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European Technical Assessment

ETA 12/0459
of 15 / 04/ 2024

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) Nº305/2011:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product	**BARRIER 87/1151**
Product family to which the construction product belongs	Fire Protective Reactive coating for structural steel
Manufacturer	**IMPA, S.P.A Unipersonale** Via Crevada 9/E – 31020 San Pietro di Feletto (TV) - Italy
Manufacturing plant(s)	Via Crevada 9/E – 31020 San Pietro di Feletto (TV) - Italy
This European Technical Assessment contains	14 pages + 1 Annex which form an integral part of this assessment. + Annex 2. Contain confidential information and is not included in the ETA
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 350402-00-1106. Reactive Coatings for Fire Protection of Steel Elements
This version replaces	ETA 12/0459 issued on 16/03/2018

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

SPECIFIC PARTS

1 Technical description of the product

The BARRIER 87/1151 product is reactive coating in water dispersion formulated for the fire protection of structural steel elements. The application is performed by spray or brush, and once the reactive coating is hardened, conforms a continuous rendering completely bonded to the support (steel and galvanized steel with different kinds of primers). The final assembly contains the following components:

Product	Trade name	Support	Environmental conditions:
Reactive coating	Barrier 87/1151.	----------	Z2
Primer	1293 Fondo EPOX (epoxy)	steel	----------
	1859 Fondo F.D.(Zinc phosphate)	steel	----------
	0717 Korinthos primer	steel and galvanized steel	----------
Top coat	1288 Top Coating Pro	steel and galvanized steel	Y
	0825 Olimpic Opaco	steel and galvanized steel	Z2

The thickness of the applied dry product is:

Product	Thickness (µm)	Consumption (kg/m²)
BARRIER 87/1151	300 –1.900	0,54 - 3,45
1293 Fondo EPOX:	80 - 100	0,25 - 0,33
1859 Fondo F.D	70 - 80	0,22 - 0,25
0717 Korinthos primer	50 - 60	0,17 - 0,20
1288 Top Coating Pro	40 - 50	0,12 - 0,14
0825 Olimpic Opaco	50 - 70	0,22 - 0,26

The ETA is issued for a “final assembly”. The ETA only covers reactive coating product, but one (or more) primers and/or one (or more) topcoats are also identified. According to EAD 350402-00-1106 this ETA is assessed under use 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 BARRIER 87/1151 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 Y**: 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 Polyurethane Acrylic de 2/C o varnish Acrylic de 1/C.
- **Type Z2**: Reactive coat intended for internal conditions without high humidity[1] content, and excluding temperatures below 0 °C, In this case the reactive coat can be applied without top coat or with any 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. Beams and columns with 3 and 4 exposed faces. With a section factor of < 65 to 340 m-[1]. Temperature ranges from 350 ºC to 650 ºC. R15, R30, R45, R60, R90 and R120.

[1] These uses do not apply for internal humidity class 5 in accordance with EN ISO 13788.

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 carried out by skilled labor,
- It can only be used the components of the Product indicated in this ETA,
- BARRIER 87/1151 can be applied directly on the surfaces to be protected, provided that they are clean, dry, without dust or grease and made rough by sanding or sand-blasting in order not to affect the adherence of BARRIER 87/1151.
- It is necessary to control the thickness of the applied product during application.
- The application must be performed by airless spraying, air mix, roller or brush.
  Airless spraying: we recommend the use of a high pressure piston or diaphragm pump, gas or electric engine powered (200÷250 bar). Choose self-cleaning nozzle and spraying angle according to the structure to be treated but not less than 23º. The angle of the spray nozzle is very important in order to limit waste spraying.
  Conventional spray gun: use nozzles with large hole ∅ 2.2-2.5 mm y 3-5 bar pressure.
- Thickness changes depending on requested protection "Class". Described thickness must be respected without exceeding, particularly in the corners where too much product can crack during drying time.
- Apply product in several coats. Do not apply more than 700 ÷ 800 μm wet for each single coat. One single coat of 800 μm wet can be applied with airless pump and it correspond to 550 μm dry = 1kg/m^2.
- The hardened product will not present cracks, according to the test performed in this evaluation.
- Before, the installation of BARRIER 87/1151, it is recommended to read its security card.

