

„ BOOK OF ATESTS FOR PROJECT OPAVA”



ZAWARTOŚĆ OPRACOWANIA

Świadectwa, Atesty, Deklaracje:

1. Pvc	str. 001-011
2. Aluminium / Aluminum	str. 012-021
3. Stal / Steel	str. 022-050
4. Liny / Ropes	str. 051-053
5. Kotwienie / Anchoring	str. 054-101



ATESTY ŚWIADECTWA DEKLARACJE

1. PVC

[logo] ITB

Instytut Techniki Budowlanej [Building Research Institute]

Research works | Development works | Accredited Group of Laboratories |

Notified Body N° 1488 | EOTA member | Certified management systems ISO 9001, ISO 27001

**REACTION TO FIRE CLASSIFICATION REPORT
IN ACCORDANCE WITH PN-EN 13501-1+A1:2010**

Contract no. 00739/19/Z00NZP

Sponsor:	Low & Bonar Poland Sp. z o.o. ul. Mikołajczyka 31 A 41-200 Sosnowiec
Prepared by:	Fire Research Department of the Building Research Institute ul. Filtrowa 1 00-611 Warsaw
Product name:	PVC-coated polyester material with the trade name VALMEX® FR 650-3
Classification report no.:	00739/19/Z00NZP
Issue number: 1	Copy no.1
Date of issue:	2019.03.13

This classification report consists of three pages and may only be used or reproduced in its entirety.

1. Introduction

This classification report defines the classification assigned to PVC-coated polyester material with the trade name VALMEX® FR 650-3 in accordance with the procedures given in PN-EN 13501-1+A1:2010.

2. Details of classified product

2.1. General provisions

The product is used as tent roofing, textile architecture and tarpaulins for special applications.

2.2. Product description

The product is described below.

Product description:

PVC-coated polyester material with the trade name VALMEX® FR 650-3.

Surface weight of the material: 650 g/m² ± 10%.

3. Test reports & test results in support of classification

3.1 Test reports

Name of laboratory	Name of sponsor	Test report no.	Test method
Fire Testing Laboratory of ITB	Low & Bonar Poland Sp. z o.o.	LZP02-00739/19/Z00NZP	PN-EN ISO 11925-2:2010
		LZP01-00739/19/Z00NZP	PN-EN 13823+A1:2014

3.2 Test results

Test method	Parameter	Number of tests	Results	
			Continuous parameter - mean (m)	Compliance with parameters
PN-EN ISO 11925-2:2010 Fire impingement to surface and edges Exposure time: 30 s	Flame propagation F _s ≤150 mm	6	(-)	Y
	Flaming droplets/particles		(-)	N
PN-EN 13823+A1:2014	FIGRA _{0,2MJ} [W/s]	3	0,0	(-)
	FIGRA _{0,4MJ} [W/s]		0,0	(-)
	LFS < edge		(-)	N
	THR _{500s} [MJ]		0.3	(-)
	SMOGR _A [m ² /s ²]		131.1	(-)
	TSP _{600s} [m ²]		81.3	(-)
	Flaming droplets/particles		(-)	N
(-): not applicable Y: Yes N: No				

4. Classification and field of application

4.1 Reference of classification

This classification has been carried out in accordance with PN-EN 13501-1+A1:2010.

4.2. Classification

PVC-coated polyester material with the trade name VALMEX® FR 650-3 described in detail in section 2.2. of this classification report, in relation to its reaction to fire behaviour is classified:

B

The additional classification in relation to smoke production is:

s2

The additional classification in relation to the presence of flaming droplets/particles is:

d0

CERTIFIED TRANSLATION FROM POLISH LANGUAGE

The format of classification in terms of reaction to fire for building products, with the exception of flooring and linear products for thermal insulation of ducts, is as follows:

Fire behaviour		Smoke production			Flaming droplets	
B	-	s	2	,	d	0

i.e.: **B-s2,d0**

Reaction to fire classification: B-s2,d0

This classification report is valid for end-use applications in accordance with the technical requirements to be met by buildings and their location, and as for "non-flammable, non-dripping and non-peeling products when exposed to fire" according to the Regulation of the Minister of Infrastructure of 12 April 2002 (Journal of Laws No. 75 of 15 June 2002, item 690, as amended) and as for a products that to not contribute to flame spread inside buildings.

4.3. Field of application

This classification is valid for:

- the product described in section 2.2,
- the product can be fixed to substrates and elements with reaction to fire classes A1 and A2 directly or at any distance from them

5 Restrictions

The classification given above remains valid as long as:

- test method remains unchanged,
- product standard or technical approval remains unchanged,
- constructional or material modifications do not exceed limits of the field of application defined in 4.3.

This classification report was issued in 3 copies (2 for the Client, 1 for Fire Research Department of ITB). Certified copies can be issued by Fire Research Department of ITB on the request of the report's owner only.

This classification document does not represent the type approval or certification of the product.

Signed by:
[signature]
Mariusz Żołnik

Approved by:
[signature]
[stamp]
acting Head of the Fire Research Department
Bartłomiej Papis, Eng, PhD

*I, the undersigned Sabina Siemaszko, sworn translator of English Language, hereby certify that the foregoing translation of the document from Polish language is the accurate translation of the copy of the document produced to me.
The translator is entered on the list of Sworn Translators maintained by the Minister of Justice; entry no. TP/3104/05
Translator's fee was collected for 4 pages á 1125 characters
Reg. no. 0049/2023, 27 January 2023*

CERTIFIED TRANSLATION FROM POLISH LANGUAGE

Z3A PZ ZLB no. 19, Filled in KI-II

Rev. VII/1 13 April 2018

[logo] ITB

Instytut Techniki Budowlanej [Building Research Institute]
GROUP OF TESTING LABORATORIES
accredited by the Polish Centre for Accreditation
certificate of accreditation no. AB 023

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FIRE RESEARCH DEPARTMENT
FIRE TESTING LABORATORY

TEST REPORT NO. LZP02-00739/19/Z00NZP

This classification report was issued in 3 copies (2 for the Client, 1 for ITB).

Client: Low & Bonar Poland Sp. z o. o.
Client address: ul. Mikołajczyka 31 A
41-200 Sosnowiec

Information regarding the tested object

Tested object: PVC-coated polyester material with the trade name VALMEX® FR 650-3

description, condition and identification **Product parameters declared by the Client:**
Surface weight: 650 g/m².

Parameters of the tested product determined in the laboratory:
Material thickness: 0.54 mm.
Material surface weight: 665 g/m².

Date of acceptance/collection of the tested object: Accepted for testing: 22.02.2019

Acceptance/collection certificate no.: Certificate of acceptance: LZP-00739/18/Z00NZP

Procedure for acceptance/collection of the object for testing: PZ ZLB 18 Handling of objects for testing

Information about testing

Testing start date: 12.03.2019
Testing completion date: 12.03.2019

TEST METHOD:
PN-EN ISO 11925-2:2010 Reaction to fire tests – Ignitability of products subjected to direct impingement of flame - part 2: single-flame source test.

DEPARTURES from PN-EN ISO 11925-2:2010
None

SEASONING:
Sample conditioning: from 22.02.2019 to 12.03.2019
Conditions of conditioning: temperature: 23 ± 2°C, relative humidity 50 ± 5%
Samples were seasoned to achieve a solid mass

SAMPLE PREPARATION (primer used and bonding method):
Samples in accordance with the requirements of PN-EN ISO 11925-2 were prepared in the laboratory from the samples supplied by the client.

TESTING CONDITIONS:

1. Fire Impingement: surface and edges
2. Handle used: standard
3. Exposure time: 30 s

FIRE TESTING LABORATORY

Pionki | ul. Przemysłowa 2, 26-670 Pionki | tel. + 48 48 31 21 600 | fax + 48 48 31 21 601
Instytut Techniki Budowlanej [Building Research Institute]: 00-611 Warsaw | ul. Filtrowa 1 | tel. 22 825 04 71 | fax 22 825 52 86 |
Head: tel.: 22 825 28 85 | 22 825 13 03 | fax 22 825 77 30 | Court Registration (KRS): 0000158785 | Business Statistical
number (Regon): 000063650 | TIN: 525 000 93 58 | www.itb.pl | instytut@itb.pl

CERTIFIED TRANSLATION FROM POLISH LANGUAGE

TESTING LABORATORY

TEST REPORT NO. LZP02-00739/19/Z00NZP

Page 2 of 2

CONDITIONS IN THE TESTING ROOM:						
<i>Air temperature: 22.0 °C, relative humidity: 37.2%</i>						
TEST RESULTS:						
Tested properties	<i>Impingement from the outer side - samples cut lengthwise</i>					
	<i>Fire impingement: surface</i>			<i>Flame impingement: edges</i>		
	1	2	3	1	2	3
<i>Inflammation, +/-</i>	+	+	+	+	+	+
<i>Time to reach 150mm limit, [s]</i>	-	-	-	-	-	-
<i>Ignition of filter paper, +/-</i>	-	-	-	-	-	-
UNCERTAINTY OF MEASUREMENT:						
<i>Qualitative studies involving observation of sample behavior are not subject to assessment of uncertainty.</i>						
OBSERVATIONS:						
-						
ENCLOSURES:						
-						
DETERMINATION OF COMPLIANCE/NON-COMPLIANCE WITH REQUIREMENTS:						
<i>The parties agreed that in assessing the conformity of the results with the criteria specified in PN-EN 13501-1+A1:2010, the simple acceptance rule is applied, i.e. the product is considered compliant with respect to the result, if the result meets the requirement without allowing for the variability due to measurement uncertainty. This is due to the risk of misjudgment due to the failure to account for uncertainty in the assessment. The risk also stems from the fact that the laboratory has no knowledge of the variability of the product population, but only of the sample being tested.</i>						
STATEMENT:						
<i>The test results relate to the behavior of the product test samples under the specific testing conditions; they cannot be the sole criterion for the assessment of the potential fire hazard of the product used.</i>						

Person in charge of testing

Mariusz Żolnik

Title, Name

[signature]

Signature

Acting Head of the Fire Testing Laboratory

Bartłomiej Papis, Eng, PhD

Title, Name

[signature]

Signature

Person authorizing the report

Bartłomiej Papis, Eng, PhD

Title, Name

[signature]

Signature

Warsaw, 13 March 2019

The Testing Laboratory declares that the test results relate only to the object tested. Without the written permission of the Testing Laboratory, the Report shall not be reproduced, except in its entirety.

The test report does not replace the documents required for the marketing and supply of construction products.

End of the report no. LZP02-00739/19/Z00NZP

I, the undersigned Sabina Siemaszko, sworn translator of English Language, hereby certify that the foregoing translation of the document from Polish language is the accurate translation of the copy of the document produced to me.

The translator is entered on the list of Sworn Translators maintained by the Minister of Justice; entry no. TP/3104/05

Translator's fee was collected for 4 pages á 1125 characters

Reg. no. 0048/2023, 27 January 2023

FIRE CLASSIFICATION
concerning the flammability of flexible products
02409.1/20/Z00NZP/Z
replaces fire classification 02409.1/20/Z00NZP

Customer: SAKO-EXPO TECHTEXTILPLAST
Henryk Sakowski Sp. J.
Aleksandria 6
95-035 Ozorków

Contract No.: 02409/20/Z00NZP

Object of classification: PVC foil reinforced with polyester mesh named SAKOTEX FR.
Grammage: 500 + 600 g/m² ± 10%.

Fire Class: The product whose samples have been tested is classified as **non-combustible**

Classification basis: UA GS VII. 16/2002, PN-EN ISO 6940 and PN-EN ISO 6941.
Testing of the degree of flammability of flexible products. Test report No. LZP01-02409/20/Z00NZP

Expiry date: 31.08.2023

Annexes:

Date: 01.10.2020

Compilation: Mariusz Żołnik

KIEROWNIK
Zakładu Badań Ogniwych
dr inż. Bartłomiej Papis



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AB 023

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DEPARTMENT OF FIRE RESEARCH FIRE
TESTING LABORATORY

TEST REPORT NO-LZP01-02409/20/Z00NZP

Customer: SAKO-EXPO TECHTEXTILPLAST
Henryk Sakowski Sp. J.
Customer address: Aleksandria 6
95-035 Ozorków

Information on the test object

Test object: PVC foil reinforced with polyester mesh named SAKOTEX FR.
name, description, status and identification
Product parameters declared by the Customer:
Grammage: 600 g/m².
Parameters of the tested product defined in the laboratory:
Thickness: 0.45 mm.
Surface mass: 570 g/m².

Date of collection/admission of the test object Date of admittance: 21.08.2020
Collected: not applicable
Protocol no. for collecting/admission of the test object: Protocol of admittance: LZP-02409/20/Z00NZP
Protocol of collection: not applicable
Procedure for collecting/admitting the test object: PZ ZLB 18 Handling of test objects

Information about testing

Date of initiation of tests: 31.08.2020
Date of completion of tests: 31.08.2020

METHOD OF RESEARCH

PN-EN ISO 6940:2005 Flat textile products. Behavior during combustion. Determination of flammability of vertically placed samples.

DEROGATIONS from PN-EN ISO 6940:2005

did not occur

SEASONING:

Sample conditioning: from 21.08.2020 to 31.08.2020
Seasoning conditions: Temperature: 23 ± 2°C, Relative humidity 50 ± 5%

FIRE TESTING LABORATORY

Pionki | ul. Przemysłowa 2, 26-670 Pionki | tel. + 48 48 31 21 600 | fax+ 48 48 31 21 601 member

Building Research Institute : 00-611 Warszawa | ul. Filtrowa 1 | tel. 22 825 04 71 | fax 22 825 52 86 | Director tel. 22 825 28 85 | 22 825 13 03 | fax 22 825 77 30 | KRS: 0000158785 | Regon: 000063650 | NIP: 525 000 93 5811www.itb.pl | instytut@itb.pl

PREPARATION OF SAMPLES:

Samples conforming to the standard PN — EN ISO 6940:2005 were prepared in the laboratory from the delivered fabric.

RESULTS OF THE TEST:

Test results according to PN—EN ISO 6940:2005

Sample No.	Flame duration [s]	Result (-/+)		Time [s]	Number of cases:	
					ignition	no ignition
1	4	-		4	0	1
2	7	-		7	0	1
3	11	-		11	0	1
4	14	-		14	0	1
5	18	-		18	0	1
6	20	-		20	0	5
7	20	-				
8	20	-				
9	20	-				
10	20	-				

+ means the ignition of the sample

- means the sample didn't ignite

„-“ opposite the t; cell means that the samples did not ignite during the test.

MEASUREMENT UNCERTAINTY:

Due to the nature of the test in accordance with EN ISO 6940, it is not possible, with the current level of knowledge, to provide uncertainty of measurement for the results presented.

OTHER INFORMATION CONCERNING THE TEST:

The results given in the report refer to the position of the burner in position "a" (surface). When the burner is placed in position "b" (edge) there is no ignition of samples either. No burning drops were observed. No burning drops were observed.

TEST ROOM CONDITIONS:

Air temperature: 21,6 °C, Relative humidity: 59,8 %

OBSERVATIONS:

-

ANNEXES:

-

STATEMENT OF COMPLIANCE AND NON-COMPLIANCE WITH THE REQUIREMENTS:

The parties have agreed that in assessing the conformity of the results with the criteria set out in UA GS VII 16/2002, the rule of simple acceptance shall be applied, i.e. a product is deemed to be compliant with respect to a result if that result, without taking into account variation due to measurement uncertainty, meets the requirement.

This is due to the risk of incorrect assessment resulting from not taking uncertainty into account in the assessment. The risk is also due to the fact that the laboratory has no knowledge of the variability of the product population, but only of the sample tested.

STATEMENT:

The test results refer to the behaviour of the samples for testing the product in the specific test conditions; they cannot be the only criterion for assessing the potential fire hazard of the used product.

Responsible for the testMariusz Żołądek

Title, Forename and Surname

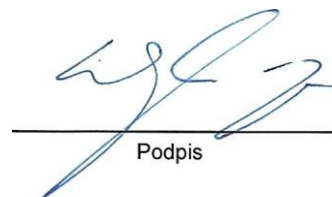
Signature

Authorising the reportdr inż. Katarzyna Kaczorek Chrobak

Signature

Warsaw, 31.08.2020

The Research Laboratory declares that the test results refer exclusively to the tested object. Without the written permission of the Testing Laboratory, the Report may not be reproduced except in its entirety. The test report shall not replace documents which are required in order to permit the placing on the market and making available of construction products.

Acting Head of the Fire Testing Laboratory
Podpis*End of report LZP01-02409/20/Z00NZP*

Data sheet

SAKOTEX FZ509FR

fabric		100% PES 1100 dtex	
construction		9x9 / cal ²	
finish		glossy	
thickness		0,40 mm	
weight	total	500 g/m ²	BS 3424 method 5A
	PES	80 g/m ²	
	PVC	420 g/m ²	
breaking strength	warp	670 N/5cm	DIN 53 354
	weft	630 N/5cm	
tearing strength	warp	240 N	DIN 53 363
	weft	120 N	
temperature resistance		-30 °C +70 °C	BS 3424 method 10
adhesion		45 N/5 cm	DIN 53 357
UV treatment		2 years	
flame retardant		pass	NFPA-701
		non-combustible	PN-EN ISO 6940 PN-EN ISO 6941
Technical data are indicative and given with a tolerance of +/- 10%			

partner na lata



ATESTY
ŚWIADECTWA
DEKLARACJE

2. ALUMINIUM /

ALUMINUM

Wałcz 2021-03-01

CERTYFIKAT INSPEKCYJNY 3.1. nr 266/2021

Nazwa i adres producenta	Albatros Aluminium Sp. z o.o. Zakład Produkcyjny Ul. Południowa 36 78-600 Wałcz
Nazwa i adres odbiorcy	PROTAN ELMARK Dębno ul. Czereśniowa 17 62-060 Stęszew Polska
Dokumenty powiązane	Zamówienie klienta: 128 Zlecenie sprzedaży: 33039 WZ: 029599
Nazwa wyrobu	Profile aluminiowe: H42541/2/6/D8090
Wyrób spełnia wymagania	PN-EN 573-3, PN-EN 755-2 oraz zawarte w zamówieniu
Badanie wytrzymałościowe przeprowadzone przez :	Albatros Aluminium Sp. z o.o. „Laboratorium Wytrzymałości”
Nr raportu z badań	Protokół nr 511/2021
Własności wytrzymałościowe	H42541(511/2021) Stan dostawy: 6082 T6 Dla: $e < 5$ $R_m = 292 \text{ MPa}$ $R_{0,2} = 222 \text{ MPa}$ $A_{50} = 14\%$ Twardość = 95 HBW
Skład chemiczny	Stop 6082 Wyprodukowany przez: Hydro Wytóp: 36072
Pieczęć producenta	Potwierdzenie informacji zawartych w certyfikacie: <div style="text-align: center;">   </div>

Walcz 2022-03-03

CERTYFIKAT INSPEKCYJNY 3.1. nr 295/2022

Nazwa i adres producenta	Albatros Aluminium Sp. z o.o. Zakład Produkcyjny Ul. Południowa 36 78-600 Walcz
Nazwa i adres odbiorcy	PROTAN ELMARK Dębno ul. Czeręśniowa 17 62-060 Stęszew Polska
Dokumenty powiązane	Zamówienie klienta: Nr.213 cz.2 Zlecenie sprzedaży: 216/02/2022 WZ: 98/03/2022
Nazwa wyrobu	Profile aluminiowe: 1/H42541/2/6/D3800
Wyrób spełnia wymagania	PN-EN 573-3, PN-EN 755-2 oraz zawarte w zamówieniu
Badanie wytrzymałościowe przeprowadzone przez :	Albatros Aluminium Sp. z o.o. „Laboratorium Wytrzymałości”
Nr raportu z badań	Protokół nr 447/2022
Własności wytrzymałościowe	H42541(447/2022) Stan dostawy: 6082 T6 Dla: $e < 5$ $R_m = 292 \text{ MPa}$ $R_{0,2} = 250 \text{ MPa}$ $A_{50} = 12\%$ Twardość = 95 HBW
Skład chemiczny	Stop 6082 Wyprodukowany przez: Hydro Wytóp: 38011
Pieczęć producenta	Potwierdzenie informacji zawartych w certyfikacie: ALBATROS ALUMINIUM Sp. Z O.O. KONTROLER JAKOŚCI <i>B. Graś</i> Bożena Graś

ALBATROS ALUMINIUM Sp. Z O.O.
61-102 Poznań, ul. Czartoria 1/27
NIP 778-145-38-22 REGON 300808661
/5/

