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General Part

Technical Assessment Body issuing the European Technical Assessment: Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)	
Trade name of the construction product	IC 11-00 INTUMESCENT IC 11-01 INTUMESCENT
Product family to which the construction product belongs	Fire Protective Reactive coating for structural steel
Manufacturer	Kansai Helios Coatings GmbH Ignaz-Köck-Straße 15, 1210 Wien, Austria
Manufacturing plant(s)	Plant 1
This European Technical Assessment contains	35 pages including 1 Annex, which form an integral part of this assessment. Annex 2. Contain confidential information and is not included in the ETA when that assessment is publicly available
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 350402-00-110611, Reactive coating for fire protection of steel elements

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SPECIFIC PARTS

1 Technical description of the product

The IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT product is reactive coating in solvent medium formulated for the fire protection of structural steel elements. The application is performed by spray, brush or roller, and once the reactive coating is hardened, conforms a continuous rendering completely bonded to the support (steel with different kinds of primers). The final assembly contains the following components:

Product	Trade name	Primer / top coat type ²	Colour ³	Thicknes (µm) ¹	Consumption (kg/m ²)	Support	Environmental conditions
Reactive coating (RC)	IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT		White	219-2165	0,39 - 3.83		Z1
Primer	Alkyd SB 1	Alkyd resin, solvent based	Red oxide	40 ± 10	0.13 ± 0.01	steel	-----
	Acrylic WB 1	Water borne, acrylic	Red oxide	30 ± 10	0.08 ± 0.01		-----
	Epoxy Primer 2K SB	Two component epoxy	Red oxide	40 ± 10	0.1 ± 0.01		-----
	Epoxy Zn 2K SB	Two component epoxy	Grey	40 ± 10	0.16 ± 0.01		-----
	2K epoxy + 2K intermediate + PU top coat, paper sanded		White	330 ± 20	1.1 ± 0.1		-----
	Epoxy Intermediate 2K SB	Two component epoxy	Red oxide	40 ± 10	0.1 ± 0.01	galvanized steel	-----
Top coat	Remoplast UVC PL HS ES	Acrylic	Dark Blue	160 ± 20		steel	X
	REM-AK OC	Alkyd	Dark Blue	120 ± 20		steel	Y

¹ Maximum and minimum thickness cannot exceed the values recommended by the producer for each product

² Other primers from the same type are acceptable

³ As the colour of the top coats have a L coordinate below 50, all colours can be used

The final assembled system is constituted by one PRIMER + IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT + none top coat or any top coat of the above table according to the environmental conditions (option 3).

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

2.1 Intended use(s)

The intended use of the IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT coat reactive is the rendering of building load-bearing constructive elements to increase the fire resistance in case of fire, keeping the resistance, integrity and insulation (REI) of the building elements until the fire extinction or the building evacuation.

This Product fulfils the Basic Works Requirements n^o 2 (Safety in case of fire), n^o 3 (Hygiene, health and the environment) and n^o 4 (Safety in use) of the of Regulation (EU) No 305/2011.

This product has a category of use related to environmental conditions:

Type X: (valid for Z1, Z2, Y and X categories). Reactive coating system intended for all conditions (internal, semi-exposed and exposed). When it is applied with top coat Remoplast UVC PL HS ES

Type Y: (valid for Z1, Z2 and Y categories) Reactive coating system intended for use in internal and semi-exposed conditions. Semi exposed includes temperatures below zero, but no exposure to rain and limited expo-sure to UV (but UV is not assessed). When it is applied with top coat REM-AK OC.

Type Z1: (valid for Z1 and Z2 categories) Reactive coating system intended for use in internal conditions with humidity equal to or higher than 85 % RH, excluding temperatures below 0°C. When it is applied without top coat or with the top coat of the system.

Type Z2: Reactive coat intended for internal conditions without high humidity¹ content, and excluding temperatures below 0°C, In this case the reactive coat can be applied without top coat or with the top coat of the system.

Use category related to the element(s) intended to be protected:

Type 4: Fire Protective Products to protect load-bearing steel elements.

Section	Section factor	Temperature	Resistance
Open sections H, I: Beams and columns	< 382 m ⁻¹	350–750 °C	R15 to R120
Hollow columns	< 252 m ⁻¹	400–750 °C	R15 to R90

2.2 Relevant general conditions for the use of the kit

The provisions made in this European Technical Assessment are based on an assumed working life of 10 years from installation in the works, according to EAD 350402-00-110611, provided that the conditions lay down for the installation, packaging, transport and storage as well as appropriate use, maintenance and repair are met.

The indications given on the working life cannot be interpreted as a guarantee given neither by the product manufacturer nor by EOTA nor by the Technical Assessment Body issuing this ETA, but are regarded only as a means for choosing the right product in relation to the expected economically reasonable working life of the works.

The real working life may be, in normal use conditions, considerably longer without major degradation affecting the Basic works requirements.

Application on site. The suitability of use of this product can only be assumed if this is applied according to the manufacturer's instructions, which are part of the MTD to this ETA placed at IETcc.

A) *Particularly, it is recommended to consider:*

- The application has to be carried out by a skilled labor.
- It can only be used the components of the Product indicated in this ETA.
- It is necessary to control the thickness of the applied product during application.
- The support to protect must be clean, dry and without dust or grease in order not to affect the adherence of IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT.
- The application must be performed by spray or brush. All these characteristics are included in the machines technical specifications and instructions of use.
- The hardened product will not present cracks, according to the test performed in this evaluation.
- Before the application of IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT or any primer, it is recommended to read their MSDS.
- Surface preparation: The steel surface must be blasted to a Sa2½ degree (ISO 8501-1), cleaned and degreased. Roughness must be at least 25 - 50 microns. Galvanized steel supports must be degreased and light sweep blasted. The application of the primers must be carried out immediately after surface preparation in order to avoid any contamination.
- The EAD is not designed to cover the application of rendering over any existing coating (e.g. 'old' existing paint) or rendering. It is therefore assumed that any existing coating or rendering must be completely removed before the application. If it could not be removed, it would necessary to consult the manufacturer
- Protection materials. In these special cases, it is needed to check it with manufacturer.

B) *Application limitations due to certain environments.*

During the application and drying time, the product has to be protected against the water rain. With strong winds, high temperatures and any climate agent that can produce a quick dry of the reactive

¹ These uses do not apply for internal humidity class 5 in accordance with EN ISO 13788. Products that meet the requirements for type Z1, also meet the requirements for type Z2.

coating, IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT will be applied in several layers with lower thickness each one to reduce the formation of cracks.

C) *Incompatibility with other Fire protection materials.*

For these special cases, it is needed to check it with the manufacturer.

Manufacturer’s responsibilities. It is responsibility of the manufacturer of the product to ensure that the information of application of the product is communicated correctly to the manufacturer’s applicators.

Recommendations of use, maintenance and repair. It is recommended to carry out yearly control inspections to check the state of the product (damages, cracks, cleanliness, etc.). The repair procedure will be carried out by:

- complete disposal of the damaged product, and preparation of the support (cleanliness),
- new application of IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT sprayed or manually according to the reparation size. The material preparation and its application will be performed as indicated above.

Further application details are laid down in the MTD place at IETcc.

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

The identification tests and the assessment for the intended use of “IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT” according to the Basic Work Requirements (BWR) were carried out in compliance with EAD 350402-00-110611, Reactive coating for fire protection of steel elements.

The characteristics of each system shall correspond to the respective values laid down in following tables of this ETA, checked by IETcc. Methods of verification and of assessing and judging are listed afterwards.

3.1 Safety in case of fire (BWR 2)

Basic requirement for construction works 2: Safety in case of fire						
Essential characteristic					Relevant clause in EAD	Classification
Fire resistance						
Support	Primer	Reactive coating	Thickness (µm) Reactive coating	Top Coat	2.2.2	
Open sections H, I: Beams and columns	Any of the system	IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT	219- 2526 (columns) 219 - 2527 (beams)	Without or with Any of the system		R 15 to R 120
Hollow columns			411 - 3408			R 15 to R 90
Fire reaction						
Steel	Any of the system	IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT	-----	Without any	2.2.1	C-s2,d0
			-----	With any		NPA

3.2 Hygiene, health and environment (BWR 3)

Basic requirement for construction works 3: Hygiene, health, and the environment		
Essential characteristic	Relevant clause in EAD	Performance
Content, emission and/or release of dangerous substances. Leachable substances	2.2.3	The semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) are not determined in accordance with EN 16516. NPA

3.3 Safety and accessibility in use (BWR 4)

Basic requirement for construction works 4: Safety and accessibility in use				
Essential characteristic			Relevant clause in EAD	Performance
Adhesion			2.2.4	Pass ²
Durability			2.2.5	NPA
Corrosion resistance	Without primer		2.2.5.1	Pass
	With any primer			Pass
Behaviour under different environmental conditions			2.2.5.2	
Reactive coating	Top coat	Environmental conditions		Performance
IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT Steel	-----	Z1	2.2.5.2.1.1	Pass ²
	Remoplast UVC PL HS ES	X	2.2.5.2.1.2	
	REM-AK OC	Y	2.2.5.2.1.5	
	-----	Resistance to chemicals	2.2.5.2.1.4	2.2.5.2.1.6

3.4 Identification of components

The characteristics of the components of this product show the following values, which are within the respective requirements and tolerances stated in the Manufacture Technical Dossier (MTD).

