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European Technical Assessment

ETA 13/0894
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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	**IGNIVER®**
Product family to which the construction product belongs	Rendering intended for Fire Resisting Application of building elements
Manufacturer	**Saint Gobain PLACO IBERICA, S.A** C/ Príncipe de Vergara nº 132. 28002 Madrid. Spain
Manufacturing plant(s)	Ctra Sagunto a Burgos km 24, SONEJA (Castellón)– Spain
This European Technical Assessment contains	13 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	EAD 350140-00-1106. Renderings and rendering kits intended for fire resisting applications
This version replaces	ETA 13/0894 issued on 24/ 06/ 2013

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SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

The IGNIVER® product is a mortar of fine granule based in calcium sulphate. This product is lightened with expansive minerals and formulated with several additives to improve the application and its performances. The application is performed by spray; the product powder is mixed with water in appropriated machines, or manually. Once the mortar is hardened, conforms a continuous rendering completely bonded to the support (steel with and without primers, and galvanized steel).

The thickness of the applied product ranges from 10 mm to 45 mm, with a consumption of 7-7,5 kg/m^2/cm thickness.

The final assembly contains a rendering and several primers (base epoxy and alkyd) when it is applied on steel supports (optional). According EAD 350140-00-1106, this ETA is assessed under use conditions: Option 3.

2 Specification of the intended use in accordance with the applicable EAD

The intended use of the IGNIVER® mortar is the rendering of indoor 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 Essential Requirements nº 2 (Safety in case of fire), nº 3 (Hygiene, health and the environment) and nº 4 (Safety in use) of the Construction Products Regulation 305/2011.

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

Type Z2. Renderings intended for internal conditions without high humidity[1] content, and excluding temperatures below 0°C, when they are applied on primed or un-primed steel, and galvanized steel.

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 <370 m^{-1}. Temperature ranges from 350ºC to 650ºC. R15, R30, R60, R90, R120, R180 y R240
- Type 5: Fire Protective Products to protect flat concrete profiled sheet composite elements.

The provisions made in this European Technical Assessment (ETA) are based on an assumed intended working life of the system of 25 years, provided that the product is subject to appropriate use and maintenance in accordance with Chapter 5. The indication given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are only to be regarded as a means for choosing the right products 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 Essential 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 must be carried out by skilled people,
- Only the components of the product indicated in this ETA can be used
- It is necessary to control the thickness of the applied product during application
- The elements to be protected must be very clean, dry and without dust or grease in order not to affect the adhesion of IGNIVER®.
- The recommended mixing water/plaster ratio is 0,70 to 0,75, so for one sack of IGNIVER® (18kg) is necessary to use 13,5 ± 1 L of water.
- The application must be performed by a spraying machine. The powder is mixed with water in usual mixing machines. There are different types and brands of these types of machines; depending on the model, it varies the type of shirt-rotor, pumping pressure, distance and height, pressure of mixing water, air pressure, hose lengths and sections, etc. All these characteristics are included in the machines technical specifications and instructions of use. The water flow of the machine must be regulated until achieving a slurry consistency that covers uniformly the steel elements and does not fall down. In order to achieve a uniform surface of IGNIVER®, nozzles diameter must be 10 or 12 mm.

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

- On site adhesion tests should be done in order to determine the product adhesion on the steel element; this adhesion should be at least 80% of the values enclosed in this ETA. This test will be performed by portable adherence equipment, with a sheet metal of 100 mm of diameter. (EGOLF SM 5).
- The density of the applied rendering on site will not vary more than 920 kg/m^3 ± 15%. If it was more than 15%, it would be needed to carry out adherence tests.
- The hardened product will not present cracks, according to the test performed in this evaluation.
- Before the application of IGNIVER®, it is recommended to read its safety data sheet.

B) Requirements to use primers on different supports and its compatibility with its rendering

- The alkyd, epoxy and silicate zinc primers are compatible with IGNIVER®. However, the application of IGNIVER® can be carried out directly on clean steel because it does not cause directly any corrosion on steel. Adherence can vary from one primer to another, depending on the primer quality and the finishing state of the surface**.** Oily primers and those, which give off pigments, are not recommended.
- For galvanized steel sheet, and galvanized steel supports, the use of primers is not necessary.
- The ETA-Guideline 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, the compatibility and adhesion between the new rendering and the existing coating or rendering must not be less than 80% of the one that exists between the rendering and the steel element.
- Non compatibility with other fire protection materials. In these special cases, it is needed to check it with manufacturer.

