



## European Technical Assessment **ETA 18/0265** of 23/04/2018

### General Part

<b>Technical Assessment Body issuing the ETA</b>	<b>VTT Expert Services LTD</b>
<b>Trade name of the construction product</b>	<b>PAROC Fire Steel Protect PAROC Fire Steel Protect N1 PAROC Fire Steel Protect AluCoat PAROC Fire Steel Protect N1AluCoat</b>
<b>Product family to which the construction product belongs</b>	Fire protection of loadbearing steel structures
<b>Manufacturer</b>	<b>Paroc Group Energiakuja 3, P.O. Box 240 FI-00181 Helsinki</b>
<b>Manufacturing plant</b>	Paroc Polska Sp. z o.o. Ul. Gnieznienska 4 PL-62-240 Trzemeszno
<b>This European Technical Assessment contains</b>	12 pages including 2 Annexes which form an integral part of this assessment
<b>This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of</b>	EAD 350142-00-1106 "Fire protective board, slab and mat products and kits", September 2017

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 (excepted the confidential Annex(es) referred to above). 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

PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat are stone wool fire protective boards. Facings of the products are:

Product name	Facing
PAROC Fire Steel Protect	Unfaced
PAROC Fire Steel Protect N1	Glass fibre tissue
PAROC Fire Steel Protect AluCoat	Aluminium foil
PAROC Fire Steel Protect N1AluCoat	Glass fibre tissue and aluminium foil

Dimensions and density of the boards are given in Table 1.

Table 1. Dimensions and density of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat

	Nominal value	Tolerance
Density	160 kg/m <sup>3</sup>	
Length	600 mm	< ±12 mm
	900 mm	< ±18 mm
Width	1200 mm	< ± 18 mm
Thickness	20 - 60 mm	≤ -1 mm, ≤ +3 mm

The boards are CE-marked according to harmonized product standard EN 13162 with designation code MW-EN13162-T5-DS(70,-)-WS-WL(P)-MU1/Z(6,0). Mechanical fasteners required for installation are described in Annex 1. The fasteners are not covered by this ETA and cannot be CE-marked on the basis of it.

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

PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat boards are intended to be used for fire protection of structural steel columns and beams as specified in Table 2.

Table 2. Intended use of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat

Product	Use category	Protection of	Climatic conditions use category
PAROC Fire Steel Protect PAROC Fire Steel Protect N1 PAROC Fire Steel Protect AluCoat PAROC Fire Steel Protect N1AluCoat	Type 4	Load-bearing steel elements as specified in Annex 1	Type Z <sub>2</sub>

The provisions made in this European Technical Assessment are based on an assumed intended working life of 25 years provided that the product is subject to appropriate installation and maintenance.

The indication given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by the Technical Assessment Body issuing this ETA, but is regarded only as a means for expressing the expected economically reasonable working life of the product.

The completed building (the works) shall comply with the building regulations (regulations on the works) applicable in the Member States in which the building is to be constructed. The procedures foreseen in the Member State for demonstrating compliance with the building regulations shall also be followed by the entity held responsible for this act. This ETA does not amend this process in any way.

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

Table 3. Basic requirements for construction works and essential characteristics

Basic requirement and essential characteristics	Performance
<b>BWR 2. Safety in case of fire</b>	
Reaction to fire	Clause 3.1
Resistance to fire	Clause 3.2
Durability and serviceability	Clause 3.3
<b>BWR 3. Hygiene, health and the environment</b>	
Water permeability	No performance assessed
<b>BWR 4. Safety and accessibility in use</b>	
Flexural strength	No performance assessed
Dimensional stability	Clause 3.4
<b>BWR 6. Energy economy and heat retention</b>	
Thermal resistance	Clause 3.5
Water vapour transmission coefficient	Clause 3.6

### 3.1 Reaction to fire

PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat have been tested and classified according to Commission Delegated Regulation (EU) No 2016/364. Reaction to fire class is A1.

### 3.2 Resistance to fire

Resistance to fire of assemblies incorporating PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat boards has been tested according to EN 13381-4:2013 and classified according to EN 13501-2:2016. Description of the tested assemblies is presented in Annex 1.

Resistance to fire performance classes of the tested assemblies are R 30 - R 240. Tables of insulation thickness required to achieve the resistance to fire class, in relation to section factor and design temperature, are presented in Annex 2.

### 3.3 Durability and serviceability

Working life of the boards is 25 years for the intended use Z<sub>2</sub> (internal use), if not more than accidental wetting and no frosting inside the building is to be expected.

