12.5	85	30	-	14
	R-LX-10X100-HF-ZP/R-LX-10X100-HF-ZF*	10.0	12.5	100	45	15	14
	R-LX-10X120-HF-ZP/R-LX-10X120-HF-ZF*	10.0	12.5	120	65	35	14
	R-LX-10X140-HF-ZP/R-LX-10X140-HF-ZF*	10.0	12.5	140	85	55	14
	R-LX-10X160-HF-ZP/R-LX-10X160-HF-ZF*	10.0	12.5	160	105	75	14
Ø17	R-LX-14X080-HF-ZP/R-LX-14X080-HF-ZF*	14.0	17	80	5	-	18
	R-LX-14X105-HF-ZP/R-LX-14X105-HF-ZF*	14.0	17	105	30	-	18
	R-LX-14X115-HF-ZP/R-LX-14X115-HF-ZF*	14.0	17	115	40	-	18
	R-LX-14X135-HF-ZP/R-LX-14X135-HF-ZF*	14.0	17	135	60	15	18
R-LX-H Hex without Flange Concrete Screw Anchor							
Ø6,3	R-LX-05X050-H-ZP/R-LX-05X050-H-ZF*	5.0	6.3	50	25	10	7
	R-LX-05X075-H-ZP/R-LX-05X075-H-ZF*	5.0	6.3	75	50	35	7
Ø7,5	R-LX-06X050-H-ZP/R-LX-06X050-H-ZF*	6.0	7.5	50	10	-	9
	R-LX-06X075-H-ZP/R-LX-06X075-H-ZF*	6.0	7.5	75	35	20	9
	R-LX-06X100-H-ZP/R-LX-06X100-H-ZF*	6.0	7.5	100	60	45	9
	R-LX-06X130-H-ZP/R-LX-06X130-H-ZF*	6.0	7.5	130	90	75	9
	R-LX-06X150-H-ZP/R-LX-06X150-H-ZF*	6.0	7.5	150	110	95	9
Ø10	R-LX-08X060-H-ZP/R-LX-08X060-H-ZF*	8.0	10	60	10	-	12
	R-LX-08X075-H-ZP/R-LX-08X075-H-ZF*	8.0	10	75	25	5	12
	R-LX-08X090-H-ZP/R-LX-08X090-H-ZF*	8.0	10	90	40	20	12
	R-LX-08X100-H-ZP/R-LX-08X100-H-ZF*	8.0	10	100	50	30	12
	R-LX-08X130-H-ZP/R-LX-08X130-H-ZF*	8.0	10	130	80	60	12
	R-LX-08X150-H-ZP/R-LX-08X150-H-ZF*	8.0	10	150	100	80	12

* Made to order

Product information (cont.)

Size	Product Code	Drill	Anchor		Fixture		
			Diameter	Length	Max. thickness		Hole diameter
			d	L	$t_{fix,r}$	$t_{fix,s}$	d_f
			[mm]	[mm]	[mm]	[mm]	[mm]
Ø12,5	R-LX-10X065-H-ZP/R-LX-10X065-H-ZF*	10.0	12.5	65	10	-	14
	R-LX-10X075-H-ZP/R-LX-10X075-H-ZF*	10.0	12.5	75	20	-	14
	R-LX-10X085-H-ZP/R-LX-10X085-H-ZF*	10.0	12.5	85	30	-	14
	R-LX-10X100-H-ZP/R-LX-10X100-H-ZF*	10.0	12.5	100	45	15	14
	R-LX-10X120-H-ZP/R-LX-10X120-H-ZF*	10.0	12.5	120	65	35	14
	R-LX-10X140-H-ZP/R-LX-10X140-H-ZF*	10.0	12.5	140	85	55	14
	R-LX-10X160-H-ZP/R-LX-10X160-H-ZF*	10.0	12.5	160	105	75	14
Ø17	R-LX-14X080-H-ZP/R-LX-14X080-H-ZF*	14.0	17	80	5	-	18
	R-LX-14X105-H-ZP/R-LX-14X105-H-ZF*	14.0	17	105	30	-	18
	R-LX-14X115-H-ZP/R-LX-14X115-H-ZF*	14.0	17	115	40	-	18
	R-LX-14X135-H-ZP/R-LX-14X135-H-ZF*	14.0	17	135	60	15	18
R-LX-CS Countersunk Concrete Screw Anchor							
Ø6,3	R-LX-05X050-CS-ZP/R-LX-05X050-CS-ZF*	5.0	6.3	50	25	10	7
	R-LX-05X075-CS-ZP/R-LX-05X075-CS-ZF*	5.0	6.3	75	50	35	7
Ø7,5	R-LX-06X050-CS-ZP/R-LX-06X050-CS-ZF*	6.0	7.5	50	10	-	9
	R-LX-06X075-CS-ZP/R-LX-06X075-CS-ZF*	6.0	7.5	75	35	20	9
	R-LX-06X100-CS-ZP/R-LX-06X100-CS-ZF*	6.0	7.5	100	60	45	9
	R-LX-06X130-CS-ZP/R-LX-06X130-CS-ZF*	6.0	7.5	130	90	75	9
	R-LX-06X150-CS-ZP/R-LX-06X150-CS-ZF*	6.0	7.5	150	110	95	9
Ø10	R-LX-08X060-CS-ZP/R-LX-08X060-CS-ZF*	8.0	10	60	10	-	12
	R-LX-08X075-CS-ZP/R-LX-08X075-CS-ZF*	8.0	10	75	25	5	12
	R-LX-08X090-CS-ZP/R-LX-08X090-CS-ZF*	8.0	10	90	40	20	12
	R-LX-08X100-CS-ZP/R-LX-08X100-CS-ZF*	8.0	10	100	50	30	12
	R-LX-08X130-CS-ZP/R-LX-08X130-CS-ZF*	8.0	10	130	80	60	12
	R-LX-08X150-CS-ZP/R-LX-08X150-CS-ZF*	8.0	10	150	100	80	12
Ø12,5	R-LX-10X065-CS-ZP/R-LX-10X065-CS-ZF*	10.0	12.5	65	10	-	14
	R-LX-10X075-CS-ZP/R-LX-10X075-CS-ZF*	10.0	12.5	75	20	-	14
	R-LX-10X085-CS-ZP/R-LX-10X085-CS-ZF*	10.0	12.5	85	30	-	14
	R-LX-10X100-CS-ZP/R-LX-10X100-CS-ZF*	10.0	12.5	100	45	15	14
	R-LX-10X120-CS-ZP/R-LX-10X120-CS-ZF*	10.0	12.5	120	65	35	14
	R-LX-10X140-CS-ZP/R-LX-10X140-CS-ZF*	10.0	12.5	140	85	55	14
	R-LX-10X160-CS-ZP/R-LX-10X160-CS-ZF*	10.0	12.5	160	105	75	14
Ø17	R-LX-14X080-CS-ZP/R-LX-14X080-CS-ZF*	14.0	17	80	5	-	18
	R-LX-14X105-CS-ZP/R-LX-14X105-CS-ZF*	14.0	17	105	30	-	18
	R-LX-14X115-CS-ZP/R-LX-14X115-CS-ZF*	14.0	17	115	40	-	18
	R-LX-14X135-CS-ZP/R-LX-14X135-CS-ZF*	14.0	17	135	60	15	18

