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## NATIONAL TECHNICAL ASSESSMENT ITB-KOT-2019/1111 version 2

This National Technical Assessment was issued in accordance with the Regulation of the Minister of Infrastructure and Construction of 17 November 2016 on national technical assessments (Dz. U. /Journal of Laws/ of 2016, item 1968) by the Building Research Institute in Warsaw, at the request of:

**RAWLPLUG S.A.**  
**ul. Kwidzyńska 6, 51-416 Wrocław**

The National Technical Assessment ITB-KOT-2019/1111 version 1 is a positive assessment of the performance of the following construction products in relation to their intended use:

**R-KSC and R-KNC  
fasteners for dynamic driving in  
concrete and steel substrates**

Date of expiry of the National Technical Assessment:

**23 December 2025.**



DIRECTOR  
of the Building Research  
Institute

*dr inż. Robert Geryło*

Warsaw, 28 December 2020.

The National Technical Assessment document contains 12 pages, including 2 Appendices. The National Technical Assessment ITB-KOT-2019/1111 version 2 replaces the National Technical Assessment ITB-KOT-2019/1111 version 1. The text of this document can only be copied in its entirety. Publishing or distributing parts of the texts of the National Technical Assessment in any form requires written agreement with the Building Research Institute.

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## 1. TECHNICAL DESCRIPTION OF THE PRODUCT

This National Technical Assessment covers R-KSC- and R-KNC-type fasteners for dynamic driving in concrete and steel substrates manufactured by RAWLPLUG S.A., ul. Kwidzyńska 6, 51-416 Wrocław, in a production plant located in China.

This National Technical Assessment applies to the types of products specified by the manufacturer and resulting from the performance given in sec. 3 and combinations of elements..

R-KSC and R-KNC fasteners are smooth pins made of ordinary carbon steel having the tensile strength of  $R_m > 600$  MPa and hardness of 53 \* 58 HRC according to the PN-EN ISO6508-1:2016 and having a zinc coating of not less than 8  $\mu\text{m}$  according to the PN-EN ISO 4042:2004 standard.

R-KSC and R-KNC fasteners can be used with the following accessories: washer (fig. A3), belts (Fig. A4) and elements designed for attaching cables or electrical conduits (fig. A5).

The shape and dimensions of the fasteners are given in Appendix A. Tolerances of dimensions correspond to tolerance class  $m$  according to the PN-EN 22768-1:1999 standard.

## 2. INTENDED USE OF THE PRODUCT

R-KSC and R-KNC fasteners are designed for multi-point non-structural fixings with the use of dynamic driving in the:

- steel substrate, of thickness not less than 3 mm, of strength properties not less than grade S235JR steel according to the PN-EN 10025-1:2007 standard – applies to R-KSC fasteners,
- solid, cracked and non-cracked concrete, class C12/15 C50/60 according to PN-EN 206+A1:2016 standard - applies to R-KNC fasteners.

R-KSC and R-KNC fasteners can be used for attaching cable or electrical conduit suspension elements (Fig. A5) to the above mentioned substrates.

Due to the aggressive corrosive environment, R-KSC and R-KNC fasteners should be used in accordance with the requirements given in the PN-EN ISO 12944-2:2001, PN-EN ISO 9223:2012 and PN-EN ISO 2081:2018 standards.

For driving fasteners, a gas nailer manufactured by RAWLPLUG S.A., in which the piston movement is triggered by a gas fuel cell, should be used.

To determine design load bearing capacities of R-KSC and R-KNC fasteners, their characteristic load bearing capacities given in Table B1, Appendix B, should be divided by partial safety factors  $y_m$ , having the following values:

- for pulling out of the concrete substrate:  $y_m = 2.52$ ,
- for shearing (concrete substrate):  $y_m = 1.25$ ,
- for pulling out and shearing (steel substrate):  $y_m = 1.33$ ,
- for pulling through accessories, washer and straps:  $y_m = 2.00$ .

R-KSC and R-KNC steel fasteners are classified as non-combustible and meet the requirements of the A1 reaction to fire class according to the PN-EN 13501-1+A1:2010 standard and Decision 96/603/EC of the European Commission (as amended).

Installation and spacing parameters of R-KSC and R-KNC fasteners in the substrate are given in Table B1, Appendix B.

