



# Montofoc Esmalte al Agua

Intumescent Paint

ISO 9001 N° ES023390  
ISO 14001 N° ES023391

BUREAU VERITAS  
Certification



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# 1. Introduction

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Today, **fire prevention** has become an important part of our culture, focused on improving and increasing safety levels in all situations within our environment.

Fires pose a significant risk to the safety of the occupants of buildings. The need to reduce this risk affects all stages of the construction process, from the design to the construction works, maintenance and use of the building.

**Passive fire prevention** encompasses all measures aimed at limiting the spread of fire and mitigating its effects.

In order to increase safety in all types of buildings, a number of **basic regulations** have been introduced which are described in the following regulation:

**UNE-ENV 13381:2010:** Tests to determine the contribution of structural elements to fire resistance.

Part 8 of this regulation (UNE-ENV 13381-4:2010): Protection applied to steel elements, gives details of a test method for determining the contribution made by fire prevention systems to the fire resistance of structural steel elements, which may be used in the form of beams, pillars or tension elements.



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## 2.Improving fire stability: Intumescent paints

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The metal support structures used in buildings today are comprised of standard steel sections. Fire alters the plasticity of steel, which results in the structure losing stability.

When it comes into contact with heat or flames, intumescent paint undergoes a transformation due to chemical reactions, and this results in the development of a heat-isolating foam with very low heat conductivity, which can reach up to 30 times its original thickness, protecting the surface from the action of the fire and heat propagation.

Steel loses its structural resistance at around 500°C, but a correctly formulated and applied intumescent paint is capable of keeping the temperature of the steel below this temperature for a number of minutes, improving evacuation conditions and the action of fire-extinguishing equipment.

**The amount of paint that needs to be applied in order to protect the structures is not arbitrary and is set out in regulation UNE-ENV 13381-8:2010 and depends on:**

- The mass of each section,  
The established fire stability,
- And the tables that the manufacturer has obtained in a laboratory authorised to test their paints.



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## 3. Applicable Regulations

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### Fire stability of construction components

Sufficient fire resistance of structural elements.

CTE - Basic Document SI-6 (table 3.1)

Use of the area below the framework considered (1)	Basement floors	Floors above ground level. Evacuation height of the building		
		<15m	<28m	≥28m
Single family home (2)	R 30	R 30	-	-
Residential Housing, Public Residential, Teaching, Administrative	R 120	R 60	R 90	R 120
Commercial, Public building, Hospital	R 120 (3)	R 90	R 120	R 180
Car park (building with exclusive use or situated above another use)		R 90		
Car park (situated below another use)		R 120 (4)		

(1) For a floor, sufficient fire resistance is the level of resistance a floor has when considered as the ceiling of the fire area situated below said floor.

(2) In grouped or terraced family dwellings, the elements that form part of the shared structure will have to have the level of fire resistance required for buildings used as Residential Homes.

(3) If the evacuation height of the building is above 28 m, it must be R 180.

(4) In the case of automated car parks, it must be R 180.

The structures of light structure roofs which are not to be used when evacuating occupants and for which the height in relation to the exterior ground level is no more than 28 m, and elements that only hold up said roofs, can be R 30 when roof failure would not result in serious damage to the building or nearby establishments, or compromise the stability of other lower floors or the compartmentalisation of the fire areas. For these purposes, a light structure roof is defined as any roof for which the permanent load is no more than 1 kN/m<sup>2</sup>.

The structural elements of a protected staircase or a protected corridor that are contained within this structure shall at least be R-30. In the case of specially protected staircases, fire resistance is not required for the structural elements.

## 4. Classification of industrial establishments in relation to fire safety

(from Official State Gazette (BOE) 303 of 17-12-2004)

### 2.1 Industrial establishments located in a building:

**TYPE A:** The industrial establishment partially occupies a building that also contains other establishments, that are either for industrial use or other uses.

**TYPE B:** The industrial establishment occupies the whole of a building that is adjacent to one or more other buildings, or which is situated at a distance of three metres or less from one or more other buildings, from another establishment, be these for industrial use or other uses.

Industrial establishments that occupy adjacent premises, with a structure shared with the adjoining buildings, which in all cases must have a separate roof, must meet the requirements corresponding to type B, provided that they can prove that the potential collapse of the structure would not affect the adjoining buildings.

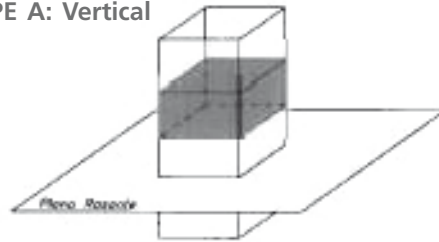
**TYPE C:** The industrial establishment occupies an entire building or a number of buildings, that is/are more than three metres away from the nearest building belonging to other establishments. Said distance must be free from combustible materials or intermediary elements that may spread fire.

### 2.2 Industrial establishments that carry out their activity in open spaces that do not constitute a building:

**TYPE D:** The industrial establishment occupies an open space, that may be totally covered, some of the facades of which have no side closure whatsoever.

**TYPE E:** The industrial establishment occupies an open space that may be partially covered (up to 50% of its surface area), and some of the facades in the covered part have no side closure whatsoever.

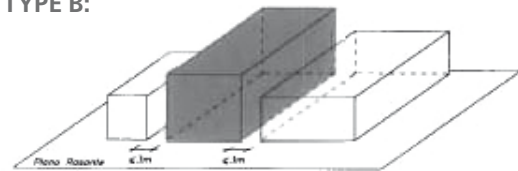
TYPE A: Vertical



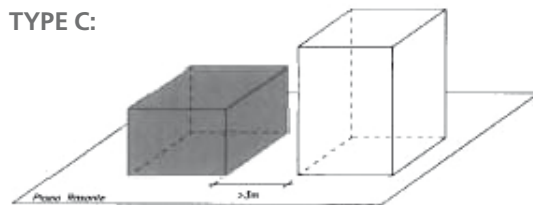
TYPE A: Horizontal



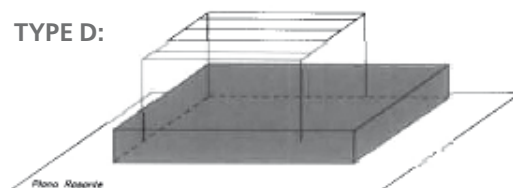
TYPE B:



