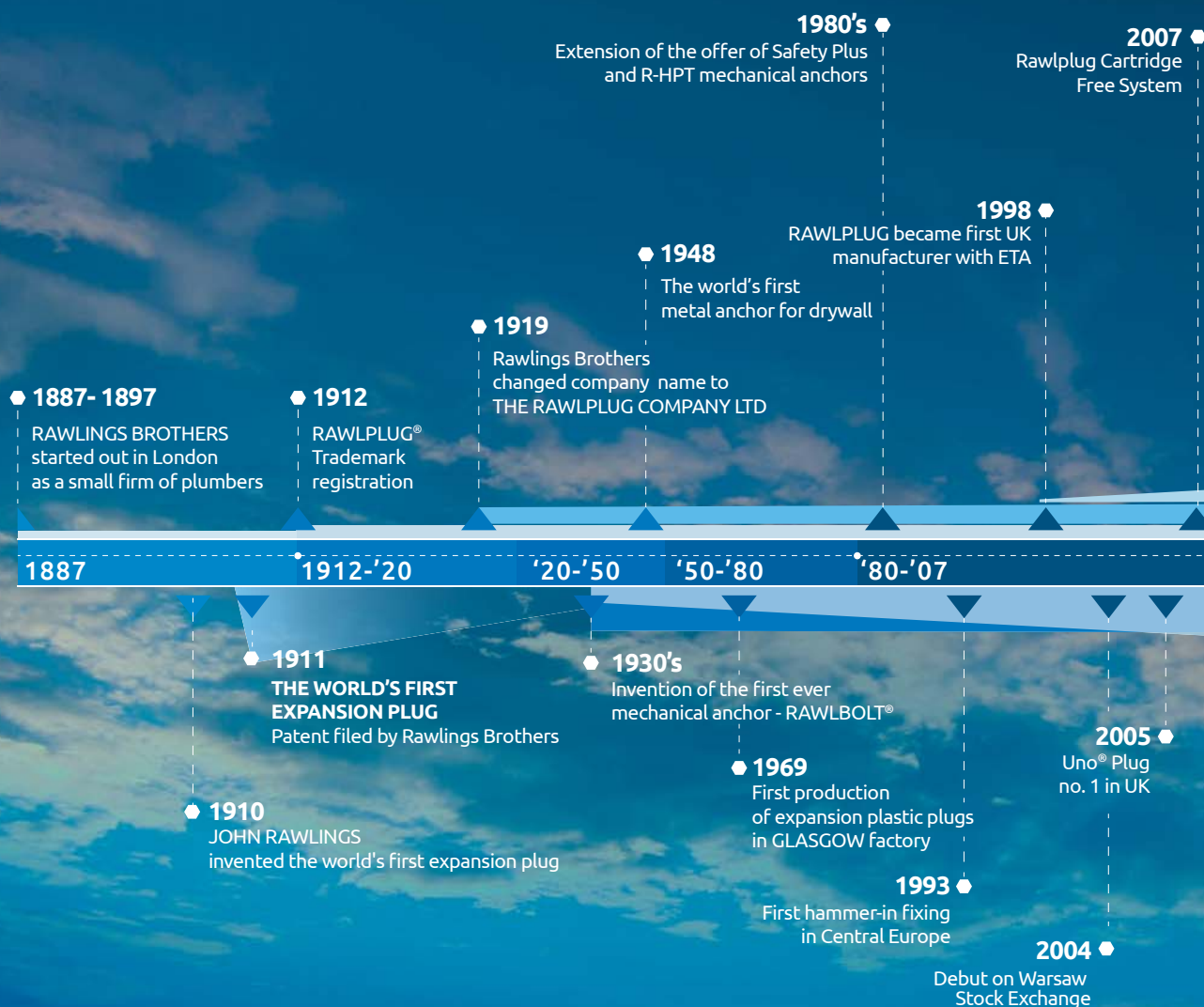


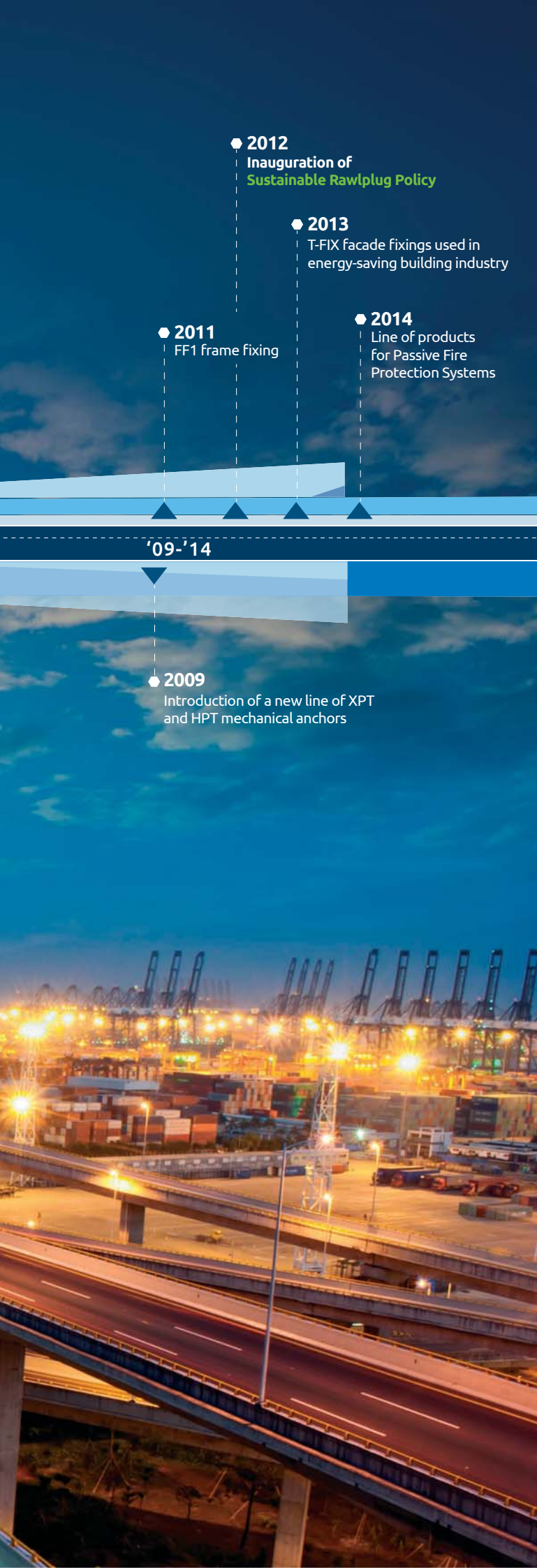


RAWLPLUG®

Bonded Anchors & Mechanical Anchors

Trust & Innovation





● **2012**
Inauguration of
Sustainable Rawlplug Policy

● **2013**
T-FIX facade fixings used in
energy-saving building industry

● **2011**
FF1 frame fixing

● **2014**
Line of products
for Passive Fire
Protection Systems

'09-'14

● **2009**
Introduction of a new line of XPT
and HPT mechanical anchors

- 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, Wrocław 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**

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 in 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 have supplemented 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.



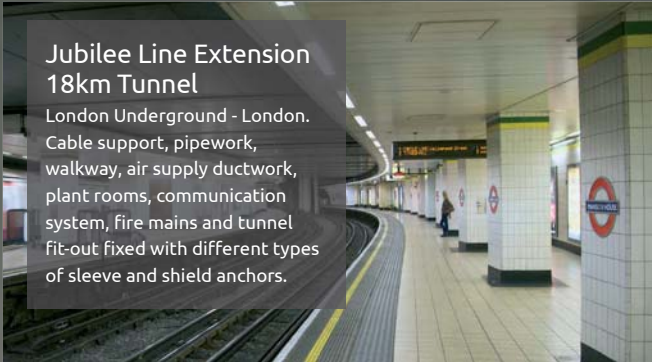
Twickenham Rugby Stadium

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



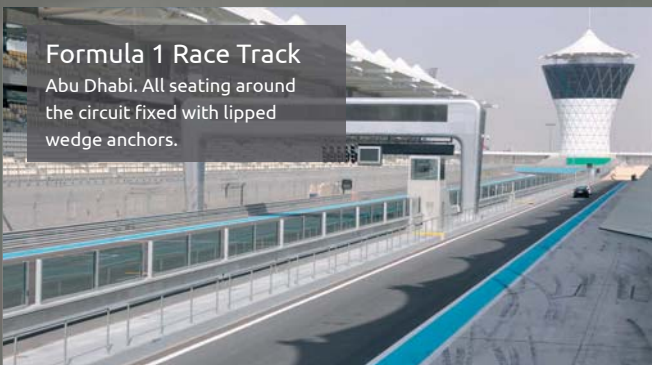
Jubilee Line Extension 18km Tunnel

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 Zayed 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.

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Overview of our range - Bonded anchor selector

										
BONDED ANCHOR SYSTEM:		R-KEX II with studs	R-KEX II with ITS	R-KEX II with rebar as an anchor	R-KEX II with post- installed rebar	R-KEX	R-KER with studs	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		✓ ETAG001 Option 1	✓ ETAG001 Option 7	✓ ETAG001 Option 7	✓ ETAG001 Option 7		✓ ETAG001 Option 1	✓ ETAG001 Option 7	✓ ETAG001 Option 7	✓ ETAG001 Option 7
	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	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					Ø32				
	160									
	170			Ø32	Ø32					Ø32
	180									
	190									
	200									
	210									
	220									
	230	M30								

7

Overview of our range - Mechanical anchor selector

											
MECHANICAL ANCHORS:			R-HPTII-A4	R-HPTII-ZF	R-XPTII-A4	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		✓	✓	-	-	-				
	AERATED CONCRETE		-	-	-	-	-				
	STONE		-	-	-	-	-				
	SOLID BRICK		-	-	-	-	-				
	HOLLOW BRICK		-	-	-	-	-				
	LIGHTWEIGHT CONCRETE BLOCKS		-	-	-	-	-				
APPROVALS			✓ ETAG001-2 Option 1	✓ ETAG001-2 Option 1	✓ ETAG001-2 Option 7	✓ ETAG001-2 Option 7	-				
			✓	✓	-	-	-				
											
			-	-	-	✓ for M24	✓				
TENSION AND SHEAR LOADS 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

[illegible]

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).

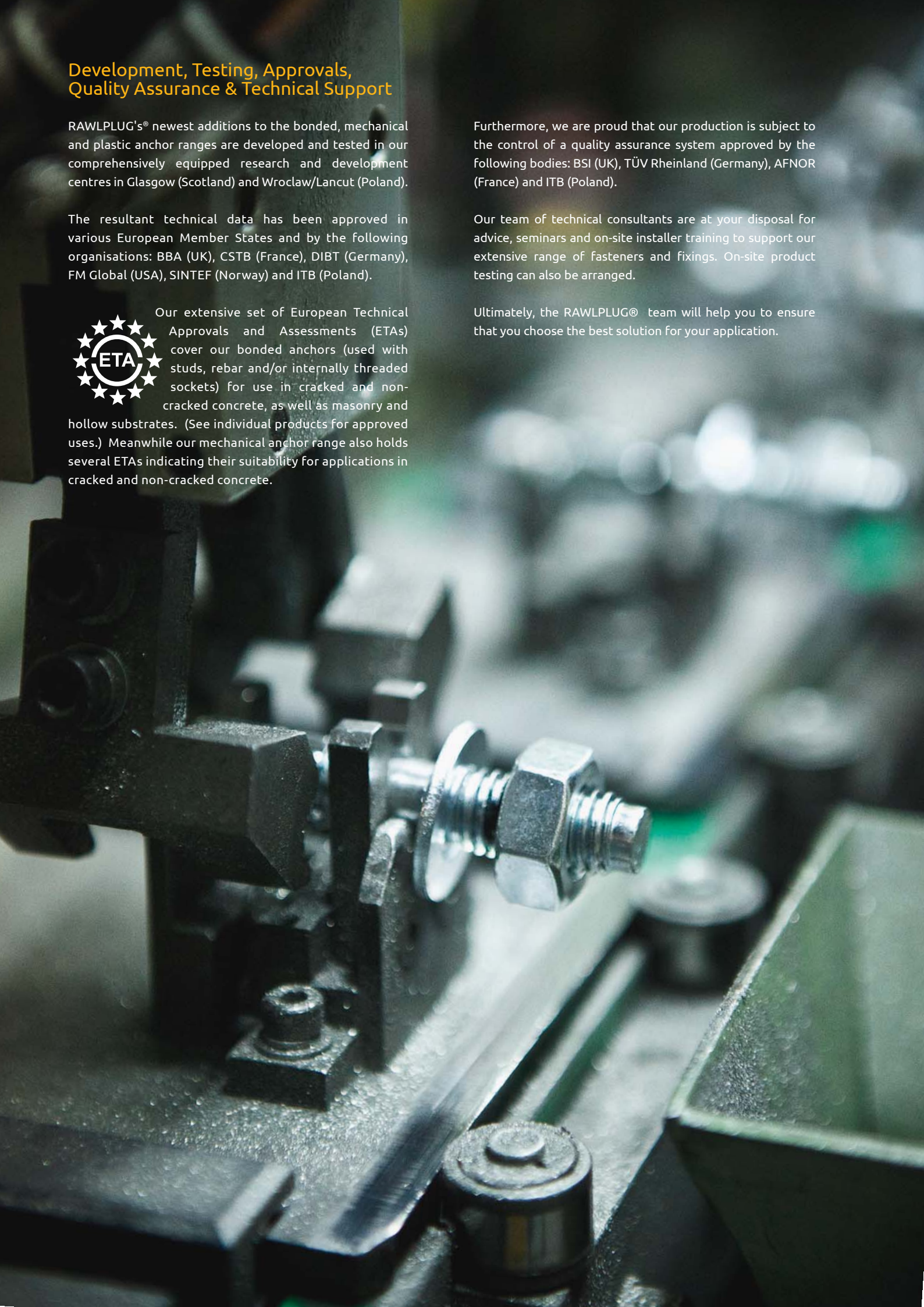


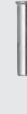
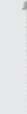
Our extensive set of European Technical Approvals and Assessments (ETAs) cover our bonded anchors (used with studs, rebar and/or internally threaded sockets) for use in cracked and non-cracked concrete, as well as masonry and hollow substrates. (See individual products for approved uses.) Meanwhile our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

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.



			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					
APPLICATIONS - CONSTRUCTION	BALUSTRADING		☒	☒			☒	☒	☒	☒	☒	☒	☒
	BARRIERS		☒					☒	☒	☒	☒	☒	☒
	CABLE TRAYS					☒		☒	☒	☒			
	CLADDING		☒		☒		☒	☒	☒	☒	☒	☒	☒
	CONDUITS					☒		☒	☒	☒			
	CURTAIN WALLING		☒				☒	☒	☒	☒	☒		
	DOORS & WINDOWS						☒	☒	☒	☒		☒	☒
	FACADES		☒							☒ Copy eco			
	FENCING & GATES		☒	☒				☒	☒	☒		☒	☒
	LIFTS & ESCALATORS		☒				☒			☒	☒	☒	☒

☒ main application

Bonded & Mechanical Anchors

		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					
APPLICATIONS - CONSTRUCTION	MACHINERY		☒	☒	☒			☒	☒	☒	☒	☒
	MASONRY SUPPORT		☒		☒		☒	☒	☒			
	PIPEWORK		☒	☒		☒	☒	☒	☒			
	PLATFORMS		☒						☒	☒	☒	☒
	PUBLIC SEATING		☒			☒			☒		☒	☒
	RACKING SYSTEMS		☒	☒	☒		☒	☒	☒	☒		
	RAINSCREENS		☒						☒			
	REBAR								☒	☒		☒
	SIGNS				☒				☒	☒	☒	
	SCAFFOLDING		☒			☒			☒	☒	☒	☒

☒ main application

			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					
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	POLYESTER STYRENE FREE
- 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 temperatures (down to -20° 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	- Recommended for outdoor applications. - Suitable for medium-duty fixings in non-cracked concrete.	- 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.

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 components, 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
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RESIN PRODUCTS AVAILABLE IN EACH SYSTEM:

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

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

Overview of our range

MECHANICAL ANCHORS - OUR RANGE		
THROUGHBOLTS	SHIELD ANCHORS	HEAVY-DUTY EXPANSION ANCHORS
Throughbolt anchors designed for use in cracked and non-cracked concrete	World's most popular all-purpose expanding shield anchor for use in cracked and non-cracked concrete	Heavy-duty expansion anchor, suitable for demanding safety-critical applications
		
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	- 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	- 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:		
R-HPTII-A4, R-HPTII-ZF, R-XPTII-A4, R-XPT, R-XPT-HD	RAWLBOLT: R-RBL, R-RBP, R-RB-PF, R-RBL-E, R-RBL-H, R-RB	SAFETY PLUS: R-SPLII, R-SPL, R-SPL-BP, R-SPL-C
WEDGE ANCHORS	SCREW ANCHORS (under development)	
Internally threaded wedge anchors for simple hammer-set installation	Self-tapping and removable concrete screw anchor for through-fixing installation	
		
FEATURES AND BENEFITS		
- High performance in cracked and non-cracked concrete confirmed by ETA Option 1 - 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	- Time-efficient installation through streamlined procedure - simply drill and drive - Completely removable - 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-HLX 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-DCA, R-DCL, R-DCA-A4	R-LX	

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

Corrosion is one of the most important and influential factors in the selection of anchors. Two basic corrosion types must be considered: atmospheric and galvanic corrosion.

Galvanic corrosion may occur when two dissimilar metals are in contact with each other. In the presence of an electrolyte (e.g. water) a galvanic cell is created, causing gradual corrosion of one of the metal elements.

The table below shows metals that may commonly be used as connector (anchor) and/or fixture materials, with indications of the expected corrosion outcome for each possible combination:

- the first column lists the fixed element (fixture) material
- the top row lists the anchor/connector material

Comments:

- Metal of the fixed element is not exposed to galvanic corrosion and, in fact, it takes advantage of galvanic protection (low, when the difference of electrochemical potentials is low, higher as the difference of potentials increases).
- The galvanic effect is influenced by the comparative surface areas of the two metals:

– in cases where the surface area of the fixture is the lesser, corrosion is accelerated

– in cases where the surface area of the fixture is the greater, corrosion is slowed.

The effect becomes more pronounced as the difference between the two surface areas increases.

Connector metal ➤	Stainless steel	Hot dip galvanised steel	Zinc electroplated steel	Zinc alloys	Lead	Brass
Fixture metal ▼						
Stainless steel	■	↑	↑	↑	↑	↑
Hot dip galvanised steel	←	■	■	■	←	←
Zinc electroplated steel	←	■	■	■	■	←
Low carbon steel	←	↑	↑	↑	■	←
Aluminium alloys	←	↑	↑	↑	■	■
Zinc alloys	←	■	■	■	←	←

■ Contact between these metals is allowable

↑ The connector metal will corrode

← The fixture metal will corrode

Basics of anchoring - Corrosion

Atmospheric corrosion is caused by the interaction of moisture or chemical compounds from the air with exposed metal. Corrosion rates depend on the concentration of chemical compounds in the air, as well as humidity levels.

According to ISO 12944-2:1998 (Table 1), atmospheric corrosion categories can be differentiated depending on locality, as well as the prevailing conditions. It is therefore important to accurately determine the working conditions of designated fixings and materials to ensure their correct application.

Atmospheric corrosion classification Corrosion categories	Typical environments		Recommended material			
	External	Internal	Zinc plating	Zinc flake	A2	A4
C1 Very low	–	Interior of air-conditioned premises with clean atmosphere (e.g. shops, offices, hotels)	5-10 µm	■	■	■
C2 Low	Atmosphere with low pollution and dry climate; mainly rural areas	Unheated buildings where condensation may occur (e.g. warehouses)	5-10 µm	■	■	■
C3 Moderate	Residential and industrial atmosphere with moderate pollution of SO ₂ . Coastal areas; low salinity atmosphere	Light industry with humidity and air pollution (food production, laundry facilities, etc.)	40 µm	■	□	■
C4 High	Industrial and coastal areas; medium salinity atmosphere	Chemical factories, swimming pools, offshore ships, etc.	40 µm	■	–	■
C5-I/M Very high (marine)	Coastal and offshore areas with highly-aggressive atmospheric conditions of high salinity and humidity	Buildings and areas with condensation of water and high pollution	40 µm	□	–	■

■ suitable for use □ consultation with our technical advisor recommended – not suitable for use

For anticorrosion protection RAWLPLUG® use not only standard technologies like zinc electroplating, but also more advanced alternatives. These include traditional protective measures such as hot dip galvanizing, or the use of stainless steel as the primary material. Modern protective technologies, like Deltatone or similar zinc flake coatings, are utilised also.

Images below show comparisons of zinc flake coated and hot dip galvanized samples after Neutral Salt Spray testing. Samples were installed in concrete cubes and placed in a corrosion testing chamber for 960 hours, with images showing sample condition after 504 hours, as well as 960 hours when the anchors were extracted from the substrate.



Image: RAWLPLUG®

Basics of anchoring - Loading considerations

Moreover, fasteners and fixings offered by RAWLPLUG® are tested in high salinity atmospheric conditions on a regular basis. The tests constitute a foundation for product development in cooperation with our customers.

All of our metal anchors for applications in low corrosion risk environments are zinc electroplated and passivated. In cases where anchors are intended for use in higher risk environments we recommend Hot Dip Galvanized, Zinc Flake, or Stainless Steel products.

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)

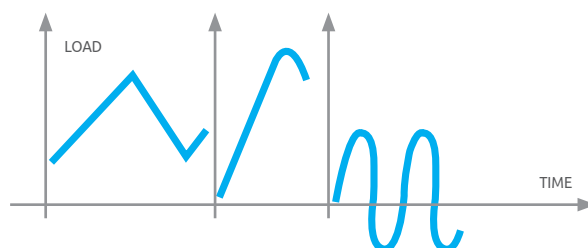
▪ Dynamic load

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

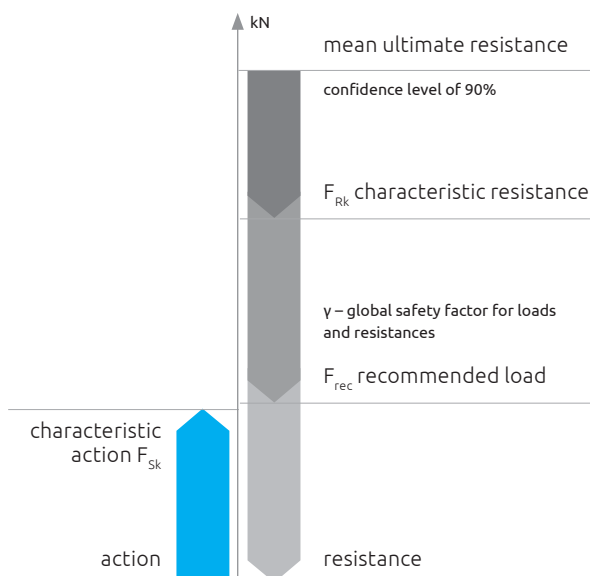
Global safety factor concept

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



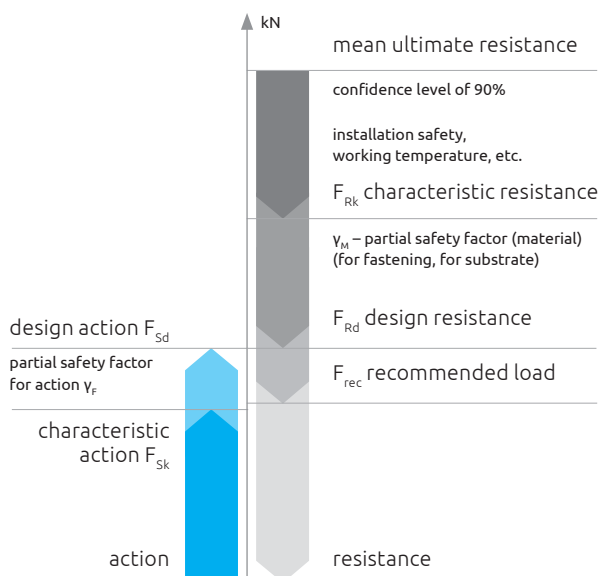
Partial safety factor concept

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:

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

F_{Sk} – characteristic action, γ_F – partial safety factor for actions
 $\gamma_F = 1.35$ – 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: $\gamma_c = 1.5$

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 $\gamma_2 = 1.0$

– for systems with normal level of installation safety $\gamma_2 = 1.2$

– for systems with low, but still acceptable level of installation safety $\gamma_2 = 1.4$

Shear loading (pry-out failure and concrete edge failure) $\gamma_2 = 1.0$

Basics of anchoring - Safety factors & calculations

In case of steel failure: γ_{Ms}

Tensile load:

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

Shear loading with and without lever arm:

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

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

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

$$\gamma_{Ms} = 1.5$$

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

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

Shear force:

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

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

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

Shear force:

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

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%.

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

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:

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

Characteristic resistance of steel for shear:

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

A_s – cross-sectional area [mm²], 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:

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

For the concept of partial safety factors:

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

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

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

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

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

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 admissible 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

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 16x32cm)	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:

$$R_m = 500 \text{ MPa} \quad | \quad R_e/R_m = 60\% \quad | \quad R_e = 300 \text{ MPa}$$

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.



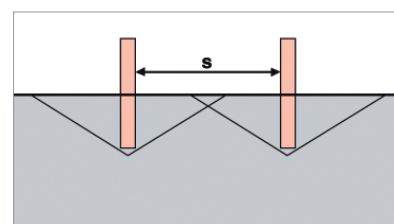
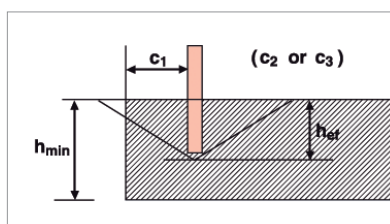
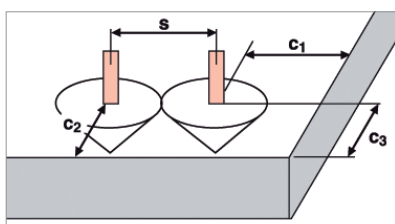
Anchor spacing and edge distances

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

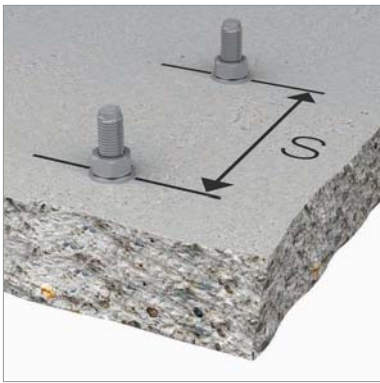
Reduction of anchor spacing and edge distances

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.