Product	Description	Color (visual)	Density kg/l (EN ISO 2811, 23 °C, HR% 50)	VOC g/l
IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT	Intumescent coating	White	1.40 - 1.50	< 396
Primers				
Alkyd SB 1	Alkydic	Red oxide	1.43 - 1.52	< 477
Acrylic WB 1	Acrylic	Red oxide	1.25 - 1.31	< 30
Epoxy Primer 2K SB	Epoxy	Red oxide	1.37 - 1.43 / 0.89 - 0.93	< 498
Epoxy Zn 2K SB	Rich zinc epoxy	Grey	2.93 - 2.97 / 0.95 - 0.99	< 483
Epoxy Intermediate 2K SB	Epoxy	White	1.35 - 1.40 / 1.02 - 1.06	< 409
Epoxy Primer 2K SB	Epoxy	Beige	1.23 - 1.29	< 86
Top Coat				
Remoplast UVC PL HS ES	Acrylic	Dark Blue	1.35-1.45	< 320
REM-AK OC	Alkyd	Dark Blue	1.15-1.25	< 483

Remark: this evaluation is not limited to the colours listed in the above table

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

According to the mandate Construct 98/311, Annex 3 (taking into account decision 1999/454/EC of the Commission) system 1 for assessment and verification of constancy of performance (see EC delegated regulation (EU) No 568/2014 amending Annex V to Regulation (EU) N° 305/2011) applies.

Product	Intended uses	Level or Classes	System
IC 11-00 INTUMESCENT IC 11-01 INTUMESCENT	Rendering intended for Fire Resisting Application of building elements	Any	1

The system 1 provides:

Tasks for the manufacturer: factory production control and further testing of samples taken at the factory by the manufacturer in accordance with the "Control Plan".

Tasks for the notified body: initial type-testing of the product, initial inspection of factory and of factory production control and two annual surveillances, assessment and approval of factory production control of the manufacturer.

² The averages time to achievement of critical Steel temperature (t₅₀₀) determined in the insulation efficiency tests with the different primers and top coats are not less than 85% of the average time t₅₀₀ (time to reach a steel temperature of 500 °C) of the reference system (IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT). No single results of exposed specimens were less than 80 % of the mean time t₅₀₀ of the initial test.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at IETcc³.

5.1 Tasks for the manufacturer

Factory production control. The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this ETA.

The manufacturer may only use components stated in the technical documentation of this ETA including Control Plan. The incoming raw materials are subjected to verifications by the manufacturer before acceptance.

The factory production control shall be in accordance with the Control Plan. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

The documentation shall be kept for at least five years. In the next table are enclosed the controls and the minimum frequency performed by the manufacturer.

Property	Frequency
Raw Material	Every delivery
Char depth (expansion ratio)	Batch
Sag resistance	Batch
Insulation efficiency	10 Batch / 1 per month at least
Viscosity	Batch
Incoming material	Every delivery
Curing	Batch
Pigment dispersion (fineness of the grind)	Batch
Non-volatile content	Batch

Further information concerning tests, frequencies and tolerances are included in the test's plan, which is part of the MTD to this ETA placed at IETcc.

Other tasks of manufacturer. The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in order to undertake the actions laid down in this clause. For this purpose, the control plan shall be handed over by the manufacturer to the notified bodies involved.

The manufacturer shall make a declaration of conformity, stating that this product is in conformity with the provisions of this ETA.

5.2 Tasks for the Notified body

Initial type-testing of the product. The initial type-testing are tests used by the IETcc to issue this ETA and they are enclosed in the EAD 350402-00-110611 "Reactive coating for fire protection of steel elements".

The initial type-testing of this ETA have been carried out by the IETcc on samples from the current production or in other accredited laboratories.

Initial inspection of factory and production control. The IETcc has checked that, in accordance with the MTD, factory conditions and production control allow the manufacturer to ensure the consistency and homogeneity of the manufactured product and its traceability, to assure the final characteristics of the product.

Continuous surveillance, assessment and evaluation of factory production control. The Notified body shall visit the factory at least twice a year. Surveillance of the manufacturing process shall include:

- Inspection of the documentation of factory production control, to ensure continuing compliance with the provisions of the ETA,

³ The Control Plan is a confidential part of the ETA and only handed over to the notified certification body involved in the assessment and verification of constancy of performance.

- Identification of changes by comparing data obtained during the initial inspection or during the last visit.
- In cases where the provisions of the European Technical Assessment and its “Control Plan” are no longer fulfilled the certification body (IETcc) shall withdraw the certificate of conformity.

Issued in Madrid on 03 November 2021

By



Director

on behalf of Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc – CSIC)

Annex I. Fire resistance tests. This Annex relates to the use of IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT for the fire protection of ‘H’ or ‘I’ shaped steel beam and column sections, hollow beams and hollow sections. The precise scope is given in the following tables which show the total dry film thickness of IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT (excluding primer and top coat) required to provide classifications of R15 to R120 (R15 to R90 for hollow sections) for various design temperatures and section factors. The product is evaluated on the basis of:

- Evaluation testing in accordance with the principles of EN 13381-8.
- A design appraisal against this ETA adopting the graphical method defined in Annex E.2 of EN 13381-8: 2013 is used for results columns/beams and hollow sections.

The data presented in the tables in this annex refers to beams and columns of open section (three-four side fire exposure), hollow beams and hollow sections. The data shown is applicable to steel sections blast cleaned to ISO 8501-1 SA21/2 or equivalent and primed with the compatible primers and top coats listed in this ETA. Based on the test data the total dry film thickness of primer and top coat together should not exceed the maximum tested.

IC 11-00 INTUMESCENT / IC 11-01 INTUMESCENT has been exposed to the slowing heating regime defined in Annex A of EN 13381-8 and has satisfied the requirements

The following tables show the thickness required for a design temperature at different exposure time

Fire resistance of H and I sections, beams and columns

I / H Beams: 350 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m ⁻¹	15 min	30 min	45 min	60 min	90 min	120 min
68	219	536	903	1.754	-	-
70	219	538	923	1.800	-	-
75	219	542	973	1.915	-	-
80	219	546	1.024	2.031	-	-
85	219	550	1.077	2.146	-	-
90	219	554	1.130	2.262	-	-
95	219	558	1.183	2.377	-	-
100	219	562	1.236	2.493	-	-
105	219	566	1.289		-	-
110	225	570	1.342		-	-
115	233	575	1.395		-	-
120	242	579	1.448		-	-
125	250	583	1.501		-	-
130	258	587	1.554		-	-
135	267	591	1.607		-	-
140	275	595	1.660		-	-
145	284	632	1.713		-	-
150	292	676	1.758		-	-
155	301	720	1.800		-	-
160	309	764	1.842		-	-
165	318	808	1.884		-	-
170	326	852	1.926		-	-
175	334	895	1.968		-	-
180	343	939	2.010		-	-
185	351	983	2.052		-	-
190	360	1.027	2.094		-	-
195	368	1.052	2.136		-	-
200	377	1.077	2.178		-	-
205	385	1.102	2.220		-	-
210	394	1.127	2.262		-	-
215	402	1.152	2.304		-	-
220	411	1.177	2.346		-	-
225	419	1.202	2.388		-	-
230	427	1.227	2.430		-	-
235	436	1.252	2.472		-	-
240	444	1.277	2.514		-	-
245	453	1.302			-	-
250	461	1.327			-	-
255	470	1.352			-	-
260	478	1.377			-	-
265	487	1.402			-	-
270	495	1.427			-	-
275	503	1.453			-	-
280	512	1.480			-	-
285	520	1.507			-	-
290	529	1.533			-	-
295	537	1.560			-	-
300	546	1.587			-	-
305	554	1.613			-	-
310	563	1.640			-	-
315	571	1.666			-	-
320	579	1.693			-	-
325	588	1.720			-	-
330	597	1.746			-	-
335	616	1.773			-	-
340	634	1.800			-	-
345	653	1.826			-	-
350	672	1.853			-	-
355	690	1.879			-	-
360	709	1.906			-	-
365	727	1.933			-	-
370	746	1.959			-	-
375	765	1.986			-	-
380	783	2.013			-	-
382	791	2.023			-	-

