



The Catalonia
Institute of Construction
Technology

Wellington 19
ES-08018 Barcelona
Tel. +34 93 309 34 04
qualprod@itec.cat
itec.cat



European Technical Assessment

ETA 13/0221
of 16.02.2021



General part

Technical Assessment Body issuing the ETA: ITeC

ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment).

Trade name of the construction product

Igniplaster®

Product family to which the construction product belongs

Rendering intended for fire resisting applications.

Manufacturer

PROMAT IBÉRICA SA
C/Velázquez 47, 6º izquierda
ES-28001 Madrid
Spain

Manufacturing plant(s)

According to Annex N kept by ITeC.

This European Technical Assessment contains

24 pages including 3 annexes which form an integral part of this assessment

and

Annex N, which contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.

This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of

European Assessment Document EAD 350140-00-1106.

This version replaces

ETA 13/0221, issued on 19.04.2018

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es)).

Specific parts of the European Technical Assessment

1 Technical description of the product

Igniplaster® is a wet-mix spray-applied fire protective rendering made of lightweight expanded perlite and vermiculite aggregates, additives and inorganic hydraulic binders included as part of the dry mix.

The rendering considered in this ETA may require additional components for its installation, as detailed in the annexes of this ETA (ETA under option 3 as described in the scope of EAD 350140-00-1106).

Properties of the applied rendering such as thickness range, density, adhesion values, etc., are described in Annex 2 and Annex 3.

2 Specification of the intended use(s) in accordance with the applicable EAD

Igniplaster® is intended for the fire protection uses as described in table 1, which also shows the related environmental use conditions.

Table 1: Intended use categories related to the protected element and the environmental conditions.

Fire protection uses		Environmental conditions
EAD 350140-00-1106 reference	Element intended to be protected	EAD 350140-00-1106 reference
Type 3	Loadbearing concrete elements	Type Z ₂
Type 4	Loadbearing steel elements	

The environmental use categories are specified in EAD 350140-00-1106, section 1.2.3:

- Type Z₂: internal conditions with temperature of at least 0 °C and humidity lower than 85 % RH.

The provisions made in this ETA are based on a working life of Igniplaster® of at least 25 years, provided that the conditions laid down in the manufacturer's instructions for the installation, use and maintenance are met. These provisions are based upon the current state of the art and the available knowledge and experience.

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

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

3.1 Performance of the product

The assessment of the Igniplaster® was performed following EAD 350140-00-1106.

Table 2: Performance of Igniplaster®.

Product: Igniplaster®		Intended use: Fire resisting applications
Basic requirement	Essential characteristic	Performance
BWR 2 Safety in case of fire	Reaction to fire	A1
	Resistance to fire	See Annex 2 and Annex 3
	Durability	Type Z ₂
BWR 4 Safety and accessibility in use	Adhesion (bond strength)	See 3.2.4, Annex 2 and Annex 3

The rest of characteristics included in EAD 350140-00-1106 have not been assessed in this ETA.

3.2 Methods used for the assessment

3.2.1 Reaction to fire

The rendering Igniplaster® has a reaction to fire classification A1 according to Decision 96/603/EC as amended.

3.2.2 Resistance to fire

Resistance to fire performance has been determined following the test and evaluation methods given in the annexes.

3.2.3 Durability

Durability of the rendering has been assessed according to EAD 350140-00-1106, section 2.2.12, in relation to its fire protective intended uses as defined in table 1.

3.2.4 Adhesion (bond strength)

Adhesion (bond strength) has been determined in accordance with EAD 350140-00-1106, section 2.2.7, and EGOLF EA 05¹. The adhesion of the rendering depends on the installed thickness and the preparation of the substrate. Bond strength guidance values of the rendering and the conditions under which they were achieved are given in Annex 2 and Annex 3.

¹ EGOLF EA 05 (SM5:1999): Fire testing. Method for the measurement of bonding properties of fire protection materials applied to steel, concrete and steel/concrete composite structures.

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

According to the Decision 1999/454/EC of the European Commission, the system of AVCP (see EC Delegated Regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table applies.

Table 3: AVCP System.

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire protective products	For fire compartmentation and/or fire protection or fire performance	Any	1

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

All the necessary technical details for the implementation of the AVCP system are laid down in the Control Plan deposited with the ITeC and agreed in accordance with EAD 350140-00-1106, section 3.

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

The factory production control operated by the manufacturer shall be in accordance with the above-mentioned Control Plan.

Issued in Barcelona on 16 February 2021

by the Catalonia Institute of Construction Technology.



Ferran Bermejo Nualart
Technical Director, ITeC

ANNEX 1. Resistance to fire performance and installation provisions

A.1.1 Overview of the assessed resistance to fire performance

The assessed constructive elements fire protected with Igniplaster® are shown in table A.1.1.

Table A.1.1: Fire protected constructive elements.

Intended use according to EAD		Test standard	Installation details
Type 3	Loadbearing concrete elements	EN 13381-3 ²	Annex 2
Type 4	Loadbearing steel elements	EN 13381-4 ³	Annex 3

A.1.2 Installation provisions related to the elements protected with Igniplaster®

The installation should be carried out in accordance with the manufacturer's instructions and the provisions given in this ETA.

The product is intended for environmental use categories Type Z₂. Special provisions following manufacturer's instructions shall be taken for temporary protection of the rendering exposed to outdoor conditions during construction.

Before application the substrate should be inspected and prepared. Surfaces to be sprayed shall be free from oil, grease, primers, sealing agents or of any other substance that will impair adhesion. If dirt is detected on the substrate, it is recommended to clean the substrate by spraying water with a hose.

Clips, hangers, supports, sleeves and other attachments to the substrate can be placed by others prior or after the application of Igniplaster®. Ducts, piping, conduits or other suspended equipment can be installed after the application of Igniplaster®, in which case later inspection will be required and, when necessary, reparation of the rendering.

A.1.3 Verifications on site

The thickness should be measured at sufficient points to determine the mean and minimum thickness. A suitable method for thickness measurement is given in EAD 350140-00-1106, section 2.3.4.

The density of the hardened rendering should be measured within the tolerances specified in the next annex.

The bond strength of the rendering to the substrate should be tested on site. A suitable method is EGOLF Agreement EA 05, which can be used as a base for the site tests. The person responsible for the works will decide on the adequacy of the site tests results taking into account the reference values given in the next annex. For their acceptability, the recommendations given in EAD, section G.4, or other existing criteria can be applied, under the responsibility of the person responsible for works.

² EN 13381-3 Test methods for determining the contribution to the fire resistance of structural members. Part 3: Applied protection to concrete members (2015).

³ EN 13381-4 Test methods for determining the contribution to the fire resistance of structural members. Part 4: Applied passive protection to steel members (2013).

ANNEX 2. Specification and assessment of fire protection of loadbearing concrete slabs and walls protected by Igniplaster® (intended use Type 3)

A.2.1 Classification

The constructive elements described in this annex have been tested and assessed according to EN 13381-3 and classified in accordance with EN 13501-2.

The equivalent thickness of concrete and the insulation performance are given in section A.2.3.