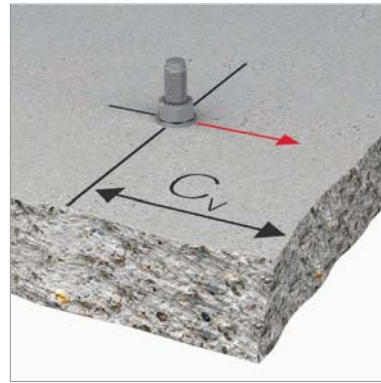
Reduction factors related to the anchor spacing: f_s



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: f_{c_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: f_{c_v}



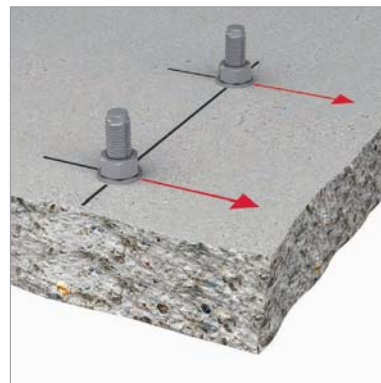
Reduction factor related to the distance $c_{cr,sp}$ of the anchor from a corner: $f_{c_{cr,sp}}$



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

$$F_{Rd,rec} = F_{Rd} \cdot f_s \cdot f_{c_N} \cdot f_{c_v}$$

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

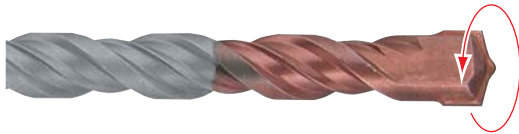
F_{Rd} – design resistance according to the technical data tables herein,
 f_s, f_{c_N}, f_{c_v} – reduction factors of axial spacing of anchors and distance to the edge of the base material.

Basics of anchoring - Anchor installation

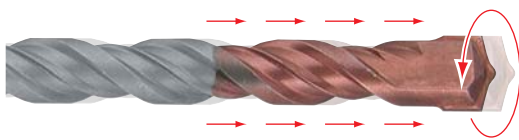
Drilling

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

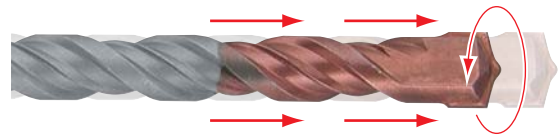
- rotary drilling – drilling by rotation and without percussion (or hammer action), recommended for drilling in materials of low mechanical strength such as bricks & aerated concrete due to the fact that it does not enlarge the hole, nor damage the structure of the material;



- 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.

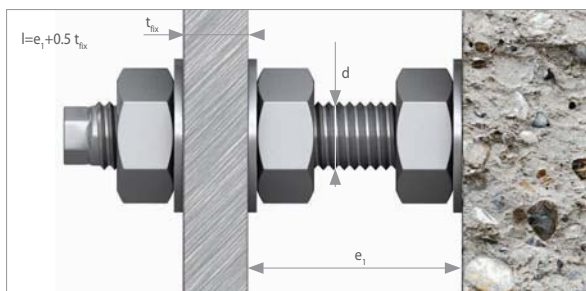
The values of tightening torque given in the specification and design guide should not be exceeded.

After initial application of the tightening torque, relaxation occurs causing a reduction in tension and therefore clamping force.

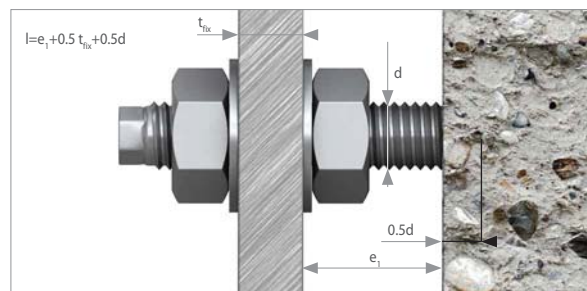
All data related to a load bearing capacity given in the present specification and design guide account for this torque relaxation behaviour.

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).

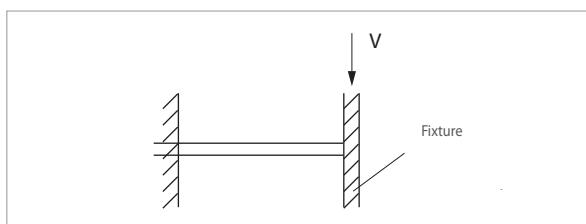


with clamping to the base material

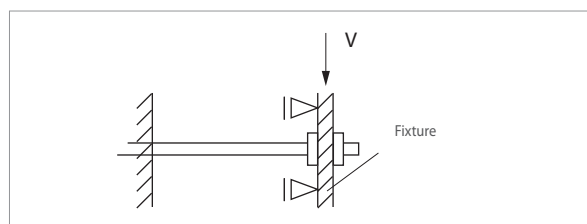


without clamping to the base material

$$M_v = V \times \frac{l}{a_M} \text{ [Nm]}$$



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



$a_M = 2.0$ 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)

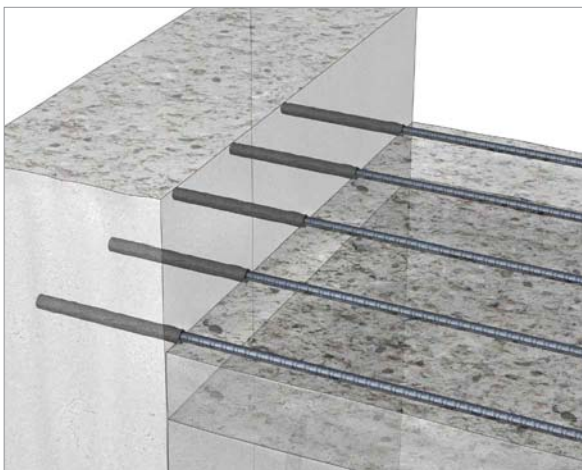


Figure 1.1: Anchorage

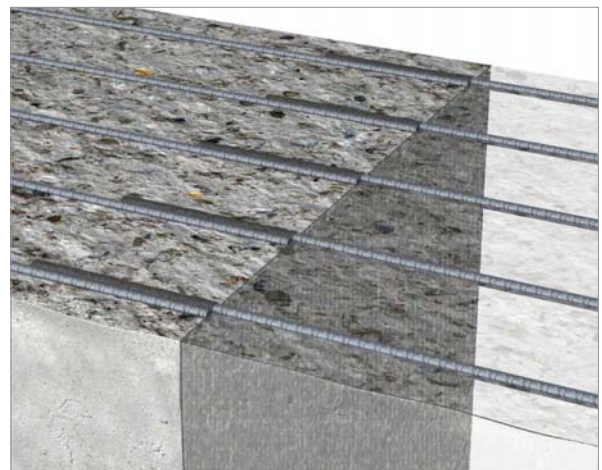


Figure 1.2: Overlap splice

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

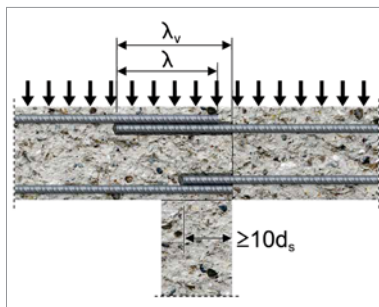


Figure 2

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

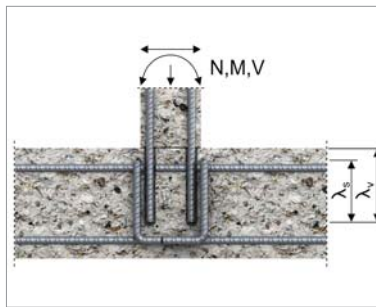


Figure 3

End anchoring of slabs or beams designed as simply supported

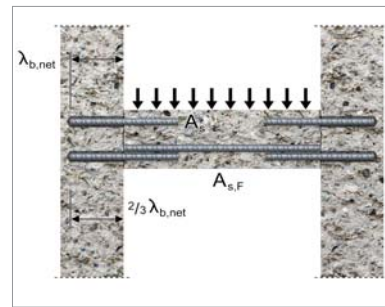


Figure 4

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

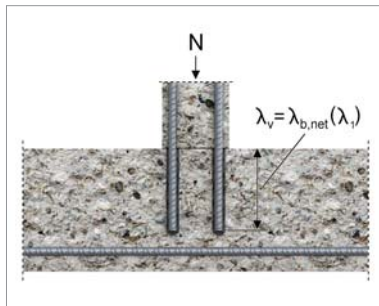
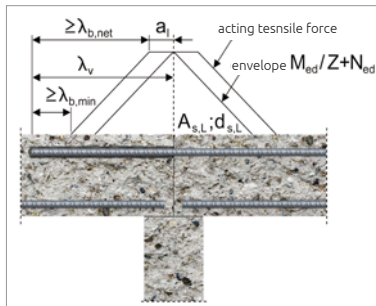


Figure 5

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

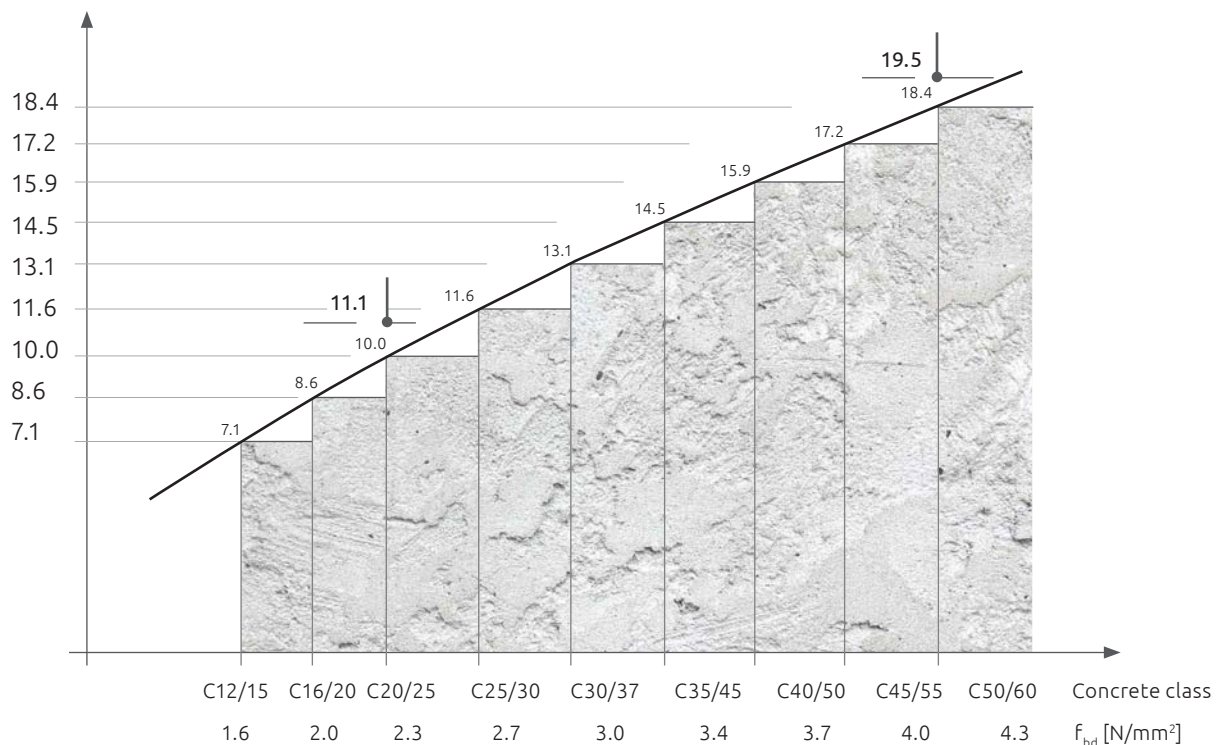
Load bearing capacity is determined by adhesion forces at the rebar-resin and resin-concrete interfaces, as well as the strength characteristics of the steel elements used. Of subsequent importance is the resin bond strength, which should be equal to or greater in strength than the concrete. Accordingly, 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:

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

where:

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.

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

$\alpha_1 - \alpha_5$ – 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)

$$0.7 \leq \alpha_2 \leq 1.00$$

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

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

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

α_3 – the effect of confinement by transverse reinforcement not welded to main reinforcement

$\alpha_3 = 1.0$ when no transverse reinforcement or no influence

$$0.7 \leq \alpha_3 \leq 1.00$$

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

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

$$K \text{ – values for beams and slabs acc. to EC2, Figure 8.4}$$

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

$\sum A_{st}$ – 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,

$\alpha_4 = 1.0$ 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

$$0.7 \leq \alpha_5 \leq 1.0$$

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

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

Product of $\alpha_2 \alpha_3 \alpha_5$ must fulfil: $\alpha_2 \alpha_3 \alpha_5 \geq 0.7$

Design anchorage length must be in the range between minimum and maximum anchorage length:

$$l_{b,min} \leq l_{bd} \leq l_{b,max}$$

$l_{b,min}$ – minimum anchorage length

$l_{b,min} = \max \{0.3 l_{b,reqd}; 10\emptyset; 100 \text{ mm}\}$ – rebar in tension

$l_{b,min} = \max \{0.6 l_{b,reqd}; 10\emptyset; 100 \text{ mm}\}$ – rebar in compression

$l_{b,max}$ – maximum embedment depth, from ETA

Basics of anchoring - Rebar connections

Design embedment length for overlap splice

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

$\alpha_1 - \alpha_5$ – as above

α_6 – influence of overlap splice relative to the total cross-section area

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

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:

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

$l_{0,min}$ – minimum lap splice length

$l_{0,min} = \max \{0.3 \alpha_6 l_{b,reqd}; 15\phi; 200 \text{ mm}\}$

$l_{v,max}$ – maximum embedment depth, from ETA

c_1 – concrete cover at frontal concrete surface

Embedment depth for lap splice connections:

$$l_v \geq l_0 + c_1$$

- The clear distance between lapped bars should not be greater than 4ϕ , or else the lap length should be increased by a length equal to the difference between the clear space and 4ϕ
- 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 anchoring 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

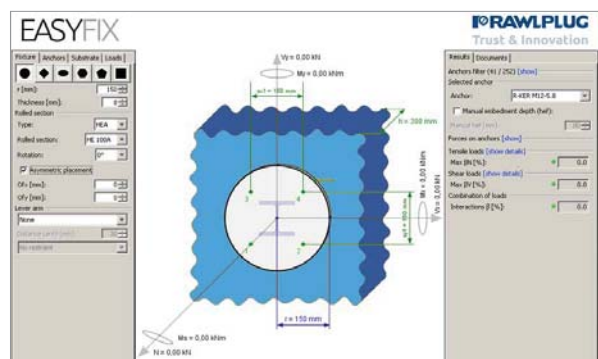
It is with pleasure that we present an improved and updated version of our popular anchor design software EasyFix.

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:

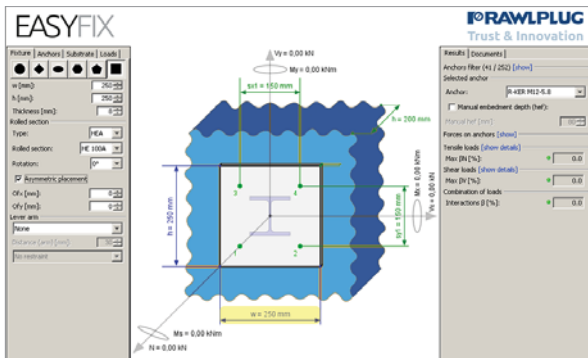
1. Enter different base plate geometries.
2. Attach a variety of different sections to the base element.
3. Add eccentricity to the anchorage by moving the point where the applied loads are acting to any point on the base element.
4. Design stand off applications by offsetting the base element from the 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.

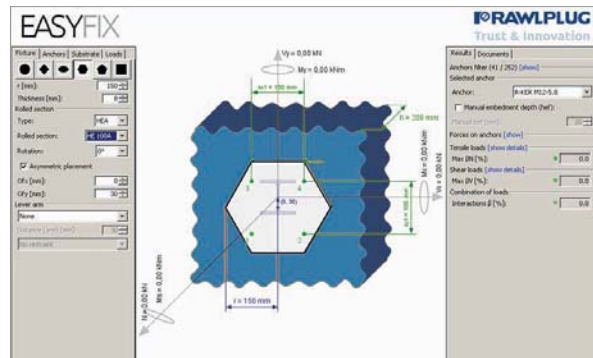


Choose baseplate shape (circular)

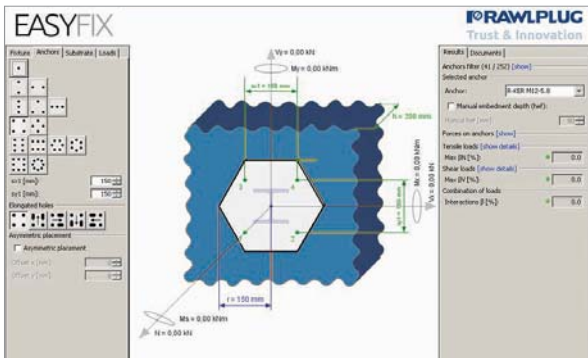
Basics of anchoring - Design software



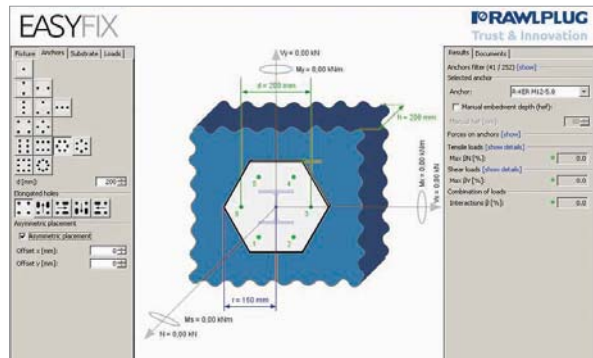
Choose baseplate shape (square/rectangular)



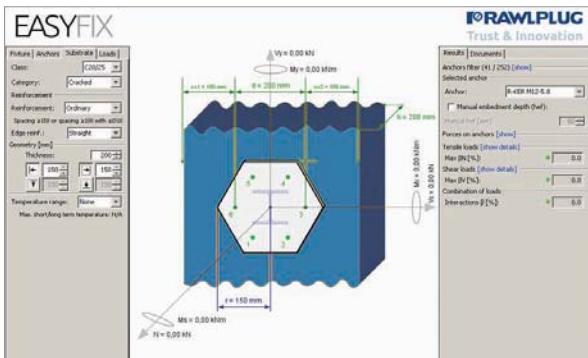
Asymmetric loading - default position is center of baseplate



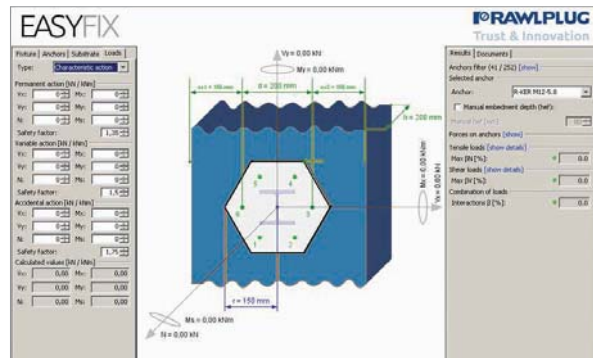
Choose hole positions and quantity (rectangular pattern)



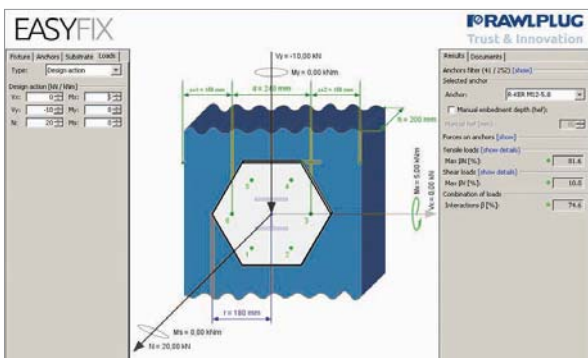
Choose hole positions and quantity (circular pattern)



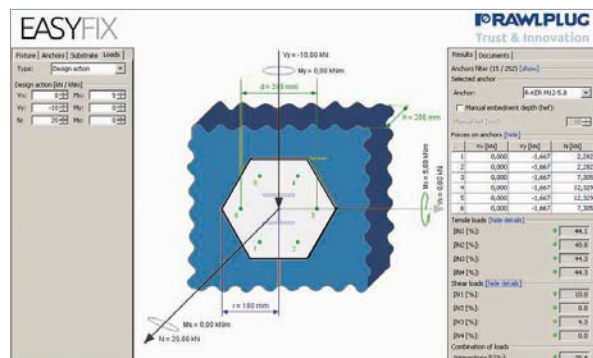
Add concrete edges and substrate details



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 catalogue are given below. Further notations are given in the text.

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
$M_{Rk,s}^0$	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

Approved Body Symbols

	European Technical Approval
	CE Marking
	Building Research Institute (Poland, Warsaw)
	Building sign
	Resistance to fire exposure
	FM Approved



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-KEX

- Pure Epoxy Resin

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

Patented self-opening clip

Peel-back label with additional info

Applications, benefits and substrates

Effortless extrusion with manual or pneumatic dispenser guns



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 metric 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 30 min. in 20°)
- For use in positive temperatures

Applications

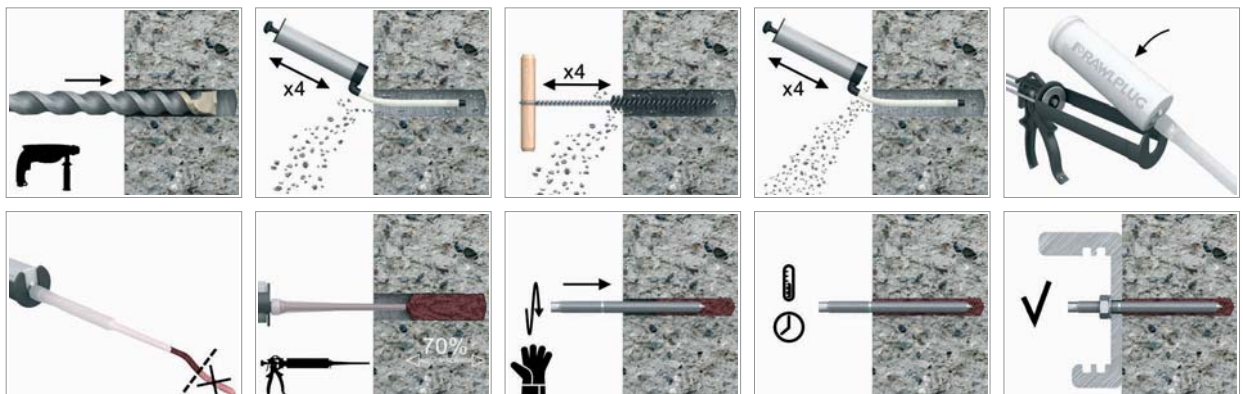
- Safety barriers
- Formworks support systems
- Structural steelwork
- Street lamps
- Curtain walling
- Racking systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms

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. 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.

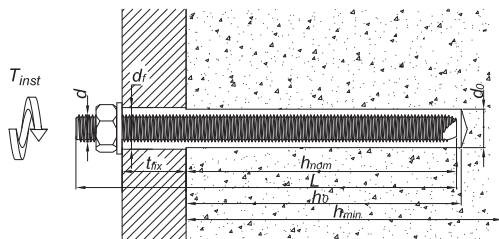
Product information

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

R-STUDS

Size	Product Code			Anchor		Fixture			
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f _{yk}	[N/mm ²]	400	400	400	400	400	400	400
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f _{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f _{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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 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 30 min. in 20°)
- For use in positive temperatures

Applications

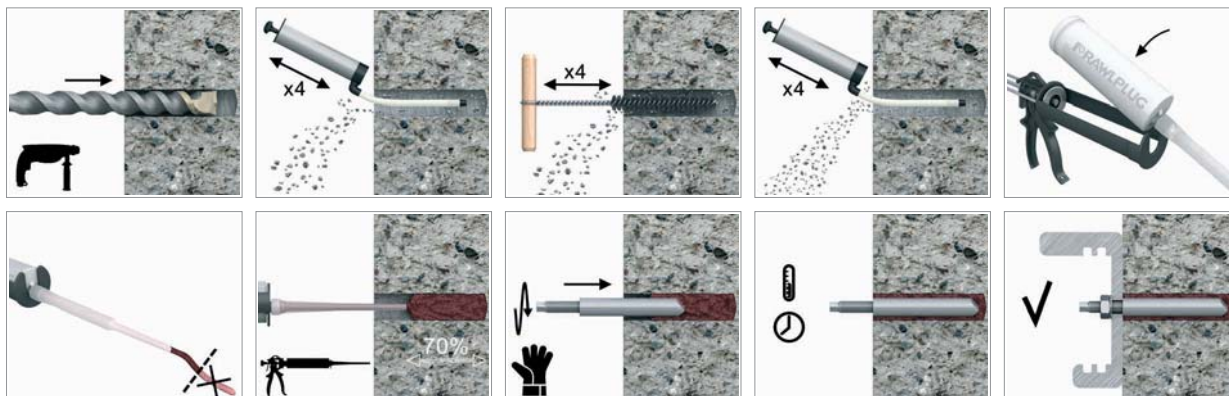
- Safety barriers
- Temporary works/formworks support systems
- Balustrading
- Barriers
- Cladding restraints
- Masonry support
- Machinery
- Platforms
- Steelwork

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. 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 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.