R-KSC and R-KNC fasteners should be used in accordance with the design prepared taking into account Polish standards and building regulations, the provisions of this National Technical Assessment, and in accordance with the manufacturer's manual related to conditions of fixings using the above-mentioned fasteners.

### **3. PERFORMANCE OF THE PRODUCT AND METHODS USED TO ASSESS THEM**

#### **3.1. Performance of the product**

**3.1.1. Characteristic load bearing capacities of fasteners.** Characteristic load bearing capacities of fasteners for pulling out of substrate, for shearing, and for pulling through of the washer, belts, and cable or electric conduit attachment elements are given in Appendix B.

**3.1.2. Durability of fasteners** The zinc coating of at least 8  $\mu\text{m}$  ensures the durability of the fasteners in the range resulting from sec. 2.

#### **3.2. Methods used to assess the performance**

**3.2.1. Characteristic load bearing capacities of fasteners.** The load bearing capacities of fasteners are tested in accordance with EAD 330083-01-0601. Checking of characteristic load-carrying capacities of the fasteners for pulling should be carried out using a device with a range selected for the expected value of ultimate force, allowing permanent and slow increase of force until destruction of the fastener.

**3.2.2. Durability of fasteners** Testing of zinc coating thickness is performed in accordance with PN-EN ISO 2178:2016 or PN-EN ISO 3497:2004.

### **4. PACKAGING, TRANSPORT, STORAGE, AND MARKING OF THE PRODUCT**

R-KSC and R-KNC fasteners should be delivered in manufacturer's packaging and stored and transported in such a way as to ensure that their technical properties remain unchanged.

Marking the products with the construction mark should be consistent with the Regulation of the Minister of Infrastructure and Construction of 17 November 2016 on the methods of declaring the performance of construction products and marking them with the construction mark (Dz. U. /Journal of Laws/ of 2016, item 1966, as amended).

The product's construction mark should be accompanied by the following information:

- the last two digits of the year in which the construction mark was placed on the construction product for the first time,
- the name and the address of the registered office of the manufacturer or an identification mark allowing the name and the address of the manufacturer to be clearly identified,
- the name and type designation of the construction product,
- number and year of issuance of the National Technical Assessment according to which the performance has been declared (ITB-KOT-2019/0111 version 2),
- the number of the national declaration of performance,
- the level or class of performance declared,
- the name of the certification body that has participated in the assessment and verification of constancy of performance of the construction product,
- the address of the manufacturer's website if the national declaration of performance is available on that website.

Apart from the national declaration of performance, the material safety data sheet should be provided or made available as appropriate. The above also applies to information on hazardous substances contained in the construction product referred to in Article 31 or 33 of Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency.

In addition, the marking of a construction product constituting a hazardous mixture according to REACH should comply with the requirements of Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

## **5. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE**

### **5.1. National system for assessment and verification of constancy of performance**

In accordance with the Regulation of the Minister of Infrastructure and Construction of 17 November 2016 on the methods of declaring the performance of construction products and marking them with the construction mark (Dz. U. /Journal of Laws/ of 2016, item 1966, as amended), the 2+ system of assessment and verification of constancy of performance is applied.

### **5.2. Type testing**

The performance assessed in sec. 3 constitutes the type examination of the product until there are changes to its raw materials, ingredients, production line or plant.

### **5.3. Factory production control**

A factory production control system should be implemented in the manufacturer's production plant. All elements of this system, requirements and provisions, adopted by the

manufacturer, should be documented in a systematic manner in the form of policies and procedures, including records of tests performed. Factory production control should be adapted to production technology and should ensure that the declared performance of the product during series production is maintained.

Factory production control includes the specification and verification of raw materials and ingredients, control and tests during the production process, and verification tests (acc. to sec. 5.4) carried out by the manufacturer in accordance with the specified test plan and with the rules and procedures specified in the factory production control documentation.

Production control results should be recorded systematically. The records should confirm that the products meet the criteria for assessment and verification of constancy of performance. Individual products or product batches and related production details should be possible to be identified and retrieved.

#### **5.4. Verification tests**

**5.4.1. Test plan.** The test program includes:

- a) routine testing,
- b) periodic testing.

**5.4.2. Routine testing.** Routine testing includes checking of:

- a) shape and dimensions,
- b) zinc coating thickness.