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 coating, BARRIER 87/1151 will be applied in several layers with lower thickens 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,
- preparation of the support (cleanliness),
- new application of BARRIER 87/1151, 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 "BARRIER 87/1151" 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					2.2.2	
Support	**Primer**	**Reactive coating**	**Thickness (µm) Reactive coating**	**Top Coat**		
Open sections H, I: Beams and columns	Any of the system	BARRIER 87/1151	0,301 – 1,934 (columns) 0,301 – 1,838 (beams)	Without or with Any of the system		R 15 to R 120
Fire reaction					2.2.1	
Steel	Any of the system	Any	-------	Without any		NPA
			-------	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	NPA The semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) are not determined in accordance with EN 16516.

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
Durability			2.2.5	
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	2.2.5.2.1.1	**Performance**
BARRIER 87/1151	---------	Z2	2.2.5.2.1.2	Pass[2]
	1288 Top Coating Pro	Y	2.2.5.2.1.4	
	0825 Olimpic Opaco	Z2X	2.2.5.2.1.5	
	--------	Resistance to chemicals	2.2.5.2.1.6	NPA

[2] The averages time to achievement of critical Steel temperature (t500) determined in the insulation effiency 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 (BARRIER 87/1151). No single results of exposed specimens were less than 80 % of the mean time t_{500} of the initial test.

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) Nº 305/2011) applies.

Product	Intended uses	Level or Classes	System
BARRIER 87/1151	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.

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 IETcc[3].

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	Frecuency
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.

[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.

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,
- 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 15 April 2024

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 BARRIER 87/1151for the fire protection of 'H' or 'I' shaped steel beam and column sections. The precise scope is given in the following tables, which show the total dry film thickness of BARRIER 87/1151 (excluding primer and top coat) required to provide classifications of R15 to R120 for various design temperatures and section factors. The product is approved on the basis of:

i) Evaluation testing in accordance with the principles of EN 13381-8.
ii) A design appraisal against this ETA adopting the regression analysis defined in Annex E of EN 13381-8.

The data presented in the tables in this annex refers to beams (three-sided fire exposure) and columns (four sided exposure).

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.

The data applies also to other shaped steel sections that have re-entrant details such as channels, angles and tees.

BARRIER 87/1151has been exposed to the slowing heating regime defined in Annex A of EN 13381-8 and has satisfied the requirements.

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

Note: The cursive values are extrapolated values

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				350ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*569*	*939*	*1310*	---	---
70	*301*	611	1002	1394	---	---
75	*301*	651	1063	1475	---	---
80	*301*	690	1122	1553	---	---
85	*301*	728	1178	1628	---	---
90	*301*	764	1232	1700	---	---
95	*314*	799	1285	1770	---	---
100	331	833	1336	*1838*	---	---
110	364	898	1432	---	---	---
120	394	958	1522	---	---	---
130	422	1015	1607	---	---	---
140	449	1068	1686	---	---	---
150	474	1118	*1761*	---	---	---
160	498	1165	*1832*	---	---	---
170	521	1210	---	---	---	---
180	542	1252	---	---	---	---
190	562	1292	---	---	---	---
200	581	1330	---	---	---	---
210	599	1366	---	---	---	---
220	617	1400	---	---	---	---
230	633	1433	---	---	---	---
240	649	1464	---	---	---	---
250	664	1494	---	---	---	---
260	678	1522	---	---	---	---
270	692	1549	---	---	---	---
280	705	1575	---	---	---	---
290	718	1600	---	---	---	---
300	730	1624	---	---	---	---
310	741	1647	---	---	---	---
320	*752*	*1669*	---	---	---	---
330	*763*	*1691*	---	---	---	---
340	*774*	*1711*	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under				350ºC	