A.2.2 Installation requirements

The system installation should be carried out in accordance with the provisions in A.1.2 and the following specification.

A.2.2.1 Supporting structural element

Igniplaster® can be applied on concrete slabs exposed to fire from one side, both in horizontal (floors) and vertical (walls) orientation. Specification of the supporting structural element is given in table A.2.1.

Table A.2.1: Specification of the concrete structural element.

Element	Characteristics	Mounting and fixing
Load bearing concrete slab or wall	Thickness of the slab/wall ≥ 120 mm Density: $2330 \text{ kg/m}^3 \pm 15 \%$ Compressive strength $\geq 30 \text{ N/mm}^2$ Made with any type of aggregate	Reinforced concrete. Concrete released from the mould without agent. Surface free of oil, grease, dust, etc.

A.2.2.2 Fire protective rendering

Igniplaster® is directly applied on the concrete structure in one coat of regular thickness to reach the requested thickness according to this annex. Hairline cracks in the dry rendering are not accepted.

Specification of the fire protective rendering is given in table A.2.2.

Table A.2.2. Specification of the applied rendering.

Product	Characteristics	Mounting and fixing
Igniplaster® (Hardened rendering)	Thickness: 8,9 mm to 18,8 mm Density: $821 \text{ kg/m}^3 \pm 15 \%$	Rendering is kept without finishing after application. Spray-applied rendering without: <ul style="list-style-type: none"> - Primer or bonding agent - Topcoat or sealing coat - Mechanical fixings or reinforcement - Additives out of dry mix

A.2.2.3 Bonding properties of Igniplaster® on concrete slabs and walls

Assessment of the bonding properties of Igniplaster®, when directly applied on concrete structures, has been carried out according to EGOLF EA 05 procedure.

The indicated values are representative of adhesive/cohesive failure at the substrate surface or within the sprayed thickness of Igniplaster®. These values are guidance values, and they do not reflect a statistical evaluation, nor minimum guaranteed values.

Table A.2.3. Tensile bond strength on concrete substrates.

Surface	Thickness of Igniplaster® (mm)	Mean tensile bond strength (MPa)	Failure mode
Concrete substrate according EGOLF EA 05	8,9	0,12	Adhesive/cohesive failure
	18,8	0,15	Adhesive/cohesive failure

A.2.3 Assessment of the fire performance of Igniplaster® on concrete slabs and walls

A.2.3.1 General

The assessment method used to assess the fire protection performance of Igniplaster® when applied on concrete elements is according to paragraph 13 of EN 13381-3.

A.2.3.2 Insulation performance

Insulation criteria were maintained for the 8,9 mm protected concrete slab over the entire test duration (183 minutes).

The maximum temperature of the 18,8 mm protected concrete slab unexposed side exceeded 180°C the initial temperature at minute 234.

A.2.3.3 Stickability performance

The stickability of Igniplaster® when applied on concrete slabs and walls is determined according to the requirements of paragraph 13.5 of EN 13381-3.

A.2.3.3.1 Stickability criteria for slab with Igniplaster® 8,9 mm

At no time the maximum recorded temperatures of the concrete exposed surface were more than 50% above the mean value of the recorded temperatures of the concrete exposed surface (no stickability failure occurs).

A.2.3.3.2 Stickability criteria for slab with Igniplaster® 18,8 mm

Between the 96th and the 276th minute the maximum recorded temperature of the concrete exposed surface was more than 50% above the mean value of the recorded temperature of the concrete exposed surface (a significant detachment was observed after the test).

A.2.3.4 Protection of concrete slabs and walls

The insulation efficiency of the 8,9 mm and 18,8 mm thicknesses protective material when applied on concrete slabs and walls as specified in table A.2.1, subject to the thermal exposure under the standard time-temperature curve as defined in clause 5.1.1 of EN 1363-1, is given in the next tables in a range of concrete temperatures within 350 °C – 650 °C.

Table A.2.4: Depth of concrete for a protection thickness of 8,9 mm according to the concrete temperature.

Duration of exposure (min)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
	Depth (mm)						
60	8	5	2	--	--	--	--
90	15	12	9	6	2	--	--
120	26	20	14	11	8	5	3
150	38	30	25	18	14	11	7
180	48	41	35	29	23	17	13

Table A.2.5: Depth of concrete for a protection thickness of 18,8 mm according to the concrete temperature.

Duration of exposure (min)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
	Depth (mm)						
90	1	--	--	--	--	--	--
120	6	3	--	--	--	--	--
150	11	8	5	2	--	--	--
180	16	13	10	8	5	2	--
210	36	24	14	12	9	7	4
240	47	38	29	18	13	10	8

A.2.3.5 Equivalent thickness of concrete

The equivalent thickness of concrete induced by the protective rendering Igniplaster® is determined according to Annex C of EN 13381-3 and given in table A.2.6.

Table A.2.6: Equivalent thickness of concrete (mm).

Component	Thickness of Igniplaster® (mm)	Duration (min)					
		30	60	90	120	180	240
Load bearing concrete slab or wall	8,9	28	31	30	28	20	--
	18,8	40	53	60	63	57	42

The equivalent thickness of concrete H_{eq} in function of the thickness of Igniplaster® is given in figures A.2.1, A.2.2, A.2.3, A.2.4 and A.2.5 for a time period of 30, 60, 90, 120 and 180 minutes respectively.

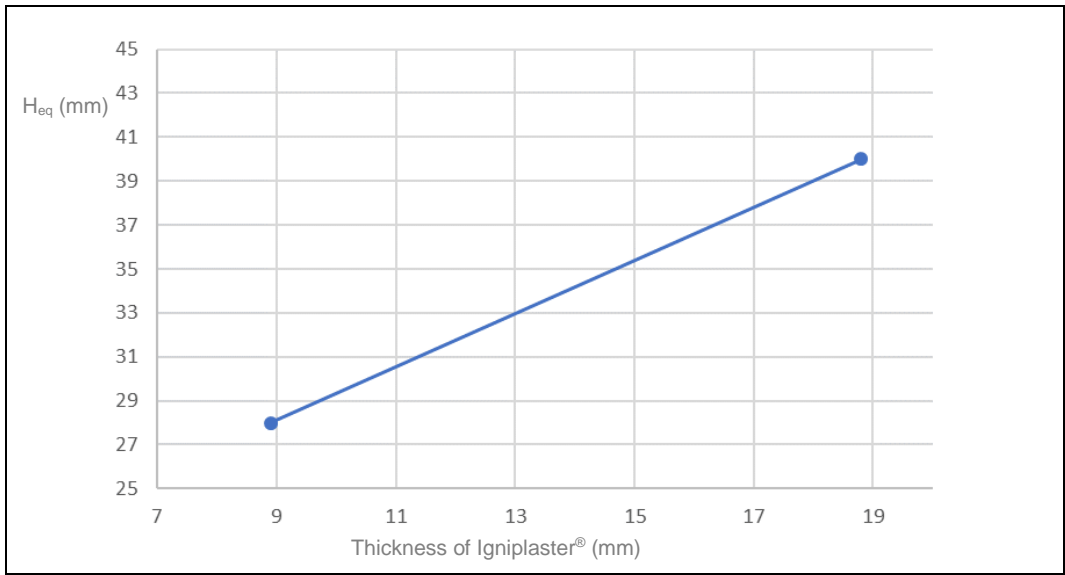


Figure A.2.1: Equivalent thickness of concrete (30 minutes).