### 3.4 Dimensional stability

Dimensional stability of the boards has been determined according to EN 1604 in condition 48 h, 70 °C. The change in product length, width and thickness is less than 1 % fulfilling the requirements of product standard EN 13162 designation DS(70,-).

### 3.5 Thermal resistance

Thermal conductivity of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat boards is  $\lambda_D$  is 0,038 W/mK.

### 3.6 Water vapour transmission coefficient

Water vapour transmission coefficient ( $\mu$ ) is 1 for PAROC Fire Steel Protect and PAROC Fire Steel Protect N1.

Water vapour transmission coefficient ( $\mu$ ) is 54 000 for PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat corresponding to declared water vapour resistance Z(6,00).

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

According to the European Commission Decision 99/454/EC as amended, the system of assessment and verification of constancy of performance is System 1.

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at VTT Expert Services Ltd.

Issued in Espoo on April 23, 2018  
by VTT Expert Services Ltd



Pertti Jokinen  
Product Manager



Tiina Tirkkonen  
Senior Expert

## **ANNEX 1. PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board protection for steel structures**

### A.1 Fire protective boards and fastenings

#### Components:

Fire protection material	Stone wool boards PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat manufactured by Paroc Group
Board sizes	1200 mm x 600 mm and 1200 x 900 mm
Nominal density	160 - 170 kg/m <sup>3</sup>
Nominal thickness	20 mm - 60 mm
Fastenings:	
Welding pins	Steel pins coated with copper, Ø 2,7 mm, length corresponding to the thickness of the fire protective board
Washers	Galvanized steel washers for welding pins, Ø 30 mm
Spiral springs	Spiral spring screws made of steel rod, rod diameter 1,6 mm, spring external diameter 8 mm and top diameter 15 mm

### A.2 Tested applications

PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat were tested to cover the following applications:

Structural members	Beams and columns, maximum depth (h) of the cross-section 600 mm
Protection	Three and four sided fire exposure
Steel sections	I/H sections and rectangular and square closed sections
Section factor, $A_m/V$	From 47 m <sup>-1</sup> to 281 m <sup>-1</sup>
Design temperature	300 °C to 700 °C

### A.2 Installation

The boards are fixed to the steel structure by using welding pins Ø 2,7 mm with attached washers Ø 30 mm. The pin used is chosen 2 - 3 mm longer than the insulation thickness. The welding is done by Capacitor Discharge (CD) equipment, or equal.

For the insulation boards between two flanges, the pins are placed max. cc 367 mm in the longitudinal direction, 50 mm in from each joint, with one pin in each side of the board connected to each flange (8 pins / board).

For the insulation boards mounted on flanges (width over 180 mm), the pins are placed max. cc 367 mm in the longitudinal direction, 50 mm in from each joint (8 pins / board). If the width of the flange is 180 mm or less, minimum one pin should be placed in the center of the board (4 pins/board). For flanges with a width above 180 mm two pins should be used.

Butt-joint joints are supported from the behind with 100 mm wide PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat or PAROC Fire Steel Protect N1AluCoat stone wool strip of the same thickness as the fire protection board.

Supporting pieces are cut suitable to the profile with 2 - 3 mm extra length. Supporting board shall be fixed to the protective board by using fire spring PAROC XFS 001.

All edges of the profile are fully covered by the boards. At installation on beams the boards on the sides shall cover the bottom layer boards and not vice versa. No openings in fire protection are allowed.

Follow the instructions at the welding equipment to install the pins properly. Foresee that the pins are properly fastened. The pins should be possible to bend aside (without insulation) and stay fastened.