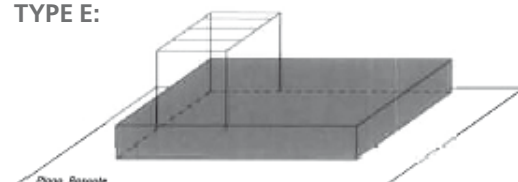
TYPE C:



TYPE D:



TYPE E:



Industrial Activity Location



## 5.Fire stability of construction elements

### Rsciei: Fire safety regulation for industrial establishments.

Approved through Royal Decree 2267/2004 of 03-12-2004, published in the Official State Gazette (BOE) 303 of 17-12-2004

Support structure (Table 2.2 from Official State Gazette (BOE) 303 of 17-12-2004)

INTRINSIC RISK LEVEL	TYPE A		TYPE B		TYPE C	
	Basement Floor	Floor above ground level	Basement Floor	Floor above ground level	Basement Floor	Floor above ground level
Low Risk	R120 (EF-120)	R90 (EF-90)	R90 (EF-90)	R90 (EF-60)	R90 (EF-60)	R90 (EF-30)
Medium Risk	not accepted	R120 (EF-120)	R120 (EF-120)	R90 (EF-90)	R90 (EF-90)	R90 (EF-60)
High Risk	not accepted	not accepted	R180 (EF-180)	R120 (EF-120)	R120 (EF-120)	R90 (EF-90)

Main Structure Light Roof (Table 2.3 from Official State Gazette (BOE) 303 of 17-12-2004)

INTRINSIC RISK LEVEL	TYPE B	TYPE C
	Above ground level	Above ground level
Low Risk	R 15 (EF-15)	not required
Medium Risk	R 30 (EF-30)	R 15 (EF-15)
High Risk	R 60 (EF-60)	R 30 (EF-30)

With automatic extinction and smoke evacuation system (Table 2.4 from Official State Gazette (BOE) 303 of 17-12-2004)

INTRINSIC RISK LEVEL	Single storey building		
	TYPE A	TYPE B	TYPE C
Low Risk	R 60 (EF-60)	not required	not required
Medium Risk	R 90 (EF-90)	R 15 (EF-15)	not required
High Risk	not accepted	R 30 (EF-30)	R 15 (EF-15)



## 5. Fire stability of construction elements

### 1. Light structure roofs in type A location.

The "Type C, above ground level" column in table 2.3 also applies to the main structure of light structure roofs on exempt buildings which are at a distance of more than three metres from the adjacent plot, in a type A configuration.

### 2. Ground level industrial premises.

Table 2.3 also applies to the main structures of light structure roofs and their supports in ground level buildings.

### 3. Industrial premises with a mezzanine.

Table 2.3 also applies both to the main structure of light structure roofs and to the supports that hold up a mezzanine in type B and C industrial buildings, provided that a minimum of 90% of the establishment is at ground level and 10% is on the floor above ground level, and calculations are carried out to show that the mezzanine could support the failure of the roof, and that the evacuation routes from any point in the industrial establishment to an exit from the floor or the building, are no longer than 25 metres. For activities classified as low intrinsic risk, the mezzanine can account for up to 20 percent of the total surface area, and the evacuation routes to an exit from the building, up to 50 metres, provided that the number of occupants is below 25.

### 4. Industrial buildings with a gantry crane.

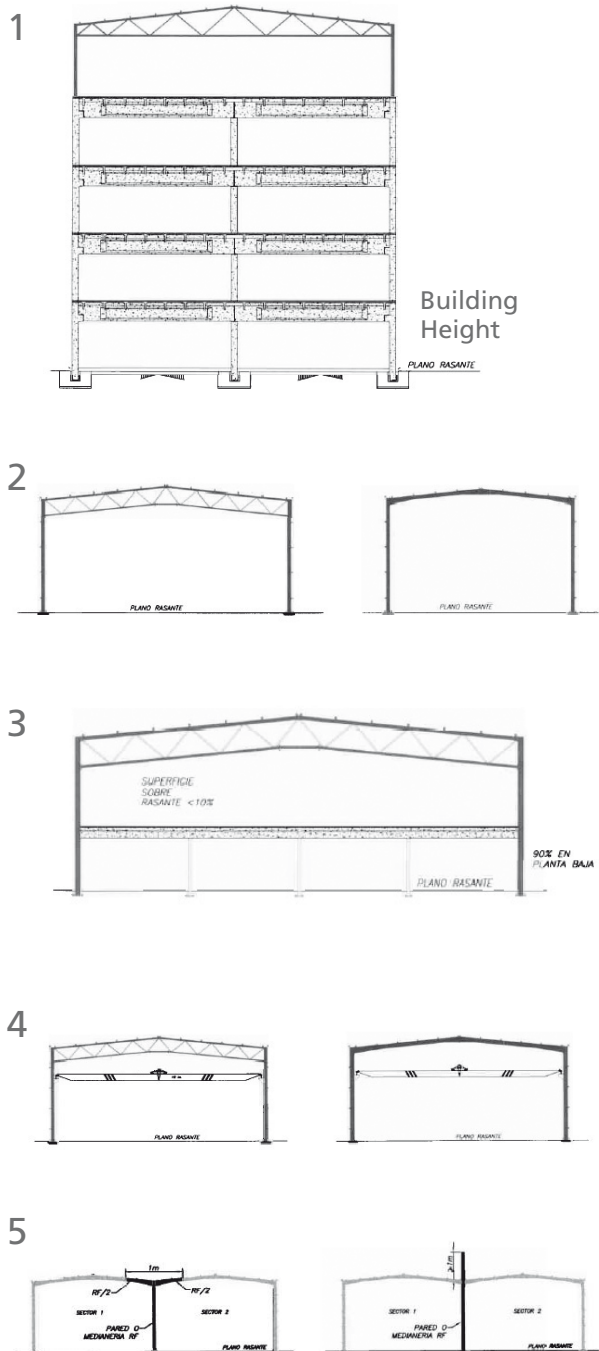
Table 2.3 also applies to the main structures of light structure roofs that may also support a crane (e.g.: crane boom or gantry crane), considered without a load.

### 5. Type A industrial premises with party walls (building on ground level).

In relation to the light structure roofs of type A industrial buildings with party walls, the stipulations set out in the paragraph in section 5.4 apply (in the column at the side).