C) Circumstances in which the rendering needs reinforcements. Although, it has not been evaluated in this ETA, in cases where the mechanical resistance needs to be improved, and in cases where the steel beams and columns are only applied on one face, it is recommended to place a mesh. In cases that the state of the surface of the primer does not assure an adequate adherence, please check it with the manufacturer.

D) Finishing of the final aspect of the rendering. Any repairing required may be performed manually by using a trowel, etc. Its finishing is rough but, if desired; it can be smoothed using a trowel or any other brickwork tool intended for this use.

E) Application limitations due to certain environments

- The recommended environmental temperature of the product to be applied will be between 5ºC and 40ºC and it will be not admitted support temperatures upper to 45ºC. In other conditions it will need to follow the manufacturer's instructions.
- During the application and drying time, the product has to be protected against the water rain.
- Curing and drying must not be exposed to strong winds during projection to avoid a rapid dry.

F) Incompatibility with other Fire protection materials. For these special cases, it is needed to check it with the manufacturer.

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 IGNIVER® sprayed or manually according to the reparation size. When the area to repair manually is significant, a mesh fixed to the support shall be used.

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 assessment of the fitness of the IGNIVER® for the intended use regard to the Essential Requirements nº 2, 3 and 4 was performed in compliance with the "EAD 350140-00-1106. Renderings and rendering kits intended for fire resisting applications

3.1 Characteristics of Product "IGNIVER®"[2]

3.1.1 *BWR*. 2 *Safety in case of fire*

Reaction to fire. Classification A1 according to EN 13501-1. Product does not require to be tested because of its composition.

[2] These tests are valid for hardened density of applied rendering between 920 ± 15% kg/m^3.

Fire resistance. The tests were performed according to ENV 13381-4, 13381-5 and EN 13501-2 (annex I).

Support	Thickness of the product	Classification
Flat concrete profiled sheet composite	12.5 at 42 mm	----------
Steel	10 at 45 mm	R15 at R240

3.1.2 BWR. 3 *Hygiene, health and environment*

Content, emission and/or release of dangerous substances. According to the manufacturer's declaration taking account of EOTA TR 034, the product installed does not contain and release any dangerous substance.

The semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) are not determined in accordance with EN 16515

Resistance to water vapour (EN 12086). $\mu = 9$

3.1.3 BWR. 4 Safety *in use.* See point 3.1.5. Serviceability aspect.

3.1.4 A*spects of durability*

Resistance to corrosion of a steel substrate by the rendering (240h, 23ºC at 60% and at 95% HR). The thickness of the sample was 10 mm and the obtained weight lost (%) was:

Support	23ºC 60%HR (%)	23ºC 95%HR (%)
Steel	$6{,}5\ 10^{-6}$	$9{,}9\ 10^{-5}$
Galvanized steel	$1\ 10^{-6}$	$5{,}8\ 10^{-5}$

3.1.5 Serviceability *aspects*

Flexural performance. NPA

Air erosion. NPA

Adherence

Support	Thickness (mm)	Adherence (MPa)
Steel	45	0,27
	25	0,15
	10	0,148
Steel + primer alkyd	25	0.04
Steel + primer epoxi Zn	25	0,1
Steel + primer silicate Zn	25	0,05
Galvanized steel	25	0,1

Thermal efficiency and aspect with the different primers

Support	Thermal efficiency	Visual observations
Steel + primer alkyd	< 15%[3]	OK
Steel + primer epoxi Zn	< 15%	OK
Steel + primer silicate Zn	< 15%	OK
Galvanized steel	< 15%	OK

3.2 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).

Properties		IGNIVER® (Tolerances)
Binder content (volumen)		> 75%
TG / ATD		IETcc
Mixing ratio (%)		70-75 %
Colour		White
Particle size (EN 1015-1) (%)		>2: 0 // > 1: 2,1 // > 0.5 : 8 // > 0.25: 17.5 >0.125: 27 // >0.063: 28 // bottom: 17
Denisty (kg/m^3)	740 (750 ± 50)	600 (550 ± 50)
	1.300 (1250 ± 50)	1.300 (1.200 ± 100)
	820 (920 ± 15%) 890 (sprayed)	850 (± 15%)
Dry extract 105°C, (% weight)		97 (≥ 96)
Ash content 450°C, (% weight)		1,3 (≥ 1) // 1,7 (sprayed)
Flexuaral strenght (EN 1015-11) (MPa)		3,1(≥ 2,2) // 4,4 (sprayed)
Compressive strenght (EN 1015-11) (MPa)		> 75%