* Made to order

Basic performance data

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

Size		Ø6.3	Ø7.5	Ø10	Ø12.5	Ø17
MEAN ULTIMATE LOAD						
TENSION LOAD $N_{Ru,m}$						
Standard embedment depth	[kN]	11.3	18.9	21.5	27.0	42.8
Reduced embedment depth	[kN]	4.70	8.50	12.3	15.0	21.3
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}						
Standard embedment depth	[kN]	3.80	9.00	13.4	20.0	31.7
Reduced embedment depth	[kN]	2.10	5.00	8.80	12.0	17.1

Basic performance data

Size		Ø6.3	Ø7.5	Ø10	Ø12.5	Ø17
DESIGN LOAD						
TENSION LOAD N_{Rd}						
Standard embedment depth	[kN]	2.08	5.00	9.00	13.3	21.1
Reduced embedment depth	[kN]	1.00	2.40	4.20	5.70	8.10
RECOMMENDED LOAD						
TENSION LOAD N_{rec}						
Standard embedment depth	[kN]	1.49	3.60	6.40	9.50	15.1
Reduced embedment depth	[kN]	0.70	1.70	3.00	4.10	5.80

Installation data

Size			Ø6.3	Ø7.5	Ø10	Ø12.5	Ø17
Thread diameter	d	[mm]	6.3	7.5	10	12.5	17
Hole diameter in substrate	d_0	[mm]	5	6	8	10	14
STANDARD EMBEDMENT DEPTH							
Min. hole depth in substrate	$h_{0,s}$	[mm]	50	65	80	95	130
Installation depth	$h_{nom,s}$	[mm]	40	55	70	85	120
Min. substrate thickness	$h_{min,s}$	[mm]	100		110	130	190
Min. spacing	$s_{min,s}$	[mm]	30	35	40	55	80
Min. edge distance	$c_{min,s}$	[mm]	30	35	35	55	80
REDUCED EMBEDMENT DEPTH							
Min. hole depth in substrate	$h_{0,r}$	[mm]	35	50	60	65	85
Installation depth	$h_{nom,r}$	[mm]	25	40	50	55	75
Min. substrate thickness	$h_{min,r}$	[mm]	100				120
Min. spacing	$s_{min,r}$	[mm]	30	35	50	70	120
Min. edge distance	$c_{min,r}$	[mm]	30	35	50	70	110

Product Commercial Data

Size	Product Code	Anchor		Quantity [pcs]	Bar Code	
		Diameter	Length	Box		
		d	L			
		[mm]				
R-LX-HF Hex with Flange Concrete Screw Anchor					R-LX-HF-ZP	R-LX-HF-ZF
Ø6,3	R-LX-05X050-HF-ZP/R-LX-05X050-HF-ZF*	6.3	50	100	5906675112947	5906675129570
	R-LX-05X075-HF-ZP/R-LX-05X075-HF-ZF*	6.3	75	100	5906675112961	5906675129587
Ø7,5	R-LX-06X050-HF-ZP/R-LX-06X050-HF-ZF*	7.5	50	100	5906675112978	5906675129594
	R-LX-06X075-HF-ZP/R-LX-06X075-HF-ZF*	7.5	75	100	5906675119175	5906675129600
	R-LX-06X100-HF-ZP/R-LX-06X100-HF-ZF*	7.5	100	100	5906675119182	5906675129617
	R-LX-06X130-HF-ZP/R-LX-06X130-HF-ZF*	7.5	130	100	5906675119199	5906675129624
	R-LX-06X150-HF-ZP/R-LX-06X150-HF-ZF*	7.5	150	100	5906675119205	5906675129631
Ø10	R-LX-08X060-HF-ZP/R-LX-08X060-HF-ZF*	10	60	100	5906675119212	5906675129648
	R-LX-08X075-HF-ZP/R-LX-08X075-HF-ZF*	10	75	100	5906675119236	5906675129655
	R-LX-08X090-HF-ZP/R-LX-08X090-HF-ZF*	10	90	100	5906675119243	5906675129662
	R-LX-08X100-HF-ZP/R-LX-08X100-HF-ZF*	10	100	100	5906675119250	5906675129679
	R-LX-08X130-HF-ZP/R-LX-08X130-HF-ZF*	10	130	50	5906675119267	5906675129686
	R-LX-08X150-HF-ZP/R-LX-08X150-HF-ZF*	10	150	50	5906675119274	5906675129693
Ø12,5	R-LX-10X065-HF-ZP/R-LX-10X065-HF-ZF*	12.5	65	50	5906675119281	5906675129709
	R-LX-10X075-HF-ZP/R-LX-10X075-HF-ZF*	12.5	75	50	5906675119304	5906675129716
	R-LX-10X085-HF-ZP/R-LX-10X085-HF-ZF*	12.5	85	50	5906675119311	5906675129723
	R-LX-10X100-HF-ZP/R-LX-10X100-HF-ZF*	12.5	100	50	5906675119335	5906675129730
	R-LX-10X120-HF-ZP/R-LX-10X120-HF-ZF*	12.5	120	25	5906675119342	5906675129747
	R-LX-10X140-HF-ZP/R-LX-10X140-HF-ZF*	12.5	140	25	5906675119410	5906675129754
	R-LX-10X160-HF-ZP/R-LX-10X160-HF-ZF*	12.5	160	20	5906675119489	5906675129761