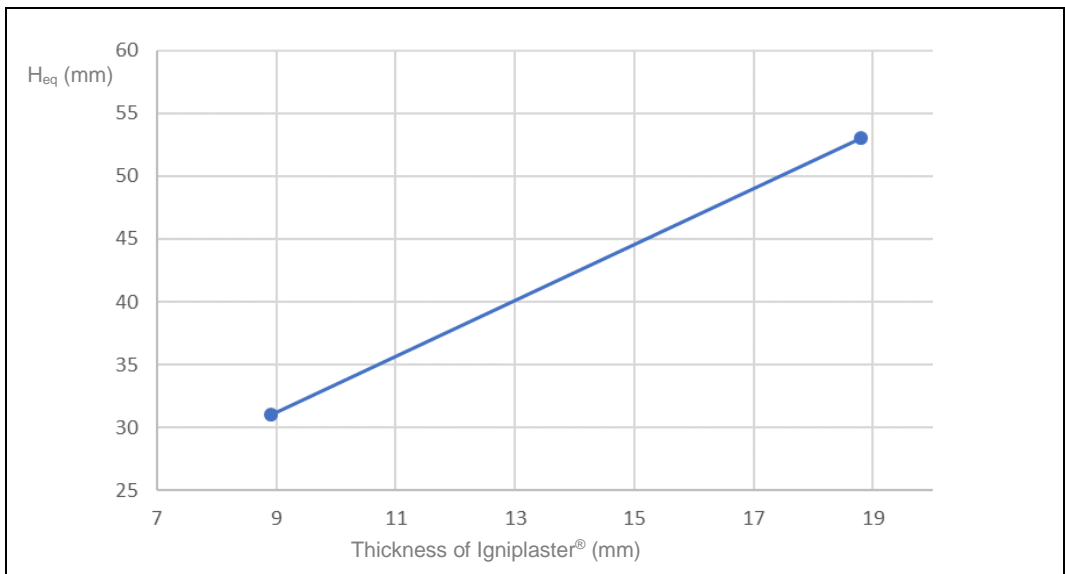


Figure A.2.2: Equivalent thickness of concrete (60 minutes).

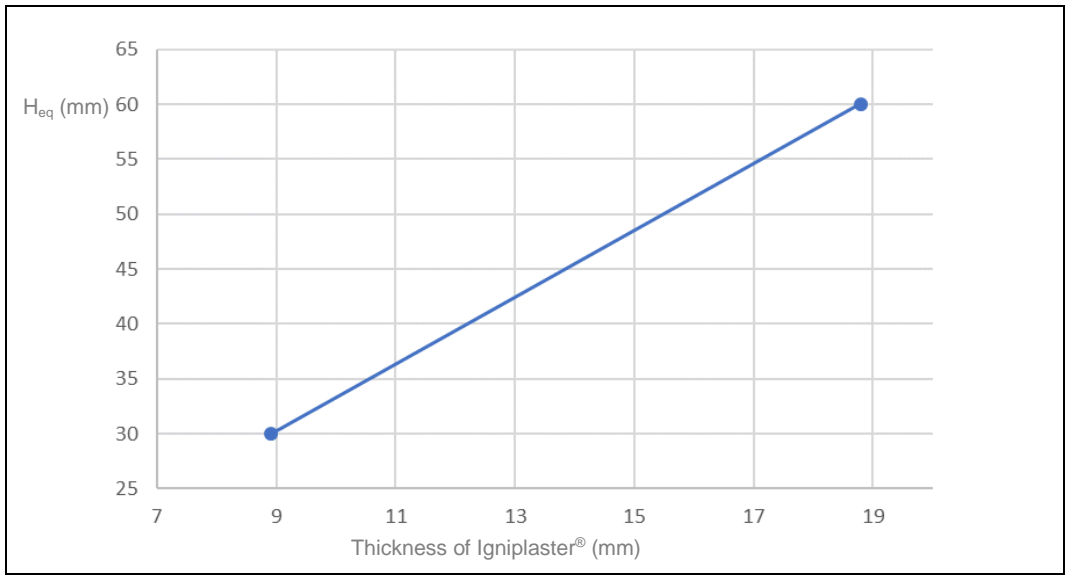


Figure A.2.3: Equivalent thickness of concrete (90 minutes).

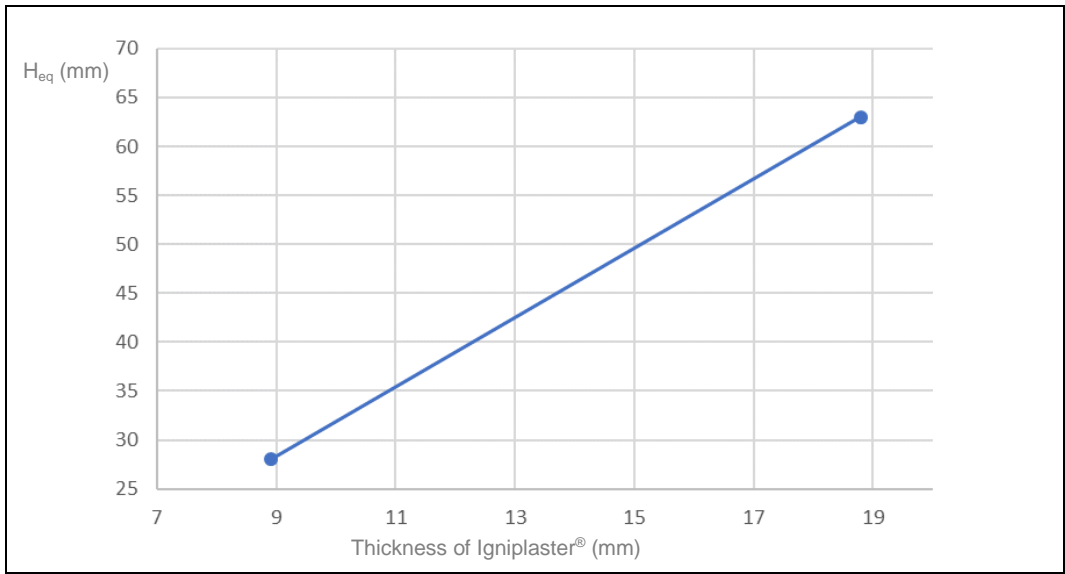


Figure A.2.4: Equivalent thickness of concrete (120 minutes).