The main structure of the roof can adopt the fire stability values in table 2.3 that correspond to the type B establishment values.

This condition does not apply when the roof is shared by two or more different industrial establishments.







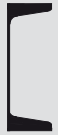


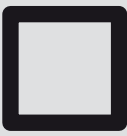


5.4 When a party wall or a construction element for compartmentalising fire areas is attached to the roof, the fire resistance of this element must be at least half of that required for that construction element, in a strip which is one metre wide. This strip may be found:

- Integrated into the roof itself, provided that there is proof that the strip will remain in place following the collapse of the non resistant parts of the roof.
- Attached to the structure of the roof, when this has at least the same fire resistance as that required of the strip.
- Formed of a one metre wide barrier for which the required fire resistance has been proven and which is situated below the roof attached to the party wall. Under no circumstances will the barrier be installed more than 40 cm from the lower part of the roof.

The fire resistance of said strip must be proven by carrying out a type test. Said test should be conducted under final use conditions, including the supports or holding systems.

However, if the party wall or the compartmentalising element extends over the roof by at least one metre, the roof does not need to meet the above requirement.









## 6. Types of sections and sides exposed to fire

HEA, HEB, HEM	IPE	IPN	UPN	UAP
				
ANGLE	SECTION T	SQUARE PIPE	RECTANGULAR PIPE	ROUND PIPE
				

Each structural element has a different Fire Stability value, in accordance with the following factors:

- Geometry of the element (type of section)
- Sides exposed to the fire (1, 2, 3 or 4)

Therefore, when calculating the thickness to be applied, you need to also take into account the number of sides exposed to the fire, which may present themselves in the following ways:

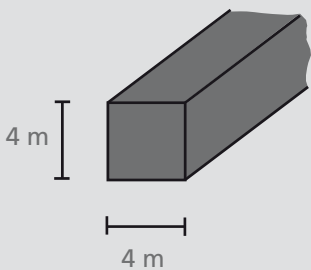
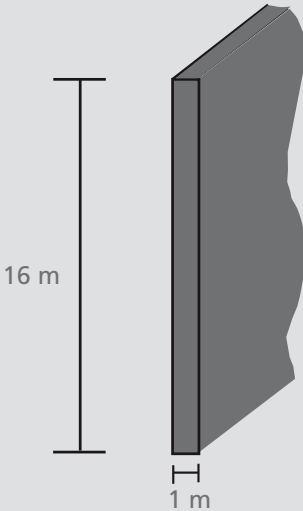
NUMBER OF SIDES EXPOSED TO THE FIRE			
1 SIDE	2 SIDES	3 SIDES	4 SIDES
			
			

## 7. Massiveness of a profile

Mass measures the relationship between the surface exposed to the fire and the volume of a section. The greater the mass, the greater the thickness of protection required.

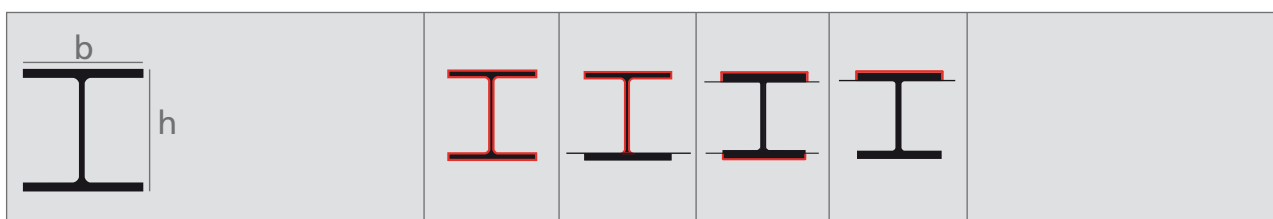
The mass concept or section form factor (for continuous sections in the same straight segment) is defined as the relationship between the perimeter of the straight protected segment of the section expressed in m<sup>2</sup> and the area of the straight segment of the section expressed in m<sup>2</sup>.

Example:

	PROFILE A	PROFILE B
		
Perimeter=	$4+4+4+4 = 16 \text{ m}$	$16 + 16 + 1 + 1 = 34 \text{ m}$
Area =	$4 \times 4 = 16 \text{ m}^2$	$16 \times 1 = 16 \text{ m}^2$
Mass=	$\frac{16}{16} = 1 \text{ m}^{-1}$	$\frac{34}{16} = 2,13 \text{ m}^{-1}$

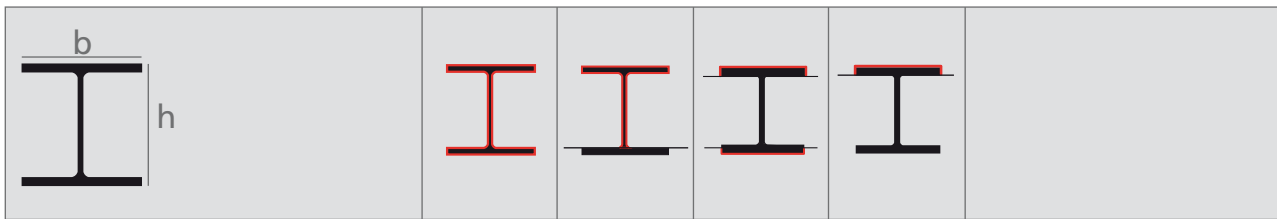
In this example, the profile will be much easier to heat than the A, because the surface exposed to fire is higher.