* Made to order

Product Commercial Data

Size	Product Code	Anchor		Quantity [pcs]	Bar Code	
		Diameter	Length	Box		
		d	L			
		[mm]				
Ø17	R-LX-14X080-HF-ZP/R-LX-14X080-HF-ZF*	17	80	20	5906675119946	5906675129822
	R-LX-14X105-HF-ZP/R-LX-14X105-HF-ZF*	17	105	20	5906675119953	5906675129839
	R-LX-14X115-HF-ZP/R-LX-14X115-HF-ZF*	17	115	20	5906675119960	5906675129846
	R-LX-14X135-HF-ZP/R-LX-14X135-HF-ZF*	17	135	20	5906675119977	5906675129853
R-LX-H Hex without Flange Concrete Screw Anchor					**R-LX-H-ZP**	**LX-H-ZF**
Ø6,3	R-LX-05X050-H-ZP/R-LX-05X050-H-ZF*	6.3	50	100	5906675120126	5906675129891
	R-LX-05X075-H-ZP/R-LX-05X075-H-ZF*	6.3	75	100	5906675120133	5906675129907
Ø7,5	R-LX-06X050-H-ZP/R-LX-06X050-H-ZF*	7.5	50	100	5906675120164	5906675129914
	R-LX-06X075-H-ZP/R-LX-06X075-H-ZF*	7.5	75	100	5906675120171	5906675129921
	R-LX-06X100-H-ZP/R-LX-06X100-H-ZF*	7.5	100	100	5906675120225	5906675129938
	R-LX-06X130-H-ZP/R-LX-06X130-H-ZF*	7.5	130	100	5906675120324	5906675129945
	R-LX-06X150-H-ZP/R-LX-06X150-H-ZF*	7.5	150	100	5906675120508	5906675129952
Ø10	R-LX-08X060-H-ZP/R-LX-08X060-H-ZF*	10	60	100	5906675120768	5906675129969
	R-LX-08X075-H-ZP/R-LX-08X075-H-ZF*	10	75	100	5906675120812	5906675129976
	R-LX-08X090-H-ZP/R-LX-08X090-H-ZF*	10	90	100	5906675120843	5906675129983
	R-LX-08X100-H-ZP/R-LX-08X100-H-ZF*	10	100	100	5906675121055	5906675129990
	R-LX-08X130-H-ZP/R-LX-08X130-H-ZF*	10	130	50	5906675121185	5906675130002
	R-LX-08X150-H-ZP/R-LX-08X150-H-ZF*	10	150	50	5906675121192	5906675130019
Ø12,5	R-LX-10X065-H-ZP/R-LX-10X065-H-ZF*	12.5	65	50	5906675121208	5906675130026
	R-LX-10X075-H-ZP/R-LX-10X075-H-ZF*	12.5	75	50	5906675121482	5906675130033
	R-LX-10X085-H-ZP/R-LX-10X085-H-ZF*	12.5	85	50	5906675122076	5906675130040
	R-LX-10X100-H-ZP/R-LX-10X100-H-ZF*	12.5	100	50	5906675122557	5906675130057
	R-LX-10X120-H-ZP/R-LX-10X120-H-ZF*	12.5	120	25	5906675123141	5906675130064
	R-LX-10X140-H-ZP/R-LX-10X140-H-ZF*	12.5	140	25	5906675123615	5906675130071
	R-LX-10X160-H-ZP/R-LX-10X160-H-ZF*	12.5	160	20	5906675124209	5906675130088
Ø17	R-LX-14X080-H-ZP/R-LX-14X080-H-ZF*	17	80	20	5906675127514	5906675130149
	R-LX-14X105-H-ZP/R-LX-14X105-H-ZF*	17	105	20	5906675127521	5906675130156
	R-LX-14X115-H-ZP/R-LX-14X115-H-ZF*	17	115	20	5906675127538	5906675130163
	R-LX-14X135-H-ZP/R-LX-14X135-H-ZF*	17	135	20	5906675127545	5906675130170
R-LX-CS Countersunk Concrete Screw Anchor					**R-LX-CS-ZP**	**R-LX-CS-ZF**
Ø6,3	R-LX-05X050-CS-ZP/R-LX-05X050-CS-ZF*	6.3	50	100	5906675127859	5906675130217
	R-LX-05X075-CS-ZP/R-LX-05X075-CS-ZF*	6.3	75	100	5906675128054	5906675130224
Ø7,5	R-LX-06X050-CS-ZP/R-LX-06X050-CS-ZF*	7.5	50	100	5906675128801	5906675130231
	R-LX-06X075-CS-ZP/R-LX-06X075-CS-ZF*	7.5	75	100	5906675129280	5906675130248
	R-LX-06X100-CS-ZP/R-LX-06X100-CS-ZF*	7.5	100	100	5906675129297	5906675130255
	R-LX-06X130-CS-ZP/R-LX-06X130-CS-ZF*	7.5	130	100	5906675129303	5906675130262
	R-LX-06X150-CS-ZP/R-LX-06X150-CS-ZF*	7.5	150	100	5906675129310	5906675130279
Ø10	R-LX-08X060-CS-ZP/R-LX-08X060-CS-ZF*	10	60	100	5906675129327	5906675130385
	R-LX-08X075-CS-ZP/R-LX-08X075-CS-ZF*	10	75	100	5906675129334	5906675130392
	R-LX-08X090-CS-ZP/R-LX-08X090-CS-ZF*	10	90	100	5906675129341	5906675130408
	R-LX-08X100-CS-ZP/R-LX-08X100-CS-ZF*	10	100	100	5906675129358	5906675130415
	R-LX-08X130-CS-ZP/R-LX-08X130-CS-ZF*	10	130	50	5906675129365	5906675130422
	R-LX-08X150-CS-ZP/R-LX-08X150-CS-ZF*	10	150	50	5906675129372	5906675130439
Ø12,5	R-LX-10X065-CS-ZP/R-LX-10X065-CS-ZF*	12.5	65	50	5906675129389	5906675130453
	R-LX-10X075-CS-ZP/R-LX-10X075-CS-ZF*	12.5	75	50	5906675129396	5906675130460
	R-LX-10X085-CS-ZP/R-LX-10X085-CS-ZF*	12.5	85	50	5906675129402	5906675130477
	R-LX-10X100-CS-ZP/R-LX-10X100-CS-ZF*	12.5	100	50	5906675129419	5906675130491
	R-LX-10X120-CS-ZP/R-LX-10X120-CS-ZF*	12.5	120	25	5906675129426	5906675130514
	R-LX-10X140-CS-ZP/R-LX-10X140-CS-ZF*	12.5	140	25	5906675129433	5906675130521
	R-LX-10X160-CS-ZP/R-LX-10X160-CS-ZF*	12.5	160	20	5906675129440	5906675130538
Ø17	R-LX-14X080-CS-ZP/R-LX-14X080-CS-ZF*	17	80	20	5906675129501	5906675130590
	R-LX-14X105-CS-ZP/R-LX-14X105-CS-ZF*	17	105	20	5906675129518	5906675130606
	R-LX-14X115-CS-ZP/R-LX-14X115-CS-ZF*	17	115	20	5906675129525	5906675130675
	R-LX-14X135-CS-ZP/R-LX-14X135-CS-ZF*	17	135	20	5906675129532	5906675130712