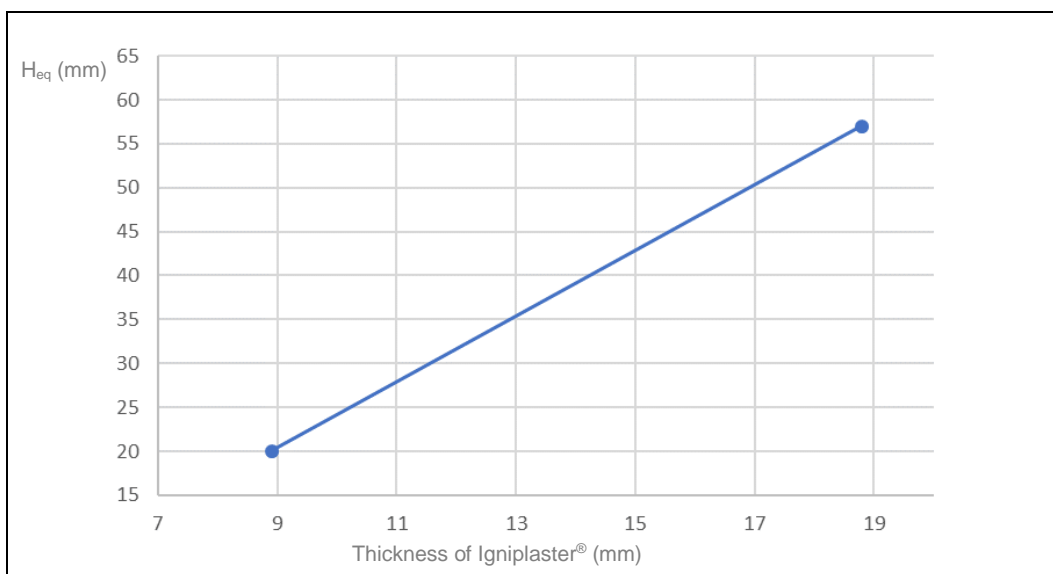


Figure A.2.5: Equivalent thickness of concrete (180 minutes).

ANNEX 3. Specification and assessment of fire protection of loadbearing steel elements protected by Igniplaster® (intended use Type 4)

A.3.1 Performance

The system described in this annex has been tested and evaluated according to EN 13381-4.

The assessment of the required thickness of Igniplaster® rendering for the relevant resistance to fire period, at the design temperature within the range of 350 °C to 550 °C and in function of the section factor of the steel element, is given in section A.3.3.

A.3.2 Installation requirements

The product installation should be carried out in accordance with the provisions in A.1.2 and the following specification.

A.3.2.1 Supporting structure

The supporting structure consists of load-bearing steel elements with the following characteristics:

- 'H' or 'I' shaped sections beam and column.
The protection thickness given for H/I sections (table A.3.3 to table A.3.12 of this ETA) also apply to steel sections of other shapes (e.g. U, L and T-sections) under consideration of the same section factor.
- Hollow beam and column sections with a protection thickness calculated according to Annex A of EN 13381-4.
- Structural steel grades (S designation) in accordance with EN 10025⁴ excluding S185.
- Section factors as given in table A.3.3 to table A.3.12 of this ETA.

Steel elements with a section factor lower than 68 m⁻¹ shall be protected with the thickness of Igniplaster® rendering given for an element with section factor equal to 68 m⁻¹.

- The maximum allowed depth of the sections will be 600 mm.
- Three-sided fire exposure for beams and four-sided fire exposure for columns.

In case of beams or columns with fewer sides exposed to fire, thickness of the rendering can be applied according to table A.3.3 to table A.3.12 under consideration of the section factor calculated for the relevant case.

A.3.2.2 Surface of steel elements

Igniplaster® shall be applied on the steel coated with an anticorrosive alkyd primer.

The steel sections must be blast cleaned to EN ISO 8501-1⁵ SA2½ or equivalent, before the primer application. The surface shall be bare, clean, dry and free of dust.

⁴ EN 10025-1 to 6 Hot rolled products of structural steels.

⁵ EN ISO 8501-1 Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coating.

A.3.2.3 Fire protective rendering

Igniplaster® is applied on the apparent sides of the steel structural element to be protected by following their shape. Igniplaster® is sprayed according to table A.3.1 to reach the requested thickness according to this annex. Hairline cracks in the dry rendering are not accepted. Specification of the fire protective rendering is given in table A.3.1.

Table A.3.1: Specification of the applied rendering.

Product	Characteristics	Mounting and fixing
Igniplaster® (Hardened rendering)	Thickness: 12 mm to 64 mm Density: 851 kg/m ³ ± 15 %	Rendering is kept without finishing after application. For a thickness application up to 50 mm, it can be sprayed in one single layer. For a greater thickness application, it is sprayed in two layers. Spray-applied rendering without: <ul style="list-style-type: none"> - Bonding agent - Topcoat or sealing coat - Mechanical fixings or reinforcement - Additives out of dry mix

A.3.2.4 Bonding properties of Igniplaster® on steel elements

Assessment of the bonding properties of Igniplaster®, when applied on primed steel structures, has been carried out according to EGOLF EA 05 procedure.

The indicated values are representative of adhesive or cohesive failure within the sprayed thickness of Igniplaster®. These values are guidance values, and they do not reflect a statistical evaluation, nor minimum guaranteed values.

Table A.3.2: Tensile bond strength on steel substrates.

Surface	Thickness of Igniplaster® (mm)	Mean tensile bond strength (MPa)	Failure mode
Steel substrate according EGOLF EA 05	10	0,07	Adhesive/Cohesive
	60	0,09	Cohesive

A.3.3 Assessment of the fire performance of Igniplaster® on steel structures

The assessment of the fire resistance performance of Igniplaster® when applied on steel structures has been done according to EN 13381-4, Annex E.5 Numerical Regression Analysis.

The resistance to fire performance of I/H columns is given in tables A.3.3 to A.3.7.

The resistance to fire performance of I/H beams is given in tables A.3.8 to A.3.12.