[3] Variation of the test time respect to the same sample un-primed steel sheet

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

System of attestation of conformity. The European Commission according to mandate Construct 98/311, Annex 3 (taking into account decision 1999/454/EC of the Commission) on the procedure of attestation of conformity for the procedure of attestation of conformity (Annex III of EU Regulation 305/2011) has laid down for this type of material:

Product	Intended uses	Level or Classes	System
IGNIVER®	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 approved 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

The ETA is issued for these products on the basis of agreed data/information, deposited at IETcc, which identifies the product that has been assessed and judged. It is the manufacturer's responsibility to make sure that all those who use the kit are appropriately informed of specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA. Changes of the product´s components or their production process, which could result in this deposited data/information being incorrect should be notified to the IETcc before the changes are introduced. IETcc will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

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[4] which is part of the Technical Documentation of this ETA. The Control Plan has been agreed between the manufacturer and the IETcc and is laid down in the context of the factory production control system operated by the manufacturer and deposited at the IETcc. 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	Batch
Bulk density of the components	Batch
Bulk density of dry product	Batch
Bulk density of paste product	Batch
Consistence	Batch
Bulk density of hardened	Monthly
Adherence	Monthly
Insulation efficiency	Monthly

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.

(4) The control plan is a confidential part of this European Technical Assessment and only handed over to the notified body involved in the procedure of attestation of conformity.

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 have been carried out by the IETcc to issue this ETA which corresponds to EAD 350140-00-1106. Renderings and rendering kits intended for fire resisting applications

The initial type-testing of this ETA have been carried out by the IETcc on samples from the current production. The IETcc has assessed the results of these tests in accordance with chapter 6 of this ETA – Guideline, as part of the ETA issuing procedure.

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, in order to assure the final characteristics of the product.

Continuous surveillance, assessment and approval 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 Approval and its “Control Plan” are no longer fulfilled the certification body (IETcc) shall withdraw the certificate of conformity.

Issued in Madrid on 10 September 2018
by

Instituto de Ciencias de la Construcción Eduardo Torroja

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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja

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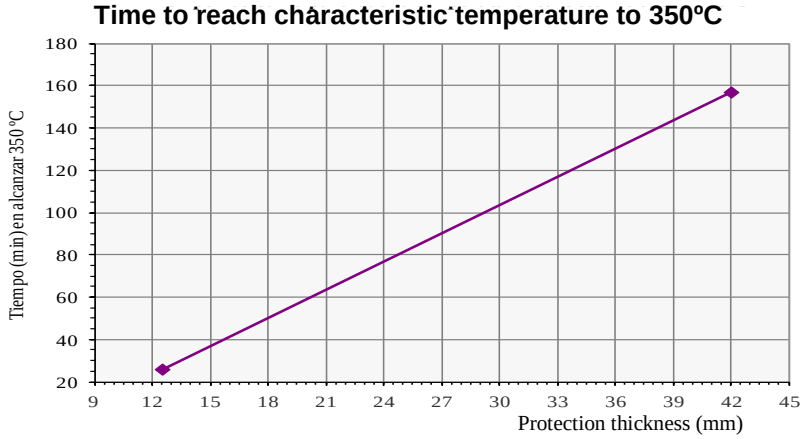
Director

Annex I. Fire resistance tests

Flat concrete profiled sheet composite (Test report 8518-11 y 8518-11-2 AFITI LICOF). The hardened density of the product for this test was 967 Kg/m^3.

Temperature of the Steel profiled sheet (ENV 13381-5:2005). The characteristic temperature of the steel profiled sheet is the average of the medium and maximum temperature registered in all the points of the measurement. The next table shows the time needed to reach the characteristic temperature of 350ºC.

