LGAI
LGAI Technological Center, S.A.
Campus UAB s/n
Apartado de Correos 18
E - 08193 Bellaterra (Barcelona)
T +34 93 567 20 00
F +34 93 567 20 01
www.applus.com

X/F

Nº 9/LE 897

Title:

Assessment report for the determination of the contribution to the fire resistance of structural H section steel columns and beams by applied protection of an intumescent protection system according to BS EN 13381-8: 2010 "Test methods for determining the contribution to the fire resistance of structural members – Part 8: Applied reactive protection to steel members." (equivalent to EN 13381-8:2010)

Tested material:

- "National Guard Zinc Phosphate Epoxy Primer" primer from National Paints Factories.
- "National Intumescent Paint" paint from National Paints Factories.

File number: 13/5489-2110

Solicitor:
NATIONAL PAINTS FACTORIES Co.Ltd
P.O.Box 5822
Sharjah, United Arab Emirates

Report Date:
1st March 2013

REQUESTED DOCUMENT

Assessment report of the ability of an intumescent coating reference "National Intumescent Paint" to protect structural H section steel columns and beams.

Steel sections used in this assessment were protected with:

- "National Guard Zinc Phosphate Epoxy Primer" primer from National Paints Factories.
- "National Intumescent Paint" paint from National Paints Factories.

Everything is supplied and/or fabricated by National Paints Factories, as indicated in the technical specifications (see Annex B).

TEST PURPOSE

Assessment of the fire resistance of H section steel columns and beams protected with different intumescent coating thicknesses on tests carried out according to BS EN 1363-1: 1999. "Fire resistance tests. Part 1: General requirements" (equivalent to UNE EN 1363-1:2000) and BS EN 13381-8: 2010 "Test methods for determining the contribution to the fire resistance of structural members – Part 8: Applied reactive protection to steel members." (equivalent to EN 13381-8:2010).

ÍNDEX

1. TEST REPORTS.

Assessment has been done in accordance with the test results stated in the following test reports:

- File number 11/2551-2177 issued by Applus-LGAI.
- File number 11/2551-2174 issued by Applus-LGAI.
- File number 13/5489-123 issued by Applus-LGAI.
- File number 12/4412-717 issued by Applus-LGAI.

2. SAMPLE INSTALLATION AND ASSEMBLY METHOD.

2.1. Tested material

- "National Guard Zinc Phosphate Epoxy Primer" primer from National Paints Factories.
- "National Intumescent Paint" paint from National Paints Factories.

2.2. Sections to protect.
Steel sections with the following characteristics were protected:

- Steel type S 275 JR + AR :
- Surface treatment:
  - Material: Abrasive grain 30 corundum (rugosity between 40 and 50 µm)
  - Projection type: compressed air 7 bar
  - Coating degree: Sa 2 ½.

2.3. Application Features.

- Primer application:
  - Application method: brush
  - Total drying time: one day
  - Dry film thickness: see chapter 4.2 of each test report
- Coating:
  - Application method: brush.
  - Thickness per layer: 100 µm each layer.
  - 3 layers of 100 µm are applied each day.
  - Total Drying time: one month

3. ASSESSMENT PROCEDURE.

The assessment has been carried out adopting the numerical regression equation method defined in chapter E.5 of BS EN 13381-8:2010. This equation is given as follows:

$$t = a_0 + a_1 d_p + a_2 \frac{d_p}{A_m/V} + a_3 \theta_a + a_4 d_p \theta_a + a_5 d_p \frac{\theta_a}{A_m/V} + a_6 \frac{\theta_a}{A_m/V} + a_7 \frac{1}{A_m/V}$$

where

t is the corrected time to design temperature θ_a , in minutes;

d_p is the thickness of protection material (reactive coating only), in millimetres;

A_m/V is the measured section factor, in m^{-1}.

a_o to a_7 are the regression coefficients.

θ_a is the design steel temperature, in degrees Celsius.

4. OBTAINED RESULTS.

Figures and tables of section temperatures can be verified at their respective test reports.

All thicknesses indicated in tables are referred to intumescent coating thicknesses only.