## 8.1. Calculations by profile - HEA Profile



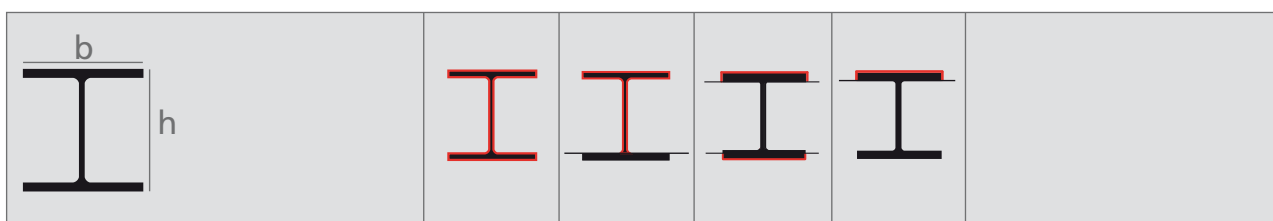
SECTION HEA	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
100	96	100	265,1	217,9	94,3	47,2	21,2	16,7
120	114	120	267,6	220,2	94,9	47,4	25,3	19,9
140	133	140	252,9	208,3	89,2	44,6	31,4	24,7
160	152	160	230,9	189,7	82,5	41,2	38,8	30,4
180	171	180	225,2	185,4	79,5	39,7	45,3	35,5
200	190	200	211,9	174,7	74,3	37,2	53,8	42,3
220	210	220	196,0	161,7	68,4	34,2	64,3	50,5
240	230	240	178,4	147,1	62,5	31,3	76,8	60,3
260	250	260	170,5	140,6	59,9	30,0	86,8	68,2
280	270	280	164,4	135,7	57,6	28,8	97,3	76,4
300	290	300	152,9	126,2	53,3	26,7	112,5	88,3
320	310	300	141,5	117,4	48,2	24,1	124,4	97,6
340	330	300	134,1	111,6	44,9	22,5	133,5	105
360	350	300	128,2	107,1	42,0	21,0	142,8	112
400	390	300	120,1	101,3	37,7	18,9	159,0	125
450	440	300	112,9	96,1	33,7	16,9	178,0	140
500	490	300	106,8	91,6	30,4	15,2	197,5	155
550	540	300	104,3	90,2	28,3	14,2	211,8	166
600	590	300	102,0	88,7	26,5	13,2	226,5	178

## 8.2. Calculations by profile - HEB Profile



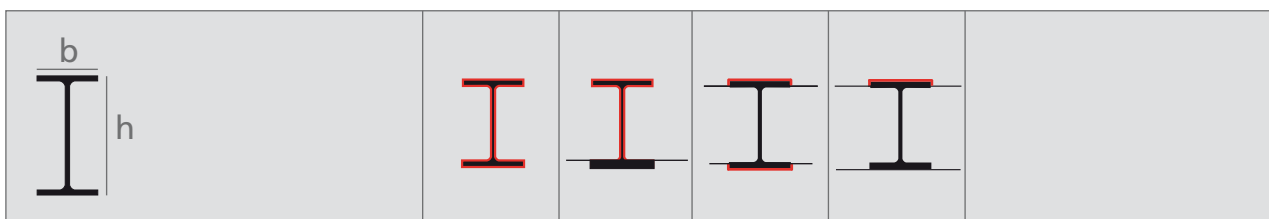
SECTION HEB	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
100	100	100	218,1	179,6	76,9	38,5	26,0	20,4
120	120	120	201,8	166,5	70,6	35,3	34,0	26,7
140	140	140	187,2	154,7	65,1	32,6	43,0	33,7
160	160	160	169,1	139,6	58,9	29,5	54,3	42,6
180	180	180	157,7	130,2	55,1	27,6	65,3	51,2
200	200	200	147,2	121,6	51,2	25,6	78,1	61,3
220	220	220	139,6	115,4	47,4	24,2	91,0	71,5
240	240	240	130,2	107,5	45,3	22,6	106,0	83,2
260	260	260	126,7	104,7	43,9	22,0	118,4	93
280	280	280	123,3	102,0	42,6	21,3	131,4	103
300	300	300	116,0	95,9	40,2	20,1	149,1	117
320	320	300	109,7	91,1	37,2	18,6	161,3	127
340	340	300	105,9	88,4	35,1	17,6	170,9	134
360	360	300	102,4	85,8	33,2	16,6	180,6	142
400	400	300	97,6	82,4	30,3	15,2	197,8	155
450	450	300	91,3	77,5	27,5	13,8	218,0	171
500	500	300	88,9	76,3	25,1	12,6	238,6	187
550	550	300	87,7	75,6	23,6	11,8	254,1	199
600	600	300	85,9	74,8	22,2	11,1	270,0	212

## 8.3. Calculations by profile - HEM Profile



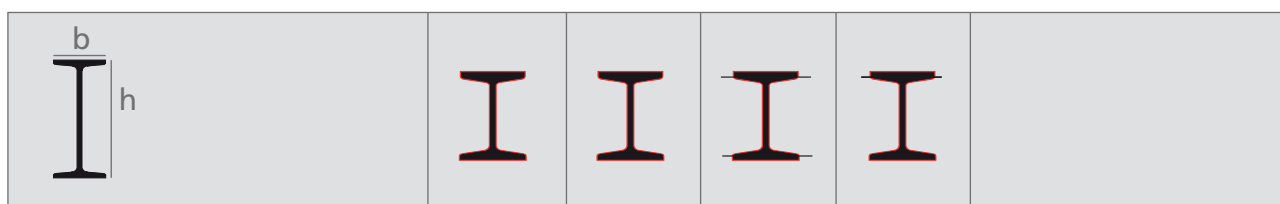
SECTION HEM	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
100	120	106	116,4	96,4	39,8	19,9	53,2	41,8
120	140	126	111,1	92,2	38,0	19,0	66,4	52,1
140	160	146	103,6	85,5	36,2	18,1	80,6	63,2
160	180	166	99,9	82,8	34,2	17,1	97,1	76,2
180	200	186	96,2	79,8	32,8	16,4	113,3	88,9
200	220	206	91,4	75,7	31,4	15,7	131,3	103
220	240	226	88,4	73,2	30,3	15,1	149,4	117
240	270	248	73,1	60,7	24,8	12,4	199,6	157
260	290	268	71,5	59,3	24,4	12,2	219,6	172
280	310	288	70,4	58,4	24,0	12,0	240,2	189
300	340	310	60,4	50,1	20,5	10,2	303,1	238
320	359	309	59,9	50,0	19,8	9,9	312,0	245
340	377	309	60,2	50,4	19,6	9,8	315,8	248
360	395	308	60,5	50,9	19,3	9,7	318,8	250
400	432	307	61,4	52,0	18,8	9,4	325,8	256
450	478	307	62,6	53,5	18,3	9,2	335,4	263
500	524	306	66,3	54,4	17,8	8,9	344,3	270
550	572	306	64,3	55,7	17,3	8,6	354,4	278
600	620	305	65,2	56,8	16,8	8,4	363,7	285

