



Austrian Institute of Construction Engineering
Schenkenstrasse 4 | T+43 1 533 65 50
1010 Vienna | Austria | F+43 1 533 64 23
www.oib.or.at | mail@oib.or.at



European Technical Assessment

ETA-15/0801
of 29.05.2017

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
Austrian Institute of Construction Engineering

Trade name of the construction product

Polylack W

Product family to which the construction product belongs

Fire Protective Products:
Reactive Coatings for Fire Protection of Steel Elements

Manufacturer

Dunamenti Tűzvédelem Zrt.
Nemeskéri Kiss Miklós utca 39
2131 Göd
HUNGARY

Manufacturing plant

Dunamenti Tűzvédelem Zrt.
Nemeskéri Kiss Miklós utca 39
2131 Göd
HUNGARY

This European Technical Assessment contains

38 pages including Annexes A to B-5 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

Guideline for European technical approval for "Fire Protective Products", ETAG 018 Part 2: "Reactive Coatings for Fire Protection of Steel Elements", edition November 2011, used as European Assessment Document (EAD)

This European Technical Assessment replaces

European Technical Assessment ETA-15/0801 of 28.12.2015

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Specific parts

1 Technical description of the product

This European Technical Assessment applies to the reactive coating for fire protection "Polylack W". "Polylack W" is a spray, brush or roller applied water based reactive coating system for fire protection of structural steel elements like H and I section columns and beams (open sections) and circular and rectangular hollow section columns and rectangular hollow section beams. The reactive coating system for fire protection consists of the primer, the reactive coating (intumescent material) and of the top coat. In conformity with ETAG 018-Part 2 the ETA is issued for the product under end use conditions (Option 3).

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

2.1 Intended use

"Polylack W" serves for the use as reactive coating system (sheathing) necessary on beams and columns made of structural steel (marking "S") in accordance with EN 10025-1, excluding S185 to achieve a fire resistance duration in accordance with EN 13501-2:2007+A1:2009.

"Polylack W" may be applied in accordance with Annex B of the ETA to the following fields.

Structural open sections (H and I) – columns

- Fire resistance classification R15 – R20 – R30 – R45 – R60
- A/V factor 60 m⁻¹ up to 365 m⁻¹
- Design temperatures in the range of 350 °C to 700 °C

Structural open sections (H and I) – beams

- Fire resistance classification R15 – R20 – R30 – R45 – R60
- A/V factor 110 m⁻¹ up to 440 m⁻¹
- Design temperatures in the range of 350 °C to 700 °C

Structural hollow sections (circular and rectangular) – columns

- Fire resistance classification R15 – R20 – R30 – R45
- A/V factor 76 m⁻¹ up to 467 m⁻¹
- Design temperatures in the range of 350 °C to 750 °C

Structural hollow sections (rectangular) – beams

- Fire resistance classification R15 – R20 – R30 – R45 – R60 – R90 – R120
- A/V factor 60 m⁻¹ up to 400 m⁻¹
- Design temperatures in the range of 350 °C to 700 °C

The application of "Polylack W" on steel tension members is not regulated by this ETA.

2.2 Use category

Depending on the use category in accordance with ETAG 018-Part 2 clause 2.2.2 the following types have been assessed.

Primer (irrespective of the use category)	Reactive coating	Top coat (depending on the use category)
Two component epoxy (solvent borne) e.g.: - EPONAL S 2300 (Chemolak, a.s.) - HEMPADUR FAST DRY 17410 (Hempel A/S) - SG 30-7283/0 (Lankwitzer Lackfabrik GmbH)	Polylack W	Category Type Y (including Types Z ₁ and Z ₂) - CHEMOPUR RW 1 SCH U 2094* (Chemolak, a.s.) - HEMPATANE HS 55610* (Hempel A/S) - PD 13-7035/0** (Lankwitzer Lackfabrik GmbH)
Short/medium oil alkyd (solvent borne) e.g.: - S 2000 B (Chemolak, a.s.) - REM – AK CORROPRIMER (Rembrandtin Lack GmbH Nfg. KG)		Category Type Z₁ (including Type Z ₂) - VAGONA S 2553* (Chemolak, a.s.) - REM – AK DS GLIMMER EXPRESS* (Rembrandtin Lack GmbH Nfg. KG)

* for all shades of this top coat

** for other shades of this top coat the use category Type Z₁ and Z₂ applies

This ETA does not cover galvanized steel and stainless steel.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of “Polylack W” of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

2.4 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with the Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1: 2007+A1:2009	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009	Clause 3.1.2 of the ETA and Annex B-1 to B-5 of the ETA
BWR 3	Content and/or release of dangerous substances	European Council Directive 67/548/EEC and Regulation (EC) No 1272/2008 as well as EOTA TR 034, edition October 2015	Declaration of conformity by the manufacturer
BWR 4	Adhesion	No performance assessed	
BWR 5	Airborne sound insulation	No performance assessed	
	Sound absorption	No performance assessed	
	Impact sound insulation	No performance assessed	
BWR 6	Thermal properties	No performance assessed	
	Water vapour permeability	No performance assessed	

3.1 Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

Different assemblies of primer, the reactive coating “Polylack W” and top coat were assessed according to ETAG 018-Part 2 clause 5.2.1 and classified according to EN 13501-1:2007+A1:2009.

Assembly			Class according to EN 13501-1: 2007+A1:2009
Primer	Reactive coating	Top coat	
REM – AK CORROPRIMER	Polylack W	REM – AK DS GLIMMER EXPRESS*	C-s1,d0
All other assemblies			No performance assessed

* for all shades of this top coat

3.1.2 Resistance to fire

“Polylack W” was tested according to ETAG 018-Part 2 clause 5.2.2, EN 13381-8:2010 and EN 13381-8:2013 in conjunction with EN 1363-1:1999 and EN 1363-1:2012.

Based upon the gained test results and the field of application specified within EN 13381-8:2010 and EN 13381-8:2013 “Polylack W” has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex B-2 to B-5 of the ETA.

The resistance to fire classification listed in Annex B-2 to B-5 of the ETA is only valid if “Polylack W” is installed according to Annex A to B-1.4 of the ETA.

3.2 Hygiene, health and environment (BWR 3)

3.2.1 Content and/or release of dangerous substances

According to the manufacturer’s declaration “Polylack W” does not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General BWR 3 Checklist for EADs/ETAs – Dangerous substances), edition October 2015.

A written declaration in this respect was submitted by the ETA-holder.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.3 Safety in use (BWR 4)

3.3.1 Adhesion

No performance assessed.

3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation

No performance assessed.

3.4.2 Sound absorption

No performance assessed.

3.4.3 Impact sound insulation
No performance assessed.

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties
No performance assessed.

3.5.2 Water vapour permeability
No performance assessed.

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

4.1 AVCP system

According to the Decision 1999/454/EC¹, amended by Decision 2001/596/EC² of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (resistance to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for fire compartmentation and/or fire protection or fire performance	any	1

In addition, according to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system(s) of assessment and verification of constancy of performance, with regard to reaction to fire, is given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4
<p>* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)</p> <p>** Products/materials not covered by footnote (*)</p> <p>*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of class A1 according to Commission Decision 96/603/EC, as amended)</p>			

¹ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

² Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory at least once a year for surveillance of the manufacturer.

Issued in Vienna on 29.05.2017
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

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Annex A Details for installation

1 Handling / Application

- > The manufacturer shall provide an installation instruction containing at least the following information:
 - List of suitable substrates
 - Preparation of the surface of the construction (e.g. cleanliness, required preparation grade of surface, e.g. SA 2 ½)
 - Method of application (e.g. temperature and humidity conditions before, during and after application)
 - Necessary application wet film thickness in relation to the dry film thickness
 - Required minimum dry film thickness of the reactive coating
 - Period of time between the application of each component, taking account of exposure conditions
 - Curing time of the system
 - Assessed top coats
 - Equipment parameters
 - Provisions to protect coatings for internal use, if temporarily exposed on site
- > This European Technical Assessment is issued under the assumption that the application of “Polylack W” occurs in accordance with the installation instruction of the manufacturer.