Reference of sections have been made in accordance with the references stated for each section in their respective test report.

The sections used for the assessment have been:

File number	Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]
11/2551-2174	IPE 400 (4.5 m) min	158	0,253
11/2551-2174	IPE 400 (1 m) min	158	0,237
13/5489-123	IPE 400 (4.5m) max	162	0,945
13/5489-123	IPE 400 (1m) max	163	0,932

Table 1.Beams.

File number	Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]
12/4412-717	HEA 200 max (2m)	227	1,276
12/4412-717	HEA 200 max	226	1.372

Table 2. Tall column Vs short column.

File number	Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]
11/2551-2177	HEA 200 ¼	225	0,872
	HEA 200 min	225	0,264
	HEA 300 min	152	0,257
	HEM 400 min	65	0,229
12/4412-717	HEA 300 med	169	0,962
	IPE 200 ¼	289	0,742
	HEM 400 ¼	67	0,709
	HEA 200 ¼	228	0,727
12/5489-123	HEA 300 med	163	0,640
	IPE 200 ¼	285	0,415
	HEA 200 ¼	225	0,435
	HEM 400 ¼	63	0,423
	IPE 200 max	287	0,887

Table 3. Short columns.

Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]	500ºC (min)	550ºC (min)	600ºC (min)	700ºC (min)
IPE 200 max	287	0,887	38	44	51	62
HEA 300 med	169	0,962	56	64	72	89
HEA 200 ¼	225	0,872	48	55	61	74
IPE 200 ¼	289	0,742	37	44	52	65
HEM 400 ¼	67	0,709	68	81	91	111
HEA 200 ¼	228	0,727	42	50	57	71
HEA 300 ½	163	0,640	48	55	62	76
IPE 200 ¼	285	0,415	31	36	41	51
HEA 200 ¼	225	0,435	24	28	33	42
HEM 400 ¼	63	0,423	44	48	52	71
HEA 200 min	225	0,264	25	28	32	40
HEA 300 min	152	0,257	27	31	34	42
HEM 400 min	65	0,229	39	44	49	61

Table 4. Test results.

5. ASSESSED PERFORMANCE.

Correction factors have been calculated using corrected times to reach each of the design temperatures using equation D.1 of annex D of BS EN 13381-8:2010.

5.1 Data Correction.

As indicated in chapter D.1 and table D.1 ref. h of BS EN 13381-8:2010, correct section data using loaded and unloaded beams and tall and reference columns. The corrected time for each section and design temperature is used in the analysis.

Design Temperature (ºC)	Time to reach mean temperature (min)		Time to reach characteristic temperature (min)		Correction factor for stickability (direct calc.)
	IPE 400 (4.5m) min	IPE 400 (1m) min	IPE 400 (4.5m) min	IPE 400 (1m) min	
500	35	36	29	33	0.829
550	40	41	33	37	0.841
600	44	46	37	42	0.831
650	47	47	42	46	0.861
700	51	59	47	52	0.853

Table 5. Minimum thickness beams.

Design Temperature (ºC)	Time to reach mean temperature (min)		Time to reach characteristic temperature (min)		Correction factor for stickability (direct calc.)
	IPE 400 (4.5m) max	IPE 400 (1m) max	IPE 400 (4.5m) max	IPE 400 (1m) max	
500	50	57	42	53	0,797
550	58	65	48	60	0,783
600	65	71	54	67	0,795
650	71	78	61	73	0,818
700	76	86	68	80	0,832

Table 6. Maximum thickness beams.

Design Temperature (ºC)	Time to reach mean temperature (min)		Time to reach characteristic temperature (min)		Correction factor for stickability (direct calc.)
	HEA 200 max (2m)	HEA 200 max (1m)	HEA 200 max (2m)	HEA 200 max (1m)	
500	51	54	46	52	0.955
550	57	61	52	58	0.968
600	63	68	58	65	0.964
650	68	77	63	72	0.945
700	73	85	67	81	0.893

Table 7. Tall column Vs short column.

Tall column and short column of report 12/4412-717 were used for the calculation of the correction factor because of a misapplication of the coating on sections that should have been used (see test report 13/5489-123). However, this change satisfies a higher conservative criterion because columns of report 12/4412-717 were applied with a larger thickness of intumescent coating.