Welding pin



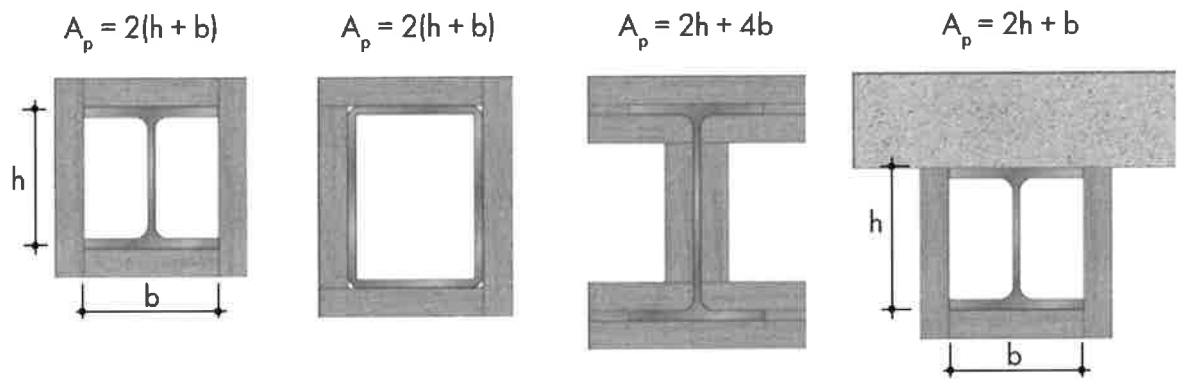
Fire spring PAROC XFS 001

## ANNEX 2. Insulation thickness in resistance to fire classes R 30 - R 240 in relation to design temperature and section factor

PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board thickness can be chosen from the design tables as a function of

- fire endurance time,
- section factor  $A_m/V$  for the member and
- critical steel temperature ranging from 300 - 700 °C.

When I-profile is higher than 450 mm the insulation shall be installed following the profile. In case of square closed section protection, the surface area is taken as the sum of the inside dimensions of the smallest possible rectangular or square encasement.





Insulation thickness for R 30 steel structure

Fire resistance class R 30									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	20	20	20	20	20	20	20	20	20
65	20	20	20	20	20	20	20	20	20
70	20	20	20	20	20	20	20	20	20
75	20	20	20	20	20	20	20	20	20
80	20	20	20	20	20	20	20	20	20
85	20	20	20	20	20	20	20	20	20
90	20	20	20	20	20	20	20	20	20
95	20	20	20	20	20	20	20	20	20
100	20	20	20	20	20	20	20	20	20
105	20	20	20	20	20	20	20	20	20
110	20	20	20	20	20	20	20	20	20
115	20	20	20	20	20	20	20	20	20
120	20	20	20	20	20	20	20	20	20
125	20	20	20	20	20	20	20	20	20
130	20	20	20	20	20	20	20	20	20
135	20	20	20	20	20	20	20	20	20
140	20	20	20	20	20	20	20	20	20
145	20	20	20	20	20	20	20	20	20
150	20	20	20	20	20	20	20	20	20
155	20	20	20	20	20	20	20	20	20
160	20	20	20	20	20	20	20	20	20
165	20	20	20	20	20	20	20	20	20
170	20	20	20	20	20	20	20	20	20
175	20	20	20	20	20	20	20	20	20
180	20	20	20	20	20	20	20	20	20
185	20	20	20	20	20	20	20	20	20
190	20	20	20	20	20	20	20	20	20
195	20	20	20	20	20	20	20	20	20
200	25	20	20	20	20	20	20	20	20
205	25	20	20	20	20	20	20	20	20
210	25	20	20	20	20	20	20	20	20
215	25	20	20	20	20	20	20	20	20
220	25	20	20	20	20	20	20	20	20
225	25	20	20	20	20	20	20	20	20
230	25	20	20	20	20	20	20	20	20
235	25	20	20	20	20	20	20	20	20
240	25	20	20	20	20	20	20	20	20
245	30	20	20	20	20	20	20	20	20
250	30	20	20	20	20	20	20	20	20
255	30	20	20	20	20	20	20	20	20
260	30	20	20	20	20	20	20	20	20
265	30	20	20	20	20	20	20	20	20
270	30	20	20	20	20	20	20	20	20
275	30	20	20	20	20	20	20	20	20
280	30	20	20	20	20	20	20	20	20
281	30	25	20	20	20	20	20	20	20