ALBATROS ALUMINIUM Sp. Z O.O.
KONTROLER JAKOŚCI
B. Graś
Bożena Graś

Walcz 2022-04-01

CERTYFIKAT INSPEKCYJNY 3.1. nr 467/2022

Nazwa i adres producenta	Albatros Aluminium Sp. z o.o. Zakład Produkcyjny Ul. Południowa 36 78-600 Walcz
Nazwa i adres odbiorcy	PROTAN ELMARK Dębno ul. Czeresniowa 17 62-060 Stęszew Polska
Dokumenty powiązane	Zamówienie klienta: Nr.390 Zlecenie sprzedaży: 62/03/2022 WZ: ZWM-1240/03/2022
Nazwa wyrobu	Profile aluminiowe: 1/H42541/2/6/D10250
Wyrób spełnia wymagania	PN-EN 573-3, PN-EN 755-2 oraz zawarte w zamówieniu
Badanie wytrzymałościowe przeprowadzone przez :	Albatros Aluminium Sp. z o.o. „Laboratorium Wytrzymałości”
Nr raportu z badań	Protokół nr 650/2022
Własności wytrzymałościowe	H42541(650/2022) Stan dostawy: 6082 T6 Dla: $e \leq 5$ $R_m = 290 \text{ MPa}$ $R_{0,2} = 247 \text{ MPa}$ $A_{50} = 11 \%$ Twardość = 95 HBW
Skład chemiczny	Stop 6082 Wyprodukowany przez: Hydro Wytóp: 92523
Pieczęć producenta	Potwierdzenie informacji zawartych w certyfikacie: <div style="text-align: center;"> ALBATROS ALUMINIUM Sp. z o.o. 61-102 Poznań, ul. Czaratoria 1/27 NIP 778-145-38-22 REGON 300808661 /5/ </div> <div style="text-align: center;"> ALBATROS ALUMINIUM Sp. z o.o. KONTROLER JAKOŚCI  Bożena Graś </div>




Albatros Aluminium


Wałcz 2023-05-12

CERTYFIKAT INSPEKCYJNY 3.1. nr 722/2023


Nazwa i adres producenta	Albatros Aluminium Sp. z o.o. Zakład Produkcyjny Ul. Południowa 36 78-600 Wałcz
Nazwa i adres odbiorcy	PROTAN ELMARK Dębno ul. Czereśniowa 17 62-060 Stęszew Polska
Dokumenty powiązane	Zamówienie klienta: 23-ZMW/0689 Zlecenie sprzedaży: 431/03/2023 WZ: ZWM-272/05/2023
Nazwa wyrobu	Profile aluminiowe: 1/H43218/2/6/D10800 1/H43218/2/6/D7800 1/H43218/2/6/D8090
Wyrób spełnia wymagania	PN-EN 573-3, PN-EN 755-2 oraz zawarte w zamówieniu
Badanie wytrzymałościowe przeprowadzone przez :	Albatros Aluminium Sp. z o.o. „Laboratorium Wytrzymałości”
Nr raportu z badań	Protokół nr 907/2023
Własności wytrzymałościowe	H43218(907/2023) Stan dostawy: 6082 T6 Dla: $e < 5$ $R_m = 294 \text{ MPa}$ $R_{0,2} = 261 \text{ MPa}$ $A_{50} = 8\%$ Twardość = 94 HBW
Skład chemiczny	Stop 6082 Wyprodukowany przez: Hydro Wytóp: 41196
Pieczęć producenta	Potwierdzenie informacji zawartych w certyfikacie: ALBATROS ALUMINIUM Sp. z o.o. 61-102 Poznań, ul. Czartoria 1/27 NIP 778-145-38-22 REGON 300808661 /5/ ALBATROS ALUMINIUM Sp. z o.o. KONTROLER JAKOŚCI <i>Bożena Graś</i> Bożena Graś

aliplast aluminium extrusion		Świadectwo odbioru 3.1 PN-EN 10204					 0045 0045-CPR-1950 Rok wstępnej kontroli: 2014		
Zamawiający		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Adres wysyłkowy		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Numer zamówienia klienta		Zlecenie sprzedaży		Zlecenie produkcyjne			Nr WZ		
23-ZMW/0327		254449		3230039			143034		
Numer produktu opis długość		Gatunek stopu		Wytop		Masa [kg]	Sztuk	Stan dostawy	
P.01741 Profil alu 169x97x3 L: 6420 mm		6005A		152381			24 (L6,42)	T6	
1. SKŁAD CHEMICZNY (%)		EN 573 - 3		Skład chemiczny – Certyfikat dostawcy.			Produkt jest wolny od substancji radioaktywnych i kadmu.		
Gatunek stopu	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
EN AW-6005A	0,5 – 0,9	Max 0,35	Max 0,30	Max 0,50	0,4 – 0,7	Max 0,30	Max 0,20	Max 0,10	rest
Wytop									
152381	0,60	0,20	0,12	0,14	0,55	0,02	0,01	0,020	rest
2. WŁAŚCIWOŚCI MECHANICZNE		EN 755-2			Próba rozciągania PN-EN ISO 6892-1		Maszyna: LabTest 6.100SP1		
	Nr próby	Stan dostawy	R _{p 0,2} [MPa] min.	R _m [MPa] min.	A (%) min.	A _{50mm} (%) min.	Twardość HBW		
		T6	225	270	8	6	85		
	1	T6	265	283	9,2	N/A	N/A		
3. TOLERANCJA WYMIAROWA		EN 755-9							
Materiał zwolniono na podstawie powyższych informacji									

Kontrola jakości	Aliplast Extrusion sp. z o.o.	Nr Certyfikatu	Data
Krzysztof Graboś  Specjalista ds. jakości Aliplast Extrusion sp. z o.o.	Aliplast Extrusion Sp. z o.o. 20-276 Lublin, ul. Wacława Moritza 3 tel. + 48 81 710 61 43, fax + 48 81 745 50 31 NIP 946-26-28-335 REGON 060781315 e-mail: extrusion@aliplast.pl	SO/2213/2023	09.05.2023

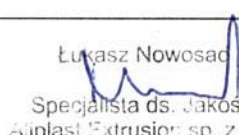
aliplast aluminium extrusion		Świadectwo odbioru 3.1 PN-EN 10204					 0045 0045-CPR-1950 Rok wstępnej kontroli: 2014		
Zamawiający		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Adres wysyłkowy		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Numer zamówienia klienta	Zlecenie sprzedaży	Zlecenie produkcyjne					Nr WZ		
23-ZMW/0327	254449	3230040					143034		
Numer produktu opis długość	Gatunek stopu	Wytop	Masa [kg]	Sztuk	Stan dostawy				
P.01741 Profil alu 169x97x3 L: 6560 mm	6005A	152381		24 (L6,56)	T6				
1. SKŁAD CHEMICZNY (%)		EN 573 - 3		Skład chemiczny – Certyfikat dostawcy.			Produkt jest wolny od substancji radioaktywnych i kadmu.		
Gatunek stopu	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
EN AW-6005A	0,5 – 0,9	Max 0,35	Max 0,30	Max 0,50	0,4 – 0,7	Max 0,30	Max 0,20	Max 0,10	rest
Wytop									
152381	0,60	0,20	0,12	0,14	0,55	0,02	0,01	0,020	rest
2. WŁAŚCIWOŚCI MECHANICZNE		EN 755-2			Próba rozciągania PN-EN ISO 6892-1		Maszyna: LabTest 6.100SP1		
	Nr próby	Stan dostawy	R _{p 0,2} [MPa] min.	R _m [MPa] min.	A (%) min.	A _{50mm} (%) min.	Twardość HBW		
		T6	225	270	8	6	85		
	1	T6	261	280	9,9	N/A	N/A		
3. TOLERANCJA WYMIAROWA		EN 755-9							
Materiał zwolniono na podstawie powyższych informacji									


Kontrola jakości	Aliplast Extrusion sp. z o.o.	Nr Certyfikatu	Data
Krzysztof Graboś <i>Graboś</i> Specjalista ds. jakości Aliplast Extrusion sp. z o.o.	Aliplast Extrusion Sp. z o.o. 20-276 Lublin, ul. Wacława Moritza 3 tel. + 48 81 710 61 43, fax + 48 81 745 50 31 NIP 946-26-28-335 REGON 060781315 e-mail: extrusion@aliplast.pl	SO/2214/2023	09.05.2023

aliplast aluminium extrusion		Świadectwo odbioru 3.1 PN-EN 10204					 0045 0045-CPR-1950 Rok wstępnej kontroli: 2014		
Zamawiający		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Adres wysyłkowy		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17, Dębno							
Numer zamówienia klienta		Zlecenie sprzedaży		Zlecenie produkcyjne			Nr WZ		
23-ZMW/0327		254449		3230041			143034		
Numer produktu opis długość		Gatunek stopu		Wytop		Masa [kg]	Sztuk	Stan dostawy	
P.01741 Profil alu 169x97x3 L: 6730 mm		6005A		152381			22 (L6,73)	T6	
1. SKŁAD CHEMICZNY (%)		EN 573 - 3		Skład chemiczny – Certyfikat dostawcy.			Produkt jest wolny od substancji radioaktywnych i kadmu.		
Gatunek stopu	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
EN AW-6005A	0,5 – 0,9	Max 0,35	Max 0,30	Max 0,50	0,4 – 0,7	Max 0,30	Max 0,20	Max 0,10	rest
Wytop									
152381	0,60	0,20	0,12	0,14	0,55	0,02	0,01	0,020	rest
2. WŁAŚCIWOŚCI MECHANICZNE		EN 755-2			Próba rozciągania PN-EN ISO 6892-1		Maszyna: LabTest 6.100SP1		
	Nr próby	Stan dostawy	R _{p 0,2} [MPa] min.	R _m [MPa] min.	A (%) min.	A _{50mm} (%) min.	Twardość HBW		
		T6	225	270	8	6	85		
	1	T6	241	271	10,3	N/A	N/A		
3. TOLERANCJA WYMIAROWA		EN 755-9							
Materiał zwolniono na podstawie powyższych informacji									

Kontrola jakości	Aliplast Extrusion sp. z o.o.	Nr Certyfikatu	Data
 Krzysztof Graboś Specjalista ds. jakości Aliplast Extrusion sp. z o.o.	Aliplast Extrusion Sp. z o.o. 20-276 Lublin, ul. Wacława Moritza 3 tel. + 48 81 710 61 43, fax + 48 81 745 50 31 NIP 946-26-28-335 REGON 060781315 e-mail: extrusion@aliplast.pl	SO/2215/2023	09.05.2023

aliplast aluminium extrusion		Świadectwo odbioru 3.1 PN-EN 10204						CE	
Zamawiający		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17 Dębno						0045	
Adres wysyłkowy		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17 Dębno						0045-CPR-1950 Rok wstępnej kontroli: 2014	
Numer zamówienia klienta		Zlecenie sprzedaży		Zlecenie produkcyjne				Nr WZ	
23-ZMW/0351		254555		3230411				143422	
Numer produktu opis długość		Gatunek stopu		Wytop		Masa [kg]		Sztuk	
PA.01179 Profil aluminiowy 105x105x3 L: 4870 mm		6005A		152409				110 (L4,87)	
1. SKŁAD CHEMICZNY (%)		EN 573 - 3		Skład chemiczny – Certyfikat dostawcy.				Produkt jest wolny od substancji radioaktywnych i kadmu.	
Gatunek stopu	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
EN AW-6005A	0,5 – 0,9	Max 0,35	Max 0,30	Max 0,50	0,4 – 0,7	Max 0,30	Max 0,20	Max 0,10	rest
Wytop									
152409	0,61	0,20	0,12	0,14	0,56	0,01	0,01	0,020	rest
2. WŁAŚCIWOŚCI MECHANICZNE		EN 755-2			Próba rozciągania PN-EN ISO 6892-1			Maszyna: LabTest 6.100SP1	
	Nr próby	Stan dostawy	R _{p 0,2} [MPa] min.	R _m [MPa] min.	A (%) min.	A _{50mm} (%) min.	Twardość HBW		
		T6	225	270	8	6	85		
	1	T6	268	285	N/A	6,7	N/A		
3. TOLERANCJA WYMIAROWA		EN 755-9							
Materiał zwolniono na podstawie powyższych informacji									

Kontrola jakości	Aliplast Extrusion sp. z o.o.	Nr Certyfikatu	Data
 Łukasz Nowosad Specjalista ds. Jakości Aliplast Extrusion sp. z o.o.	Aliplast Extrusion Sp. z o.o. 20-276 Lublin, ul. Wacława Moritza 3 tel. + 48 81 710 61 43, fax + 48 81 745 50 3 NIP 946-26-28-335 REGON 060781315 e-mail: extrusion@aliplast.pl	SO/1750/2023	11.04.2023

aliplast aluminium extrusion		Świadectwo odbioru 3.1 PN-EN 10204					 0045 0045-CPR-1950		
Zamawiający		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17 Dębno							
Adres wysyłkowy		Protan Elmark Spółka Z o.o. 62-060 Stęszew, Czereśniowa 17 Dębno							
Numer zamówienia klienta		Zlecenie sprzedaży		Zlecenie produkcyjne			Nr WZ		
668		248201		3208110			129193		
Numer produktu opis długość		Gatunek stopu		Wytop		Masa [kg]	Sztuk	Stan dostawy	
PA.01742 Profil aluminiowy 130x67.5x3 L: 4560 mm		6005A		150137			32 (L4,56)	T6	
1. SKŁAD CHEMICZNY (%)		EN 573 - 3		Skład chemiczny – Certyfikat dostawcy.			Produkt jest wolny od substancji radioaktywnych i kadmu.		
Gatunek stopu	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Al
EN AW-6005A	0,5 – 0,9	Max 0,35	Max 0,30	Max 0,50	0,4 – 0,7	Max 0,30	Max 0,20	Max 0,10	rest
Wytop									
150137	0,61	0,20	0,120	0,14	0,56	0,0100	0,010	0,01	rest
2. WŁAŚCIWOŚCI MECHANICZNE		EN 755-2			Próba rozciągania PN-EN ISO 6892-1		Maszyna: LabTest 6.100SP1		
	Nr próby	Stan dostawy	R _{p 0,2} [MPa] min.	R _m [MPa] min.	A (%) min.	A _{50mm} (%) min.	Twardość HW		
		T6	225	270	8	6	N/A		
	2	T6	261	279	8,6	N/A	N/A		
3. TOLERANCJA WYMIAROWA		EN 755-9							
Materiał zwolniono na podstawie powyższych informacji									

Kontrola jakości	Aliplast Extrusion sp. z o.o.	Nr Certyfikatu	Data
 Sebastian Włoczek Specjalista ds. jakości Protan Extrusion Sp. z o.o.	Aliplast Extrusion Sp. z o.o. 20-276 Lublin, ul. Wacława Moritza 3 tel. + 48 81 710 61 43, fax + 48 81 745 50 31 NIP 946-26-28-335 REGON 060781315 e-mail: extrusion@aliplast.pl	SO/1772/2022	29.04.2022



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3. STAL /

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<div><div><div><div></div><div>MARCEGAGLIA</div><div>PLATES</div></div><div><div>Marcegaglia</div><div>46040 via Bresciani 16-Garzoldo degli Ippoliti Mantova-Italy</div><div>Tel. +39 - 0376 685 1 Fax. +39 - 0376 685 600</div><div>www.marcegaglia.com</div></div><div><div>Stab. di S.Giorgio di Nogaro:</div><div>Via Enrico Fermi 33, 33058 S.Giorgio di Nogaro-Udine</div><div>tel.+39(0431)624111 fax (043)624222</div></div></div></div>										THIS DOCUMENT WAS PRODUCED AUTOMATICALLY AND IS VALID WITHOUT SIGNATURE										Number		16022461433		Issued On		15/07/2022																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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2										22E8007341										130005										1766										1										The Declaration of Performance (DOP) can be downloaded from the following web page: www.quality.marcegaglia.com/marcegaglia-plates-dop																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Material Free of radioactive contamination

Dimensional check and visual examination of the surface condition: without objection

- We Declare that the above mentioned plates are in compliance with the order prescription

- We hereby declare that the above mentioned material have been rolled in Italy, thus of European Community origin

A06.1 Zamawiający: Obróbka Metali "Gromet" Ryszard Mądry Purchaser: Ul.Oś. Wojska Polskiego 76 nr.76 Besteller: 62-065 Grodzisk Wielkopolski		A06.3 Odbiorca dok. kontroli: Obróbka Metali "Gromet" Ryszard Mądry Recipient of the certificate: M:Porazyn nr.68a Empfanger eines Zertifikates: 64-330 Opalenica		
A07 Nr. zam. odbiorcy / Recipient order no / Empfänger Bestellung-Nr. 1/2023	A08 Nr potwierdzenia zam. Odbiorcy/ Order confirmation no/ Auftrag Nr.	A10.1 Dowód dostawy / Delivery note/ Lieferschein Nr. 06TP/WZ2301/01146-03	A10.2 Data / Date / Datum 2023-01-25	A11 Śr. transportu/ Mode of transportation/ Transportmittel Nr.

B04. Norma, rodzaj materiału / Standard, type of material, Norm, Art. Des. Materiale, Lieferzustand				Norma przedmiotowa / According to / Nach				Norma klasyfikacyjna / Classification standards / Materialnorm				Norma wymiarowa / Tolerance standards / Massnorm			
EN 10219-1:2006				EN 10219-1:2006				EN 10219-2:2019							
B01 kształtownik zamknięty kwadratowy wykonany na zimno Coldformed square closed profile Kaltgeformtes quadratisches geschlossenes Profil				Niepowtarzalny kod identyfikacyjny wyrobu Unique identification code of product-type S235JRH/1.0039-0036-CPR-M-111-2017.001				B06 Wyrób oznaczono Product was marked Erzeugnis w. bezeichnet				Znak wytwórcy, gatunek, Nr wytopu Producer sign, Type of material, Heat no. Zeichen des Herstellerwerkes, Werkstoff, Shmelz-Nr			
Poz. Indeks Paczki Pos. Pack No. Pos. Paket Nr.		Wymiary wyrobu [mm] Product dimensions [mm] Produktabmessungen [mm]		Oznaczenie stali Steel designation Stahlbezeichnung		Nr wytopu Heat No. Shmelz-Nr.		Id odcinka próbnego Sample Id Identifizierung des Probenabschnittes		Masa rzeczywista Actual mass Ist-Masse		Sztuk Pieces Stückzahl			
A10.3 A10.4		B09 - B11		B02		B07		C00		B13		B08			
1 9200920511995		60x 60x 3,00		L= 12000		S235JRH/1.0039		D778030		0000000023778		2890 49			
2 9200910511990		60x 60x 3,00		L= 12000		S235JRH/1.0039		D778100		0000000023778		2890 49			

Poz. Nr wytopu	C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C93
Pos. Heat No.	C	Mn	Si	P	S	Cr	Ni	Cu	Al	N2	Mo	Nb	V	Ti	CEV
Pos. Schmelze Nr.															
1 D778030	0,110	0,530	0,006	0,009	0,012	0,020	0,012	0,010	0,043	0,004	0,006	0,000	-	0,000	0,205
2 D778100	0,120	0,520	0,009	0,015	0,010	0,030	0,012	0,010	0,044	0,005	0,001	0,000	-	0,000	0,214

Próba rozciągania - tensile test - Zugversuch							Próba udernościowa / Impact test / Kerbschlagversuch						
Poz. Nr wytopu		Id odcinka próbnego	Kierunek	Granica plastyczności	Wytrzm. na roz.	A	A%	Rodzaj próbki					
Pos. Heat No.		Sample Id	Direction	Yield or proof strength	Tensile strength			Type of sample					
Pos. Schmelze Nr.		Identifizierung des Probenabschnittes	Probenrichtung	Streck-o. Denhgrenze	Zugfestigkeit			Probenform	1	2	3	Σ/3	C
								C40	C42	C42	C42	C42	C03
	B07	C00	C02	C11 ReH [MPa]	C12 Rm[MPa]			C13.1	C13.2				
1	229315	0000000023778	L	413	462	5,65	34,10		-	-	-	-	-

Z01 Potwierdza się, że dostawa została sprawdzona i spełnia warunki zamówienia.
It is confirmed that the delivery has been checked and meets the conditions of the order.
Est wir bestätigt, dass die Lieferung geprüft wurde und die Bedingungen der Bestellung erfüllt.