I / H Beams: 400 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m ⁻¹	15 min.	30 min	45 min	60 min	90 min	120 min
68	219	227	593	856	-	-
70	219	233	600	873	-	-
75	219	246	617	915	-	-
80	219	260	635	957	-	-
85	219	274	652	999	-	-
90	219	287	670	1042	-	-
95	219	301	687	1090	-	-
100	219	315	704	1138	-	-
105	219	328	722	1186	-	-
110	219	342	739	1233	-	-
115	219	356	757	1281	-	-
120	219	369	774	1329	-	-
125	219	383	792	1377	-	-
130	219	397	809	1424	-	-
135	219	410	826	1472	-	-
140	219	424	844	1520	-	-
145	219	438	874	1568	-	-
150	219	451	906	1629	-	-
155	219	465	939	1693	-	-
160	219	478	972	1756	-	-
165	219	492	1005	1820	-	-
170	219	506	1037	1884	-	-
175	219	519	1066	1948	-	-
180	219	533	1096	2012	-	-
185	219	547	1126	2076	-	-
190	220	560	1155	2140	-	-
195	226	574	1185	2204	-	-
200	233	588	1214	2267	-	-
205	239	604	1244	2331	-	-
210	246	623	1274	2395	-	-
215	252	642	1303	2459	-	-
220	259	661	1333	2523	-	-
225	266	680	1362		-	-
230	272	700	1392		-	-
235	279	719	1422		-	-
240	285	738	1452		-	-
245	292	757	1483		-	-
250	298	776	1515		-	-
255	305	796	1546		-	-
260	311	815	1577		-	-
265	318	834	1608		-	-
270	324	853	1639		-	-
275	331	872	1670		-	-
280	338	892	1701		-	-
285	344	911	1732		-	-
290	351	930	1763		-	-
295	357	949	1794		-	-
300	364	968	1825		-	-
305	370	987	1856		-	-
310	377	1007	1887		-	-
315	383	1026	1918		-	-
320	390	1042	1949		-	-
325	396	1058	1980		-	-
330	403	1074	2011		-	-
335	410	1089	2042		-	-
340	416	1105	2073		-	-
345	423	1121	2104		-	-
350	429	1137	2135		-	-
355	436	1153	2166		-	-
360	442	1169	2197		-	-
365	449	1184	2228		-	-
370	455	1200	2259		-	-
375	462	1216	2290		-	-
380	469	1232	2321		-	-
382	471	1238	2333		-	-

I / H Beams: 450 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	290	656	1313	-
70	219	219	297	666	1377	-
75	219	220	313	692	1540	-
80	219	230	329	718	1702	-
85	219	239	345	743	1864	-
90	219	248	361	769	2026	-
95	219	257	377	795	2189	-
100	219	266	393	821	2351	-
105	219	275	409	847	2513	-
110	219	285	425	872		-
115	219	294	441	898		-
120	219	303	457	924		-
125	219	312	474	950		-
130	219	321	490	975		-
135	219	331	506	1001		-
140	219	340	522	1027		-
145	219	349	538	1058		-
150	219	358	554	1090		-
155	219	367	570	1121		-
160	219	376	586	1152		-
165	219	386	605	1184		-
170	219	395	627	1215		-
175	219	404	650	1246		-
180	219	413	672	1278		-
185	219	422	694	1309		-
190	219	432	717	1340		-
195	219	441	739	1372		-
200	219	450	762	1403		-
205	219	459	784	1437		-
210	219	468	806	1476		-
215	219	477	829	1515		-
220	219	487	851	1554		-
225	219	496	874	1593		-
230	219	505	896	1632		-
235	219	514	919	1671		-
240	219	523	941	1709		-
245	219	532	963	1748		-
250	219	542	986	1787		-
255	219	551	1008	1826		-
260	219	560	1030	1865		-
265	219	569	1050	1904		-
270	219	578	1070	1943		-
275	219	588	1090	1982		-
280	219	598	1110	2021		-
285	219	616	1130	2060		-
290	219	634	1150	2099		-
295	219	652	1170	2138		-
300	219	670	1190	2177		-
305	219	688	1210	2215		-
310	219	706	1230	2254		-
315	219	725	1250	2293		-
320	219	743	1270	2332		-
325	219	761	1290	2371		-
330	219	779	1310	2410		-
335	224	797	1330	2449		-
340	230	815	1350	2488		-
345	237	833	1370	2527		-
350	243	851	1390			-
355	249	870	1410			-
360	255	888	1442			-
365	261	906	1499			-
370	267	924	1555			-
375	273	942	1612			-
380	279	960	1669			-
382	282	967	1692			-

I / H Beams: 500 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	243	320	892	2409
70	219	219	249	328	909	2409
75	219	219	262	346	953	2409
80	219	219	275	365	996	
85	219	219	288	384	1064	
90	219	219	301	403	1201	
95	219	219	314	421	1338	
100	219	220	327	440	1475	
105	219	227	340	459	1612	
110	219	234	353	477	1748	
115	219	242	366	496	1885	
120	219	249	379	515	2022	
125	219	256	392	533	2159	
130	219	264	405	552	2296	
135	219	271	418	571	2433	
140	219	279	431	589		
145	219	286	444	613		
150	219	293	457	639		
155	219	301	470	665		
160	219	308	484	691		
165	219	315	497	717		
170	219	323	510	743		
175	219	330	523	770		
180	219	338	536	796		
185	219	345	549	822		
190	219	352	562	848		
195	219	360	575	874		
200	219	367	588	900		
205	219	374	604	926		
210	219	382	624	952		
215	219	389	644	978		
220	219	397	664	1004		
225	219	404	685	1031		
230	219	411	705	1069		
235	219	419	725	1106		
240	219	426	745	1143		
245	219	433	765	1180		
250	219	441	785	1217		
255	219	448	805	1255		
260	219	456	826	1292		
265	219	463	846	1329		
270	219	470	866	1366		
275	219	478	886	1403		
280	219	485	906	1449		
285	219	493	926	1505		
290	219	500	947	1560		
295	219	507	967	1615		
300	219	515	987	1671		
305	219	522	1007	1726		
310	219	529	1027	1781		
315	219	537	1045	1837		
320	219	544	1063	1892		
325	219	552	1081	1947		
330	219	559	1098	2003		
335	219	566	1116	2058		
340	219	574	1134	2113		
345	219	581	1152	2169		
350	219	588	1169	2224		
355	219	596	1187	2279		
360	219	613	1205	2335		
365	219	630	1222	2390		
370	219	647	1240	2445		
375	219	664	1258	2501		
380	219	681	1276			
382	219	688	1283			

I / H Beams: 550 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	285	763	1354
70	219	219	222	292	777	1440
75	219	219	233	307	810	1656
80	219	219	243	322	844	1872
85	219	219	254	338	877	2087
90	219	219	264	353	911	2303
95	219	219	275	369	944	2519
100	219	219	285	384	977	
105	219	219	296	400	1011	
110	219	219	306	415	1044	
115	219	219	317	431	1075	
120	219	219	327	446	1107	
125	219	219	338	462	1139	
130	219	219	348	477	1171	
135	219	225	359	493	1203	
140	219	231	369	508	1235	
145	219	237	380	524	1267	
150	219	244	390	539	1299	
155	219	250	401	555	1331	
160	219	256	411	570	1363	
165	219	263	422	586	1395	
170	219	269	432	603	1520	
175	219	276	443	626		
180	219	282	453	649		
185	219	288	464	671		
190	219	295	474	694		
195	219	301	485	716		
200	219	307	495	739		
205	219	314	506	761		
210	219	320	516	784		
215	219	326	527	806		
220	219	333	537	829		
225	219	339	548	851		
230	219	346	558	874		
235	219	352	569	897		
240	219	358	579	919		
245	219	365	590	942		
250	219	371	604	964		
255	219	377	623	987		
260	219	384	642	1009		
265	219	390	661	1032		
270	219	396	681	1052		
275	219	403	700	1073		
280	219	409	719	1094		
285	219	416	738	1115		
290	219	422	757	1136		
295	219	428	776	1157		
300	219	435	795	1178		
305	219	441	814	1198		
310	219	447	833	1219		
315	219	454	852	1240		
320	219	460	871	1261		
325	219	466	890	1282		
330	219	473	909	1303		
335	219	479	928	1323		
340	219	486	947	1344		
345	219	492	966	1365		
350	219	498	985	1386		
355	219	505	1004	1407		
360	219	511	1024	1446		
365	219	517	1040	1546		
370	219	524	1055	1645		
375	219	530	1070	1745		
380	219	536	1085	1845		
382	219	539	1091	1885		

I / H Beams: 600 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	258	654	807
70	219	219	219	263	665	822
75	219	219	219	275	690	1031
80	219	219	219	287	716	1250
85	219	219	224	299	741	1468
90	219	219	232	311	767	1687
95	219	219	240	324	792	1905
100	219	219	248	336	818	2124
105	219	219	256	348	843	2342
110	219	219	264	360	869	
115	219	219	271	372	894	
120	219	219	279	384	920	
125	219	219	287	396	946	
130	219	219	295	409	971	
135	219	219	303	421	997	
140	219	219	311	433	1022	
145	219	219	319	445	1052	
150	219	219	327	457	1083	
155	219	219	335	469	1114	
160	219	219	343	481	1145	
165	219	219	351	494	1176	
170	219	219	359	506	1206	
175	219	219	366	518	1237	
180	219	223	374	530	1268	
185	219	228	382	542	1299	
190	219	233	390	554	1329	
195	219	239	398	566	1360	
200	219	244	406	578	1391	
205	219	249	414	591	1422	
210	219	255	422	609		
215	219	260	430	632		
220	219	265	438	655		
225	219	270	446	677		
230	219	276	454	700		
235	219	281	461	723		
240	219	286	469	746		
245	219	292	477	769		
250	219	297	485	791		
255	219	302	493	814		
260	219	308	501	837		
265	219	313	509	860		
270	219	318	517	883		
275	219	323	525	905		
280	219	329	533	928		
285	219	334	541	951		
290	219	339	549	974		
295	219	345	556	997		
300	219	350	564	1019		
305	219	355	572	1040		
310	219	361	580	1058		
315	219	366	588	1077		
320	219	371	597	1096		
325	219	377	619	1115		
330	219	382	641	1133		
335	219	387	663	1152		
340	219	392	685	1171		
345	219	398	707	1190		
350	219	403	729	1208		
355	219	408	751	1227		
360	219	414	773	1246		
365	219	419	796	1264		
370	219	424	818	1283		
375	219	430	840	1302		
380	219	435	862	1321		
382	219	437	871	1328		