Temperature	500ºC	550ºC	600ºC	650ºC	700ºC
Correction factor for stickability used in the assessment	0,797	0,783	0,795	0,818	0,832

Table 8. Correction factor for stickability used in the assessment

Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]	500ºC (min)	550ºC (min)	600ºC (min)	650ºC (min)	700ºC (min)
IPE 200 max	287	0,887	29,57	34,94	40,58	46,39	51,68
HEA 300 med	169	0,962	42,97	50,08	57,22	65,44	74,09
HEA 200 ¼	225	0,872	37,11	43,35	48,67	55,89	61,71
IPE 200 ¼	289	0,742	29,00	35,11	41,79	48,08	54,38
HEM 400 ¼	67	0,709	53,47	64,85	73,26	83,90	92,94
HEA 200 ¼	228	0,727	32,97	39,96	45,85	53,10	59,42
HEA 300 ½	163	0,640	38,33	44,32	49,70	57,24	63,41
IPE 200 ¼	285	0,415	25,36	29,47	33,38	38,86	42,93
HEA 200 ¼	225	0,435	19,16	22,84	26,80	31,96	35,66
HEM 400 ¼	63	0,423	35,94	39,40	42,44	50,77	59,95
HEA 200 min	225	0,264	20,56	23,37	26,39	30,77	33,86
HEA 300 min	152	0,257	22,22	25,89	28,05	32,49	35,56
HEM 400 min	65	0,229	32,11	36,76	40,44	47,04	51,65

Table 9. Corrected times.

5.2 Assessment expression.

According to the regression of the test data (corrected for stickability), the coefficients a_o to a_7 of the expression indicated in chapter 2 are the following:

Expression:

$$t = a_0 + a_1 d_p + a_2 \frac{d_p}{A_m/V} + a_3 \theta_a + a_4 d_p \theta_a + a_5 d_p \frac{\theta_a}{A_m/V} + a_6 \frac{\theta_a}{A_m/V} + a_7 \frac{1}{A_m/V}$$

Where;

t is the corrected time to design temperature θ_a , in minutes;

d_p is the thickness of protection material (reactive coating only), in millimetres;

A_m/V is the measured section factor, in m^{-1}.

θ_a is the design steel temperature, in degrees Celsius.

a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7
-13,604	-4,928	-4167,956	0,052	0,039	13,069	-2,296	1553,552

Table 10. coefficients a_o to a_7

Modification factors:

Temperature	500ºC	550ºC	600ºC	650ºC	700ºC
Modification factor (K)	0,876	0,895	0,918	0,973	0,972

Table 11. Modification factors.

5.3. Acceptability criteria (point 13.5 of BS EN 13381-8:2010):

Section	Section Factor (m^{-1})	Thickness of intumescent coating [mm]	500ºC (min)	550ºC (min)	600ºC (min)	650ºC (min)	700ºC (min)
IPE 200 max	287	0,887	29,93	35,91	42,30	50,64	56,38
HEA 300 med	169	0,962	37,16	44,70	52,76	63,25	70,50
HEA 200 ¼	225	0,872	31,70	38,05	44,85	53,70	59,80
IPE 200 ¼	289	0,742	26,95	32,31	38,03	45,50	50,64
HEM 400 ¼	67	0,709	47,21	56,46	66,34	79,26	88,11
HEA 200 ¼	228	0,727	28,37	34,00	40,02	47,87	53,27
HEA 300 ½	163	0,640	29,39	35,14	41,29	49,32	54,83
IPE 200 ¼	285	0,415	20,41	24,40	28,66	34,22	38,03
HEA 200 ¼	225	0,435	21,99	26,23	30,76	36,69	40,74
HEM 400 ¼	63	0,423	35,81	41,95	48,52	57,26	63,02
HEA 200 min	225	0,264	18,20	21,60	25,25	30,04	33,28
HEA 300 min	152	0,257	19,94	23,45	27,22	32,20	35,52
HEM 400 min	65	0,229	26,50	30,27	34,34	39,87	43,31

Table 12. Predicted times acc. to expression indicated in 5.2

Criteria	500ºC (min)	550ºC (min)	600ºC (min)	650ºC (min)	700ºC (min)
A (%)	14,78	14,85	14,76	14,81	14,23
B (%)	-9,79	-8,25	-5,15	-2,73	-3,45
C (%)	15	23	23	23	23

Table 13. Acceptability criteria.