Z05 Certyfikat/Certificate/Zertifikat 0036-CPR-M-111-2017.001 dated 2017-10-06

Wyrób zgodny z Rozporządzeniem nr 305/2011 Parlamentu Europejskiego i Rady (UE)


The product conforms to Regulation (EU) No 305/2011 of the European Parliament and of the Council.
Das Produkt entspricht Verordnung (EU) Nr.305/2011 des Europäischen Parlaments und des Rates

A5 Wystawiający / Issued by / Austeller
Kierownik Kontroli Jakości

Jerzy Piś

Piotr Jędrzejewski
2023-01-25

Z02/Z03

Z04  0036
17
036-CPR-M 111-2017.001

A06.1 Zamawiający: Obróbka Metali "Gromet" Ryszard Mądry Purchaser: Ul.Os. Wojska Polskiego 76 nr.76 Besteller: 62-065 Grodzisk Wielkopolski			A06.3 Odbiorca dok. kontroli: Obróbka Metali "Gromet" Ryszard Mądry Recipient of the certificate: M:Porążyn nr.68a Empfänger eines Zertifikates: 64-330 Opalenica		
A07 Nr zam. odbiorcy / Recipient order no / Empfänger Bestellung-Nr.	A08 Nr potwierdzenia zam. Odbiorcy/ Order confirmation no/ Auftrag Nr.	A10.1 Dowód dostawy / Delivery note/ Lieferschein Nr.	A10.2 Data / Date / Datum	A11 Śr. transportu/ Mode of transportation/ Transportmittel Nr.	
		06TP/WZ2301/01146-01	2023-01-25		

B04. Norma, rodzaj materiału / Standard, type of material, Nirm, Art. Des Materiale, Lieferzustand			Norma klasyfikacyjna / Classification standards / Materialnorm		
Norma przedmiotowa / According to / Nach			Norma wymiarowa / Tolerance standards / Massnorm		
EN 10219-1:2006			EN 10219-2:2019		

B01 kształtownik zamknięty prostokątny wykonany na zimno Coldformed rectangular closed profile Kaltgefertigtes rechteckiges geschlossenes Profil		Niepowtarzalny kod identyfikacyjny wyrobu Unique identification code of product-type S235JRH/1.0039-0036-CPR-M-111-2017.001		B06 Wyrób oznaczono Product was marked Erzeugniss w. bezeichnet		Znak wytwórcy, gatunek, Nr wytopu Producer sign, Type of material, Heat no. Zeichen des Herstellerwerkes, Werkstoff, Shmelz-Nr	
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Poz. Indeks Paczki Pos. Pack No. Pos. Paket Nr.	Wymiary wyrobu [mm] Product dimensions [mm] Produktabmessungen [mm]			Oznaczenie stali Steel designation Stahlbezeichnung	Nr wytopu Heat No. Shmelz-Nr.	Id odcinka próbnego Sample Id Identifizierung des Probenabschnittes	Masa rzeczywista Actual mass Ist-Masse	Sztuk Pieces Stückzahl
A10.3 A10.4	B09 - B11			B02	B07	C00	B13	B08
1	9200610512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1720	50
2	9200520512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1715	50
3	9200720512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1720	50
4	9200110512507	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777801	0000000023808	1720	50
5	9200120512507	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777801	0000000023808	1720	50
6	9200530512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1720	50
7	9200630512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1710	50
8	9200620512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1720	50
9	9200710512522	80x 40x 2,00	L= 10000	S235JRH/1.0039	D777825	0000000023808	1715	50

Poz. Nr wytopu Pos. Heat No. Pos. Schmelze Nr.	C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C93
	C	Mn	Si	P	S	Cr	Ni	Cu	Al	N2	Mo	Nb	V	Ti	CEV
1	D777801	0,120	0,540	0,010	0,009	0,009	0,020	0,012	0,010	0,042	0,005	0,004	0,000	0,000	0,216
2	D777825	0,120	0,540	0,009	0,010	0,008	0,020	0,012	0,010	0,035	0,005	0,001	0,000	0,001	0,216

Próba rozciągania - tensile test - Zugversuch							Próba uderzeniowa / Impact test / Kerbschlagversuch					
Poz. Nr wytopu Pos. Heat No. Pos. Schmelze Nr.	Id odcinka próbnego Sample Id Identifizierung des Probenabschnittes	Kierunek Direction Probenrichtung	Granica plastyczności Yield or proof strength Streck-o. Denhgrenze	Wytrzm. na roz. Tensile strength Zugfestigkeit	A	A%	Rodzaj próbki Type of sample Probenform	1	2	3	Σ/3	C
							C40	C42	C42	C42	C42	C03
B07	C00	C02	C11 ReH [MPa]	C12 Rm[MPa]		C13.1	C13.2					
1	D777953	L	374	460	80,00	23,10		-	-	-	-	-

Z01 Potwierdza się, że dostawa została sprawdzona i spełnia warunki zamówienia.
It is confirmed that the delivery has been checked and meets the conditions of the order.
Est wir bestätigt, dass die Lieferung geprüft wurde und die Bedingungen der Bestellung erfüllt.

Z05 Certyfikat/Certificate/Zertifikat 0036-CPR-M-111-2017.001 dated 2017-10-06

Wyrób zgodny z Rozporządzeniem nr 305/2011 Parlamentu Europejskiego i Rady (UE)

The product conforms to Regulation (EU) No 305/2011 of the European Parliament and of the Council.

Das Produkt entspricht Verordnung (EU) Nr.305/2011 des Europäischen Parlaments und des Rates

Z04



0036-CPR-M 111-2017.001

A5 Wystawiający / Issued by / Aussteller
Kierownik Kontroli Jakości



Piotr Jędrzejewski
2023-01-25

Z02/Z03



Registered seat and Administration offices/Siedziba i biuro administracji:
Ligota Dolna 46-200
Kluczbork-Polonia
www.marcegaglia.com

Type/Type	Inspection Certificate 3.1 EN 10204/Certifikat 3.1 EN 10204
Number/Number	80122044761
Issued On/Data	13/12/2022

Customer/Klient
Spett.le THYSSENKRUPP MATERIALS POLAND S.A.
U.L. GRUDZIADZKA 159
87100 TORUN PL

Consignee/Odbiorca
thyssenkrupp Materials
Nowe Marzy 25 A
886-134 Nowe Marzy PL

Consignee/Odbiorca
thyssenkrupp Materials Poland S.A.
Nowe Marzy 25 A
86-134 Nowe Marzy PL

Delivery N
Of/z dnia
Delivery n

Pages/Strony
1/5

[illegible]

58013598 TNR021 PL 120.00 X 80X4.00X12000 S355J2H EN10219-1 6000230114/570 ZW23001023 XIB Data 12/8/2022

	22KF031245	240 MTL		22KF031247	240 MTL		22KF031245	240 MTL		22KF031247	240 MTL
NI207	.089	1.070	.024	.001	.016	.041	.0035	.274	.435	.505	33.0
MP383	.151	.924	.016	.011	.011	.030	.0024	.313	.448	.518	30.5

Remarks/Uwazi:

Deklaracja Wlasciwosci Uzytkowych dostepna na / DoP available at:

<http://www.quality.marceqqlia.com/marceqqlia-klucz-bork-dop/>

Oświadczamy, że dostarczone wyroby są zgodne z wymaganiami zamówienia klienta. / We declare that the delivered products comply with the requirements of the customer's order.

→ Eddy current test of 100% length of tube according to EN ISO 10893-2 - OK

E 0474 EN10219-1 / -2

EN10219-1 / -2



Registered seat and Administration offices/Siedziba i biuro administracji:
 Ligota Dolna 46-200
 Kluczbork-Polonia
 www.marcegalia.com

Type/Type	Inspection Certificate 3.1 EN 10204/Certyfikat 3.1 EN 10204
Number/Number	80120204761
Issued On/Data	13/12/2022

Customer/Klient Spół. THYSSSENKRUPP MATERIALS POLAND S.A. U.L. GRUDZIADZKA 159 87100 TORUN PL				Consignee/Odbiorca thyssenkrupp Materials Poland S.A. Nowe Marzy 25 A 86-134 Nowe Marzy PL										Delivery No/Nr dostawy 0081118228 Of/z dnia 13/12/2022 Delivery note no/Numer 1001013773		Q. Control/K. Jakości Q.M. Daniel Sala Plant Of/Zakład w Kluczbork		Pages/Strony 2/5
Lot/Partia	Quantity/Ilość	Heat/Wytop	C (%)	Mn (%)	Si (%)	S (%)	P (%)	Al (%)	N (%)	CEV (%)	Re [N/mm²]	Rm [N/mm²]	A (%)	Kv1 [J]	Kv2 [J]	Kv3 [J]	Kv ^a [J]	
			0.22	1.6	0.55	0.03	0.03	0.03	0.009	0.45	355	470	18	13.5	13.5	13.5	13.5	

58014176 TNR021 PL 80.00 X 60X6.00X12000 S355J2H# EN10219-1 6000230114/110 ZW23001023 XIIB Data 12/8/2022

[illegible]

Remarks/Uwagi:

Deklaracja Wlasciwosci Uzytkowych dostepna na / DoP available at:

<http://www.quality.marceaglia.com/marceaglia-kluczbork-dop/>

Eddy current test of 100% length of tube according to EN ISO 10893-2 - OK

T impact test: -20°C

○ Impact values relating to the sample's dimension 10mm x 5mm

34 Oswiadczamy, ze dostarczone wyroby sa zgodne z wymaganiami zamowienia klienta. / We

declare that the delivered products comply with the requirements of the customer's order.



**Zakład Prod. LIGOTA DOLNA
ul. PRZEMYSŁOWA 1
46-200 KLUCZBORK -POLSKA**

EN10219-1 / -2



Registered seat and Administration offices/Siedziba i biuro administracji:
Ligota Dolna 46-200
Kluczbork-Polonia
www.marcegaglia.com

Type/Type	Inspection Certificate 3.1 EN 10204/Certifikat 3.1 EN 10204
Number/Number	80122044761
Issued On/Data	13/12/2022

Customer/Klient Spółka THYSSSENKRUPP MATERIALS POLAND S.A. U.L. GRUDZIADZKA 159 87100 TORUŃ PL										Consignee/Odbiorca thyssenkrupp Materials Poland S.A. Nowe Marzy 25 A 86-134 Nowe Marzy PL										Delivery No/Nr dostawy 0081118228 Oficjalna data 13/12/2022 Delivery note no/Numer 1001013773				Q. Control/K. Jakości Q.M. Daniel Sala Plant Of/Zakład w Kłuczbork		Pages/Strony 3/5	
Lot/Partia		Quantity/Ilość		Heat/Wytop		C (%)	Mn (%)	Si (%)	S (%)	P (%)	Al (%)	N (%)	CEV (%)	Re [N/mm ²]	Rm [N/mm ²]	A (%)	Kv1 [J]	Kv2 [J]	Kv3 [J]	Kv ^a [J]							
						0.22	1.6	0.55	0.03	0.03		0.009	0.45	355	470	18	13.5	13.5	13.5	13.5							

58013483 TNQ021 PL 80X80X8.0X12000 S355J2H EN10219-1 6000230114/370 ZW23001023 XIB Data 12/8/2022

[illegible]

Remarks/Uwagi:

Deklaracja Wlasciwosci Uzytkowych dostepna na / DoP available at:

<http://www.quality.marcegaglia.com/marcegaglia-kluczbork-dop/>

Eddy current test of 100% length of tube according to EN ISO 10893-2 - OK

T impact test: -20°C

○ Impact values relating to the sample's dimension 10mm x 5mm

35 Oswiadczamy, ze dostarczone wyroby sa zgodne z wymaganiami zamówienia klienta. / We

declare that the delivered products comply with the requirements of the customer's order.



Zakład Prod. LIGOTA DOLNA
ul. PRZEMYSŁOWA 1
46-200 KLUCZBORK -POLSKA

EN10219-1 / -2



Type/Type	Inspection Certificate 3.1 EN 10204/Certifikat 3.1 EN 10204
Number/Number	80122044761
Issued On/Data	13/12/2022

Delivery No/Nr dostawy	0081118228	Q. Control/K. Jakości	4/5
Ofiz dnia	13/12/2022	Q.M. Daniel Sala	
Delivery note no/Numér	1001013773	Plant Of/Zaklad w Kluczbork	

58013401 TNQ021_PL 30X30X3.00X12000 S355J2H EN10219-1 6000230114/360 ZW23001023 XIIB Data 12/8/2022

	.137	1.251	.011	.007	.012	.039	.0040	.353	.551	.620	20.5
	N55802	22KD022382	1188 MTL								

0474 **EN10219-1 / -2**
Zakład Prod. LIGOTA DOLNA
ul. PRZEMYSŁOWA 1
46-200 KLUCZBORK - POLSKA



Type/Type	Inspection Certificate 3.1 EN 10204/Certifikat 3.1 EN 10204
Number/Number	80122044761
Issued On/Data	13/12/2022

Consignee/Odbiorca
thyssenkrupp Materials Poland S.A.
Nowe Marzy 25 A
86-134 Nowe Marzy PL

Delivery No/Nr dostawy	008118228	Q. Control/K. Jakości	Pages/Strony 5/5
Of/z dnia	13/12/2022	Q.M. Daniel Sala	
Delivery note no/Number	1001013773	Plant Of/Zakład w Kłuczbork	

A (%) 22

B

22.9
22.9
22.9
28.5
28.5
28.5
28.5

Remarks/Uwagi:

Rad Prod. LIGOTA DOLNA
ul. PRZEMYSŁOWA 1
00 KLUCZBORK -POLSKA

EN10219-1 / -2

Società a socio unico, soggetta a dir. e coord. di Padana Holding srl
Via Portamurata, 8/A
42016 GUASTALLA (RE) – ITALIA
Tel. + + 39 522 83.65.55 (r.a.)
Fax + + 39 522 83.65.72 – 83.65.73
Cod. Fis. e P. IVA IT00323370353
UNI EN ISO 9001

AZIENDA CON SISTEMA DI GESTIONE
QUALITÀ: CERTIFICATO SECONDO

TIPO DOCUMENTO – TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1

Inspection Certificate 3.1

Nr. : 22098292

Pag. 1 / 1

Data – Date

22/12/2022

THYSSENKRUPP MATERIALS POLAND S.A. UL. GRUZIADZKA 159 87-100 TORUN Poland	Consegna: Delivery: THYSSENKRUPP POLAND POZNAN UL. LUTYCKA 1 60-580 POZNAN Poland	(23127)	(19893)	D.D.T. – DELIVERY NOTE
				22068316 – 22/12/2022

Riferimenti Normativi Tubi – Hollow Sections Standard: EN 10219-1



Profili cavi formati a freddo e saldati longitudinalmente (ERW) Cold formed and longitudinal welded hollow sections (ERW)										Proprietà Meccaniche e Tecniche Mechanical and Technical Properties	
Dim.	Sp.	L	Acciaio	Fin.	Loito	MT	Peso	Colata		Trazione / Tensile Test	
(mm)	Th.	(mm)	Steel				Tot. WGT	Heat		ReH	Rm
(mm)	(mm)	(mm)				(m)	(kg)			MPa	MPa
										Durezza	
										Charpy Impact Test (KV)	
										Resilienza	
										Hardness	
										HRB HB30	
										1 (J) 2 (J) 3 (J) X (J) T (° C)	
										%	

ORDINE CLIENTE – CUSTOMER ORDER ZZ23000618										ORDINE PADANA TUBI – P.T. ORDER S2 – 22055794	
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D 193.7	5.00	12000	S355J2H							0,160	0,010	1,260	0,020	0,006	0,010	0,030	0,010	0,010	0,005	0,377	447	565	25,0
D 193.7	8,00	12000	S355J2H							0,180	0,010	1,260	0,015	0,006	0,010	0,040	0,030	0,020	0,020	0,399	443	515	28,8

ORDINE CLIENTE – CUSTOMER ORDER ZZ23000859										ORDINE PADANA TUBI – P.T. ORDER S2 – 22057634	
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150X150	8,00	12000	S355J2H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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 0948 08 Padana Tubi S.p.A., Via Portamurata 8/A, I-42016 Guastalla (RE)		0948-CPR-0063 Rev.2 or 0948-CPR-0064 Rev.2		EN 10219-1:2006 Profili cavi di acciaio per strutture metalliche o composti metallici e strutture di calcestruzzo Steel hollow sections for metal structures or composite metal and concrete structures Designazione del prodotto: vedi sopra Product designation: see above Sostanza pericolosa / Dangerous substance: NPD Durabilità / Durability: NPD		DoP n. S235 DoP n. S275 DoP n. S355 DoP è disponibile su / DoP is available on http://www.padanatubi.it/Qualita		P.N.D.: correnti indotte sulla saldatura: esito positivo NDT: Eddy Current test on the weld: esito positivo OK		Controllo visivo e dimensionale: esito positivo Visual and dimensional control: OK		Certifichiamo che il prodotto fornito è conforme ai requisiti dell'ordine We certify that material supplied complies with the requirements agreed on order		Padana Tubi & Profilati Acciaio S.p.A. Controllo Qualità / Quality Department Rep. Qualità / Quality Manager  Dott. Michele Massa	
--	--	--	--	--	--	--	--	--	--	---	--	---	--	--	--

A01


Stalprodukt S.A.

ul. Wygoda 69, 32-700 Bochnia, tel. 48 / 14 615 10 00

A02

ŚWIADECTWO ODBIORU 3.1
INSPECTION CERTIFICATE 3.1
ABNAHMEPRÜFZEUGNIS 3.1
EN 10204

A03

Nr: 2304925

Dn. 2023-02-23

A06

 Zamawiający:
 Customer:
 Bestseller:

LEBAL S.A.
ul. Michałowo 27
61-314 Poznań

A10

 Nr wagonu - Wagoon no:
 Wagon no:
WGM95025

A08	A07	B01	B02	B03	B08	B13
Nr zamówienia Manufacturer's works order number Werksauftragsnummer	Nr zamówienia klienta Purchase order number Kundenbestellnummer	Wyrób, Product, Erzeugnis	Gatunek, Steel Grade, Marke			
B07.2 Numer KP Lot No - Los no	B07.1 Wytóp Heat - Abstrich	Norma przedmiotowa According Nach	Norma klasyfikacyjna Classification standards Materialnorm	Norma wymiarowa Dimensional standards Massnorm	B08 Sztuki wiązek No of bundles Bundanzahl	B13 Masa rzecz. Actual mass Ist-Masse
P118733	ZAKD/23/02/0067	ZAMKN. KWADR. 160X160X4.0 KSZT. Z/GIĘTY Z BEDN. G/WALC. ,GAT. S355J2H. KL. I				
1724 / 8	234177	EN 10219-1	EN 10025-2	EN 10219-2	2	4,04
P118807	ZAKD/23/02/0108	ZAMKN. PROST. 200X120X4.0 KSZT. Z/GIĘTY Z BEDN. G/WALC. ,GAT. S355J2H. KL. I				
1783 / 8	227751	EN 10219-1	EN 10219-1	EN 10219-2	2	1,34
P118807	ZAKD/23/02/0108	ZAMKN. PROST. 200X120X4.0 KSZT. Z/GIĘTY Z BEDN. G/WALC. ,GAT. S355J2H. KL. I				
1780 / 8	234177	EN 10219-1	EN 10219-1	EN 10219-2	7	9,52
P118785	ZAKD/23/02/0084	ZAMKN. KWADR. 160X160X6.0 KSZT. Z/GIĘTY Z BEDN. G/WALC. ,GAT. S355J2H. KL. I				
1730 / 8	222325	EN 10219-1	EN 10219-1	EN 10219-2	3	5,84
P118785	ZAKD/23/02/0084	ZAMKN. KWADR. 160X160X6.0 KSZT. Z/GIĘTY Z BEDN. G/WALC. ,GAT. S355J2H. KL. I				
1729 / 8	222325	EN 10219-1	EN 10219-1	EN 10219-2	2	3,5

C71-C92 Skład chemiczny - Chemical composition - Chemische Zusammensetzung

B07.1 Wytóp - Heat - Abstrich	C [%]	Mn [%]	Si [%]	P [%]	S [%]	Cr [%]	Ni [%]	Cu [%]	Al [%]	N2 [%]	Nb [%]	Ti [%]	Mo [%]	V [%]	C _{EV} [%]
222325	0,16	1,54	0,014	0,009	0,003	0,04	0,063	0,03	0,036	0,0051	0,0077	0,0007	0,001	0,005	0,43
227751	0,175	1,55	0,009	0,013	0,004	0,03	0,024	0,032	0,037	0,0029	0,001	0,001	0,003	0,001	0,444
234177	0,15	1,38	0,014	0,009	0,004	0,03	0,019	0,05	0,037	0,0057	0,0087	0,0007	0,001	0,004	0,39

Własności mechaniczne - Mechanical properties - Mechanische Eigenschaften

B07.2 Numer KP - Lot No - Los no	C11 Re [MPa]	C12 Rm [MPa]	C13.1 A5 [%]	C13.2 Rm / Re	C13.3 A80 [%]	D51 Zn [mm]	D52 KV [J]	C69 HV 30
1724 / 8	484	569	27,2					
1729 / 8	492	596	28,8				100,4	
1730 / 8	492	596	28,8				100,4	
1780 / 8	504	579	28,6					
1783 / 8	429	568	21,5					

 D01 Powierzchnia i wymiary - sprawdzono zgodność z zamówieniem
 Surface and dimension - tested according to purchase order
 Oberfläche und Masse - geprüft entsprechend der Bestellung

 Z05
 Cechowanie
 znakiem B

 Z02 Biuro Kontroli Jakości
 Quality Control Office
 Büro der Qualitätskontrolle

 Z04
 Cechowanie znakiem CE
 CE marking
 CE - Zeichen

Stalprodukt S.A.
 Samodzielny Inspektor DP/PJ

 Bogdan Chrobak

Z01

Na podstawie przeprowadzonych badań uznano, że wykonany wyrób jest zgodny z warunkami zamówienia

On the basis of the tests it has been recognized that the product conforms with the order requirements

Nach der durchgeführten Prüfungen wurde festgestellt, daß des Erzeugnis den Anforderungen der Bestellung entepricht

Z06 Informacje uzupełniające - Supplementary Information - Ergänzende Angaben

Poziom radioaktywności produkowanych przez nas wyrobów jest niższy od dawki granicznej wyrażonej jako dawka skuteczna dopuszczalna dla ogółu społeczeństwa , która wynosi 1 mSv (miliSiwert) rocznie

The radiological level of our products has a value below the regular limit effective dose for the general public, which is 1 mSv (miliSievert) per year.