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				400ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*402*	*764*	*1127*	---	---
70	*301*	438	820	1203	---	---
75	*301*	473	874	1276	---	---
80	*301*	506	926	1346	---	---
85	*301*	538	976	1413	---	---
90	*301*	569	1023	1478	---	---
95	*301*	599	1069	1540	---	---
100	*301*	628	1114	1600	---	---
110	*301*	682	1198	1713	---	---
120	*301*	732	1276	*1819*	---	---
130	*301*	780	1349	---	---	---
140	*301*	824	1417	---	---	---
150	*301*	865	1481	---	---	---
160	*301*	904	1541	---	---	---
170	*301*	941	1597	---	---	---
180	*301*	975	1651	---	---	---
190	*314*	1008	1701	---	---	---
200	328	1039	1749	---	---	---
210	342	1068	*1794*	---	---	---
220	354	1096	*1837*	---	---	---
230	366	1122	---	---	---	---
240	378	1147	---	---	---	---
250	389	1171	---	---	---	---
260	399	1194	---	---	---	---
270	409	1215	---	---	---	---
280	418	1236	---	---	---	---
290	427	1256	---	---	---	---
300	436	1275	---	---	---	---
310	444	1293	---	---	---	---
320	*452*	*1311*	---	---	---	---
330	*460*	*1328*	---	---	---	---
340	*467*	*1344*	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under					400ºC

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Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				450ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*301*	*597*	*952*	*1662*	---
70	*301*	*301*	647	1021	*1768*	---
75	*301*	*303*	695	1086	---	---
80	*301*	332	740	1149	---	---
85	*301*	359	784	1210	---	---
90	*301*	385	826	1268	---	---
95	*301*	411	867	1323	---	---
100	*301*	435	906	1377	---	---
110	*301*	481	979	1477	---	---
120	*301*	523	1047	1571	---	---
130	*301*	562	1110	1657	---	---
140	*301*	599	1169	1738	---	---
150	*301*	633	1224	*1814*	---	---
160	*301*	665	1275	---	---	---
170	*301*	696	1323	---	---	---
180	*301*	724	1369	---	---	---
190	*301*	751	1411	---	---	---
200	*301*	776	1452	---	---	---
210	*301*	800	1490	---	---	---
220	*301*	822	1526	---	---	---
230	*301*	843	1560	---	---	---
240	*301*	864	1592	---	---	---
250	*301*	883	1623	---	---	---
260	*301*	901	1653	---	---	---
270	*301*	919	1681	---	---	---
280	*301*	936	1707	---	---	---
290	*301*	951	1733	---	---	---
300	*301*	967	*1757*	---	---	---
310	*301*	981	*1780*	---	---	---
320	*301*	*995*	*1803*	---	---	---
330	*301*	*1009*	*1824*	---	---	---
340	*301*	*1021*	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under					450ºC

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				500ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*301*	*436*	*784*	*1479*	---
70	*301*	*301*	481	846	1577	---
75	*301*	*301*	524	906	1671	---
80	*301*	*301*	564	963	*1760*	---
85	*301*	*301*	603	1017	---	---
90	*301*	*301*	640	1069	---	---
95	*301*	*301*	676	1119	---	---
100	*301*	*301*	710	1167	---	---
110	*301*	*301*	774	1257	---	---
120	*301*	328	834	1339	---	---
130	*301*	361	888	1416	---	---
140	*301*	391	939	1487	---	---
150	*301*	420	987	1553	---	---
160	*301*	447	1031	1615	---	---
170	*301*	471	1072	1673	---	---
180	*301*	495	1111	1727	---	---
190	*301*	517	1148	*1778*	---	---
200	*301*	537	1182	*1826*	---	---
210	*301*	557	1214	---	---	---
220	*301*	575	1245	---	---	---
230	*301*	593	1274	---	---	---
240	*301*	609	1301	---	---	---
250	*301*	625	1327	---	---	---
260	*301*	639	1352	---	---	---
270	*301*	654	1375	---	---	---
280	*301*	667	1397	---	---	---
290	*301*	680	1419	---	---	---
300	*301*	692	1439	---	---	---
310	*301*	704	1458	---	---	---
320	*301*	*715*	*1477*	---	---	---
330	*301*	*726*	*1495*	---	---	---
340	*301*	*736*	*1512*	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 500ºC					

