IGNIVER

Gypsum based mortar for passive fire protection

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IGNIVER

Passive **fire** protection for structures

Placo, true to its philosophy of innovation, has developed **Igniver** - machine applied gypsum based mortar for structures, which adds to the Placo range of fire protection solutions.

Passive protection of structures in the case of fire is aimed at avoiding alteration in the properties of materials that make up the structural elements of the building, due to high temperatures, and significant change to their mechanical capacity.

Likewise, during a fire and as a consequence of deformation of structural elements, there is indirect action that generally creates added tension on top of that which is already affecting the structure.

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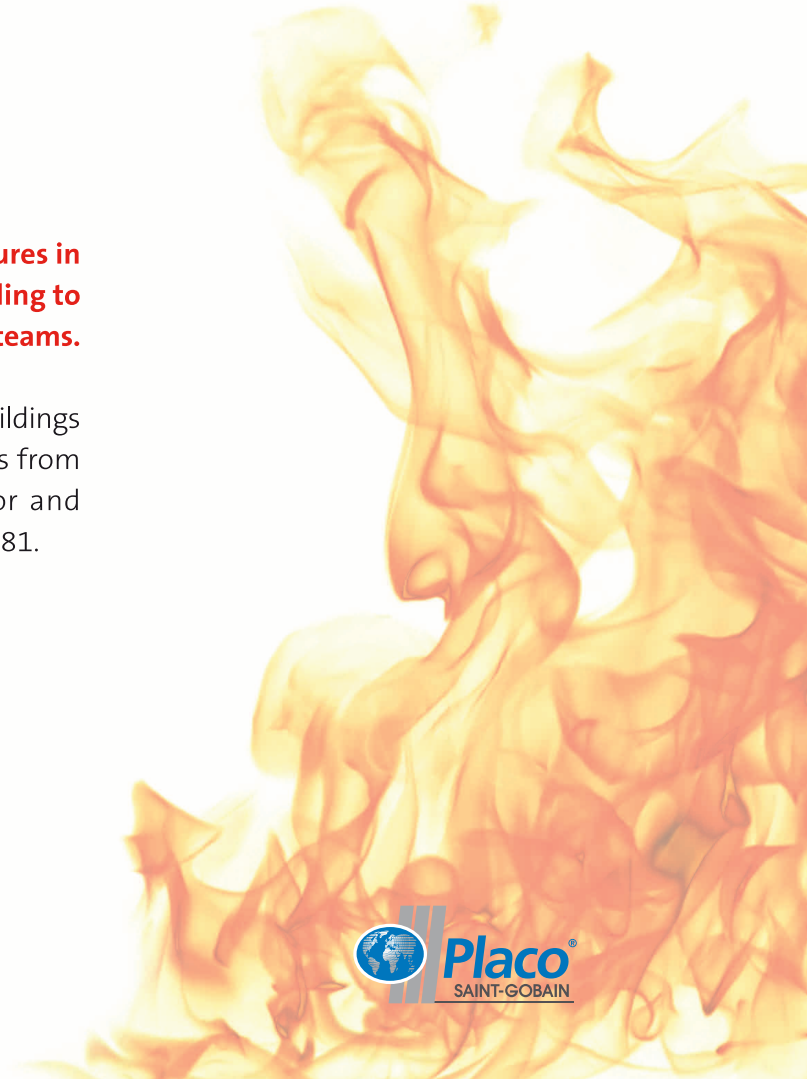
IGNIVER

Gypsum based mortar for fire protection

Therefore, passive protection lends stability to structures in the case of fire, reducing the risk for users of the building to an acceptable level and guaranteeing the safety of fire teams.

Fire resistance requirements for structural elements of buildings are established in the Fire Safety Guidance Documents from different european countries for the building sector and according to the following european standard ENV 13381.



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WHAT IS **IGNIVER**?

Igniver is a machine applied gypsum based mortar with lightweight aggregates (vermiculite and perlite) and specially formulated to protect building structures against fire.

It is a machine applied product in a similar way that machine applied building plasters.

HOW IS IT APPLIED?

Any surface to be protected with **Igniver** mortar must be clean and free of dust, grease and rust. **Igniver** must be applied indoors although, once applied, it can remain outdoors for a limited time until the building site closure.

Igniver's final finish may be rough or smooth to allow for subsequent painting.

Metallic mesh is not necessary for the application of **Igniver** although it may be used in some cases to improve adherence.

The recommended temperature for application is between +5º C and +40º C.

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ADVANTAGES OF **IGNIVER**

IGNIVER

Gypsum based mortar for fire protection

- Tested under harmonised european standard (ENV 13381).
- Efficient protection for metallic structures up to R 180.
- Efficient protection for composite steel and concrete structures up to R120.
- Fireproof: A1 classification for reaction to fire.
- Nicely finished for the creation of smoother and less crinkled surfaces.
- It does not contain fibres and is not harmful for human health.