**5.4.3. Periodic testing.** Periodic testing includes the testing of characteristic load capacities of the fasteners for pulling out of substrate.

#### **5.5. Testing frequency**

Routine testing should be carried out according to the agreed test programme, but at least for each product batch. The size of the product batch should be specified in the factory production control documentation.

Periodic testing should be carried out at least once every 3 years.

### **6. INSTRUCTION**

**6.1.** The National Technical Assessment ITB-KOT-2019/1111 version 2 replaces the National Technical Assessment ITB-KOT-2019/1111 version 1.

**6.2.** The National Technical Assessment ITB-KOT-2019/1111 version 2 is a positive assessment of the performance of these essential characteristics of R-KSC and R-KNC fasteners for dynamic driving in concrete and steel substrates that, in accordance with their intended use resulting from the provisions of this Assessment, affect the fulfilment of basic requirements by the construction works in which the product is to be applied.

**6.3.** The National Technical Assessment ITB-KOT-2019/1111 version 2 does not constitute the authorisation to mark the construction product with the construction mark.

According to the Act on Construction Products of 16 April 2004 (Dz. U. (Journal of Laws) of 2012, item 215, as amended) products covered by this National Technical Assessment may be placed on the market and made available on the national market if the manufacturer has assessed and verified constancy of their performance, prepared a national declaration of performance in accordance with National Technical Assessment ITB-KOT-2019/1111 version 2 and marked the products with a construction mark according to applicable regulations.

**6.4.** The National Technical Assessment ITB-KOT-2019/1111 version 2 does not infringe the rights provided for in provisions on the protection of industrial property, in particular the Act of 30 June 2000 – Industrial Property Law (Dz. U. (Journal of Laws) of 2012, item 286, as amended). The provision of these rights is the responsibility of users of this National Technical Assessment issued by the Building Research Institute.

**6.5.** By issuing this National Technical Assessment, the Building Research Institute shall not become liable for any infringement of exclusive or acquired rights.

**6.6.** The National Technical Assessment does not release the manufacturer of the products from the liability for their proper quality and contractors from the liability for their proper application.

**6.7.** The validity of the National Technical Assessment may be extended further periods not exceeding 5 years.

## **7. LIST OF DOCUMENTS USED IN THE PROCEDURE**

### **7.1. Reports, test reports, assessments, classifications**

- 1) LZK00-02328/20/R135NZK. Test report. Building Structures and Geotechnics Department of the Building Research Institute, Katowice 2020
- 2) RB-05\_12\_20. Test report dated 02/12/2020. RAWLPLUG Laboratory, Wroclaw 2020.
- 3) LZK00-02328/19/R122NZK. Test report. Building Structures and Geotechnics Department of the Building Research Institute, Katowice 2019

### **7.2. Related standards and documents**

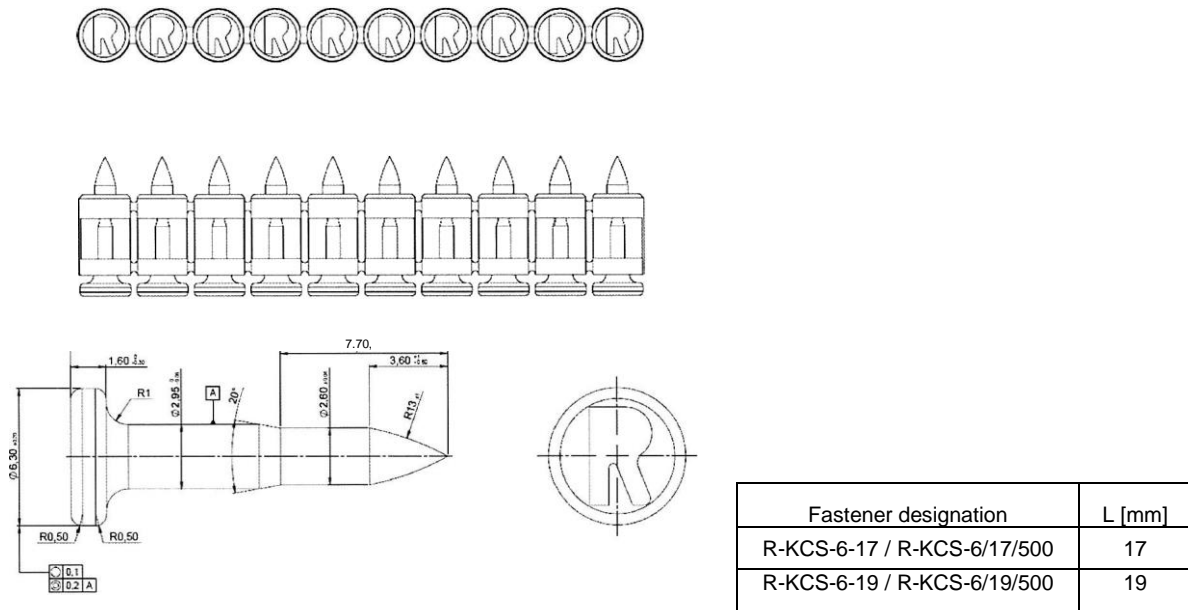
PN-EN 22768-1:1999	<i>General tolerances. Tolerances for linear and angular dimensions without individual tolerance indications</i>
PN-EN ISO 4042:2001	<i>Fasteners. Electroplated coatings</i>
PN-EN 206+A1:2016	<i>Concrete. Part 1: Specification, performance, production and conformity</i>
PN-EN 10025-1:2007	<i>Hot rolled products of structural steels. Part 1: General technical delivery conditions</i>
PN-EN ISO 12944-2:2001	<i>„Paints and Varnishes“. Corrosion protection of steel structures by protective paint systems. Part 2: Classification of environments</i>