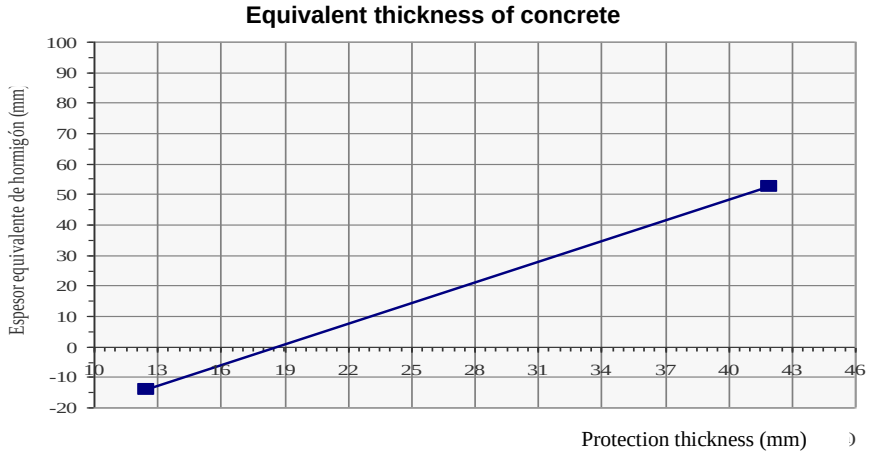
	Maximum thickness of protection 12.5 ≡ p_{max} (mm)	Minimum thickness of protection ≡ dp_{min} 40 (mm)
Time(min) / TºC characteristic = 350ºC	157	26



Equivalent thickness of concrete. The final Equivalent thickness of concrete obtained was obtained according to the curves of Eurocode 4 (ENV 1994-1-1:1995. Project of mixed structures of concrete and steel. Part. 1-1 General rules and rules for building) for concrete are:

Thickness of the protection System (mm) $\mathbf{d_p}$	Equivalent thickness of concrete (mm) $\mathbf{h_{eq}}$
42.0	52.6
12.5	-14.2*

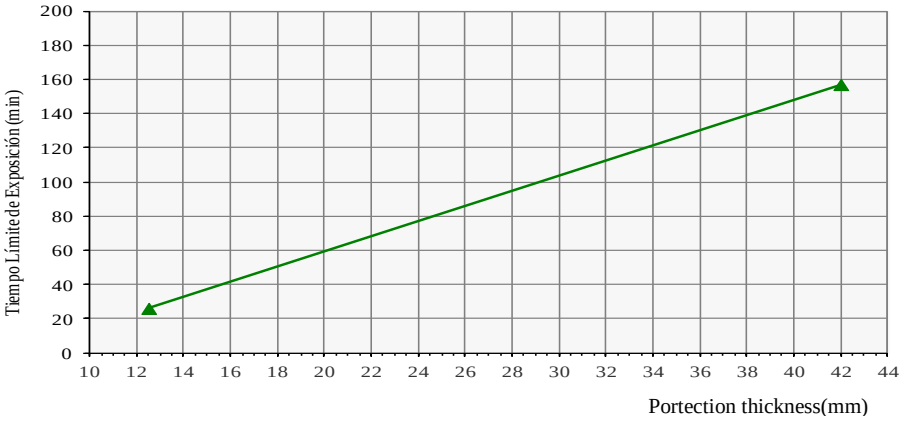
*The premature finished of the test give a negative valour of the equivalent thickness.



Limit time of exposition. This limit time of exposition is related with the adhesion to the system and the protection to the mixed slab, according to part 13.4 of ENV 13381-5-2005:

Thickness of the protection system (mm) $\mathbf{d_p}$	Limit time of exposition (min)
42.0	157
12.5	26

Limit time of exposition



Isulation. The thermal insulation of the mixed slab + the protection according to EN 1363-1 is:

	Maximun thickness of protection ≡ dp_{max} ≡ 42 mm	Minimun thickness of protection ≡ dp_{min} ≡ 12.5 mm
Time (min) EN 1363-1:2000	180	40

The application limitations of the results obtained are the following:

- The test results, according to the performance of the fire protection system in accordance with this method, can be applied to slabs composed of concrete/steel with profiled steel sheet, which may or may not contain framework steel bars for the purpose of load resistance.
- The results of the assessment are applicable to the mixed slabs of concrete/steel with exposition to fire next to the steel and in accordance with the following:
- The sheet's thickness is superior or equal to 0,8 mm of thickness.
- The width of the rib (lp1), to which the fire protection material is directly fixed, should not be superior to 1.5 times as much the width of the specimen tested. Thus, lp1 ≤ 225 mm.
- The height of the rib (h2) should not be superior to 1,5 times as much the height of the specimen tested, that is, $h_2 \leq 87$ mm.
- The equivalent thickness of concrete for a given thickness of the fire protection system is applicable within the corresponding Limiting Exposure Time (according to graphic).
- The results of the assessment are valid solely for slabs composed of concrete/sheet made with trapezoidal profiled steel sheet.
- The results of the assessment can only be applied to slabs made of concrete/sheet whose concrete's density is comprised between 0,85-1,15 times the concrete tested (1.929 / 2.610 kg/m^3).
- The results of the assessment are applicable to concrete elements whose concrete's strength is equal or greater to the resistance of the concrete tested, that is: 30.9 MPa within 28 days.
- The results of the assessment are applicable to all of those concrete elements whose concrete has been made of siliceous aggregates.
- The results of the assessment can only be applied to slabs made of concrete/steel where the effective thickness of the slab is equal or superior to the slab tested (85.9 mm).
- The results of the assessment can only be applied to fire protection systems where the fixation system used is equal to the one used in the system tested.
- The results of the assessment can only be applied to protections of maximum one coat.

Beams and Columns of steel with 3 or 4 exposed faces (Report of test AFITI LICOF 2200T11-3 y -4, ENV 13381-4:2005). The hardened density of the product for this test was 1000 Kg/m^3.
Note. The cursive figures correspond to extrapolated values

Section factor	Classification of Fire Resistance						350°C	
(m^{-1})	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*12*	*15*	*18*	*24*	*30*	*43*	- - -
70	*10*	12	15	18	25	31	43	- - -
75	*10*	12	15	19	25	31	*44*	- - -
80	*10*	12	16	19	25	31	*44*	- - -
85	*10*	13	16	19	25	32	*45*	- - -
90	*10*	13	16	19	26	32	*45*	- - -
95	*10*	13	16	19	26	32	*45*	- - -
100	*10*	13	16	19	26	32	- - -	- - -
110	*10*	13	16	20	26	33	- - -	- - -
120	*10*	13	17	20	27	33	- - -	- - -
130	*10*	13	17	20	27	33	- - -	- - -
140	*10*	14	17	20	27	34	- - -	- - -
150	*10*	14	17	20	27	34	- - -	- - -
160	*10*	14	17	21	27	34	- - -	- - -
170	*10*	14	17	21	27	34	- - -	- - -
180	11	14	17	21	28	34	- - -	- - -
190	11	14	17	21	28	35	- - -	- - -
200	11	14	17	21	28	35	- - -	- - -
210	11	14	18	21	28	35	- - -	- - -
220	11	14	18	21	28	35	- - -	- - -
230	11	14	18	21	28	35	- - -	- - -
240	11	14	18	21	28	35	- - -	- - -
250	11	14	18	21	28	35	- - -	- - -
260	11	14	18	21	28	35	- - -	- - -
270	11	14	18	21	28	35	- - -	- - -
280	11	14	18	21	28	35	- - -	- - -
290	11	14	18	21	28	35	- - -	- - -
300	11	14	18	21	28	35	- - -	- - -
310	11	15	18	21	28	35	- - -	- - -
320	11	15	18	22	28	35	- - -	- - -
330	11	15	18	22	29	36	- - -	- - -
340	*11*	*15*	*18*	*22*	*29*	*36*	- - -	- - -
350	*11*	*15*	*18*	*22*	*29*	*36*	- - -	- - -
360	*11*	*15*	*18*	*22*	*29*	*36*	- - -	- - -
370	*11*	*15*	*18*	*22*	*29*	*36*	- - -	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 350°C							