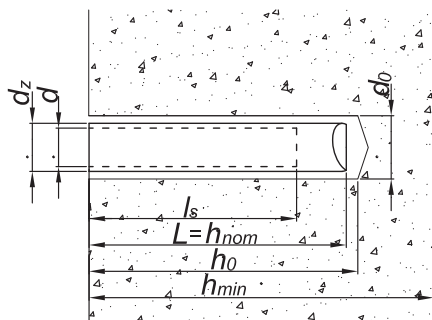
Product information

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

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
15	15	80	720
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/mm ²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	21.2	50.3	98.2	169.7	402.1
R-ITS-A4 INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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 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 30 min. in 20°)
- For use in positive temperatures

Applications

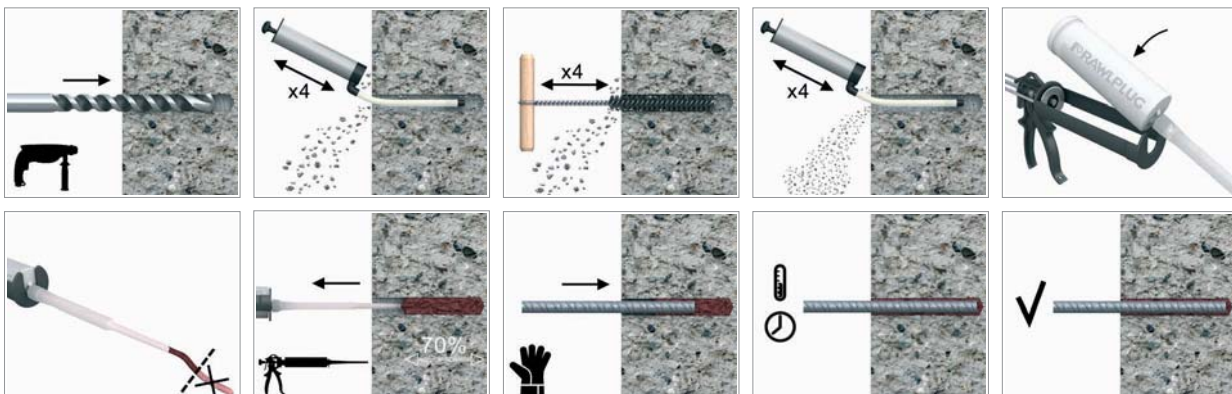
- Safety barriers
- Temporary works/formworks support systems
- Rebar
- Curtain walling
- Formwork supports
- Masonry support
- Platforms
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



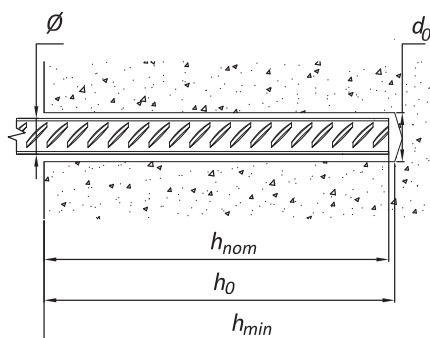
Installation guide (cont.)

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. 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 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

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	180	960
10	10	120	600
15	15	60	300
20	20	50	270
25	25	40	240
25	30	20	180

*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/mm ²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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 [m]	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 with Post-Installed Rebar

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



Approvals and Reports

- ETA-13/0585; ETAG 001-05, Option 7



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 Option 7)
- 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 30 min. in 20°)
- For use in positive temperatures

Applications

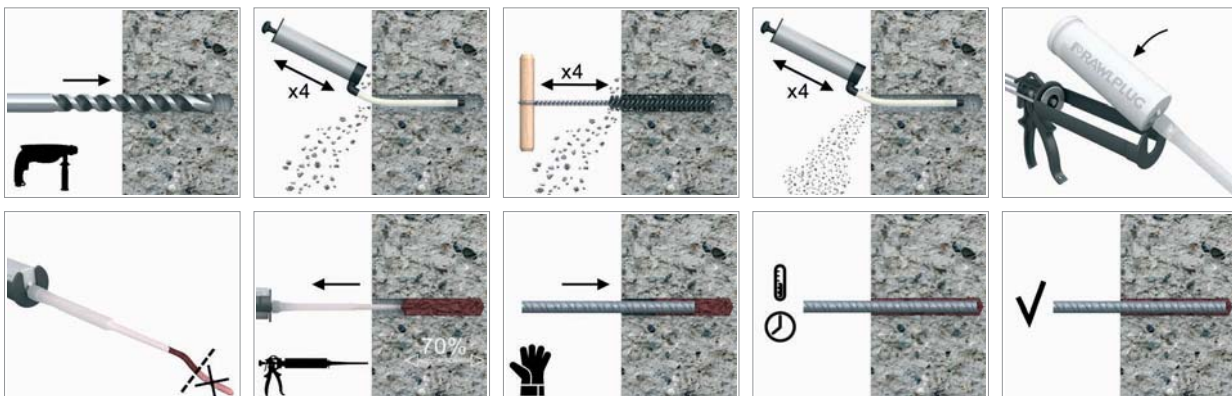
- Post-installed rebar connections
- Rebar
- Temporary works/Formworks support systems
- Safety barriers
- Barriers
- Platforms

Base materials

Approved for use in:

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

Installation guide



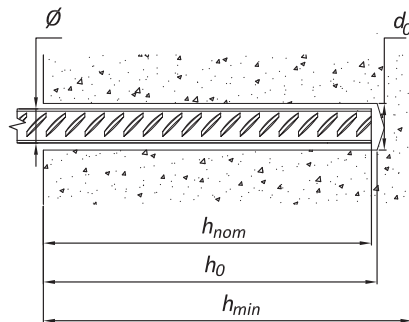
Installation guide (cont.)

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. 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 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

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_o	[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)	$l_{o,min.}$	[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
15	15	80	720
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/mm ²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	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]																										
$\frac{l_{bd}}{d_s}$ [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]																											
$\frac{l_{bd}}{d_s}$ [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]																										
$\frac{l_0}{d_s}$	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]																										
$\frac{l_0}{d_s}$	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]																										
$\frac{l_{bd}}{d_s}$	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]																										
$\frac{l_{bd}}{d_s}$	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]																											
$\frac{l_0}{d_s}$ [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]																											
$\frac{l_0}{d_s}$ [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/BS500S/BS500SP) [kN]																											
$\frac{l_{bd}}{d_s}$ (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/BS500S/BS500SP) [kN]																											
$\frac{l_{bd}}{d_s}$ (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/BS500S/BS500SP) [kN]																										
$\frac{l_0}{d_s}$	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/BS500S/BS500SP) [kN]																										
$\frac{l_0}{d_s}$	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 [m]	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

High performance pure epoxy resin approved for use in non-cracked concrete

Approvals and Reports

- AT-15-7047/2010
- AT-15-7047/2010 - Aneks nr 1



Product information

Features and benefits

- Suitable for variable embedment, recommended for deep anchorage
- Minimal shrinkage
- Very high chemical resistance
- Longer curing time suitable for high temperature
- Can be installed in diamond-drilled holes

Applications

- Safety barriers
- Curtain walling
- Racking systems
- Balustrading
- Cladding restraints
- Formwork supports
- Heavy machinery
- Masonry support
- Steelwork

Base materials

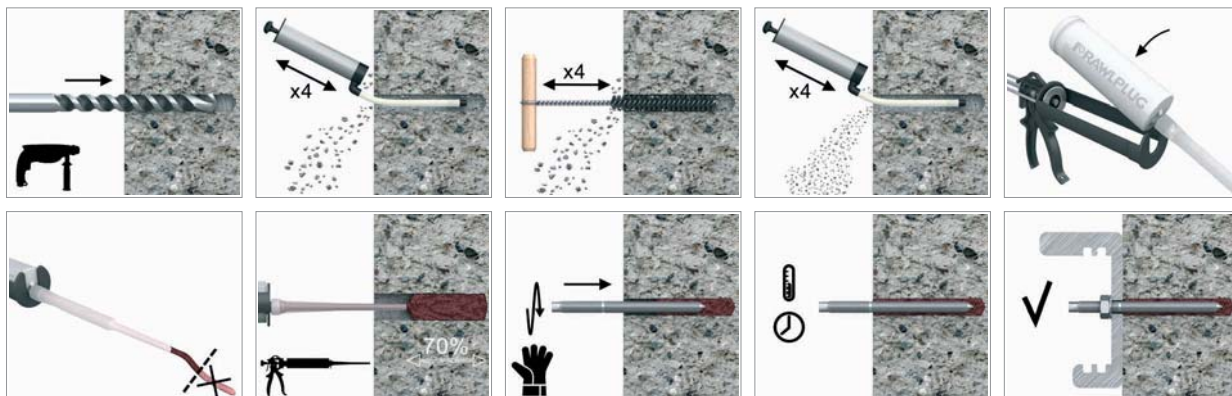
Approved for use in:

- 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 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.

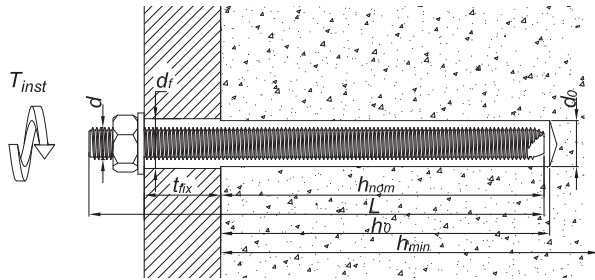
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KEX-400	R-KEX	Epoxy Resin	400

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}
				[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20
	R-STUDS-08160	-	R-STUDS-08160-A4	8	160	9	70
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	28
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	68
	R-STUDS-10190	-	R-STUDS-10190-A4	10	190	12	88
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	35
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	65
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	95
	R-STUDS-12260	-	R-STUDS-12260-A4	12	260	14	135
	R-STUDS-12300	-	R-STUDS-12300-A4	12	300	14	175
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	46
	R-STUDS-16220	-	R-STUDS-16220-A4	16	220	18	76
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	116
	R-STUDS-16300	-	R-STUDS-16300-A4	16	300	18	156
	R-STUDS-16380	-	R-STUDS-16380-A4	16	380	18	236
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	67
	R-STUDS-20300	-	R-STUDS-20300-A4	20	300	22	107
	R-STUDS-20350	-	R-STUDS-20350-A4	20	350	22	157
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	62
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	76

Installation data



Size			M8	M10	M16	M20	M24	M30
Thread diameter	d	[mm]	8	10	16	20	24	30
Hole diameter in substrate	d ₀	[mm]	10	12	18	24	28	35
Installation torque	T _{inst}	[Nm]	10	20	80	120	180	300
Min. hole depth in substrate	h ₀	[mm]	h _{ef} + 5					
Installation depth	h _{nom}	[mm]	80	90	125	170	210	270
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	180	960
10	10	120	600
15	15	60	300
20	20	50	270
25	25	40	240
25	30	20	180

*For wet concrete the curing time must be doubled

Mechanical properties

R-STUDS

Size			M8	M10	M16	M20	M24	M30
R-STUDS METRIC THREADED RODS - steel class 5.8								
Nominal ultimate tensile strength - tension	f _{uk}	[N/mm ²]	520	520	520	520	520	520
Nominal yield strength - tension	f _{yk}	[N/mm ²]	420	420	420	420	420	420
Cross sectional area - tension	A _s	[mm ²]	36.6	58	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	277.5	541	935	1868
Characteristic bending resistance	M ⁰ _{Rk,s}	[Nm]	20	39	173	338	583	1166
Design bending resistance	M	[Nm]	11	22	99	193	333	666
R-STUDS METRIC THREADED RODS - steel class 8.8								
Nominal ultimate tensile strength - tension	f _{uk}	[N/mm ²]	800	800	800	800	520	800
Nominal yield strength - tension	f _{yk}	[N/mm ²]	640	640	640	640	420	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	277.5	541	935	1868
Characteristic bending resistance	M ⁰ _{Rk,s}	[Nm]	30	60	266	519	898	1793
Design bending resistance	M	[Nm]	17	34	152	297	513	1025
R-STUDS METRIC THREADED RODS - A4								
Nominal ultimate tensile strength - tension	f _{uk}	[N/mm ²]	700	700	700	700	520	700
Nominal yield strength - tension	f _{yk}	[N/mm ²]	350	350	350	350	420	350
Cross sectional area - tension	A _s	[mm ²]	36.6	58	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	277.5	541	935	1868
Characteristic bending resistance	M ⁰ _{Rk,s}	[Nm]	26	52	233	454	785	1569
Design bending resistance	M	[Nm]	12	24	107	208	360	719

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	87.6	121.22	149.71	285.9
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	25.2	37.86	59.25	87.6	121.22	149.71	285.9
R-STUDS METRIC THREADED RODS - A4	[kN]	25.2	37.86	59.25	87.6	121.22	149.71	285.9
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	73.4	110.2	136.1	266.8
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	21.5	33.8	52.9	73.4	110.2	136.1	266.8
R-STUDS METRIC THREADED RODS - A4	[kN]	21.5	33.8	52.9	73.4	110.2	136.1	266.8
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]	8.53	13.41	20.99	29.13	43.73	54.01	105.87
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	8.53	13.41	20.99	29.13	43.73	54.01	105.87
R-STUDS METRIC THREADED RODS - A4	[kN]	8.53	13.41	20.99	29.13	43.73	54.01	105.87
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]	6.09	9.58	14.99	20.8	31.24	38.58	75.62
R-STUDS METRIC THREADED RODS - STEEL CLASS 8.8	[kN]	6.09	9.58	14.99	20.8	31.24	38.58	75.62
R-STUDS METRIC THREADED RODS - A4	[kN]	6.09	9.58	14.99	20.8	31.24	38.58	75.62
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-KEX-400	400	10	10	480	7.0	7.0	365.5	5906675087849	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° 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

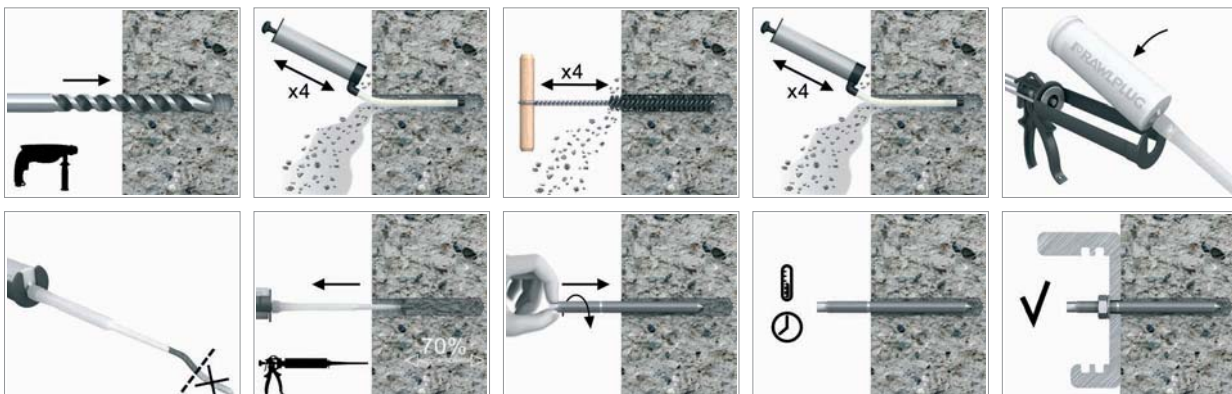
- Pipeline systems
- Curtain walling
- Balustrading
- Handrails
- Canopies
- Large panel reinforcing system -Copy Eco
- Cable conduits and trays
- Fencing & gates
- Pipework/ductwork supports
- Platforms
- Passenger lifts

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. 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.

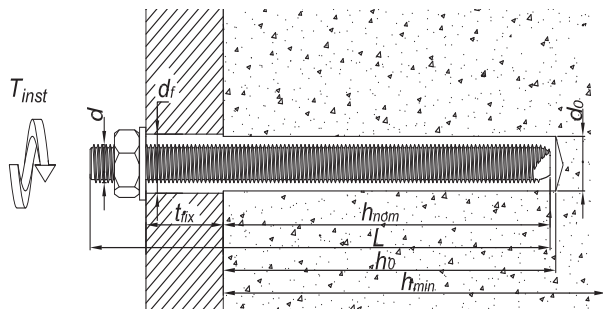
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-W-380	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-S-380	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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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

R-KER

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	-	-
5	-15	-	-
5	-10	-	-
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	25	3	30
25	30	2	20
25	40	0.5	10

R-KER-S

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	65	1440
5	0	50	960
5	5	35	720
10	10	20	480
15	15	12	240
20	20	9	240
25	25	7	180
25	30	6	120
25	40	4	45
25	45	3	35
25	50	2	25

R-KER-W

Resin temperature	Concrete temperature	Working time	Curing time-
[°C]	[°C]	[min]	[min]
5	-20	100	1440
5	-15	60	960
5	-10	30	480
5	-5	16	240
5	0	12	120
5	5	8	60
10	10	5	45
15	15	3	30
20	20	2	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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	400	400	400	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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° 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

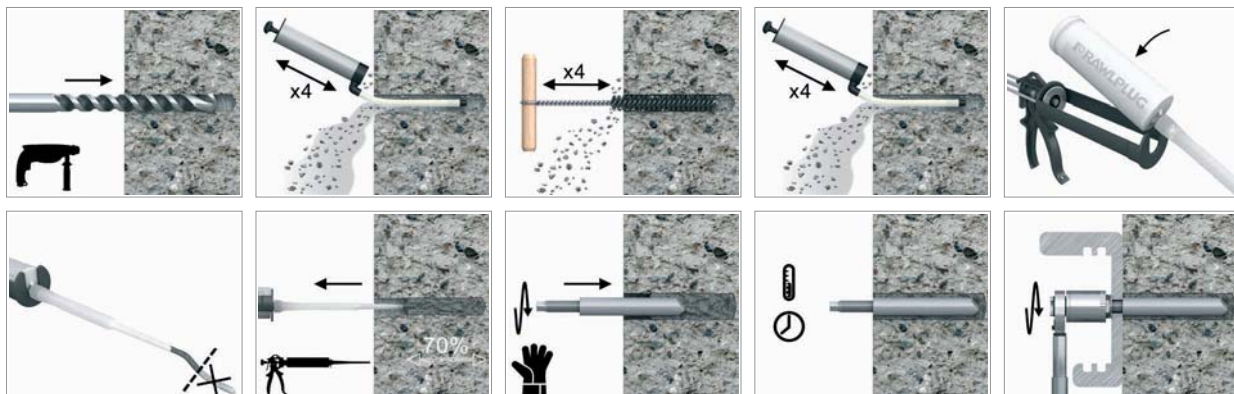
- Curtain walling
- Balustrading
- Handrails
- Canopies

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. 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 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.

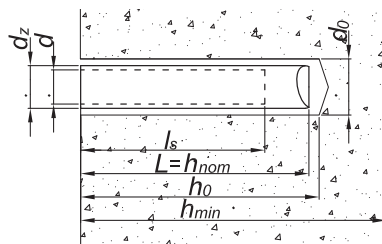
Product information

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

R-KER

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	25	3	30
25	30	2	20
25	40	0.5	10

R-KER-S

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

R-KER-W

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	100	1440
5	-15	60	960
5	-10	30	480
5	-5	16	240
5	0	12	120
5	5	8	60
10	10	5	45
15	15	3	30
20	20	2	10

*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/mm ²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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 [m]	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° 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

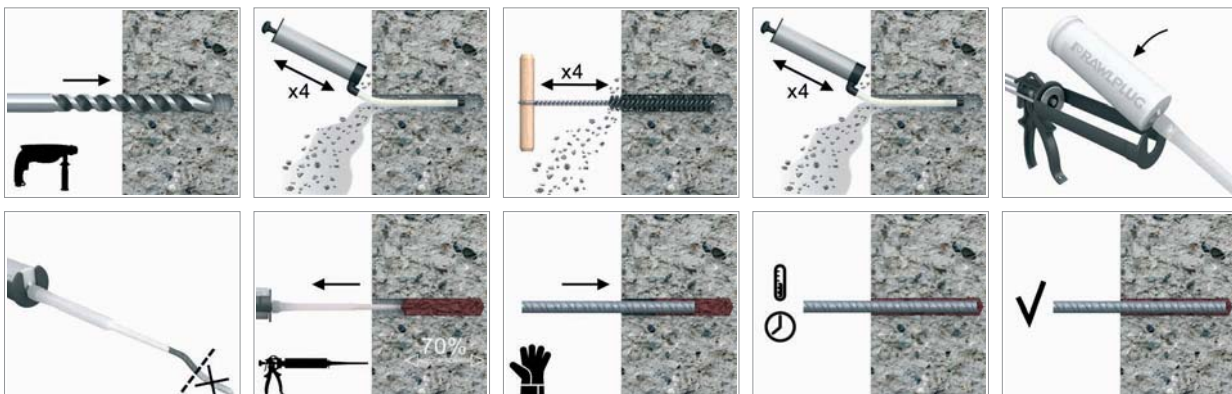
- Curtain walling
- Balustrading
- Barriers
- Cable trays
- Cladding restraints
- Steelwork
- Rebar dowelling
- Starter bars
- Rebar missed-outs

Base materials

Approved for use in:

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

Installation guide



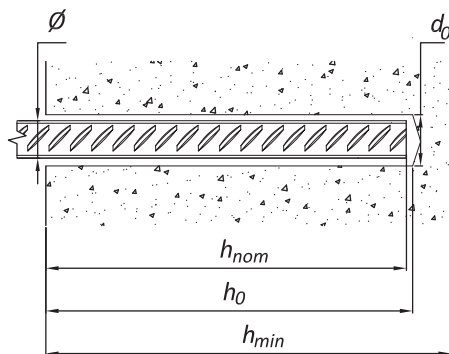
Installation guide (cont.)

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. 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 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-KER-280	R-KER	Styrene Free Vinylester Resin	280
R-KER-380			380
R-KER-W-380	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-S-380	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

R-KER

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	-	-
5	-15	-	-
5	-10	-	-
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	25	3	30
25	30	2	20
25	40	0.5	10

R-KER-W

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	100	1440
5	-15	60	960
5	-10	30	480
5	-5	16	240
5	0	12	120
5	5	8	60
10	10	5	45
15	15	3	30
20	20	2	10

R-KER-S

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	65	1440
5	0	50	960
5	5	35	720
10	10	20	480
15	15	12	360
20	20	9	240
25	25	7	180
25	30	6	120
25	40	4	45
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/mm ²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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

Mechanical properties (cont.)

REBARS AS ANCHORS

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
B500SP										
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M_{Rk,s}^0$	[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/mm ²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	50.3	98.2	169.6	269.4	402.1	785.4	1534	3217
Characteristic bending resistance	$M_{Rk,s}^0$	[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

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]	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
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



Product overview

Features and benefits

- Approved for use with post-installed rebar in non-cracked concrete (ETAG001 Option 7)
- Suitable for use in low temperatures (down to -20° 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

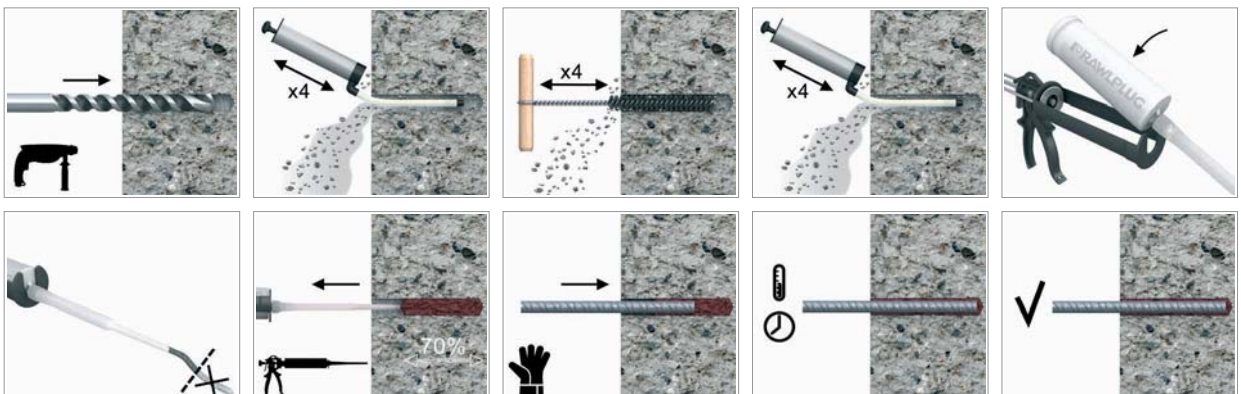
- Curtain walling
- Balustrading
- Handrails
- Canopies

Base materials

Approved for use in:

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

Installation guide



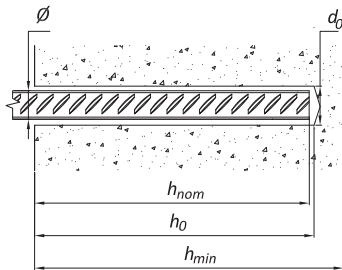
Installation guide (cont.)

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. 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 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-W-380	R-KER-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-KER-S-380	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

R-KER

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	25	3	30
25	30	2	20
25	40	0.5	10

R-KER-W

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	100	1440
5	-15	60	960
5	-10	30	480
5	-5	16	240
5	0	12	120
5	5	8	60
10	10	5	45
15	15	3	30
20	20	2	10

Installation data (cont.)

Minimum working and curing time

R-KER-S

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	-	-
5	-15	-	-
5	-10	-	-
5	-5	65	1440
5	0	50	960
5	5	35	720
10	10	20	480
15	15	12	360
20	20	9	240
25	25	7	180
25	30	6	120
25	40	4	45
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/mm ²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
34G5											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	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]																										
$\frac{l_{bd}}{d_s}$	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]																										
$\frac{l_{bd}}{d_s}$ [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]																											
$\frac{l_0}{d_s}$ [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]																											
$\frac{l_0}{d_s}$ [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]																										
$\frac{l_{bd}}{d_s}$ [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]																									
$\frac{l_{bd}}{d_s}$ [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

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
$\frac{l_o}{d_s}$ [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]																									
$\frac{l_o}{d_s}$ [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/BS500S/BS500SP) [kN]																									
$\frac{l_{bd}}{d_s}$ [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

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BSt500S/BS500SP) [kN]																											
$\frac{l_{bd}}{d_s}$ [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]																										
$\frac{l_o}{d_s}$ $\frac{l_o}{d_s}$	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]																										
$\frac{l_0}{d_s}$ [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

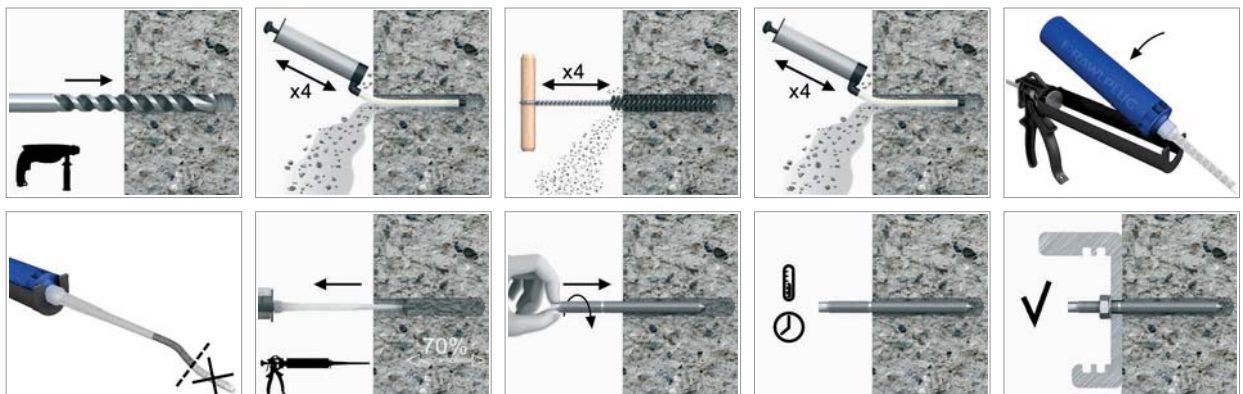
Approved for use in:

- 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. 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.