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FIRE PROTECTION: METALLIC STRUCTURES

The degree of protection that **Igniver** lends to steel structural elements has been tested at homologated fire laboratory (EGOLF member), AFITI-LICOF, as indicated by European Standard ENV 13381-4:2005 **"Test methods for determining the contribution to the fire resistance of structural members - Part 4: Applied protection to steel elements.**

TECHNICAL DATA:

Test report nº 2200T11-3

Reaction to fire	A1
Powder Density (kg/m^3)	745
pH	12
Coverage (kg/m^2 and cm)	7
Compressive resistance (N/mm^2)	≥2
Flexural resistance (N/mm^2)	≥1
Thermal conductivity λ (W/mK)	0,22
Adherence (N/mm^2)	0,26

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THE SECTION FACTOR

Any metal element exposed to fire will heat up faster, the greater the surface that is in contact with the fire.
At the same time and with the same amount of surface exposed, the greater the mass of the element, the longer it will take to heat up. The parameter for determining the increase in temperature for a constant section of steel is called section factor: **Am/V**

Am: The surface of the member exposed to fire by unit of length - that of the member if it is not protected, or of the inner side of the protection if it is coated.

V: Volume of the steel member by unit of length.

The section factor for constant-section elements is equal to the quotient between the exposed perimeter (HP) and the area of the cross section (A):

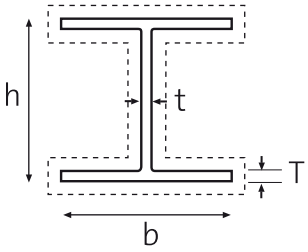
$$\textbf{Section factor} = \frac{\text{Perimeter exposed to fire}}{\text{Area of steel section}} = \frac{\textbf{HP}}{\textbf{A}} \ (\textbf{m}^{-1})$$

Therefore, the greater the section factor, the faster the steel element will collapse due to high temperatures. So, in order for a particular section of laminated steel to gain the highest R classification and retain its mechanical properties in the case of fire, it will need to be protected by coating it with insulation materials that have reduced thermal conductivity and are fire-resistant, such as **Igniver**.

Examples of section factor calculations

The dimensions, areas and perimeters of the sections needed to carry out the calculations have been taken from tables published by manufacturers of heat-laminated steel sections.

Section HEB 200: 4-sided protection.

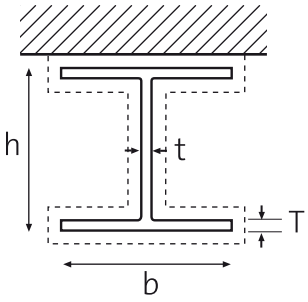


Perimeter: 115 cm

Area: 78,1 cm^2

Section factor = $\frac{115 \times 10^{-2}}{78{,}1 \times 10^{-4}}$ = **147,2 m^{-1}**

Section HEB 200: 3-sided protection.



b: 200 mm

h: 200 mm

t: 9 mm

T:15 mm

Perimeter: 115 cm

Area: 78,1 cm^2

Section factor = $\frac{(115\text{-}20) \times 10^{-2}}{78{,}1 \times 10^{-4}}$ = **121,6 m^{-1}**

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How to calculate **IGNIVER** thickness

1. Determine the period of fire protection needed in minutes.
2. Establish the kind of protection: four sides, three sides, etc.
3. Obtain the corresponding section factor.

In the following table, find the column corresponding to the number of minutes of protection needed and then locate the corresponding section factor in the vertical scale. The value obtained where the corresponding column and row meet is the total thickness of **Igniver** that should be applied.

Examples of **IGNIVER** thickness calculations.

For the examples given above, the thickness of **Igniver** to be applied would be:

Section HEB 200: 4-sided protection. Fire resistance R 90.
Section factor: 147,2 mm
Igniver Thickness: 22 mm

Section HEB 200: 3-sided protection. Fire resistance R 120.
Section factor: 121,6 mm
Igniver Thickness: 28 mm

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IGNIVER thickness for the protection of metallic pillars and beams according to European Standard ENV 13381-4 : 2005

	Fire resistance (minutes)						
Section factor (m^{-1})	R 15	R 30	R 45	R 60	R 90	R 120	R 180
60	10	10	10	12	17	23	33
65	10	10	10	13	18	23	34
70	10	10	11	13	19	24	35
75	10	10	11	14	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	16	21	27	39
120	10	10	13	16	22	28	39
130	10	10	13	16	22	28	40
140	10	11	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	30	42
190	10	11	14	17	24	30	42
200	10	11	15	18	24	30	42
210	10	12	15	18	24	30	43
220	10	12	15	18	24	30	43
230	10	12	15	18	24	30	43
240	10	12	15	18	24	31	43
250	10	12	15	18	24	31	43
260	10	12	15	18	25	31	43
270	10	12	15	18	25	31	44
280	10	12	15	18	25	31	44
290	10	12	15	18	25	31	44
300	10	12	15	19	25	31	44
310	10	12	15	19	25	31	44
320	10	12	15	19	25	31	44
330	10	12	16	19	25	31	44
340	10	12	16	19	25	32	44

Test report: AFITI LICOF 2200T11-3

Thickness of coating (mm) for a reference critical temperature of 500° C.