Insulation thickness for R 60 steel structure

Fire resistance class R 60									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	20	20	20	20	20	20	20	20	20
65	20	20	20	20	20	20	20	20	20
70	20	20	20	20	20	20	20	20	20
75	20	20	20	20	20	20	20	20	20
80	20	20	20	20	20	20	20	20	20
85	20	20	20	20	20	20	20	20	20
90	25	20	20	20	20	20	20	20	20
95	25	20	20	20	20	20	20	20	20
100	25	20	20	20	20	20	20	20	20
105	30	20	20	20	20	20	20	20	20
110	30	25	20	20	20	20	20	20	20
115	30	25	20	20	20	20	20	20	20
120	30	25	20	20	20	20	20	20	20
125	40	25	20	20	20	20	20	20	20
130	40	30	20	20	20	20	20	20	20
135	40	30	20	20	20	20	20	20	20
140	40	30	25	20	20	20	20	20	20
145	40	30	25	20	20	20	20	20	20
150	40	30	25	20	20	20	20	20	20
155	40	40	25	20	20	20	20	20	20
160	40	40	30	20	20	20	20	20	20
165	40	40	30	20	20	20	20	20	20
170	50	40	30	25	20	20	20	20	20
175	50	40	30	25	20	20	20	20	20
180	50	40	30	25	20	20	20	20	20
185	50	40	30	25	20	20	20	20	20
190	50	40	30	25	20	20	20	20	20
195	50	40	40	25	20	20	20	20	20
200	50	40	40	25	20	20	20	20	20
205	50	40	40	30	20	20	20	20	20
210	50	40	40	30	25	20	20	20	20
215	50	50	40	30	25	20	20	20	20
220	60	50	40	30	25	20	20	20	20
225	60	50	40	30	25	20	20	20	20
230	60	50	40	30	25	20	20	20	20
235	60	50	40	30	25	20	20	20	20
240	60	50	40	30	25	20	20	20	20
245	60	50	40	30	25	20	20	20	20
250	60	50	40	30	25	20	20	20	20
255	60	50	40	40	25	20	20	20	20
260	60	50	40	40	30	25	20	20	20
265	60	50	40	40	30	25	20	20	20
270	60	50	40	40	30	25	20	20	20
275	-	50	40	40	30	25	20	20	20
280	-	50	40	40	30	25	20	20	20
281	-	50	40	40	30	25	20	20	20

Insulation thickness for R 90 steel structure

Fire resistance class R 90									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>2</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	20	20	20	20	20	20	20	20	20
50	20	20	20	20	20	20	20	20	20
55	20	20	20	20	20	20	20	20	20
60	25	20	20	20	20	20	20	20	20
65	25	20	20	20	20	20	20	20	20
70	30	25	20	20	20	20	20	20	20
75	30	25	20	20	20	20	20	20	20
80	40	30	20	20	20	20	20	20	20
85	40	30	25	20	20	20	20	20	20
90	40	30	25	20	20	20	20	20	20
95	40	40	30	20	20	20	20	20	20
100	40	40	30	25	20	20	20	20	20
105	50	40	30	25	20	20	20	20	20
110	50	40	40	30	20	20	20	20	20
115	50	40	40	30	25	20	20	20	20
120	50	50	40	30	25	20	20	20	20
125	50	50	40	30	25	20	20	20	20
130	50	50	40	40	30	20	20	20	20
135	60	50	40	40	30	25	20	20	20
140	60	50	40	40	30	25	20	20	20
145	60	50	50	40	30	25	20	20	20
150	60	50	50	40	40	25	20	20	20
155	60	60	50	40	40	30	25	20	20
160	60	60	50	40	40	30	25	20	20
165	-	60	50	40	40	30	25	20	20
170	-	60	50	40	40	30	25	20	20
175	-	60	50	50	40	30	25	20	20
180	-	60	50	50	40	30	25	25	20
185	-	60	50	50	40	40	30	25	20
190	-	60	50	50	40	40	30	25	20
195	-	60	60	50	40	40	30	25	20
200	-	-	60	50	40	40	30	25	20
205	-	-	60	50	40	40	30	25	20
210	-	-	60	50	40	40	30	25	20
215	-	-	60	50	40	40	30	25	25
220	-	-	60	50	40	40	30	30	25
225	-	-	60	50	50	40	30	30	25
230	-	-	60	50	50	40	40	30	25
235	-	-	60	50	50	40	40	30	25
240	-	-	60	50	50	40	40	30	25
245	-	-	60	50	50	40	40	30	25
250	-	-	60	50	50	40	40	30	25
255	-	-	60	50	50	40	40	30	25
260	-	-	60	50	50	40	40	30	25
265	-	-	60	60	50	40	40	30	25
270	-	-	-	60	50	40	40	30	30
275	-	-	-	60	50	40	40	30	30
280	-	-	-	60	50	40	40	30	30
281	-	-	-	60	50	40	40	30	30