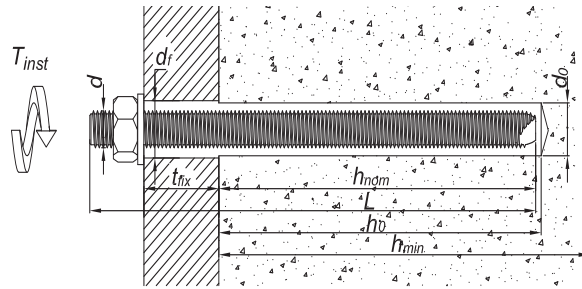
Product information

Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-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-300S	R-KEMII-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	380
R-KEM-II-380	R-KEMII	Styrene Free Polyester Resin	

THREADED RODS

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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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]		
		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/mm ²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm ²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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	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

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-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-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

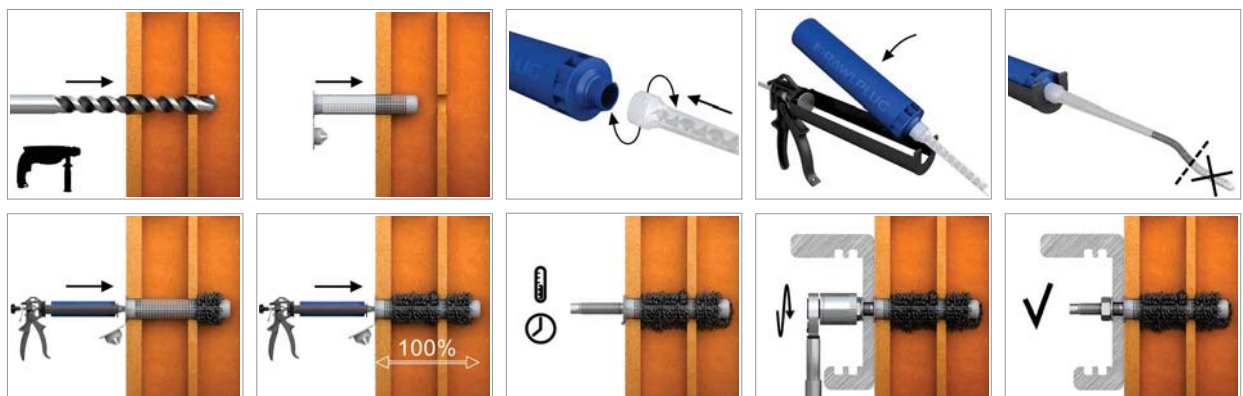
- Gates
- Window elements
- Canopies
- Sanitary appliances
- Railings
- Handrails
- Consoles
- Ladders
- Cable trays

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. 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-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-300S	R-KEMII-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	380
R-KEM-II-380	R-KEMII	Styrene Free Polyester Resin	

THREADED RODS

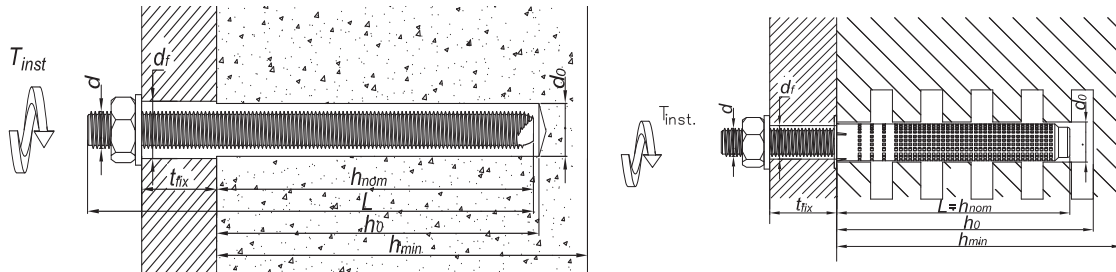
Size	Product Code			Anchor		Hole diameter	Fixture		
	Steel grade A4	Steel class 5.8	Steel class 8.8	Diameter	Length		Max. thickness		
				d	L	d _f	Solid substrates	Hollow substrates	
				[mm]	[mm]	[mm]	t _{fix} for h _{nom}	t _{fix} for h _{nom,std}	t _{fix} for h _{nom,max}
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20	50	20
	R-STUDS-08160	-	-	8	160	9	70	100	70
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	33	33	-
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	73	73	33
	R-STUDS-10190	-	-	10	190	12	93	93	53
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	50	60	20
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	80	90	50
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	110	120	80
	R-STUDS-12260	-	-	12	260	14	150	160	120
	R-STUDS-12300	-	-	12	300	14	190	200	160
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	66	86	-
	R-STUDS-16220	R-STUDS-16220-88	-	16	220	18	96	116	-
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	136	156	-
	R-STUDS-16300	-	-	16	300	18	176	196	-
	R-STUDS-16380	-	-	16	380	18	256	276	-

Product information (cont.)

R-PLS Plastic Mesh Sleeves and SP-CE Wire 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	0.06	0.06	5906675377520
R-PLS-15085-10	15x85	M8-M10	10	6000	0.06	0.06	5906675291840
R-PLS-15125-10	15x125	M8-M10	10	6000	0.08	0.08	5906675291857
R-PLS-20085-10	20x85	M12-M16	10	4800	0.08	0.08	5906675291864
SP-CE-R08	10x1000	M6-M8	10	-	0,129	0,129	5906675266138
SP-CE-R10	12x1000	M8	10	-	0,129	0,129	5906675610122
SP-CE-R12	16x1000	M10	10	-	0,129	0,129	5906675610320
SP-CE-R16	22x1000	M12	10	-	0,129	0,129	5906675610528
SP-CE-R20	28x1000	M16	5	-	0,258	0,258	5906675610726
SP-CE-ED-1M	-	-	10	-	0,002	0,002	5906675601120

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 _o	[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 _o	[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	d _{xl}	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
Hole diameter in substrate	d _o	[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 _o	[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/mm ²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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
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	3.0
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	2.0	2.5	2.5	2.5
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	1.5	2.0	2.0	2.5
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	1.5	2.0	2.0	2.5
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	2.0	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
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.9	1.2	1.5	1.5
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.9	0.9	1.2	1.5
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.9	0.9	1.5	1.5
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.9	1.2	0.9	1.2
Lightweight concrete hollow block min 2.0MPa	[kN]	1.2	1.5	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	1.2
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.88	1.0	1.2	1.4
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.6	0.8	1.0	1.4
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.6	0.8	0.8	1.0
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.8	1.0	1.4	1.6
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.36	0.36	0.8	0.8
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.48	0.48	0.6	0.8
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.36	0.36	0.6	0.6
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.36	0.36	0.6	0.6
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.48	0.48	0.48	0.48
Lightweight concrete hollow block min 2.0MPa	[kN]	0.48	0.6	1.0	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	0.86
Perforated ceramic blocks min 12MPa (eg Proton Hlz 12/0.9 DF)	[kN]	0.63	0.71	0.86	1.0
Perforated ceramic blocks min 15MPa (eg Wienerberger Porotherm)	[kN]	0.43	0.57	0.71	1.0
Perforated ceramic blocks min 10MPa (eg Leiter Thermopor)	[kN]	0.43	0.57	0.57	0.71
Perforated ceramic blocks min 15MPa (eg MEGA MAX)	[kN]	0.57	0.71	1.0	1.14
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Mono Rect)	[kN]	0.26	0.26	0.57	0.57
Perforated ceramic blocks min 6.0MPa (eg LS Tableau Rect)	[kN]	0.34	0.34	0.43	0.57
Perforated ceramic blocks min 6.0MPa (eg LS Monomur)	[kN]	0.26	0.26	0.43	0.43
Perforated ceramic blocks min 6MPa (eg SM BGV Thermo)	[kN]	0.26	0.26	0.43	0.43
Perforated ceramic blocks min 6.0MPa (eg SM BGV Thermo Plus)	[kN]	0.34	0.34	0.34	0.34
Lightweight concrete hollow block min 2.0MPa	[kN]	0.34	0.43	0.71	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

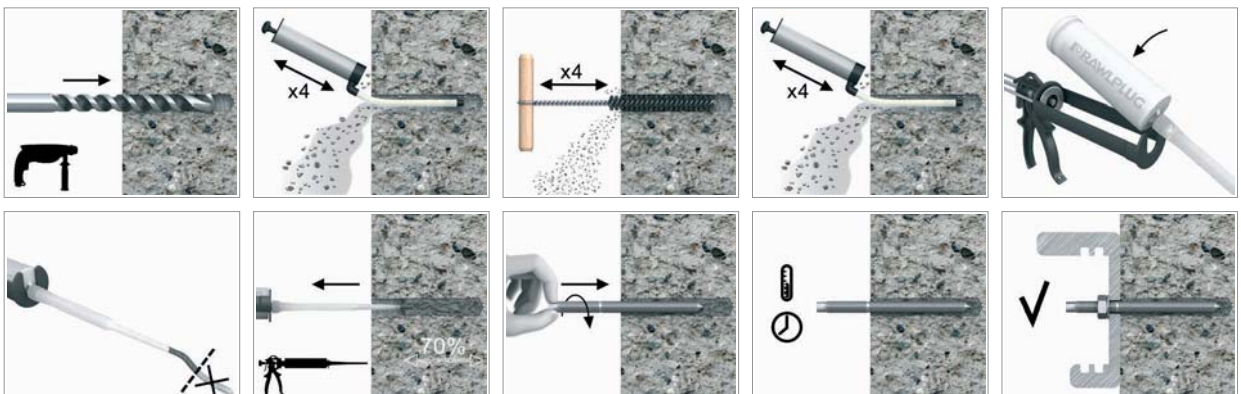
- Guard rails
- Handrails
- Canopies
- Masonry support
- Balustrading
- Cable trays
- Curtain walling
- Fencing & gates

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.

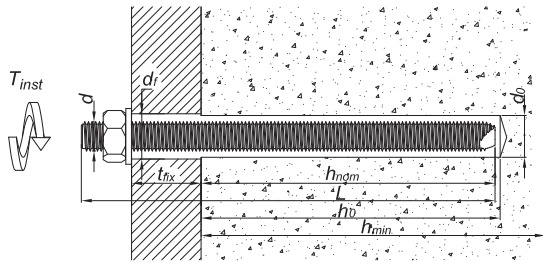
Product information

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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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	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

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/mm ²]	520	520	520	520	520	520	520
Nominal yield strength - tension	F _{yk}	[N/mm ²]	420	420	420	420	420	420	420
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	F _{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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

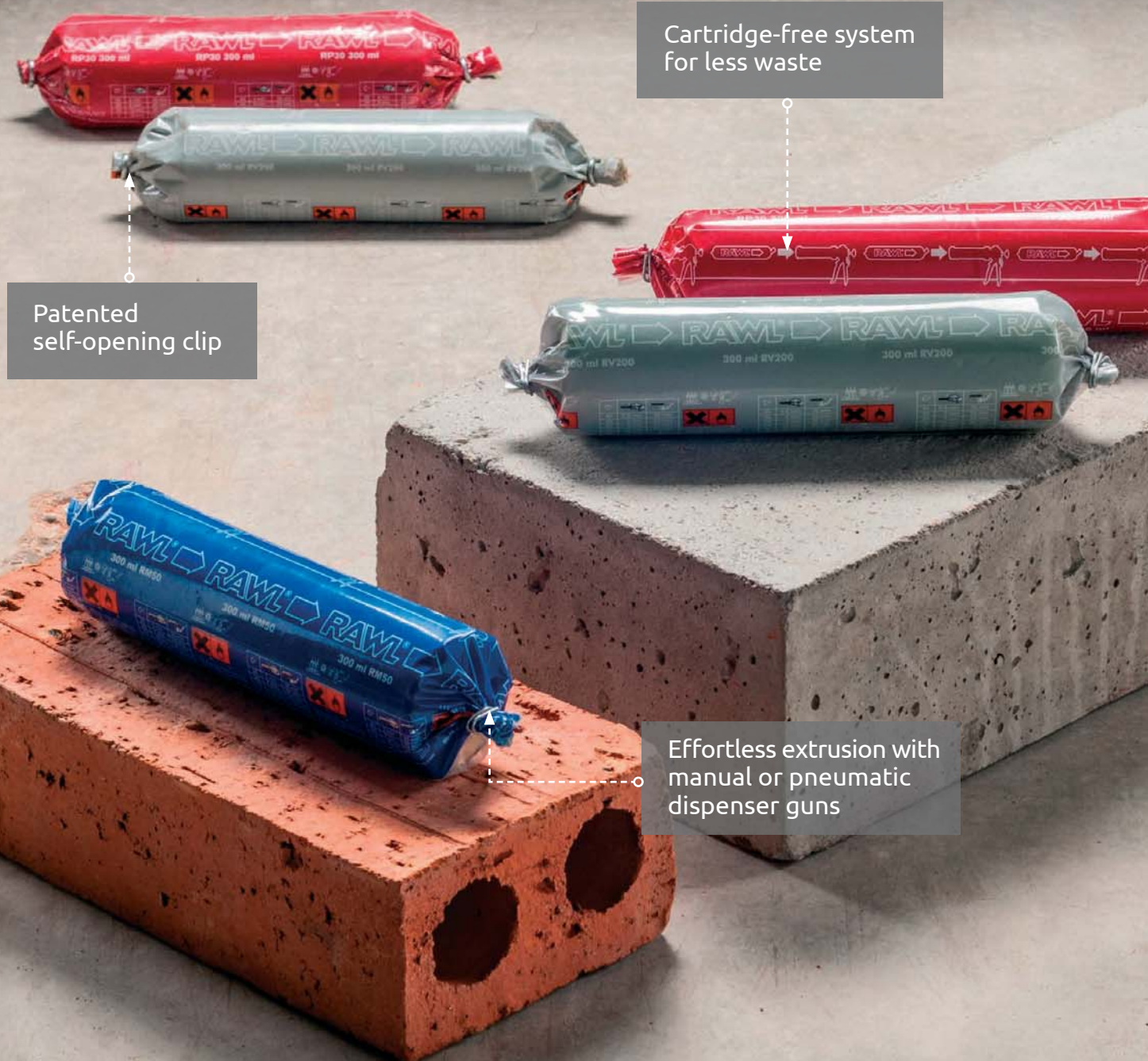
RV200

- 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



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° 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 substrate 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

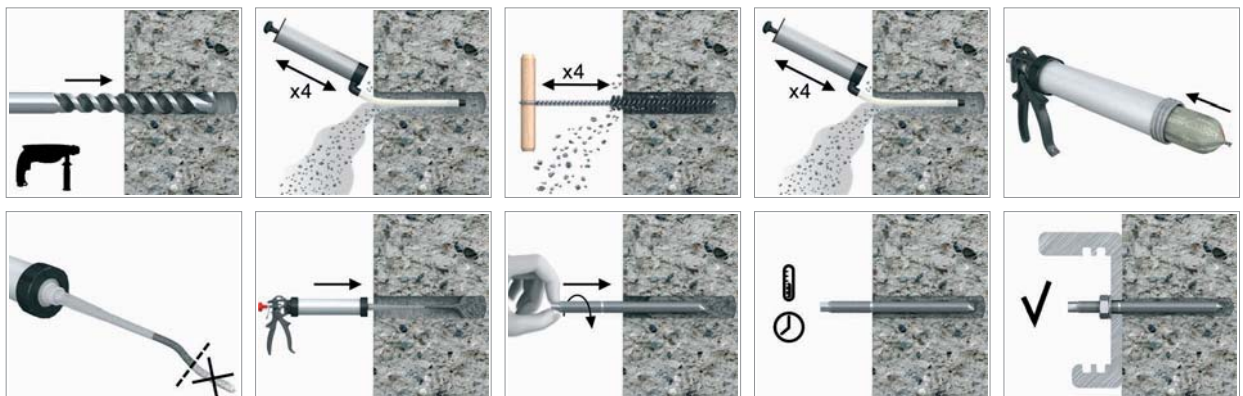
Approved for use in:

- 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

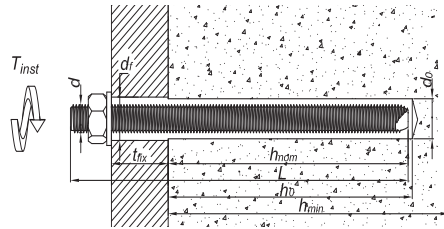
Product Code	Resin	Description / Resin Type	Volume
			[ml]
R-CFS+RV200-4	RV200	Styrene Free Vinylester Resin	300
R-CFS+RV200W-4	RV200-W	Low Temperature (Winter) / Rapid Cure Styrene Free Vinylester Resin	
R-CFS+RV200S-4	RV200-S	High Temperature (Summer) / Slow Cure Styrene Free Polyester Resin	
R-CFS+RV200-600-8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

R-STUDS

Size	Product Code			Anchor		Hole diameter	Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length		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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f _{yk}	[N/mm ²]	400	400	400	400	400	400	400
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	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/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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

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° 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

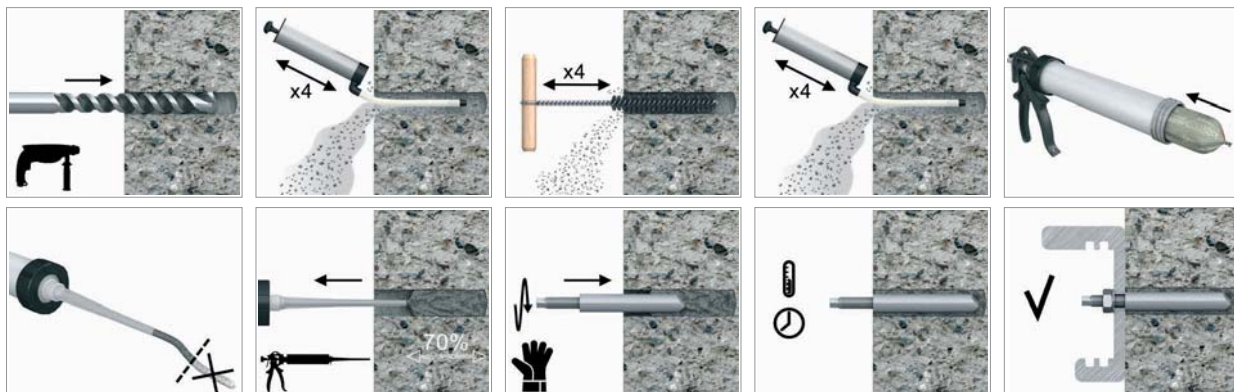
Approved for use in:

- 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.

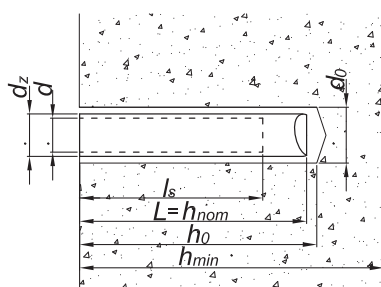
Product information

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

SOCKETS

Size	Product Code		Anchor			Fixture
	Steel class 5.8	Steel grade A4	Socket diameter	Length	Internal thread length	Hole diameter
			d [mm]	L [mm]	l_g [mm]	d_f [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/mm ²]	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	21.21	50.27	98.17	169.65	402.12
R-ITS-Z INTERNALLY THREADED SOCKETS							
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	520	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	420	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	21.21	50.27	98.17	169.65	402.12
R-STUDS METRIC THREADED RODS - steel class 5.8							
Characteristic bending resistance	$M_{Rk,s}^0$	[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	$M_{Rk,s}^0$	[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	$M_{Rk,s}^0$	[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 $N_{Rd,m}$								
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 $V_{Rd,m}$								
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

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° 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

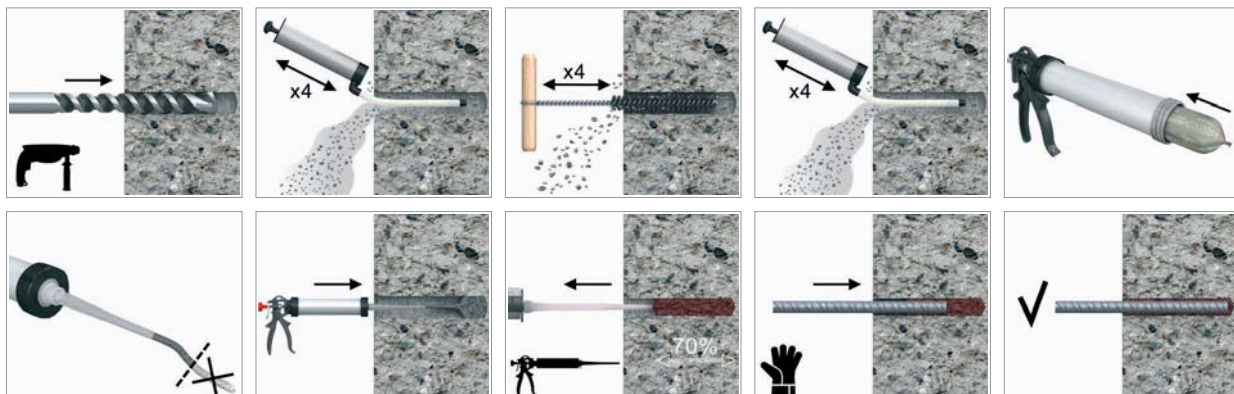
- Curtain walling
- Canopies
- Cable trays
- Formwork supports
- Heavy machinery

Base materials

Approved for use in:

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

Installation guide



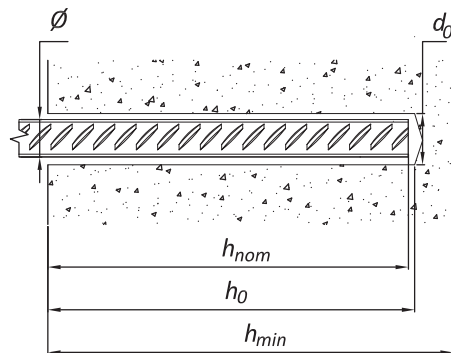
Installation guide (cont.)

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

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/mm ²]	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	804.2
Elastic section modulus	W_{el}	[mm ³]	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

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-13/0319; ETAG 001-05



Product overview

Features and benefits

- Approved for use with post-installed rebar 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° 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

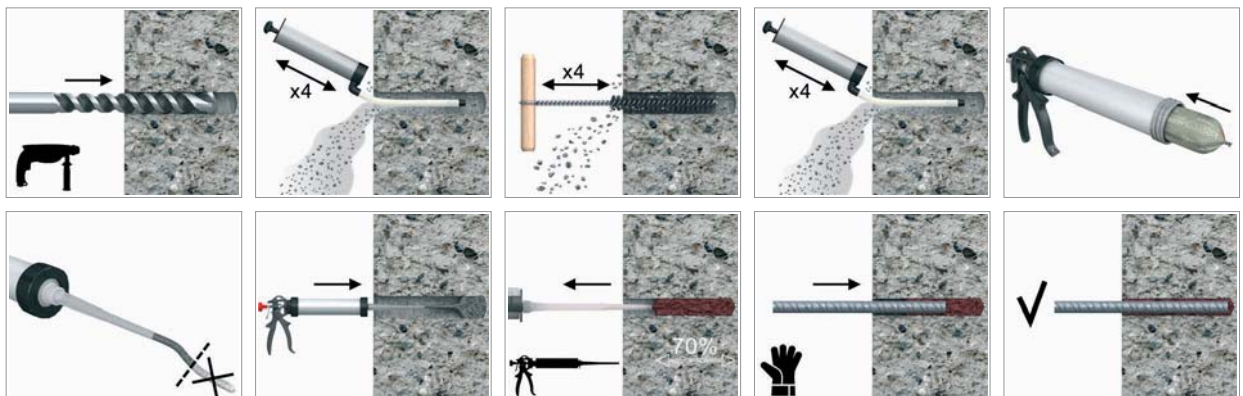
- Shear dowel connections
- Foundation wall connections

Base materials

Approved for use in:

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

Installation guide



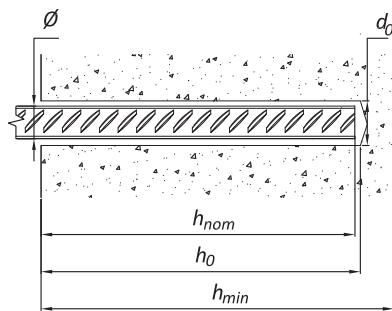
Installation guide (cont.)

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

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

RV200

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	25	3	30
25	30	2	20
25	40	0.5	10

RV200-W

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-20	100	1440
5	-15	60	960
5	-10	30	480
5	-5	16	240
5	0	12	120
5	5	8	60
10	10	5	45
15	15	3	30
20	20	2	10

*For wet concrete the curing time must be doubled

Installation data (cont.)

Minimum working and curing time

RV200-S

Resin temperature	Concrete temperature	Working time	Curing time*
[°C]	[°C]	[min]	[min]
5	-5	65	1440
5	0	50	960
5	5	35	720
10	10	20	480
15	15	12	360
20	20	9	240
25	25	7	180
25	30	6	120
25	40	4	45
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/mm ²]	480	480	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	500	500	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	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/mm ²]	575	575	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9	615.8	804.2
RB500/BSL500S											
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	550	550	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	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]																										
$\frac{l_{bd}}{d_s}$ [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]																										
$\frac{l_{bd}}{d_s}$ [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]																											
$\frac{l_0}{d_s}$ [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]																											
$\frac{l_0}{d_s}$ [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]																											
$\frac{l_{bd}}{d_s}$ [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]																									
$\frac{l_{bd}}{d_s}$ [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

OVERLAP SPLICE – DESIGN RESISTANCE* – CONCRETE C20/25. STEEL A-III (34GS) [kN]																									
$\frac{l_o}{d_s}$ [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]																									
$\frac{l_o}{d_s}$ [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/BS500S/BS500SP) [kN]																									
$\frac{l_{bd}}{d_s}$ [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

Basic performance data (cont.)