According to table 13, the following statements can be inferred:

- Criterion A: For each short section the predicted time to reach the design temperature does not exceed the corrected time by more than 15%. In table 13, the highest value of the difference between predicted and corrected time is indicated.
- Criterion B: The mean value of all percentage differences is less than zero. In table 13, the mean value is indicated.
- Criterion C: Less than 30 % of individual values of all percentage differences as calculated in A) are more than zero. In table 13, the % of values higher than zero is indicated.

Assessment results are indicated in annex A.
Times of Fire Resistance correspond to design temperatures from 500ºC to 700ºC in 50ºC steps as average temperature.

The expanded uncertainty of the measure has been expressed as to the typical uncertainty of the measure multiplied by a covering factor k = 2 which corresponds to a probability for a normal distribution of approximately 95%.

6. LIMITS OF APPLICABILITY (according to chapter 15 of BS EN 13381-8:2010) .

Feature	Tested value	Permitted extensions.
Thickness of fire protection material	Minimum thickness tested on an unloaded beam: 0.253 mm Maximum thickness tested on a loaded beam: 0.945 mm	Minimum allowed thickness (0.253 less 5%): 0.240 mm Maximum allowed thickness: 0.992 mm (0.945 mm plus 5%).
Section factor	Minimum tested section factor on minimum section column: 65 m^{-1} Maximum tested section factor: 289 m^{-1}	Minimum allowed section factor: 59 m^{-1} (65 m^{-1} less 10%) Maximum allowed section factor: 318 m^{-1} (289 m^{-1} plus 10%)
Section type	H section	Extensions only applicable on H sections.
Steel grade	See test reports	Applicable to all other grades of steel to that tested and as given in EN 10025-1 as specified in 6.1 and with the limitations given therein.
Method of application	See test reports	Only applicable to the method used in the test specimen preparation.

Thickness values obtained from the equation indicated in issue 5.2 and not indicated in the tables attached in annex A are theoretical and approximate values.

Digitally signed by Jordi Mirabent Junyent

Fire Laboratory Responsible
LGAI Technological Center, S.A

Digitally signed by Albert Ger Castillo

Fire Resistance Responsible
LGAI Technological Center, S.A

The results refer exclusively to the sample, product or material surrendered to the Laboratory, just as it is informed in the section of received material and tested under the conditions indicated in the norms mentioned in this document.

Quality Service Warranty

Applus+, guaranties that this work has been realized following the exigencies of our Quality and Sustainable System, complying with honoring the contractual conditions and the legal standard.

We would be very grateful if you would send us any comment you consider appropriate , addressing either to the signatory of this document or to the Applus+ Quality Director, to the direction satisfaccion.cliente@appluscorp.com

7.- ANNEXES:

A.- TABLES OF FIRE RESISTANCE

B.- GENERAL SPECIFICATIONS SUPPLIED BY THE TEST SPONSOR

A.- TABLES OF FIRE RESISTANCE

All thicknesses indicated in tables are referred to intumescent coating thicknesses only.
Thickness values given in the tables of this annex are the only valid values according to BS EN 13381-8:2010.

Thickness values given in the table below are the only valid values according to BS EN 13381-8:2010 for a design temperature of 500ºC.