I / H Beams: 620 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	247	628	911
70	219	219	219	252	634	929
75	219	219	219	263	649	973
80	219	219	219	274	665	1018
85	219	219	219	285	680	1186
90	219	219	221	296	695	1390
95	219	219	228	307	711	1594
100	219	219	235	319	726	1799
105	219	219	242	330	742	2003
110	219	219	249	341	757	2207
115	219	219	256	352	772	2411
120	219	219	264	363	788	
125	219	219	271	374	803	
130	219	219	278	386	818	
135	219	219	285	397	834	
140	219	219	292	408	849	
145	219	219	300	419	891	
150	219	219	307	430	940	
155	219	219	314	441	989	
160	219	219	321	452	1034	
165	219	219	328	464	1065	
170	219	219	335	475	1096	
175	219	219	343	486	1127	
180	219	219	350	497	1158	
185	219	219	357	508	1189	
190	219	219	364	519	1220	
195	219	219	371	531	1251	
200	219	219	378	542	1282	
205	219	219	386	553	1313	
210	219	223	393	564	1344	
215	219	228	400	575	1375	
220	219	233	407	586	1406	
225	219	238	414	600	1571	
230	219	244	422	623	1909	
235	219	249	429	646	2248	
240	219	254	436	668		
245	219	259	443	691		
250	219	264	450	714		
255	219	269	457	737		
260	219	274	465	760		
265	219	279	472	783		
270	219	284	479	806		
275	219	289	486	829		
280	219	294	493	852		
285	219	299	500	875		
290	219	304	508	898		
295	219	309	515	921		
300	219	314	522	944		
305	219	319	529	967		
310	219	325	536	990		
315	219	330	543	1013		
320	219	335	551	1034		
325	219	340	558	1051		
330	219	345	565	1069		
335	219	350	572	1086		
340	219	355	579	1104		
345	219	360	587	1121		
350	219	365	594	1139		
355	219	370	613	1156		
360	219	375	636	1174		
365	219	380	660	1191		
370	219	385	684	1209		
375	219	390	707	1226		
380	219	395	731	1244		
382	219	397	740	1251		

I / H Beams: 650 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	577	702
70	219	219	219	223	580	716
75	219	219	219	234	589	750
80	219	219	219	246	597	785
85	219	219	219	258	605	819
90	219	219	219	269	614	853
95	219	219	219	281	622	888
100	219	219	219	293	630	922
105	219	219	224	304	639	957
110	219	219	231	316	647	991
115	219	219	239	328	655	1025
120	219	219	246	339	663	1057
125	219	219	254	351	672	1089
130	219	219	261	363	680	1120
135	219	219	269	374	688	1152
140	219	219	276	386	697	1183
145	219	219	284	398	724	1215
150	219	219	291	409	757	1246
155	219	219	299	421	789	1278
160	219	219	306	433	822	1309
165	219	219	314	444	855	1341
170	219	219	321	456	887	1372
175	219	219	329	468	920	1404
180	219	219	336	479	952	1549
185	219	219	344	491	985	1870
190	219	219	351	503	1017	2190
195	219	219	359	514	1050	2511
200	219	219	366	526	1082	
205	219	219	374	538	1115	
210	219	219	381	549	1148	
215	219	219	389	561	1180	
220	219	219	396	573	1213	
225	219	219	404	584	1246	
230	219	219	411	596	1278	
235	219	219	419	615	1311	
240	219	219	426	634	1344	
245	219	219	434	653	1376	
250	219	219	442	673	1409	
255	219	219	449	692	1461	
260	219	219	457	711	1529	
265	219	219	464	730	1597	
270	219	224	472	749	1665	
275	219	230	479	768	1733	
280	219	236	487	787	1801	
285	219	241	494	806	1869	
290	219	247	502	825	1937	
295	219	253	509	844	2005	
300	219	258	517	863	2072	
305	219	264	524	882	2140	
310	219	270	532	901	2208	
315	219	276	539	920	2276	
320	219	281	547	939	2344	
325	219	287	554	958	2412	
330	219	293	562	977	2480	
335	219	298	569	996		
340	219	304	577	1015		
345	219	310	584	1034		
350	219	316	592	1051		
355	219	321	604	1067		
360	219	327	620	1084		
365	219	333	637	1101		
370	219	338	653	1118		
375	219	344	670	1135		
380	219	350	686	1152		
382	219	352	693	1158		

I / H Beams: 700 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	293	702
70	219	219	219	219	300	716
75	219	219	219	219	316	750
80	219	219	219	221	332	785
85	219	219	219	230	348	819
90	219	219	219	239	364	853
95	219	219	219	247	379	888
100	219	219	219	256	395	922
105	219	219	219	265	411	957
110	219	219	219	274	427	991
115	219	219	219	282	443	1025
120	219	219	219	291	459	1057
125	219	219	219	300	475	1089
130	219	219	219	309	491	1120
135	219	219	219	318	507	1152
140	219	219	224	326	523	1183
145	219	219	231	335	539	1215
150	219	219	237	344	555	1246
155	219	219	243	353	571	1278
160	219	219	249	361	586	1309
165	219	219	255	370	608	1341
170	219	219	261	379	637	1372
175	219	219	267	388	667	1404
180	219	219	273	396	696	1549
185	219	219	280	405	725	1870
190	219	219	286	414	755	2190
195	219	219	292	423	784	2511
200	219	219	298	431	813	
205	219	219	304	440	843	
210	219	219	310	449	872	
215	219	219	316	458	901	
220	219	219	322	466	930	
225	219	219	329	475	960	
230	219	219	335	484	989	
235	219	219	341	493	1018	
240	219	219	347	502	1046	
245	219	219	353	510	1072	
250	219	219	359	519	1099	
255	219	219	365	528	1125	
260	219	219	371	537	1151	
265	219	219	377	545	1178	
270	219	219	384	554	1204	
275	219	219	390	563	1231	
280	219	219	396	572	1257	
285	219	219	402	580	1284	
290	219	219	408	589	1310	
295	219	219	414	602	1336	
300	219	219	420	626	1363	
305	219	219	426	650	1389	
310	219	219	433	674	1416	
315	219	219	439	699	1546	
320	219	219	445	723	1717	
325	219	219	451	747	1888	
330	219	219	457	771	2059	
335	219	219	463	795	2230	
340	219	219	469	819	2400	
345	219	219	475	843		
350	219	219	482	868		
355	219	219	488	892		
360	219	219	494	916		
365	219	219	500	940		
370	219	219	506	964		
375	219	219	512	988		
380	219	220	518	1013		
382	219	222	521	1022		

I / H Beams: 750 °C (EN 13381-8:2013)						
Section factor m ⁻¹	Thickness intumescent coating (µm)					
	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	261	628
70	219	219	219	219	267	639
75	219	219	219	219	281	667
80	219	219	219	219	295	696
85	219	219	219	219	309	724
90	219	219	219	219	323	752
95	219	219	219	219	338	780
100	219	219	219	224	352	809
105	219	219	219	232	366	837
110	219	219	219	239	380	865
115	219	219	219	247	394	893
120	219	219	219	255	409	922
125	219	219	219	262	423	950
130	219	219	219	270	437	978
135	219	219	219	277	451	1006
140	219	219	219	285	466	1035
145	219	219	219	293	480	1064
150	219	219	219	300	494	1094
155	219	219	219	308	508	1123
160	219	219	219	315	522	1153
165	219	219	219	323	537	1182
170	219	219	219	331	551	1211
175	219	219	219	338	565	1241
180	219	219	221	346	579	1270
185	219	219	227	353	593	1300
190	219	219	232	361	618	1329
195	219	219	238	369	645	1358
200	219	219	243	376	672	1388
205	219	219	249	384	699	1417
210	219	219	254	391	726	1628
215	219	219	259	399	753	1883
220	219	219	265	407	781	2139
225	219	219	270	414	808	2394
230	219	219	276	422	835	
235	219	219	281	429	862	
240	219	219	287	437	889	
245	219	219	292	445	916	
250	219	219	297	452	943	
255	219	219	303	460	970	
260	219	219	308	467	997	
265	219	219	314	475	1024	
270	219	219	319	483	1045	
275	219	219	325	490	1066	
280	219	219	330	498	1087	
285	219	219	335	505	1107	
290	219	219	341	513	1128	
295	219	219	346	521	1149	
300	219	219	352	528	1169	
305	219	219	357	536	1190	
310	219	219	363	543	1211	
315	219	219	368	551	1231	
320	219	219	373	559	1252	
325	219	219	379	566	1273	
330	219	219	384	574	1293	
335	219	219	390	581	1314	
340	219	219	395	589	1335	
345	219	219	401	598	1355	
350	219	219	406	619	1376	
355	219	219	411	640	1397	
360	219	219	417	661	1417	
365	219	219	422	682	1671	
370	219	219	428	703	2011	
375	219	219	433	724	2351	
380	219	219	439	745		
382	219	219	441	753		