FIRE PROTECTION: COMPOSITE STEEL AND CONCRETE STRUCTURES

For regulated exposure to fire, composite steel and concrete structures must comply with the following requirements as established under EN 1994-1:2005 Eurocode 4. Design of composite steel and concrete structures. Part 1-2. General Rules. Structural fire design:

- Separating only: integrity (criterion E) and, when requested, insulation (criterion I);
- Load bearing only: mechanical resistance (criterion R);
- Separating and load bearing: criteria R, E and, when requested, I.

The fire resistance of mixed slabs may be improved by using a protection system applied to the steel sheet in order to reduce heat transfer. In this case, **IGNIVER** gypsum based mortar.

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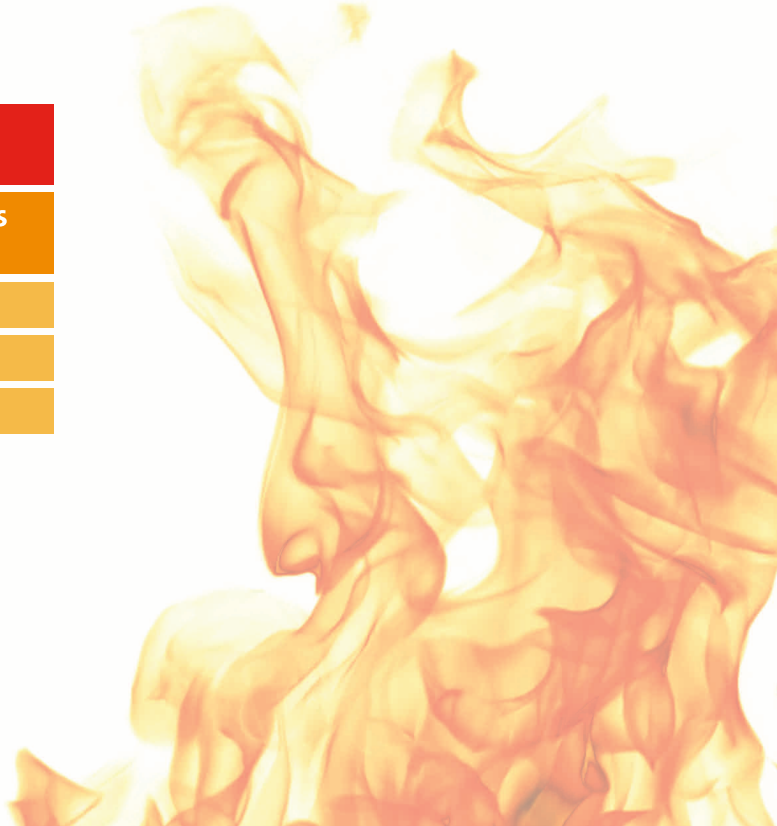
This protection must be tested as indicated under European Standard ENV 13381-5:2005 “Test methods for determining the contribution to the fire resistance of structural elements - Part 5: Applied protection to concrete/profiled sheet steel composite members” taking into account that:

- Criterion “R”: is satisfied when the steel sheet temperature is less than or equal to 350°C (in unprotected composite slabs, with or without additional reinforcement, criterion “R” is considered to be at least 30 minutes).
- Criterion “E”: is considered satisfied.
- Criterion “I”: must be evaluated obtaining the effective concrete thickness of the composite slab.

PROTECTING COMPOSITE STRUCTURES WITH IGNIVER MORTAR	
Fire resistance. Criterion “R”	**Application thickness (mm)**
60	20
90	27
120	34

Thickness of protection (mm) for a reference critical 350º C.

Test report 8518/11 and technical report 8518/11.



Section-factor calculation tool

(Passive fire protection for structures)

Fire resistance:
the fire resistance of Placo products is determined according to European Regulations as established in Spanish Fire Safety Guidance Documents (DB SI).

The 1st mobile app for the plastering industry:

Placo launches the 1st mobile app for the plastering industry for calculating the thickness of fire protection needed for metallic structures.

Where can you download it?

Find the app icon at the **"App Store" (iPhone)** or at the **"Android Market" (Android)**. Install the app on your mobile free of charge.

Android iPhone

How does it work?

1. Start the application and select one of two solutions: **IGNIVER** or **GLASROC F.**

2. Put in the information and the shape factor for protecting the metallic member will be calculated according to European Standard **ENV 13381 - 4:2005,** for either gypsum based mortar or plasterboard.

IGNIVER Gypsum based mortar for fire protection

GLASROC F High resistance fire board

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