Table A.3.3: Resistance to fire of I/H columns for design steel temperature 350 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period								
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
	Igniplaster® thickness (mm) for a design temperature of 350 °C								
68	12	12	15	21	33	45	57	-	-
70	12	12	16	22	33	45	57	-	-
75	12	12	17	22	34	45	57	-	-
80	12	12	18	23	34	45	57	-	-
85	12	13	18	24	34	45	57	-	-
90	12	13	19	24	35	45	57	-	-
95	12	14	19	24	35	45	57	-	-
100	12	15	20	25	35	45	57	-	-
105	12	15	20	25	35	45	57	-	-
110	12	15	20	25	35	45	57	-	-
115	12	16	21	26	35	45	57	-	-
120	12	16	21	26	35	45	57	-	-
125	12	16	21	26	36	45	57	-	-
130	12	17	21	26	36	45	57	-	-
135	12	17	22	26	36	45	57	-	-
140	12	17	22	26	36	45	57	-	-
145	13	17	22	27	36	45	57	-	-
150	13	17	22	27	36	45	57	-	-
155	13	18	22	27	36	45	57	-	-
160	13	18	22	27	36	45	57	-	-
165	13	18	22	27	36	45	57	-	-
170	14	18	23	27	36	45	57	-	-
175	14	18	23	27	36	45	57	-	-
180	14	18	23	27	36	45	57	-	-
185	14	18	23	27	36	45	57	-	-
190	14	19	23	27	36	45	57	-	-
195	14	19	23	27	36	45	57	-	-
200	14	19	23	28	36	45	57	-	-
205	14	19	23	28	36	45	57	-	-
210	14	19	23	28	36	45	57	-	-
215	15	19	23	28	36	45	57	-	-
220	15	19	23	28	36	45	57	-	-
225	15	19	23	28	36	45	57	-	-
230	15	19	23	28	37	45	57	-	-
235	15	19	24	28	37	45	57	-	-
240	15	19	24	28	37	45	57	-	-
245	15	19	24	28	37	45	57	-	-
250	15	19	24	28	37	45	57	-	-
255	15	19	24	28	37	45	57	-	-
260	15	20	24	28	37	45	57	-	-
265	15	20	24	28	37	45	57	-	-
270	15	20	24	28	37	45	57	-	-
275	15	20	24	28	37	45	57	-	-
280	15	20	24	28	37	45	57	-	-
285	15	20	24	28	37	45	57	-	-
290	16	20	24	28	37	45	57	-	-
295	16	20	24	28	37	45	57	-	-
300	16	20	24	28	37	45	57	-	-
305	16	20	24	28	37	45	57	-	-
310	16	20	24	28	37	45	57	-	-
315	16	20	24	28	37	45	57	-	-
320	16	20	24	28	37	45	57	-	-
325	16	20	24	28	37	45	57	-	-
330	16	20	24	28	37	45	57	-	-
335	16	20	24	28	37	45	57	-	-
340	16	20	24	28	37	45	57	-	-
345	16	20	24	28	37	45	57	-	-
350	16	20	24	29	37	45	57	-	-
351	16	20	24	29	37	45	57	-	-

Table A.3.4: Resistance to fire of I/H columns for design steel temperature 400 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period								
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	
	Igniplaster® thickness (mm) for a design temperature of 400 °C								
68	12	12	13	19	29	39	50	60	-
70	12	12	14	19	29	40	50	60	-
75	12	12	15	20	30	40	50	60	-
80	12	12	16	21	30	40	50	60	-
85	12	12	16	21	31	41	50	60	-
90	12	12	17	22	31	41	50	60	-
95	12	13	17	22	32	41	51	60	-
100	12	13	18	23	32	41	51	60	-
105	12	14	18	23	32	41	51	60	-
110	12	14	19	23	32	42	51	60	-
115	12	15	19	24	33	42	51	60	-
120	12	15	19	24	33	42	51	60	-
125	12	15	20	24	33	42	51	60	-
130	12	15	20	24	33	42	51	60	-
135	12	16	20	25	33	42	51	60	-
140	12	16	20	25	33	42	51	60	-
145	12	16	20	25	34	42	51	60	-
150	12	16	21	25	34	42	51	60	-
155	12	16	21	25	34	42	51	60	-
160	12	17	21	25	34	43	51	60	-
165	12	17	21	25	34	43	51	60	-
170	13	17	21	26	34	43	51	60	-
175	13	17	21	26	34	43	51	60	-
180	13	17	21	26	34	43	51	60	-
185	13	17	22	26	34	43	51	60	-
190	13	17	22	26	34	43	51	60	-
195	13	18	22	26	34	43	51	60	-
200	13	18	22	26	35	43	51	60	-
205	14	18	22	26	35	43	51	60	-
210	14	18	22	26	35	43	51	60	-
215	14	18	22	26	35	43	51	60	-
220	14	18	22	26	35	43	51	60	-
225	14	18	22	26	35	43	51	60	-
230	14	18	22	26	35	43	51	60	-
235	14	18	22	27	35	43	51	60	-
240	14	18	22	27	35	43	51	60	-
245	14	18	23	27	35	43	51	60	-
250	14	18	23	27	35	43	51	60	-
255	14	18	23	27	35	43	52	60	-
260	14	19	23	27	35	43	52	60	-
265	14	19	23	27	35	43	52	60	-
270	15	19	23	27	35	43	52	60	-
275	15	19	23	27	35	43	52	60	-
280	15	19	23	27	35	43	52	60	-
285	15	19	23	27	35	43	52	60	-
290	15	19	23	27	35	43	52	60	-
295	15	19	23	27	35	43	52	60	-
300	15	19	23	27	35	43	52	60	-
305	15	19	23	27	35	43	52	60	-
310	15	19	23	27	35	43	52	60	-
315	15	19	23	27	35	43	52	60	-
320	15	19	23	27	35	43	52	60	-
325	15	19	23	27	35	43	52	60	-
330	15	19	23	27	35	43	52	60	-
335	15	19	23	27	35	44	52	60	-
340	15	19	23	27	35	44	52	60	-
345	15	19	23	27	35	44	52	60	-
350	15	19	23	27	35	44	52	60	-
351	15	19	23	27	35	44	52	60	-

Table A.3.5: Resistance to fire of I/H columns for design steel temperature 450 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period								
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
	Igneplaster® thickness (mm) for a design temperature of 450 °C								
68	12	12	12	17	26	35	44	54	-
70	12	12	12	17	26	35	45	54	-
75	12	12	13	18	27	36	45	54	-
80	12	12	14	19	28	37	45	54	-
85	12	12	15	19	28	37	46	55	-
90	12	12	15	20	29	37	46	55	-
95	12	12	16	20	29	38	46	55	-
100	12	12	16	21	29	38	47	55	-
105	12	13	17	21	30	38	47	56	-
110	12	13	17	22	30	39	47	56	-
115	12	13	18	22	30	39	47	56	-
120	12	14	18	22	31	39	47	56	-
125	12	14	18	22	31	39	48	56	-
130	12	14	19	23	31	39	48	56	-
135	12	15	19	23	31	40	48	56	-
140	12	15	19	23	31	40	48	56	-
145	12	15	19	23	32	40	48	56	-
150	12	15	19	24	32	40	48	56	-
155	12	15	20	24	32	40	48	57	-
160	12	16	20	24	32	40	48	57	-
165	12	16	20	24	32	40	49	57	-
170	12	16	20	24	32	40	49	57	-
175	12	16	20	24	32	41	49	57	-
180	12	16	20	24	32	41	49	57	-
185	12	16	20	24	33	41	49	57	-
190	12	16	21	25	33	41	49	57	-
195	13	17	21	25	33	41	49	57	-
200	13	17	21	25	33	41	49	57	-
205	13	17	21	25	33	41	49	57	-
210	13	17	21	25	33	41	49	57	-
215	13	17	21	25	33	41	49	57	-
220	13	17	21	25	33	41	49	57	-
225	13	17	21	25	33	41	49	57	-
230	13	17	21	25	33	41	49	57	-
235	13	17	21	25	33	41	49	57	-
240	13	17	21	25	33	41	49	57	-
245	13	17	21	25	33	41	49	57	-
250	14	18	22	25	33	41	49	57	-
255	14	18	22	26	34	41	49	57	-
260	14	18	22	26	34	41	49	57	-
265	14	18	22	26	34	42	49	57	-
270	14	18	22	26	34	42	49	57	-
275	14	18	22	26	34	42	50	57	-
280	14	18	22	26	34	42	50	57	-
285	14	18	22	26	34	42	50	57	-
290	14	18	22	26	34	42	50	57	-
295	14	18	22	26	34	42	50	58	-
300	14	18	22	26	34	42	50	58	-
305	14	18	22	26	34	42	50	58	-
310	14	18	22	26	34	42	50	58	-
315	14	18	22	26	34	42	50	58	-
320	14	18	22	26	34	42	50	58	-
325	14	18	22	26	34	42	50	58	-
330	14	18	22	26	34	42	50	58	-
335	14	18	22	26	34	42	50	58	-
340	14	18	22	26	34	42	50	58	-
345	15	18	22	26	34	42	50	58	-
350	15	18	22	26	34	42	50	58	-
351	15	18	22	26	34	42	50	58	-