PN-EN ISO 9223:2012	<i>Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and estimation</i>
PN-EN ISO 2081:2018	<i>Metallic and other inorganic coatings. Electroplated coatings of zinc with supplementary treatments on iron or steel</i>
PN-EN ISO 2178:2016	<i>Non-magnetic coatings on magnetic substrates. Measurement of coating thickness. Magnetic method</i>
PN-EN ISO 3497:2004	<i>Metallic coatings. Measurements of coating thickness. X-ray spectrometric methods</i>
PN-EN ISO 6508-1:2016 EAD 330083-00-0601	<i>Metallic materials. Rockwell hardness test. Part 1: Test method</i>
ITB-KOT-2019/1111	<i>Power-actuated fastener for multiple use in concrete for non-structural applications R-KSC and R-KNC fasteners for dynamic driving in concrete and steel substrates</i>
version 1	

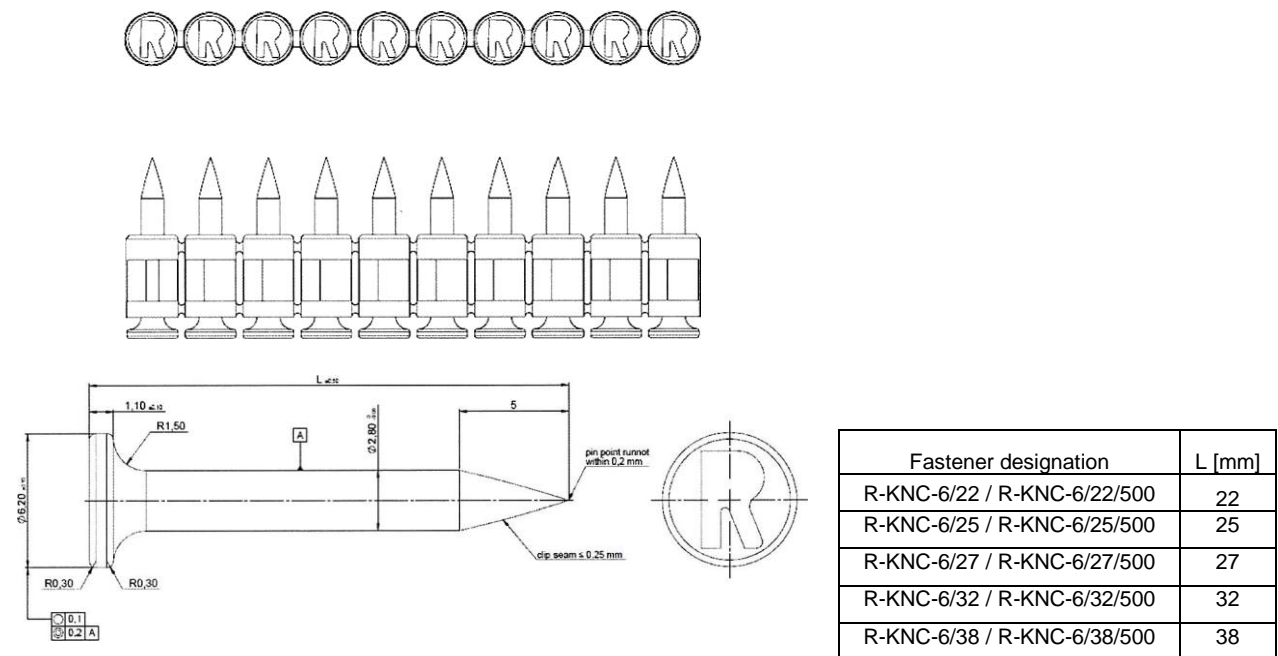
## APPENDICES

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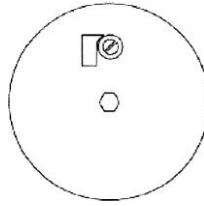




**Figure A1.** R-KSC fastener – shape, dimensions



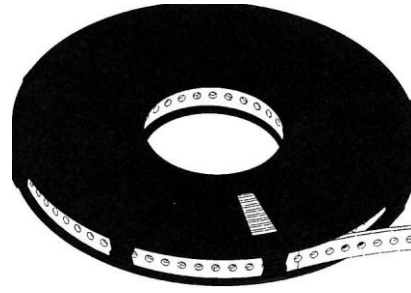
**Figure A2.** R-KNC fastener – shape, dimensions