1.1 Primer

- > A two component epoxy primer or short/medium oil alkyd primer as specified by the manufacturer shall be used (see clause 2.2 of the ETA).
- > The primer shall be applied on surface prepared steel. The surface of the steel shall be free of dust, grease and other pollutants.
- > The preparation grade of the surface shall be in accordance with the technical data sheets.
- > The primer shall cover the surface of the steel completely.
- > The required dry film thickness according to the installation instruction of the manufacturer shall be respected.
- > Primer applied on the steel sections at the factory, where relevant, which does not comply with the requirements of this European Technical Assessment shall be removed before.

1.2 Reactive coating

- > The dry film thickness of the reactive coating “Polylack W” (without primer and top coat) shall have at least the tabular values as given in Annex B-2 to B-5 of the ETA.

1.3 Top coat

- > The top coat shall be compatible with the reactive coating and therefore only top coats as given in clause 2.2 of the ETA shall be used.
- > The required dry film thickness according to the installation instruction of the manufacturer shall be respected.

1.4 Structural references

- > The steel members coated with “Polylack W” should not have claddings or other sheathings which could prevent the reactive coating from foaming.

Annex B Resistance to fire

Annex B-1 Field of application

This Annex relates to the use of “Polylack W” for the fire protection of:

- > Structural open sections (H and I) – columns (see Annex B-2 of the ETA)
- > Structural open sections (H and I) – beams (see Annex B-3 of the ETA)
- > Structural hollow sections (circular and rectangular) – columns (see Annex B-4 of the ETA)
- > Structural hollow sections (rectangular) – beams (see Annex B-5 of the ETA)

The precise scope is given in the tables which specify the dry film thickness of the reactive coating (without primer and top coat) required to achieve the classification R for various design temperatures and section factors.

The product is assessed on the basis of EN 13381-8:2010 and EN 13381-8:2013 as well as ETAG 018-Part 2.

The data presented in Annex B-2 and Annex B-4 of the ETA for columns refer to a four-sided fire exposure.

The data presented in Annex B-3 and Annex B-5 of the ETA for beams refer to a three-sided fire exposure.

Annex B-1.1 Structural open sections (H and I) – columns

Parameters	Restrictions for columns
Section factors (A/V)	60 m ⁻¹ to 365 m ⁻¹ (including permitted extrapolation according standard) values derived for any section factor may also be applied to steel members having lower section factors
Thickness of protection (Dry film thickness)	from 0,230 mm to 1,395 mm (including permitted extrapolation according standard)
Maximum web depth	-
Design temperatures	350 °C, 400 °C, 450 °C, 500 °C, 550 °C, 600 °C, 650 °C, 700 °C
Fire resistance	R15, R20, R30, R45, R60
Type of profiles	results for members with open cross section (type H and I) are directly applicable to angles, channels and T sections used as individual elements or as bracing
Type of construction member	results for columns are applicable to columns exposed on four sides. results for columns are also applicable to beams exposed on four sides (with section factors and thicknesses of protection limitation valid for beams)
Material	steel of any structural grade (S designation) according to EN 10025-1, except S185. Engineering grades (E designation) are not allowed

Annex B-1.2 Structural open sections (H and I) – beams

Parameters	Restrictions for beams
Section factors (A/V)	110 m ⁻¹ to 440 m ⁻¹ (including permitted extrapolation according standard) values derived for any section factor may also be applied to steel members having lower section factors
Thickness of protection (Dry film thickness)	from 0,250 mm to 1,397 mm (including permitted extrapolation according standard)
Maximum web depth	-
Design temperatures	350 °C, 400 °C, 450 °C, 500 °C, 550 °C, 600 °C, 650 °C, 700 °C
Fire resistance	R15, R20, R30, R45, R60
Type of profiles	results for members with open cross section (type H and I) are directly applicable to angles, channels and T sections used as individual elements or as bracing
Type of construction member	results for beams are applicable to beams exposed on three sides.
Material	steel of any structural grade (S designation) according to EN 10025-1, except S185. Engineering grades (E designation) are not allowed

Annex B-1.3 Structural hollow sections (circular and rectangular) – columns

Parameters	Restrictions for columns
Section factors	76 m ⁻¹ to 467 m ⁻¹ (including permitted extrapolation according standard) values derived for any section factor may also be applied to steel members having lower section factors
Thickness of protection (Dry film thickness)	from 0,262 mm to 1,392 mm (including permitted extrapolation according standard)
Design temperatures	350 °C, 400 °C, 450 °C, 500 °C, 550 °C, 600 °C, 650 °C, 700 °C, 750 °C
Fire resistance	R15, R20, R30, R45
Type of profiles	structural hollow sections with circular or rectangular sections
Type of construction member	results for columns are applicable to columns exposed on four sides. results for columns are also applicable to beams exposed on four sides (with section factors and thicknesses of protection limitation valid for beams)
Material	steel of any structural grade (S designation) according to EN 10025-1, except S185. Engineering grades (E designation) are not allowed

Annex B-1.4 Structural hollow sections (rectangular) – beams

Parameters	Restrictions for beams
Section factors	60 m ⁻¹ to 400 m ⁻¹ (including permitted extrapolation according standard) values derived for any section factor may also be applied to steel members having lower section factors
Thickness of protection (Dry film thickness)	from 0,250 mm to 3,469 mm (including permitted extrapolation according standard)
Design temperatures	350 °C, 400 °C, 450 °C, 500 °C, 550 °C, 600 °C, 650 °C, 700 °C
Fire resistance	R15, R20, R30, R45, R60, R90, R120
Type of profiles	structural hollow sections with rectangular sections, including welded profiles
Type of construction member	results for beams are applicable to beams exposed on three sides
Material	steel of any structural grade (S designation) according to EN 10025-1, except S185. Engineering grades (E designation) are not allowed

Annex B-2 Tabulated results of assessment for columns made from structural open sections (H and I)

Structural open sections (H and I) – columns								
Fire resistance period: R15								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
70	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
80	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
90	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
100	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
110	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
120	0,251	0,230	0,230	0,230	0,230	0,230	0,230	0,230
130	0,275	0,230	0,230	0,230	0,230	0,230	0,230	0,230
140	0,299	0,230	0,230	0,230	0,230	0,230	0,230	0,230
150	0,321	0,230	0,230	0,230	0,230	0,230	0,230	0,230
160	0,343	0,230	0,230	0,230	0,230	0,230	0,230	0,230
170	0,365	0,230	0,230	0,230	0,230	0,230	0,230	0,230
180	0,385	0,230	0,230	0,230	0,230	0,230	0,230	0,230
190	0,405	0,230	0,230	0,230	0,230	0,230	0,230	0,230
200	0,425	0,230	0,230	0,230	0,230	0,230	0,230	0,230
210	0,444	0,230	0,230	0,230	0,230	0,230	0,230	0,230
220	0,462	0,230	0,230	0,230	0,230	0,230	0,230	0,230
230	0,480	0,230	0,230	0,230	0,230	0,230	0,230	0,230
240	0,497	0,230	0,230	0,230	0,230	0,230	0,230	0,230
250	0,514	0,230	0,230	0,230	0,230	0,230	0,230	0,230
260	0,530	0,230	0,230	0,230	0,230	0,230	0,230	0,230
270	0,546	0,230	0,230	0,230	0,230	0,230	0,230	0,230
280	0,561	0,230	0,230	0,230	0,230	0,230	0,230	0,230
290	0,576	0,237	0,230	0,230	0,230	0,230	0,230	0,230
300	0,591	0,245	0,230	0,230	0,230	0,230	0,230	0,230
310	0,605	0,253	0,230	0,230	0,230	0,230	0,230	0,230
320	0,619	0,261	0,230	0,230	0,230	0,230	0,230	0,230
330	0,632	0,268	0,230	0,230	0,230	0,230	0,230	0,230
340	0,646	0,276	0,230	0,230	0,230	0,230	0,230	0,230
350	0,658	0,283	0,230	0,230	0,230	0,230	0,230	0,230
360	0,671	0,290	0,230	0,230	0,230	0,230	0,230	0,230
365	0,677	0,294	0,230	0,230	0,230	0,230	0,230	0,230