Insulation thickness for R 120 steel structure

Fire resistance class R 120									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>2</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	25	20	20	20	20	20	20	20	20
50	30	25	20	20	20	20	20	20	20
55	30	25	20	20	20	20	20	20	20
60	40	30	25	20	20	20	20	20	20
65	40	40	30	20	20	20	20	20	20
70	40	40	30	25	20	20	20	20	20
75	50	40	40	30	20	20	20	20	20
80	50	40	40	30	25	20	20	20	20
85	50	50	40	40	30	20	20	20	20
90	50	50	40	40	30	25	20	20	20
95	60	50	50	40	40	25	20	20	20
100	60	50	50	40	40	30	20	20	20
105	60	60	50	40	40	30	25	20	20
110	60	60	50	50	40	40	25	20	20
115	-	60	50	50	40	40	30	25	20
120	-	60	60	50	40	40	30	25	20
125	-	60	60	50	50	40	30	25	20
130	-	-	60	50	50	40	40	30	25
135	-	-	60	50	50	40	40	30	25
140	-	-	60	60	50	40	40	30	25
145	-	-	60	60	50	40	40	30	25
150	-	-	60	60	50	50	40	40	30
155	-	-	-	60	50	50	40	40	30
160	-	-	-	60	50	50	40	40	30
165	-	-	-	60	50	50	40	40	30
170	-	-	-	60	50	50	40	40	30
175	-	-	-	60	60	50	40	40	30
180	-	-	-	60	60	50	40	40	40
185	-	-	-	60	60	50	50	40	40
190	-	-	-	-	60	50	50	40	40
195	-	-	-	-	60	50	50	40	40
200	-	-	-	-	60	50	50	40	40
205	-	-	-	-	60	50	50	40	40
210	-	-	-	-	60	50	50	40	40
215	-	-	-	-	60	50	50	40	40
220	-	-	-	-	60	50	50	40	40
225	-	-	-	-	60	50	50	40	40
230	-	-	-	-	60	60	50	40	40
235	-	-	-	-	60	60	50	40	40
240	-	-	-	-	60	60	50	50	40
245	-	-	-	-	60	60	50	50	40
250	-	-	-	-	60	60	50	50	40
255	-	-	-	-	60	60	50	50	40
260	-	-	-	-	60	60	50	50	40
265	-	-	-	-	-	60	50	50	40
270	-	-	-	-	-	60	50	50	40
275	-	-	-	-	-	60	50	50	40
280	-	-	-	-	-	60	50	50	40
281	-	-	-	-	-	60	50	50	40



Insulation thickness for R 150 steel structure

Fire resistance class R 150									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	40	30	25	20	20	20	20	20	20
50	40	30	30	20	20	20	20	20	20
55	40	40	30	25	20	20	20	20	20
60	50	40	40	30	25	20	20	20	20
65	50	50	40	40	30	20	20	20	20
70	50	50	50	40	40	25	20	20	20
75	60	50	50	40	40	30	25	20	20
80	60	60	50	50	40	40	30	20	20
85	60	60	50	50	50	40	30	25	20
90	-	60	60	50	50	40	40	30	20
95	-	60	60	50	50	40	40	30	25
100	-	-	60	60	50	50	40	40	25
105	-	-	60	60	50	50	40	40	30
110	-	-	-	60	60	50	50	40	30
115	-	-	-	60	60	50	50	40	40
120	-	-	-	-	60	50	50	40	40
125	-	-	-	-	60	60	50	40	40
130	-	-	-	-	60	60	50	50	40
135	-	-	-	-	60	60	50	50	40
140	-	-	-	-	60	60	50	50	40
145	-	-	-	-	-	60	50	50	40
150	-	-	-	-	-	60	50	50	40
155	-	-	-	-	-	60	60	50	50
160	-	-	-	-	-	60	60	50	50
165	-	-	-	-	-	60	60	50	50
170	-	-	-	-	-	60	60	50	50
175	-	-	-	-	-	60	60	50	50
180	-	-	-	-	-	-	60	50	50
185	-	-	-	-	-	-	60	50	50
190	-	-	-	-	-	-	60	50	50
195	-	-	-	-	-	-	60	50	50
200	-	-	-	-	-	-	60	60	50
205	-	-	-	-	-	-	60	60	50
210	-	-	-	-	-	-	60	60	50
215	-	-	-	-	-	-	60	60	50
220	-	-	-	-	-	-	60	60	50
225	-	-	-	-	-	-	60	60	50
230	-	-	-	-	-	-	60	60	50
235	-	-	-	-	-	-	60	60	50
240	-	-	-	-	-	-	60	60	50
245	-	-	-	-	-	-	60	60	50
250	-	-	-	-	-	-	60	60	50
255	-	-	-	-	-	-	60	60	50
260	-	-	-	-	-	-	-	60	50
265	-	-	-	-	-	-	-	60	50
270	-	-	-	-	-	-	-	60	50
275	-	-	-	-	-	-	-	60	50
280	-	-	-	-	-	-	-	60	50
281	-	-	-	-	-	-	-	60	50