Section factor	Classification of Fire Resistance						400°C	
(m^{-1})	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*13*	*16*	*22*	*28*	*39*	- - -
70	*10*	*10*	13	16	22	28	40	- - -
75	*10*	11	14	17	23	29	41	- - -
80	*10*	11	14	17	23	29	41	- - -
85	*10*	11	14	17	23	29	42	- - -
90	*10*	11	14	17	24	30	42	- - -
95	*10*	11	15	18	24	30	42	- - -
100	*10*	12	15	18	24	30	43	- - -
110	*10*	12	15	18	24	31	43	- - -
120	*10*	12	15	18	25	31	*44*	- - -
130	*10*	12	15	19	25	31	*44*	- - -
140	*10*	12	16	19	25	32	*45*	- - -
150	*10*	13	16	19	26	32	*45*	- - -
160	*10*	13	16	19	26	32	*45*	- - -
170	*10*	13	16	19	26	32	*45*	- - -
180	*10*	13	16	19	26	33	- - -	- - -
190	*10*	13	16	20	26	33	- - -	- - -
200	*10*	13	16	20	26	33	- - -	- - -
210	*10*	13	16	20	26	33	- - -	- - -
220	*10*	13	17	20	27	33	- - -	- - -
230	*10*	13	17	20	27	33	- - -	- - -
240	*10*	13	17	20	27	33	- - -	- - -
250	*10*	13	17	20	27	33	- - -	- - -
260	*10*	13	17	20	27	34	- - -	- - -
270	*10*	14	17	20	27	34	- - -	- - -
280	*10*	14	17	20	27	34	- - -	- - -
290	*10*	14	17	20	27	34	- - -	- - -
300	*10*	14	17	20	27	34	- - -	- - -
310	*10*	14	17	20	27	34	- - -	- - -
320	*10*	14	17	20	27	34	- - -	- - -
330	*10*	14	17	21	27	34	- - -	- - -
340	*10*	*14*	*17*	*21*	*27*	*34*	- - -	- - -
350	*10*	*14*	*17*	*21*	*27*	*34*	- - -	- - -
360	*10*	*14*	*17*	*21*	*27*	*34*	- - -	- - -
370	*10*	*14*	*17*	*21*	*27*	*34*	- - -	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 400°C							

Section factor (m^{-1})	Classification of Fire Resistance						450ºC	
	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*12*	*14*	*20*	*25*	*36*	- - -
70	*10*	*10*	12	15	20	26	37	- - -
75	*10*	*10*	12	15	21	26	38	- - -
80	*10*	*10*	12	15	21	27	38	- - -
85	*10*	*10*	13	16	21	27	39	- - -
90	*10*	*10*	13	16	22	28	39	- - -
95	*10*	*10*	13	16	22	28	40	- - -
100	*10*	*10*	13	16	22	28	40	- - -
110	*10*	11	14	17	23	29	41	- - -
120	*10*	11	14	17	23	29	41	- - -
130	*10*	11	14	17	23	30	42	- - -
140	*10*	11	15	18	24	30	42	- - -
150	*10*	12	15	18	24	30	43	- - -
160	*10*	12	15	18	24	31	43	- - -
170	*10*	12	15	18	24	31	43	- - -
180	*10*	12	15	18	25	31	*44*	- - -
190	*10*	12	15	18	25	31	*44*	- - -
200	*10*	12	15	19	25	31	*44*	- - -
210	*10*	12	15	19	25	31	*44*	- - -
220	*10*	12	16	19	25	32	*44*	- - -
230	*10*	12	16	19	25	32	*45*	- - -
240	*10*	13	16	19	25	32	*45*	- - -
250	*10*	13	16	19	26	32	*45*	- - -
260	*10*	13	16	19	26	32	*45*	- - -
270	*10*	13	16	19	26	32	*45*	- - -
280	*10*	13	16	19	26	32	*45*	- - -
290	*10*	13	16	19	26	32	*45*	- - -
300	*10*	13	16	19	26	32	*45*	- - -
310	*10*	13	16	19	26	33	- - -	- - -
320	*10*	13	16	19	26	33	- - -	- - -
330	*10*	13	16	20	26	33	- - -	- - -
340	*10*	*13*	*16*	*20*	*26*	*33*	- - -	- - -
350	*10*	*13*	*16*	*20*	*26*	*33*	- - -	- - -
360	*10*	*13*	*16*	*20*	*26*	*33*	- - -	- - -
370	*10*	*13*	*16*	*20*	*26*	*33*	- - -	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 450ºC							