Table A.3.6: Resistance to fire of I/H columns for design steel temperature 500 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period								
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
	Igneplaster® thickness (mm) for a design temperature of 500 °C								
68	12	12	12	15	23	32	40	48	-
70	12	12	12	15	24	32	40	48	-
75	12	12	12	16	24	33	41	49	-
80	12	12	13	17	25	33	42	50	-
85	12	12	14	18	26	34	42	50	-
90	12	12	14	18	26	34	43	51	-
95	12	12	15	19	27	35	43	51	-
100	12	12	15	19	27	35	43	51	-
105	12	12	16	20	28	36	44	52	-
110	12	12	16	20	28	36	44	52	-
115	12	12	16	20	28	36	44	52	-
120	12	13	17	21	29	37	44	52	-
125	12	13	17	21	29	37	45	53	-
130	12	13	17	21	29	37	45	53	-
135	12	14	18	22	29	37	45	53	-
140	12	14	18	22	30	37	45	53	-
145	12	14	18	22	30	38	45	53	-
150	12	14	18	22	30	38	46	53	-
155	12	15	18	22	30	38	46	54	-
160	12	15	19	23	30	38	46	54	-
165	12	15	19	23	30	38	46	54	-
170	12	15	19	23	31	38	46	54	-
175	12	15	19	23	31	39	46	54	-
180	12	15	19	23	31	39	46	54	-
185	12	15	19	23	31	39	46	54	-
190	12	16	19	23	31	39	47	54	-
195	12	16	20	23	31	39	47	54	-
200	12	16	20	24	31	39	47	54	-
205	12	16	20	24	31	39	47	55	-
210	12	16	20	24	31	39	47	55	-
215	12	16	20	24	32	39	47	55	-
220	12	16	20	24	32	39	47	55	-
225	12	16	20	24	32	39	47	55	-
230	13	16	20	24	32	39	47	55	-
235	13	16	20	24	32	40	47	55	-
240	13	17	20	24	32	40	47	55	-
245	13	17	20	24	32	40	47	55	-
250	13	17	21	24	32	40	47	55	-
255	13	17	21	24	32	40	47	55	-
260	13	17	21	25	32	40	48	55	-
265	13	17	21	25	32	40	48	55	-
270	13	17	21	25	32	40	48	55	-
275	13	17	21	25	32	40	48	55	-
280	13	17	21	25	32	40	48	55	-
285	13	17	21	25	32	40	48	55	-
290	13	17	21	25	32	40	48	55	-
295	13	17	21	25	33	40	48	55	-
300	13	17	21	25	33	40	48	55	-
305	14	17	21	25	33	40	48	55	-
310	14	17	21	25	33	40	48	56	-
315	14	17	21	25	33	40	48	56	-
320	14	17	21	25	33	40	48	56	-
325	14	18	21	25	33	40	48	56	-
330	14	18	21	25	33	40	48	56	-
335	14	18	21	25	33	40	48	56	-
340	14	18	21	25	33	40	48	56	-
345	14	18	21	25	33	40	48	56	-
350	14	18	22	25	33	41	48	56	-
351	14	18	22	25	33	41	48	56	-

Table A.3.7: Resistance to fire of I/H columns for design steel temperature 550 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period								
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min	240 min
	Igneplaster® thickness (mm) for a design temperature of 550 °C								
68	12	12	12	14	21	29	36	44	59
70	12	12	12	14	21	29	37	44	59
75	12	12	12	15	22	30	37	45	60
80	12	12	12	16	23	31	38	46	61
85	12	12	12	16	24	31	39	46	61
90	12	12	13	17	24	32	39	47	62
95	12	12	14	17	25	32	40	47	62
100	12	12	14	18	25	33	40	48	63
105	12	12	15	18	26	33	41	48	63
110	12	12	15	19	26	34	41	49	64
115	12	12	15	19	27	34	42	49	64
120	12	12	16	19	27	34	42	49	64
125	12	12	16	20	27	35	42	50	-
130	12	13	16	20	27	35	42	50	-
135	12	13	17	20	28	35	43	50	-
140	12	13	17	20	28	35	43	50	-
145	12	13	17	21	28	36	43	51	-
150	12	13	17	21	28	36	43	51	-
155	12	14	17	21	29	36	43	51	-
160	12	14	18	21	29	36	44	51	-
165	12	14	18	21	29	36	44	51	-
170	12	14	18	22	29	37	44	51	-
175	12	14	18	22	29	37	44	52	-
180	12	15	18	22	29	37	44	52	-
185	12	15	18	22	30	37	44	52	-
190	12	15	18	22	30	37	44	52	-
195	12	15	19	22	30	37	45	52	-
200	12	15	19	22	30	37	45	52	-
205	12	15	19	23	30	37	45	52	-
210	12	15	19	23	30	37	45	52	-
215	12	15	19	23	30	38	45	52	-
220	12	15	19	23	30	38	45	53	-
225	12	16	19	23	30	38	45	53	-
230	12	16	19	23	30	38	45	53	-
235	12	16	19	23	31	38	45	53	-
240	12	16	19	23	31	38	45	53	-
245	12	16	20	23	31	38	45	53	-
250	12	16	20	23	31	38	46	53	-
255	12	16	20	23	31	38	46	53	-
260	12	16	20	23	31	38	46	53	-
265	12	16	20	24	31	38	46	53	-
270	12	16	20	24	31	38	46	53	-
275	13	16	20	24	31	38	46	53	-
280	13	16	20	24	31	39	46	53	-
285	13	16	20	24	31	39	46	53	-
290	13	16	20	24	31	39	46	53	-
295	13	16	20	24	31	39	46	53	-
300	13	17	20	24	31	39	46	54	-
305	13	17	20	24	31	39	46	54	-
310	13	17	20	24	31	39	46	54	-
315	13	17	20	24	31	39	46	54	-
320	13	17	20	24	32	39	46	54	-
325	13	17	20	24	32	39	46	54	-
330	13	17	21	24	32	39	46	54	-
335	13	17	21	24	32	39	46	54	-
340	13	17	21	24	32	39	46	54	-
345	13	17	21	24	32	39	47	54	-
350	13	17	21	24	32	39	47	54	-
351	13	17	21	24	32	39	47	54	-