Structural open sections (H and I) – columns								
Fire resistance period: R20								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,230	0,230	0,230	0,230	0,230	0,230	0,230	0,230
70	0,232	0,230	0,230	0,230	0,230	0,230	0,230	0,230
80	0,276	0,230	0,230	0,230	0,230	0,230	0,230	0,230
90	0,318	0,230	0,230	0,230	0,230	0,230	0,230	0,230
100	0,358	0,230	0,230	0,230	0,230	0,230	0,230	0,230
110	0,397	0,230	0,230	0,230	0,230	0,230	0,230	0,230
120	0,434	0,234	0,230	0,230	0,230	0,230	0,230	0,230
130	0,471	0,258	0,230	0,230	0,230	0,230	0,230	0,230
140	0,506	0,281	0,230	0,230	0,230	0,230	0,230	0,230
150	0,540	0,303	0,230	0,230	0,230	0,230	0,230	0,230
160	0,572	0,325	0,230	0,230	0,230	0,230	0,230	0,230
170	0,604	0,347	0,230	0,230	0,230	0,230	0,230	0,230
180	0,635	0,368	0,230	0,230	0,230	0,230	0,230	0,230
190	0,665	0,388	0,230	0,230	0,230	0,230	0,230	0,230
200	0,694	0,408	0,230	0,230	0,230	0,230	0,230	0,230
210	0,722	0,428	0,230	0,230	0,230	0,230	0,230	0,230
220	0,749	0,447	0,230	0,230	0,230	0,230	0,230	0,230
230	0,775	0,466	0,230	0,230	0,230	0,230	0,230	0,230
240	0,801	0,484	0,230	0,230	0,230	0,230	0,230	0,230
250	0,826	0,502	0,241	0,230	0,230	0,230	0,230	0,230
260	0,850	0,519	0,251	0,230	0,230	0,230	0,230	0,230
270	0,874	0,537	0,262	0,230	0,230	0,230	0,230	0,230
280	0,897	0,553	0,272	0,230	0,230	0,230	0,230	0,230
290	0,919	0,570	0,282	0,230	0,230	0,230	0,230	0,230
300	0,941	0,586	0,292	0,230	0,230	0,230	0,230	0,230
310	0,962	0,602	0,302	0,230	0,230	0,230	0,230	0,230
320	0,983	0,617	0,312	0,230	0,230	0,230	0,230	0,230
330	1,003	0,632	0,321	0,230	0,230	0,230	0,230	0,230
340	1,023	0,647	0,331	0,230	0,230	0,230	0,230	0,230
350	1,042	0,662	0,340	0,230	0,230	0,230	0,230	0,230
360	1,060	0,676	0,349	0,230	0,230	0,230	0,230	0,230
365	1,070	0,683	0,354	0,230	0,230	0,230	0,230	0,230

Structural open sections (H and I) – columns								
Fire resistance period: R30								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,392	0,260	0,230	0,230	0,230	0,230	0,230	0,230
70	0,467	0,315	0,230	0,230	0,230	0,230	0,230	0,230
80	0,539	0,368	0,253	0,230	0,230	0,230	0,230	0,230
90	0,608	0,420	0,292	0,230	0,230	0,230	0,230	0,230
100	0,675	0,471	0,331	0,230	0,230	0,230	0,230	0,230
110	0,739	0,520	0,369	0,230	0,230	0,230	0,230	0,230
120	0,802	0,569	0,406	0,230	0,230	0,230	0,230	0,230
130	0,862	0,616	0,443	0,230	0,230	0,230	0,230	0,230
140	0,920	0,661	0,479	0,252	0,230	0,230	0,230	0,230
150	0,976	0,706	0,515	0,274	0,230	0,230	0,230	0,230
160	1,031	0,750	0,550	0,296	0,230	0,230	0,230	0,230
170	1,083	0,793	0,585	0,317	0,230	0,230	0,230	0,230
180	1,134	0,834	0,618	0,339	0,230	0,230	0,230	0,230
190	1,184	0,875	0,652	0,360	0,230	0,230	0,230	0,230
200	1,232	0,915	0,685	0,380	0,230	0,230	0,230	0,230
210	1,278	0,954	0,717	0,401	0,230	0,230	0,230	0,230
220	1,323	0,992	0,749	0,422	0,230	0,230	0,230	0,230
230	1,367	1,029	0,780	0,442	0,230	0,230	0,230	0,230
240	-	1,065	0,811	0,462	0,235	0,230	0,230	0,230
250	-	1,101	0,841	0,482	0,247	0,230	0,230	0,230
260	-	1,136	0,871	0,502	0,259	0,230	0,230	0,230
270	-	1,170	0,901	0,521	0,271	0,230	0,230	0,230
280	-	1,203	0,930	0,541	0,283	0,230	0,230	0,230
290	-	1,236	0,959	0,560	0,295	0,230	0,230	0,230
300	-	1,268	0,987	0,579	0,307	0,230	0,230	0,230
310	-	1,299	1,015	0,598	0,319	0,230	0,230	0,230
320	-	1,330	1,042	0,617	0,331	0,230	0,230	0,230
330	-	1,360	1,069	0,635	0,343	0,230	0,230	0,230
340	-	1,389	1,096	0,654	0,354	0,230	0,230	0,230
350	-	-	1,122	0,672	0,366	0,230	0,230	0,230
360	-	-	1,148	0,690	0,378	0,230	0,230	0,230
365	-	-	1,161	0,699	0,384	0,230	0,230	0,230

Structural open sections (H and I) – columns								
Fire resistance period: R45								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,700	0,531	0,425	0,293	0,230	0,230	0,230	0,230
70	0,819	0,627	0,505	0,352	0,270	0,230	0,230	0,230
80	0,933	0,720	0,584	0,411	0,318	0,230	0,230	0,230
90	1,044	0,811	0,661	0,470	0,365	0,243	0,230	0,230
100	1,151	0,900	0,738	0,527	0,412	0,277	0,230	0,230
110	1,253	0,986	0,812	0,584	0,459	0,311	0,230	0,230
120	1,353	1,070	0,886	0,641	0,506	0,346	0,230	0,230
130	-	1,152	0,959	0,697	0,553	0,380	0,230	0,230
140	-	1,232	1,030	0,753	0,600	0,414	0,249	0,230
150	-	1,310	1,100	0,808	0,647	0,449	0,272	0,230
160	-	1,387	1,169	0,863	0,693	0,484	0,295	0,230
170	-	-	1,237	0,917	0,739	0,518	0,318	0,230
180	-	-	1,304	0,970	0,786	0,553	0,341	0,230
190	-	-	1,369	1,024	0,832	0,588	0,365	0,230
200	-	-	-	1,076	0,878	0,623	0,389	0,230
210	-	-	-	1,128	0,924	0,658	0,413	0,230
220	-	-	-	1,180	0,969	0,694	0,437	0,230
230	-	-	-	1,231	1,015	0,729	0,462	0,230
240	-	-	-	1,282	1,060	0,765	0,486	0,230
250	-	-	-	1,332	1,106	0,800	0,511	0,230
260	-	-	-	1,382	1,151	0,836	0,536	0,230
270	-	-	-	-	1,196	0,872	0,562	0,230
280	-	-	-	-	1,241	0,908	0,587	0,230
290	-	-	-	-	1,286	0,944	0,613	0,230
300	-	-	-	-	1,331	0,980	0,639	0,230
310	-	-	-	-	1,375	1,017	0,665	0,230
320	-	-	-	-	-	1,053	0,692	0,230
330	-	-	-	-	-	1,090	0,719	0,230
340	-	-	-	-	-	1,127	0,746	0,230
350	-	-	-	-	-	1,163	0,773	0,230
360	-	-	-	-	-	1,200	0,801	0,230
365	-	-	-	-	-	1,219	0,815	0,235

Structural open sections (H and I) – columns								
Fire resistance period: R60								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	1,007	0,802	0,677	0,516	0,434	0,337	0,255	0,230
70	1,170	0,939	0,797	0,611	0,517	0,404	0,308	0,230
80	1,328	1,072	0,915	0,705	0,599	0,471	0,361	0,230
90	-	1,202	1,030	0,799	0,681	0,538	0,414	0,261
100	-	1,328	1,144	0,892	0,763	0,605	0,468	0,297
110	-	-	1,256	0,983	0,845	0,672	0,522	0,334
120	-	-	1,366	1,074	0,926	0,740	0,577	0,371
130	-	-	-	1,164	1,007	0,808	0,632	0,409
140	-	-	-	1,254	1,088	0,876	0,687	0,447
150	-	-	-	1,342	1,169	0,944	0,744	0,485
160	-	-	-	-	1,249	1,012	0,800	0,525
170	-	-	-	-	1,330	1,081	0,857	0,564
180	-	-	-	-	-	1,150	0,915	0,605
190	-	-	-	-	-	1,219	0,973	0,646
200	-	-	-	-	-	1,289	1,032	0,687
210	-	-	-	-	-	1,358	1,091	0,729
220	-	-	-	-	-	-	1,151	0,772
230	-	-	-	-	-	-	1,211	0,815
240	-	-	-	-	-	-	1,272	0,859
250	-	-	-	-	-	-	1,333	0,904
260	-	-	-	-	-	-	1,395	0,949
270	-	-	-	-	-	-	-	0,995
280	-	-	-	-	-	-	-	1,042
290	-	-	-	-	-	-	-	1,089
300	-	-	-	-	-	-	-	1,137
310	-	-	-	-	-	-	-	1,186
320	-	-	-	-	-	-	-	1,235
330	-	-	-	-	-	-	-	1,286
340	-	-	-	-	-	-	-	1,337
350	-	-	-	-	-	-	-	1,389