## 8.4. Calculations by profile - IPE Profile



SECTION IPE	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
80	80	46	430,6	370,4	120,4	60,2	7,6	6
100	100	55	389,3	335,9	106,8	53,4	10,3	8,1
120	120	64	359,1	310,6	97,0	48,5	13,2	10,4
140	140	73	335,4	290,9	89,0	44,5	16,4	12,9
160	160	82	309,5	268,7	81,6	40,8	20,1	15,8
180	180	91	292,1	254,0	76,2	38,1	23,9	18,8
200	200	100	269,5	234,4	70,2	35,1	28,5	22,4
220	220	110	253,9	221,0	65,9	32,9	33,4	26,2
240	240	120	235,5	204,9	61,4	30,7	39,1	30,7
270	270	135	226,6	197,2	58,8	29,4	45,9	36,1
300	300	150	215,6	187,7	55,8	27,9	53,8	42,2
330	330	160	199,7	174,1	51,1	25,6	62,6	49,1
360	360	170	185,7	162,3	46,8	23,4	72,7	57,1
400	400	180	174,0	152,7	42,6	21,3	84,5	66,3
450	450	190	163,0	143,7	38,5	19,2	98,8	77,6
500	500	200	150,0	132,8	34,5	17,2	116,0	90,7
550	550	210	140,3	124,6	31,3	15,7	134,0	106
600	600	220	129,5	115,4	28,4	14,2	155,0	122

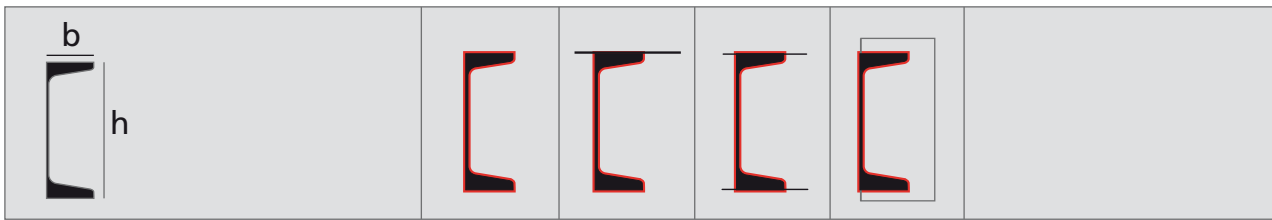
## 8.5. Calculations by profile - IPN Profile



SECTION IPN	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
80	80	42	401,1	345,6	110,8	55,4	7,6	5,95
100	100	50	349,1	301,9	94,3	47,2	10,6	8,32
120	120	58	309,2	268,3	81,7	40,8	14,2	11,2
140	140	66	274,3	238,3	72,1	36,1	18,3	14,4
160	160	74	252,2	219,7	64,9	32,5	22,8	17,9
180	180	82	229,4	200,0	58,8	29,4	27,9	21,9
200	200	90	211,6	184,8	53,7	26,9	33,5	26,3
220	220	98	195,7	171,0	49,5	24,7	39,6	31,1
240	240	106	183,1	160,1	46,0	23,0	46,1	36,2
260	260	113	169,7	140,5	42,3	21,2	53,4	41,9
280	280	119	158,1	138,6	39,0	19,5	61,1	48
300	300	125	149,1	131,0	36,2	18,1	69,1	54,2
320	320	131	140,1	123,3	33,7	16,8	77,8	61,1
340	340	137	132,5	116,7	31,6	15,8	86,8	68,1
360	360	143	124,6	109,9	29,5	14,7	97,1	76,2
380	380	149	118,7	104,8	27,9	13,9	107,0	84
400	400	155	112,7	99,6	26,3	13,1	118,0	92,6
450	450	170	100,7	89,1	23,1	11,6	147,0	115
500	500	185	90,6	80,3	20,6	10,3	180,0	141
550	550	200	84,5	75,1	18,8	9,4	213,0	167
600	600	215	75,6	67,1	16,9	8,5	254,0	199



## 8.6. Calculations by profile - UAP Profile



SECTION UPE	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
80	80	45	308,4	266,4	84,3	75,0	10,7	8,4
100	100	50	290,3	253,0	74,7	74,7	13,4	10,5
130	130	55	267,4	236,0	62,9	74,3	17,5	13,7
150	150	65	238,4	210,9	56,9	65,7	22,8	17,9
175	175	70	227,8	190,3	51,7	64,7	27,1	21,2
200	200	75	213,7	182,9	46,9	62,5	32,0	25,1
220	220	80	205,0	179,2	44,1	60,7	36,3	28,5
250	250	85	187,7	168,3	38,8	57,1	43,8	34,4
300	300	100	167,4	150,3	34,2	51,2	58,6	46

## 8.7. Calculations by profile - UPN Profile



SECTION UPN	DIMENSIONS		MASSIVENESS				SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	h	b	4 sides	3 sides	2 sides	1 side		
80	80	45	283,6	242,7	81,8	72,7	11,0	8,64
100	100	50	275,6	238,5	74,1	74,1	13,5	10,6
120	120	55	255,3	222,9	64,7	70,6	17,0	13,4
140	140	60	239,7	210,3	58,8	68,6	20,4	16
160	160	65	227,5	200,4	54,2	66,7	24,0	18,8
180	180	70	218,2	193,2	50,0	64,3	28,0	22
200	200	75	205,3	182,0	46,6	62,1	32,2	25,3
220	220	80	192,0	170,6	42,8	58,8	37,4	29,4
240	240	85	183,2	163,1	40,2	56,7	42,3	33,2
260	260	90	172,7	154,0	37,3	53,8	48,3	37,9
280	280	95	167,0	149,0	35,6	52,5	53,3	41,8
300	300	100	161,5	144,6	34,0	51,0	58,8	46,2