ANCHORAGES – DESIGN RESISTANCE – CONCRETE C50/60. STEEL A-IIIN (RB500/BS1500S/BS500SP) [kN]																											
$\frac{l_{bd}}{d_s}$ [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]																										
$\frac{l_0}{d_s}$ [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/BS500S/BS500SP) [kN]																											
$\frac{l_0}{d_s}$ [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 [m]	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

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-13/0394



Installation movie

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

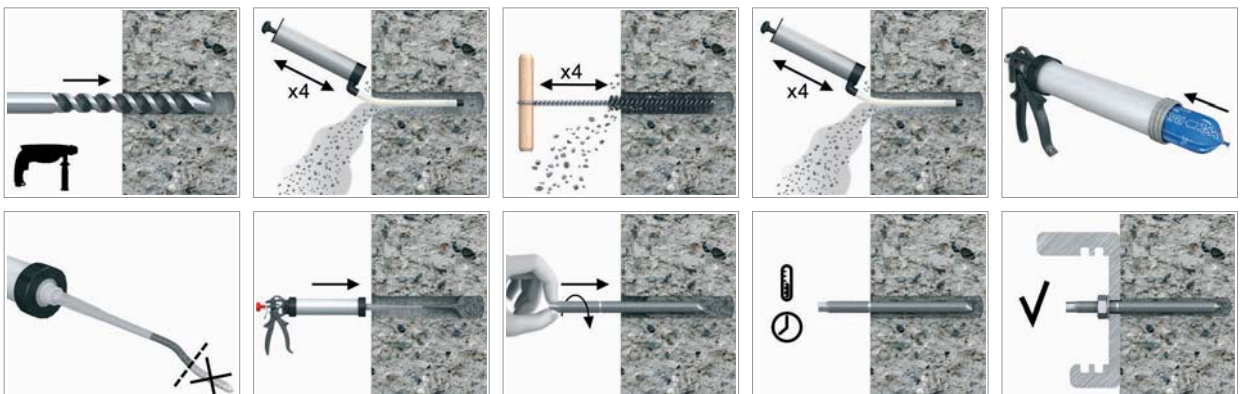
Approved for use in:

- 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.

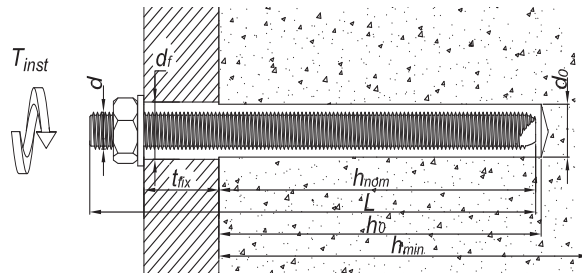
Product information

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

THREADED RODS

Size	Product Code			Anchor		Hole diameter	Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length		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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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 _o	[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 _o	[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 _o		
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/mm ²]	520	520	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm ²]	420	420	420	420	420	420	420
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W_{el}	[mm ³]	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	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
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-13/0528; 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

THREADED RODS

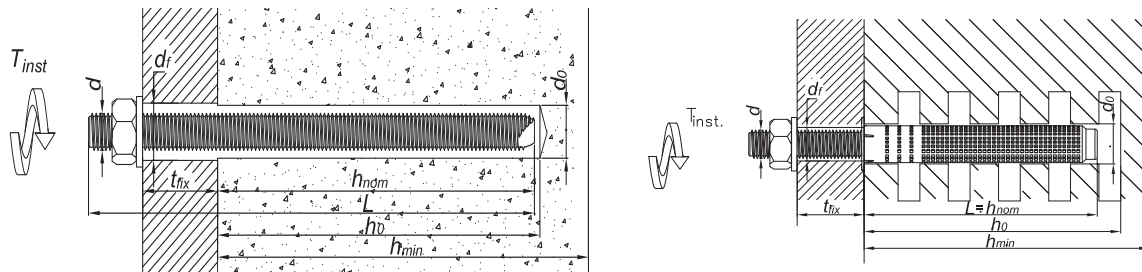
Size	Product Code			Anchor		Fixture			
	Steel grade A4	Steel class 5.8	Steel class 8.8	Diameter	Length	Hole diameter	Max. thickness		
							Solid substrates	Hollow substrates	
				d	L	d _f	t _{fix} For h _{nom}	t _{fix} For h _{nom,std}	t _{fix} For h _{nom,max}
				[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8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

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	0.06	0.06	5906675377520
R-PLS-15085-10	15x85	M8-M10	10	6000	0.06	0.06	5906675291840
R-PLS-15125-10	15x125	M8-M10	10	6000	0.08	0.08	5906675291857
R-PLS-20085-10	20x85	M12-M16	10	4800	0.08	0.08	5906675291864
SP-CE-R08	10x1000	M6-M8	10	-	0,129	0,129	5906675266138
SP-CE-R10	12x1000	M8	10	-	0,129	0,129	5906675610122
SP-CE-R12	16x1000	M10	10	-	0,129	0,129	5906675610320
SP-CE-R16	22x1000	M12	10	-	0,129	0,129	5906675610528
SP-CE-R20	28x1000	M16	5	-	0,258	0,258	5906675610726
SP-CE-ED-1M	-	-	10	-	0,002	0,002	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/mm ²]	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	400	400	400	400
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	700	700	700	700
Nominal yield strength - tension	f_{yk}	[N/mm ²]	350	350	350	350
Cross sectional area - tension	A_s	[mm ²]	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	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 $V_{R,u,m}$					
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 $N_{R,k}$					
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 $V_{R,k}$					
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 $N_{R,d}$					
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 $V_{R,d}$					
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 $N_{R,rec}$					
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 $V_{R,rec}$					
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 $F_{R,u,m}$								
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
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
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_{Rc}								
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

*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

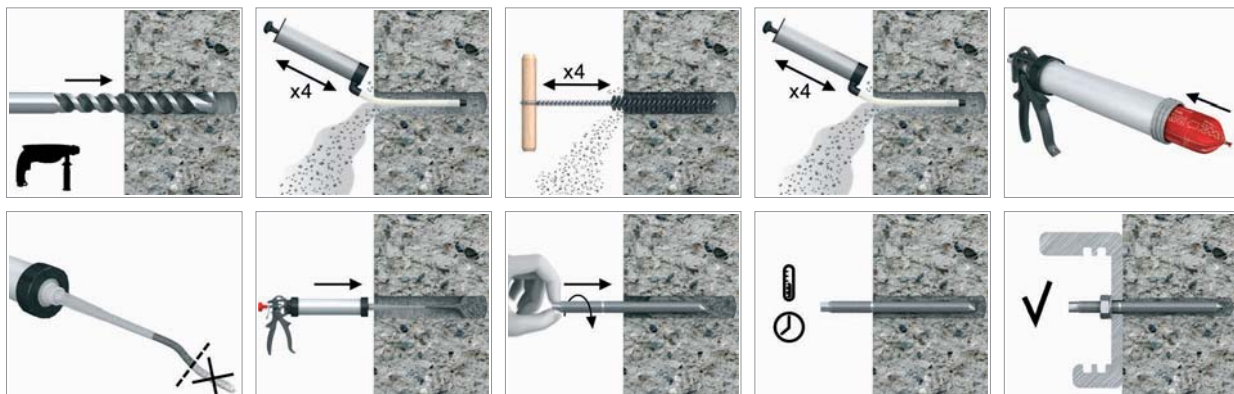
Approved for use in:

- 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.

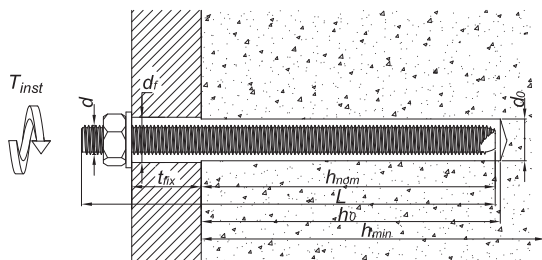
Product information

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

R-STUDS

Size	Product Code			Anchor		Hole diameter	Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length		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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f _{yk}	[N/mm ²]	400	400	400	400	400	400	400
Cross sectional area - tension	A _s	[mm ²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	f _{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	f _{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A _s	[mm ²]	36.6	58.0	84.3	157.0	245.0	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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	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

Capsule contains a precise volume of resin and hardener. No waste packaging.

Quick and easy to install by hammering or spinning in stud or rebar

Rounded capsule tip for insertion in to hole

Hammer-in and spin-in capsules

Drill/hole diameter, stud size indicated on the capsule



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

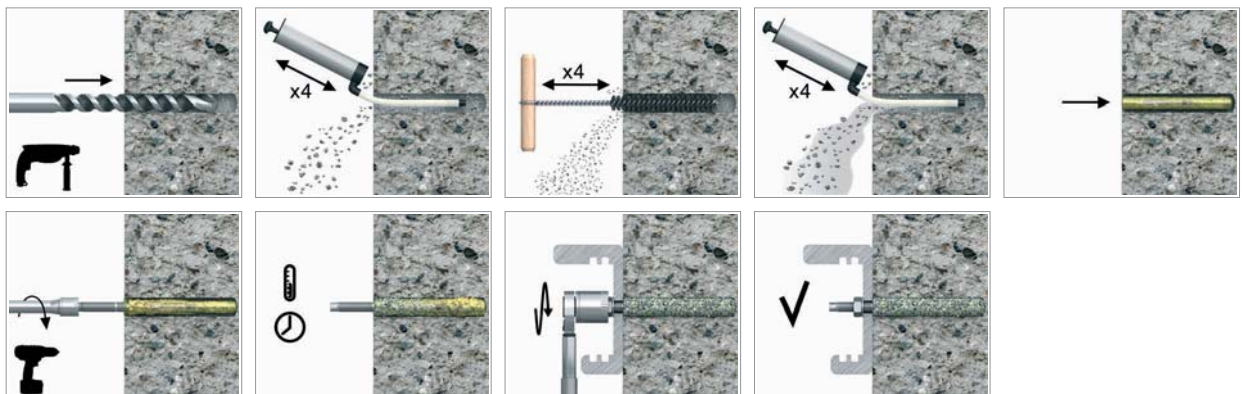
Approved for use in:

- 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 until the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

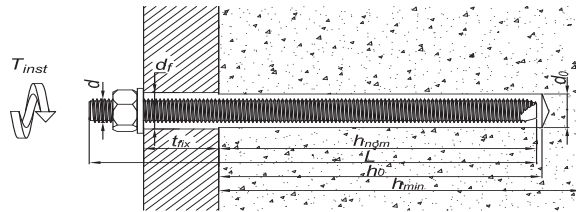
Product information

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

R-STUDS

Size	Product Code			Anchor		Hole diameter	Fixture		
	Steel class 5.8	Steel class 8.8	Steel grade A4	Diameter	Length	d _f	Max. thickness		
				d	L		t _{fix} for h _{ef,min}	t _{fix} for h _{ef,std}	t _{fix} for h _{ef,max}
				[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	-	-	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	-	-	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	-	-	12	260	14	165	135	100
	R-STUDS-12300	-	-	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	-	16	220	18	101	76	11
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	141	116	51
	R-STUDS-16300	-	-	16	300	18	181	156	91
	R-STUDS-16380	-	-	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	-	20	300	22	157	107	37
	R-STUDS-20350	-	-	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	-

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/mm ²]	520	520	520	520	520	520	520
Nominal yield strength - tension	F _{yk}	[N/mm ²]	420	420	420	420	420	420	420
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	F _{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	F _{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	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	500	8000	0.13	6.5	133.2	5906675280189	18
R-CAS-V-10	M10	10	500	8000	0.16	8.1	158.8	5906675280196	18
R-CAS-V-12	M12	10	500	8000	0.24	12.0	222.0	5906675280202	18
R-CAS-V-16	M16	10	500	6000	0.38	18.8	255.6	5906675280219	18
R-CAS-V-20	M20	6	60	960	0.78	7.8	155.2	5906675280226	18
R-CAS-V-24	M24	6	60	720	1.09	10.9	160.9	5906675280233	18
R-CAS-V-30	M30	2	20	320	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 stud



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
- 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

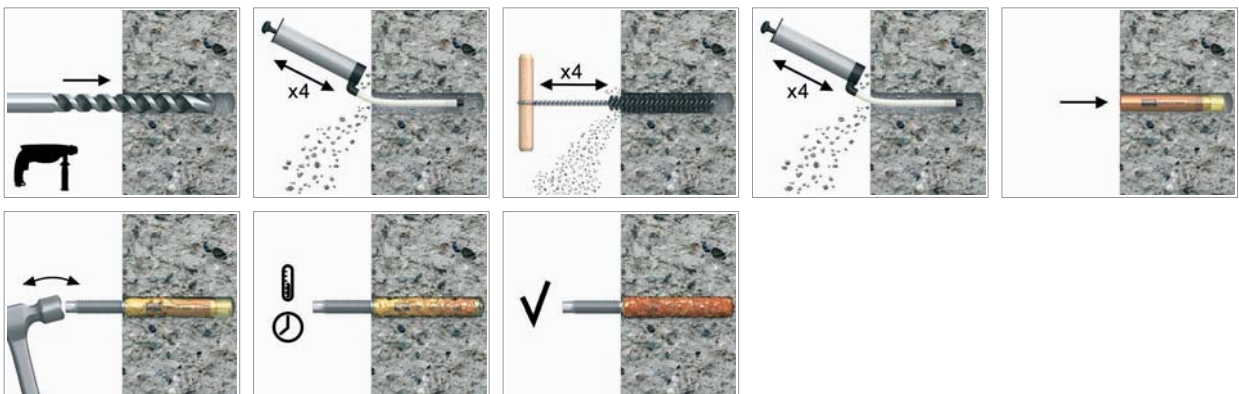
Approved for use in:

- 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 until the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

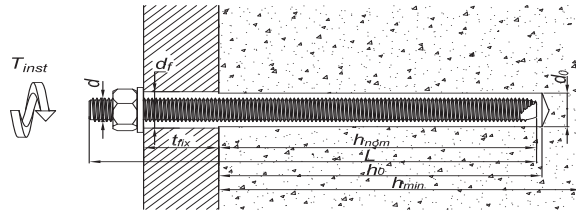
Product information

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

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 _{nom}
				[mm]	[mm]	[mm]	[mm]
M8	R-STUDS-08110	R-STUDS-08110-88	R-STUDS-08110-A4	8	110	9	20
	R-STUDS-08160	-	-	8	160	9	70
M10	R-STUDS-10130	R-STUDS-10130-88	R-STUDS-10130-A4	10	130	12	28
	R-STUDS-10170	-	R-STUDS-10170-A4	10	170	12	68
	R-STUDS-10190	-	-	10	190	12	88
M12	R-STUDS-12160	R-STUDS-12160-88	R-STUDS-12160-A4	12	160	14	35
	R-STUDS-12190	-	R-STUDS-12190-A4	12	190	14	65
	R-STUDS-12220	-	R-STUDS-12220-A4	12	220	14	95
	R-STUDS-12260	-	-	12	260	14	135
	R-STUDS-12300	-	-	12	300	14	175
M16	R-STUDS-16190	R-STUDS-16190-88	R-STUDS-16190-A4	16	190	18	46
	R-STUDS-16220	R-STUDS-16220-88	-	16	220	18	76
	R-STUDS-16260	-	R-STUDS-16260-A4	16	260	18	116
	R-STUDS-16300	-	-	16	300	18	156
	R-STUDS-16380	-	-	16	380	18	236
M20	R-STUDS-20260	R-STUDS-20260-88	R-STUDS-20260-A4	20	260	22	67
	R-STUDS-20300	R-STUDS-20300-88	-	20	300	22	107
	R-STUDS-20350	-	-	20	350	22	157
M24	R-STUDS-24300	R-STUDS-24300-88	R-STUDS-24300-A4	24	300	26	62
M30	R-STUDS-30380	R-STUDS-30380-88	R-STUDS-30380-A4	30	380	32	76

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/mm ²]	520	520	520	520	520	520	520
Nominal yield strength - tension	F _{yk}	[N/mm ²]	420	420	420	420	420	420	420
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	M _{Rk,s} ⁰	[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/mm ²]	800	800	800	800	800	800	800
Nominal yield strength - tension	F _{yk}	[N/mm ²]	640	640	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	M _{Rk,s} ⁰	[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/mm ²]	700	700	700	700	700	700	700
Nominal yield strength - tension	F _{yk}	[N/mm ²]	350	350	350	350	350	350	350
Cross sectional area - tension	A _s	[mm ²]	36.6	58	84.3	157	245	352.8	559.8
Elastic section modulus	W _{el}	[mm ³]	31.2	62.3	109.2	277.5	541	935	1868
Characteristic bending resistance	M _{Rk,s} ⁰	[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	500	8000	0.13	6.6	135.3	5906675377827	18
R-HAC-V-10	M10	10	500	8000	0.14	6.8	138.0	5906675379913	18
R-HAC-V-12	M12	10	500	8000	0.19	9.5	181.2	5906675379920	18
R-HAC-V-16	M16	10	500	6000	0.30	15.1	210.6	5906675379937	18
R-HAC-V-20	M20	6	60	960	0.57	5.7	120.8	5906675379944	18
R-HAC-V-24	M24	6	54	960	0.76	6.9	152.0	5906675379951	18
R-HAC-V-30	M30	2	20	320	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

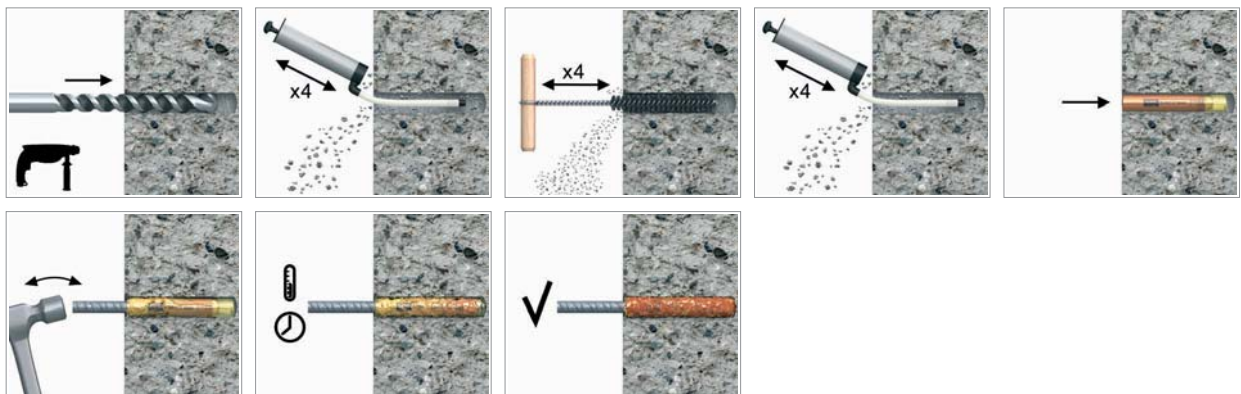
Approved for use in:

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

Also suitable for use in:

- Natural Stone

Installation guide



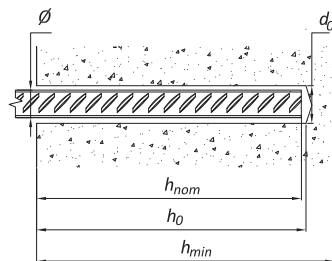
Product information

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 until the curing time elapses.
6. Attach fixture and tighten the nut to the required torque.

Installation guide (cont.)

Size	Product Code	Description / Resin Type
Ø8	R-HAC-V-10	Styrene Free Vinylester Resin
Ø10	R-HAC-V-12	
Ø12	R-HAC-V-16	
Ø14	R-HAC-V-16	
Ø16	R-HAC-V-20	
Ø20	R-HAC-V-24	
Ø25	R-HAC-V-30	

Installation data



REBARS

Size			Ø8	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/mm ²]	480	480	480	480	480	480	480
Nominal yield strength - tension	f_{yk}	[N/mm ²]	355	355	355	355	355	355	355
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	f_{yk}	[N/mm ²]	410	410	410	410	410	410	410
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm ³]	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/mm ²]	575	575	575	575	575	575	575
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm ³]	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/BS500S									
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm ²]	550	550	550	550	550	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	500	500	500	500	500	500	500
Cross sectional area - tension	A_s	[mm ²]	50.3	78.5	113.1	153.9	201.1	314.2	490.9
Elastic section modulus	W_{el}	[mm ³]	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, BS500S, 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, BS500S, 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	Diameter size	Quantity [pcs]			Weight [kg]			Bar Code	Shelf Life [month]
			Box	Outer	Pallet	Box	Outer	Pallet		
R-HAC-V-08	M8	Ø8	10	500	8000	0.13	6.6	135.3	5906675377827	18
R-HAC-V-10	M10	Ø10	10	500	8000	0.14	6.8	138.0	5906675379913	18
R-HAC-V-12	M12	Ø12	10	500	8000	0.19	9.5	181.2	5906675379920	18
R-HAC-V-16	M16	Ø16	10	500	6000	0.30	15.1	210.6	5906675379937	18
R-HAC-V-20	M20	Ø20	6	60	960	0.57	5.7	120.8	5906675379944	18
R-HAC-V-24	M24	Ø24	6	54	960	0.76	6.9	152.0	5906675379951	18
R-HAC-V-30	M30	Ø30	2	20	320	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 Metric 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

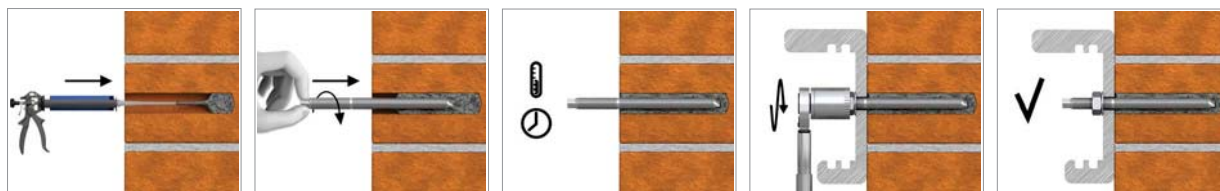
Features and benefits

- 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

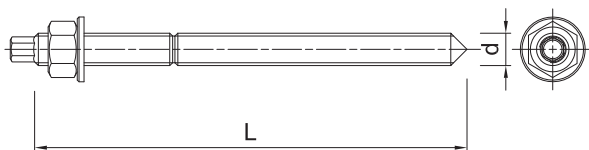
Installation guide



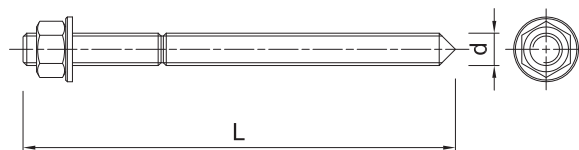
1. Drill hole to the required diameter and depth for stud size being used.
2. Clean the hole thoroughly with hand pump and hole brush
3. If required, insert the mesh sleeve into position
4. Fill hole with the required resin to the recommended fill level. (Follow the relevant instructions for the resin 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 - 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

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							
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
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

* Made to order

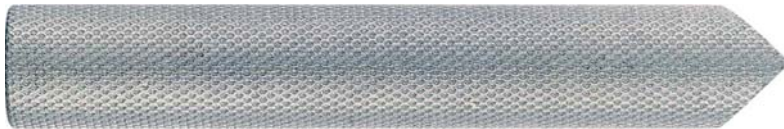
Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	
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 - 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

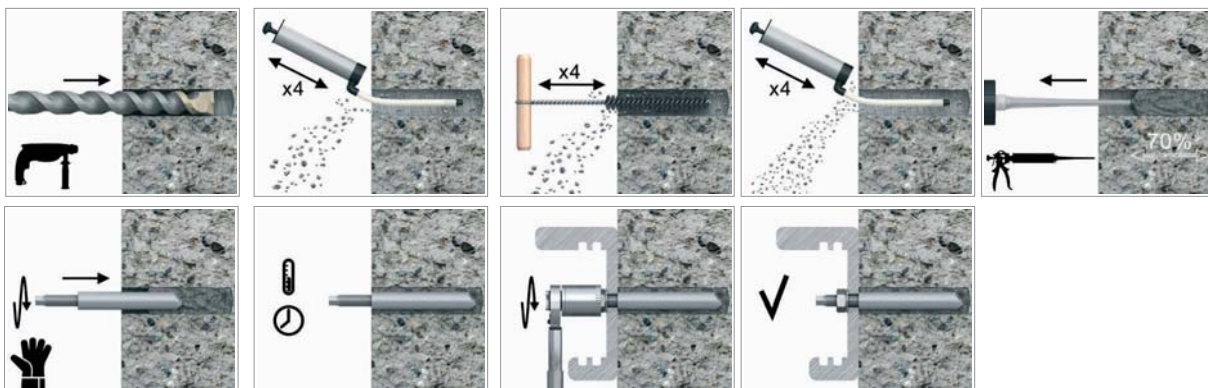
- For fastening of threaded rods or bolts
- Safety barriers
- Temporary works/formworks support systems

Base materials

Approved for use in:

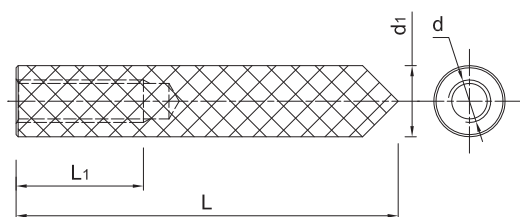
- Non-cracked concrete C20/25-C50/60

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 _i	L	L _i	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	Art No.
		Box	Outer		
R-BLOW PUMP	1	12.0	12.0	5906675102412	55025

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 centered
- 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

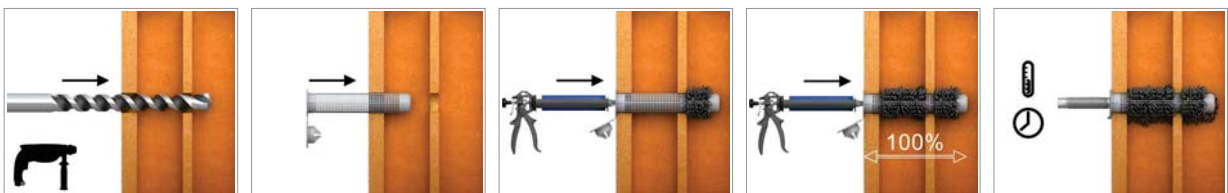
- For use with R-STUDS threaded rods in hollow base materials