**Figure A3.** Washer R-MW (mild steel, carbon steel, galvanised steel)



**R-MTC**  
(mild steel, carbon steel, galvanised)

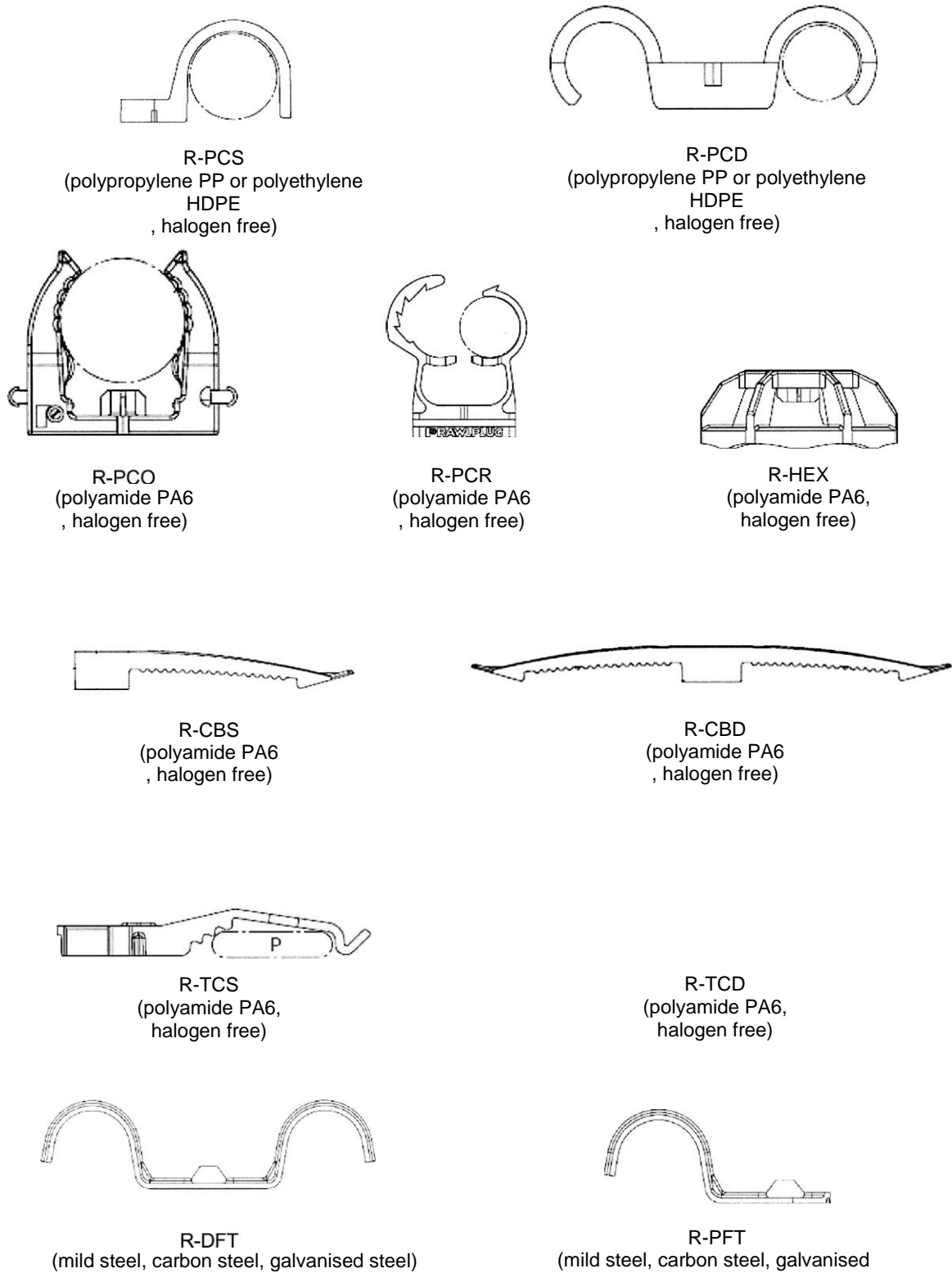


**R-MTP**  
(mild steel, carbon steel, galvanised)



**R-MTT**  
(polyester)

**Figure A4.** Belts



**Figure A5.** Accessories for cable or electric conduit suspension

**Table B1.** Installation and spacing parameters and pull-out strength  $N_{Rk}$  and shear strength  $V_{Rk}$  of R-KNC and R-KSC fasteners

Item	Fastener designation	Type of substrate	Type of fixture	min. $h_{ef}$ [mm] <sup>1)</sup>	$h_{min}$ [mm] <sup>2)</sup>	$S_{min}$ [mm] <sup>3)</sup>	$C_{min}$ [mm] <sup>4)</sup>	$N_{Rk}$ [kN]	$V_{Rk}$ [kN]	
1	2	3	4	5	6	7	8	9	10	
1	R-KNC	Concrete substrate – ordinary, cracked, and non-cracked concrete, class: C12/15*	Steel sheet gr. 0.50 + 1.00 mm, grade min. S280GD	17	80	200	150	0.35		
		C20/25 + C50/60*						0.45		
2	R-KSC	Steel substrate – steel of grade min. S235JR**	Steel sheet grade min S280GD, thickness, mm:	3	-	90	45	1.37	1	
								0.63	1.74	