## 8.8. Calculations by profile - Rectangular Pipe

RECTANGULAR PIPE	DIMENSIONS					MASSIVENESS		SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	b	e	P-4	P-3	4 sides	3 sides		
60.40.2	60	40	2	191	145	516,2	392,7	3,70	2,91
60.40.3	60	40	3	187	138	350,8	258,7	5,33	4,18
60.40.4	60	40	4	183	132	268,7	193,2	6,81	5,35
70.40.2	70	40	2	211	165	514,6	403,2	4,10	3,22
70.40.3	70	40	3	207	158	349,1	266,2	5,93	4,66
70.40.4	70	40	4	203	152	266,8	199,2	7,61	5,97
70.50.2	70	50	2	231	175	513,3	389,5	4,50	3,53
70.50.3	70	50	3	227	168	347,6	257,1	6,53	5,13
70.50.4	70	50	4	223	162	265,2	192,1	8,41	6,60
80.40.3	80	40	3	227	178	347,6	272,4	6,53	5,13
80.40.4	80	40	4	223	172	265,2	204,0	8,41	6,60
80.40.5	80	40	4	219	164	216,0	161,9	10,14	7,96
80.60.3	80	60	3	267	198	345,4	256,0	7,73	6,07
80.60.4	80	60	4	263	192	263,0	191,6	10,00	7,86
80.60.5	80	60	5	259	184	214,0	152,2	12,10	9,53
100.50.3	100	50	3	287	228	344,5	273,6	8,33	6,54
100.50.4	100	50	4	283	222	262,0	205,2	10,80	8,49
100.50.5	100	50	5	279	214	213,0	163,5	13,10	10,31
100.50.6	100	50	6	274	207	179,1	135,2	15,30	12,03
100.60.4	100	60	4	303	232	261,2	199,6	11,60	9,11
100.60.5	100	60	5	299	224	212,1	159,0	14,10	11,10

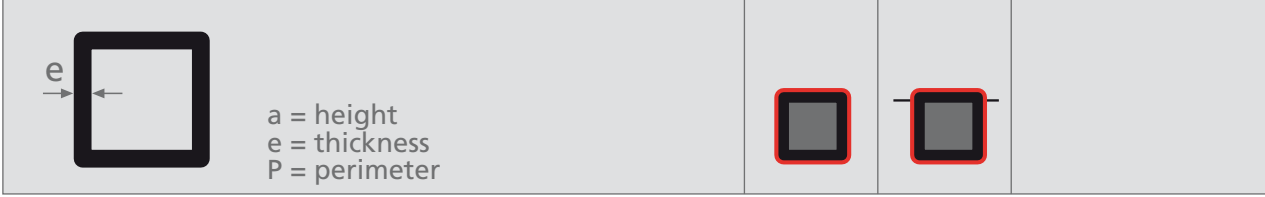
## 8.8. Calculations by profile - Rectangular Pipe

RECTANGULAR PIPE	DIMENSIONS					MASSIVENESS		SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	b	e	P-4	P-3	4 sides	3 sides		
100.60.6	100	60	6	294	217	178,2	131,4	16,50	12,97
100.80.4	100	80	4	343	252	259,8	190,6	13,20	10,37
100.80.5	100	80	5	339	244	210,6	151,7	16,10	12,67
100.80.6	100	80	6	334	237	176,7	125,3	18,90	14,85
120.60.4	120	60	4	343	272	259,8	205,7	13,20	10,37
120.60.5	120	60	5	339	264	210,6	164,1	16,10	12,67
120.60.6	120	60	6	334	257	176,7	135,9	18,90	14,85
120.80.4	120	80	4	383	292	258,8	197,0	14,80	11,63
120.80.5	120	80	5	379	284	209,4	157,0	18,10	14,24
120.80.6	120	80	6	374	277	175,6	130,0	21,30	16,74
120.100.4	120	100	4	423	312	257,9	190,0	16,40	12,88
120.100.5	120	100	5	419	304	208,5	151,3	20,10	15,81
120.100.6	120	100	6	414	297	174,7	125,3	23,70	18,62
140.60.4	140	60	4	383	312	258,8	210,5	14,80	11,63
140.60.5	140	60	5	379	304	209,4	168,0	18,10	14,24
140.60.6	140	60	6	374	297	175,6	139,4	21,30	16,74
140.80.4	140	80	4	423	332	257,9	202,2	16,40	12,88
140.80.5	140	80	5	419	324	208,5	161,3	20,10	15,81
140.80.6	140	80	6	414	317	174,7	133,7	23,70	18,62
140.100.4	140	100	4	463	352	257,2	195,3	18,00	14,14
140.100.5	140	100	5	459	344	207,7	155,7	22,10	17,38
140.100.6	140	100	6	454	337	173,9	129,1	26,10	20,51
160.80.4	160	80	4	463	372	257,2	206,4	18,00	14,14

## 8.8. Calculations by profile - Rectangular Pipe

RECTANGULAR PIPE	DIMENSIONS					MASSIVENESS		SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	b	e	P-4	P-3	4 sides	3 sides		
160.80.5	160	80	5	459	364	207,7	164,8	22,10	17,38
160.80.6	160	80	6	454	357	173,9	136,7	26,10	20,51
160.120.5	160	120	5	539	404	206,5	154,9	26,10	20,52
160.120.6	160	120	6	534	397	172,8	128,4	30,90	24,27
160.120.8	160	120	8	526	383	131,5	95,8	40,00	31,43
180.100.5	180	100	5	539	424	206,5	162,5	26,10	20,52
180.100.6	180	100	6	534	417	172,8	134,9	30,90	24,27
180.100.8	180	100	8	526	403	131,5	100,8	40,00	31,43
180.140.5	180	140	5	619	464	205,6	154,2	30,10	23,66
180.140.6	180	140	6	614	457	172,0	128,0	35,70	28,04
180.140.8	180	140	8	606	443	130,6	95,5	46,40	36,45
200.80.5	200	80	5	539	444	206,5	170,2	26,10	20,52
200.80.6	200	80	6	534	437	172,8	141,4	30,90	24,27
200.80.8	200	80	8	526	423	131,5	105,8	40,00	31,43
200.120.5	200	120	5	619	484	205,6	160,9	30,10	23,66
200.120.6	200	120	6	614	477	172,0	133,6	35,70	28,04
200.120.8	200	120	8	606	463	130,6	99,8	46,40	36,45
200.150.5	200	150	5	679	474	193,1	143,3	33,10	26,01
200.150.6	200	150	6	674	507	171,5	129,0	39,30	30,87
200.150.8	200	150	8	666	493	130,1	96,3	51,20	40,22