Jakość zgrzewu badana za pomocą prądów wirowych według EN ISO 10893-2 - próba pozytywna.

The weld quality tested by method of eddy currents test according to EN ISO 10893-2 - positive control.

EN 10204-3.1

Date

12.11.2021

Page

1

Buyer
LEBAL S.A. 8393510Consignee
LEBAL S.A. 8419130MICHALOWO 27
61-314 POZNAN POLANDFABRYCZNA 7
64-610 ROGOZNO POLAND

Confirmation of Order

676400

Your Order

ZAUD/21/10/0099

Your Reference

Consignment

676400-001 09.11.2021

MARKING

Mark of the Manufacturer

Inspector's Stamp

Steel Grade

Cast No.

Pipe No.

Other Stamps

SSAB

S355J2H



Product

COLD-FORMED WELDED STRUCTURAL HOLLOW SECTIONS

Steel Grade

SSAB DOMEX TUBE S355J2H

NON-ALLOY STRUCTURAL STEEL EN 10219-1

Technical Terms of Delivery

EN 10219-1,2:2006 CFRHS

Inspection

ULTRASONIC INSPECTION OF THE WELD SEAM

SPECIFICATION

Cast No.	Test No.	Bundle No.	Pcs	m	kg	Bundle Pcs
Item 1	160 X 160	5.00 X 12000				
81162	81162061978	19767203				
Item in total			8	96	2285	1
Item 2	160 X 160	6.00 X 12000				
79856	79856030974	19767154				
80263	80263010975	19767154				
80475	80475041976	19767154-19767155				
Item in total			14	168	4754	2
Item 3	160 X 160	8.00 X 12000				
81785	81785051973	19767136				
Item in total			4	48	1752	1
Item 5	200 X 120	8.00 X 12000				

We hereby certify that the products described above have been tested and comply with the terms of the Order contract.

SSAB Europe Oy

Pulkila Works
Quality Manager

Arto Törmälehto

www.ssab.com
SSAB Europe Oy

Postal Address

Lehtolantie 76
FI-92600 PULKKILA

Telephone

+ 358 20 59 11

Telefax

+ 358 20 59 27090

Company name

Harvialantie 420
FI-13300 HÄMEENLINNA

Registered Office

HÄMEENLINNA

Business ID

2389445-7

EN 10204-3.1

Date
12.11.2021

Page

2

SPECIFICATION

Cast No.	Test Number	Bundle No.	Pcs	m	kg	Bundle Pcs
81785	81785051968	19767109				
Item in total			1	12	438	1
Item 6	200 X 120	10.00 X 12000				
81444	81444021966	19767092 19767096				
81444	81444051967	19767097-19767100				
Item in total			54	648	28770	6
Item 7	250 X 150	6.00 X 12000				
81848	81848021960	19767031-19767033				
Item in total			18	216	7734	3
Item 8	250 X 150	8.00 X 12000				
81677	81677021959	19767019-19767020				
Item in total			12	144	6696	2
Item 9	250 X 150	10.00 X 12000				
81628	81628041955	19766992				
Item in total			4	48	2736	1
Items in total			115	1380	55165	17

We hereby certify that the products described above have been tested and comply with the terms of the Order contract.

SSAB Europe Oy
Pulkkila Works



Arto Törmälehto

DECLARATION OF PERFORMANCE

ref. S355J2H_20150812

Product type:

Cold formed welded structural hollow section: EN 10219-1:2006 S355J2H

Intended use:

Structural hollow sections to be used in structural steel components and kits and steel components of composite steel and concrete structures and other steel structures.

Company:

SSAB

SSAB Europe Oy
Harvialantie 420,
FI-13300 Hämeenlinna, FINLANDVerification of constancy:
System 2+

Notified body:

Inspecta Sertifiointi Oy
PL 113
FI-00181 Helsinki, Finland

Inspecta Sertifiointi (No 0416) has performed initial inspection of the manufacturing plant and factory product control and continuous surveillance, assessment and evaluation of factory production control and issued factory production control certificates.

Essential characteristics:

	Yield strength Rp0.2 min	Tensile strength Rm T<3 mm	Tensile strength Rm T≥3 mm	Elongation A% min*	Impact strength min J / Temp	Weldability CEV max	Tolerances on dimensions and shape	Durability
S355J2H	355	510-680	470-630	20	27 / -40 °C	0.39	EN 10219-2, Clause 6	Suitable for hot dip galvanizing

*For section sizes D/T < 15 (round) and (B+H)/2T < 12,5 (square and rectangular) the minimum elongation is reduced by 2

Hämeenlinna 12.08.2015



Jouko Vuorinen

Head of Hämeenlinna, Pulkila and Oulainen tube mills

SSAB Europe Oy



0416

SSAB

SSAB Europe Oy, Harvialantie 420,
13300 Hämeenlinna
07

ref. S355J2H_20150812

EN 10219-1:2006

Cold formed welded structural hollow section:

EN 10219-1:2006

S355J2H

Essential characteristics:

Yield strength Rp0.2 min	355
Tensile strength Rm T<3 mm	510-680
Tensile strength Rm T≥3 mm	470-630
Elongation A% min*	20
Impact strength min J / Temp	27 / -40 °C
Weldability CEV max	0.39
Tolerances on dimensions and shape	EN 10219-2, Clause 6
Durability	Suitable for hot dip galvanizing

*For section sizes D/T < 15 (round) and (B+H)/2T < 12,5 (square and rectangular) the minimum elongation is reduced by 2

EN 10204-3.1

Date
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Item	Cast No.	CEV	Cast analysis %															
			C	Si	Mn	P	S	Al	Nb	V	Cu	Cr	N	Ti	Mo	Ni	B	
1	81162	,27	,06	,20	1,21	,009	,005	,034	,035	,008	,017	,047	,006	,015	,005	,036	,0002	
2	79856	,33	,07	,17	1,45	,009	,006	,034	,024	,009	,024	,051	,004	,016	,005	,043	,0003	
2	80263	,33	,08	,17	1,41	,008	,005	,033	,025	,007	,020	,043	,006	,017	,003	,040	,0001	
2	80475	,32	,07	,19	1,41	,010	,007	,038	,023	,006	,018	,053	,005	,016	,004	,036	,0002	
3	81785	,32	,07	,19	1,41	,008	,007	,040	,024	,008	,021	,048	,005	,015	,005	,040	,0002	
5	81785	,32	,07	,19	1,41	,008	,007	,040	,024	,008	,021	,048	,005	,015	,005	,040	,0002	
6	81444	,34	,09	,19	1,42	,010	,005	,034	,014	,010	,014	,048	,004	,014	,003	,033	,0002	

Item	Test Number	Tensile Test				Impact test					
		P2	Rp0.2	Rm	A	P3	oC	1(J)	2(J)	3(J)	AVG(J)
			N/mm2	N/mm2	%						
1	81162061978	11	503	585	23						
2	79856030974	11	477	550	25	117	-40	133	136	144	138
2	80263010975	11	456	539	28	117	-40	140	145	135	140
2	80475041976	11	439	519	27	117	-40	161	153	146	153
3	81785051973	11	478	543	26	117	-40	143	135	165	148
5	81785051968	11	482	544	25	117	-40	144	124	177	148
6	81444021966	11	449	501	29	117	-40	261	267	267	265

Visual inspection and dimensional control has been performed
in compliance with the terms of the order contract- No objection.

SSAB Europe Oy

Pulkila Works
Quality Manager

Arto Törmälehto

CEV: $C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15$

P2: 11=Pipe body, longitudinal

P3: 117=Impact test CV t x 10 mm, pipe body, longitudinal

EN 10204-3.1

Date
12.11.2021Page
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Item	Cast No.	CEV	Cast analysis %														
			C	Si	Mn	P	S	Al	Nb	V	Cu	Cr	N	Ti	Mo	Ni	B
6	81444	,34	,09	,19	1,42	,010	,005	,034	,014	,010	,014	,048	,004	,014	,003	,033	,0002
7	81848	,28	,06	,20	1,22	,011	,004	,037	,034	,007	,013	,051	,004	,016	,004	,035	,0003
8	81677	,27	,06	,21	1,21	,008	,005	,041	,036	,005	,014	,050	,003	,018	,003	,035	,0000
9	81628	,33	,07	,17	1,46	,011	,006	,035	,021	,011	,014	,046	,004	,014	,004	,035	,0001

Item	Test Number	Tensile Test				Impact test					
		P2	Rp0.2	Rm	A	P3	oC	1(J)	2(J)	3(J)	AVG(J)
			N/mm2	N/mm2	%						
6	81444051967	11	468	516	27	117	-40	290	220	287	266
7	81848021960	11	498	569	26	117	-40	138	147	115	133
8	81677021959	11	501	570	24	117	-40	209	195	218	207
9	81628041955	11	439	526	29	117	-40	270	266	276	271

Visual inspection and dimensional control has been performed
in compliance with the terms of the order contract- No objection.

SSAB Europe Oy

Pulkila Works
Quality Manager


Arto Törmälehto

CEV: $C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15$

P2: 11=Pipe body, longitudinal

P3: 117=Impact test CV t x 10 mm, pipe body, longitudinal

Via Portamurata, 8/A
42016 GUASTALLA (RE) - ITALIA
Tel. + 39 522 83.65.55 (r.a.)
Fax + 39 522 83.65.72 - 83.65.73
Cod. Fis. e P. IVA IT00323370353

AZIENDA CON SISTEMA DI GESTIONE
QUALITA' CERTIFICATO SECONDO
UNI EN ISO 9001

TIPO DOCUMENTO - TYPE DOCUMENT (EN10204)

Certificato di Controllo 3.1

Inspection Certificate 3.1

Nr. : 18003848

Data - Date
15/01/2020

Pag. 1 / 1

Consegna:
Delivery:

(23127)

(61057)

D.D.T. - DELIVERY NOTE

18002958 - 15/01/2020

Riferimenti Normativi Tubi - Hollow Sections Standard: EN 10219-1

Tubi saldati longitudinalmente (ERW)

Longitudinal Welded Tubes (ERW)

Dim.							Orientational Composition										Mechanical and Technical Properties																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Th.		Steel										Heat		%C		%Si		%Mn		%P		%S		%Nb		%V		%Al		%Ti		%Cr		%Ni		%Mo		%Cu		%N		%CEV		ReH		Rm		A		A80		Hardness		Charpy Impact Test (KV)		1 (J)		2 (J)		3 (J)		X (J)		T (°C)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)		(mm)</	

ORDINE CLIENTE - CUSTOMER ORDER

ZZ18000817

ORDINE PADANA TUBI - P.T. ORDER

S2 - 17057157

FATTURA - INVOICE

UC - 18002306 - 15/01/2020

D 114.3	5,00	12000	S355J2H		TQ05301193	120 1.517	@IT07894	0,160	0,030	1,420	0,016	0,005	0,002	0,004	0,037	0,024	0,020	0,030	0,004	0,050	0,006	0,408	508	570	21,8	93	85	84	87	-20
D 114.3	5,00	12000	S355J2H		TQ05301211	120 1.519	@IT07897	0,160	0,020	1,450	0,015	0,006	0,002	0,004	0,035	0,024	0,020	0,020	0,004	0,030	0,007	0,411	508	570	21,8	93	85	84	87	-20

ORDINE CLIENTE - CUSTOMER ORDER

ZZ18000814

ORDINE PADANA TUBI - P.T. ORDER

S2 - 17057359

FATTURA - INVOICE

UC - 18002306 - 15/01/2020

180X100	8,00	12000	S355J2H		TQ05215416	72 2.220	727339	0,196	0,027	0,855	0,009	0,002		0,034		0,053	0,051	0,009	0,134	0,009	0,134	0,363	430	524	36,9	44	54	53	50	-20
250X150	5,00	12000	S355J2H		TQ05302558	72 2.641	792272	0,162	0,022	0,714	0,013	0,018	0,035	0,001	0,031		0,024	0,003		0,011	0,006	0,287	447	551	34,0	42	58	45	49	-20
250X150	8,00	12000	S355J2H		TQ05303272	48 2.168	@IT05763	0,177	0,016	1,106	0,015	0,004	0,012	0,005	0,035	0,010	0,013	0,008	0,001	0,006	0,006	0,366	388	519	41,8	76	79	78	77	-20
200X100	10,00	12000	S355J2H		TQ05119542	48 1.932	T@IT0725048	0,177	0,010	1,473	0,013	0,009	0,020	0,002	0,038	0,012	0,028	0,034	0,004	0,041	0,005	0,434	553	582	25,6	25	37	93	52	-20
200X100	4,00	12000	S355J2H		TQ05206641	144 2.383	@IT07236	0,160	0,020	1,430	0,017	0,006	0,002	0,004	0,040	0,016	0,030	0,030	0,004	0,060	0,006	0,412	413	558	34,2	622	21,8			
80X60	4,00	12000	S355J2H		TQ05292878	300 1.888	A5174637	0,150	0,030	1,380	0,019	0,012	0,002	0,056	0,038	0,002	0,020	0,020	0,002	0,030	0,005	0,399	523	622	21,8					
80X60	4,00	12000	S355J2H		TQ05292961	300 1.886	A5174635	0,150	0,030	1,320	0,018	0,011	0,002	0,053	0,046	0,002	0,020	0,010	0,001	0,010	0,005	0,386	523	622	21,8					
80X60	4,00	12000	S355J2H		TQ05293041	300 1.890	A5174652	0,170	0,030	1,300	0,020	0,014	0,002	0,055	0,040	0,002	0,020	0,010	0,001	0,020	0,005	0,404	523	622	21,8					

CE

0948

18

Padana Tubi S.p.A., Via Portamurata 8/A, I-42016 Guastalla (RE)

0948-CPR-0063 Rev.1 or 0948-CPR-0064 Rev.1

EN 10219-1:2006

Profilati cavi di acciaio formati a freddo per edilizia e ingegneria civile
Cold formed steel hollow sections for building and civil engineering

Designazione del prodotto: vedi sopra

Product designation: see above

Sostanza pericolosa / Dangerous substance: NPD

Durabilità / Durability: NPD

Controllo visivo e dimensionale:

esito positivo

Visual and dimensional control:

OK

Certifichiamo che il prodotto fornito
è conforme ai requisiti dell'ordine

We certify that material supplied complies
with the requirements agreed on order

P.N.D.: correnti indotte sulla saldatura:

esito positivo

NDT: Eddy Current test on the weld:

OK

Padana Tubi & Profilati Acciaio S.p.A.

Controllo Qualità / Quality Department

Resp. Qualità / Quality Manager

Ing. Carlo Maramotti

Arvedi Tubi Acciaio S.p.A.
26100 Cremona - Italia
Via Acquaviva, 3 - Zona Porto Canale
Tel. +39 0372 4091
Fax +39 0372 413170

www.arvedi.it

A01

Cap.Soc. 24.000.000 EUR i.v.
Società soggetta all'attività di
direzione e coordinamento di
Finarvedi S.p.A.
Società con Socio Unico
R.I. CR 00113630198
R.E.A. CR 90188
Mecc. Est. CR 000296
C.F. e Part. IVA IT 00113630198

A04

Arvedi Tubi Acciaio



Inspection certificate EN 10204/3.1

A02

Number A03	834627	date Z02	05/01/2023
Our order A08	0211267787	/ 130	
Customer order A07	ZZ23000873		
date	20/12/2022		
Consegna	0221566365		
delivery A10	0000200190	date	05/01/2023

Messrs

A06

THYSSENKRUPP MATERIALS POLAND S.A.

UL. GRUDZIADZKA 159

87-100 TORUN

PL

Description **TUBE**

B01

Standard **EN 10219-1 T>= 3 MM**

B01

Dimensions **SGM 200x120x5x12000 S355J2H EN 10219**

B04:B9-B11

Steel grade **S355J2H**

B02

Tubes **12** MT **144,00** KG **3.271,00**

B08

B14

B13

Chemical analysis

C71-C92

	C	Mn	Si	P	S	Al	Cr	Ni	Mo	Cu	Sn	V	Nb	Ti	B	N
min						0,0200										
max	0,2500	1,7000	0,6000	0,0400	0,0400		0,3000	0,5000	0,1000	0,3500		0,1200	0,0500	0,0300		0,0110
B07																
1117641A	0,1700	1,3100	0,2040	0,0106	0,0003	0,0292	0,1190	0,1280	0,0480	0,2660		0,0020	0,0015	0,0020		0,0034
1117641A	C+MN/6+(CR+MO+V)/5+(NI+CU)/15							<=0,45	0,4484							

Mechanical and technological tests

C10-C29

<u>Mechanical and technological tests</u>					R (MPa)				REH (MPa)			A(%)		Rs/R		Fm (N)					
C10-C29																					
Works Nr.		B07	Heat		B07	Lot		B07	Tubes	>=	470	<=	630	>=	355		>=	20,0			
11117817			1117641A						12		582				459			26,00			

Impact test

C40-C49

	Code	°C C03	Limit (J/cm2)	Value	C42	Mean	C43	Sample dim.	C41	Position	C01-C02
1	KV	0	0								

Test	B06;D1-D6;D51-D60	Standard	Required		-	Result
Non destructive test		EN ISO 10893-2	E4	%	100	POSITIVE
Dimensional inspection		EN 10219-2		LOT	1	POSITIVE
Visual		EN 10219-1		%	100	POSITIVE

Remarks

D51



Quality Management
System Certified
by IGQ

TÜV
manufacturer approved
AD 2000 W0 -PED



AMMM00001HV



Arvedi Tubi Acciaio S.p.A.
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Tel. +39 0372 4091
Fax +39 0372 413170

www.arvedi.it

A01

Cap.Soc. 24.000.000 EUR i.v.
Società soggetta all'attività di
direzione e coordinamento di
Finarvedi S.p.A.
Società con Socio Unico
R.I. CR 00113630198
R.E.A. CR 90188
Mecc. Est. CR 000296
C.F. e Part. IVA IT 00113630198

A04

Arvedi Tubi Acciaio



Inspection certificate EN 10204/3.1

A02

Number A03	834627	date Z02	05/01/2023
---------------	--------	-------------	------------

Our order **0211267787** / 130

A08

Customer order **ZZ23000873**

A07

date **20/12/2022**

Consegna **0221566365**

delivery **0000200190** date **05/01/2023**

A10

Messrs

A06

THYSSENKRUPP MATERIALS POLAND S.A.