	Table for 500ºC (acc. BS EN 13381-8:2010) for H sections			
Section Factor	Thickness (National Intumescent Paint) mm. Values between parentheses are extrapolated values acc. Chapter 15 of BS EN 13381-8: 2010			
m^{-1}	15 min	30 min	45 min	60 min
60	(0,240)	(0,280)	(0,596)	(0,911)
70	(0,240)	0,333	0,685	-
80	(0,240)	0,381	0,766	-
90	(0,240)	0,425	0,841	-
100	(0,240)	0,465	0,910	-
110	(0,240)	0,503	(0,974)	-
120	(0,240)	0,538	-	-
130	(0,240)	0,571	-	-
140	(0,240)	0,601	-	-
150	(0,240)	0,629	-	-
160	(0,240)	0,656	-	-
170	(0,240)	0,681	-	-
180	(0,240)	0,705	-	-
190	(0,240)	0,727	-	-
200	(0,240)	0,748	-	-
210	(0,240)	0,768	-	-
220	(0,240)	0,786	-	-
230	(0,240)	0,804	-	-
240	(0,240)	0,821	-	-
250	(0,240)	0,837	-	-
260	(0,240)	0,853	-	-
270	(0,240)	0,867	-	-
280	(0,240)	0,881	-	-
290	(0,240)	(0,895)	-	-
300	(0,240)	(0,907)	-	-
310	(0,240)	(0,920)	-	-

Thickness values given in the table below are the only valid values according to BS EN 13381-8:2010 for a design temperature of 550ºC.

Section Factor	Table for 550ºC (acc. BS EN 13381-8:2010) for H sections Thickness (National Intumescent Paint) mm. Values between parentheses are extrapolated values acc. Chapter 15 of BS EN 13381-8: 2010			
m^{-1}	15 min	30 min	45 min	60 min
60	(0,240)	(0,240)	(0,455)	(0,705)
70	(0,240)	(0,242)	0,521	0,801
80	(0,240)	0,275	0,583	0,890
90	(0,240)	0,306	0,639	(0,972)
100	(0,240)	0,335	0,692	-
110	(0,240)	0,362	0,740	-
120	(0,240)	0,387	0,786	-
130	(0,240)	0,410	0,829	-
140	(0,240)	0,432	0,869	-
150	(0,240)	0,453	0,906	-
160	(0,240)	0,472	0,942	-
170	(0,240)	0,490	(0,975)	-
180	(0,240)	0,507	-	-
190	(0,240)	0,524	-	-
200	(0,240)	0,539	-	-
210	(0,240)	0,554	-	-
220	(0,240)	0,568	-	-
230	(0,240)	0,581	-	-
240	(0,240)	0,593	-	-
250	(0,240)	0,605	-	-
260	(0,240)	0,617	-	-
270	(0,240)	0,628	-	-
280	(0,240)	0,638	-	-
290	(0,240)	(0,648)	-	-
300	(0,240)	(0,658)	-	-
310	(0,240)	(0,667)	-	-

Thickness values given in the table below are the only valid values according to BS EN 13381-8:2010 for a design temperature of 600ºC.

	Table for 600ºC (acc. BS EN 13381-8:2010) for H sections				
Section Factor	Thickness (National Intumescent Paint) mm. Values between parentheses are extrapolated values acc. Chapter 15 of BS EN 13381-8: 2010				
m^{-1}	15 min	30 min	45 min	60 min	90 min
60	(0,240)	(0,240)	(0,358)	(0,562)	(0,971)
70	(0,240)	(0,240)	0,408	0,637	-
80	(0,240)	(0,240)	0,454	0,706	-
90	(0,240)	(0,240)	0,497	0,771	-
100	(0,240)	(0,243)	0,537	0,831	-
110	(0,240)	0,261	0,574	0,887	-
120	(0,240)	0,279	0,609	0,940	-
130	(0,240)	0,295	0,642	(0,990)	-
140	(0,240)	0,310	0,673	-	-
150	(0,240)	0,325	0,702	-	-
160	(0,240)	0,338	0,730	-	-
170	(0,240)	0,351	0,756	-	-
180	(0,240)	0,364	0,780	-	-
190	(0,240)	0,375	0,804	-	-
200	(0,240)	0,386	0,826	-	-
210	(0,240)	0,397	0,847	-	-
220	(0,240)	0,407	0,867	-	-
230	(0,240)	0,416	0,886	-	-
240	(0,240)	0,425	0,904	-	-
250	(0,240)	0,434	0,922	-	-
260	(0,240)	0,442	0,938	-	-
270	(0,240)	0,450	(0,954)	-	-
280	(0,240)	0,458	(0,970)	-	-
290	(0,240)	(0,465)	(0,984)	-	-
300	(0,240)	(0,472)	-	-	-
310	(0,240)	(0,479)	-	-	-

Thickness values given in the table below are the only valid values according to BS EN 13381-8:2010 for a design temperature of 650ºC.