Annex B-3 Tabulated results of assessment for beams made from structural open sections (H and I)

Structural open sections (H and I) – beams Fire resistance period: R15								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
110	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
120	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
130	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
140	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
150	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
160	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
170	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
180	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
190	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
200	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
210	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
220	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
230	0,252	0,250	0,250	0,250	0,250	0,250	0,250	0,250
240	0,274	0,250	0,250	0,250	0,250	0,250	0,250	0,250
250	0,297	0,250	0,250	0,250	0,250	0,250	0,250	0,250
260	0,319	0,250	0,250	0,250	0,250	0,250	0,250	0,250
270	0,341	0,250	0,250	0,250	0,250	0,250	0,250	0,250
280	0,364	0,250	0,250	0,250	0,250	0,250	0,250	0,250
290	0,387	0,250	0,250	0,250	0,250	0,250	0,250	0,250
300	0,409	0,250	0,250	0,250	0,250	0,250	0,250	0,250
310	0,432	0,250	0,250	0,250	0,250	0,250	0,250	0,250
320	0,455	0,250	0,250	0,250	0,250	0,250	0,250	0,250
330	0,478	0,250	0,250	0,250	0,250	0,250	0,250	0,250
340	0,502	0,250	0,250	0,250	0,250	0,250	0,250	0,250
350	0,525	0,250	0,250	0,250	0,250	0,250	0,250	0,250
360	0,549	0,250	0,250	0,250	0,250	0,250	0,250	0,250
370	0,572	0,250	0,250	0,250	0,250	0,250	0,250	0,250
380	0,596	0,256	0,250	0,250	0,250	0,250	0,250	0,250
390	0,620	0,275	0,250	0,250	0,250	0,250	0,250	0,250
400	0,644	0,293	0,250	0,250	0,250	0,250	0,250	0,250
410	0,668	0,312	0,250	0,250	0,250	0,250	0,250	0,250
420	0,692	0,332	0,250	0,250	0,250	0,250	0,250	0,250
430	0,717	0,352	0,250	0,250	0,250	0,250	0,250	0,250
440	0,741	0,372	0,250	0,250	0,250	0,250	0,250	0,250

Structural open sections (H and I) – beams								
Fire resistance period: R20								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
110	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
120	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
130	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
140	0,264	0,250	0,250	0,250	0,250	0,250	0,250	0,250
150	0,300	0,250	0,250	0,250	0,250	0,250	0,250	0,250
160	0,337	0,250	0,250	0,250	0,250	0,250	0,250	0,250
170	0,374	0,250	0,250	0,250	0,250	0,250	0,250	0,250
180	0,411	0,250	0,250	0,250	0,250	0,250	0,250	0,250
190	0,448	0,250	0,250	0,250	0,250	0,250	0,250	0,250
200	0,485	0,250	0,250	0,250	0,250	0,250	0,250	0,250
210	0,522	0,266	0,250	0,250	0,250	0,250	0,250	0,250
220	0,560	0,296	0,250	0,250	0,250	0,250	0,250	0,250
230	0,598	0,326	0,250	0,250	0,250	0,250	0,250	0,250
240	0,636	0,356	0,250	0,250	0,250	0,250	0,250	0,250
250	0,674	0,387	0,250	0,250	0,250	0,250	0,250	0,250
260	0,713	0,419	0,250	0,250	0,250	0,250	0,250	0,250
270	0,751	0,451	0,250	0,250	0,250	0,250	0,250	0,250
280	0,790	0,483	0,250	0,250	0,250	0,250	0,250	0,250
290	0,829	0,516	0,250	0,250	0,250	0,250	0,250	0,250
300	0,868	0,550	0,250	0,250	0,250	0,250	0,250	0,250
310	0,908	0,584	0,250	0,250	0,250	0,250	0,250	0,250
320	0,947	0,618	0,269	0,250	0,250	0,250	0,250	0,250
330	0,987	0,653	0,294	0,250	0,250	0,250	0,250	0,250
340	1,027	0,689	0,320	0,250	0,250	0,250	0,250	0,250
350	1,067	0,726	0,347	0,250	0,250	0,250	0,250	0,250
360	1,108	0,763	0,374	0,250	0,250	0,250	0,250	0,250
370	1,148	0,800	0,402	0,250	0,250	0,250	0,250	0,250
380	1,189	0,839	0,431	0,250	0,250	0,250	0,250	0,250
390	1,230	0,878	0,461	0,250	0,250	0,250	0,250	0,250
400	1,272	0,917	0,491	0,250	0,250	0,250	0,250	0,250
410	1,313	0,958	0,523	0,250	0,250	0,250	0,250	0,250
420	1,355	0,999	0,555	0,250	0,250	0,250	0,250	0,250
430	1,397	1,041	0,589	0,250	0,250	0,250	0,250	0,250
440	-	1,083	0,623	0,250	0,250	0,250	0,250	0,250

Structural open sections (H and I) – beams								
Fire resistance period: R30								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
110	0,477	0,267	0,250	0,250	0,250	0,250	0,250	0,250
120	0,543	0,319	0,250	0,250	0,250	0,250	0,250	0,250
130	0,609	0,372	0,250	0,250	0,250	0,250	0,250	0,250
140	0,675	0,426	0,250	0,250	0,250	0,250	0,250	0,250
150	0,742	0,481	0,252	0,250	0,250	0,250	0,250	0,250
160	0,809	0,537	0,294	0,250	0,250	0,250	0,250	0,250
170	0,877	0,593	0,337	0,250	0,250	0,250	0,250	0,250
180	0,945	0,650	0,382	0,250	0,250	0,250	0,250	0,250
190	1,013	0,708	0,427	0,250	0,250	0,250	0,250	0,250
200	1,082	0,767	0,473	0,276	0,250	0,250	0,250	0,250
210	1,150	0,827	0,521	0,314	0,250	0,250	0,250	0,250
220	1,220	0,888	0,569	0,353	0,250	0,250	0,250	0,250
230	1,289	0,949	0,619	0,394	0,264	0,250	0,250	0,250
240	1,359	1,012	0,669	0,435	0,300	0,250	0,250	0,250
250	-	1,076	0,721	0,478	0,338	0,250	0,250	0,250
260	-	1,140	0,775	0,523	0,377	0,250	0,250	0,250
270	-	1,206	0,829	0,568	0,418	0,250	0,250	0,250
280	-	1,273	0,885	0,616	0,460	0,250	0,250	0,250
290	-	1,340	0,943	0,664	0,504	0,273	0,250	0,250
300	-	-	1,001	0,715	0,550	0,309	0,250	0,250
310	-	-	1,062	0,767	0,597	0,346	0,250	0,250
320	-	-	1,124	0,821	0,647	0,385	0,250	0,250
330	-	-	1,187	0,877	0,699	0,425	0,250	0,250
340	-	-	1,253	0,935	0,753	0,468	0,250	0,250
350	-	-	1,320	0,995	0,809	0,513	0,250	0,250
360	-	-	1,389	1,057	0,868	0,561	0,277	0,250
370	-	-	-	1,121	0,930	0,611	0,314	0,250
380	-	-	-	1,189	0,995	0,664	0,353	0,250
390	-	-	-	1,258	1,063	0,720	0,395	0,250
400	-	-	-	1,331	1,135	0,780	0,441	0,250
410	-	-	-	-	1,210	0,843	0,489	0,250
420	-	-	-	-	1,289	0,911	0,541	0,250
430	-	-	-	-	1,373	0,983	0,597	0,250
440	-	-	-	-	-	1,060	0,658	0,250