* Made to order

ACCESSORIES

- Tension Tester

Rawlplug Tension Tester Kit

Model 2000 tester kit for measurement of tensile loads on anchors

Product overview

Features and benefits

- Pull-out tester enables engineers to confirm the holding power of anchors in most construction materials

Applications

- Pull-out tester for testing fixings, fasteners and anchors

Instructions for use

1. Fit the appropriate button to the fastener to be tested
2. Slide the slot in the bolt tester adaptor over the button adaptor until the fastener axis and bolt tester axis are in alignment
3. Adjust the length of the threaded legs until the head of the bolt tester adaptor can be passed through the opening in the load spreading bridge. Check that the head of the load spreading bridge is centered in the tester and the button adaptor is square in the u shaped slot in the puller. Make final adjustments so that the bolt tester adaptor, tester and fixing are aligned
4. Position the tester so that the gauge can be easily read
5. Adjust the length of the threaded legs so that all three are in contact with the base material and the load spreading bridge is aligned and level by referring to the bubble levels on each face
6. Set the red pointer on the gauge to zero – hold the tester by the grip handle and proceed to load the fastener by turning the operating handle clockwise
7. Increase the load until the required test load is attained. Hold this load and observe any falling back of the gauge pointer which would indicate movement and possible failure of the fastener. Record the satisfactory result
8. Release the load on the fastener by turning the operating handle anti-clockwise and allowing the test jaw to return to the original position
9. Remove the tester and bolt tester adaptor

RAWLPLUG®

Trust & Innovation

Drill bits

DRILL BITS

- RT-SDSA
- RT-SDSB
- RT-SDSR
- RT-MAXA

RT-SDSA Aggressor SDS plus

Drill bits for fast drilling in concrete AGGRESSOR SDS plus

Certificate

Product overview

Features and benefits

- Self-aligning drill bit tip enables quick and easy start drilling at the marked spot
- Increased angle plates to 160° results in faster drilling in concrete
- Very deep seating of carbide plate significantly increases the durability of the connection to the core drill which improves the quality of the drill
- Aggressive flutes increase dust extraction and accelerate drilling
- Steel on the specification of 34CrNiMo6 provides high resistance and durability
- Subjected to a heat treatment by which the hardness of the steel increases to 52 HRC for optimal resistance during drilling
- Drilling speed increased by 30%
- Extremely high durability confirmed by the international certificate SicherSafe

Applications

- Drilling in concrete, brick and stone
- Suitable for use with SDS plus Rotary Hammer

Base materials

For use in:

- Concrete
- Solid Brick
- Hollow Brick
- Natural Stone
- Aerated Concrete Block

Recommended fixings

R-LX-HF-ZF
Zinc flake concrete screw anchor with hexagonal head with flange

R-XPT
Throughbolt

R-XPTII-A4
Stainless Steel Throughbolt

Product Commercial Data

Product Code	Description			Logistic data		EAN
	Diameter	Length				
	Ø	L	L1	Quantity	Weight	
	[mm]			[szt.]	[kg]	
RT-SDSA-4/110	4	110	50	1	0.04	5906675114767
RT-SDSA-5/110	5	110	50	1	0.04	5906675114774
RT-SDSA-5/160	5	160	100	1	0.04	5906675027944
RT-SDSA-5/210	5	210	150	1	0.04	5906675114781
RT-SDSA-5/310	5	310	250	1	0.15	5906675063461
RT-SDSA-5/310B12	5	310	250	12	9.12	5906675063478
RT-SDSA-5/460	5	460	400	1	0.09	5906675114798
RT-SDSA-55/160	5,5	160	100	1	0.04	5906675026503
RT-SDSA-55/260	5,5	260	200	1	0.06	5906675114804
RT-SDSA-55/310	5,5	310	250	1	0.06	5906675114811
RT-SDSA-55/460	5,5	460	400	1	0.09	5906675114828
RT-SDSA-6/110	6	110	50	1	0.09	5906675027920
RT-SDSA-6/160	6	160	100	1	0.05	5906675026589
RT-SDSA-6/160B12	6	160	100	12	6.84	5906675063539
RT-SDSA-6/210	6	210	150	1	0.05	5906675027982
RT-SDSA-6/260	6	260	200	1	0.1	5906675048598
RT-SDSA-6/310B12	6	310	250	12	10.61	5906675063485
RT-SDSA-6/460	6	460	400	1	0.09	5906675114835
RT-SDSA-65/210	6.5	210	150	1	0.06	5906675114842
RT-SDSA-65/260	6.5	260	200	1	0.06	5906675114859
RT-SDSA-65/310	6.5	310	250	1	0.07	5906675114866
RT-SDSA-7/110	7	110	50	1	0.04	5906675026572
RT-SDSA-7/160	7	160	100	1	0.05	5906675026565
RT-SDSA-8/110	8	110	50	1	0.04	5906675026558
RT-SDSA-8/160	8	160	100	1	0.06	5906675027951
RT-SDSA-8/160B12	8	160	100	12	8.15	5906675063546
RT-SDSA-8/210	8	210	150	1	0.07	5906675027968
RT-SDSA-8/260	8	260	200	1	0.07	5906675027937
RT-SDSA-8/310	8	310	250	1	0.08	5906675027975
RT-SDSA-8/310B12	8	310	250	12	11.64	5906675063508
RT-SDSA-8/410	8	410	350	1	0.14	5906675114873
RT-SDSA-8/460	8	460	400	1	0.15	5906675114880
RT-SDSA-8/610	8	610	550	1	0.33	5906675064468
RT-SDSA-9/160	9	160	100	1	0.07	5906675114897
RT-SDSA-95/260	9.5	260	200	1	0.30	5906675045979
RT-SDSA-95/310	9.5	310	250	1	0.30	5906675045986
RT-SDSA-95/410	9.5	410	350	1	0.30	5906675045993
RT-SDSA-10/110	10	110	50	1	0.05	5906675026596
RT-SDSA-10/160	10	160	100	1	0.07	5906675026602
RT-SDSA-10/160B12	10	160	100	12	12.00	5906675063553
RT-SDSA-10/210	10	210	150	1	0.09	5906675026619
RT-SDSA-10/260	10	260	200	1	0.08	5906675026626
RT-SDSA-10/310	10	310	250	1	0.08	5906675028002
RT-SDSA-10/310B12	10	310	250	12	12.00	5906675063515
RT-SDSA-10/460	10	460	400	1	0.20	5906675114910
RT-SDSA-10/610	10	610	550	1	0.26	5906675114927
RT-SDSA-10/1000	10	1000	940	1	0.54	5906675114934
RT-SDSA-11/260	11	260	200	1	0.07	5906675086156
RT-SDSA-11/310	11	310	250	1	0.12	5906675086163
RT-SDSA-11/410	11	410	350	1	0.20	5906675086811
RT-SDSA-12/160	12	160	100	1	0.09	5906675026633
RT-SDSA-12/210	12	210	150	1	0.11	5906675026640
RT-SDSA-12/260	12	260	200	1	0.08	5906675028019
RT-SDSA-12/310	12	310	250	1	0.17	5906675026657
RT-SDSA-12/460	12	460	400	1	0.29	5906675086149
RT-SDSA-12/610	12	610	550	1	0.33	5906675114958