UL. GRUDZIADZKA 159

87-100 TORUN

PL

Z04

<p>CE 1608</p>	
<p>Arvedi Tubi Acciaio S.p.A. via Acquaviva 3, I-26100 Cremona 23 1608 CPR P064</p>	
<p>EN 10219-1:2006 DoP n. 10219-01072013-3</p>	
<p>Cold formed welded structural hollow sections of non-alloy structural steels <i>Profilati cavi per impieghi strutturali formati a freddo di acciai non legati e a grano fine</i></p>	
Product designation (Designazione prodotto):	S355J2H
Dimensional Tolerances (Tolleranze dimensionali):	EN 10219-2
Elongation (Allungamento):	EN 10219-1
Tensile and Yield strength (Carico di snervamento a rottura):	EN 10219-1
Impact energy (Resilienza):	EN 10219-1
Weldability (Saldabilità):	EN 10219-1

DOP download link:

<https://www.arvedi.it/en/ata/quality-and-technology/product-environment-and-people/>

A05

QUALITY DEPARTMENT

Z02

(Noris Battocletti)

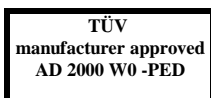
Tel. +39 0372 4091

Fax +39 0372 409349

e-mail: controllo.qualita@ata.arvedi.it

Z01

We hereby certify, that the material described above has been tested and complies with the terms of the order contract. This certificate has been created by a data processing system and does not contain a personal signature but the name and the official address of the appointed department.



<p>Wyrób budowlany oznakowany znakiem CE zgodnie z rozporządzeniem nr 305/2011 Parlamentu Europejskiego i Rady UE.. Construction product CE marked in accordance with Regulation No 305/2011 of the European Parliament and of the Council of the EU Ein Bauprodukt, das mit dem CE-Zeichen gemäß Verordnung 305/2011 des Europäischen Parlaments und des EU-Rates versehen ist.</p>		
<div> <div>Z.04</div> <div>CE 0035</div> <div>0035-CPR-A150</div> </div>	<div> <div>D01 Powierzchnia i wymiary - Sprawdzono zgodność z zamówieniem</div> <div>Surface and dimension - tested according to purchase order</div> <div>Oberfläche und Masse - Geprüft entprechend der Bestellung</div> </div>	<div> <div>Z01 Na podstawie przeprowadzonych badań uznano, że wykonany wyrób jest zgodny z warunkami zamówienia.</div> <div>On the basis of the tests it has been recognized that the product conforms with the order requirements.</div> <div>Nach der durchgeführten Prüfungen wurde festgestellt, das des Erzeugnis den Anforderungen der Bestellung entspricht.</div> </div>
		<div> <div>A05 Zarządzanie Jakością Wyroby Plaskie</div> <div>Quality Management Flat Products</div> <div>Qualitätsmanagement Flachprodukte</div> <div>Z02.2</div> <div>Kierownik Zarządzania Jakością</div> <div>- wyroby płaskie</div> <div><i>Tybor Grzegorz</i></div> <div>Grzegorz Tybor</div> </div>



ATESTY
ŚWIADECTWA
DEKLARACJE

4. LINY /

ROPES



SP REMAK
Zakład Usługowy
ul. Unii Lubelskiej 3, 61-249 Poznań
618783331; remak-sp.pl; biuro@remak-sp.pl

DEKLARACJA ZGODNOŚCI ZAŚWIADCZENIE JAKOŚCI nr 085/2023

Deklarujemy z pełną odpowiedzialnością, że sprzedany wyrób

1. Lina DACHOWA GÓRNA 4.1.1 z osprzętem
2. Lina DACHOWA DOLNA 4.1.2 z osprzętem
3. Lina ŚCIENNA 4.2 z osprzętem
4. Lina NAPINACZA RYGŁA GÓRNA 4.3.1 z osprzętem
5. Lina NAPINACZA RYGŁA DOLNA 4.3.2 z osprzętem
6. ŚCIĄG NAPINACZY 4.3.3 z osprzętem

faktura nr 072/2023 z dnia 30.03.2023
dla PROTAN ELMARK Dębienko – zlecenie 640

do którego odnosi się niniejsze zaświadczenie, jest zgodny z normami PN-M-84732, PN-M-84720, PN-M-84719, PN-EN 13889, odp. DIN 1480 z atestem, projektem i wymaganiami Zamawiającego.

DANE TECHNICZNE WYROBU:

LP	Typ lub model (pierwsza wartość kN: siła do doboru liny / druga wartość kN: siła do doboru osprzętu)	Nazwa	fi liny [mm]	Oznako- wanie	Ilość [szt.]	Waga 1 szt. [kg]
1	NBCA; 5,93 m; 31,5 / 36,75 kN	Lina dachowa górna 4.1.1	8	RK 0207/23	48	2,3
2	NBCA; 5,83 m; 31,5 / 36,75 kN	Lina dachowa dolna 4.1.2	8	RK 0208/23	16	2,3
3	NBCA; 5,71 m; 31,5 / 36,75 kN	Lina ścienna 4.2	8	RK 0209/23	16	2,3
4	ABCAA; 8,62 m; 43,5 / 50,75 kN	Lina napinacza rygła górna 4.3.1	10	RK 0210/23	24	4,3
5	ABCAA; 8,39 m; 70,5 / 82,25 kN	Lina napinacza rygła dolna 4.3.2	12	RK 0211/23	24	6,8
6	ABCAA; 12,62 m; 43,5 / 50,75 kN	Ściąg napinaczy 4.3.3	10	RK 0212/23	12	5,6

Siły zrywające lin i osprzętu są większe lub równe niż siły zadane w zleceniu – zgodnie z zamówieniem.

Uwagi:

Zaświadczenie jakości odpowiada pkt. 2.1 normy PN-EN 10 204.

Poznań, 30.03.2023


Kierownik Zakładu
Maciej Styczyński



SP REMAK
Zakład Usługowy
ul. Unii Lubelskiej 3, 61-249 Poznań
618783331; remak-sp.pl; biuro@remak-sp.pl

GWARANCJA nr 050/2023

faktura nr 072/2023 z dnia 30.03.2023
dla PROTAN ELMARK Dębienko – zlecenie 640

DANE TECHNICZNE WYROBU:

LP	Typ lub model (pierwsza wartość kN: siła do doboru liny / druga wartość kN: siła do doboru osprzętu)	Nazwa	fi liny [mm]	Oznako- wanie	Ilość [szt.]	Waga 1 szt. [kg]
1	NBCA; 5,93 m; 31,5 / 36,75 kN	Lina dachowa górna 4.1.1	8	RK 0207/23	48	2,3
2	NBCA; 5,83 m; 31,5 / 36,75 kN	Lina dachowa dolna 4.1.2	8	RK 0208/23	16	2,3
3	NBCA; 5,71 m; 31,5 / 36,75 kN	Lina ścienna 4.2	8	RK 0209/23	16	2,3
4	ABCAA; 8,62 m; 43,5 / 50,75 kN	Lina napinacza rygla górna 4.3.1	10	RK 0210/23	24	4,3
5	ABCAA; 8,39 m; 70,5 / 82,25 kN	Lina napinacza rygla dolna 4.3.2	12	RK 0211/23	24	6,8
6	ABCAA; 12,62 m; 43,5 / 50,75 kN	Ściąg napinaczy 4.3.3	10	RK 0212/23	12	5,6

Siły zrywające lin i osprzętu są większe lub równe niż siły zadane w zleceniu – zgodnie z zamówieniem.

Na ww. linę / liny wytwórca udziela gwarancji na okres 36 miesięcy od chwili zakupu.
Wytwórca odpowiada za wady wynikłe w czasie eksploatacji, wady materiałowe itd., ale tylko w przypadku, gdy wyrób:

- 1) jest używany zgodnie z instrukcją obsługi,
- 2) nie posiada uszkodzeń mechanicznych związanych z nieodpowiednią naprawą lub zakazanymi manipulacjami.

Gwarancja jest ważna po okazaniu niniejszego listu gwarancyjnego.


Kierownik Zakładu
Maciej Styczyński

Poznań, 30.03.2023



ATESTY
ŚWIADECTWA
DEKLARACJE

5. KOTWIENIE/

ANCHORING



INSTYTUT TECHNIKI BUDOWLANEJ
PL 00-611 WARSZAWA
ul. Filtrowa 1
tel.: (+48 22) 825-04-71
(+48 22) 825-76-55
fax: (+48 22) 825-52-86
www.itb.pl



Member of



www.eota.eu

European Technical Assessment

ETA-21/0242
of 11/03/2021

General Part

Technical Assessment Body issuing the European Technical Assessment

Instytut Techniki Budowlanej

Trade name of the construction product

R-KER-II, R-KER-II-S and R-KER-II-W

Product family to which the construction product belongs

Bonded fasteners for use in concrete

Manufacturer

RAWLPLUG S.A.
ul. Kwidzyńska 6
51-416 Wrocław
Poland

Manufacturing plant

Manufacturing Plant no. 3

This European Technical Assessment contains

45 pages including 3 Annexes which form an integral part of this Assessment

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

European Assessment Document EAD 330499-01-0601 "Bonded fasteners for use in concrete"

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

Specific Part

1 Technical description of the product

The R-KER-II, R-KER-II-S and R-KER-II-W are bonded anchors (injection type) consisting of a injection mortar cartridge using an applicator gun equipped with a special mixing nozzle and steel element.

The steel element consists of:

- threaded anchor rod sizes M8 to M30 made of:
 - galvanized carbon steel,
 - carbon steel with zinc flake coating,
 - stainless steel,
 - high corrosion resistant stainless steel,
 - ultra-high strength steel with zinc flake coating,
 with hexagon nut and washer,
- anchor rod with inner thread sizes M6/Ø10 to M16/Ø24 made of:
 - galvanized carbon steel,
 - stainless steel,
 - high corrosion resistant stainless steel,
- rebar sizes Ø8 to Ø32.

The steel element is placed into a drilled hole previously injected (using an applicator gun) with a mortar with a slow and slight twisting motion. The rod or rebar is anchored by the bond between steel element, mortar and concrete.

The threaded rods are available for all diameters with three type of tip end: a one side 45° chamfer, a two sides 45° chamfer or a flat. The threaded rods are either delivered with the mortar cartridges or commercial standard threaded rods purchased separately. The mortar cartridges are available in different sizes and types.

Description of the products is given in Annex A.

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

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

The performances given in this European Technical Assessment are based on an assumed working life of the anchor of 50 and/or 100 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load and shear load (static and quasi static loading), displacements	See Annex C1 to C15
Characteristic resistance for seismic performance category C1, displacements	See Annex C16 to C18

3.1.2 Hygiene, health and the environment (BWR 3)

No performance assessed.

3.2 Methods used for the assessment

The assessment of the products has been made in accordance with the EAD 330499-01-0601.

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

According to Decision 96/582/EC of the European Commission the system 1 of assessment and verification of constancy of performance (see Annex V to regulation (EU) No 305/2011) applies.

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

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

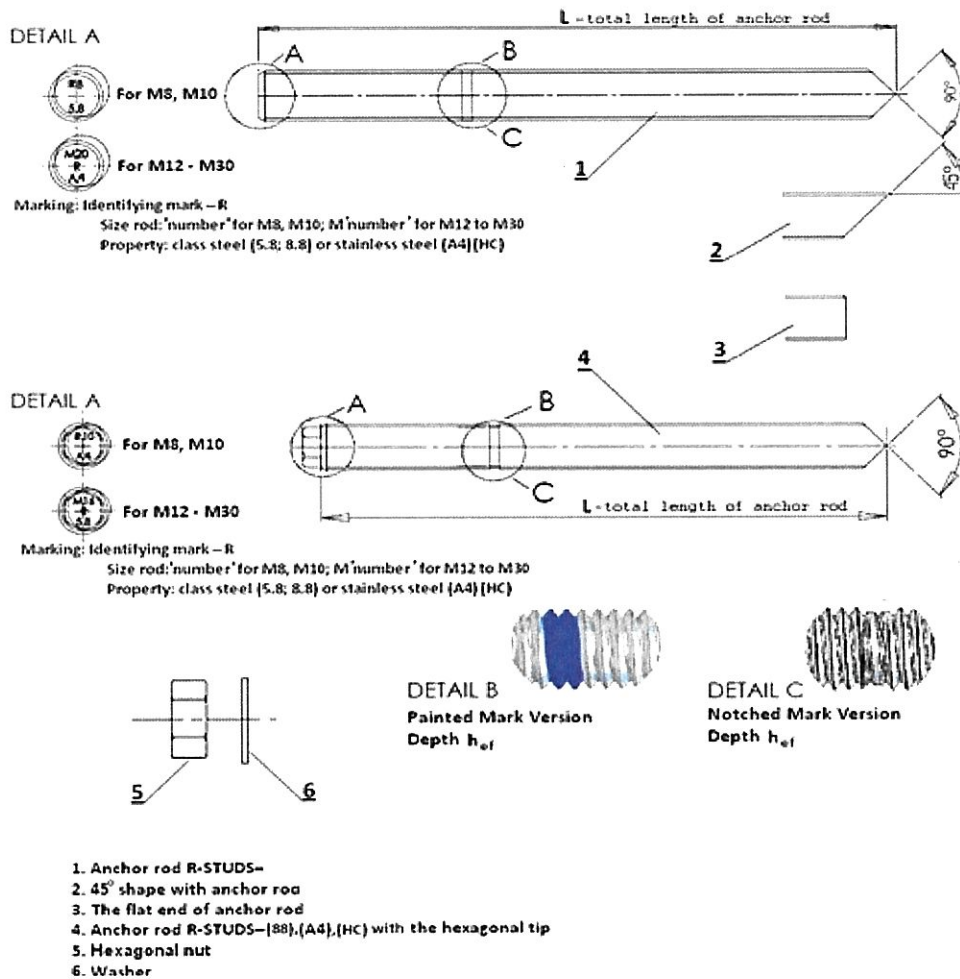
For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 11/03/2021 by Instytut Techniki Budowlanej



Anna Panek, MSc
Deputy Director of ITB

Threaded anchor rods

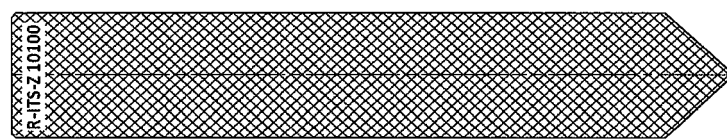
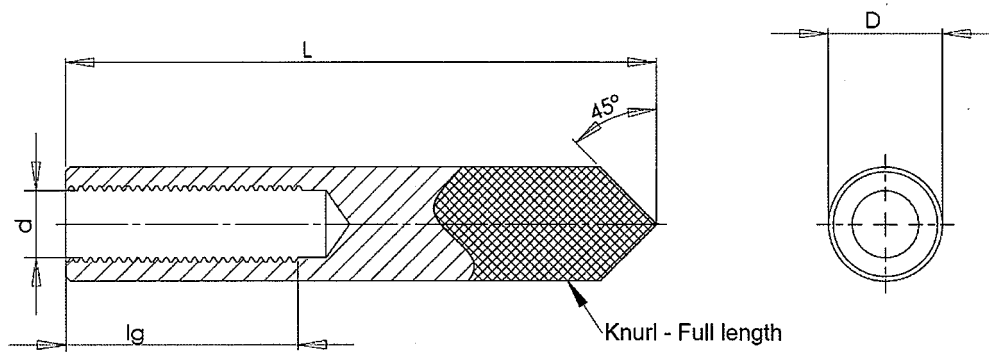


R-KER-II, R-KER-II-S and R-KER-II-W

Product description
Threaded anchor rods

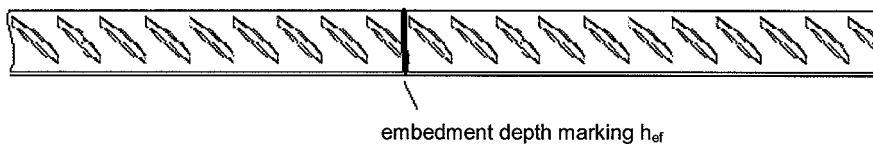
Annex A1
of European
Technical Assessment
ETA-21/0242

Anchor rods with inner thread



Marking: R - Identifying mark
 ITS - product index
 Z - carbon steel or A4 - stainless steel
 XX - thread size
 YYY - length of sleeve

Rebar



R-KER-II, R-KER-II-S and R-KER-II-W

Product description
 Anchor rods with inner thread and rebar

Annex A2
 of European
 Technical Assessment
 ETA-21/0242

Table A1: Threaded rods

Part	Designation			
	Steel, zinc plated	Stainless steel	High corrosion resistance stainless steel (HCR)	Ultra-high Strength Steel, coated
Threaded rod	Steel, property class 5.8 to 12.9 acc. to EN ISO 898-1 electroplated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or hot-dip galvanized $\geq 45 \mu\text{m}$ acc. to EN ISO 10684 or non-electrolytically applied zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683	Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006 +A1:2015	Steel 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006 +A1:2015	Steel, property class 14.8U to 16.8U acc. to USCAR- UHSFG-1416U non-electrolytically zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683
Hexagon nut	Steel, property class 5 to 12, acc. to EN ISO 898-2; electroplated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or hot-dip galvanized $\geq 45 \mu\text{m}$ acc. to EN ISO 10684 or non-electrolytically applied zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683	Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006 +A1:2015	Steel 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006 +A1:2015	Steel, property class 12 to 16 acc. to USCAR- UHSFG-1416U non-electrolytically applied zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683
Washer	Steel acc. to EN ISO 7089; electroplated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or hot-dip galvanized $\geq 45 \mu\text{m}$ acc. to EN ISO 10684 or non-electrolytically applied zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683	Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006 +A1:2015	Steel 1.4529, 1.4565, 1.4547 acc. to EN 10088 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006 +A1:2015	Steel acc. to EN ISO 7089; non-electrolytically applied zinc flake coating $\geq 8 \mu\text{m}$ acc. EN ISO 10683

Commercial threaded rods (in the case of rods made of galvanized steel – standard rods with property class ≤ 8.8 only), with:

- material and mechanical properties according to Table A1,
- confirmation of material and mechanical properties by inspection certificate 3.1 according to EN- 0204:2004; the documents shall be stored,
- marking of the threaded rod with the embedment depth.

Note: Commercial threaded rods made of galvanized steel with property class above 8.8 are not permitted in some Member States.