								0.75	2.47	
								0.88	2.49	
								1.00	2.55	

<sup>1)</sup>  $h_{ef}$  - effective embedment depth of the fastener  
<sup>2)</sup>  $h_{min}$  - min. thickness of concrete substrate  
<sup>3)</sup>  $S_{min}$  - min. spacing of fasteners  
<sup>4)</sup>  $C_{min}$  - min. distance of the fastener from the edge of the substrate  
 \* according to EN 206+A1:2016 standard  
 \*\* according to PN-EN 10025-1:2007 standard

**Table B2.** characteristic load-carrying capacities of the R-KNC and R-KSC fasteners for pulling through accessories:

Item	Type of accessory / thickness at mounting point	Pulling strength [kN]	
		R-KNC	R-KSC
1	2	3	4
i 1	R-PCS / 3 mm	0.20	0.20
2	R-PCD / 4 mm	0.40	0.40
3	R-PCO / 3 mm	0.05	0.05
4	R-PCR / 7.5 mm	0.10	0.10
5	R-HEX / 2 mm	0.10	0.10
6	R-CBS / 7 mm	0.04	0.04
7	R-CBD / 7 mm	0.05	0.05
8	R-TCS/1.5 mm	0.01	0.01
9	R-TCD/1.5mm	0.01	0.01
10	R-DFT /1.5 mm	0.45	0.70
11	R-PFT /1.5 mm	0.30	0.30
12	R-MTC / 0.8 mm	0.45	0.80
13	R-MTP / 2.5 mm	0.45	1.30
14	R-MTT /1.15 mm	0.45	0.55
15	R-MW / 0.8 mm	0.45	1.30