Structural open sections (H and I) – beams								
Fire resistance period: R45								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
110	0,958	0,676	0,436	0,282	0,250	0,250	0,250	0,250
120	1,069	0,769	0,510	0,344	0,251	0,250	0,250	0,250
130	1,181	0,863	0,586	0,408	0,308	0,250	0,250	0,250
140	1,293	0,959	0,664	0,473	0,367	0,250	0,250	0,250
150	-	1,056	0,743	0,540	0,428	0,283	0,250	0,250
160	-	1,154	0,824	0,609	0,490	0,335	0,250	0,250
170	-	1,254	0,906	0,680	0,555	0,389	0,250	0,250
180	-	1,355	0,991	0,752	0,621	0,445	0,297	0,250
190	-	-	1,077	0,827	0,690	0,503	0,346	0,250
200	-	-	1,165	0,904	0,761	0,564	0,397	0,254
210	-	-	1,255	0,983	0,834	0,627	0,450	0,299
220	-	-	1,348	1,065	0,911	0,692	0,505	0,345
230	-	-	-	1,149	0,989	0,760	0,563	0,393
240	-	-	-	1,235	1,071	0,830	0,623	0,444
250	-	-	-	1,324	1,156	0,904	0,686	0,497
260	-	-	-	-	1,243	0,981	0,752	0,553
270	-	-	-	-	1,335	1,061	0,821	0,612
280	-	-	-	-	-	1,144	0,894	0,674
290	-	-	-	-	-	1,232	0,970	0,739
300	-	-	-	-	-	1,323	1,050	0,808
310	-	-	-	-	-	-	1,134	0,881
320	-	-	-	-	-	-	1,223	0,958
330	-	-	-	-	-	-	1,317	1,041
340	-	-	-	-	-	-	-	1,128
350	-	-	-	-	-	-	-	1,221
360	-	-	-	-	-	-	-	1,321

Structural open sections (H and I) – beams								
Fire resistance period: R60								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
110	-	1,086	0,781	0,588	0,482	0,348	0,250	0,250
120	-	1,219	0,891	0,682	0,568	0,422	0,301	0,250
130	-	1,354	1,003	0,779	0,657	0,498	0,367	0,257
140	-	-	1,117	0,878	0,748	0,577	0,435	0,316
150	-	-	1,234	0,979	0,842	0,659	0,506	0,377
160	-	-	1,353	1,084	0,939	0,743	0,579	0,441
170	-	-	-	1,191	1,039	0,830	0,655	0,507
180	-	-	-	1,302	1,143	0,921	0,734	0,576
190	-	-	-	-	1,249	1,015	0,817	0,649
200	-	-	-	-	1,360	1,113	0,903	0,724
210	-	-	-	-	-	1,214	0,992	0,803
220	-	-	-	-	-	1,319	1,085	0,885
230	-	-	-	-	-	-	1,183	0,971
240	-	-	-	-	-	-	1,284	1,062
250	-	-	-	-	-	-	1,391	1,156
260	-	-	-	-	-	-	-	1,256
270	-	-	-	-	-	-	-	1,361

Annex B-4 Tabulated results of assessment for columns made from structural hollow sections (circular and rectangular)

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R15									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
76	0,612	0,434	0,262	0,262	0,262	0,262	0,262	0,262	0,262
80	0,612	0,434	0,262	0,262	0,262	0,262	0,262	0,262	0,262
85	0,612	0,434	0,272	0,262	0,262	0,262	0,262	0,262	0,262
90	0,659	0,473	0,306	0,262	0,262	0,262	0,262	0,262	0,262
95	0,707	0,513	0,340	0,262	0,262	0,262	0,262	0,262	0,262
100	0,750	0,552	0,374	0,262	0,262	0,262	0,262	0,262	0,262
105	0,773	0,591	0,408	0,262	0,262	0,262	0,262	0,262	0,262
110	0,795	0,630	0,443	0,262	0,262	0,262	0,262	0,262	0,262
115	0,818	0,670	0,477	0,287	0,262	0,262	0,262	0,262	0,262
120	0,841	0,709	0,511	0,317	0,262	0,262	0,262	0,262	0,262
125	0,863	0,748	0,545	0,347	0,262	0,262	0,262	0,262	0,262
130	0,886	0,769	0,579	0,377	0,262	0,262	0,262	0,262	0,262
135	0,908	0,791	0,613	0,407	0,262	0,262	0,262	0,262	0,262
140	0,931	0,813	0,647	0,436	0,262	0,262	0,262	0,262	0,262
145	0,954	0,835	0,681	0,466	0,262	0,262	0,262	0,262	0,262
150	0,976	0,858	0,715	0,496	0,262	0,262	0,262	0,262	0,262
155	0,999	0,880	0,748	0,526	0,271	0,262	0,262	0,262	0,262
160	1,022	0,902	0,769	0,556	0,300	0,262	0,262	0,262	0,262
165	1,044	0,924	0,790	0,586	0,329	0,262	0,262	0,262	0,262
170	1,067	0,946	0,811	0,616	0,358	0,262	0,262	0,262	0,262
175	1,090	0,968	0,832	0,645	0,387	0,262	0,262	0,262	0,262
180	1,112	0,990	0,853	0,675	0,416	0,270	0,262	0,262	0,262
185	1,135	1,012	0,874	0,705	0,445	0,296	0,262	0,262	0,262
190	1,157	1,034	0,895	0,735	0,474	0,321	0,262	0,262	0,262
195	1,180	1,056	0,916	0,758	0,503	0,346	0,262	0,262	0,262
200	1,203	1,078	0,936	0,778	0,532	0,372	0,262	0,262	0,262
205	1,225	1,100	0,957	0,797	0,561	0,397	0,262	0,262	0,262
210	1,248	1,122	0,978	0,817	0,590	0,422	0,262	0,262	0,262
215	1,271	1,144	0,999	0,836	0,619	0,448	0,262	0,262	0,262
220	1,293	1,167	1,020	0,856	0,648	0,473	0,262	0,262	0,262
225	1,316	1,189	1,041	0,875	0,678	0,498	0,262	0,262	0,262
230	1,339	1,211	1,062	0,895	0,707	0,524	0,262	0,262	0,262
235	1,361	1,233	1,083	0,914	0,736	0,549	0,262	0,262	0,262
240	1,384	1,255	1,104	0,934	0,758	0,574	0,282	0,262	0,262
245	-	1,277	1,125	0,953	0,776	0,600	0,304	0,262	0,262

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R15									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
250	-	1,299	1,146	0,973	0,795	0,625	0,326	0,262	0,262
255	-	1,321	1,167	0,992	0,813	0,650	0,347	0,262	0,262
260	-	1,343	1,188	1,011	0,832	0,676	0,369	0,262	0,262
265	-	1,365	1,209	1,031	0,850	0,701	0,390	0,262	0,262
270	-	1,387	1,230	1,050	0,869	0,726	0,412	0,262	0,262
275	-	-	1,251	1,070	0,887	0,750	0,434	0,262	0,262
280	-	-	1,271	1,089	0,906	0,769	0,455	0,262	0,262
285	-	-	1,292	1,109	0,924	0,789	0,477	0,262	0,262
290	-	-	1,313	1,128	0,943	0,808	0,498	0,262	0,262
295	-	-	1,334	1,148	0,961	0,827	0,520	0,262	0,262
300	-	-	1,355	1,167	0,980	0,846	0,542	0,262	0,262
305	-	-	1,376	1,187	0,998	0,865	0,563	0,262	0,262
310	-	-	-	1,206	1,017	0,884	0,585	0,262	0,262
315	-	-	-	1,226	1,035	0,904	0,607	0,262	0,262
320	-	-	-	1,245	1,054	0,923	0,628	0,262	0,262
325	-	-	-	1,265	1,072	0,942	0,650	0,262	0,262
330	-	-	-	1,284	1,090	0,961	0,671	0,275	0,262
335	-	-	-	1,304	1,109	0,980	0,693	0,289	0,262
340	-	-	-	1,323	1,127	1,000	0,715	0,303	0,262
345	-	-	-	1,343	1,146	1,019	0,736	0,317	0,262
350	-	-	-	1,362	1,164	1,038	0,757	0,331	0,262
360	-	-	-	-	1,201	1,076	0,799	0,359	0,262
370	-	-	-	-	1,238	1,115	0,840	0,387	0,262
380	-	-	-	-	1,275	1,153	0,881	0,415	0,262
390	-	-	-	-	1,312	1,191	0,923	0,443	0,262
400	-	-	-	-	1,349	1,230	0,964	0,471	0,262
410	-	-	-	-	1,386	1,268	1,005	0,499	0,262
420	-	-	-	-	-	1,306	1,047	0,527	0,262
430	-	-	-	-	-	1,345	1,088	0,555	0,262
440	-	-	-	-	-	1,383	1,129	0,583	0,262
450	-	-	-	-	-	-	1,171	0,611	0,262
460	-	-	-	-	-	-	1,212	0,639	0,262
467	-	-	-	-	-	-	1,241	0,659	0,262