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				550ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*301*	*301*	*623*	*1304*	---
70	*301*	*301*	323	680	1394	---
75	*301*	*301*	361	734	1481	---
80	*301*	*301*	397	786	1563	---
85	*301*	*301*	432	835	1641	---
90	*301*	*301*	465	882	1716	---
95	*301*	*301*	496	927	*1788*	---
100	*301*	*301*	526	969	---	---
110	*301*	*301*	583	1050	---	---
120	*301*	*301*	635	1124	---	---
130	*301*	*301*	683	1192	---	---
140	*301*	*301*	727	1255	---	---
150	*301*	*301*	768	1313	---	---
160	*301*	*301*	806	1368	---	---
170	*301*	*301*	842	1418	---	---
180	*301*	*301*	875	1466	---	---
190	*301*	*303*	907	1510	---	---
200	*301*	320	936	1552	---	---
210	*301*	336	964	1591	---	---
220	*301*	351	990	1628	---	---
230	*301*	365	1014	1663	---	---
240	*301*	379	1037	1696	---	---
250	*301*	391	1060	1728	---	---
260	*301*	403	1080	1757	---	---
270	*301*	415	1100	*1786*	---	---
280	*301*	426	1119	*1812*	---	---
290	*301*	436	1137	*1838*	---	---
300	*301*	446	1154	---	---	---
310	*301*	456	1171	---	---	---
320	*301*	*465*	*1186*	---	---	---
330	*301*	*473*	*1201*	---	---	---
340	*301*	*481*	*1215*	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 550ºC					

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				600ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*301*	*301*	*468*	*1135*	*1802*
70	*301*	*301*	*301*	520	1220	---
75	*301*	*301*	*301*	570	1300	---
80	*301*	*301*	*301*	617	1376	---
85	*301*	*301*	*301*	662	1448	---
90	*301*	*301*	*301*	704	1516	---
95	*301*	*301*	326	745	1582	---
100	*301*	*301*	353	783	1644	---
110	*301*	*301*	403	856	*1761*	---
120	*301*	*301*	449	922	---	---
130	*301*	*301*	491	982	---	---
140	*301*	*301*	529	1039	---	---
150	*301*	*301*	565	1090	---	---
160	*301*	*301*	599	1139	---	---
170	*301*	*301*	630	1183	---	---
180	*301*	*301*	659	1225	---	---
190	*301*	*301*	686	1264	---	---
200	*301*	*301*	711	1301	---	---
210	*301*	*301*	735	1335	---	---
220	*301*	*301*	757	1368	---	---
230	*301*	*301*	778	1398	---	---
240	*301*	*301*	798	1427	---	---
250	*301*	*301*	817	1454	---	---
260	*301*	*301*	835	1480	---	---
270	*301*	*301*	852	1504	---	---
280	*301*	*301*	868	1527	---	---
290	*301*	*301*	883	1549	---	---
300	*301*	*301*	898	1570	---	---
310	*301*	*301*	911	1591	---	---
320	*301*	*301*	*925*	*1610*	---	---
330	*301*	*301*	*937*	*1628*	---	---
340	*301*	*301*	*949*	*1645*	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under					**600ºC**