R-KER-II, R-KER-II-S and R-KER-II-W

Product description
Materials

Annex A3
of European
Technical Assessment
ETA-21/0242

Table A2: Rods with inner threaded

Part	Material		
	Steel, zinc plated	Stainless steel	High corrosion resistance stainless steel (HCR)
Rod with inner threaded	Steel, property class 5.8 to 8.89 acc. to EN ISO 898-1 electroplated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or hot-dip galvanized $\geq 45 \mu\text{m}$ acc. to EN ISO 10684	Steel 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506 acc. to EN ISO 3506 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006 +A1:2015	Steel 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006 +A1:2015

Table A3: Reinforcing bars according to EN 1992-1-1, Annex C

Product form		Bars and de-coiled rods	
Class		B	C
Characteristic yield strength f_{yk} or $f_{0,2k}$ [N/mm ²]		400 to 600	
Minimum value of $k = (f_t / f_y)_k$		$\geq 1,08$	$\geq 1,15$ $< 1,35$
Characteristic strain at maximum force, ϵ_{uk} [%]		$\geq 5,0$	$\geq 7,5$
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) [%]	Nominal bar size [mm]		
	≤ 8 > 8	$\pm 6,0$ $\pm 4,5$	
Bond: minimum relative rib area, $f_{R,min}$	Nominal bar size [mm]		
	8 to 12 > 12	0,040 0,056	

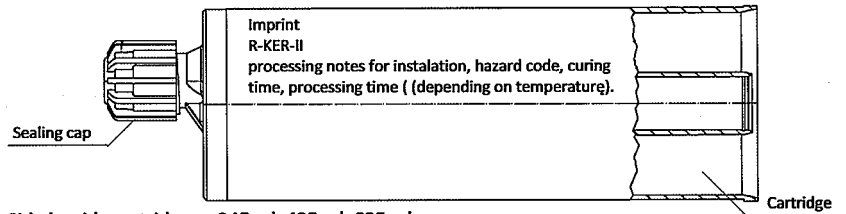
Rib height h: The maximum rib height h_{rib} shall be: $h_{rib} \leq 0,07 \cdot \varnothing$

Table A4: Injection mortars

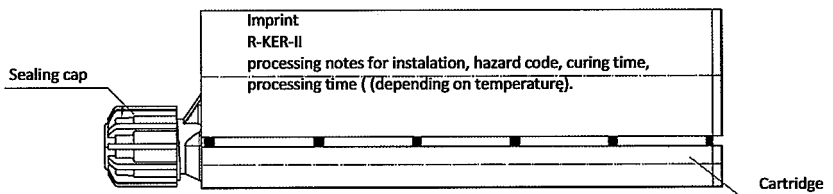
Product	Composition
R-KER-II, R-KER-II-S and R-KER-II-W (two component injection mortars)	Additive: quartz Bonding agent: vinyl ester mortar styrene free Hardener: dibenzoyl peroxide

R-KER-II, R-KER-II-S and R-KER-II-W	Annex A4 of European Technical Assessment ETA-21/0242
Product description Materials	

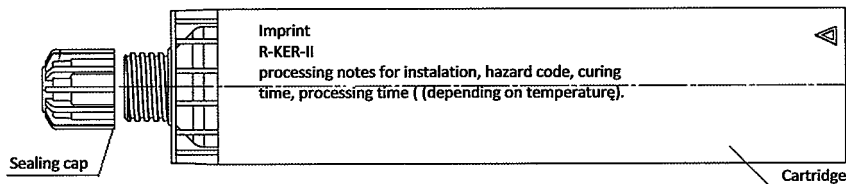
Coaxial cartridges – 150 ml, 280 ml, 300 ml, 310 ml, 330 ml, 380 ml, 400 ml, 410 ml, 420 ml



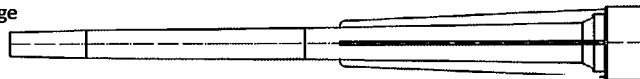
Side by side cartridges – 345 ml, 425 ml, 825 ml



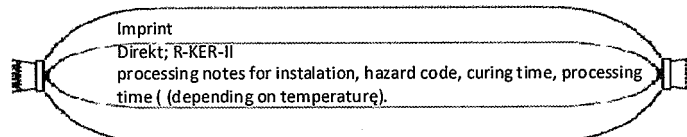
Cartridges for two part foil capsules within a single components –
150 ml, 280 ml, 300 ml, 310 ml, 330 ml, 380 ml, 400 ml, 550 ml, 600 ml



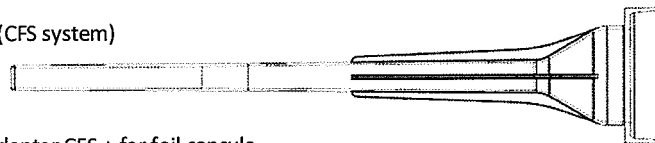
Mixer for Cartridge



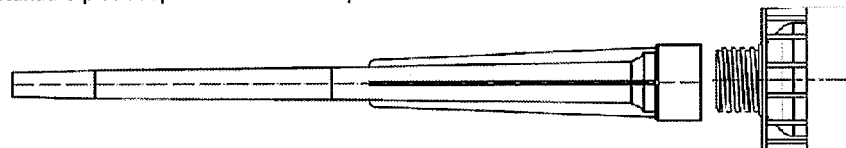
Foil capsule (CFS system) – 150 ml, 175 ml, 280 ml, 300 ml, 310 ml, 380 ml, 550 ml, 600 ml



Mixer for foil capsule (CFS system)



Mixer standard plus adapter CFS + for foil capsule



R-KER-II, R-KER-II-S and R-KER-II-W

Product description
Cartridge types and sizes

Annex A5
of European
Technical Assessment
ETA-21/0242

Specification of intended use

Anchorage subject to:

Static and quasi-static loads: threaded rod size M8 to M30, rod with inner thread sizes M6/Ø10 to M16/Ø24 and rebar Ø8 to Ø32.

Seismic performance category C1: threaded rod size M8 to M30 and rebar Ø8 to Ø32

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 to C50/60 according to EN 206:2013+A1:2016.
- Cracked and uncracked concrete.

Temperature ranges:

Installation temperature (temperature of substrate):

- -5°C to +40°C in case of R-KER-II (standard version).
- +5°C to +40°C in case of R-KER-II-S (version for summer season).
- -20°C to +40°C in case of R-KER-II-W (version for winter season).

In-service temperature:

The anchors may be used in the following temperature range:

- -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C).
- -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C).
- -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +80°C).

Use conditions (environmental conditions):

- Structures subject to dry internal conditions: all materials.
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class (CRC): elements made of stainless steel or high corrosion resistance stainless steel (HCR).

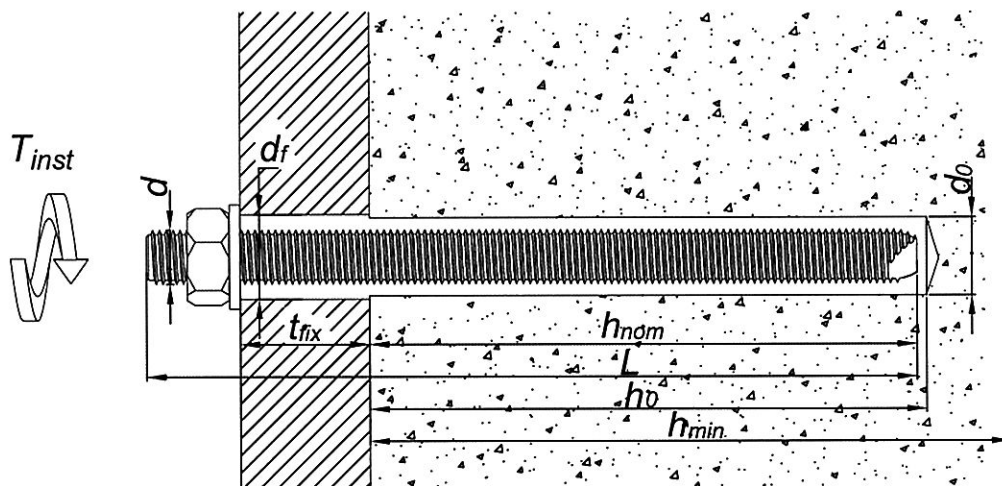
Installation:

- Dry or wet concrete (use category I1).
- Flooded holes (use category I2).
- Installation direction D3 (downward and horizontal and upwards installation).
- The anchors are suitable for hammer drilled holes or by special method with cleaning during drill a hole using hollow drill bit with vacuum cleaner.

Design methods:

- Anchorages under static or quasi-static loads are designed in accordance to EN 1992-4:2018 and EOTA Technical Report TR 055.
- Anchors are designed under the responsibility of the engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under seismic actions (cracked concrete) have to be designed in accordance to EN 1992-4:2018.

R-KER-II, R-KER-II-S and R-KER-II-W	Annex B1 of European Technical Assessment ETA-21/0242
Intended use Specifications	

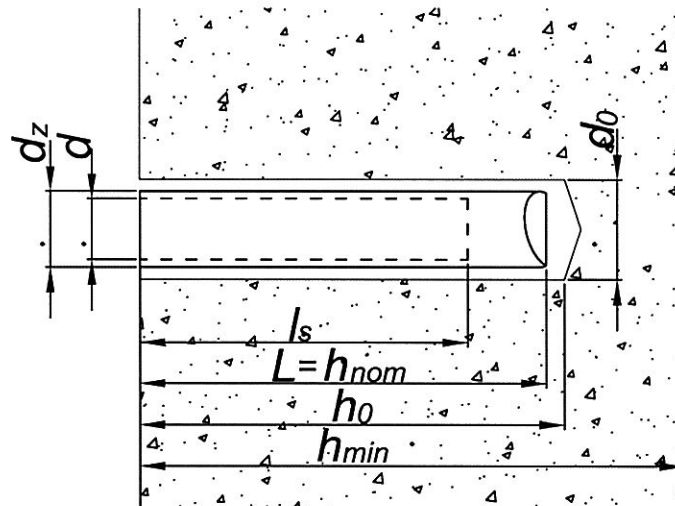
**Table B1: Installation parameters – threaded anchor rod**

Size		M8	M10	M12	M16	M20	M24	M30
Diameter of anchor rod	d [mm]	8	10	12	16	20	24	30
Nominal drilling diameter	d ₀ [mm]	10	12	14	18	24	28	35
Maximum diameter hole in the fixture	d _f [mm]	9	12	14	18	22	26	33
Effective embedment depth	h _{ef,min} [mm]	60	60	60	60	80	96	120
	h _{ef,max} [mm]	160	200	240	320	400	480	600
Depth of the drilling hole	h ₀ [mm]	h _{ef} + 5 mm						
Minimum thickness of the concrete slab	h _{min} [mm]	h _{ef} + 30 mm; ≥ 100 mm				h _{ef} + 2d ₀		
Maximum installation torque	T _{inst,max} [N·m]	10	20	40	80	120	160	200
Minimum spacing	s _{min} [mm]	40	40	40	40	40	50	60
Minimum edge distance	c _{min} [mm]	40	40	40	40	40	50	60

R-KER-II, R-KER-II-S and R-KER-II-W

Intended use
Installation parameters – threaded anchor rod

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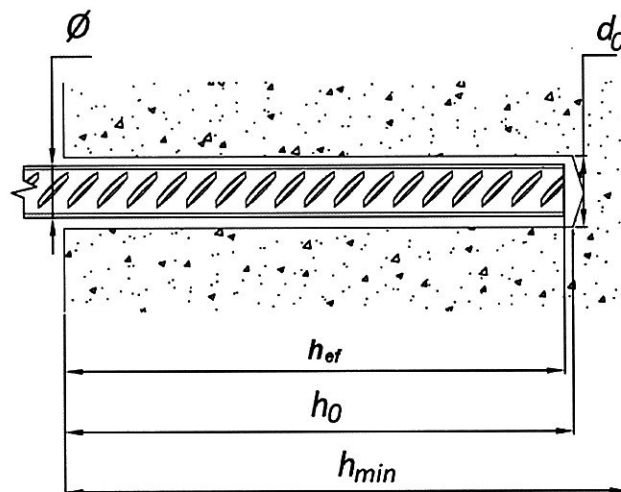
**Table B2: Installation parameters – anchor rod with inner thread**

Size		M6/ Ø10 /75	M8/ Ø12/ 75	M8/ Ø12/ 90	M10/Ø 16/ 75	M10/Ø 16/ 100	M12/Ø 16/ 100	M16/Ø 24/ 125
Nominal drilling diameter	d_0 [mm]	12	14	14	20	20	20	28
Maximum diameter hole in the fixture	d_f [mm]	7	9	9	12	12	14	18
Effective embedment depth	$h_{ef} = h_{nom}$ [mm]	75	75	90	75	100	100	125
Thread length, min	l_s [mm]	24	25	25	30	30	35	50
Depth of the drilling hole	h_0 [mm]	$h_{ef} + 5$ mm						
Minimum thickness of the concrete slab	h_{min} [mm]	$h_{ef} + 30$ mm; ≥ 100 mm				$h_{ef} + 2d_0$		
Maximum installation torque	$T_{inst,max}$ [N·m]	3	5	5	10	10	20	40
Minimum spacing	s_{min} [mm]	40	40	50	40	50	50	70
Minimum edge distance	c_{min} [mm]	40	40	50	40	50	50	70

R-KER-II, R-KER-II-S and R-KER-II-W

Intended use
Installation parameters – anchor rod with inner thread

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**Table B3: Installation parameters – rebar**

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Nominal drilling diameter	d_0 [mm]	12	14	18	18	22	26	32	40
Effective embedment depth	$h_{ef,min}$ [mm]	60	60	60	60	64	80	100	128
	$h_{ef,max}$ [mm]	160	200	240	240	320	400	500	640
Depth of the drilling hole	h_0 [mm]	$h_{ef} + 5$ mm							
Minimum thickness of the concrete slab	h_{min} [mm]	$h_{ef} + 30$ mm; ≥ 100 mm				$h_{ef} + 2d_0$			
Minimum spacing	s_{min} [mm]	40	40	40	40	40	40	50	70
Minimum edge distance	c_{min} [mm]	40	40	40	40	40	40	50	70

R-KER-II, R-KER-II-S and R-KER-II-W

Intended use
Installation parameters – rebar

Annex B4
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Table B4: Maximum processing time and minimum curing time

R-KER-II (standard version)			
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing (open) time [min]	Minimum curing time ¹⁾ [min]
+5	-5	40	1440
+5	0	30	180
+5	+5	15	90
+10	+10	8	60
+15	+15	5	60
+20	+20	2,5	45
+25	+25	2	45
+25	+30	2	45
+25	+35	1,5	30
+25	+40	1,5	30

Table B5: Maximum processing time and minimum curing time

R-KER-II-S (version for summer season)			
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing time [min.]	Minimum curing time ¹⁾ [min.]
+5	+5	40	720
+10	+10	20	480
+15	+15	15	360
+20	+20	10	240
+25	+25	9,5	180
+25	+30	7	120
+25	+35	6,5	120
+25	+40	6,5	90

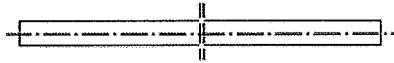
Table B6: Maximum processing time and minimum curing time

R-KER-II-W (version for winter season)			
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing time [min.]	Minimum curing time ¹⁾ [min.]
+5	-20	100	1440
+5	-15	60	960
+5	-10	40	480
+5	-5	20	240
+5	0	14	120
+5	+5	9	60
+10	+10	5,5	45
+15	+15	3	30
+20	+20	2	15
+25	+25	1,5	10
+25	+30	1,5	10
+25	+35	1	5
+25	+40	1	5

¹⁾ The minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer). Minimum mortar temperature for installation +5°C; maximum mortar temperature for installation +25°C. For wet condition and flooded holes the curing time must be doubled.

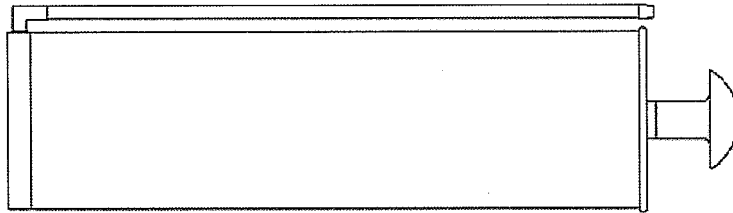
R-KER-II, R-KER-II-S and R-KER-II-W	Annex B5 of European Technical Assessment ETA-21/0242
Intended use Maximum processing time and minimum curing time	

Additional mixer extension

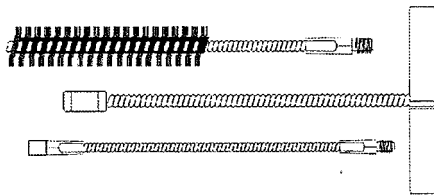
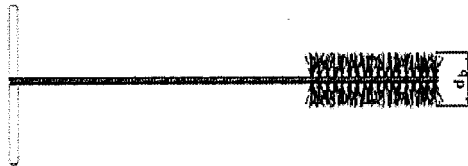


*Variable length from 300 mm up 1000 mm

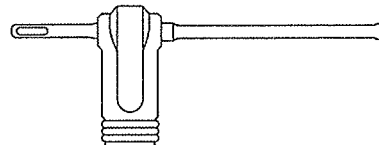
Manual blower pump



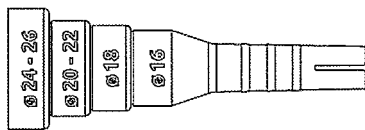
Steel brush



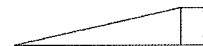
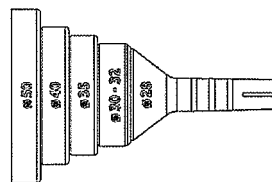
Brush with extension



Hollow drill bit with vacuum cleaner



Piston plugs



Temporary centring wedge

R-KER-II, R-KER-II-S and R-KER-II-W

Intended use
Tools (1)

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Dispensers	Cartridge or foil capsule size
 <p>Manual gun for coaxial cartridges</p>	380, 400, 410 and 420 ml
 <p>Manual gun for side by side cartridges</p>	345 ml
 <p>Manual gun for foil capsule in cartridge and coaxial cartridges</p>	150, 175, 280, 300 and 310 ml
 <p>Manual gun for foil capsules CFS+</p>	300 to 600 ml
 <p>Cordless dispenser gun for coaxial cartridges</p>	380, 400, 410 and 420 ml
 <p>Cordless dispenser gun for foil capsules</p>	300 to 600 ml
 <p>Pneumatic gun for coaxial cartridges</p>	380, 400, 410 and 420 ml
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B7 of European Technical Assessment ETA-21/0242</p>
<p>Intended use Tools (2)</p>	

Table B7: Brush diameter for threaded rod

Threaded rod diameter			M8	M10	M12	M16	M20	M24	M30
d _b	Brush diameter	[mm]	12	14	16	20	26	30	37

Table B8: Standard brush diameter for rod with inner thread

Threaded rod diameter			M6/Ø10	M8/Ø12	M10/Ø16	M12/ Ø16	M16/Ø24
d _b	Brush diameter	[mm]	16	16	22	22	30

Table B9: Brush diameter for rebar

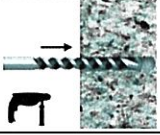
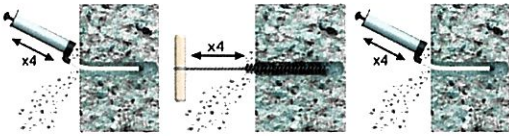
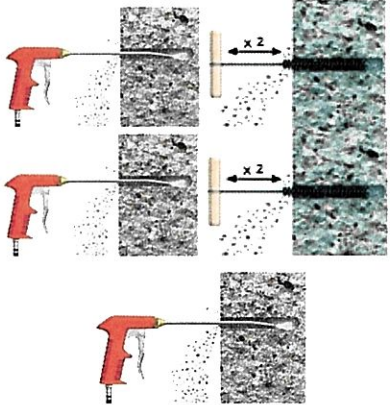

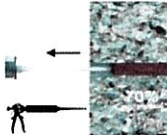
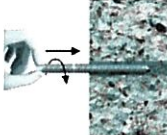
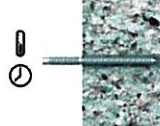
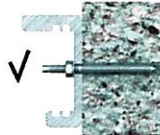
Rebar diameter			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
d _b	Brush diameter	[mm]	14	16	20	20	24	28	37	42

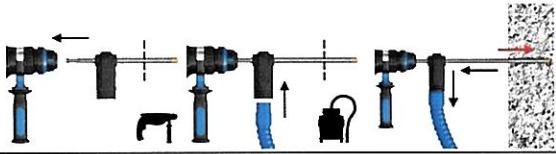

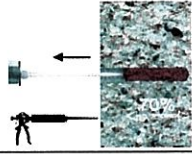
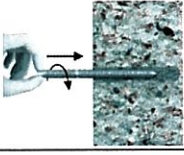
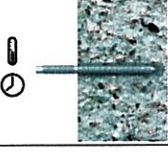
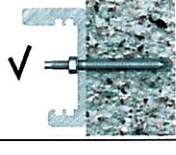
Table B10: Piston plug size

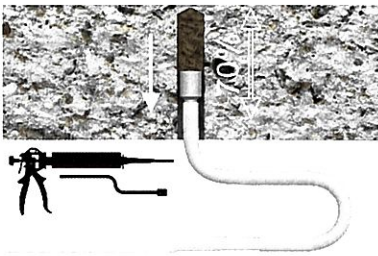
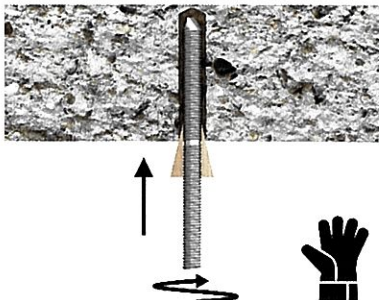
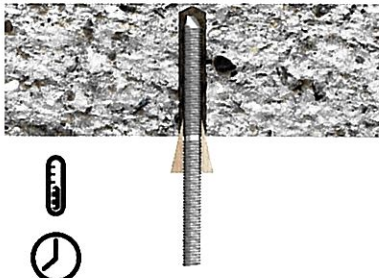
Hole diameter [mm]	16	18	20	22	24	25	26	28	30	32	35	40	50
Piston plug description	Ø16	Ø18	Ø20 to Ø22	Ø24 to Ø26			Ø28	Ø30 to 32		Ø35	Ø40	Ø50	

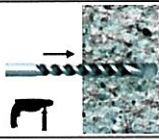
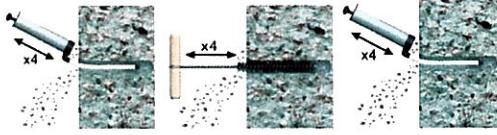
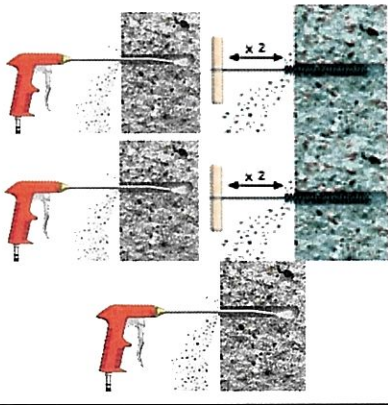