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R20									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
76	1,294	0,746	0,502	0,343	0,262	0,262	0,262	0,262	0,262
80	1,294	0,746	0,502	0,343	0,262	0,262	0,262	0,262	0,262
85	1,294	0,746	0,502	0,343	0,262	0,262	0,262	0,262	0,262
90	1,294	0,749	0,549	0,383	0,262	0,262	0,262	0,262	0,262
95	1,294	0,775	0,597	0,423	0,262	0,262	0,262	0,262	0,262
100	1,294	0,801	0,644	0,462	0,287	0,262	0,262	0,262	0,262
105	1,294	0,828	0,692	0,502	0,323	0,262	0,262	0,262	0,262
110	1,294	0,854	0,739	0,542	0,359	0,262	0,262	0,262	0,262
115	1,294	0,880	0,767	0,582	0,394	0,294	0,262	0,262	0,262
120	1,294	0,907	0,792	0,622	0,430	0,327	0,262	0,262	0,262
125	1,294	0,933	0,817	0,661	0,466	0,360	0,262	0,262	0,262
130	1,294	0,959	0,842	0,701	0,501	0,394	0,262	0,262	0,262
135	1,294	0,986	0,867	0,741	0,537	0,427	0,262	0,262	0,262
140	1,294	1,012	0,892	0,766	0,573	0,460	0,262	0,262	0,262
145	1,294	1,038	0,917	0,790	0,609	0,494	0,287	0,262	0,262
150	1,294	1,065	0,941	0,813	0,644	0,527	0,317	0,262	0,262
155	1,294	1,091	0,966	0,836	0,680	0,560	0,347	0,262	0,262
160	1,294	1,117	0,991	0,860	0,716	0,594	0,377	0,262	0,262
165	1,294	1,144	1,016	0,883	0,749	0,627	0,408	0,262	0,262
170	1,294	1,170	1,041	0,906	0,771	0,660	0,438	0,262	0,262
175	1,314	1,196	1,066	0,930	0,793	0,694	0,468	0,262	0,262
180	1,342	1,223	1,091	0,953	0,815	0,727	0,498	0,262	0,262
185	1,369	1,249	1,115	0,976	0,836	0,756	0,529	0,268	0,262
190	-	1,275	1,140	1,000	0,858	0,778	0,559	0,291	0,262
195	-	1,302	1,165	1,023	0,880	0,801	0,589	0,315	0,262
200	-	1,328	1,190	1,046	0,902	0,823	0,619	0,339	0,262
205	-	1,354	1,215	1,070	0,924	0,845	0,650	0,362	0,262
210	-	1,381	1,240	1,093	0,946	0,868	0,680	0,386	0,262
215	-	-	1,265	1,117	0,967	0,890	0,710	0,410	0,262
220	-	-	1,290	1,140	0,989	0,913	0,740	0,434	0,262
225	-	-	1,314	1,163	1,011	0,935	0,764	0,457	0,262
230	-	-	1,339	1,187	1,033	0,958	0,787	0,481	0,262
235	-	-	1,364	1,210	1,055	0,980	0,809	0,505	0,262
240	-	-	1,389	1,233	1,077	1,003	0,832	0,528	0,262
245	-	-	-	1,257	1,098	1,025	0,854	0,552	0,262

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R20									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
250	-	-	-	1,280	1,120	1,048	0,877	0,576	0,262
255	-	-	-	1,303	1,142	1,070	0,899	0,600	0,262
260	-	-	-	1,327	1,164	1,092	0,922	0,623	0,265
265	-	-	-	1,350	1,186	1,115	0,944	0,647	0,279
270	-	-	-	1,373	1,207	1,137	0,967	0,671	0,293
275	-	-	-	-	1,229	1,160	0,989	0,694	0,307
280	-	-	-	-	1,251	1,182	1,012	0,718	0,321
285	-	-	-	-	1,273	1,205	1,034	0,742	0,336
290	-	-	-	-	1,295	1,227	1,057	0,768	0,350
295	-	-	-	-	1,317	1,250	1,079	0,795	0,364
300	-	-	-	-	1,338	1,272	1,102	0,821	0,378
305	-	-	-	-	1,360	1,295	1,124	0,848	0,392
310	-	-	-	-	1,382	1,317	1,147	0,874	0,406
315	-	-	-	-	-	1,339	1,169	0,901	0,421
320	-	-	-	-	-	1,362	1,191	0,928	0,435
325	-	-	-	-	-	1,384	1,214	0,954	0,449
330	-	-	-	-	-	-	1,236	0,981	0,463
335	-	-	-	-	-	-	1,259	1,007	0,477
340	-	-	-	-	-	-	1,281	1,034	0,491
345	-	-	-	-	-	-	1,304	1,061	0,506
350	-	-	-	-	-	-	1,326	1,087	0,520
360	-	-	-	-	-	-	1,371	1,140	0,548
370	-	-	-	-	-	-	-	1,194	0,576
380	-	-	-	-	-	-	-	1,247	0,605
390	-	-	-	-	-	-	-	1,300	0,633
400	-	-	-	-	-	-	-	1,353	0,661
410	-	-	-	-	-	-	-	-	0,690
420	-	-	-	-	-	-	-	-	0,718
430	-	-	-	-	-	-	-	-	0,749
440	-	-	-	-	-	-	-	-	1,016
450	-	-	-	-	-	-	-	-	1,283
460	-	-	-	-	-	-	-	-	-
467	-	-	-	-	-	-	-	-	-

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R30									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
76	-	-	-	0,740	0,560	0,487	0,328	0,262	0,262
80	-	-	-	0,740	0,560	0,487	0,328	0,262	0,262
85	-	-	-	0,740	0,560	0,487	0,328	0,262	0,262
90	-	-	-	0,775	0,615	0,539	0,377	0,262	0,262
95	-	-	-	0,807	0,670	0,591	0,425	0,262	0,262
100	-	-	-	0,839	0,725	0,643	0,474	0,276	0,262
105	-	-	-	0,870	0,765	0,696	0,523	0,320	0,262
110	-	-	-	0,902	0,794	0,747	0,572	0,363	0,262
115	-	-	-	0,934	0,824	0,778	0,620	0,406	0,262
120	-	-	-	0,966	0,854	0,809	0,669	0,449	0,262
125	-	-	-	0,998	0,884	0,840	0,718	0,493	0,262
130	-	-	-	1,030	0,913	0,871	0,759	0,536	0,262
135	-	-	-	1,062	0,943	0,901	0,789	0,579	0,289
140	-	-	-	1,094	0,973	0,932	0,819	0,622	0,323
145	-	-	-	1,126	1,002	0,963	0,849	0,665	0,357
150	-	-	-	1,158	1,032	0,994	0,880	0,709	0,391
155	-	-	-	1,190	1,062	1,025	0,910	0,750	0,425
160	-	-	-	1,222	1,092	1,056	0,940	0,780	0,459
165	-	-	-	1,254	1,121	1,087	0,970	0,809	0,493
170	-	-	-	1,286	1,151	1,118	1,001	0,839	0,527
175	-	-	-	1,318	1,181	1,149	1,031	0,869	0,561
180	-	-	-	1,350	1,210	1,179	1,061	0,899	0,596
185	-	-	-	1,382	1,240	1,210	1,091	0,928	0,630
190	-	-	-	-	1,270	1,241	1,122	0,958	0,664
195	-	-	-	-	1,300	1,272	1,152	0,988	0,698
200	-	-	-	-	1,329	1,303	1,182	1,018	0,732
205	-	-	-	-	1,359	1,334	1,212	1,047	0,766
210	-	-	-	-	1,389	1,365	1,243	1,077	0,801
215	-	-	-	-	-	-	1,273	1,107	0,836
220	-	-	-	-	-	-	1,303	1,136	0,870
225	-	-	-	-	-	-	1,333	1,166	0,905
230	-	-	-	-	-	-	1,364	1,196	0,940
235	-	-	-	-	-	-	-	1,226	0,975
240	-	-	-	-	-	-	-	1,255	1,009
245	-	-	-	-	-	-	-	1,285	1,044