I / H Columns: 350 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	542	908	1684	-	-
70	219	543	928	1724	-	-
75	219	547	979	1823	-	-
80	219	551	1029	1922	-	-
85	219	555	1078	2021	-	-
90	219	558	1127	2120	-	-
95	219	562	1176	2219	-	-
100	219	566	1225	2318	-	-
105	219	569	1274	2417	-	-
110	227	573	1323	2516	-	-
115	235	577	1372		-	-
120	244	580	1421		-	-
125	252	584	1470		-	-
130	261	588	1519		-	-
135	269	591	1568		-	-
140	277	595	1617		-	-
145	286	635	1666		-	-
150	294	681	1702		-	-
155	303	728	1735		-	-
160	311	775	1768		-	-
165	319	822	1801		-	-
170	328	868	1834		-	-
175	336	915	1867		-	-
180	345	962	1900		-	-
185	353	1008	1933		-	-
190	361	1042	1966		-	-
195	370	1066	1998		-	-
200	378	1090	2031		-	-
205	386	1114	2064		-	-
210	395	1138	2097		-	-
215	403	1162	2130		-	-
220	412	1186	2163		-	-
225	420	1210	2196		-	-
230	428	1234	2229		-	-
235	437	1258	2262		-	-
240	445	1282	2295		-	-
245	454	1306	2328		-	-
250	462	1330	2361		-	-
255	470	1354	2394		-	-
260	479	1378	2427		-	-
265	487	1402	2459		-	-
270	496	1426	2492		-	-
275	504	1451	2525		-	-
280	512	1476			-	-
285	521	1501			-	-
290	529	1526			-	-
295	538	1551			-	-
300	546	1575			-	-
305	554	1600			-	-
310	563	1625			-	-
315	571	1650			-	-
320	580	1675			-	-
325	588	1700			-	-
330	597	1725			-	-
335	616	1750			-	-
340	635	1774			-	-
345	654	1799			-	-
350	674	1824			-	-
355	693	1849			-	-
360	712	1874			-	-
365	731	1899			-	-
370	750	1924			-	-
375	769	1949			-	-
380	788	1973			-	-
382	796	1983			-	-

I / H Columns: 40 0°C (s. UNE EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	223	593	856	2100	-
70	219	233	600	873	2165	-
75	219	247	618	915	2329	-
80	219	261	635	957	2494	-
85	219	274	653	999		-
90	219	288	670	1042		-
95	219	302	687	1088		-
100	219	315	705	1134		-
105	219	329	722	1180		-
110	219	342	739	1227		-
115	219	356	757	1273		-
120	219	370	774	1319		-
125	219	383	792	1365		-
130	219	397	809	1411		-
135	219	411	826	1457		-
140	219	424	844	1503		-
145	219	438	874	1549		-
150	219	451	906	1606		-
155	219	465	939	1664		-
160	219	479	972	1722		-
165	219	492	1005	1780		-
170	219	506	1037	1839		-
175	219	520	1066	1897		-
180	219	533	1096	1955		-
185	219	547	1126	2014		-
190	222	560	1155	2072		-
195	229	574	1185	2130		-
200	235	588	1214	2188		-
205	242	604	1244	2247		-
210	248	623	1274	2305		-
215	255	642	1303	2363		-
220	261	661	1333	2422		-
225	268	680	1362	2480		-
230	274	700	1392			-
235	281	719	1422			-
240	287	738	1452			-
245	294	757	1483			-
250	300	776	1514			-
255	307	796	1544			-
260	313	815	1575			-
265	320	834	1606			-
270	326	853	1637			-
275	333	872	1667			-
280	339	892	1698			-
285	346	911	1729			-
290	352	930	1760			-
295	359	949	1790			-
300	365	968	1821			-
305	372	987	1852			-
310	378	1007	1883			-
315	385	1026	1913			-
320	391	1042	1944			-
325	398	1058	1975			-
330	404	1074	2006			-
335	411	1089	2036			-
340	417	1105	2067			-
345	424	1121	2098			-
350	430	1137	2129			-
355	437	1153	2159			-
360	443	1169	2190			-
365	450	1184	2221			-
370	456	1200	2252			-
375	463	1216	2282			-
380	469	1232	2313			-
382	472	1238	2325			-

I / H Columns: 450 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	286	654	1281	-
70	219	219	293	664	1342	-
75	219	219	309	690	1495	-
80	219	227	325	716	1647	-
85	219	236	342	742	1800	-
90	219	245	358	768	1953	-
95	219	255	374	794	2105	-
100	219	264	390	820	2258	-
105	219	273	407	846	2410	-
110	219	282	423	872		-
115	219	292	439	898		-
120	219	301	456	924		-
125	219	310	472	950		-
130	219	319	488	976		-
135	219	329	504	1002		-
140	219	338	521	1028		-
145	219	347	537	1059		-
150	219	356	553	1090		-
155	219	366	570	1122		-
160	219	375	586	1153		-
165	219	384	605	1185		-
170	219	393	627	1216		-
175	219	403	650	1247		-
180	219	412	672	1279		-
185	219	421	694	1310		-
190	219	430	717	1341		-
195	219	440	739	1373		-
200	219	449	762	1404		-
205	219	458	784	1439		-
210	219	467	807	1479		-
215	219	477	829	1518		-
220	219	486	852	1558		-
225	219	495	874	1598		-
230	219	504	896	1637		-
235	219	514	919	1677		-
240	219	523	941	1717		-
245	219	532	964	1756		-
250	219	541	986	1796		-
255	219	551	1009	1836		-
260	219	560	1031	1876		-
265	219	569	1051	1915		-
270	219	578	1071	1955		-
275	219	588	1091	1995		-
280	219	598	1111	2034		-
285	219	616	1131	2074		-
290	219	634	1151	2114		-
295	219	652	1171	2153		-
300	219	670	1191	2193		-
305	219	689	1211	2233		-
310	219	707	1231	2273		-
315	219	725	1251	2312		-
320	219	743	1271	2352		-
325	219	761	1291	2392		-
330	219	779	1311	2431		-
335	219	797	1331	2471		-
340	219	815	1350	2511		-
345	222	834	1370			-
350	228	852	1390			-
355	234	870	1410			-
360	241	888	1445			-
365	247	906	1504			-
370	253	924	1563			-
375	260	942	1622			-
380	266	961	1681			-
382	269	968	1705			-

I / H Columns: 500 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	240	318	892	1933
70	219	219	246	325	910	2025
75	219	219	259	344	953	2255
80	219	219	272	363	997	2485
85	219	219	285	382	1064	
90	219	219	298	401	1190	
95	219	219	311	420	1317	
100	219	219	325	439	1443	
105	219	224	338	457	1570	
110	219	232	351	476	1696	
115	219	239	364	495	1823	
120	219	247	377	514	1949	
125	219	254	390	533	2076	
130	219	261	404	552	2202	
135	219	269	417	571	2328	
140	219	276	430	589	2455	
145	219	284	443	613		
150	219	291	456	639		
155	219	299	469	666		
160	219	306	483	692		
165	219	313	496	718		
170	219	321	509	744		
175	219	328	522	771		
180	219	336	535	797		
185	219	343	548	823		
190	219	351	562	849		
195	219	358	575	876		
200	219	365	588	902		
205	219	373	604	928		
210	219	380	624	954		
215	219	388	644	981		
220	219	395	665	1007		
225	219	403	685	1035		
230	219	410	705	1072		
235	219	417	725	1110		
240	219	425	745	1147		
245	219	432	766	1184		
250	219	440	786	1221		
255	219	447	806	1259		
260	219	455	826	1296		
265	219	462	846	1333		
270	219	469	867	1370		
275	219	477	887	1408		
280	219	484	907	1455		
285	219	492	927	1511		
290	219	499	947	1566		
295	219	507	968	1621		
300	219	514	988	1677		
305	219	521	1008	1732		
310	219	529	1028	1788		
315	219	536	1046	1843		
320	219	544	1064	1898		
325	219	551	1081	1954		
330	219	559	1099	2009		
335	219	566	1117	2064		
340	219	574	1135	2120		
345	219	581	1153	2175		
350	219	588	1170	2230		
355	219	596	1188	2286		
360	219	613	1206	2341		
365	219	630	1224	2396		
370	219	647	1241	2452		
375	219	664	1259	2507		
380	219	681	1277			
382	219	688	1284			