Section factor up to (m^{-1})	Beam steel. Fire Resistance Classification				650ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*301*	*301*	*301*	*320*	*974*	*1627*
70	*301*	*301*	*301*	368	1052	1737
75	*301*	*301*	*301*	413	1127	---
80	*301*	*301*	*301*	456	1197	---
85	*301*	*301*	*301*	497	1264	---
90	*301*	*301*	*301*	536	1327	---
95	*301*	*301*	*301*	573	1387	---
100	*301*	*301*	*301*	608	1445	---
110	*301*	*301*	*301*	673	1552	---
120	*301*	*301*	*301*	732	1649	---
130	*301*	*301*	*311*	787	1739	---
140	*301*	*301*	345	837	*1821*	---
150	*301*	*301*	377	884	---	---
160	*301*	*301*	406	926	---	---
170	*301*	*301*	433	966	---	---
180	*301*	*301*	459	1003	---	---
190	*301*	*301*	482	1038	---	---
200	*301*	*301*	504	1070	---	---
210	*301*	*301*	525	1100	---	---
220	*301*	*301*	544	1129	---	---
230	*301*	*301*	562	1156	---	---
240	*301*	*301*	580	1181	---	---
250	*301*	*301*	596	1205	---	---
260	*301*	*301*	611	1227	---	---
270	*301*	*301*	626	1249	---	---
280	*301*	*301*	639	1269	---	---
290	*301*	*301*	653	1288	---	---
300	*301*	*301*	665	1306	---	---
310	*301*	*301*	677	1324	---	---
320	*301*	*301*	*688*	*1340*	---	---
330	*301*	*301*	*699*	*1356*	---	---
340	*301*	*301*	*709*	*1371*	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under					**650ºC**

Section factor up to (m^{-1})	Columns. Fire Resistance Classification				350ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*599*	*1017*	*1434*	---	---
70	308	647	1088	1530	---	---
75	308	693	1158	1623	---	---
80	308	737	1225	1714	---	---
85	308	780	1291	1801	---	---
90	308	822	1354	*1886*	---	---
95	309	862	1415	---	---	---
100	328	901	1474	---	---	---
110	364	976	1587	---	---	---
120	398	1046	1694	---	---	---
130	430	1113	1795	---	---	---
140	461	1176	*1890*	---	---	---
150	489	1235	---	---	---	---
160	517	1291	---	---	---	---
170	543	1345	---	---	---	---
180	567	1396	---	---	---	---
190	591	1445	---	---	---	---
200	613	1491	---	---	---	---
210	634	1535	---	---	---	---
220	655	1577	---	---	---	---
230	674	1617	---	---	---	---
240	693	1656	---	---	---	---
250	711	1693	---	---	---	---
260	728	1728	---	---	---	---
270	744	1763	---	---	---	---
280	760	1795	---	---	---	---
290	775	1827	---	---	---	---
300	790	*1857*	---	---	---	---
310	804	*1886*	---	---	---	---
320	*817*	*1914*	---	---	---	---
330	*830*	---	---	---	---	---
340	*843*	---	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 350ºC					

Section factor up to (m^{-1})	Columns. Fire Resistance Classification				400ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*414*	*821*	*1228*	---	---
70	308	455	885	1315	---	---
75	308	494	946	1398	---	---
80	308	531	1005	1479	---	---
85	308	567	1062	1556	---	---
90	308	602	1117	1631	---	---
95	308	636	1170	1704	---	---
100	308	669	1221	1774	---	---
110	308	731	1319	*1907*	---	---
120	308	789	1411	---	---	---
130	308	844	1497	---	---	---
140	308	895	1578	---	---	---
150	308	944	1654	---	---	---
160	308	990	1726	---	---	---
170	308	1033	1794	---	---	---
180	308	1074	*1859*	---	---	---
190	308	1113	*1920*	---	---	---
200	321	1150	---	---	---	---
210	336	1185	---	---	---	---
220	351	1219	---	---	---	---
230	364	1250	---	---	---	---
240	377	1281	---	---	---	---
250	390	1310	---	---	---	---
260	402	1338	---	---	---	---
270	413	1365	---	---	---	---
280	424	1390	---	---	---	---
290	434	1415	---	---	---	---
300	444	1438	---	---	---	---
310	454	1461	---	---	---	---
320	*463*	*1483*	---	---	---	---
330	*472*	*1503*	---	---	---	---
340	*481*	*1524*	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 400ºC					