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Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R30									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
250	-	-	-	-	-	-	-	1,315	1,079
255	-	-	-	-	-	-	-	1,345	1,113
260	-	-	-	-	-	-	-	1,374	1,148
265	-	-	-	-	-	-	-	-	1,183
270	-	-	-	-	-	-	-	-	1,217
275	-	-	-	-	-	-	-	-	1,252
280	-	-	-	-	-	-	-	-	1,287
285	-	-	-	-	-	-	-	-	1,321
290	-	-	-	-	-	-	-	-	1,356
295	-	-	-	-	-	-	-	-	1,391
300	-	-	-	-	-	-	-	-	-
305	-	-	-	-	-	-	-	-	-
310	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-	-
320	-	-	-	-	-	-	-	-	-
325	-	-	-	-	-	-	-	-	-
330	-	-	-	-	-	-	-	-	-
335	-	-	-	-	-	-	-	-	-
340	-	-	-	-	-	-	-	-	-
345	-	-	-	-	-	-	-	-	-
350	-	-	-	-	-	-	-	-	-
360	-	-	-	-	-	-	-	-	-
370	-	-	-	-	-	-	-	-	-
380	-	-	-	-	-	-	-	-	-
390	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	-	-
410	-	-	-	-	-	-	-	-	-
420	-	-	-	-	-	-	-	-	-
430	-	-	-	-	-	-	-	-	-
440	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	-
460	-	-	-	-	-	-	-	-	-
467	-	-	-	-	-	-	-	-	-

Structural hollow sections (circular and rectangular) – columns									
Fire resistance period: R45									
Design temperature [°C]	350	400	450	500	550	600	650	700	750
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature								
76	-	-	-	-	-	-	-	0,654	0,389
80	-	-	-	-	-	-	-	0,654	0,389
85	-	-	-	-	-	-	-	0,654	0,389
90	-	-	-	-	-	-	-	0,727	0,454
95	-	-	-	-	-	-	-	0,778	0,519
100	-	-	-	-	-	-	-	0,821	0,583
105	-	-	-	-	-	-	-	0,864	0,648
110	-	-	-	-	-	-	-	0,906	0,713
115	-	-	-	-	-	-	-	0,949	0,766
120	-	-	-	-	-	-	-	0,992	0,806
125	-	-	-	-	-	-	-	1,035	0,846
130	-	-	-	-	-	-	-	1,078	0,886
135	-	-	-	-	-	-	-	1,121	0,927
140	-	-	-	-	-	-	-	1,164	0,967
145	-	-	-	-	-	-	-	1,207	1,007
150	-	-	-	-	-	-	-	1,249	1,047
155	-	-	-	-	-	-	-	1,292	1,088
160	-	-	-	-	-	-	-	1,335	1,128
165	-	-	-	-	-	-	-	1,378	1,168
170	-	-	-	-	-	-	-	-	1,209
175	-	-	-	-	-	-	-	-	1,249
180	-	-	-	-	-	-	-	-	1,289
185	-	-	-	-	-	-	-	-	1,329
190	-	-	-	-	-	-	-	-	1,370

Annex B-5 Tabulated results of assessment for beams made from structural hollow sections (rectangular)

Structural hollow sections (rectangular) – beams								
Fire resistance period: R15								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
70	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
80	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
90	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
100	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
110	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
120	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
130	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
140	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
150	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
160	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
170	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
180	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
190	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
200	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
210	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
220	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
230	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
240	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
250	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
260	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
270	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
280	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
290	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
300	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
310	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
320	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
330	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
340	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
350	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
360	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
370	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
380	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
390	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
400	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250

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Structural hollow sections (rectangular) – beams								
Fire resistance period: R20								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
70	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
80	0,250	0,250	0,250	0,250	0,250	0,250	0,250	0,250
90	0,254	0,250	0,250	0,250	0,250	0,250	0,250	0,250
100	0,267	0,250	0,250	0,250	0,250	0,250	0,250	0,250
110	0,281	0,250	0,250	0,250	0,250	0,250	0,250	0,250
120	0,294	0,250	0,250	0,250	0,250	0,250	0,250	0,250
130	0,308	0,250	0,250	0,250	0,250	0,250	0,250	0,250
140	0,322	0,250	0,250	0,250	0,250	0,250	0,250	0,250
150	0,337	0,250	0,250	0,250	0,250	0,250	0,250	0,250
160	0,352	0,250	0,250	0,250	0,250	0,250	0,250	0,250
170	0,367	0,250	0,250	0,250	0,250	0,250	0,250	0,250
180	0,383	0,250	0,250	0,250	0,250	0,250	0,250	0,250
190	0,398	0,250	0,250	0,250	0,250	0,250	0,250	0,250
200	0,415	0,250	0,250	0,250	0,250	0,250	0,250	0,250
210	0,431	0,250	0,250	0,250	0,250	0,250	0,250	0,250
220	0,448	0,250	0,250	0,250	0,250	0,250	0,250	0,250
230	0,465	0,250	0,250	0,250	0,250	0,250	0,250	0,250
240	0,483	0,250	0,250	0,250	0,250	0,250	0,250	0,250
250	0,501	0,250	0,250	0,250	0,250	0,250	0,250	0,250
260	0,520	0,250	0,250	0,250	0,250	0,250	0,250	0,250
270	0,539	0,250	0,250	0,250	0,250	0,250	0,250	0,250
280	0,558	0,250	0,250	0,250	0,250	0,250	0,250	0,250
290	0,578	0,250	0,250	0,250	0,250	0,250	0,250	0,250
300	0,598	0,250	0,250	0,250	0,250	0,250	0,250	0,250
310	0,619	0,250	0,250	0,250	0,250	0,250	0,250	0,250
320	0,641	0,250	0,250	0,250	0,250	0,250	0,250	0,250
330	0,662	0,250	0,250	0,250	0,250	0,250	0,250	0,250
340	0,685	0,250	0,250	0,250	0,250	0,250	0,250	0,250
350	0,708	0,250	0,250	0,250	0,250	0,250	0,250	0,250
360	0,732	0,250	0,250	0,250	0,250	0,250	0,250	0,250
370	0,756	0,250	0,250	0,250	0,250	0,250	0,250	0,250
380	0,781	0,250	0,250	0,250	0,250	0,250	0,250	0,250
390	0,807	0,250	0,250	0,250	0,250	0,250	0,250	0,250
400	0,833	0,250	0,250	0,250	0,250	0,250	0,250	0,250

Structural hollow sections (rectangular) – beams								
Fire resistance period: R30								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	0,539	0,295	0,250	0,250	0,250	0,250	0,250	0,250
70	0,608	0,338	0,250	0,250	0,250	0,250	0,250	0,250
80	0,680	0,381	0,250	0,250	0,250	0,250	0,250	0,250
90	0,752	0,426	0,250	0,250	0,250	0,250	0,250	0,250
100	0,826	0,472	0,250	0,250	0,250	0,250	0,250	0,250
110	0,901	0,519	0,250	0,250	0,250	0,250	0,250	0,250
120	0,978	0,568	0,250	0,250	0,250	0,250	0,250	0,250
130	1,057	0,617	0,258	0,250	0,250	0,250	0,250	0,250
140	1,137	0,668	0,282	0,250	0,250	0,250	0,250	0,250
150	1,219	0,721	0,308	0,250	0,250	0,250	0,250	0,250
160	1,302	0,774	0,335	0,250	0,250	0,250	0,250	0,250
170	1,388	0,830	0,362	0,250	0,250	0,250	0,250	0,250
180	1,475	0,887	0,390	0,250	0,250	0,250	0,250	0,250
190	1,564	0,945	0,420	0,250	0,250	0,250	0,250	0,250
200	1,654	1,006	0,450	0,250	0,250	0,250	0,250	0,250
210	1,747	1,068	0,482	0,250	0,250	0,250	0,250	0,250
220	1,842	1,132	0,515	0,250	0,250	0,250	0,250	0,250
230	1,939	1,198	0,549	0,250	0,250	0,250	0,250	0,250
240	2,039	1,266	0,584	0,250	0,250	0,250	0,250	0,250
250	2,140	1,336	0,621	0,250	0,250	0,250	0,250	0,250
260	2,244	1,408	0,659	0,250	0,250	0,250	0,250	0,250
270	2,351	1,483	0,699	0,250	0,250	0,250	0,250	0,250
280	2,460	1,560	0,740	0,250	0,250	0,250	0,250	0,250
290	2,571	1,640	0,783	0,250	0,250	0,250	0,250	0,250
300	2,686	1,723	0,828	0,250	0,250	0,250	0,250	0,250
310	2,803	1,809	0,876	0,250	0,250	0,250	0,250	0,250
320	2,923	1,898	0,925	0,250	0,250	0,250	0,250	0,250
330	3,046	1,989	0,976	0,250	0,250	0,250	0,250	0,250
340	3,173	2,085	1,031	0,250	0,250	0,250	0,250	0,250
350	3,302	2,184	1,087	0,250	0,250	0,250	0,250	0,250
360	3,436	2,286	1,147	0,250	0,250	0,250	0,250	0,250
370	-	2,393	1,210	0,250	0,250	0,250	0,250	0,250
380	-	2,504	1,276	0,250	0,250	0,250	0,250	0,250
390	-	2,620	1,345	0,250	0,250	0,250	0,250	0,250
400	-	2,740	1,419	0,250	0,250	0,250	0,250	0,250