I / H Columns: 550 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	278	761	1327
70	219	219	219	284	775	1411
75	219	219	223	300	808	1623
80	219	219	234	316	842	1834
85	219	219	245	332	876	2045
90	219	219	256	347	910	2257
95	219	219	267	363	944	2468
100	219	219	277	379	978	
105	219	219	288	395	1012	
110	219	219	299	411	1045	
115	219	219	310	427	1077	
120	219	219	321	443	1109	
125	219	219	331	459	1141	
130	219	219	342	475	1173	
135	219	219	353	490	1205	
140	219	220	364	506	1237	
145	219	226	375	522	1269	
150	219	233	385	538	1301	
155	219	240	396	554	1333	
160	219	246	407	570	1365	
165	219	253	418	586	1397	
170	219	259	429	604	1855	
175	219	266	439	627		
180	219	272	450	649		
185	219	279	461	672		
190	219	286	472	694		
195	219	292	482	717		
200	219	299	493	740		
205	219	305	504	762		
210	219	312	515	785		
215	219	318	526	807		
220	219	325	536	830		
225	219	332	547	852		
230	219	338	558	875		
235	219	345	569	898		
240	219	351	580	920		
245	219	358	590	943		
250	219	364	605	965		
255	219	371	625	988		
260	219	378	644	1010		
265	219	384	663	1033		
270	219	391	682	1054		
275	219	397	701	1075		
280	219	404	720	1095		
285	219	410	739	1116		
290	219	417	758	1137		
295	219	424	777	1158		
300	219	430	796	1179		
305	219	437	815	1200		
310	219	443	834	1221		
315	219	450	853	1242		
320	219	456	872	1263		
325	219	463	891	1284		
330	219	469	911	1305		
335	219	476	930	1326		
340	219	483	949	1346		
345	219	489	968	1367		
350	219	496	987	1388		
355	219	502	1006	1409		
360	219	509	1025	1464		
365	219	515	1041	1586		
370	219	522	1056	1708		
375	219	529	1071	1830		
380	219	535	1087	1952		
382	219	538	1093	2001		

I / H Columns: 600 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	242	649	805
70	219	219	219	247	660	846
75	219	219	219	261	686	1031
80	219	219	219	274	712	1216
85	219	219	219	288	738	1401
90	219	219	227	302	763	1586
95	219	219	236	316	789	1771
100	219	219	245	329	815	1956
105	219	219	253	343	841	2141
110	219	219	262	357	867	2325
115	219	219	271	370	893	2510
120	219	219	280	384	919	
125	219	219	289	398	945	
130	219	219	298	411	971	
135	219	219	307	425	997	
140	219	219	316	439	1023	
145	219	219	325	453	1052	
150	219	219	334	466	1083	
155	219	219	343	480	1114	
160	219	219	352	494	1145	
165	219	219	360	507	1176	
170	219	219	369	521	1206	
175	219	219	378	535	1237	
180	219	219	387	548	1268	
185	219	219	396	562	1299	
190	219	219	405	576	1329	
195	219	221	414	589	1360	
200	219	227	423	607	1391	
205	219	233	432	628	1422	
210	219	239	441	648	1725	
215	219	245	450	669	2041	
220	219	252	459	690	2356	
225	219	258	467	710		
230	219	264	476	731		
235	219	270	485	752		
240	219	276	494	772		
245	219	282	503	793		
250	219	288	512	814		
255	219	294	521	834		
260	219	300	530	855		
265	219	307	539	876		
270	219	313	548	896		
275	219	319	557	917		
280	219	325	566	938		
285	219	331	574	958		
290	219	337	583	979		
295	219	343	592	1000		
300	219	349	607	1020		
305	219	356	625	1040		
310	219	362	643	1058		
315	219	368	660	1077		
320	219	374	678	1096		
325	219	380	696	1115		
330	219	386	714	1133		
335	219	392	732	1152		
340	219	398	750	1171		
345	219	405	768	1190		
350	219	411	786	1208		
355	219	417	804	1227		
360	219	423	822	1246		
365	219	429	840	1264		
370	219	435	857	1283		
375	219	441	875	1302		
380	219	447	893	1321		
382	219	450	900	1328		

I / H Columns: 620 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	230	618	910
70	219	219	219	235	625	928
75	219	219	219	248	644	973
80	219	219	219	260	662	1018
85	219	219	219	273	681	1163
90	219	219	219	286	699	1337
95	219	219	222	298	718	1512
100	219	219	230	311	736	1686
105	219	219	238	324	754	1860
110	219	219	246	337	773	2034
115	219	219	255	349	791	2209
120	219	219	263	362	810	2383
125	219	219	271	375	828	
130	219	219	279	387	846	
135	219	219	287	400	865	
140	219	219	295	413	883	
145	219	219	303	425	918	
150	219	219	312	438	957	
155	219	219	320	451	997	
160	219	219	328	464	1034	
165	219	219	336	476	1065	
170	219	219	344	489	1096	
175	219	219	352	502	1127	
180	219	219	361	514	1158	
185	219	219	369	527	1189	
190	219	219	377	540	1220	
195	219	219	385	553	1251	
200	219	219	393	565	1282	
205	219	219	401	578	1313	
210	219	219	410	591	1344	
215	219	219	418	608	1375	
220	219	219	426	628	1406	
225	219	219	434	649	1508	
230	219	221	442	669	1703	
235	219	227	450	689	1898	
240	219	233	459	710	2094	
245	219	239	467	730	2289	
250	219	245	475	750	2484	
255	219	251	483	771		
260	219	257	491	791		
265	219	263	499	811		
270	219	269	508	832		
275	219	275	516	852		
280	219	281	524	872		
285	219	287	532	893		
290	219	293	540	913		
295	219	299	548	933		
300	219	305	557	954		
305	219	311	565	974		
310	219	317	573	994		
315	219	323	581	1015		
320	219	329	589	1034		
325	219	335	599	1051		
330	219	341	618	1069		
335	219	347	636	1086		
340	219	353	654	1104		
345	219	359	672	1121		
350	219	365	690	1139		
355	219	371	708	1156		
360	219	377	727	1174		
365	219	383	745	1191		
370	219	389	763	1209		
375	219	395	781	1226		
380	219	401	799	1244		
382	219	403	806	1251		

I / H Columns: 650 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	575	705
70	219	219	219	219	578	719
75	219	219	219	229	586	754
80	219	219	219	241	595	789
85	219	219	219	253	603	824
90	219	219	219	265	612	859
95	219	219	219	277	620	894
100	219	219	219	288	629	929
105	219	219	220	300	637	964
110	219	219	227	312	646	999
115	219	219	235	324	654	1033
120	219	219	242	336	663	1064
125	219	219	250	348	671	1095
130	219	219	258	359	680	1126
135	219	219	265	371	688	1157
140	219	219	273	383	697	1188
145	219	219	280	395	724	1219
150	219	219	288	407	757	1250
155	219	219	296	419	789	1281
160	219	219	303	430	822	1311
165	219	219	311	442	855	1342
170	219	219	318	454	887	1373
175	219	219	326	466	920	1404
180	219	219	333	478	952	1506
185	219	219	341	490	985	1717
190	219	219	349	501	1017	1928
195	219	219	356	513	1050	2140
200	219	219	364	525	1082	2351
205	219	219	371	537	1115	
210	219	219	379	549	1148	
215	219	219	387	561	1180	
220	219	219	394	572	1213	
225	219	219	402	584	1246	
230	219	219	409	596	1278	
235	219	219	417	615	1311	
240	219	219	425	634	1344	
245	219	219	432	653	1376	
250	219	219	440	673	1409	
255	219	219	447	692	1461	
260	219	219	455	711	1529	
265	219	219	463	730	1597	
270	219	219	470	749	1665	
275	219	219	478	768	1733	
280	219	219	485	787	1801	
285	219	219	493	806	1869	
290	219	224	501	825	1937	
295	219	230	508	844	2005	
300	219	236	516	863	2072	
305	219	242	523	882	2140	
310	219	248	531	901	2208	
315	219	254	539	920	2276	
320	219	260	546	939	2344	
325	219	267	554	958	2412	
330	219	273	561	977	2480	
335	219	279	569	996		
340	219	285	577	1015		
345	219	291	584	1034		
350	219	297	592	1051		
355	219	303	604	1067		
360	219	309	620	1084		
365	219	315	637	1101		
370	219	321	653	1118		
375	219	327	670	1135		
380	219	333	686	1152		
382	219	336	693	1158		

I / H Columns: 700 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m ⁻¹	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	292	705
70	219	219	219	219	298	719
75	219	219	219	219	314	754
80	219	219	219	220	330	789
85	219	219	219	229	346	824
90	219	219	219	238	362	859
95	219	219	219	247	378	894
100	219	219	219	255	394	929
105	219	219	219	264	410	964
110	219	219	219	273	426	999
115	219	219	219	282	442	1033
120	219	219	219	290	458	1064
125	219	219	219	299	474	1095
130	219	219	219	308	490	1126
135	219	219	219	317	506	1157
140	219	219	222	326	522	1188
145	219	219	229	334	538	1219
150	219	219	235	343	554	1250
155	219	219	241	352	570	1281
160	219	219	247	361	586	1311
165	219	219	253	370	608	1342
170	219	219	259	378	638	1373
175	219	219	265	387	668	1404
180	219	219	272	396	698	1506
185	219	219	278	405	728	1717
190	219	219	284	413	758	1928
195	219	219	290	422	789	2140
200	219	219	296	431	819	2351
205	219	219	302	440	849	
210	219	219	309	449	879	
215	219	219	315	457	909	
220	219	219	321	466	939	
225	219	219	327	475	969	
230	219	219	333	484	999	
235	219	219	339	493	1029	
240	219	219	346	501	1054	
245	219	219	352	510	1080	
250	219	219	358	519	1106	
255	219	219	364	528	1132	
260	219	219	370	536	1158	
265	219	219	376	545	1184	
270	219	219	382	554	1209	
275	219	219	389	563	1235	
280	219	219	395	572	1261	
285	219	219	401	580	1287	
290	219	219	407	589	1313	
295	219	219	413	602	1338	
300	219	219	419	627	1364	
305	219	219	426	652	1390	
310	219	219	432	677	1416	
315	219	219	438	702	1580	
320	219	219	444	727	1798	
325	219	219	450	752	2016	
330	219	219	456	777	2234	
335	219	219	462	802	2452	
340	219	219	469	827		
345	219	219	475	852		
350	219	219	481	877		
355	219	219	487	902		
360	219	219	493	927		
365	219	219	499	952		
370	219	219	506	976		
375	219	219	512	1001		
380	219	219	518	1026		
382	219	219	520	1032		