Table A.3.8: Resistance to fire of I/H beams for design steel temperature 350 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period							
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min
Igniplaster® thickness (mm) for a design temperature of 350 °C								
68	12	12	15	21	33	45	57	-
70	12	12	16	22	33	45	57	-
75	12	12	17	22	34	45	57	-
80	12	12	18	23	34	45	57	-
85	12	13	18	24	34	45	57	-
90	12	13	19	24	35	45	57	-
95	12	14	19	24	35	45	57	-
100	12	15	20	25	35	45	57	-
105	12	15	20	25	35	45	57	-
110	12	15	20	25	35	45	57	-
115	12	16	21	26	35	45	57	-
120	12	16	21	26	35	45	57	-
125	12	16	21	26	36	45	57	-
130	12	17	21	26	36	45	57	-
135	12	17	22	26	36	45	57	-
140	12	17	22	26	36	45	57	-
145	13	17	22	27	36	45	57	-
150	13	17	22	27	36	45	57	-
155	13	18	22	27	36	45	57	-
160	13	18	22	27	36	45	57	-
165	13	18	22	27	36	45	57	-
170	14	18	23	27	36	45	57	-
175	14	18	23	27	36	45	57	-
180	14	18	23	27	36	45	57	-
185	14	18	23	27	36	45	57	-
190	14	19	23	27	36	45	57	-
195	14	19	23	27	36	45	57	-
200	14	19	23	28	36	45	57	-
205	14	19	23	28	36	45	57	-
210	14	19	23	28	36	45	57	-
215	15	19	23	28	36	45	57	-
220	15	19	23	28	36	45	57	-
225	15	19	23	28	36	45	57	-
230	15	19	23	28	37	45	57	-
235	15	19	24	28	37	45	57	-
240	15	19	24	28	37	45	57	-
245	15	19	24	28	37	45	57	-
250	15	19	24	28	37	45	57	-
255	15	19	24	28	37	45	57	-
260	15	20	24	28	37	45	57	-
265	15	20	24	28	37	45	57	-
270	15	20	24	28	37	45	57	-
275	15	20	24	28	37	45	57	-
280	15	20	24	28	37	45	57	-
285	15	20	24	28	37	45	57	-
290	16	20	24	28	37	45	57	-
295	16	20	24	28	37	45	57	-
300	16	20	24	28	37	45	57	-
305	16	20	24	28	37	45	57	-
310	16	20	24	28	37	45	57	-
315	16	20	24	28	37	45	57	-
320	16	20	24	28	37	45	57	-
325	16	20	24	28	37	45	57	-
330	16	20	24	28	37	45	57	-
335	16	20	24	28	37	45	57	-
340	16	20	24	28	37	45	57	-
345	16	20	24	28	37	45	57	-
350	16	20	24	29	37	45	57	-
351	16	20	24	29	37	45	57	-

Table A.3.9: Resistance to fire of I/H beams for design steel temperature 400 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period							
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min
Igniplaster® thickness (mm) for a design temperature of 400 °C								
68	12	12	13	19	29	39	50	60
70	12	12	14	19	29	40	50	60
75	12	12	15	20	30	40	50	60
80	12	12	16	21	30	40	50	60
85	12	12	16	21	31	41	50	60
90	12	12	17	22	31	41	50	60
95	12	13	17	22	32	41	51	60
100	12	13	18	23	32	41	51	60
105	12	14	18	23	32	41	51	60
110	12	14	19	23	32	42	51	60
115	12	15	19	24	33	42	51	60
120	12	15	19	24	33	42	51	60
125	12	15	20	24	33	42	51	60
130	12	15	20	24	33	42	51	60
135	12	16	20	25	33	42	51	60
140	12	16	20	25	33	42	51	60
145	12	16	20	25	34	42	51	60
150	12	16	21	25	34	42	51	60
155	12	16	21	25	34	42	51	60
160	12	17	21	25	34	43	51	60
165	12	17	21	25	34	43	51	60
170	13	17	21	26	34	43	51	60
175	13	17	21	26	34	43	51	60
180	13	17	21	26	34	43	51	60
185	13	17	22	26	34	43	51	60
190	13	17	22	26	34	43	51	60
195	13	18	22	26	34	43	51	60
200	13	18	22	26	35	43	51	60
205	14	18	22	26	35	43	51	60
210	14	18	22	26	35	43	51	60
215	14	18	22	26	35	43	51	60
220	14	18	22	26	35	43	51	60
225	14	18	22	26	35	43	51	60
230	14	18	22	26	35	43	51	60
235	14	18	22	27	35	43	51	60
240	14	18	22	27	35	43	51	60
245	14	18	23	27	35	43	51	60
250	14	18	23	27	35	43	51	60
255	14	18	23	27	35	43	52	60
260	14	19	23	27	35	43	52	60
265	14	19	23	27	35	43	52	60
270	15	19	23	27	35	43	52	60
275	15	19	23	27	35	43	52	60
280	15	19	23	27	35	43	52	60
285	15	19	23	27	35	43	52	60
290	15	19	23	27	35	43	52	60
295	15	19	23	27	35	43	52	60
300	15	19	23	27	35	43	52	60
305	15	19	23	27	35	43	52	60
310	15	19	23	27	35	43	52	60
315	15	19	23	27	35	43	52	60
320	15	19	23	27	35	43	52	60
325	15	19	23	27	35	43	52	60
330	15	19	23	27	35	43	52	60
335	15	19	23	27	35	44	52	60
340	15	19	23	27	35	44	52	60
345	15	19	23	27	35	44	52	60
350	15	19	23	27	35	44	52	60
351	15	19	23	27	35	44	52	60

Table A.3.10: Resistance to fire of I/H beams for design steel temperature 450 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period							
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min
Igniplaster® thickness (mm) for a design temperature of 450 °C								
68	12	12	12	17	26	35	44	54
70	12	12	12	17	26	35	45	54
75	12	12	13	18	27	36	45	54
80	12	12	14	19	28	37	45	54
85	12	12	15	19	28	37	46	55
90	12	12	15	20	29	37	46	55
95	12	12	16	20	29	38	46	55
100	12	12	16	21	29	38	47	55
105	12	13	17	21	30	38	47	56
110	12	13	17	22	30	39	47	56
115	12	13	18	22	30	39	47	56
120	12	14	18	22	31	39	47	56
125	12	14	18	22	31	39	48	56
130	12	14	19	23	31	39	48	56
135	12	15	19	23	31	40	48	56
140	12	15	19	23	31	40	48	56
145	12	15	19	23	32	40	48	56
150	12	15	19	24	32	40	48	56
155	12	15	20	24	32	40	48	57
160	12	16	20	24	32	40	48	57
165	12	16	20	24	32	40	49	57
170	12	16	20	24	32	40	49	57
175	12	16	20	24	32	41	49	57
180	12	16	20	24	32	41	49	57
185	12	16	20	24	33	41	49	57
190	12	16	21	25	33	41	49	57
195	13	17	21	25	33	41	49	57
200	13	17	21	25	33	41	49	57
205	13	17	21	25	33	41	49	57
210	13	17	21	25	33	41	49	57
215	13	17	21	25	33	41	49	57
220	13	17	21	25	33	41	49	57
225	13	17	21	25	33	41	49	57
230	13	17	21	25	33	41	49	57
235	13	17	21	25	33	41	49	57
240	13	17	21	25	33	41	49	57
245	13	17	21	25	33	41	49	57
250	14	18	22	25	33	41	49	57
255	14	18	22	26	34	41	49	57
260	14	18	22	26	34	41	49	57
265	14	18	22	26	34	42	49	57
270	14	18	22	26	34	42	49	57
275	14	18	22	26	34	42	50	57
280	14	18	22	26	34	42	50	57
285	14	18	22	26	34	42	50	57
290	14	18	22	26	34	42	50	57
295	14	18	22	26	34	42	50	58
300	14	18	22	26	34	42	50	58
305	14	18	22	26	34	42	50	58
310	14	18	22	26	34	42	50	58
315	14	18	22	26	34	42	50	58
320	14	18	22	26	34	42	50	58
325	14	18	22	26	34	42	50	58
330	14	18	22	26	34	42	50	58
335	14	18	22	26	34	42	50	58
340	14	18	22	26	34	42	50	58
345	15	18	22	26	34	42	50	58
350	15	18	22	26	34	42	50	58
351	15	18	22	26	34	42	50	58