Structural hollow sections (rectangular) – beams								
Fire resistance period: R45								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	1,023	0,722	0,485	0,293	0,250	0,250	0,250	0,250
70	1,178	0,842	0,575	0,359	0,250	0,250	0,250	0,250
80	1,337	0,964	0,668	0,426	0,250	0,250	0,250	0,250
90	1,499	1,090	0,763	0,496	0,273	0,250	0,250	0,250
100	1,664	1,220	0,862	0,568	0,322	0,250	0,250	0,250
110	1,833	1,352	0,963	0,642	0,373	0,250	0,250	0,250
120	2,005	1,488	1,068	0,720	0,426	0,250	0,250	0,250
130	2,180	1,628	1,176	0,800	0,482	0,250	0,250	0,250
140	2,359	1,771	1,288	0,883	0,539	0,250	0,250	0,250
150	2,541	1,919	1,403	0,969	0,599	0,280	0,250	0,250
160	2,728	2,070	1,522	1,059	0,662	0,317	0,250	0,250
170	2,918	2,226	1,645	1,152	0,727	0,357	0,250	0,250
180	3,113	2,386	1,773	1,248	0,795	0,399	0,250	0,250
190	3,311	2,551	1,905	1,349	0,866	0,442	0,250	0,250
200	-	2,721	2,042	1,454	0,941	0,488	0,250	0,250
210	-	2,895	2,183	1,563	1,019	0,536	0,250	0,250
220	-	3,075	2,330	1,677	1,100	0,587	0,250	0,250
230	-	3,261	2,483	1,797	1,186	0,641	0,250	0,250
240	-	3,453	2,642	1,921	1,277	0,697	0,250	0,250
250	-	-	2,806	2,051	1,372	0,757	0,250	0,250
260	-	-	2,978	2,188	1,472	0,821	0,250	0,250
270	-	-	3,156	2,331	1,578	0,888	0,254	0,250
280	-	-	3,342	2,482	1,690	0,960	0,285	0,250
290	-	-	-	2,640	1,809	1,037	0,318	0,250
300	-	-	-	2,806	1,934	1,119	0,353	0,250
310	-	-	-	2,981	2,068	1,206	0,391	0,250
320	-	-	-	3,166	2,210	1,300	0,433	0,250
330	-	-	-	3,362	2,362	1,401	0,478	0,250
340	-	-	-	-	2,524	1,511	0,526	0,250
350	-	-	-	-	2,698	1,629	0,580	0,250
360	-	-	-	-	2,885	1,757	0,638	0,250
370	-	-	-	-	3,086	1,897	0,703	0,250
380	-	-	-	-	3,303	2,050	0,774	0,250
390	-	-	-	-	-	2,218	0,854	0,250
400	-	-	-	-	-	2,403	0,944	0,250

Structural hollow sections (rectangular) – beams								
Fire resistance period: R60								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	1,507	1,148	0,866	0,638	0,450	0,292	0,250	0,250
70	1,748	1,345	1,026	0,767	0,553	0,373	0,250	0,250
80	1,995	1,547	1,191	0,901	0,660	0,457	0,283	0,250
90	2,246	1,755	1,361	1,039	0,771	0,544	0,349	0,250
100	2,503	1,967	1,536	1,182	0,886	0,635	0,419	0,250
110	2,764	2,185	1,717	1,330	1,005	0,729	0,491	0,284
120	3,031	2,409	1,903	1,483	1,130	0,828	0,567	0,339
130	3,303	2,638	2,095	1,642	1,259	0,930	0,646	0,397
140	-	2,874	2,293	1,806	1,393	1,038	0,729	0,458
150	-	3,117	2,498	1,977	1,533	1,150	0,815	0,521
160	-	3,366	2,710	2,155	1,679	1,267	0,907	0,589
170	-	-	2,929	2,339	1,831	1,390	1,002	0,659
180	-	-	3,155	2,531	1,991	1,519	1,103	0,734
190	-	-	3,390	2,730	2,157	1,654	1,209	0,813
200	-	-	-	2,938	2,331	1,796	1,321	0,896
210	-	-	-	3,155	2,513	1,945	1,439	0,985
220	-	-	-	3,381	2,705	2,103	1,564	1,079
230	-	-	-	-	2,906	2,269	1,697	1,179
240	-	-	-	-	3,117	2,445	1,837	1,285
250	-	-	-	-	3,339	2,631	1,987	1,399
260	-	-	-	-	-	2,828	2,146	1,521
270	-	-	-	-	-	3,037	2,316	1,651
280	-	-	-	-	-	3,260	2,498	1,792
290	-	-	-	-	-	-	2,694	1,944
300	-	-	-	-	-	-	2,904	2,108
310	-	-	-	-	-	-	3,130	2,286
320	-	-	-	-	-	-	3,375	2,480
330	-	-	-	-	-	-	-	2,693
340	-	-	-	-	-	-	-	2,926
350	-	-	-	-	-	-	-	3,183
360	-	-	-	-	-	-	-	3,469

Structural hollow sections (rectangular) – beams								
Fire resistance period: R90								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m ⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	2,474	2,002	1,629	1,328	1,079	0,871	0,693	0,540
70	2,889	2,353	1,929	1,585	1,300	1,061	0,856	0,680
80	3,311	2,713	2,238	1,851	1,530	1,258	1,026	0,826
90	-	3,083	2,557	2,126	1,767	1,464	1,203	0,978
100	-	3,462	2,885	2,410	2,014	1,677	1,388	1,137
110	-	-	3,223	2,705	2,270	1,900	1,581	1,303
120	-	-	-	3,010	2,536	2,132	1,782	1,477
130	-	-	-	3,326	2,813	2,374	1,993	1,659
140	-	-	-	-	3,101	2,626	2,213	1,851
150	-	-	-	-	3,401	2,890	2,444	2,052
160	-	-	-	-	-	3,166	2,687	2,264
170	-	-	-	-	-	3,456	2,942	2,487
180	-	-	-	-	-	-	3,210	2,723
190	-	-	-	-	-	-	-	2,971
200	-	-	-	-	-	-	-	3,235

Structural hollow sections (rectangular) – beams								
Fire resistance period: R120								
Design temperature [°C]	350	400	450	500	550	600	650	700
Section factor [m⁻¹]	Thickness (mm) of reactive coating (without primer and top coat) to maintain steel temperature below design temperature							
60	3,442	2,855	2,392	2,017	1,708	1,449	1,229	1,039
70	-	3,361	2,832	2,403	2,048	1,749	1,494	1,274
80	-	-	3,285	2,801	2,399	2,060	1,770	1,519
90	-	-	-	3,213	2,763	2,383	2,057	1,775
100	-	-	-	-	3,142	2,720	2,357	2,042
110	-	-	-	-	-	3,070	2,670	2,322
120	-	-	-	-	-	3,436	2,997	2,615
130	-	-	-	-	-	-	3,340	2,922
140	-	-	-	-	-	-	-	3,244