Product Commercial Data

Product Code	Description			Logistic data		EAN
	Diameter	Length				
	Ø	L	L1	Quantity	Weight	
	[mm]			[szt.]	[kg]	
RT-SDSA-12/1000	12	1000	940	1	0.54	5906675114965
RT-SDSA-14/160	14	160	100	1	0.11	5906675114972
RT-SDSA-14/210	14	210	150	1	0.131	5906675026664
RT-SDSA-14/260	14	260	200	1	0.167	5906675026671
RT-SDSA-14/310	14	310	250	1	0.199	5906675026688
RT-SDSA-14/460	14	460	400	1	0.25	5906675026695
RT-SDSA-14/610	14	610	550	1	0.38	5906675115009
RT-SDSA-14/1000	14	1000	940	1	0.54	5906675115047
RT-SDSA-15/160	15	160	100	1	0.14	5906675115054
RT-SDSA-15/210	15	210	150	1	0.14	5906675086828
RT-SDSA-16/160	16	160	100	1	0.14	5906675115054
RT-SDSA-16/210	16	210	150	1	0.18	5906675115078
RT-SDSA-16/260	16	260	200	1	0.21	5906675026701
RT-SDSA-16/310	16	310	250	1	0.26	5906675026718
RT-SDSA-16/460	16	460	400	1	0.30	5906675026725
RT-SDSA-16/610	16	610	550	1	0.50	5906675115085
RT-SDSA-16/1000	16	1000	940	1	0.88	5906675115092
RT-SDSA-18/210	18	210	150	1	0.22	5906675115108
RT-SDSA-18/260	18	260	200	1	0.28	5906675115115
RT-SDSA-18/310	18	310	250	1	0.32	5906675026732
RT-SDSA-18/460	18	460	400	1	0.41	5906675026749
RT-SDSA-18/610	18	610	550	1	0.66	5906675115139
RT-SDSA-18/1000	18	1000	940	1	1.11	5906675115146
RT-SDSA-20/310	20	310	250	1	0.40	5906675026756
RT-SDSA-20/460	20	460	400	1	0.53	5906675026763
RT-SDSA-20/610	20	610	550	1	0.79	5906675115153
RT-SDSA-22/460	22	460	400	1	0.64	5906675026770
RT-SDSA-24/460	24	460	400	1	0.74	5906675026787
RT-SDSA-25/310	25	310	250	1	0.96	5906675115238
RT-SDSA-25/460	25	460	400	1	0.96	5906675115245
RT-SDSA-26/460	26	460	400	1	0.87	5906675026794
RT-SDSA-30/460	30	460	400	1	1.10	5906675115252

RT-SDSR Rebardrill SDS plus

High quality drill bits for reinforced concrete REBARDRILL SDS plus

Certificate

Product overview

Features and benefits

- The monolithic carbide plate greatly increases the life of the drill
- Self-aligning drill bit tip enables quick and easy start drilling at the marked spot
- 3 symemetrical points of contact of the drill bit with the substrate allows drilling perfectly straight and cylindical holes
- Suitable Approach angle Plate 135° allows for drilling in reinforced concrete
- Very deep seating of carbide plate significantly increases the durability of the connection to the core drill which improves the quality of the drill
- 3 areas of dust extractionl and special shape make it easy to remove the dust
- Steel on the specification of 34CrNiMo6 provides high resistance and durability
- Subjected to a heat treatment by which the hardness of the steel increases to 52 HRC for optimal resistance during drilling
- Drilling without damage the substrate even near edges

Applications

- Drilling in reinforced concrete and hard brick
- Suitable for use with SDS plus Rotary Hammer

Base materials

For use in:

- Reinforced concrete
- Concrete
- Natural Stone
- Solid Concrete Block
- Solid Brick

Recommended fixings

R-KER
High vinylester resin

R-XPT
Throughbolt

R-HPTII-ZF
Zinc Flake Throughbolt

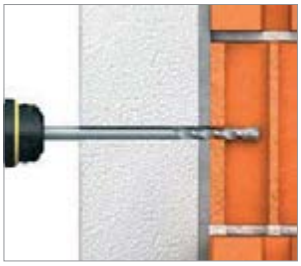
Bonded anchors of width up to 20mm thanks to possibility of drilling close to the edge and perfectly circular holes.