Insulation thickness for R 180 steel structure

Fire resistance class R 180									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	40	40	40	30	20	20	20	20	20
50	50	40	40	40	25	20	20	20	20
55	50	50	40	40	40	25	20	20	20
60	60	50	50	50	40	30	25	20	20
65	60	60	50	50	50	40	30	20	20
70	60	60	60	50	50	40	40	30	20
75	-	60	60	60	50	50	40	40	25
80	-	-	60	60	60	50	50	40	30
85	-	-	-	60	60	50	50	40	40
90	-	-	-	-	60	60	50	50	40
95	-	-	-	-	-	60	60	50	40
100	-	-	-	-	-	60	60	50	50
105	-	-	-	-	-	60	60	50	50
110	-	-	-	-	-	-	60	50	50
115	-	-	-	-	-	-	60	60	50
120	-	-	-	-	-	-	60	60	50
125	-	-	-	-	-	-	60	60	50
130	-	-	-	-	-	-	-	60	50
135	-	-	-	-	-	-	-	60	60
140	-	-	-	-	-	-	-	60	60
145	-	-	-	-	-	-	-	60	60
150	-	-	-	-	-	-	-	60	60
155	-	-	-	-	-	-	-	60	60
160	-	-	-	-	-	-	-	60	60
165	-	-	-	-	-	-	-	60	60
170	-	-	-	-	-	-	-	-	60
175	-	-	-	-	-	-	-	-	60
180	-	-	-	-	-	-	-	-	60
185	-	-	-	-	-	-	-	-	60
190	-	-	-	-	-	-	-	-	60
195	-	-	-	-	-	-	-	-	60
200	-	-	-	-	-	-	-	-	60
205	-	-	-	-	-	-	-	-	60
210	-	-	-	-	-	-	-	-	60
215	-	-	-	-	-	-	-	-	60
220	-	-	-	-	-	-	-	-	60
225	-	-	-	-	-	-	-	-	60
230	-	-	-	-	-	-	-	-	60
235	-	-	-	-	-	-	-	-	60
240	-	-	-	-	-	-	-	-	60
245	-	-	-	-	-	-	-	-	60
250	-	-	-	-	-	-	-	-	60
255	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-
265	-	-	-	-	-	-	-	-	-
270	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	-
281	-	-	-	-	-	-	-	-	-

Insulation thickness for R 210 steel structure

Fire resistance class R 210									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	50	50	50	40	40	30	20	20	20
50	50	50	50	50	40	40	25	20	20
55	60	60	50	50	50	40	40	25	20
60	60	60	60	60	50	50	40	40	25
65	-	-	60	60	60	50	50	40	40
70	-	-	-	-	60	60	50	50	40
75	-	-	-	-	-	60	60	50	50
80	-	-	-	-	-	-	60	60	50
85	-	-	-	-	-	-	60	60	50
90	-	-	-	-	-	-	-	60	60
95	-	-	-	-	-	-	-	60	60
100	-	-	-	-	-	-	-	-	60
105	-	-	-	-	-	-	-	-	60
110	-	-	-	-	-	-	-	-	60
115	-	-	-	-	-	-	-	-	60
120	-	-	-	-	-	-	-	-	-
125	-	-	-	-	-	-	-	-	-
130	-	-	-	-	-	-	-	-	-
135	-	-	-	-	-	-	-	-	-

Insulation thickness for R 240 steel structure

Fire resistance class R 240									
Design temperature [°C]	300	350	400	450	500	550	600	650	700
Section factor [m <sup>-1</sup> ]	Thickness in mm of PAROC Fire Steel Protect, PAROC Fire Steel Protect N1, PAROC Fire Steel Protect AluCoat and PAROC Fire Steel Protect N1AluCoat board								
47	60	60	50	50	50	50	40	25	20
50	60	60	60	60	50	50	50	40	20
55	-	-	60	60	60	60	50	50	40
60	-	-	-	-	-	60	60	60	50
65	-	-	-	-	-	-	-	60	60
70	-	-	-	-	-	-	-	-	60
75	-	-	-	-	-	-	-	-	60
80	-	-	-	-	-	-	-	-	-