I / H Columns: 750 °C (EN 13381-8:2013)						
Section factor	Thickness intumescent coating (µm)					
m-1	15 min	30 min	45 min	60 min	90 min	120 min
68	219	219	219	219	253	625
70	219	219	219	219	259	636
75	219	219	219	219	273	665
80	219	219	219	219	288	694
85	219	219	219	219	302	723
90	219	219	219	219	317	752
95	219	219	219	219	332	781
100	219	219	219	219	346	810
105	219	219	219	225	361	839
110	219	219	219	233	375	868
115	219	219	219	241	390	897
120	219	219	219	249	404	926
125	219	219	219	256	419	955
130	219	219	219	264	433	984
135	219	219	219	272	448	1013
140	219	219	219	280	462	1042
145	219	219	219	287	477	1071
150	219	219	219	295	491	1100
155	219	219	219	303	506	1128
160	219	219	219	311	521	1157
165	219	219	219	318	535	1186
170	219	219	219	326	550	1215
175	219	219	219	334	564	1244
180	219	219	219	341	579	1273
185	219	219	219	349	593	1302
190	219	219	219	357	619	1331
195	219	219	221	365	646	1360
200	219	219	226	372	674	1388
205	219	219	232	380	701	1417
210	219	219	238	388	729	1576
215	219	219	244	396	756	1767
220	219	219	249	403	784	1958
225	219	219	255	411	811	2148
230	219	219	261	419	838	2339
235	219	219	266	427	866	
240	219	219	272	434	893	
245	219	219	278	442	921	
250	219	219	283	450	948	
255	219	219	289	457	976	
260	219	219	295	465	1003	
265	219	219	300	473	1030	
270	219	219	306	481	1050	
275	219	219	312	488	1071	
280	219	219	317	496	1091	
285	219	219	323	504	1112	
290	219	219	329	512	1132	
295	219	219	335	519	1152	
300	219	219	340	527	1173	
305	219	219	346	535	1193	
310	219	219	352	543	1214	
315	219	219	357	550	1234	
320	219	219	363	558	1254	
325	219	219	369	566	1275	
330	219	219	374	573	1295	
335	219	219	380	581	1316	
340	219	219	386	589	1336	
345	219	219	391	598	1356	
350	219	219	397	620	1377	
355	219	219	403	641	1397	
360	219	219	408	662	1418	
365	219	219	414	684	2176	
370	219	219	420	705		
375	219	219	426	726		
380	219	219	431	748		
382	219	219	433	756		

The evaluation results within which the product can be used are:

- Section Factor between 68 m⁻¹ and below or equal to 382 m⁻¹
- Protection thicknesses assessed between 0.219-2.527 mm for steel beams and 0,219-2,526 mm for columns.
- Critical temperature up to 750 °C

In the same way, the evaluation results are only applicable to:

- “I”, “H”, section profiles..
- Other grades of steel in accordance to EN 10025-1

Fire resistance of Hollow columns

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	1.333	2.416	
50	411	411	411	1.456	2.554	
55	411	411	605	1.736	2.867	
60	411	411	823	1.983	3.143	
65	411	411	1.016	2.202	3.387	
70	411	411	1.188	2.397		
75	411	411	1.343	2.573		
80	411	411	1.483	2.732		
85	411	411	1.610	2.876		
90	411	445	1.726	3.007		
95	411	537	1.833	3.128		
100	411	622	1.930	3.239		
105	411	700	2.020	3.341		
110	411	772	2.104	3.435		
115	411	839	2.181			
120	411	901	2.253			
125	411	959	2.320			
130	411	1.014	2.383			
135	411	1.064	2.441			
140	411	1.112	2.497			
145	411	1.157	2.549			
150	411	1.200	2.598			
155	411	1.240	2.644			
160	411	1.277	2.687			
165	411	1.313	2.729			
170	411	1.347	2.768			
175	411	1.380	2.805			
180	411	1.410	2.841			
185	411	1.439	2.874			
190	411	1.467	2.907			
195	411	1.494	2.937			
200	411	1.519	2.967			
205	411	1.543	2.995			
210	411	1.567	3.022			
215	411	1.589	3.047			
220	411	1.610	3.072			
225	411	1.631	3.096			
230	411	1.651	3.118			
235	411	1.669	3.140			
240	411	1.688	3.161			
245	411	1.705	3.181			
250	411	1.722	3.201			
252	411	1.729	3.209			

Minimum thickness (µm) required of the protection to keep the temperature of the support under 400 °C

Section factor up to (m-1)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	567	1.570	2.573
50	411	411	411	691	1.708	2.725
55	411	411	411	973	2.024	3.075
60	411	411	411	1.222	2.304	3.385
65	411	411	411	1.445	2.553	
70	411	411	513	1.645	2.777	
75	411	411	672	1.825	2.978	
80	411	411	816	1.989	3.161	
85	411	411	947	2.138	3.328	
90	411	411	1.067	2.274	3.481	
95	411	411	1.177	2.399		
100	411	411	1.279	2.514		
105	411	411	1.373	2.621		
110	411	411	1.460	2.720		
115	411	411	1.540	2.812		
120	411	411	1.616	2.897		
125	411	411	1.686	2.977		
130	411	452	1.752	3.052		
135	411	506	1.814	3.122		
140	411	556	1.872	3.188		
145	411	603	1.927	3.251		
150	411	648	1.979	3.309		
155	411	690	2.028	3.365		
160	411	730	2.074	3.417		
165	411	768	2.118	3.467		
170	411	804	2.159			
175	411	838	2.199			
180	411	871	2.237			
185	411	902	2.273			
190	411	932	2.307			
195	411	960	2.339			
200	411	987	2.371			
205	411	1.013	2.401			
210	411	1.037	2.429			
215	411	1.061	2.457			
220	411	1.084	2.483			
225	411	1.106	2.508			
230	411	1.127	2.533			
235	411	1.147	2.556			
240	411	1.167	2.579			
245	411	1.185	2.600			
250	411	1.203	2.621			
252	411	1.210	2.630			

Minimum thickness (µm) required of the protection to keep the temperature of the support under 450 °C

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	841	1.774
50	411	411	411	411	978	1.926
55	411	411	411	411	1.292	2.274
60	411	411	411	559	1.571	2.583
65	411	411	411	782	1.822	2.861
70	411	411	411	983	2.047	3.110
75	411	411	411	1.165	2.251	3.336
80	411	411	411	1.331	2.437	
85	411	411	411	1.482	2.606	
90	411	411	480	1.621	2.762	
95	411	411	593	1.749	2.905	
100	411	411	696	1.866	3.037	
105	411	411	792	1.976	3.159	
110	411	411	881	2.077	3.273	
115	411	411	964	2.172	3.379	
120	411	411	1.042	2.260	3.478	
125	411	411	1.114	2.342		
130	411	411	1.182	2.420		
135	411	411	1.246	2.492		
140	411	411	1.306	2.561		
145	411	411	1.363	2.625		
150	411	411	1.417	2.686		
155	411	411	1.467	2.744		
160	411	411	1.516	2.799		
165	411	411	1.561	2.851		
170	411	411	1.604	2.900		
175	411	411	1.646	2.947		
180	411	411	1.685	2.991		
185	411	411	1.722	3.034		
190	411	441	1.758	3.075		
195	411	471	1.792	3.114		
200	411	499	1.825	3.151		
205	411	526	1.856	3.186		
210	411	552	1.886	3.220		
215	411	577	1.915	3.253		
220	411	601	1.943	3.285		
225	411	623	1.969	3.315		
230	411	645	1.995	3.344		
235	411	667	2.019	3.372		
240	411	687	2.043	3.399		
245	411	707	2.066	3.425		
250	411	726	2.088	3.450		
252	411	733	2.096	3.459		
Minimum thickness (µm) required of the protection to keep the temperature of the support under 500 °C						