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		Quantity [pcs]			Weight [kg]			Bar Code
	Sleeve [mm]	Stud	Box	Outer	Pallet	Box	Outer	Pallet	
R-PLS-12050-10	12x50	M6-M8	10	10	480	0.06	0.06	32.9	5906675377520
R-PLS-15085-10	15x85	M8-M10	10	10	6000	0.06	0.06	66.0	5906675291840
R-PLS-15125-10	15x125	M8-M10	10	10	6000	0.08	0.08	78.0	5906675291857
R-PLS-20085-10	20x85	M12-M16	10	10	4800	0.08	0.08	68.4	5906675291864
SP-CE-R08	10x1000	M6-M8	10	10	-	0,129	0,129	-	5906675266138
SP-CE-R10	12x1000	M8	10	10	-	0,129	0,129	-	5906675610122
SP-CE-R12	16x1000	M10	10	10	-	0,129	0,129	-	5906675610320
SP-CE-R16	22x1000	M12	6	6	-	0,129	0,129	-	5906675610528
SP-CE-R20	28x1000	M16	5	5	-	0,258	0,258	-	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 nozzle fits all cartridge delivery systems for bonded anchors, except R-KEX and R-KER
- Specially dedicated nozzles for epoxy and vinylester resins
- 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+ system
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
R-NOZ-RKEX-10	R-KEX, R-KEM-II, R-KF2, R-KER (product not suitable for epoxy resin)	10	100	0.10	0.10	5906675018089
SP-CE-ED-1M	Extension for every nozzle type	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



Applications

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

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-300-N	300 ml CARTRIDGE GUN for R-KEM+, R-KEM II	1	12	960	1.0	12.0	987.1	5906675280141

R-GUN 345 ml



Applications

- Dispenser gun suitable for: 345ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-345-N	345 ml CARTRIDGE GUN for R-KER	1	12	300	1.0	12.0	329.1	5906675280158

R-GUN 380 ml



Applications

- Dispenser gun suitable for: 380ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-380-N	380 ml CARTRIDGE GUN for R-KF2, R-KER	1	12	180	1.03	12.4	215.4	5906675280165

R-GUN Dispenser Guns

Professional manual dispensing system for resin anchors in cartridges

R-GUN 385 ml



Applications

- Dispenser gun suitable for: 385 ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-385-N	385 ml CARTRIDGE GUN for R-KEX II	1	10	150	1.41	14.1	241.5	5906675067971

R-GUN 400 ml



Applications

- Dispenser gun suitable for: 400 ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-400-N	400 ml CARTRIDGE GUN for R-KEX	1	1	80	1.25	1.25	130.0	5906675290218

R-GUN Pneumatic Dispenser Guns

Professional pneumatic dispensing system for resin anchors in cartridges

R-GUN 380 ml



Applications

- Pneumatic dispenser gun suitable for: 380 ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-380-PNEU	380 ml CARTRIDGE PNEUMATIC GUN for R-KF2, R-KER	1	1	584	1.30	1.30	789.2	5906675286068

R-GUN Pneumatic Dispenser Guns

Professional pneumatic dispensing system for resin anchors in cartridges

R-GUN 400 ml



Applications

- Pneumatic dispenser gun suitable for: 400 ml cartridges

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-GUN-400-PNEU	400 ml CARTRIDGE PNEUMATIC GUN for R-KEX	1	1	609	1.25	1.25	791.3	5906675286457

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-GUN Pneumatic Dispenser Gun CFS+

Professional pneumatic dispensing system for resin anchors in CFS+ foils

R-CFS+-GUN 300/600 ml



Applications

- Pneumatic dispenser gun suitable for: 300/600 ml CFS+ system

Product Code	Description	Quantity [pcs]			Weight [kg]			Bar Code
		Box	Outer	Pallet	Box	Outer	Pallet	
R-CFS+-GUN-PNEU	300/600 ml CARTRIDGE GUN RV200, RM50, RP30	1	1	599	1.23	1.23	766.8	5906675288772



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-HPTII-A4

- Stainless Steel Throughbolt

R-HPTII-ZF

- Zink Flake Throughbolt

R-XPTII-A4

- Stainless Steel Throughbolt

R-XPT

- Throughbolt

R-XPT-HD

- Hot Dip Galvanized Throughbolt

Through fixing – drill and install directly through fixture

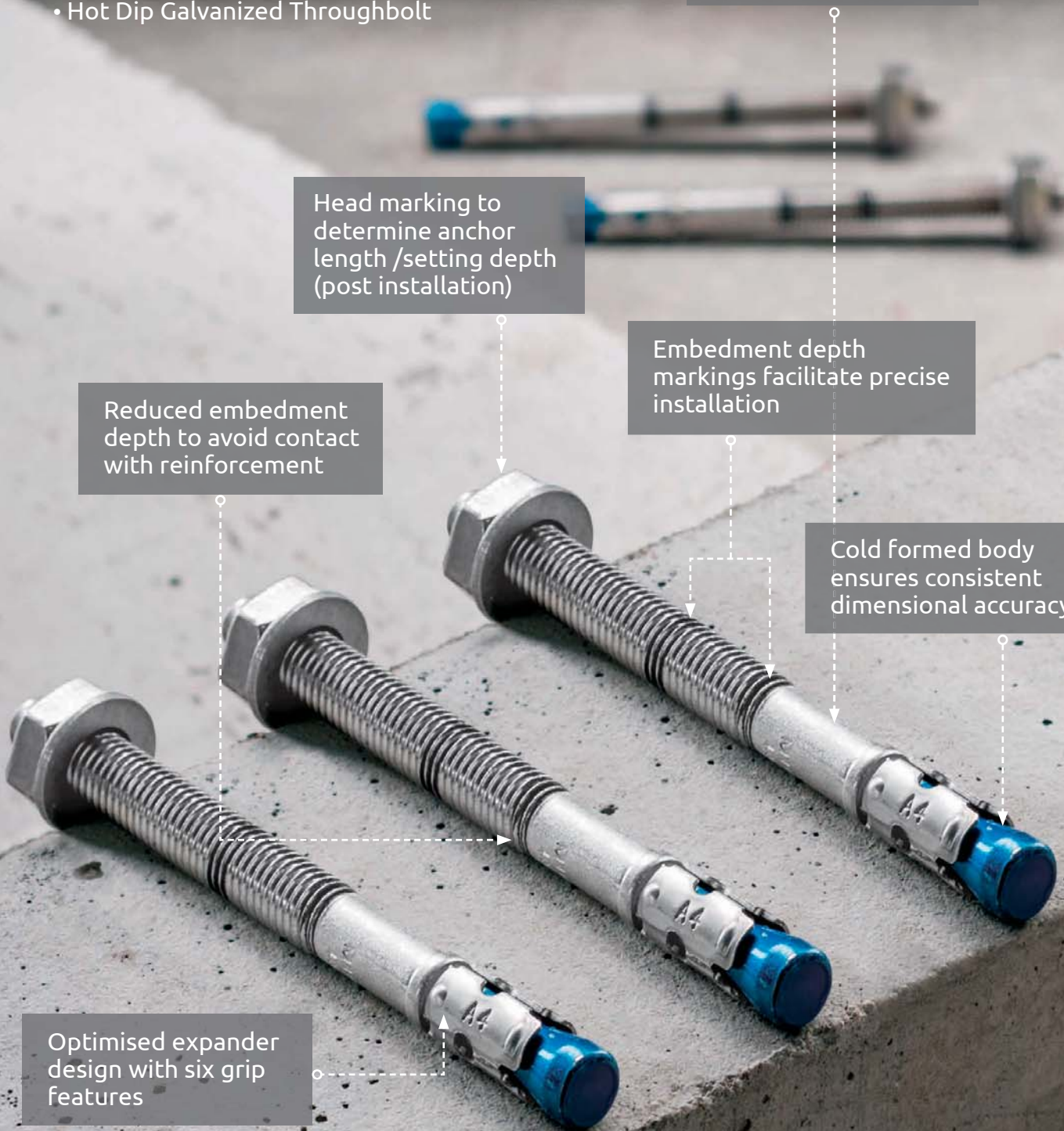
Head marking to determine anchor length /setting depth (post installation)

Reduced embedment depth to avoid contact with reinforcement

Embedment depth markings facilitate precise installation

Cold formed body ensures consistent dimensional accuracy

Optimised expander design with six grip features



R-HPTII-A4 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 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 effort

Applications

- Cladding restraints
- Consoles
- 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:

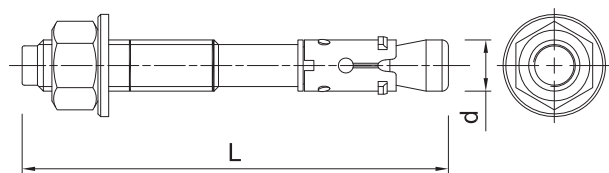
- Natural stone

Installation guide



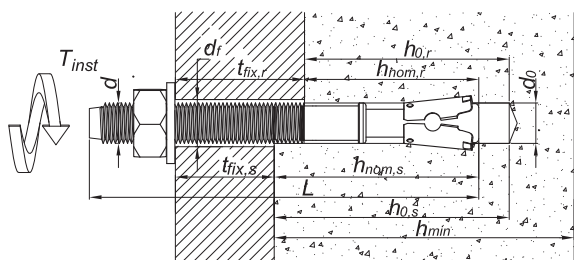
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

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-HPTII-A4-08060/10	8	60	10	-	9
	R-HPTII-A4-08075/10	8	75	25	10	9
	R-HPTII-A4-08085/20	8	85	35	20	9
	R-HPTII-A4-08095/30	8	95	45	30	9
	R-HPTII-A4-08105/40	8	105	55	40	9
	R-HPTII-A4-08115/50	8	115	65	50	9
M10	R-HPTII-A4-10065/5	10	65	5	-	11
	R-HPTII-A4-10080/20	10	80	20	-	11
	R-HPTII-A4-10095/15	10	95	35	15	11
	R-HPTII-A4-10115/35	10	115	55	35	11
	R-HPTII-A4-10130/50	10	130	70	50	11
	R-HPTII-A4-10140/60	10	140	80	60	11
M12	R-HPTII-A4-12080/5	12	80	5	-	13
	R-HPTII-A4-12100/5	12	100	25	5	13
	R-HPTII-A4-12125/30	12	125	50	30	13
	R-HPTII-A4-12150/55	12	150	75	55	13
	R-HPTII-A4-12180/85	12	180	105	85	13
M16	R-HPTII-A4-16125/5	16	125	25	5	18
	R-HPTII-A4-16140/20	16	140	40	20	18
	R-HPTII-A4-16150/30	16	150	50	30	18
	R-HPTII-A4-16180/60	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
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 (Non-cracked concrete)	$s_{min,r}$	[mm]	55	70	90	135
Min. spacing (Cracked concrete)	$s_{min,r}$	[mm]	55	70	90	135

Installation data (cont.)

Size			M8	M10	M12	M16
Min. edge distance (Non-cracked concrete)	$c_{min,r}$	[mm]	40	50	55	80
Min. edge distance (Cracked concrete)	$c_{min,r}$	[mm]	40	45	55	70
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 (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/mm ²]	545	545	500	500
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm ²]	600	600	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	436	436	400	400
Nominal yield strength - shear	f_{yk}	[N/mm ²]	480	480	440	440
Cross sectional area - tension	A_s	[mm ²]	38.9	61.7	89.6	165.2
Cross sectional area - shear	A_s	[mm ²]	38.9	61.7	89.6	165.2
Elastic section modulus	W_{el}	[mm ³]	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]	15.4	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-HPTII-ZF 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 effort

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
- Concrete

Also suitable for use in:

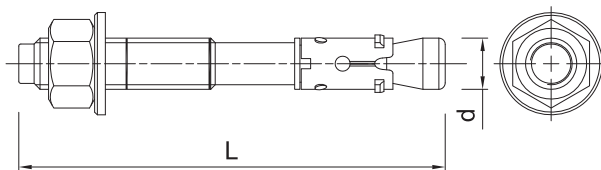
- Natural Stone

Installation guide



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump 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

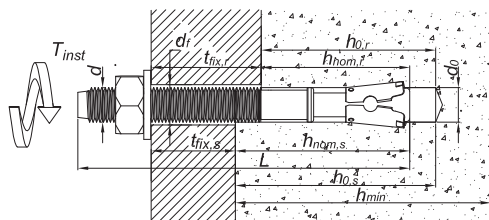
Product information



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-HPTII-ZF-08065/15	8	65	15	-	9
	R-HPTII-ZF-08080/15	8	80	30	15	9
	R-HPTII-ZF-08085/20	8	85	35	20	9
	R-HPTII-ZF-08100/35	8	100	50	35	9
	R-HPTII-ZF-08115/50*	8	115	65	50	9
M10	R-HPTII-ZF-10065/5	10	65	5	-	11
	R-HPTII-ZF-10080/20	10	80	20	-	11
	R-HPTII-ZF-10095/15	10	95	35	15	11
	R-HPTII-ZF-10115/35	10	115	55	35	11
	R-HPTII-ZF-10130/50	10	130	70	50	11
M12	R-HPTII-ZF-12080/5	12	80	5	-	13
	R-HPTII-ZF-12100/5	12	100	25	5	13
	R-HPTII-ZF-12120/25	12	120	45	25	13
	R-HPTII-ZF-12135/40	12	135	60	40	13
	R-HPTII-ZF-12150/55	12	150	75	55	13
M16	R-HPTII-ZF-16100/5	16	100	5	-	18
	R-HPTII-ZF-16105/10	16	105	10	-	18
	R-HPTII-ZF-16140/20	16	140	40	20	18
	R-HPTII-ZF-16160/40	16	160	60	40	18
	R-HPTII-ZF-16180/60	16	180	80	60	18
M20	R-HPTII-ZF-20125/5	20	125	5	-	22
	R-HPTII-ZF-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/mm ²]	620	620	620	620	620
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm ²]	520	520	520	520	520
Nominal yield strength - tension	f_{yk}	[N/mm ²]	531	531	531	531	531
Nominal yield strength - shear	f_{yk}	[N/mm ²]	416	416	416	416	416
Cross sectional area - tension	A_s	[mm ²]	25.5	40.7	60.1	106.6	162.9
Cross sectional area - shear	A_s	[mm ²]	38.9	61.7	89.6	165.2	259.1
Elastic section modulus	W_{el}	[mm ³]	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-XPTII-A4 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 cracked and non-cracked concrete confirmed by ETA Option 7
- Highest quality to receive optimal load capability
- Fire resistant
- 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 effort

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:

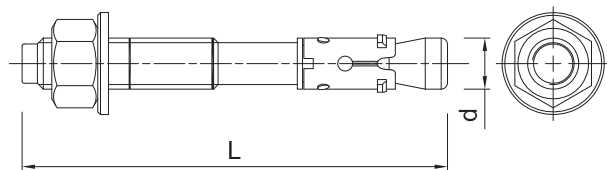
- Natural Stone

Installation guide



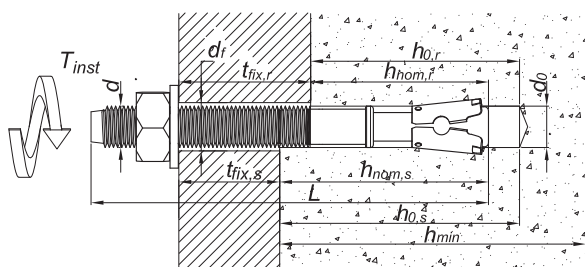
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

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-XPTII-A4-08075/10	8	75	25	10	9
	R-XPTII-A4-08085/20	8	85	35	20	9
	R-XPTII-A4-08095/30	8	95	45	30	9
	R-XPTII-A4-08105/40	8	105	55	40	9
	R-XPTII-A4-08115/50	8	115	65	50	9
M10	R-XPTII-A4-10065/5	10	65	5	-	11
	R-XPTII-A4-10080/20	10	80	20	-	11
	R-XPTII-A4-10095/15	10	95	35	15	11
	R-XPTII-A4-10115/35	10	115	55	35	11
	R-XPTII-A4-10130/50	10	130	70	50	11
M12	R-XPTII-A4-10140/60	10	140	80	60	11
	R-XPTII-A4-12080/5	12	80	5	-	13
	R-XPTII-A4-12100/5	12	100	25	5	13
	R-XPTII-A4-12125/30	12	125	50	30	13
	R-XPTII-A4-12150/55	12	150	75	55	13
M16	R-XPTII-A4-12180/85	12	180	105	85	13
	R-XPTII-A4-16125/5	16	125	25	5	18
	R-XPTII-A4-16140/20	16	140	40	20	18
	R-XPTII-A4-16150/30	16	150	50	30	18
	R-XPTII-A4-16180/60	16	180	80	60	18
	R-XPTII-A4-16220/100	16	220	120	100	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
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

Installation data (cont.)

Size			M8	M10	M12	M16
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/mm ²]	545	545	500	500
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm ²]	600	600	550	550
Nominal yield strength - tension	f_{yk}	[N/mm ²]	436	436	400	400
Nominal yield strength - shear	f_{yk}	[N/mm ²]	480	480	440	440
Cross sectional area - tension	A_s	[mm ²]	38.9	61.7	89.6	165.2
Cross sectional area - shear	A_s	[mm ²]	38.9	61.7	89.6	165.2
Elastic section modulus	W_{el}	[mm ³]	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
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

Basic performance data (cont.)

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

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-XPTII-A4-08075/10	8	75	100	100	12000	2.8	2.8	366.0	5906675047249
	R-XPTII-A4-08085/20	8	85	100	100	12000	3.3	3.3	426.0	5906675047256
	R-XPTII-A4-08095/30	8	95	100	100	12000	3.3	3.3	426.0	5906675047263
	R-XPTII-A4-08105/40	8	105	100	100	12000	4.4	4.4	558.0	5906675047270
	R-XPTII-A4-08115/50	8	115	100	100	12000	4.8	4.8	606.0	5906675047287
M10	R-XPTII-A4-10065/5	10	65	50	50	11000	3.0	3.0	690.0	5906675047294
	R-XPTII-A4-10080/20	10	80	50	50	6000	3.0	3.0	390.0	5906675047300
	R-XPTII-A4-10095/15	10	95	50	50	6000	3.7	3.7	468.0	5906675047317
	R-XPTII-A4-10115/35	10	115	50	50	6000	4.0	4.0	510.0	5906675047324
	R-XPTII-A4-10130/50	10	130	50	50	6000	5.0	5.0	630.0	5906675047331
	R-XPTII-A4-10140/60	10	140	50	50	6000	5.0	5.0	630.0	5906675047318
M12	R-XPTII-A4-12080/5	12	80	50	50	6000	5.6	5.6	702.0	5906675047355
	R-XPTII-A4-12100/5	12	100	50	50	6000	6.0	6.0	750.0	5906675047362
	R-XPTII-A4-12125/30	12	125	50	50	6000	7.0	7.0	870.0	5906675047379
	R-XPTII-A4-12150/55	12	150	50	50	4000	10.0	10.0	830.0	5906675047386
	R-XPTII-A4-12180/85	12	180	50	50	3000	12.0	12.0	750.0	5906675047393
M16	R-XPTII-A4-16125/5	16	125	25	25	3000	6.0	6.0	750.0	5906675047409
	R-XPTII-A4-16140/20	16	140	25	25	2000	6.0	6.0	750.0	5906675047416
	R-XPTII-A4-16150/30	16	150	25	25	2000	5.7	5.7	488.0	5906675047430
	R-XPTII-A4-16180/60	16	180	25	25	2000	6.0	6.0	512.0	5906675047447
	R-XPTII-A4-16220/100	16	220	25	25	2000	6.0	6.0	720.0	

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
- High quality with cost effectiveness
- 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 effort
- 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

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:

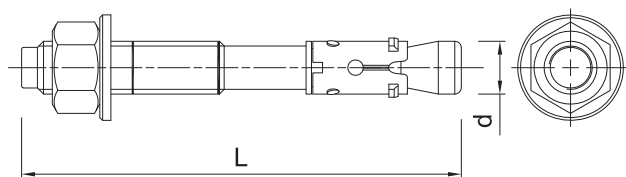
- Natural Stone

Installation guide



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump 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
M10	R-XPT-08150/85	8	150	100	85	9
	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
M12	R-XPT-10180/110	10	180	120	110	11
	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
M16	R-XPT-12220/125*	12	220	145	125	13
	R-XPT-12300/205*	12	300	225	205	13
	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

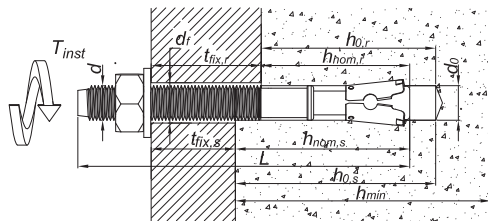
* AT-ITB Polish Technical Approval AT-15-9327/2014

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

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/mm ²]	630	620	620	620	620	620	580
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm ²]	520	520	520	520	520	520	680
Nominal yield strength - tension	f_{yk}	[N/mm ²]	539	531	531	531	531	531	496
Nominal yield strength - shear	f_{yk}	[N/mm ²]	416	416	416	416	416	416	544
Cross sectional area - tension	A_s	[mm ²]	15.2	25.5	40.7	60.1	106.6	162.9	311.0
Cross sectional area - shear	A_s	[mm ²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W_{el}	[mm ³]	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
M12	R-XPT-10180/110	10	180	50	50	5400	6.0	6.0	678.0	5906675250366
	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
M16	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
	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
M20	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
	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
M24	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
	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

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
- High performance in non-cracked concrete confirmed by ETA Option 7
- 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 effort
- 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:

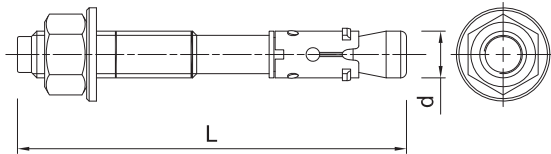
- Natural Stone

Installation guide



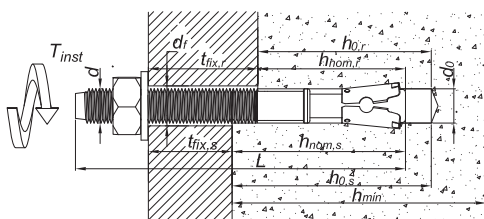
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

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/mm ²]	630	620	620	620	620	620	580
Nominal ultimate tensile strength - shear	f _{uk}	[N/mm ²]	520	520	520	520	520	520	680
Nominal yield strength - tension	f _{yk}	[N/mm ²]	539	531	531	531	531	531	496
Nominal yield strength - shear	f _{yk}	[N/mm ²]	416	416	416	416	416	416	544
Cross sectional area - tension	A _s	[mm ²]	15.2	25.5	40.7	60.1	106.6	162.9	311.0
Cross sectional area - shear	A _s	[mm ²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W _{el}	[mm ³]	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
	R-XPT-HD-10065/5	10	65	50	50	10000	2.3	2.3	498.0	5906675234052
M10	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
	R-XPT-HD-12080/5	12	80	50	50	6000	4.0	4.0	507.0	5906675234106
M12	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-H

- Hook Bolt

R-RB

- Rawlbolt Shield

Optimum taper nut angle
for maximum expansion
in all substrates

Bolt lengths suitable
for fixture thickness
up to 150mm

Shield available
separately

Pressed steel segments
ensure consistent
dimensional accuracy



R-RBL, R-RBP RAWLBOLT

World's most popular all-purpose expanding shield anchor



Approvals and Reports

- ETA-11/0479; ETAG 001-2, Option 1



Versions

- R-RBL - Loose Bolt
- R-RBP - Bolt Projecting



Installation movie



Product overview

Features and benefits

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

Applications

- Roller shutter doors
- Fire doors
- Steelwork
- Security grills
- 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
- Hollow-core Slab
- Hollow Brick

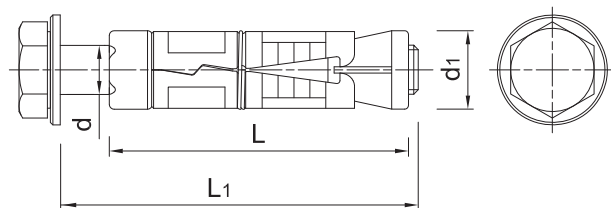
Installation guide



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 blowpump 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

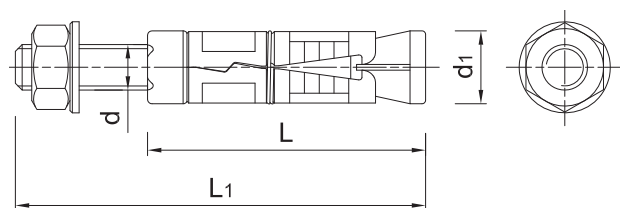
Product information

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

R-RBP



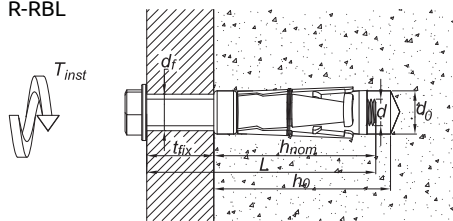
Size	Product Code	Anchor			Fixture		
		Bolt diameter	External diameter	Length	Max. thickness	Min. thickness	Hole diameter
		d	d ₁	L ₁	t _{fix}		d _f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBP-M06/10W	6	12	65	10	0	6.5
	R-RBP-M06/25W	6	12	80	25	0	6.5
	R-RBP-M06/60W	6	12	115	60	0	6.5
M8	R-RBP-M08/10W	8	14	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.)