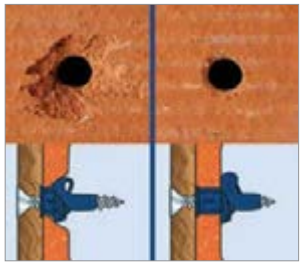
Product Commercial Data

Product Code	Description			Logistic data		EAN
	Diameter	Length				
	Ø	L	L1	Quantity	Weight	
	[mm]			[szt.]	[kg]	
RT-SDSR-5/160	5	160	100	1	0.3	5906675046006
RT-SDSR-6/110	6	110	50	1	0.3	5906675047713
RT-SDSR-6/160	6	160	100	1	0.3	5906675046013
RT-SDSR-6/160B12	6	160	100	12	6.84	5906675063560
RT-SDSR-6/210	6	210	150	1	0.3	5906675046020
RT-SDSR-6/260	6	260	200	1	0.3	5906675046037
RT-SDSR-6/310B12	6	310	250	12	10.61	5906675063591
RT-SDSR-7/160	7	160	100	1	0.3	5906675047737
RT-SDSR-8/110	8	110	50	1	0.3	5906675047720
RT-SDSR-8/160	8	160	100	1	0.3	5906675046044
RT-SDSR-8/160B12	8	160	100	12	8.15	5906675063577
RT-SDSR-8/210	8	210	150	1	0.3	5906675046051
RT-SDSR-8/260	8	260	200	1	0.3	5906675046068
RT-SDSR-8/310	8	310	250	1	0.3	5906675046075
RT-SDSR-8/310B12	8	310	250	12	11.64	5906675063607
RT-SDSR-8/460	8	460	400	1	0.3	5906675046082
RT-SDSR-10/160	10	160	100	1	0.3	5906675046099
RT-SDSR-10/160B12	10	160	100	12	12.00	5906675063584
RT-SDSR-10/210	10	210	150	1	0.3	5906675046105
RT-SDSR-10/260	10	260	200	1	0.3	5906675046112
RT-SDSR-10/310	10	310	250	1	0.3	5906675046136
RT-SDSR-10/310B12	10	310	250	12	12.00	5906675063614
RT-SDSR-10/460	10	460	400	1	0.3	5906675046143
RT-SDSR-12/160	12	160	100	1	0.3	5906675046150
RT-SDSR-12/210	12	210	150	1	0.3	5906675046167
RT-SDSR-12/260	12	260	200	1	0.3	5906675046174
RT-SDSR-12/310	12	310	250	1	0.3	5906675046181
RT-SDSR-12/460	12	460	400	1	0.3	5906675046198
RT-SDSR-14/210	14	210	150	1	0.3	5906675046204
RT-SDSR-14/260	14	260	200	1	0.3	5906675046211
RT-SDSR-14/310	14	310	250	1	0.3	5906675046228
RT-SDSR-14/460	14	460	400	1	0.3	5906675046235
RT-SDSR-16/210	16	210	150	1	0.3	5906675046242
RT-SDSR-16/260	16	260	200	1	0.3	5906675046259
RT-SDSR-16/310	16	310	250	1	0.3	5906675046266
RT-SDSR-16/460	16	460	400	1	0.3	5906675046273
RT-SDSR-18/310	18	310	250	1	0.3	5906675046280
RT-SDSR-20/310	20	310	250	1	0.3	5906675046297
RT-SDSR-20/460	20	460	400	1	0.55	5906675071183

RT-SDSB Brickdrill SDS plus

Drill bits for fast drilling in ceramic materials without damage BRICKDRILL SDS plus





Certificate

Product overview

Features and benefits

- Tip angle 120° allows for fast drilling of holes in ceramic material without damage
- Short drill bit flute accelerates dust extraction between the slots of ceramic brick
- Drilling without hammering
- Perfect straight hole without damaging the ceramic brick
- Steel on the specification of 34CrNiMo6 provides high resistance and durability
- Subjected to a heat treatment by which the hardness of the steel increases to 52 HRC for optimal resistance during drilling
- Also suitable for aerated concrete
- Long drill bit shank allows to drill deep holes also by insulation
- Extremely high durability confirmed by the international certificate SicherSafe

Applications

- Drilling in ceramic hollow bricks
- Suitable for use with SDS plus Rotary Hammer

Base materials

For use in:

- Hollow Brick
- Aerated Concrete Block

Recommended fixings

R-KEM II

Bonded anchor

RM50

Bonded anchor - universal polyester (styrene free) resin

Product Commercial Data

Product Code	Description			Logistic data		EAN
	Diameter	Length				
	Ø	L	L1	Quantity	Weight	
	[mm]			[szt.]	[kg]	
RT-SDSB-6/260	8	260	200	1	0,3	5906675046303
RT-SDSB-8/260	8	260	200	1	0,3	5906675046310
RT-SDSB-8/310	8	310	250	1	0,3	5906675047553
RT-SDSB-8/460	8	460	400	1	0,2	5906675048918
RT-SDSB-10/260	10	260	200	1	0,3	5906675046334
RT-SDSB-10/310	10	310	250	1	0,3	5906675047560
RT-SDSB-10/460	10	460	400	1	0,2	5906675048604
RT-SDSB-12/260	12	260	200	1	0,3	5906675046341
RT-SDSB-15/260	15	260	200	1	0,3	5906675046358
RT-SDSB-16/260	16	260	200	1	0,3	5906675046365

RT-MAXA Aggressor SDS max

High quality AGGRESSOR SDS MAX drill bits for reinforced concrete

Certificate

SICHERSAFE

Product overview

Features and benefits

- 3 deep seeting cabide plates greatly increase the life of the drill
- 6 cutting edges increase the drilling efficiency and accelerates the execution of holes
- 3 self-aligning points allow drilling in reinforced concrete even when it hits the side of the rebar
- Optimized geometry of drill bit body allows to make axial and cylindrical holes ideal for fixing
- Steel on the specification of 34CrNiMo6 provides high resistance and durability
- Subjected to a heat treatment by which the hardness of the steel increases to 52 HRC for optimal resistance during drilling
- Drill bit core subjected to special thermal treatment which increases flexibility, resistance to twisting and the possibility of breaking
- Extremely high durability confirmed by the international certificate SicherSafe

Applications

- Drilling in reinforced concrete and hard brick
- Suitable for use with SDS max Rotary Hammer

Base materials

For use in:

- Reinforced concrete
- Concrete
- Natural Stone
- Solid Brick
- Solid Concrete Block

Recommended fixings

R-CAS
Spin-In Capsule

R-HPTII-ZF
Zinc Flake Throughbolt

R-KEX-II-600
Pure epoxy resin

Vinylester glass capsules and mechanical anchors of 12mm diameter thanks to perfectly circular and centric holes.