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	411	1.079
50	411	411	411	411	411	1.228
55	411	411	411	411	650	1.572
60	411	411	411	411	927	1.878
65	411	411	411	411	1.176	2.154
70	411	411	411	411	1.400	2.403
75	411	411	411	579	1.604	2.629
80	411	411	411	745	1.790	2.836
85	411	411	411	896	1.960	3.025
90	411	411	411	1.036	2.117	3.198
95	411	411	411	1.164	2.262	3.359
100	411	411	411	1.284	2.395	
105	411	411	411	1.394	2.519	
110	411	411	411	1.497	2.635	
115	411	411	443	1.593	2.742	
120	411	411	522	1.682	2.843	
125	411	411	596	1.766	2.937	
130	411	411	665	1.845	3.026	
135	411	411	730	1.920	3.109	
140	411	411	791	1.989	3.188	
145	411	411	849	2.055	3.262	
150	411	411	904	2.118	3.332	
155	411	411	956	2.177	3.398	
160	411	411	1.005	2.233	3.461	
165	411	411	1.052	2.286		
170	411	411	1.096	2.337		
175	411	411	1.139	2.385		
180	411	411	1.179	2.431		
185	411	411	1.218	2.475		
190	411	411	1.254	2.517		
195	411	411	1.289	2.557		
200	411	411	1.323	2.595		
205	411	411	1.355	2.632		
210	411	411	1.386	2.667		
215	411	411	1.416	2.701		
220	411	411	1.444	2.734		
225	411	411	1.472	2.765		
230	411	411	1.498	2.795		
235	411	411	1.524	2.824		
240	411	411	1.548	2.852		
245	411	411	1.572	2.879		
250	411	411	1.594	2.905		
252	411	411	1.603	2.915		
Minimum thickness (µm) required of the protection to keep the temperature of the support under 550 °C						

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	411	469
50	411	411	411	411	411	615
55	411	411	411	411	411	951
60	411	411	411	411	411	1.253
65	411	411	411	411	601	1.525
70	411	411	411	411	823	1.772
75	411	411	411	411	1.025	1.997
80	411	411	411	411	1.210	2.202
85	411	411	411	411	1.380	2.391
90	411	411	411	509	1.536	2.564
95	411	411	411	637	1.681	2.725
100	411	411	411	756	1.815	2.873
105	411	411	411	867	1.939	3.012
110	411	411	411	970	2.055	3.141
115	411	411	411	1.067	2.164	3.261
120	411	411	411	1.157	2.265	3.374
125	411	411	411	1.242	2.361	3.479
130	411	411	411	1.321	2.450	
135	411	411	411	1.396	2.534	
140	411	411	411	1.467	2.614	
145	411	411	411	1.534	2.689	
150	411	411	435	1.597	2.760	
155	411	411	487	1.657	2.828	
160	411	411	537	1.714	2.892	
165	411	411	584	1.768	2.952	
170	411	411	630	1.820	3.010	
175	411	411	672	1.869	3.065	
180	411	411	713	1.916	3.118	
185	411	411	753	1.960	3.168	
190	411	411	790	2.003	3.216	
195	411	411	826	2.044	3.262	
200	411	411	860	2.083	3.306	
205	411	411	893	2.121	3.348	
210	411	411	925	2.157	3.389	
215	411	411	955	2.191	3.428	
220	411	411	984	2.225	3.465	
225	411	411	1.012	2.257		
230	411	411	1.039	2.287		
235	411	411	1.065	2.317		
240	411	411	1.090	2.345		
245	411	411	1.114	2.373		
250	411	411	1.137	2.400		
252	411	411	1.146	2.410		

Minimum thickness (µm) required of the protection to keep the temperature of the support under 600 °C

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	411	411
50	411	411	411	411	411	411
55	411	411	411	411	411	411
60	411	411	411	411	411	695
65	411	411	411	411	411	962
70	411	411	411	411	411	1.205
75	411	411	411	411	504	1.427
80	411	411	411	411	687	1.630
85	411	411	411	411	855	1.817
90	411	411	411	411	1.010	1.990
95	411	411	411	411	1.154	2.150
100	411	411	411	411	1.287	2.298
105	411	411	411	411	1.412	2.436
110	411	411	411	491	1.528	2.565
115	411	411	411	587	1.636	2.685
120	411	411	411	677	1.738	2.798
125	411	411	411	762	1.833	2.904
130	411	411	411	842	1.923	3.004
135	411	411	411	917	2.007	3.098
140	411	411	411	988	2.087	3.187
145	411	411	411	1.055	2.163	3.271
150	411	411	411	1.119	2.235	3.351
155	411	411	411	1.179	2.303	3.426
160	411	411	411	1.237	2.367	
165	411	411	411	1.291	2.429	
170	411	411	411	1.343	2.487	
175	411	411	411	1.393	2.543	
180	411	411	411	1.440	2.596	
185	411	411	411	1.485	2.647	
190	411	411	411	1.528	2.695	
195	411	411	411	1.570	2.742	
200	411	411	432	1.609	2.787	
205	411	411	465	1.647	2.829	
210	411	411	497	1.684	2.870	
215	411	411	528	1.719	2.910	
220	411	411	557	1.752	2.948	
225	411	411	585	1.785	2.984	
230	411	411	613	1.816	3.019	
235	411	411	639	1.846	3.053	
240	411	411	665	1.875	3.086	
245	411	411	689	1.903	3.118	
250	411	411	713	1.930	3.148	
252	411	411	722	1.941	3.160	
Minimum thickness (µm) required of the protection to keep the temperature of the support under 650 °C						

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	411	411
50	411	411	411	411	411	411
55	411	411	411	411	411	411
60	411	411	411	411	411	411
65	411	411	411	411	411	455
70	411	411	411	411	411	693
75	411	411	411	411	411	912
80	411	411	411	411	411	1.112
85	411	411	411	411	411	1.296
90	411	411	411	411	532	1.467
95	411	411	411	411	674	1.625
100	411	411	411	411	806	1.772
105	411	411	411	411	929	1.909
110	411	411	411	411	1.044	2.038
115	411	411	411	411	1.152	2.157
120	411	411	411	411	1.253	2.270
125	411	411	411	411	1.349	2.376
130	411	411	411	411	1.438	2.476
135	411	411	411	476	1.523	2.570
140	411	411	411	547	1.603	2.659
145	411	411	411	614	1.678	2.743
150	411	411	411	677	1.750	2.823
155	411	411	411	738	1.818	2.898
160	411	411	411	795	1.883	2.970
165	411	411	411	850	1.944	3.039
170	411	411	411	902	2.003	3.104
175	411	411	411	952	2.059	3.166
180	411	411	411	999	2.113	3.226
185	411	411	411	1.044	2.164	3.283
190	411	411	411	1.088	2.213	3.337
195	411	411	411	1.129	2.259	3.389
200	411	411	411	1.169	2.304	3.439
205	411	411	411	1.208	2.347	3.487
210	411	411	411	1.244	2.389	
215	411	411	411	1.280	2.429	
220	411	411	411	1.314	2.467	
225	411	411	411	1.346	2.504	
230	411	411	411	1.378	2.539	
235	411	411	411	1.408	2.573	
240	411	411	411	1.437	2.606	
245	411	411	411	1.466	2.638	
250	411	411	411	1.493	2.669	
252	411	411	411	1.504	2.681	
Minimum thickness (µm) required of the protection to keep the temperature of the support under 700 °C						

Section factor up to (m ⁻¹)	Hollow columns. Fire Resistance Classification					
	R15	R30	R45	R60	R75	R90
48	411	411	411	411	411	411
50	411	411	411	411	411	411
55	411	411	411	411	411	411
60	411	411	411	411	411	411
65	411	411	411	411	411	411
70	411	411	411	411	411	411
75	411	411	411	411	411	443
80	411	411	411	411	411	640
85	411	411	411	411	411	821
90	411	411	411	411	411	989
95	411	411	411	411	411	1.145
100	411	411	411	411	411	1.291
105	411	411	411	411	487	1.426
110	411	411	411	411	601	1.553
115	411	411	411	411	707	1.672
120	411	411	411	411	808	1.784
125	411	411	411	411	902	1.889
130	411	411	411	411	991	1.988
135	411	411	411	411	1.075	2.082
140	411	411	411	411	1.155	2.170
145	411	411	411	411	1.230	2.254
150	411	411	411	411	1.301	2.334
155	411	411	411	411	1.369	2.410
160	411	411	411	411	1.434	2.482
165	411	411	411	441	1.495	2.550
170	411	411	411	493	1.554	2.615
175	411	411	411	542	1.610	2.678
180	411	411	411	590	1.663	2.737
185	411	411	411	635	1.715	2.794
190	411	411	411	678	1.764	2.849
195	411	411	411	720	1.811	2.901
200	411	411	411	760	1.856	2.951
205	411	411	411	798	1.899	2.999
210	411	411	411	835	1.940	3.046
215	411	411	411	870	1.980	3.090
220	411	411	411	904	2.019	3.133
225	411	411	411	937	2.056	3.174
230	411	411	411	969	2.091	3.214
235	411	411	411	999	2.126	3.252
240	411	411	411	1.029	2.159	3.289
245	411	411	411	1.057	2.191	3.325
250	411	411	411	1.084	2.222	3.359
252	411	411	411	1.095	2.234	3.373
Minimum thickness (µm) required of the protection to keep the temperature of the support under 750 °C						

The evaluation results within which the product can be used are:

- Section Factor between 48 m⁻¹ and below or equal to 252 m⁻¹
- Protection thicknesses assessed between 0.411 - 3.487 mm for hollow columns.
- Critical temperature up to 750 °C

In the same way, the evaluation results are only applicable to other grades of steel in accordance to EN 10025.