Table A.3.11: Resistance to fire of I/H beams for design steel temperature 500 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period							
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min
Igniplaster® thickness (mm) for a design temperature of 500 °C								
68	12	12	12	15	23	32	40	48
70	12	12	12	15	24	32	40	48
75	12	12	12	16	24	33	41	49
80	12	12	13	17	25	33	42	50
85	12	12	14	18	26	34	42	50
90	12	12	14	18	26	34	43	51
95	12	12	15	19	27	35	43	51
100	12	12	15	19	27	35	43	51
105	12	12	16	20	28	36	44	52
110	12	12	16	20	28	36	44	52
115	12	12	16	20	28	36	44	52
120	12	13	17	21	29	37	44	52
125	12	13	17	21	29	37	45	53
130	12	13	17	21	29	37	45	53
135	12	14	18	22	29	37	45	53
140	12	14	18	22	30	37	45	53
145	12	14	18	22	30	38	45	53
150	12	14	18	22	30	38	46	53
155	12	15	18	22	30	38	46	54
160	12	15	19	23	30	38	46	54
165	12	15	19	23	30	38	46	54
170	12	15	19	23	31	38	46	54
175	12	15	19	23	31	39	46	54
180	12	15	19	23	31	39	46	54
185	12	15	19	23	31	39	46	54
190	12	16	19	23	31	39	47	54
195	12	16	20	23	31	39	47	54
200	12	16	20	24	31	39	47	54
205	12	16	20	24	31	39	47	55
210	12	16	20	24	31	39	47	55
215	12	16	20	24	32	39	47	55
220	12	16	20	24	32	39	47	55
225	12	16	20	24	32	39	47	55
230	13	16	20	24	32	39	47	55
235	13	16	20	24	32	40	47	55
240	13	17	20	24	32	40	47	55
245	13	17	20	24	32	40	47	55
250	13	17	21	24	32	40	47	55
255	13	17	21	24	32	40	47	55
260	13	17	21	25	32	40	48	55
265	13	17	21	25	32	40	48	55
270	13	17	21	25	32	40	48	55
275	13	17	21	25	32	40	48	55
280	13	17	21	25	32	40	48	55
285	13	17	21	25	32	40	48	55
290	13	17	21	25	32	40	48	55
295	13	17	21	25	33	40	48	55
300	13	17	21	25	33	40	48	55
305	14	17	21	25	33	40	48	55
310	14	17	21	25	33	40	48	56
315	14	17	21	25	33	40	48	56
320	14	17	21	25	33	40	48	56
325	14	18	21	25	33	40	48	56
330	14	18	21	25	33	40	48	56
335	14	18	21	25	33	40	48	56
340	14	18	21	25	33	40	48	56
345	14	18	21	25	33	40	48	56
350	14	18	22	25	33	41	48	56
351	14	18	22	25	33	41	48	56

Table A.3.12: Resistance to fire of I/H beams for design steel temperature 550 °C.

Section factor A_m/V (m ⁻¹)	Fire resistance period							
	15 min	30 min	45 min	60 min	90 min	120 min	150 min	180 min
Igniplaster® thickness (mm) for a design temperature of 550 °C								
68	12	12	12	15	23	32	40	48
70	12	12	12	15	24	32	40	48
75	12	12	12	16	24	33	41	49
80	12	12	13	17	25	33	42	50
85	12	12	14	18	26	34	42	50
90	12	12	14	18	26	34	43	51
95	12	12	15	19	27	35	43	51
100	12	12	15	19	27	35	43	51
105	12	12	16	20	28	36	44	52
110	12	12	16	20	28	36	44	52
115	12	12	16	20	28	36	44	52
120	12	13	17	21	29	37	44	52
125	12	13	17	21	29	37	45	53
130	12	13	17	21	29	37	45	53
135	12	14	18	22	29	37	45	53
140	12	14	18	22	30	37	45	53
145	12	14	18	22	30	38	45	53
150	12	14	18	22	30	38	46	53
155	12	15	18	22	30	38	46	54
160	12	15	19	23	30	38	46	54
165	12	15	19	23	30	38	46	54
170	12	15	19	23	31	38	46	54
175	12	15	19	23	31	39	46	54
180	12	15	19	23	31	39	46	54
185	12	15	19	23	31	39	46	54
190	12	16	19	23	31	39	47	54
195	12	16	20	23	31	39	47	54
200	12	16	20	24	31	39	47	54
205	12	16	20	24	31	39	47	55
210	12	16	20	24	31	39	47	55
215	12	16	20	24	32	39	47	55
220	12	16	20	24	32	39	47	55
225	12	16	20	24	32	39	47	55
230	13	16	20	24	32	39	47	55
235	13	16	20	24	32	40	47	55
240	13	17	20	24	32	40	47	55
245	13	17	20	24	32	40	47	55
250	13	17	21	24	32	40	47	55
255	13	17	21	24	32	40	47	55
260	13	17	21	25	32	40	48	55
265	13	17	21	25	32	40	48	55
270	13	17	21	25	32	40	48	55
275	13	17	21	25	32	40	48	55
280	13	17	21	25	32	40	48	55
285	13	17	21	25	32	40	48	55
290	13	17	21	25	32	40	48	55
295	13	17	21	25	33	40	48	55
300	13	17	21	25	33	40	48	55
305	14	17	21	25	33	40	48	55
310	14	17	21	25	33	40	48	56
315	14	17	21	25	33	40	48	56
320	14	17	21	25	33	40	48	56
325	14	18	21	25	33	40	48	56
330	14	18	21	25	33	40	48	56
335	14	18	21	25	33	40	48	56
340	14	18	21	25	33	40	48	56
345	14	18	21	25	33	40	48	56
350	14	18	22	25	33	41	48	56
351	14	18	22	25	33	41	48	56