Product Commercial Data

Product Code	Description			Logistic data		EAN
	Diameter	Length				
	Ø	L	L1	Quantity	Weight	
	[mm]			[szt.]	[kg]	
RT-MAXA-12/340	12	340	200	1	0,382	5906675115283
RT-MAXA-12/540	12	540	400	1	0,477	5906675115573
RT-MAXA-12/690	12	690	550	1	0,506	5906675116211
RT-MAXA-14/340	14	340	200	1	0,403	5906675116228
RT-MAXA-14/540	14	540	400	1	0,593	5906675116235
RT-MAXA-16/340	16	340	200	1	0,441	5906675025933
RT-MAXA-16/540	16	540	400	1	0,593	5906675026367
RT-MAXA-18/340	16	340	200	1	0,501	5906675026374
RT-MAXA-18/540	18	540	400	1	0,718	5906675026381
RT-MAXA-20/340	20	340	200	1	0,548	5906675026398
RT-MAXA-20/540	20	540	400	1	0,819	5906675026404
RT-MAXA-20/920	20	920	780	1	1,113	5906675116242
RT-MAXA-22/340	22	340	200	1	0,6	5906675026411
RT-MAXA-22/540	22	540	400	1	0,934	5906675026428
RT-MAXA-22/920	22	920	780	1	1,603	5906675116341
RT-MAXA-24/340	24	340	200	1	0,669	5906675026435
RT-MAXA-24/540	24	540	400	1	1,05	5906675026442
RT-MAXA-25/340	25	340	200	1	0,735	5906675116358
RT-MAXA-25/540	25	340	400	1	1,144	5906675026459
RT-MAXA-25/920	25	920	780	1	1,786	5906675116365
RT-MAXA-26/340	26	340	200	1	0,735	5906675116372
RT-MAXA-26/540	26	540	400	1	1,176	5906675116389
RT-MAXA-28/340	28	340	200	1	0,829	5906675116396
RT-MAXA-28/540	28	540	400	1	1,334	5906675026466
RT-MAXA-28/690	28	690	550	1	1,692	5906675116402
RT-MAXA-30/340	30	340	200	1	0,873	5906675116419
RT-MAXA-30/540	30	540	400	1	1,472	5906675026473
RT-MAXA-32/340	32	340	200	1	0,88	5906675116440
RT-MAXA-32/540	32	540	400	1	1,48	5906675026480
RT-MAXA-32/920	32	920	780	1	2,768	5906675116457
RT-MAXA-35/340	35	340	200	1	0,965	5906675116501
RT-MAXA-35/540	35	540	400	1	1,6	5906675071190
RT-MAXA-35/690	35	690	550	1	2,1	5906675116518
RT-MAXA-36/540	36	540	400	1	1,945	5906675116525
RT-MAXA-38/340	38	340	200	1	1,1	5906675116532
RT-MAXA-38/540	38	540	400	1	1,742	5906675116549
RT-MAXA-38/690	38	690	550	1	2,33	5906675116563
RT-MAXA-40/540	40	540	400	1	1,8	5906675071206
RT-MAXA-40/920	40	920	780	1	3,806	5906675116624
RT-MAXA-42/540	42	540	400	1	2,1	5906675071213
RT-MAXA-45/540	45	540	400	1	2,284	5906675116648

RAWLPLUG®

Trust & Innovation

Packaging System

Packaging & labelling

Packaging

Our new packaging systems have been developed in accordance with the latest trends and with a strong focus on eco-friendly design. Boxes are made from high-cellulose content corrugated cardboard, with a water-based varnish used on selected sections. The design incorporates the Rawlplug identity and brand colours within a clean and modern design.

Our new packaging system for resin cartridges can also double up as a product display box, as in the case of our new R-KEM II resin seen here.

Clear communication

Packaging & labelling

Innovations

Installation guides
Instructional movie with installation steps, accessed simply by scanning the QR code

www.rawlplug.co.uk

Selective varnish
enhanced graphics, reduced absorption of dust and moisture, protection of printing.

One colour print
directly on cardboard

Kraft board type
a high content of cellulose (lower moisture absorption, higher stiffness and durability of cardboard, greater resistance to crushing and deformation)

QR Code
easy scanning thanks to 30% improvement in error correction

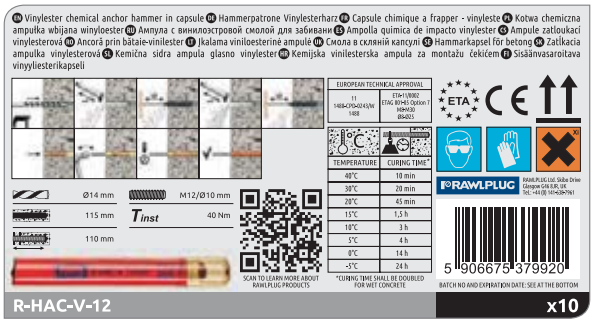
Recycling
Information about waste disposal and recycling

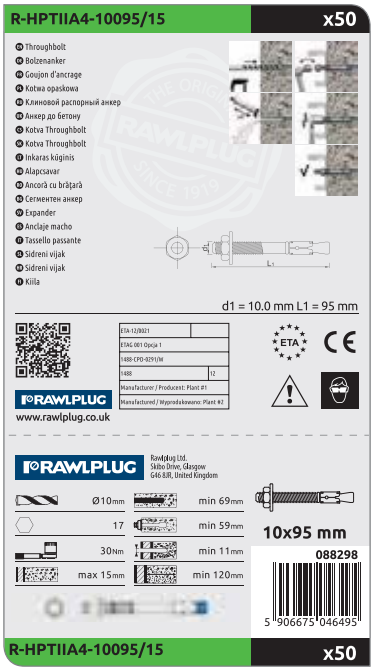
Interactive box with QR codes

A QR code (quick response code) is a type of 2D, matrix bar code that is often used to provide access to information through mobile devices.

New colour coded labelling system

Our labels include all technical data necessary for installation. Our mechanical anchors have various material and finish/ coating types and these characteristics are denoted by specific label colours (e.g. green for stainless steel).
Each resin type used in our bonded anchor range also has its own colour coded label for resin types (e.g. grey for vinylester resin).