Section factor	Columns. Fire Resistance Classification				450ºC	
up to (m^{-1})	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*308*	*635*	*1032*	*1826*	---
70	308	308	691	1110	---	---
75	308	308	745	1185	---	---
80	308	337	797	1257	---	---
85	308	367	847	1327	---	---
90	308	397	895	1393	---	---
95	308	425	941	1458	---	---
100	308	452	986	1520	---	---
110	308	504	1070	1637	---	---
120	308	552	1149	1747	---	---
130	308	597	1223	*1849*	---	---
140	308	639	1292	---	---	---
150	308	679	1357	---	---	---
160	308	716	1418	---	---	---
170	308	751	1475	---	---	---
180	308	784	1530	---	---	---
190	308	816	1581	---	---	---
200	308	845	1629	---	---	---
210	308	873	1676	---	---	---
220	308	900	1719	---	---	---
230	308	925	1761	---	---	---
240	308	950	1800	---	---	---
250	308	973	*1838*	---	---	---
260	308	995	*1874*	---	---	---
270	308	1016	*1909*	---	---	---
280	308	1036	---	---	---	---
290	308	1055	---	---	---	---
300	308	1073	---	---	---	---
310	308	1091	---	---	---	---
320	*308*	*1108*	---	---	---	---
330	*308*	*1124*	---	---	---	---
340	*308*	*1140*	---	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under				**450ºC**	

Section factor	Columns. Fire Resistance Classification				500ºC	
up to (m^{-1})	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*308*	*458*	*845*	*1621*	---
70	308	308	508	916	1733	---
75	308	308	555	983	*1840*	---
80	308	308	601	1048	---	---
85	308	308	645	1110	---	---
90	308	308	687	1170	---	---
95	308	308	727	1227	---	---
100	308	308	766	1282	---	---
110	308	308	839	1386	---	---
120	308	333	908	1482	---	---
130	308	370	971	1572	---	---
140	308	404	1030	1656	---	---
150	308	437	1086	1734	---	---
160	308	467	1137	1808	---	---
170	308	496	1186	*1877*	---	---
180	308	522	1232	---	---	---
190	308	548	1275	---	---	---
200	308	571	1316	---	---	---
210	308	594	1355	---	---	---
220	308	615	1391	---	---	---
230	308	636	1426	---	---	---
240	308	655	1459	---	---	---
250	308	673	1490	---	---	---
260	308	691	1520	---	---	---
270	308	707	1548	---	---	---
280	308	723	1576	---	---	---
290	308	738	1602	---	---	---
300	308	753	1626	---	---	---
310	308	767	1650	---	---	---
320	*308*	*780*	*1673*	---	---	---
330	*308*	*793*	*1695*	---	---	---
340	*308*	*805*	*1716*	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under				**500ºC**	

Section factor up to (m^{-1})	Columns. Fire Resistance Classification				550ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*308*	*308*	*667*	*1425*	---
70	308	308	333	731	1528	---
75	308	308	375	792	1627	---
80	308	308	415	850	1721	---
85	308	308	454	906	1811	---
90	308	308	491	960	*1897*	---
95	308	308	526	1011	---	---
100	308	308	560	1060	---	---
110	308	308	624	1152	---	---
120	308	308	683	1237	---	---
130	308	308	738	1316	---	---
140	308	308	789	1390	---	---
150	308	308	837	1458	---	---
160	308	308	881	1522	---	---
170	308	308	923	1582	---	---
180	308	308	962	1639	---	---
190	308	308	998	1692	---	---
200	308	324	1033	1741	---	---
210	308	342	1065	1788	---	---
220	308	359	1096	1833	---	---
230	308	376	1125	*1875*	---	---
240	308	391	1153	*1915*	---	---
250	308	406	1179	---	---	---
260	308	419	1204	---	---	---
270	308	433	1228	---	---	---
280	308	445	1250	---	---	---
290	308	457	1272	---	---	---
300	308	469	1292	---	---	---
310	308	480	1312	---	---	---
320	*308*	*490*	*1331*	---	---	---
330	*308*	*500*	*1349*	---	---	---
340	*308*	*510*	*1366*	---	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 550ºC					