Section factor (m^{-1})	Classification of Fire Resistance						500ºC	
	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*10*	*13*	*18*	*23*	*34*	*44*
70	*10*	*10*	*10*	13	19	24	35	*45*
75	*10*	*10*	11	13	19	24	35	- - -
80	*10*	*10*	11	14	19	25	36	- - -
85	*10*	*10*	11	14	20	25	36	- - -
90	*10*	*10*	12	15	20	26	37	- - -
95	*10*	*10*	12	15	20	26	37	- - -
100	*10*	*10*	12	15	21	26	38	- - -
110	*10*	*10*	13	15	21	27	39	- - -
120	*10*	*10*	13	16	22	27	39	- - -
130	*10*	*10*	13	16	22	28	40	- - -
140	*10*	*10*	13	16	22	28	40	- - -
150	*10*	11	14	17	23	29	41	- - -
160	*10*	11	14	17	23	29	41	- - -
170	*10*	11	14	17	23	29	41	- - -
180	*10*	11	14	17	23	29	42	- - -
190	*10*	11	14	17	24	30	42	- - -
200	*10*	11	14	18	24	30	42	- - -
210	*10*	11	15	18	24	30	42	- - -
220	*10*	12	15	18	24	30	43	- - -
230	*10*	12	15	18	24	30	43	- - -
240	*10*	12	15	18	24	30	43	- - -
250	*10*	12	15	18	24	31	43	- - -
260	*10*	12	15	18	24	31	43	- - -
270	*10*	12	15	18	25	31	43	- - -
280	*10*	12	15	18	25	31	43	- - -
290	*10*	12	15	18	25	31	44	- - -
300	*10*	12	15	18	25	31	44	- - -
310	*10*	12	15	19	25	31	44	- - -
320	*10*	12	15	19	25	31	44	- - -
330	*10*	12	15	19	25	31	44	- - -
340	*10*	*12*	*16*	*19*	*25*	*31*	*44*	- - -
350	*10*	*12*	*16*	*19*	*25*	*31*	*44*	- - -
360	*10*	*12*	*16*	*19*	*25*	*32*	*44*	- - -
370	*10*	*12*	*16*	*19*	*25*	*32*	*44*	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 500ºC							

Section factor (m^{-1})	Classification of Fire Resistance						550ºC	
	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*10*	*11*	*16*	*21*	*31*	*43*
70	*10*	*10*	*10*	12	17	22	32	43
75	*10*	*10*	*10*	12	17	23	33	43
80	*10*	*10*	*10*	13	18	24	34	44
85	*10*	*10*	*10*	13	18	24	34	45
90	*10*	*10*	11	13	19	24	35	45
95	*10*	*10*	11	14	19	24	35	- - -
100	*10*	*10*	11	14	19	25	36	- - -
110	*10*	*10*	11	14	20	25	36	- - -
120	*10*	*10*	12	15	20	26	37	- - -
130	*10*	*10*	12	15	21	26	38	- - -
140	*10*	*10*	12	15	21	27	38	- - -
150	*10*	*10*	13	16	21	27	39	- - -
160	*10*	*10*	13	16	22	27	39	- - -
170	*10*	*10*	13	16	22	28	39	- - -
180	*10*	*10*	13	16	22	28	40	- - -
190	*10*	*10*	13	16	22	28	40	- - -
200	*10*	11	14	17	22	28	40	- - -
210	*10*	11	14	17	23	29	41	- - -
220	*10*	11	14	17	23	29	41	- - -
230	*10*	11	14	17	23	29	41	- - -
240	*10*	11	14	17	23	29	41	- - -
250	*10*	11	14	17	23	29	41	- - -
260	*10*	11	14	17	23	29	42	- - -
270	*10*	11	14	17	23	30	42	- - -
280	*10*	11	14	17	24	30	42	- - -
290	*10*	11	14	18	24	30	42	- - -
300	*10*	11	15	18	24	30	42	- - -
310	*10*	12	15	18	24	30	42	- - -
320	*10*	12	15	18	24	30	42	- - -
330	*10*	12	15	18	24	30	42	- - -
340	*10*	*12*	*15*	*18*	*24*	*30*	*43*	- - -
350	*10*	*12*	*15*	*18*	*24*	*30*	*43*	- - -
360	*10*	*12*	*15*	*18*	*24*	*30*	*43*	- - -
370	*10*	*12*	*15*	*18*	*24*	*30*	*43*	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 550ºC							