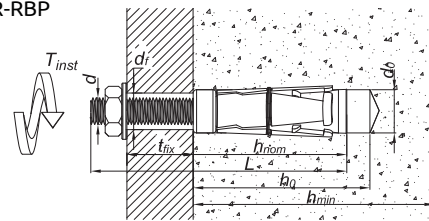
Size	Product Code	Anchor			Fixture		
		Bolt diameter	External diameter	Length	Max. thickness	Min. thickness	Hole diameter
		d	d ₁	L ₁	t _{fix}		d _f
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M10	R-RBP-M10/15W	10	16	90	15	0	11
	R-RBP-M10/30W	10	16	105	30	0	11
	R-RBP-M10/60W	10	16	135	60	0	11
M12	R-RBP-M12/15W	12	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

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/mm ²]	500	500	500	500	500	500	500
Nominal yield strength - tension	F _{yk}	[N/mm ²]	400	400	400	400	400	400	400
Cross sectional area - tension	A _s	[mm ²]	20.1	36.6	58.0	84.3	157.0	245.0	353.0
Elastic section modulus	W _{el}	[mm ³]	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

R-RBL-PF, R-RBP-PF RAWLBOLT Colar

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 M24)
- Three-pieces expanding sleeve of maximum expansion provides optimal load and safety of use in any substrate

Applications

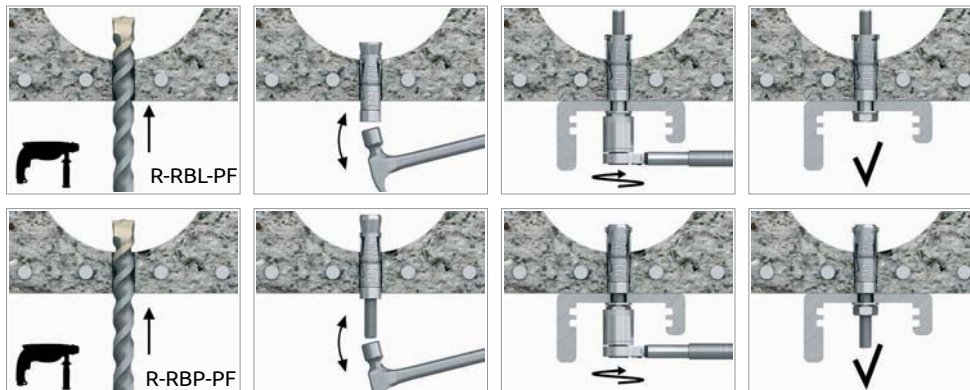
- Roller shutter doors
- Fire doors
- Steelwork
- Security grills
- Machinery
- Pipework/ductwork supports

Base materials

Approved for use in:

- Hollow concrete slab min. C20/25
- Solid brick
- Hollow sand-lime brick min. C20/25
- Hollow lightweight
- Concrete block

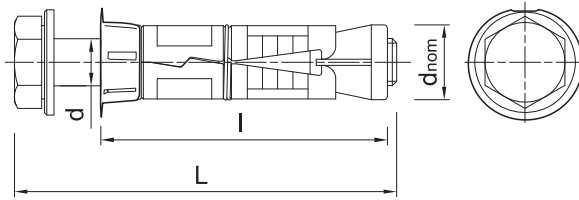
Installation guide



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 blowpump 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

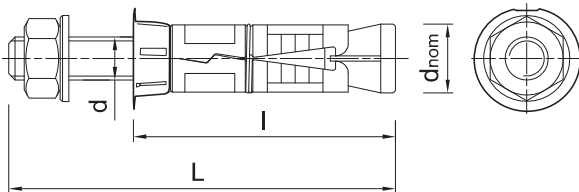
Product information

R-RBL-PF



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Bolt length	Max. thickness	Hole diameter
		d	d _i	L _i	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

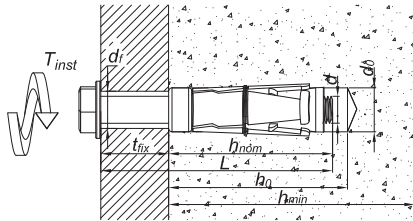
R-RBP-PF



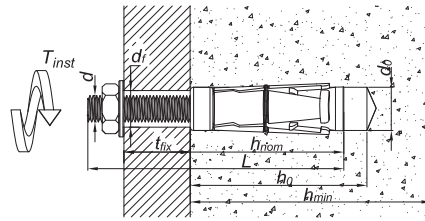
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Bolt length	Max. thickness	Hole diameter
		d	d _i	L _i	t _{fix}	d _f
		[mm]	[mm]	[mm]	[mm]	[mm]
M6	R-RBP-PF-M06/10W	6	12	65	10	6.5
	R-RBP-PF-M06/25W	6	12	80	25	6.5
	R-RBP-PF-M06/60W	6	12	115	60	6.5
M8	R-RBP-PF-M08/10W	8	14	75	10	9
	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



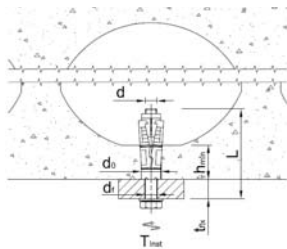
R-RBP-PF



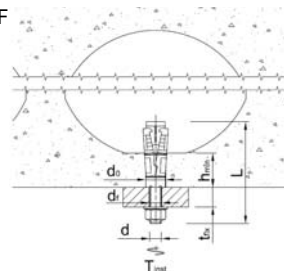
Installation data for solid material

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 Slab								
CONCRETE HOLLOW SLAB	THICKNESS	Class						
		C30/37	[kN]	8.91	10.40	—	—	—
		C35/45	[kN]	9.86	11.50	—	—	—
		C45/55	[kN]	10.93	12.75	—	—	—
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 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
LIGHTWEIGHT 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 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
LIGHTWEIGHT 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 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
LIGHTWEIGHT 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 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
LIGHTWEIGHT 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

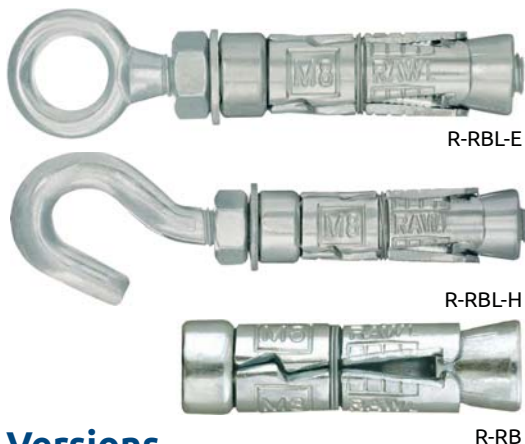
Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
Rawlbolt R-RBL-PF Loose Bolt										
M6	R-RBL-PF-M06/10W	6	55	50	400	22400	1.6	12.4	694.4	5906675117485
	R-RBL-PF-M06/25W	6	70	50	400	22400	1.6	12.8	716.8	5906675117492
	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



Versions

- R-RBL-E Eye Bolt
- R-RBL-H Hook Bolt
- R-RB Shield



Installation movie



Product overview

Features and benefits

- For use in concrete, hollowcore slabs, flooring blocks and ceramics
- Eyebolt and hook designed & manufactured for maximum performance
- Product recommended for applications requiring fire resistance
- Three-pieces expanding sleeve of maximum expansion provides optimal load and safety of use in any substrate

Applications

- Supporting guy ropes, stays and cables
- Supporting ladder restraints

Base materials

Suitable for use in:

- Concrete
- Natural Stone
- Hollow-core Slab
- Hollow Brick

Installation guide

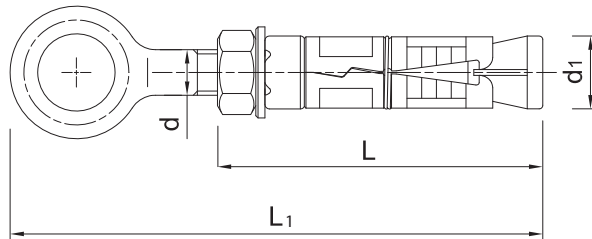


Installation guide

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 blowpump 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)

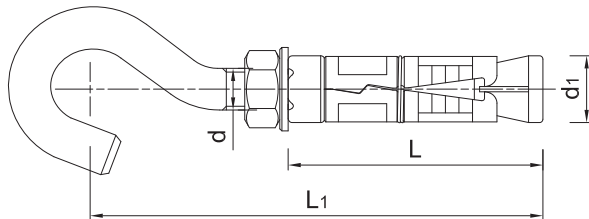
Product information

R-RBL-E



Size	Product Code	Anchor		
		Bolt diameter	External diameter	Length
		d	d ₁	L ₁
		[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

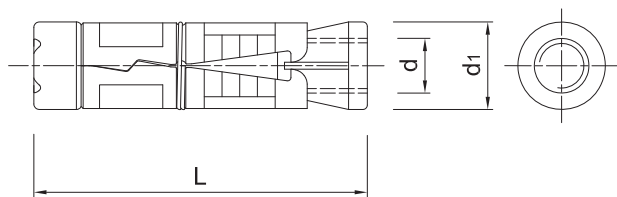
R-RBL-H



Size	Product Code	Anchor		
		Bolt diameter	External diameter	Length
		d	d ₁	L ₁
		[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

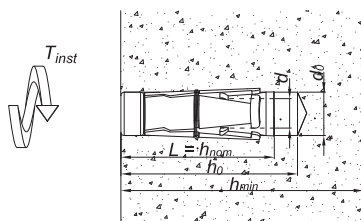
Product information (cont.)

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



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

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

Product commercial data (cont.)

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Code
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
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

R-SPL

- Loose Bolt

R-SPL-BP

- Bolt Projecting

R-SPL-C

- Countersunk

Case-hardened nut with optimum taper angle for maximum expansion

Integral controlled collapse and anti-rotation feature ensures fixture is firmly secured

Sleeve provides maximum shear load resistance

Unique zig-zag feature provides balanced expansion ensuring secure setting and maximum load carrying capacity

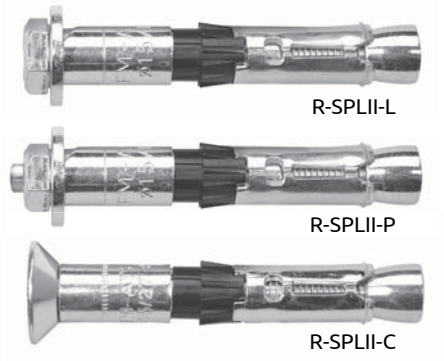
High strength steel washer

8.8 grade bolts



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



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 brush 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 material of anchor provides high durability

Applications

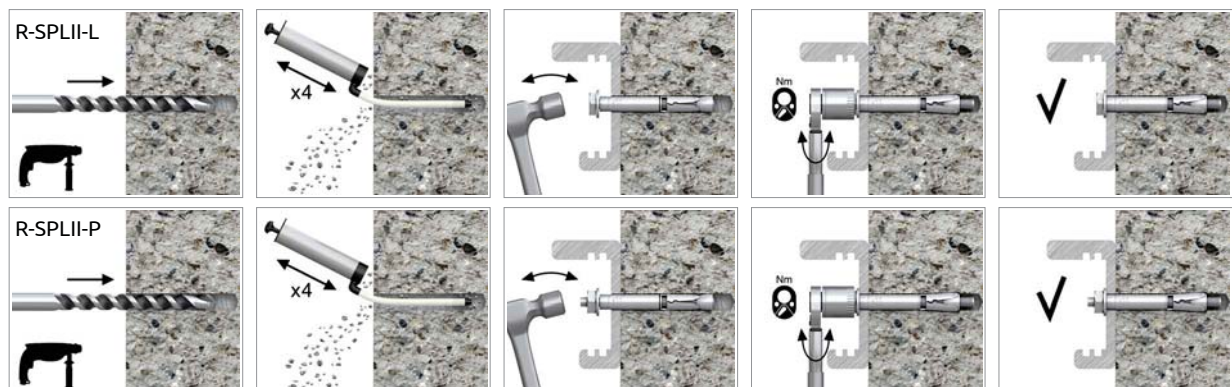
- Structural steel
- Masonry support
- Cladding restraints
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

Base materials

Approved for use in:

- Non-cracked concrete C20/25-C50/60
- Cracked concrete C20/25-C50/60
- Reinforced concrete
- Concrete subjected to seismic actions cat. C1/C2

Installation guide



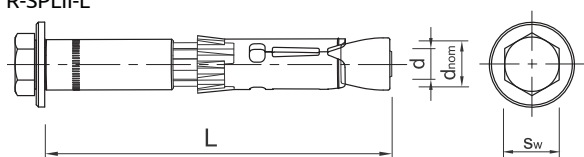
Installation guide (cont.)



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

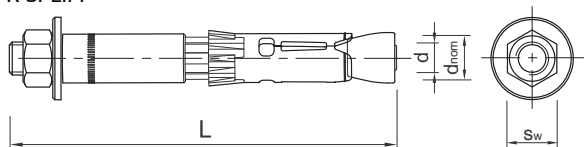
Product information

R-SPLII-L



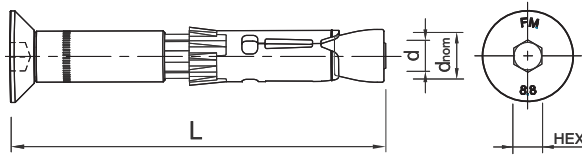
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d _i	L	t _{fix}	d _f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-SPLII SafetyPlus - Loose Bolt						
M6	R-SPL-II-06080/20L	6	10	80	20	12
	R-SPL-II-06110/50L	6	10	110	50	12
M8	R-SPL-II-08080/10L	8	10	80	10	14
	R-SPL-II-08090/20L	8	10	90	20	14
	R-SPL-II-08120/20L	8	10	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 _i	L	t _{fix}	d _f
		[mm]	[mm]	[mm]	[mm]	[mm]
R-SPLII-P SafetyPlus - Bolt Projecting						
M6	R-SPL-II-06080/20P	6	10	80	20	12
	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

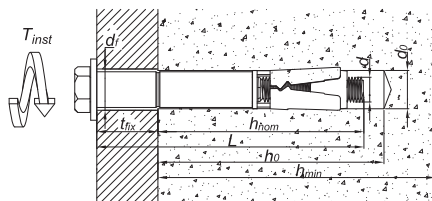
R-SPLII-C



Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d _e	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



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/mm ²]	800	800	800	800	830
Nominal yield strength - tension	f _{yk}	[N/mm ²]	640	640	640	640	640
Cross sectional area - tension	A _s	[mm ²]	20.1	36.6	58.0	84.3	157.0
Elastic section modulus	W _{el}	[mm ³]	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]	17.3	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.)

DESIGN LOAD											
TENSION LOAD N_{Rd}	[kN]	11.5	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]	8.25	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-06080/20P	6	80	50	400	9600	2.1	16.9	404.7	5010445007347
	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

Also suitable for use in:

- Natural Stone

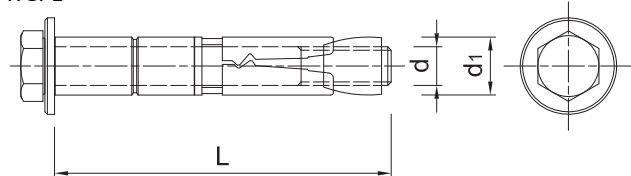
Installation guide



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

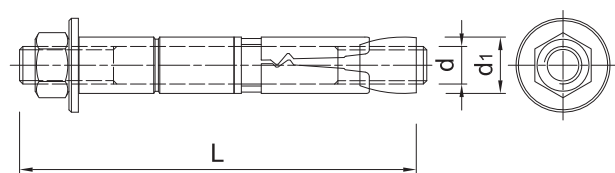
Product information

R-SPL



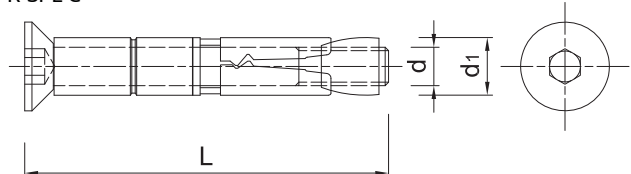
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d ₁	L	t _{fix}	d _f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-08090/15	8	12	90	15	14
	R-SPL-08110/40	8	12	110	40	14
M10	R-SPL-10105/20	10	15	105	20	17
	R-SPL-10120/40	10	15	120	40	17
	R-SPL-10140/60	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



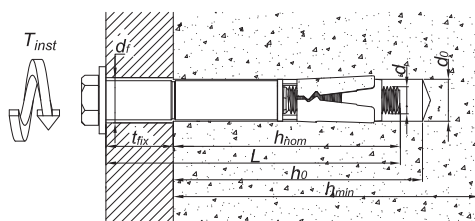
Size	Product Code	Anchor			Fixture	
		Bolt diameter	External diameter	Length	Max. thickness	Hole diameter
		d	d ₁	L	t _{fix}	d _f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-BP-08095/15	8	12	95	15	14
M10	R-SPL-BP-10110/20	10	15	110	20	17
M12	R-SPL-BP-12135/25	12	18	120	25	20
	R-SPL-BP-12160/50	12	18	160	50	20
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

R-SPL-C



Size	Product Code	Anchor				Fixture	
		Bolt diameter	External diameter	Head diameter	Length	Max. thickness	Hole diameter
		d	d ₁	d ₂	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/mm ²]	800	800	800	800	830
Nominal yield strength - tension	F _{yk}	[N/mm ²]	640	640	640	640	660
Cross sectional area - tension	A _s	[mm ²]	36.6	58.0	84.3	157.0	245.0
Elastic section modulus	W _{el}	[mm ³]	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

Wedge Anchors

R-DCA

- Wedge Anchors

R-DCL

- Lipped Wedge Anchors

R-DCA-A4

- Stainless Steel Wedge Anchors

Easy to install
by hammer
action

Internally
threaded to take
stud or bolt

Slotted sleeve
and internal wedge
component facilitate
easy setting



R-DCA, R-DCL Wedge Anchors

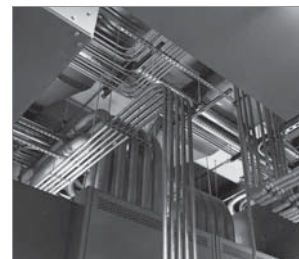
Internally-threaded wedge anchor for simple hammer-set installation



R-DCA



R-DCL



Approvals and Reports

- ETA-13/0584;
ETAG 001, Part 6



Versions

- R-DCA - Wedge Anchor
- R-DCL - Lipped Wedge Anchor



Installation movie

Product overview

Features and benefits

- High performance in cracked and non-cracked concrete confirmed by ETA Option 1
- 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

Applications

- Pipelines systems
- Ventilation systems
- Sprinkler systems
- Cable conduits and wires
- Gratings

Base materials

Approved for use in:

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

Also suitable for use in:

- Natural Stone

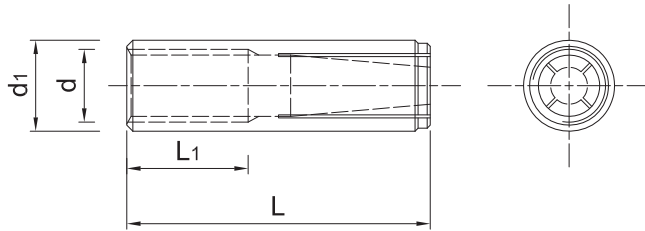
Installation guide



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump 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

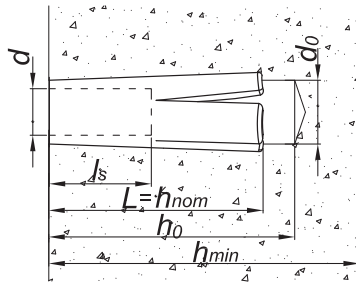
Product information

R-DCA/R-DCL



Size	Product Code	Anchor				Fixture
		Thread size	External diameter	Length	Thread length	Hole diameter
		d	d _i	L	L _i	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	30	22

Installation data



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/mm ²]	450	450	450	450	450	450
Nominal yield strength - tension	f _{yk}	[N/mm ²]	360	360	360	360	360	360
Cross sectional area - tension	A _s	[mm ²]	20.1	36.6	58.0	84.3	157.0	245.0
Elastic section modulus	W _{el}	[mm ³]	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

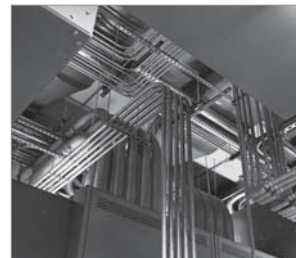
Size		M6	M8	M10	M12	M16	M20
Embedment depth h_{ef}	[mm]	25	30	40	50	65	80
CHARACTERISTIC LOAD							
TENSION LOAD N_{Rk}	[kN]	1.50	3.00	4.57	6.40	13.3	17.4
SHEAR LOAD V_{Rk}	[kN]	1.50	3.00	4.57	6.40	13.3	17.4
DESIGN LOAD							
TENSION LOAD N_{Rd}	[kN]	0.72	1.43	2.18	3.06	6.30	8.30
SHEAR LOAD V_{Rd}	[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 Wedge Anchor

Internally threaded stainless steel wedge anchor
for simple hammer-set installation



Approvals and Reports

- ETA-13/0584; ETAG 001, Part 6



Product overview

Features and benefits

- 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

Applications

- Pipelines systems
- Ventilation systems
- Sprinkler systems
- Cable conduits and wires
- Gratings

Base materials

Approved for use in:

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

Also suitable for use in:

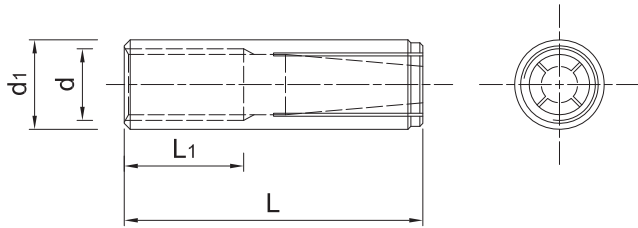
- Natural Stone

Installation guide



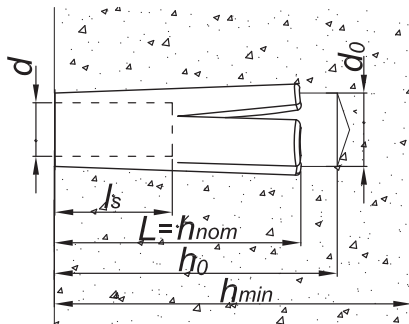
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert wedge anchor, slotted end first
4. Use the setting tool to drive the internal wedge into the anchor
5. Insert bolt or stud through fixture and tighten to the recommended torque

Product information



Size	Product Code	Anchor				Fixture
		Thread size	External diameter	Length	Thread length	Hole diameter
		d	d ₁	L	L ₁	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/mm ²]	700	700	700	700	700
Nominal yield strength - tension	f _{yk}	[N/mm ²]	525	525	525	525	525
Cross sectional area - tension	A _s	[mm ²]	20.1	36.6	58.0	84.3	157.0
Elastic section modulus	W _{el}	[mm ³]	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 Wedge Anchor Setting Tools

Manual setting tool



R-DCA-ST-PLUS



R-DCA-ST

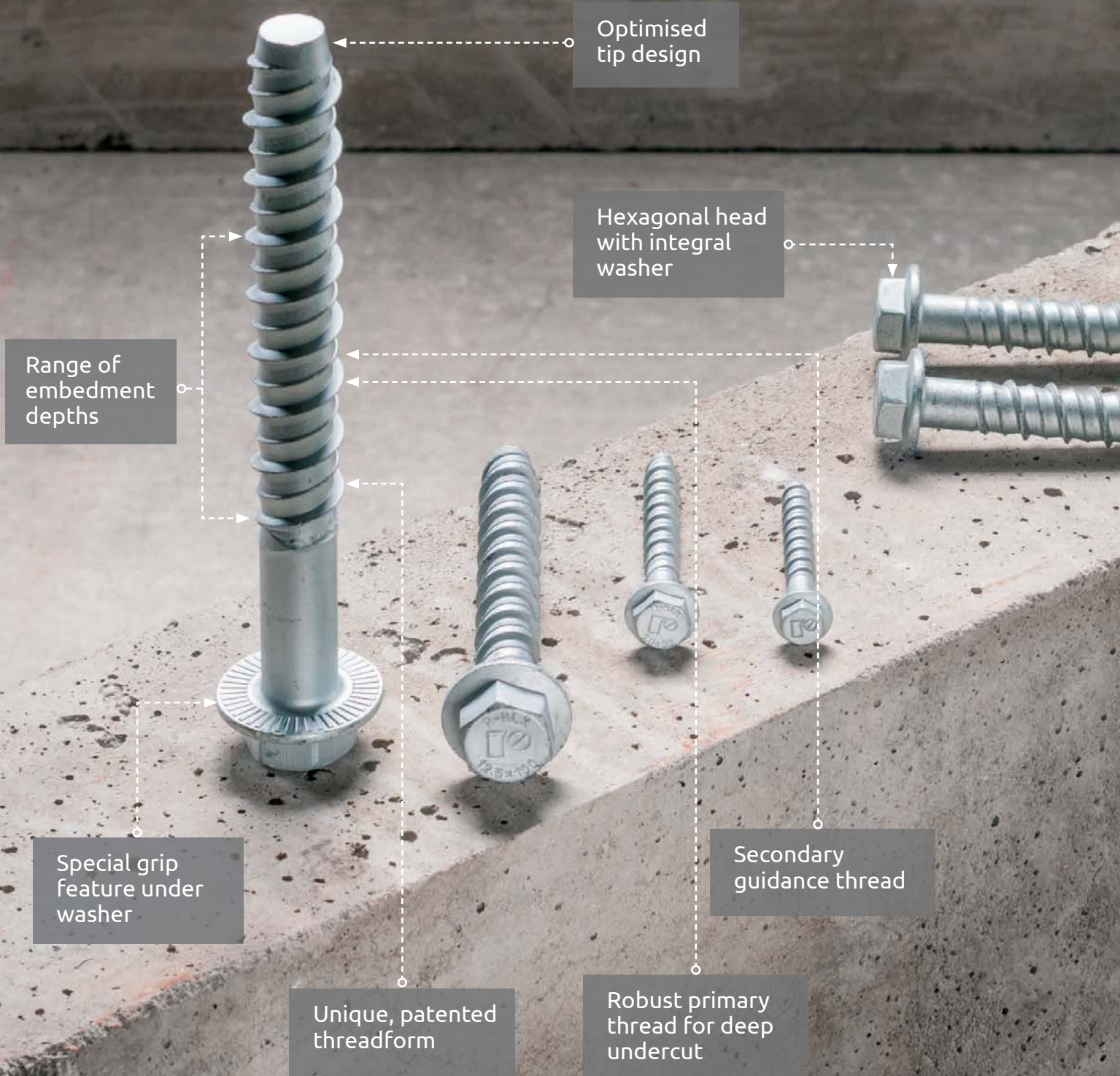
Product commercial data

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

• Concrete Screw Anchor



R-LX Concrete Screw Anchor

Self-tapping concrete screwbolt



Approvals and Reports

- Pending



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
- 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-HLX 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