POLYESTER STYRENE FREE | VINYLESTER STYRENE FREE | PURE EPOXY | POLYESTER

DELTA PROTECT | ZINC PLATED | HDG | STAINLESS STEEL | HCR

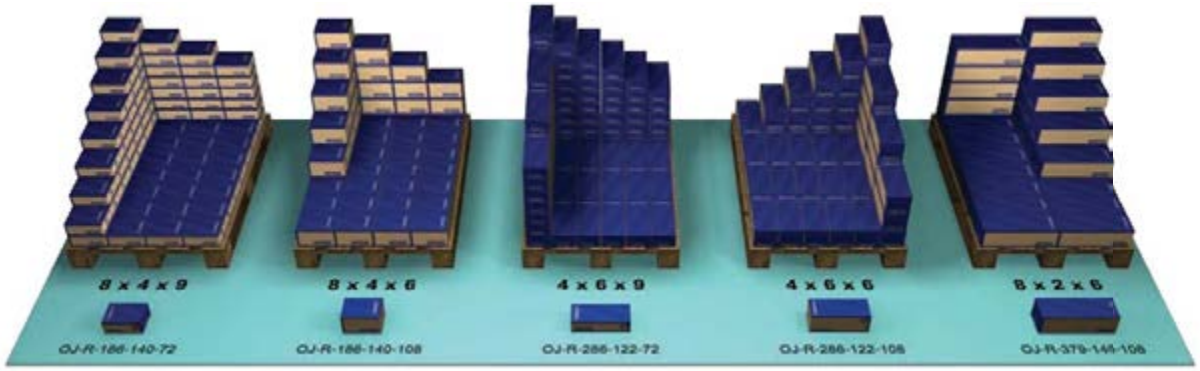
Packaging & labelling

Environmentally friendly philosophy

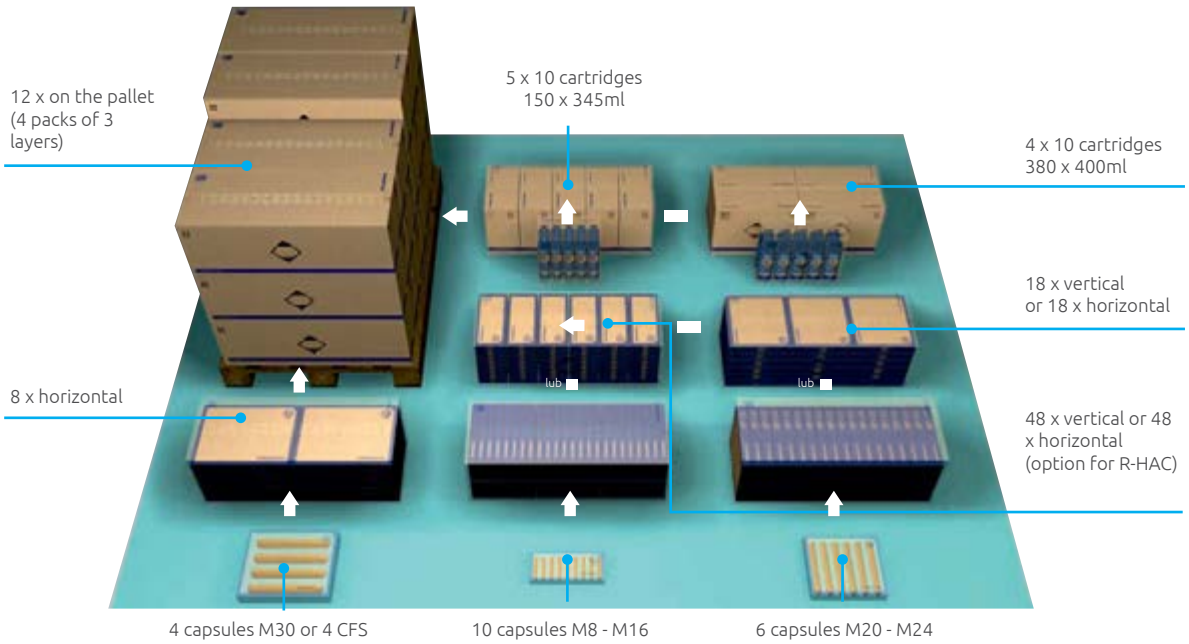
In our efforts at Rawlplug to care for the environment, we created a packaging system inspired by the latest pro-environmental trends. Paying close attention to the details, a system was developed to minimise waste whilst also allowing re-use of raw materials. The eco-friendly qualities of our packaging are highlighted by the special logo used on packaging to express our philosophy.

A functional and consistent system

Mechanical Anchors packaging:



Bonded Anchors packaging:



More from Rawlplug

Efficacy in the hardest conditions

We are proud to present innovative fixing from the ***Bonded Anchors and Mechanical Anchors*** group designed for the heavy loads demanded by industrial construction. Among our products you will find unique solutions to enable you to achieve maximal amounts with any kind of substrate. Knowledge backed-up with experience guarantees the effectiveness of our fixings and the success of your investment.

Durability and versatility

Our wide range of expansion plugs made of synthetic materials and metal, for low and medium loads, have been used for years for both industrial and residential construction. Incredibly durable FF1 from frame fixings group, universal in use 4ALL and UNO Plug, no. 1 on the UK market, are leading products of RAWLPLUG®'s offer in the field of ***Lightweight Fixings***, designed with every substrate in mind.

Innovations in Energy Saving construction

As a leading producer of façade insulation fixings we would like to present to you our wide array of products used in energy saving constructions. The Reliability and simplicity of our solutions combined with their ease of installation make them the most popular and desired by professionals. We invite you to familiarize yourselves with our offer for ***Façade Insulations Fixings***.

Excellent resistance for high loads

Thanks to our close cooperation with roof covering product producers, and our insight into the needs of investment contractors, our ***Roofing Insulations Fixings*** are one of the most popular among European roof fixing system producers. We invite cooperation from engineers, architects, and roof works contractors. And encourage you to try out our calculation software "ROOFIX" today.

Safety Certificate

Stepping towards the needs of customers, and increasing the general level of safety in closed spaces, we have created a protection system event of which in the combustion prevents fire and smoke from spreading. We invite you to acquaint with our offer for ***Passive Fire Protection Systems***, which hold the European Conformity Assessment.

Guarantee of lasting quality

Thanks to our constant monitoring of the production of assortments from our ***Foams, Sealants and Adhesives*** range we guarantee the constant and repeatable quality of our products. Their wide range of application possibilities and high efficiency has enabled us to rank among the top 5 of companies in the construction chemistry industry for years.

Maximal weather resistance

Rawlplug® ***Fasteners*** guarantee reliability of connections and maximal weather resistance. Our products, thanks to the use of appropriate materials and adoption of modern anticorrosion coating, pass even the hardest tests, matching the expectations of the most demanding clients. In our rich offer of screws characterized by extraordinary ease of installation, one may find perfect kind of connection for any kind of material and substrate.

Save time and minimize costs

In our offer of ***Direct Fastening Systems*** you may find, among others, highly effective pneumatically and gas powered nailers with accessories, compressors and an innovative and ergonomic rebar tier. We invite you to familiarize yourselves with the capabilities of Rawlplug® tools, which can significantly increase the comfort and effectiveness of work at any construction site.

Maximal effect of optimal offer

In order to ease the application and proper use and installation of our products, we supplement the our assortment of fixings with a precisely composed offer of ***Power Tool Accessories***. They include, among others, European-made drills of the highest quality, as confirmed with a Sichersafe certificate. We invite you to familiarize yourselves with our offer of accessories for professional installation techniques of the Rawlplug® brand.

Ergonomics for construction and at home

We offer high-quality ***Stapling, Tacking and Gluing*** tools that are recommended for both professionals and home DIY. Rawlplug's stapling tools are especially intended for construction, finishing works and repairs while our hot-melt adhesive system includes a new line of glue guns and glues for a wide range of applications - all of which are exceptionally easy to use and provide maximum efficiency and a high degree of flexibility for routine work

Unique and exclusive exposition

Rawlplug ***POS Essential Offer*** it is a unique and complete solution designed for product exposition in building wholesale and retail stores. The POS system is based on easily configurable rack components enhanced with expansive information elements and additional decorations, as well as a combination of individual packages in form of innovative Rawlplug Bag and cutting-edge cardboard boxes.

RAWLPLUG®

Trust & Innovation. Since 1919.

RAWLPLUG®

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