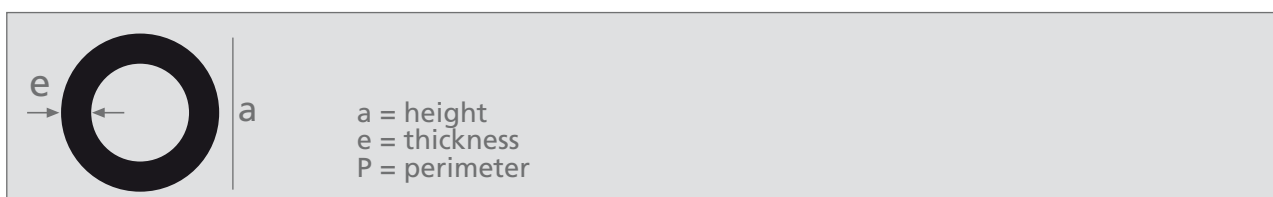
## 8.9. Calculations by profile - Square Pipe

					DIMENSIONS		MASSIVENESS		SEGMENT AREA	WEIGHT
SQUARE PIPE	DIMENSIONS				MASSIVENESS		cm <sup>2</sup>	(kg/m)		
	a	e	P-4	P-3	4 sides	3 sides				
40.2	40	2	151	105	520,7	363,1	2,90	2,28		
40.3	40	3	147	98	355,9	237,0	4,13	3,24		
40.4	40	4	143	92	274,5	175,8	5,21	4,09		
45.2	45	2	171	120	518,2	364,5	3,30	2,59		
45.3	45	3	167	113	353,1	238,6	4,73	3,71		
45.4	45	4	163	107	271,2	177,3	6,01	4,72		
50.2	50	2	191	135	516,2	365,7	3,70	2,91		
50.3	50	3	187	128	350,8	239,9	5,33	4,18		
50.4	50	4	183	122	315,0	209,3	5,81	5,35		
55.2	55	2	211	150	514,6	366,6	4,10	3,22		
55.3	55	3	207	143	349,1	240,9	5,93	4,66		
55.4	55	4	203	173	266,8	179,5	7,61	5,97		
60.2	60	2	231	165	513,5	367,3	4,50	3,53		
60.3	60	3	227	158	347,6	241,8	6,53	5,13		
60.4	60	4	223	152	265,2	180,2	8,41	6,60		
60.5	60	5	219	139	216,8	137,8	10,10	7,96		
70.2	70	2	271	200	511,3	377,9	5,30	4,16		
70.3	70	3	267	193	345,4	249,5	7,73	6,07		
70.4	70	4	263	182	263,0	181,6	10,00	7,86		
70.5	70	5	259	174	214,0	143,9	12,10	9,53		
80.3	80	3	307	228	343,8	255,2	8,93	7,01		

## 8.9. Calculations by profile - Square Pipe

SQUARE PIPE	DIMENSIONS				MASSIVENESS		SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	e	P-4	P-3	4 sides	3 sides		
80.4	80	4	303	217	261,2	186,7	11,60	9,11
80.5	80	5	299	209	212,1	148,3	14,10	11,10
80.6	80	6	294	202	178,2	122,4	16,50	13,00
90.3	90	3	347	258	343,6	255,3	10,10	7,95
90.4	90	4	343	252	259,8	190,6	13,20	10,40
90.5	90	5	339	244	210,6	151,7	16,10	12,70
90.6	90	6	334	227	176,7	120,0	18,90	14,90
100.3	100	3	387	288	342,5	254,8	11,30	8,89
100.4	100	4	383	282	258,8	190,3	14,80	11,60
100.5	100	5	379	264	209,4	145,9	18,10	14,20
100.6	100	6	374	257	175,6	120,6	21,30	16,70
120.4	120	4	463	352	257,2	195,3	18,00	14,10
120.5	120	5	459	344	207,7	155,7	22,10	17,40
120.6	120	6	454	312	173,9	119,5	26,10	20,50
140.5	140	5	539	399	206,5	152,9	26,10	20,50
140.6	140	6	534	392	172,8	126,8	30,90	24,30
140.8	140	8	526	348	131,5	87,0	40,00	31,40
160.5	160	5	619	449	205,6	149,2	30,10	23,70
160.6	160	6	614	442	172,0	123,8	35,70	28,00
160.8	160	8	609	411	131,3	88,6	46,40	36,50
170.5	170	5	659	469	205,3	146,2	32,10	25,20
170.6	170	6	654	462	171,7	121,2	38,10	29,90
170.8	170	8	646	423	130,2	85,3	49,60	39,00

## 8.10. Calculations by profile - Round Pipe



ROUND PIPE	DIMENSIONS			MASSIVENESS	SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	e	p	4 caras		
40.2	40	2	126	527,2	2,39	1,88
40.3	40	3	126	361,0	3,49	2,74
40.4	40	4	126	278,8	4,52	3,55
45.2	45	2	141	522,2	2,70	2,12
45.3	45	3	141	356,1	3,96	3,11
45.4	45	4	141	273,8	5,15	4,04
50.2	50	2	157	519,9	3,02	2,37
50.3	50	3	157	354,4	4,43	3,47
50.4	50	4	157	271,6	5,78	4,53
55.2	55	2	173	519,5	3,33	2,61
55.3	55	3	173	353,1	4,90	3,85
55.4	55	4	173	269,9	6,41	5,03
60.2	60	2	188	516,5	3,64	2,86
60.3	60	3	188	350,1	5,37	4,21
60.4	60	4	188	267,0	7,04	5,52
65.2	65	2	204	515,2	3,96	3,11
65.3	65	3	204	349,3	5,84	4,58
65.4	65	4	204	266,0	7,67	6,02
70.2	70	2	220	515,2	4,27	3,35
70.3	70	3	220	348,7	6,31	4,95
70.4	70	4	220	265,4	8,29	6,51



## 8.10. Calculations by profile - Round Pipe

ROUND PIPE	DIMENSIONS			MASSIVENESS	SEGMENT AREA cm <sup>2</sup>	WEIGHT (kg/m)
	a	e	p	4 caras		
75.2	75	2	236	515,3	4,58	3,60
75.3	75	3	236	348,1	6,78	5,32
75.4	75	4	236	264,6	8,92	7,00
80.2	80	2	251	512,2	4,90	3,85
80.3	80	3	251	345,7	7,26	5,70
80.4	80	4	251	262,8	9,55	7,50
90.3	90	3	283	345,5	8,19	6,43
90.4	90	4	283	262,0	10,80	8,48
90.5	90	5	283	211,2	13,40	10,50
100.3	100	3	314	343,5	9,14	7,17
100.4	100	4	314	259,5	12,10	9,47
100.5	100	5	314	210,7	14,90	11,70
100.6	100	6	314	177,4	17,70	13,90
125.4	125	4	393	258,6	15,20	11,90
125.5	125	5	393	209,0	18,80	14,80
125.6	125	6	393	175,4	22,40	17,60
155.5	155	5	487	206,4	23,60	18,50
155.6	155	6	487	173,3	28,10	22,10
155.8	155	8	487	132,0	36,90	29,00
175.5	175	5	550	206,0	26,70	21,00
175.6	175	6	550	172,4	31,90	25,00
175.8	175	8	550	131,0	42,00	33,00
200.5	200	5	628	205,2	30,60	24,00
200.6	200	6	628	171,6	36,60	28,70
200.8	200	8	628	130,0	48,30	37,90