Suitable for use in:

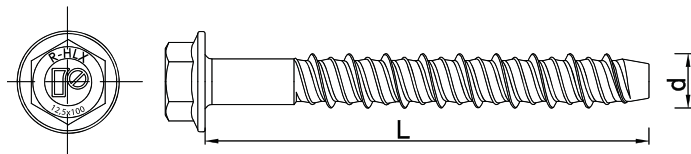
- Concrete
- Solid brick
- Solid concrete block
- Aerated concrete block
- High density natural stone

Installation guide



1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump 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



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]
Ø5	R-LX-5X50-HF-ZF	5	6,3	50	25	10	7
	R-LX-5X75-HF-ZF	5	6,3	75	55	35	7
Ø6	R-LX-6X50-HF-ZF	6	7,5	50	25	10	9
	R-LX-6X75-HF-ZF	6	7,5	75	55	25	9
	R-LX-6X100-HF-ZF	6	7,5	100	60	45	9
	R-LX-6X130-HF-ZF	6	7,5	130			9
	R-LX-6X150-HF-ZF	6	7,5	150			9
Ø8	R-LX-8X60-HF-ZF	8	10	60			12
	R-LX-8X75-HF-ZF	8	10	75	25	5	12
	R-LX-8X90-HF-ZF	8	10	90	45	25	12
	R-LX-8X100-HF-ZF	8	10	100			12
	R-LX-8X130-HF-ZF	8	10	130			12
	R-LX-8X150-HF-ZF	8	10	150			12
Ø10	R-LX-10X65-HF-ZF	10	12,5	65	10	-	14
	R-LX-10X75-HF-ZF	10	12,5	75			14
	R-LX-10X85-HF-ZF	10	12,5	85	30	-	14
	R-LX-10X100-HF-ZF	10	12,5	100	45	15	14
	R-LX-10X120-HF-ZF	10	12,5	120			14
	R-LX-10X140-HF-ZF	10	12,5	140			14
	R-LX-10X160-HF-ZF	10	12,5	160			14
Ø14	R-LX-14X80-HF-ZF	14	17	80			18
	R-LX-14X105-HF-ZF	14	17	105	5	-	18
	R-LX-14X115-HF-ZF	14	17	115			18
	R-LX-14X135-HF-ZF	14	17	135	60	15	18

Product Commercial Data

Size	Product Code	Anchor	Quantity [pcs]
		Length [mm]	Box
Ø5	R-LX-5X50-HF-ZF	50	100
	R-LX-5X75-HF-ZF	75	100
Ø6	R-LX-6X50-HF-ZF	50	100
	R-LX-6X75-HF-ZF	75	100
	R-LX-6X100-HF-ZF	100	50
	R-LX-6X130-HF-ZF	130	50
	R-LX-6X150-HF-ZF	150	50
Ø8	R-LX-8X60-HF-ZF	60	50
	R-LX-8X75-HF-ZF	75	50
	R-LX-8X90-HF-ZF	90	50
	R-LX-8X100-HF-ZF	100	50
	R-LX-8X130-HF-ZF	130	50
	R-LX-8X150-HF-ZF	150	50

Product Commercial Data

Size	Product Code	Anchor	Quantity [pcs]
		Length [mm]	Box
Ø10	R-LX-10X65-HF-ZF	65	50
	R-LX-10X75-HF-ZF	75	50
	R-LX-10X85-HF-ZF	85	50
	R-LX-10X100-HF-ZF	100	50
	R-LX-10X120-HF-ZF	120	50
	R-LX-10X140-HF-ZF	140	50
Ø14	R-LX-10X160-HF-ZF	160	50
	R-LX-14X80-HF-ZF	80	50
	R-LX-14X105-HF-ZF	105	50
	R-LX-14X115-HF-ZF	115	50
	R-LX-14X135-HF-ZF	135	50

Accessories

Tension Tester
Wedge Anchor Setting Tools



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

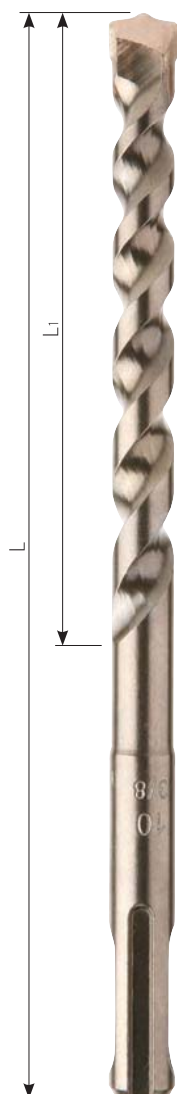
Instructions for use

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



Drill bits

Drill bits for concrete AGGRESSOR SDS plus



concrete

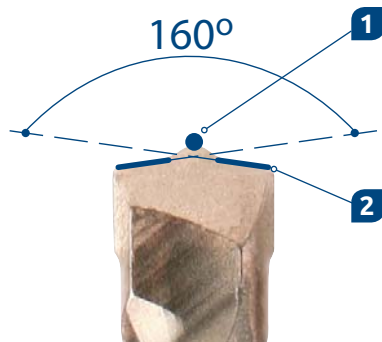


stone



brick

Features and benefits



1 **Self-aligning drill bit tip** enables quick location and start up

2 **Increased angle plates to 160°** results in ensures faster drilling in concrete



3 **Extra deep seating carbide plate** significantly increases the durability of the connection to the core of the drill, which improves quality.

4 **Aggressive flutes** increase dust extraction and accelerate drilling



Recommended fixings

R-HLX

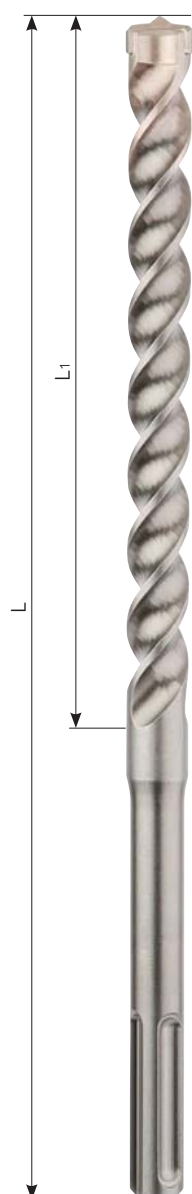
Concrete screw



Technical Data

Product Code	Description			Logistic data		EAN
	Ø [mm]	L [mm]	L1 [mm]	Quantity [pcs]	Weight [kg]	
RT-SDSA-4/110	4	110	50	1	0,038	5906675114767
RT-SDSA-5/110	5	110	50	1	0,0395	5906675114774
RT-SDSA-5/160	5	160	100	1	0,039	5906675027944
RT-SDSA-5/210	5	210	150	1	0,036	5906675114781
RT-SDSA-5/310	5	310	250	1	0,15	5906675063461
RT-SDSA-5/310B12	5	310	250	12	0,76	5906675063478
RT-SDSA-5/460	5	460	400	1	0,09	5906675114798
RT-SDSA-55/160	5,5	160	100	1	0,041	5906675026503
RT-SDSA-6/110	6	110	50	1	0,037	5906675027920
RT-SDSA-6/160	6	160	100	1	0,045	5906675026589
RT-SDSA-6/160B12	6	160	100	12	0,57	5906675063539
RT-SDSA-6/210	6	210	150	1	0,045	5906675027982
RT-SDSA-6/260	6	260	200	1	0,1	5906675048598
RT-SDSA-6/310B12	6	310	250	12	0,884	5906675063485
RT-SDSA-6/460	6	460	400	1	0,09	5906675114835
RT-SDSA-7/110	7	110	50	1	0,05	5906675026572
RT-SDSA-7/160	7	160	100	1	0,049	5906675026565
RT-SDSA-8/110	8	110	50	1	0,043	5906675026558
RT-SDSA-8/160	8	160	100	1	0,056	5906675027951
RT-SDSA-8/160B12	8	160	100	12	0,679	5906675063546
RT-SDSA-8/210	8	210	150	1	0,068	5906675027968
RT-SDSA-8/260	8	260	200	1	0,068	5906675027937
RT-SDSA-8/310	8	310	250	1	0,077	5906675027975
RT-SDSA-8/310B12	8	310	250	12	0,97	5906675063508
RT-SDSA-8/410	8	410	350	1	0,137	5906675114873
RT-SDSA-8/460	8	460	400	1	0,15	5906675114880
RT-SDSA-9/160	9	160	100	1	0,071	5906675114897
RT-SDSA-10/110	10	110	50	1	0,058	5906675026596
RT-SDSA-10/160	10	160	100	1	0,069	5906675026602
RT-SDSA-10/160B12	10	160	100	12	1	5906675063553
RT-SDSA-10/210	10	210	150	1	0,09	5906675026619
RT-SDSA-10/310	10	310	250	1	0,077	5906675028002
RT-SDSA-10/310B12	10	310	250	12	1	5906675063515
RT-SDSA-10/460	10	460	400	1	0,199	5906675114910
RT-SDSA-10/610	10	610	550	1	0,261	5906675114927
RT-SDSA-10/1000	10	1000	940	1	0,54	5906675114934
RT-SDSA-12/160	12	160	100	1	0,089	5906675026633
RT-SDSA-12/210	12	210	150	1	0,112	5906675026640
RT-SDSA-12/260	12	260	200	1	0,077	5906675028019
RT-SDSA-12/310	12	310	250	1	0,168	5906675026657
RT-SDSA-12/1000	12	1000	940	1	0,54	5906675114965
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-16/260	16	260	200	1	0,207	5906675026701
RT-SDSA-16/310	16	310	250	1	0,255	5906675026718
RT-SDSA-16/460	16	460	400	1	0,302	5906675026725
RT-SDSA-16/610	16	610	550	1	0,499	5906675115085
RT-SDSA-16/1000	16	1000	940	1	0,88	5906675115092
RT-SDSA-18/310	18	310	250	1	0,315	5906675026732
RT-SDSA-18/460	18	460	400	1	0,413	5906675026749
RT-SDSA-18/610	18	610	550	1	0,66	5906675115139
RT-SDSA-18/1000	18	1000	940	1	1,105	5906675115146
RT-SDSA-20/310	20	310	250	1	0,399	5906675026756
RT-SDSA-20/460	20	460	400	1	0,529	5906675026763
RT-SDSA-22/460	22	460	400	1	0,64	5906675026770
RT-SDSA-24/460	24	460	400	1	0,735	5906675026787
RT-SDSA-25/460	25	460	400	1	0,95	5906675115245
RT-SDSA-26/460	26	460	400	1	0,866	5906675026794

Drill bits for reinforced concrete REBARDRILL SDS plus



reinforced concrete



concrete

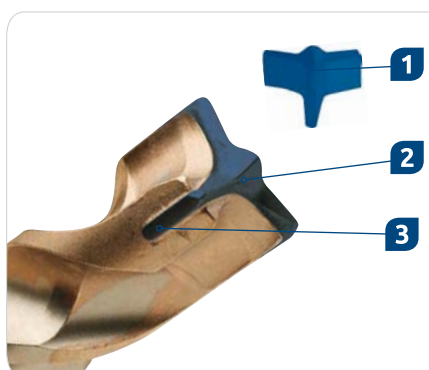


stone

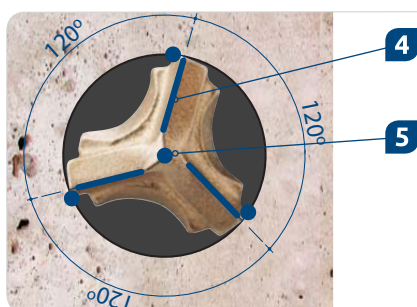


brick

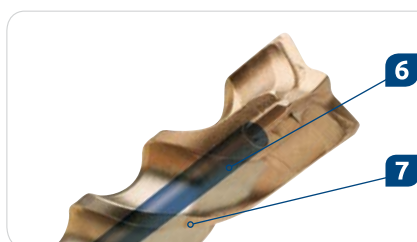
Features and benefits



- 1 **Sintered carbide tip**
The monolithic carbide plate greatly increases the life of the drill
- 2 Suitable Approach **angle plate 135°** allows for drilling in reinforced concrete
- 3 **Extra deep seating carbide plate** significantly increases the durability of the connection to the core of the drill, which improves quality.



- 4 **3 symmetrical cutting edges** allows drilling perfectly straight and cylindrical holes remove of close to the edges without breaking of the substrate
- 5 **Self-aligning drill bit tip** enables quick location and start up



- 6 **Drill bit core subjected to special thermal treatment** remove what increases the working life
- 7 **Special flute for swarf removal** 3 surfaces and a special shape make dust extraction easy



Recommended fixings

R-KER

Bonded anchor



R-XTP II A4

Throughbolt anchor



R-HTP II ZF

Throughbolt anchor

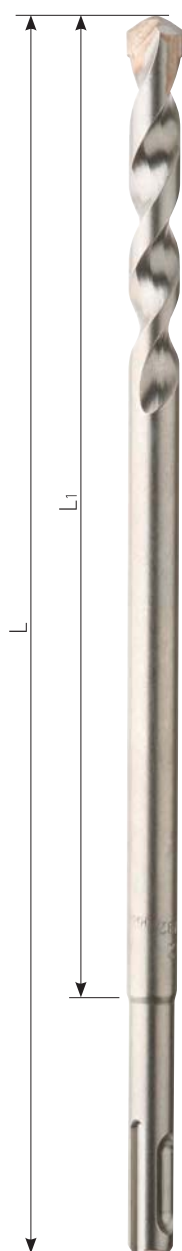


Bonded anchors with diameters up to Ø 16 thanks to the capability of drilling near edges.
Throughbolt anchors with diameters up to Ø 16 thanks to perfectly centered holes.

Technical Data

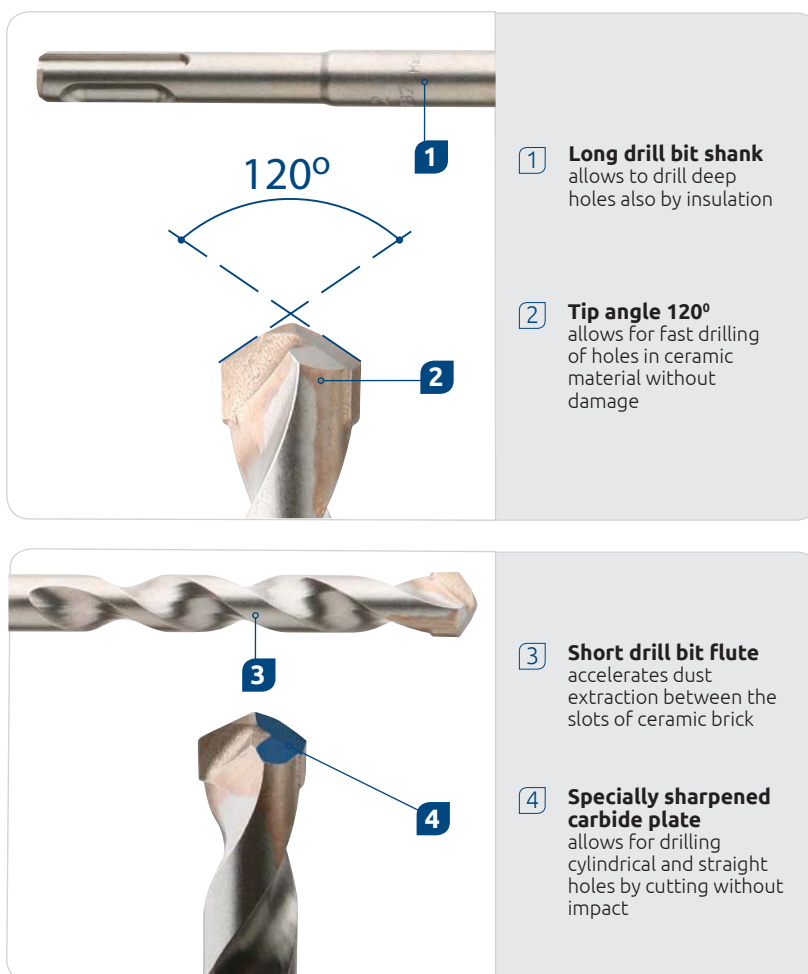
Product Code	Description			Logistic data		EAN
	Ø [mm]	L [mm]	L1 [mm]	Quantity [pcs]	Weight [kg]	
RT-SDSR-5/110	5	110	50	1	0,039	5906675115269
RT-SDSR-5/160	5	160	100	1	0,3	5906675046006
RT-SDSR-5/210	5	210	150	1	0,042	5906675115276
RT-SDSR-6/110	6	110	50	1	0,3	5906675047713
RT-SDSR-6/160	6	160	100	1	0,3	5906675046013
RT-SDSR-6/160B12	6	160	100	12	0,57	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	0,884	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	0,679	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	0,97	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	1	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	1	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

Drill bits for structural clay tiles BRICKDRILL SDS plus



structural
clay tile

Features and benefits



Recommended fixings

R-KEM II

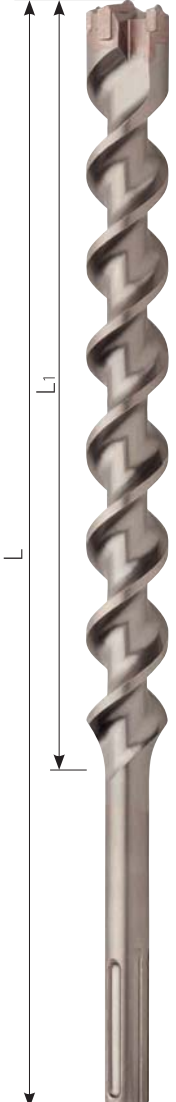
Bonded anchors



Technical Data

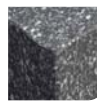
Product Code	Description			Logistic data		EAN
	Ø [mm]	L [mm]	L1 [mm]	Quantity [pcs]	Weight [kg]	
RT-SDSB-6/260	8	260	200	1	0,3	5906675046303
RT-SDSB-8/260	8	260	200	1	0,3	5906675046310
RT-SDSB-8/310	8	310	250	1	0,3	5906675047553
RT-SDSB-8/460	8	460	400	1	0,2	5906675048918
RT-SDSB-10/260	10	260	200	1	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

Drill bits for rebar concrete AGGRESSOR SDS max











reinforced concrete

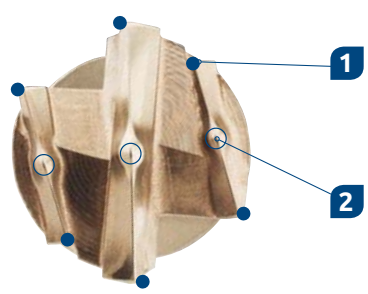
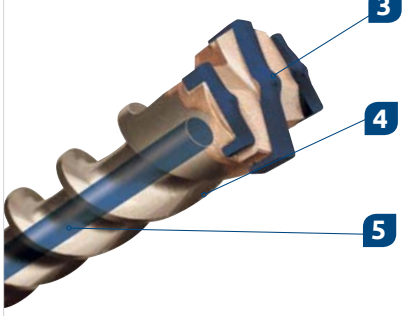
concrete

granite

stone

brick

Features and benefits

- 1 6 cutting edges**
increase the drilling efficiency and accelerates the execution of holes
- 2 3 self-aligning points**
allow drilling in reinforced concrete even when it hits the side of the rebar
- 3 3 deep seating carbide plates**
greatly increase the life of the drill
- 4 Optimized geometry of drill bit body**
allows to make axial and cylindrical holes ideal for fixing
- 5 Drill bit core subjected to special thermal treatment**
which increases resistance to twisting and the possibility of breaking



Recommended fixings

R-CAS

Vinylester capsule



R-HTP II ZF

Throughbolt anchor



Vinylester capsule and throughbolt anchors with a diameter above Ø 16 anchored in concrete (thanks to ideally centered holes).

Technical Data

Product Code	Description			Logistic data		EAN
	Ø [mm]	L [mm]	L1 [mm]	Quantity [pcs]	Weight [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



Packaging System

Bonded Anchors and Mechanical Anchors

Packaging & labelling

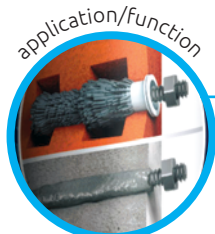
Packaging

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

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).

R-HAC-V-12 x10

Vinylester chemical anchor hammer in capsule • Hammerpatrone Vinylesterhartz • Capsule chimique a frapper - vinylester • Kotwa chemiczna ampulka wbijana winylester • Ампула с винилэстеровой смолой для забивания • Ampolla química de impacto vinylester • Ampule zatlučací vinylesterová • Ancoră prin bătăie-vinylester • Jkalama vinilesterine ampule • Смoла в склейный капсул • Hammarkapsel für betong • Zatlačacia ampulka vinylesterová • Kemická sidra ampula glasnó vinylester • Kemická vinilesterová ampula za montažu čekičem • Sidlávnasorotava vinylesterikapseli

TEMPERATURE	COMING TIME*
40°C	10 min
30°C	20 min
20°C	45 min
15°C	1.5 h
10°C	2 h
5°C	4 h
0°C	14 h
-5°C	24 h

*CURING TIME SHOULD BE DOUBLED FOR WET CONCRETE

BATCH NO AND EXPIRATION DATE: SEE AT THE BOTTOM

5 906675 379920

POLYESTER STYRENE FREE
VINYLESTER STYRENE FREE
PURE EPOXY
POLYESTER

R-HPTIIA4-10095/15 x50

- Throughbolt
- Bolzenanker
- Coujon d'ancrage
- Kotwa opaskowa
- Клиновой распорный анкер
- Анкер до бетону
- Kotva Throughbolt
- Kotva Throughbolt
- Inkarsa kiginis
- Alapcsavar
- Ancoră cu brătară
- Cermeiren anker
- Expander
- Áncage macho
- Tasselet passante
- Sidreni vijak
- Sidreni vijak
- Killa

d1 = 10.0 mm L1 = 95 mm

ETA CE

www.rawlplug.co.uk

Rawlplug Ltd.
Skelton Drive, Glasgow
G41 1JL, United Kingdom

Ø10mm	min 69mm
17	min 59mm
30mm	min 11mm
max 15mm	min 120mm

10x95 mm

088298

5 906675 046495

DELTA PROTECT
ZINC PLATED
HDG
STAINLESS STEEL
HCR

Bonded Anchors and Mechanical Anchors

Packaging & labelling

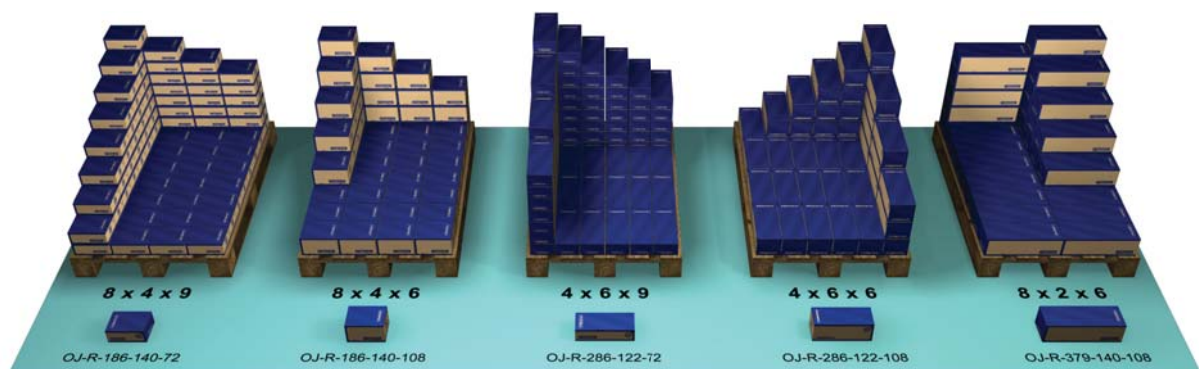
Environmentally friendly philosophy

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

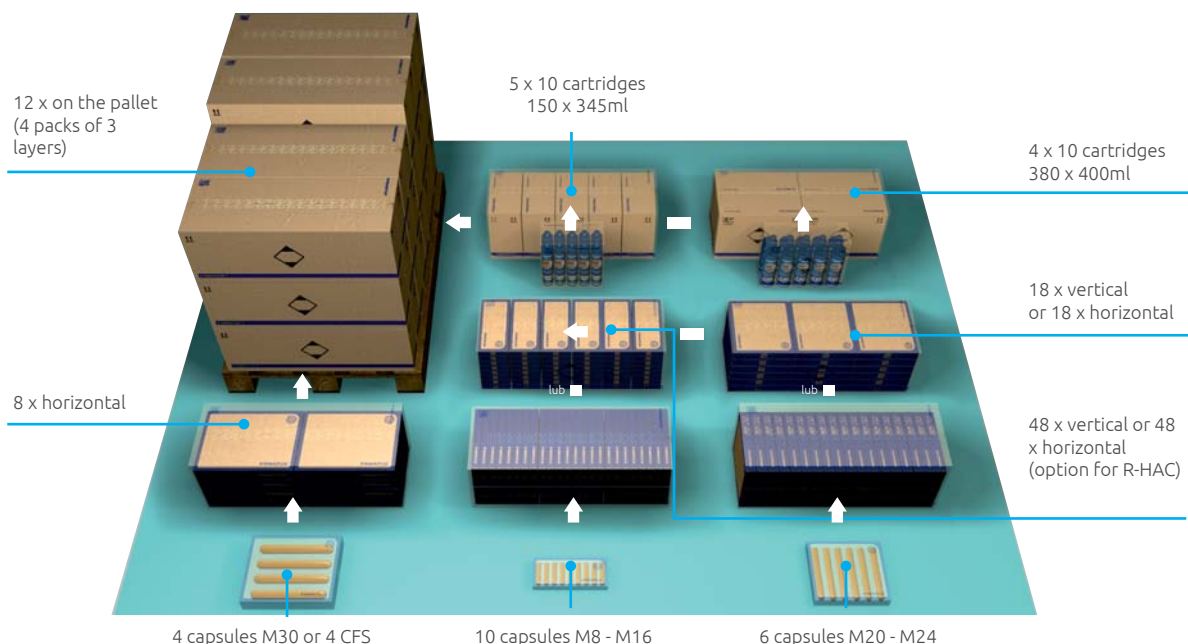
allowing re-use of raw materials. The eco-friendly qualities of our packaging are highlighted by the special logo used on packaging to express our philosophy.

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 **Facade 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 **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.

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.