Section factor (m^{-1})	Classification of Fire Resistance						600ºC	
	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*10*	*10*	*15*	*20*	*29*	*39*
70	*10*	*10*	*10*	*10*	15	20	30	40
75	*10*	*10*	*10*	11	16	21	31	41
80	*10*	*10*	*10*	11	16	21	31	42
85	*10*	*10*	*10*	12	17	22	32	42
90	*10*	*10*	*10*	12	17	22	33	43
95	*10*	*10*	*10*	12	18	23	33	44
100	*10*	*10*	*10*	13	18	23	34	44
110	*10*	*10*	*10*	13	18	24	34	45
120	*10*	*10*	11	14	19	24	35	- - -
130	*10*	*10*	11	14	19	25	36	- - -
140	*10*	*10*	12	14	20	25	36	- - -
150	*10*	*10*	12	15	20	26	37	- - -
160	*10*	*10*	12	15	20	26	37	- - -
170	*10*	*10*	12	15	21	26	38	- - -
180	*10*	*10*	12	15	21	27	38	- - -
190	*10*	*10*	13	15	21	27	38	- - -
200	*10*	*10*	13	16	21	27	39	- - -
210	*10*	*10*	13	16	22	27	39	- - -
220	*10*	*10*	13	16	22	28	39	- - -
230	*10*	*10*	13	16	22	28	39	- - -
240	*10*	*10*	13	16	22	28	40	- - -
250	*10*	*10*	13	16	22	28	40	- - -
260	*10*	11	13	16	22	28	40	- - -
270	*10*	11	14	17	22	28	40	- - -
280	*10*	11	14	17	23	28	40	- - -
290	*10*	11	14	17	23	29	40	- - -
300	*10*	11	14	17	23	29	41	- - -
310	*10*	11	14	17	23	29	41	- - -
320	*10*	11	14	17	23	29	41	- - -
330	*10*	11	14	17	23	29	41	- - -
340	*10*	*11*	*14*	*17*	*23*	*29*	*41*	- - -
350	*10*	*11*	*14*	*17*	*23*	*29*	*41*	- - -
360	*10*	*11*	*14*	*17*	*23*	*29*	*41*	- - -
370	*10*	*11*	*14*	*17*	*23*	*29*	*41*	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 600ºC							

Section factor (m^{-1})	Classification of Fire Resistance					650ºC		
	R15	R30	R45	R60	R90	R120	R180	R240
≤ 65	*10*	*10*	*10*	*10*	*13*	*18*	*27*	*25*
70	*10*	*10*	*10*	*10*	14	19	28	36
75	*10*	*10*	*10*	*10*	15	19	29	37
80	*10*	*10*	*10*	*10*	15	20	30	38
85	*10*	*10*	*10*	11	16	20	30	39
90	*10*	*10*	*10*	11	16	21	31	41
95	*10*	*10*	*10*	11	16	21	31	41
100	*10*	*10*	*10*	12	17	22	32	42
110	*10*	*10*	*10*	12	17	22	33	43
120	*10*	*10*	*10*	13	18	23	33	44
130	*10*	*10*	*10*	13	18	24	34	45
140	*10*	*10*	11	13	19	24	35	45
150	*10*	*10*	11	14	19	24	35	- - -
160	*10*	*10*	11	14	19	25	36	- - -
170	*10*	*10*	11	14	20	25	36	- - -
180	*10*	*10*	12	14	20	25	36	- - -
190	*10*	*10*	12	15	20	26	37	- - -
200	*10*	*10*	12	15	20	26	37	- - -
210	*10*	*10*	12	15	21	26	37	- - -
220	*10*	*10*	12	15	21	26	38	- - -
230	*10*	*10*	12	15	21	27	38	- - -
240	*10*	*10*	13	15	21	27	38	- - -
250	*10*	*10*	13	15	21	27	38	- - -
260	*10*	*10*	13	16	21	27	38	- - -
270	*10*	*10*	13	16	21	27	39	- - -
280	*10*	*10*	13	16	22	27	39	- - -
290	*10*	*10*	13	16	22	27	39	- - -
300	*10*	*10*	13	16	22	28	39	- - -
310	*10*	*10*	13	16	22	28	39	- - -
320	*10*	*10*	13	16	22	28	39	- - -
330	*10*	*10*	13	16	22	28	39	- - -
340	*10*	*10*	*13*	*16*	*22*	*28*	*40*	- - -
350	*10*	*11*	*13*	*16*	*22*	*28*	*40*	- - -
360	*10*	*11*	*13*	*16*	*22*	*28*	*40*	- - -
370	*10*	*11*	*14*	*16*	*22*	*28*	*40*	- - -
	Minimum thickness (mm) of product to keep the profile temperature below 650ºC							

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

- Section Factor between 65 m^{-1} and 370 m^{-1}
- Protection thicknesses assessed between 10 mm and 45 mm.
- Critical temperature of 650 ºC

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

- "I" and "H" section profiles
- Those profiles of different type of section to the previous ones must be assessed expressly, according to the indications shown on ANNEX B of the ENV 13381-4:2005.
- Other grades of steel in accordance to EN 10025 and EN 10113
- Columns and beams with 3 or 4 faces exposed.