## 9.Montofoc - Technical specifications

503610

# MONTOFOC ESMALTE AL AGUA



**FAMILY** PRODUCTOS PARA USO ESPECIFICO  
**LINE** PINTURAS INTUMESCENTES

### DESCRIPTION AND NATURE

Single component water-based intumescent paint. Generates a protective foam when subjected to intense heat that thermally isolates the base, preventing fire from spreading and slowing down damage to the base.

Tested and Certified by independent laboratories according to European Standard EN 13381-8:2010

### USAGES

Indoors  
Exterior with protection.  
Previously primed iron/steel beams and pillars.  
Metal structures

### PROPERTIES

- Easy to repaint
- Elasticity enough to resist the normal structural movements
- Good applicability
- Good adhesion
- Certified to European Standard EN 13381-8:2010
- Water-based intumescent.
- Fire protection for metal structures. Beams and pillars.
- Strongness
- Non toxic
- Adequate for High thickness coats

### TECHNICAL CHARACTERISTICS

Finish	Matt White
Specific weight	1,29± 0,05 kg/l
Viscosity	250 +/- 25 PO
Solids in volume	63± 1
Solids in weight	68± 1
VOC	Cat. i/BA 140/140 (2007/2010):5,98 g/l
Aproximated performance by coat	Depending of product usage
Dry to touch	1 - 3 hours
Dry to repaint	6 - 24 hours

### SURFACE PREPAIRING

#### New surfaces

- Treat as usual for the paints and varnishes recommended in the surface/process table. -Each product must be treated according to the chosen primer and suitable intermediate coat.
- In the case of primers and intermediate coats recommended by PINTURAS MONTÓ, S. A., the guidelines and waiting times for each product must be followed, as indicated in the technical specification of each product used in the preparation system.
- Cleaning: Water.

#### Restoring and maintenance

- Completely remove any old paint that is flaking away or in poor condition.
- Remove foreign products in the usual way.

## 9.Montofoc - Technical specifications

503610

# MONTOFOC ESMALTE AL AGUA



-Given that the previous coats may be flaking, it is recommended that they be removed using a heat gun, blasting or by other means.

- In the case of primers and intermediate coats recommended by PINTURAS MONTO, S. A., the guidelines and waiting times for each product must be followed, as indicated in the technical specification of each product used in the preparation system.

-Use plaster to fill any defects in the base (to make a suitable selection, see the PREPARING BASES family for lines corresponding to powder plaster and prepared fillers).

### WAY OF USE

#### Application Notes

Stir the product until perfectly blended.

- Do not apply at relative humidity in excess of 80%.

- Two or three coats are recommended to obtain a thickness of more than 500-600 Micra when dry.

- Apply as for a water-based paint, except as regards coat thickness, as a thicker coat is more effective.

- For exterior applications, protect the product with Monto products certified for flame reaction.

#### Solvent for dilution and cleaning

Water

#### Way of use

#### Aproximate dilution

Air-less gun

0 - 10 %

Aerographic gun

5 - 15 %

Brush, Roller

0 - 5 %

### SYSTEM

#### Procedures depending of surface type

	Primer	Intermedium	Finish
<b>Iron, Steel</b>			
<b>MAX</b>	IMPRIEPOX M10 + CATALIZADOR		MONTOFOC ESMALTE AL AGUA
<b>STD</b>			

### SECURITY

Do not eat, neither drink, nor smoke during the application. In case of contact with eyes, wash abundantly with clean water. Keep away from children. Do not throw in darin. Keep product in dry area, under cover and temperature between 5 to 35°C. For further information, please check product safety sheet.

### NOTE

Maximum recommended storage time : 12 months since its fabrication in its original packaging perfectly closed, stored indoors and at temperatures between 5º and 35ºC

Information here indicated is based on our actual knowledge, laboratory testing and taking in count the practical use under specific circumstances.As it is impossible to stablish an adequate description for every nature and status of the supports to be painted, we are unable to warrant the absolute reproductibility in each specific use

### PACKINGS

20 Kg

## 9.Montofoc - Certificate table

Masividad	R15	R30	R45	R60	R90
65	256	256	341	614	1160
70	256	256	374	669	1258
75	256	256	408	724	1357
80	256	256	441	780	1456
85	256	256	475	835	1556
90	256	256	509	892	1656
95	256	256	543	948	---
100	256	256	578	1004	---
110	256	256	647	1118	---
120	256	256	716	1233	---
130	256	256	787	1349	---
140	256	256	858	1466	---
150	256	275	929	1584	---
160	256	300	1002	---	---
170	256	326	1075	---	---
180	256	352	1148	---	---
190	256	378	1223	---	---
200	256	404	1298	---	---
210	256	431	1374	---	---
220	256	458	1450	---	---
230	256	485	1527	---	---
240	256	512	1605	---	---
250	256	540	---	---	---
260	256	568	---	---	---
270	256	596	---	---	---
280	256	625	---	---	---
290	256	653	---	---	---
300	256	682	---	---	---
310	256	712	---	---	---
320	256	741	---	---	---
330	256	771	---	---	---
340	256	802	---	---	---

**PRODUCT: MONTOFOC ESMALTE AL AGUA**

**Certified by AFITI LICOF according NORMA UNE-EN 13381-8-2010**

**Crítical T. 500°C**

**K=0,975**



Intumescent Paint Montofoc

# THE STRONGEST DEFENCE **AGAINST** **FIRE**



**MONTOFOC** Protects metal structures against fire like no other intumescent paint. It has one of the best set of technical specifications on the market. In case of fire, there is no better protection than Montofoc.

**Excellent features:** Minimum micron density/Maximum protection.  
Latest technology, water-based.

Certified to the latest regulations (UNE ENV 13381-8:2010)





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