Section factor up to (m^{-1})	Columns. Fire Resistance Classification				600ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*308*	*308*	*497*	*1238*	---
70	308	308	308	555	1333	---
75	308	308	308	611	1424	---
80	308	308	308	663	1510	---
85	308	308	308	714	1593	---
90	308	308	308	762	1672	---
95	308	308	338	807	1747	---
100	308	308	368	851	1819	---
110	308	308	424	934	---	---
120	308	308	475	1009	---	---
130	308	308	523	1080	---	---
140	308	308	567	1144	---	---
150	308	308	608	1205	---	---
160	308	308	646	1261	---	---
170	308	308	682	1313	---	---
180	308	308	715	1362	---	---
190	308	308	746	1408	---	---
200	308	308	776	1452	---	---
210	308	308	803	1492	---	---
220	308	308	829	1531	---	---
230	308	308	854	1567	---	---
240	308	308	877	1601	---	---
250	308	308	899	1634	---	---
260	308	308	920	1665	---	---
270	308	308	940	1694	---	---
280	308	308	959	1722	---	---
290	308	308	977	1748	---	---
300	308	308	995	1774	---	---
310	308	308	1011	1798	---	---
320	*308*	*308*	*1027*	*1821*	---	---
330	*308*	*308*	*1042*	*1843*	---	---
340	*308*	*308*	*1056*	*1864*	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 600ºC					

Section factor up to (m^{-1})	Columns. Fire Resistance Classification				650ºC	
	R15	R30	R45	R60	R90	R120
≤ 65	*308*	*308*	*308*	*335*	*1059*	*1784*
70	308	308	308	388	1147	*1907*
75	308	308	308	438	1231	---
80	308	308	308	486	1311	---
85	308	308	308	531	1387	---
90	308	308	308	575	1459	---
95	308	308	308	616	1528	---
100	308	308	308	655	1594	---
110	308	308	308	729	1717	---
120	308	308	308	797	1830	---
130	308	308	322	859	*1934*	---
140	308	308	361	917	---	---
150	308	308	396	970	---	---
160	308	308	429	1020	---	---
170	308	308	460	1066	---	---
180	308	308	489	1109	---	---
190	308	308	516	1149	---	---
200	308	308	541	1187	---	---
210	308	308	565	1223	---	---
220	308	308	587	1256	---	---
230	308	308	608	1288	---	---
240	308	308	628	1318	---	---
250	308	308	647	1346	---	---
260	308	308	664	1372	---	---
270	308	308	681	1398	---	---
280	308	308	697	1422	---	---
290	308	308	713	1445	---	---
300	308	308	727	1467	---	---
310	308	308	741	1487	---	---
320	*308*	*308*	*754*	*1507*	---	---
330	*308*	*308*	*767*	*1526*	---	---
340	*308*	*308*	*779*	*1544*	---	---
	Minimum thickness (µm) required of the protection to keep the TºC of the support under 650ºC					

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

- Section Factor between 65 m^{-1} and 340 m^{-1}
- Protection thicknesses assessed between 0,301 mm and 1,838 mm for steel beams.
- Protection thicknesses assessed between 0,308 mm and 1,934 mm for steel columns.
- Critical temperature of 650 ºC

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

- "I" H, U and "H" section profiles, angles and T sections.
- Other grades of steel in accordance to EN 10025-1
- Columns and beams with 3 or 4 faces exposed.
- Beams with a web maximum length of 6m.