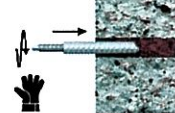

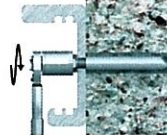
R-KER-II, R-KER-II-S and R-KER-II-W

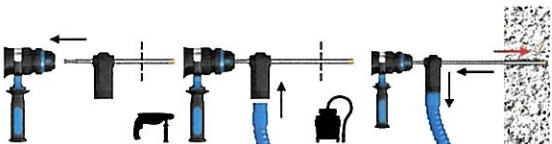

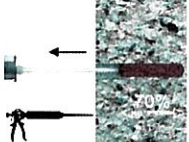
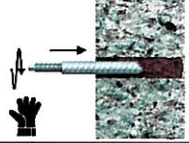
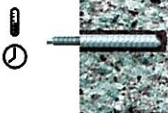

Intended use
Tools (2)Annex B8
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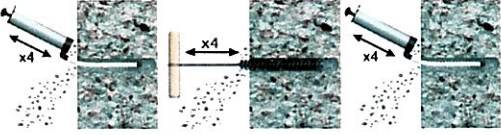
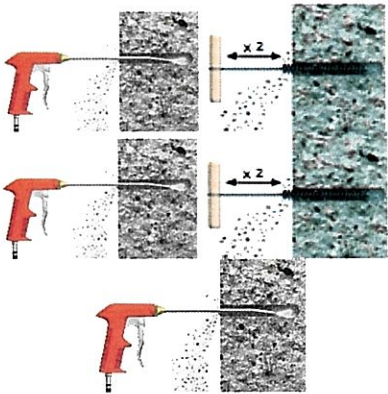

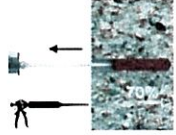
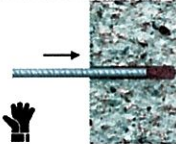
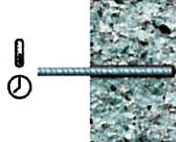
	<p>1. Drill hole to the required diameter and depth using a rotary percussive machine</p>
<p>a.</p>  <p>b.</p> 	<p>2. Hole cleaning.</p> <p>a. Clean the hole with brush and hand pump:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least 4 times using the hand pump, - using the specified brush, mechanically brush out the hole at least 4 times, - starting from the drill hole bottom, blow at least 4 times with the hand pump. <p>b. Cleaning hole with compressed air:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least twice by compressed air (6 atm), - using the specified brush, mechanically brush out the hole at least twice, - blow the hole at least twice by compressed air (6atm), - brush out the hole at least twice, - blow over the hole at least twice by compressed air (6atm).
	<p>3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).</p>
	<p>4. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>
	<p>5. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>
	<p>6. Leave the fixing undisturbed until the curing time elapses.</p>
	<p>7. Attach fixture and tighten the nut to the required installation torque. The applied installation torque cannot exceed $T_{inst,max}$.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	
<p>Intended use Installation instruction – threaded rod – standard cleaning</p>	
<p>Annex B9 of European Technical Assessment ETA-21/0242</p>	

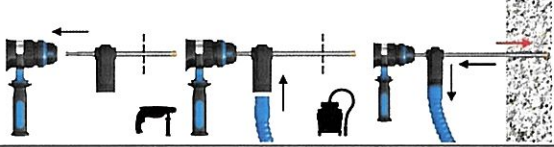

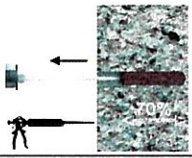
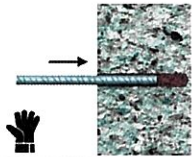
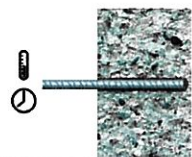
	<p>1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.</p>
	<p>2. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained.</p>
	<p>3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>
	<p>4. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>
	<p>5. Leave the fixing undisturbed until the curing time elapses.</p>
	<p>6. Attach fixture and tighten the nut to the required installation torque. The applied installation torque cannot exceed $T_{inst,max}$.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B10 of European Technical Assessment ETA-21/0242</p>
<p>Intended use Installation instruction – threaded rod – cleaning with hollow drill bit (special cleaning method)</p>	

	<ol style="list-style-type: none"> 1. Inject from the bottom of the hole. Inject the mortar about 2/3 of the hole depth. For best performance use extension and appropriately sized piston plug assembled on the mixer.
	<ol style="list-style-type: none"> 2. Drive the stud immediately into the hole. Use temporary interlocking element.
	<ol style="list-style-type: none"> 3. Leave the fixing undisturbed until the curing time elapses. To avoid the slipping of the stud during the open time of the product (due to the stud own weight) use a temporary interlocking element.
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	
<p>Intended use Installation instruction – threaded rod – overhead installation</p>	<p>Annex B11 of European Technical Assessment ETA-21/0242</p>

	<p>1. Drill hole to the required diameter and depth using a rotary percussive machine.</p>
<p>a.</p>  <p>b.</p> 	<p>2. Hole cleaning.</p> <p>a. Clean the hole with brush and hand pump:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least 4 times using the hand pump, - using the specified brush, mechanically brush out the hole at least 4 times, - starting from the drill hole bottom, blow at least 4 times with the hand pump. <p>b. Cleaning hole with compressed air:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least twice by compressed air (6 atm), - using the specified brush, mechanically brush out the hole at least twice, - blow the hole at least twice by compressed air (6 atm), - brush out the hole at least twice, - blow over the hole at least twice by compressed air (6 atm).
	<p>3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).</p>
	<p>4. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>
	<p>5. Immediately insert the rod with inner thread, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>
	<p>6. Leave the fixing undisturbed until the curing time elapses.</p>
	<p>7. Attach fixture and tighten the bolt to the required installation torque. The applied installation torque cannot exceed $T_{inst,max}$.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B12</p> <p>of European Technical Assessment ETA-21/0242</p>
<p>Intended use</p> <p>Installation instruction – anchor rod with inner thread – standard cleaning</p>	

	<p>1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.</p>
	<p>2. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).</p>
	<p>3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>
	<p>4. Immediately insert the rod with inner thread, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>
	<p>5. Leave the fixing undisturbed until the curing time elapses.</p>
	<p>6. Attach fixture and tighten the bolt to the required installation torque. The applied installation torque cannot exceed $T_{inst,max}$.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	
<p>Intended use Installation instruction—anchor rod with inner thread – cleaning with hollow drill bit (special cleaning method)</p>	<p>Annex B13 of European Technical Assessment ETA-21/0242</p>

	<p>1. Drill hole to the required diameter and depth using a rotary percussive machine.</p>			
<p>a.</p>  <p>b.</p> 	<p>2. Hole cleaning.</p> <p>a. Cleaning hole with brush and hand pump:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least 4 times using the hand pump, - using the specified brush, mechanically brush out the hole at least 4 times, - starting from the drill hole bottom, blow at least 4 times with the hand pump. <p>b. Cleaning hole with compressed air:</p> <ul style="list-style-type: none"> - starting from the drill hole bottom blow the hole at least twice by compressed air (6 atm), - using the specified brush, mechanically brush out the hole at least twice, - blow the hole at least twice by compressed air (6 atm), - brush out the hole at least twice, - blow over the hole at least twice by compressed air (6atm). 			
	<p>3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).</p>			
	<p>4. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>			
	<p>5. Immediately insert the rebar, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>			
	<p>6. Leave the fixing undisturbed until the curing time elapses.</p>			
<table border="1"> <tr> <td data-bbox="180 1758 1082 1881"> <p>R-KER-II, R-KER-II-S and R-KER-II-W</p> </td><td data-bbox="1082 1758 1406 2002" rowspan="2"> <p>Annex B14 of European Technical Assessment ETA-21/0242</p> </td></tr> <tr> <td data-bbox="180 1881 1082 2002"> <p>Intended use Installation instruction – rebar – standard cleaning</p> </td></tr> </table>		<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B14 of European Technical Assessment ETA-21/0242</p>	<p>Intended use Installation instruction – rebar – standard cleaning</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B14 of European Technical Assessment ETA-21/0242</p>			
<p>Intended use Installation instruction – rebar – standard cleaning</p>				

	<p>1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.</p>
	<p>2. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).</p>
	<p>3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.</p>
	<p>4. Immediately insert the rebar, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.</p>
	<p>5. Leave the fixing undisturbed until the curing time elapses.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	
<p>Intended use Installation instruction – rebar – cleaning with hollow drill bit (special cleaning method)</p>	
<p>Annex B15 of European Technical Assessment ETA-21/0242</p>	

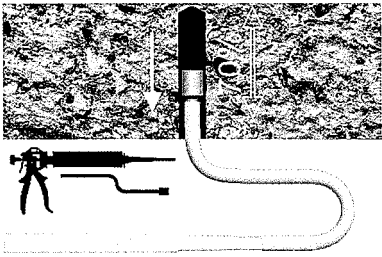
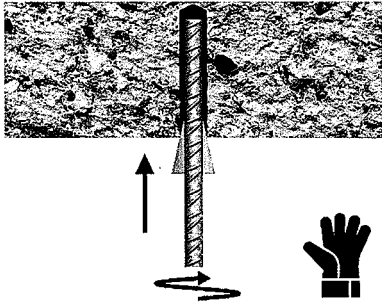
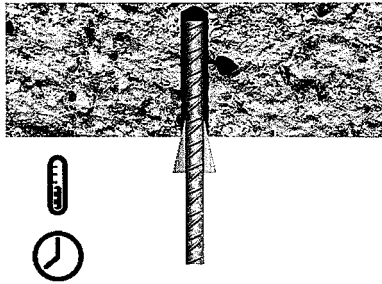
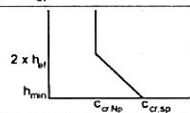
	<p>1. Inject from the bottom of the hole. Inject the mortar about 2/3 of the hole depth. For best performance use extension and appropriately sized piston plug assembled on the mixer.</p>
	<p>2. Drive the rebar immediately into the hole. Use temporary interlocking element.</p>
	<p>3. Leave the fixing undisturbed until the curing time elapses. To avoid the slipping of the rebar during the open time of the product (due to the rebar own weight) use a temporary interlocking element.</p>
<p>R-KER-II, R-KER-II-S and R-KER-II-W</p>	<p>Annex B16 of European Technical Assessment ETA-21/0242</p>
<p>Intended use Installation instruction – rebar – overhead installation</p>	

Table C1: Characteristic resistance under tension load for threaded rod in uncracked concrete

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
Steel failure with threaded rod grade 5.8									
Characteristic resistance	N _{Rk,s}	[kN]	18	29	42	78	122	176	280
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,50						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	N _{Rk,s}	[kN]	29	46	67	125	196	282	448
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,50						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	N _{Rk,s}	[kN]	36	58	84	157	245	353	561
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,40						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	N _{Rk,s}	[kN]	43	69	101	188	294	423	673
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,40						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	N _{Rk,s}	[kN]	25	40	59	109	171	247	392
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,87						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	N _{Rk,s}	[kN]	29	46	67	125	196	282	448
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,60						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	N _{Rk,s}	[kN]	25	40	59	109	171	247	392
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,87						
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	N _{Rk,s}	[kN]	51	81	118	219	343	494	785
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	N _{Rk,s}	[kN]	54	87	126	235	367	529	841
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	N _{Rk,s}	[kN]	58	92	134,9	251	392	564	897
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,5						
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,50}	[N/mm ²]	16,0	15,0	15,0	13,0	10,0	10,0	8,0
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,50}	[N/mm ²]	16,0	15,0	15,0	13,0	10,0	10,0	8,0
Temperature range III: 80°C / 120°C	τ _{Rk,ucr,50}	[N/mm ²]	8,5	8,0	8,0	7,0	5,5	5,5	4,5
Increasing factor	ψ _c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						
Sustained load factor	ψ ⁰ _{std}	24°C / 40°C	0,72						
		50°C / 80°C	0,72						
		80°C / 120°C	0,61						
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,100}	[N/mm ²]	15,0	15,0	14,0	13,0	10,0	9,5	8,0
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,100}	[N/mm ²]	15,0	15,0	14,0	13,0	10,0	9,5	8,0
Increasing factor	ψ _c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						

R-KER-II, R-KER-II-S and R-KER-II-WCharacteristic resistance under tension loads for threaded rod
in uncracked concrete**Annex C1**
of European
Technical Assessment
ETA-21/0242

Table C1 (continuation)

Size			M8	M10	M12	M16	M20	M24	M30
Concrete cone failure in uncracked concrete									
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0						
Edge distance	$c_{ucr,N}$	[mm]	$1,5 \cdot h_{ef}$						
Spacing	$s_{ucr,N}$	[mm]	$3,0 \cdot h_{ef}$						
Splitting failure									
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$					$1,5 \cdot h_{ef}$	
	$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)								
	$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$						
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$						
Installation safety factor for combined pull-out, concrete cone and splitting failure									
Installation safety factors for in use category I1	standard cleaning	γ_{inst}	[-]	1,0					
	special cleaning			1,2	1,0				1,2
Installation safety factors for in use category I2	standard cleaning			1,0					
	special cleaning			1,2	1,0				1,2

¹⁾ In the absence of other national regulation.

²⁾ h – concrete member thickness.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under tension loads for threaded rod
in uncracked concrete

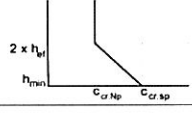
Annex C2
of European
Technical Assessment
ETA-21/0242

Table C2: Characteristic resistance under tension loads for threaded rod in cracked concrete

Size										M8	M10	M12	M16	M20	M24	M30
Steel failure																
Steel failure with threaded rod grade 5.8																
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	280							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50													
Steel failure with threaded rod grade 8.8																
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50													
Steel failure with threaded rod grade 10.9																
Characteristic resistance	$N_{Rk,s}$	[kN]	36	58	84	157	245	353	561							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,40													
Steel failure with threaded rod grade 12.9																
Characteristic resistance	$N_{Rk,s}$	[kN]	43	69	101	188	294	423	673							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,40													
Steel failure with stainless steel threaded rod A4-70																
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,87													
Steel failure with stainless steel threaded rod A4-80																
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,60													
Steel failure with high corrosion resistant steel grade 70																
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,87													
Steel failure with ultra-high strength steel threaded rod grade 14.8																
Characteristic resistance	$N_{Rk,s}$	[kN]	51	81	118	219	343	494	785							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5													
Steel failure with ultra-high strength steel threaded rod grade 15.8																
Characteristic resistance	$N_{Rk,s}$	[kN]	54	87	126	235	367	529	841							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5													
Steel failure with ultra-high strength steel threaded rod grade 16.8																
Characteristic resistance	$N_{Rk,s}$	[kN]	58	92	134,9	251	392	564	897							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5													
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years																
Characteristic bond resistance																
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm ²]	10,0	11,0	11,0	9,5	7,5	7,0	5,0							
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm ²]	10,0	11,0	11,0	9,5	7,5	7,0	5,0							
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm ²]	5,0	6,0	6,0	5,0	4,0	4,0	3,0							
Increasing factor	ψ_c	C30/37	1,04													
		C40/50	1,07													
		C50/60	1,09													
Sustained load factor	ψ_{stls}^{ρ}	24°C / 40°C	0,72													
		50°C / 80°C	0,72													
		80°C / 120°C	0,61													
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 100 years																
Characteristic bond resistance																
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,100}$	[N/mm ²]	9,5	10,0	10,5	9,5	7,5	7,0	5,0							
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,100}$	[N/mm ²]	9,5	10,0	10,5	9,5	7,5	7,0	5,0							
Increasing factor	ψ_c	C30/37	1,04													
		C40/50	1,07													
		C50/60	1,09													

R-KER-II, R-KER-II-S and R-KER-II-WCharacteristic resistance under tension loads for threaded rod
in cracked concrete**Annex C3**of European
Technical Assessment
ETA-21/0242

Table C2 (continuation)

Size			M8	M10	M12	M16	M20	M24	M30
Concrete cone failure in cracked concrete									
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7						
Edge distance	$c_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$						
Spacing	$s_{cr,N}$	[mm]	$3,0 \cdot h_{ef}$						
Splitting failure									
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$					$1,5 \cdot h_{ef}$	
	$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)								
	$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$						
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$						
Installation safety factor for combined pull-out, concrete cone and splitting failure									
Installation safety factors for in use category I1	standard cleaning	γ_{inst}	[-]	1,0					
	special cleaning			1,2	1,0				1,2
Installation safety factors for in use category I2	standard cleaning			1,0					
	special cleaning			1,2	1,0				1,2

¹⁾ In the absence of other national regulation.

²⁾ h – concrete member thickness.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under tension loads for threaded rod
in cracked concrete

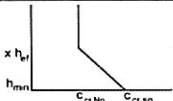
Annex C4
of European
Technical Assessment
ETA-21/0242

Table C3: Characteristic resistance under tension load for rod with inner thread in uncracked concrete

Size			M6 /Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure							
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	N _{Rk,s}	[kN]	10	18	29	42	78
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,50				
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	N _{Rk,s}	[kN]	16	29	46	67	125
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,50				
Steel failure with stainless steel rod with inner thread threaded rod A4-70							
Characteristic resistance	N _{Rk,s}	[kN]	14	25	40	59	109
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,87				
Steel failure with stainless steel rod with inner thread A4-80							
Characteristic resistance	N _{Rk,s}	[kN]	16	29	46	67	125
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,60				
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	N _{Rk,s}	[kN]	14	25	40	59	109
Partial safety factor ¹⁾	γ _{Ms}	[-]	1,87				
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years							
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,50}	[N/mm ²]	11,0	14,0	11,0	11,0	8,0
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,50}	[N/mm ²]	11,0	14,0	11,0	11,0	8,0
Temperature range III: 80°C / 120°C	τ _{Rk,ucr,50}	[N/mm ²]	6,0	7,0	6,0	6,0	4,0
Increasing factor	ψ _c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ ⁰ _{stss}	24°C/40°C	0,72				
		50°C/80°C	0,72				
		80°C / 120°C	0,61				
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years							
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,100}	[N/mm ²]	10,0	13,0	10,0	11,0	8,0
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,100}	[N/mm ²]	10,0	13,0	10,0	11,0	8,0
Increasing factor	ψ _c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00

R-KER-II, R-KER-II-S and R-KER-II-WCharacteristic resistance under tension loads for rod with inner thread
in uncracked concrete**Annex C5**of European
Technical Assessment
ETA-21/0242

Table C3: (continuation)

Resistance to concrete cone failure in uncracked concrete				
Factor for ucracked concrete	$k_{ucr,N}$	[-]	11,0	
Edge distance	$c_{ucr,N}$	[mm]	$1,5 \cdot h_{ef}$	
Spacing	$s_{ucr,N}$	[mm]	$3,0 \cdot h_{ef}$	
Splitting failure				
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$	$1,5 \cdot h_{ef}$
	$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)			
	$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$	
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$	
Installation safety factor for combined pull-out, concrete cone and splitting failure				
Installation safety factors for use category I1 ¹⁾	standard cleaning	γ_{inst}	[-]	1,0
	special cleaning			1,0
Installation safety factors for use category I2 ¹⁾	standard cleaning			1,0
	special cleaning			1,0

¹⁾ In the absence of other national regulation.

²⁾ h – concrete member thickness.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under tension loads for rod with inner thread
in uncracked concrete

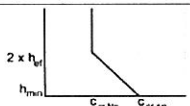
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Table C4: Characteristic resistance under tension loads for rod with inner thread in cracked concrete

Size			M6 /Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure							
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	10	18	29	42	78
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50				
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50				
Steel failure with stainless steel rod with inner thread A4-70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,87				
Steel failure with stainless steel rod with inner thread rod A4-80							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,60				
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,87				
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm ²]	10,0	10,0	9,5	9,0	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm ²]	10,0	10,0	9,5	9,0	4,0
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm ²]	5,0	6,0	5,0	5,0	2,0
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ_{sust}^0	24°C/40°C	0,72				
		50°C/80°C	0,72				
		80°C / 120°C	0,61				
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 100 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,100}$	[N/mm ²]	7,0	9,5	9,0	8,5	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,100}$	[N/mm ²]	7,0	9,5	9,0	8,5	4,0
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00

R-KER-II, R-KER-II-S and R-KER-II-WCharacteristic resistance under tension loads for rod with inner thread
in cracked concrete**Annex C6**
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Table C4: (continuation)

Cone failure in cracked concrete				
Factor for cracked concrete	$k_{cr,N}$	[-]	7,7	
Edge distance	$C_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$	
Spacing	$S_{cr,N}$	[mm]	$3,0 \cdot h_{ef}$	
Splitting failure				
Edge distance	$C_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$	$1,5 \cdot h_{ef}$
	$C_{cr,sp}$ for $h_{min} < h^2) < 2 \cdot h_{ef}$ ($C_{cr,sp}$ from linear interpolation)			
	$C_{cr,sp}$ for $h^2) \geq 2 \cdot h_{ef}$		$C_{cr,N}$	
Spacing	$S_{cr,sp}$	[mm]	$2,0 \cdot C_{cr,sp}$	
Installation safety factor for combined pull-out, concrete cone and splitting failure				
Installation safety factors for use category I1	standard cleaning	γ_{inst}	[-]	1,0
	special cleaning			1,0
Installation safety factors for use category I2	standard cleaning			1,0
	special cleaning			1,0

¹⁾ In the absence of other national regulation.

²⁾ h – concrete member thickness.

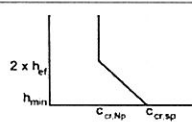
R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under tension loads for rod with inner thread
in cracked concrete

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Table C5: Characteristic resistance under tension load for rebar in uncracked concrete

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$N_{Rk,s}$	[kN]	$A_s^{3)} \cdot f_{uk}^{4)}$							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,40							
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,50}$	[N/mm ²]	13,0	14,0	14,0	13,0	13,0	10,0	9,0	7,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,50}$	[N/mm ²]	13,0	14,0	14,0	13,0	13,0	10,0	9,0	7,5
Temperature range III: 80°C / 120°C	$\tau_{Rk,ucr,50}$	[N/mm ²]	7,0	7,0	7,0	7,0	7,0	5,5	5,0	4,0
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ_{s15}^{ρ}	24°C/40°C	0,72							
		50°C/80°C	0,72							
		80°C / 120°C	0,61							
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,100}$	[N/mm ²]	12,0	14,0	14,0	12,0	12,0	10,0	8,5	7,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,100}$	[N/mm ²]	12,0	14,0	14,0	12,0	12,0	10,0	8,5	7,5
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Concrete cone failure in uncracked concrete										
Factor for non-cracked concrete	$k_{ucr,N}$	[-]	11,0							
Edge distance	$c_{ucr,N}$	[mm]	$1,5 \cdot h_{ef}$							
Spacing	$s_{ucr,N}$	[mm]	$3,0 \cdot h_{ef}$							
Splitting failure										
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$						$1,5 \cdot h_{ef}$	
	$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)									
	$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$							
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$							
Installation safety factor for combined pull-out, concrete cone and splitting failure										
Installation safety factors for use category I1	standard cleaning	γ_{inst}	[-]	1,0						
	special cleaning			1,2	1,0					1,2
Installation safety factors for use category I2	standard cleaning			1,2						
	special cleaning			1,2	1,0					1,2

¹⁾ In the absence of other national regulation.

²⁾ h – concrete member thickness.

³⁾ Stressed cross section of the steel.

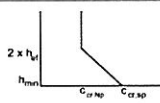
⁴⁾ Acc. to EN 1992-1-1.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under tension loads for rebar
in non-cracked concrete

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Table C6: Characteristic resistance under tension loads for rebar in cracked concrete

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$N_{Rk,s}$	[kN]	$A_s^{3)} \cdot f_{uk}^{4)}$							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,40							
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm ²]	8	9	10	10	8,5	7,5	6	3,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm ²]	8	9	10	10	8,5	7,5	6	3,5
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm ²]	4,5	5	5	5	4,5	4	3	2
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ_{sus}^0	24°C/40°C	0,72							
		50°C/80°C	0,72							
		80°C / 120°C	0,61							
Combined pull-out and concrete cone failure in non-cracked concrete C20/25 for a working life of 100 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,100}$	[N/mm ²]	7,5	9	10	10	8,5	7,5	6	3,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,100}$	[N/mm ²]	7,5	9	10	10	8,5	7,5	6	3,5
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Concrete cone failure in cracked concrete										
Factor for racked concrete	$k_{cr,N}$	[-]	7,7							
Edge distance	$c_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$							
Spacing	$s_{cr,N}$	[mm]	$3,0 \cdot h_{ef}$							
Splitting failure										
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$						$1,5 \cdot h_{ef}$	
	$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)									
	$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$							
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$							
Installation safety factor for combined pull-out, concrete cone and splitting failure										
Installation safety factors for use category I1 ¹⁾	standard cleaning	γ_{inst}	[-]	1,0						
	special cleaning			1,2	1,0					1,2
Installation safety factors for use category I2 ¹⁾	standard cleaning			1,2						
	special cleaning			1,2	1,0					1,2

¹⁾ In the absence of other national regulation.²⁾ h – concrete member thickness.³⁾ Stressed cross section of the steel.⁴⁾ Acc. to EN 1992-1-1.**R-KER-II, R-KER-II-S and R-KER-II-W**Characteristic resistance under tension loads for rebar
in cracked concrete**Annex C8**
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Table C7: Characteristic resistance under shear loads for threaded rod – steel failure without lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	9	14	21	39	61	88	140
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,25			
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	224
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,25			
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$V_{Rk,s}$	[kN]	18	29	42	78	122	176	280
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,50			
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$V_{Rk,s}$	[kN]	22	35	51	94	147	212	336
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,50			
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124	196
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,56			
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	224
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,33			
Steel failure with high corrosion stainless steel grade 70									
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124	196
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,56			
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	25	40	59	109	171	247	392
Factor considering ductility	k_7					0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,50			
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	27	43	63	117	183	264	420
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,50			
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	29	46	67	125	196	282	448
Factor considering ductility	k_7	[-]				0,8			
Partial safety factor ¹⁾	γ_{Ms}	[-]				1,50			

¹⁾ In the absence of other national regulation.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under shear loads for threaded rod
in cracked and non-cracked concrete

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Table C8: Characteristic resistance under shear loads for threaded rod – steel failure with lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	19	37	65	166	324	561	1124
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,25						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	37	75	131	333	649	1123	2249
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	45	90	157	400	779	1347	2698
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,56						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,33						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,56						
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	52	104	183	466	908	1571	3148
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50						
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	56	112	196	499	973	1683	3373
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50						
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	59	119	209	532	1038	1796	3598
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,50						

¹⁾ In the absence of other national regulation.

Table C9: Characteristic resistance under shear loads – pry out and concrete edge failure for threaded rod

Size			M8	M10	M12	M16	M20	M24	M30	
Pry out failure										
Pry out factor	k_8	[-]	2							
Concrete edge failure										
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24	30	
Effective length of anchor under shear loading	l_f	[mm]	$l_f = h_{ef}$ and $\leq 12 d_{nom}$							$l_f = h_{ef}$ and $\leq \max(8 \cdot d_{nom}; 300 \text{ mm})$

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under shear loads for threaded rod
in cracked and non-cracked concrete

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Table C10: Characteristic resistance under shear loads for rod with inner thread – steel failure without lever arm

Size			M6 /Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$V_{Rk,s}$	[kN]	5,0	9,2	14,5	21,1	39,3
Factor considering ductility	k_7	[-]			0,8		
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,25		
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$V_{Rk,s}$	[kN]	8,0	14,6	23,2	33,7	62,8
Factor considering ductility	k_7	[-]	0,8				
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,25		
Steel failure with stainless steel for rod with inner thread A4-70							
Characteristic resistance	$V_{Rk,s}$	[kN]	7,0	12,8	20,3	29,5	55,0
Factor considering ductility	k_7	[-]			0,8		
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,56		
Steel failure with stainless steel for rod with inner thread A4-80							
Characteristic resistance	$V_{Rk,s}$	[kN]	8,0	14,6	23,2	33,7	62,8
Factor considering ductility	k_7	[-]			0,8		
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,33		
Steel failure with high corrosion stainless steel grade 70							
Characteristic resistance	$V_{Rk,s}$	[kN]	7,0	12,8	20,3	29,5	55,0
Factor considering ductility	k_7	[-]			0,8		
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,56		

¹⁾ In the absence of other national regulation.**Table C11: Characteristic resistance under shear loads for rod with inner thread - steel failure with lever arm**

Size			M6 /Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	7,6	18,7	37,4	65,5	166,5
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,25		
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	12,2	30,0	59,8	104,8	266,4
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,25		
Steel failure with stainless steel for rod with inner thread A4-70							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	10,7	26,2	52,3	91,7	233,1
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,56		
Steel failure with stainless steel for rod with inner thread A4-80							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	12,2	30,0	59,8	104,8	266,4
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,33		
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	10,7	26,2	52,3	91,7	233,1
Partial safety factor ¹⁾	γ_{Ms}	[-]			1,56		

¹⁾ In the absence of other national regulation.**Table C12: Characteristic resistance under shear loads – pry out and concrete edge failure for rod with inner thread**

Size			M6 /Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Pry out failure							
Factor	k_8	[-]			2		
Concrete edge failure							
Outside diameter of anchor	d_{nom}	[mm]	10	12	16	16	24
Effective length of anchor under shear loading	l_f	[mm]			$l_f = h_{ef}$ and $\leq 12 d_{nom}$		

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under shear loads for threaded rod in cracked and non-cracked concrete

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Table C13: Characteristic resistance under shear loads for rebar – steel failure without lever arm

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$V_{Rk,s}$	[kN]	$0,5 \cdot A_s^{2)} \cdot f_{uk}^{3)}$							
Factor considering ductility	k_7	[-]	0,8							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5							

¹⁾ In the absence of other national regulation.²⁾ Stressed cross section of the steel element.³⁾ Acc. to EN 1992-1-1.**Table C14: Characteristic resistance under shear loads for rebar – steel failure with lever arm**

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	$1,2 \cdot W_{el}^{2)} \cdot f_{uk}^{3)}$							
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5							

¹⁾ In the absence of other national regulation.²⁾ Elastic section modulus calculated from the stressed cross section of steel element.³⁾ Acc. to EN 1992-1-1.**Table C15: Characteristic resistance under shear loads – pry out and concrete edge failure for rebar**

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	
Pry out failure											
Factor	k ₈	[-]	2								
Concrete edge failure											
Outside diameter of anchor	d _{nom}	[mm]	8	10	12	14	16	20	25	32	
Effective length of anchor under shear loading	l _f	[mm]	l _f = h _{ef} and ≤ 12 d _{nom}								l _f = h _{ef} and ≤ max (8·d _{nom} ; 300 mm)

R-KER-II, R-KER-II-S and R-KER-II-WCharacteristic resistance under shear loads
in cracked and non-cracked concrete**Annex C12**
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Table C16: Displacement under tension loads – threaded rod

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads									
Displacement ¹⁾	δ_{N0}	[mm]	0,3	0,4	0,4	0,5	0,5	0,6	0,7
	$\delta_{N\%}$	[mm]	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads									
Displacement ¹⁾	δ_{N0}	[mm]	0,3	0,4	0,4	0,5	0,5	0,6	0,6
	$\delta_{N\%}$	[mm]	2	2	2	2	2	2	2
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0\text{-factor}} \cdot N$; $\delta_N = \delta_{N\% \text{-factor}} \cdot N$; (N – applied tension load)									

Table C17: Displacement under shear loads – threaded rod

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads									
Displacement ¹⁾	δ_{V0}	[mm]	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	$\delta_{V\%}$	[mm]	3,7	3,7	3,7	3,7	3,7	3,7	3,7
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0\text{-factor}} \cdot V$; $\delta_V = \delta_{V\% \text{-factor}} \cdot V$; (V – applied shear load)									

R-KER-II, R-KER-II-S and R-KER-II-W

Displacement under service loads: tension and shear loads – threaded rod

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Table C18: Displacement under tension loads – rod with inner thread

Size		M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads						
Displacement ¹⁾	δ_{N0}	[mm]	0,2	0,3	0,3	0,4
	$\delta_{N\infty}$	[mm]	0,6	0,6	0,6	0,6
Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads						
Displacement ¹⁾	δ_{N0}	[mm]	0,3	0,4	0,4	0,5
	$\delta_{N\infty}$	[mm]	2	2	2	2
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0-factor} \cdot N$; $\delta_N = \delta_{N\infty-factor} \cdot N$; (N – applied tension load)						

Table C19: Displacement under shear loads – rod with inner thread

Size		M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads						
Displacement ¹⁾	δ_{V0}	[mm]	2,5	2,5	2,5	2,5
	$\delta_{V\infty}$	[mm]	3,7	3,7	3,7	3,7
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0-factor} \cdot V$; $\delta_V = \delta_{V\infty-factor} \cdot V$; (V – applied shear load)						

R-KER-II, R-KER-II-S and R-KER-II-W

Displacement under service loads: tension and shear loads – rod with inner thread

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Table C20: Displacement under tension loads – rebar

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads										
Displacement ¹⁾	δ_{N0}	[mm]	0,3	0,3	0,4	0,4	0,5	0,6	0,6	0,8
	δ_{Nx}	[mm]	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads										
Displacement ¹⁾	δ_{N0}	[mm]	0,3	0,3	0,3	0,4	0,5	0,6	0,6	0,7
	δ_{Nx}	[mm]	2	2	2	2	2	2	2	2
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0\text{-factor}} \cdot N$; $\delta_{Nx} = \delta_{Nx\text{-factor}} \cdot N$; (N – applied tension load)										

Table C21: Displacement under shear loads – rebar

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads										
Displacement ¹⁾	δ_{V0}	[mm]	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	δ_{Vx}	[mm]	3,7	3,7	3,7	3,7	3,7	3,7	3,7	3,7
¹⁾ These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0\text{-factor}} \cdot V$; $\delta_{Vx} = \delta_{Vx\text{-factor}} \cdot V$; (V – applied shear load)										

R-KER-II, R-KER-II-S and R-KER-II-W

Displacement under service loads: tension and shear loads – rebar

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Table C22: Characteristic resistance under tension load for threaded rod for seismic performance category C1

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	18	29	42	78	122	176	280
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,50						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	29	46	67	125	196	282	448
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,50						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	25	40	59	109	171	247	392
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,87						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	29	46	67	125	196	282	448
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,60						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	25	40	59	109	171	247	392
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,87						
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,seis,50}$	[N/mm ²]	8,0	10,0	10,0	9,5	7,5	7,0	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,seis,50}$	[N/mm ²]	8,0	10,0	10,0	9,5	7,5	7,0	4,0
Temperature range II: 80°C / 120°C	$\tau_{Rk,ucr,seis,50}$	[N/mm ²]	4,5	5,0	6,0	5,0	4,0	4,0	2,0
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,seis,100}$	[N/mm ²]	8,0	9,0	10,0	9,5	7,5	7,0	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,seis,100}$	[N/mm ²]	8,0	9,0	10,0	9,5	7,5	7,0	4,0

Table C23: Characteristic resistance under tension load for rebar for seismic performance category C1

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	N _{Rk,s,seis}	[kN]	A _s ²⁾ · f _{uk} ³⁾							
Partial safety factor ¹⁾	γ _{Ms, seis}	[-]	1,40							
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years										
Characteristic bond resistance										
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,seis,50}	[N/mm ²]	7,0	8,5	10,0	10,0	8,5	7,5	6,0	3,5
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,seis,50}	[N/mm ²]	7,0	8,5	10,0	10,0	8,5	7,5	6,0	3,5
Temperature range II: 80°C / 120°C	τ _{Rk,ucr,seis,50}	[N/mm ²]	4,0	4,5	5,0	5,0	4,5	4,0	3,0	1,5
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years										
Characteristic bond resistance										
Temperature range I: 24°C / 40°C	τ _{Rk,ucr,seis,100}	[N/mm ²]	6,0	8,5	10,0	10,0	8,5	7,5	6,0	3,5
Temperature range II: 50°C / 80°C	τ _{Rk,ucr,seis,100}	[N/mm ²]	6,0	8,5	10,0	10,0	8,5	7,5	6,0	3,5

¹⁾ In the absence of other national regulation.²⁾ Stressed cross section of the steel element.³⁾ Acc. to EN 1992-1-1.**R-KER-II, R-KER-II-S and R-KER-II-W**Characteristic resistance under tension loads for threaded and rebar
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Table C24: Characteristic resistance under shear loads for threaded rod for seismic performance category C1 - steel failure without lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	6,3	10,1	14,7	27,3	42,7	61,6	98,0
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	10,2	16,1	23,5	44,1	68,6	98,7	156,8
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,25						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$V_{Rk,seis}$	[kN]	9,1	14,4	20,7	38,5	59,9	86,5	137,4
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,56						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$V_{Rk,seis}$	[kN]	10,2	16,1	23,5	44,1	68,6	98,7	157,2
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,33						
Steel failure with high corrosion stainless steel grade 70									
Characteristic resistance	$V_{Rk,seis}$	[kN]	9,1	14,4	20,7	38,5	59,9	86,5	137,4
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,56						

¹⁾ In the absence of other national regulation.

Table C25: Characteristic resistance under shear loads for rebar for seismic performance category C1 – steel failure without lever arm

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	$0,35 \cdot A_s^{2)} \cdot f_{uk}^{3)}$							
Partial safety factor ¹⁾	$\gamma_{Ms,seis}$	[-]	1,5							

¹⁾ In the absence of other national regulation.

²⁾ Stressed cross section of the steel element.

³⁾ Acc. to EN 1992-1-1.

R-KER-II, R-KER-II-S and R-KER-II-W

Characteristic resistance under shear loads for threaded and rebar
for seismic action category C1

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Table C26: Displacement under tension loads – threaded rod for seismic performance category C1

Size			M8	M10	M12	M16	M20	M24	M30
Displacement	$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	5,0	6,0	6,6

Table C27: Displacement under shear loads – threaded rod for seismic performance category C1

Size			M8	M10	M12	M16	M20	M24	M30
Displacement	$\delta_{V,seis}$	[mm]	3,5	4,0	4,6	5,0	5,8	6,5	7,0

Table C28: Displacement under tension loads – rebar for seismic performance category C1

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Displacement	$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	4,0	5,0	6,0	6,4

Table C29: Displacement under shear loads – rebar for seismic performance category C1

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Displacement	$\delta_{V,seis}$	[mm]	3,5	4,0	4,6	5,0	5,0	5,8	6,5	7,2

R-KER-II, R-KER-II-S and R-KER-II-W

Displacement under service loads: tension and shear loads
for seismic action category C1Annex C18
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National Declaration of Performance

NR 01/PG8.8/2118/2022



1. Name and trade name of product: **Threaded rod**
2. Type of product : **PG class 8.8**
3. Intended used: **For fixing building materials, wood, can be using as a wooden roof structures, or as hanging on for installations**
4. Manufactured name and address:
Marcopol Sp. z o.o. Producent Śrub Oliwska 100 str., 80-209 Chwaszczyno k/Gdyni,
5. System of Conformity Assessment: **System of Assessment: 3**
6. National Technical Specification: **ITB-KOT-2022/2118**
 National Assessment Body: **Instytut Techniki Budowlanej**
7. Declared performance:

No.	Thread (d)	Nominal active section area $A_s^{(1)}$, mm ²	Mechanical mproperties class 8.8 ¹⁾		
			Tensile strenght		Destructive force, kN
			Nominal $R_{m \text{ nom}}$, N/mm ²	Minimum $R_{m \text{ min}}$, N/mm ²	
1	2	3	4	5	6
Threaded rods PG					
1	M6	20,1	800	800	16,10
2	M8	36,6			29,20
3	M10	58,0			46,40
4	M12	84,3			67,40
5	M14	115,0			92,00
6	M16	157,0			125,00
7	M18	192,0		830	159,00
8	M20	245,0			203,00
9	M22	303,0			252,00
10	M24	353,0			293,00
11	M27	459,0			381,00
12	M30	561,0			466,00
13	M33	694,0			576,00
14	M36	817,0			678,00

15	M39	976,0			810,00
16	M42	1121,0			931,00
17	M48	1473,0			1223, 00
1) according to standard PN-EN ISO 898-1:2013					

8. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 7.

This declaration of performance is issued according to national regulation dates 16 April 2004 "About building materials" under the sole responsibility of the Producer.

Date:

Signed by:

Chwaszczyno, 29.04.2022

R&D Director

Janusz Kabała
 Dyrektor Działu Rozwoju
 Produktów


 Janusz Kabała