Section Factor	Table for 650ºC (acc. BS EN 13381-8:2010) for H sections Thickness (National Intumescent Paint) mm. Values between parentheses are extrapolated values acc. Chapter 15 of BS EN 13381-8: 2010				
m^{-1}	15 min	30 min	45 min	60 min	90 min
60	(0,240)	(0,240)	(0,271)	(0,437)	(0,769)
70	(0,240)	(0,240)	0,307	0,494	0,867
80	(0,240)	(0,240)	0,340	0,546	(0,958)
90	(0,240)	(0,240)	0,371	0,595	-
100	(0,240)	(0,240)	0,400	0,641	-
110	(0,240)	(0,240)	0,427	0,683	-
120	(0,240)	(0,240)	0,452	0,724	-
130	(0,240)	(0,240)	0,476	0,761	-
140	(0,240)	(0,240)	0,499	0,797	-
150	(0,240)	(0,240)	0,520	0,831	-
160	(0,240)	(0,240)	0,540	0,863	-
170	(0,240)	(0,240)	0,559	0,893	-
180	(0,240)	(0,240)	0,577	0,922	-
190	(0,240)	(0,240)	0,595	(0,949)	-
200	(0,240)	(0,247)	0,611	(0,975)	-
210	(0,240)	0,254	0,627	-	-
220	(0,240)	0,260	0,641	-	-
230	(0,240)	0,266	0,656	-	-
240	(0,240)	0,272	0,669	-	-
250	(0,240)	0,277	0,682	-	-
260	(0,240)	0,282	0,694	-	-
270	(0,240)	0,287	0,706	-	-
280	(0,240)	0,292	0,718	-	-
290	(0,240)	(0,297)	(0,729)	-	-
300	(0,240)	(0,301)	(0,739)	-	-
310	(0,240)	(0,305)	(0,749)	-	-

Thickness values given in the table below are the only valid values according to BS EN 13381-8:2010 for a design temperature of 700ºC.

Section Factor	Table for 700ºC (acc. BS EN 13381-8:2010) for H sections Thickness (National Intumescent Paint) mm. Values between parentheses are extrapolated values acc. Chapter 15 of BS EN 13381-8: 2010					
m^{-1}	15 min	30 min	45 min	60 min	90 min	120 min
60	(0,240)	(0,240)	(0,240)	(0,378)	(0,670)	(0,962)
70	(0,240)	(0,240)	0,260	0,425	0,753	-
80	(0,240)	(0,240)	0,286	0,468	0,831	-
90	(0,240)	(0,240)	0,311	0,508	0,904	-
100	(0,240)	(0,240)	0,334	0,546	(0,972)	-
110	(0,240)	(0,240)	0,355	0,582	-	-
120	(0,240)	(0,240)	0,375	0,616	-	-
130	(0,240)	(0,240)	0,394	0,647	-	-
140	(0,240)	(0,240)	0,412	0,677	-	-
150	(0,240)	(0,240)	0,429	0,705	-	-
160	(0,240)	(0,240)	0,446	0,732	-	-
170	(0,240)	(0,240)	0,461	0,757	-	-
180	(0,240)	(0,240)	0,475	0,782	-	-
190	(0,240)	(0,240)	0,489	0,805	-	-
200	(0,240)	(0,240)	0,502	0,826	-	-
210	(0,240)	(0,240)	0,515	0,847	-	-
220	(0,240)	(0,240)	0,527	0,867	-	-
230	(0,240)	(0,240)	0,538	0,886	-	-
240	(0,240)	(0,240)	0,549	0,904	-	-
250	(0,240)	(0,240)	0,560	0,922	-	-
260	(0,240)	(0,240)	0,570	0,938	-	-
270	(0,240)	(0,240)	0,579	(0,954)	-	-
280	(0,240)	(0,240)	0,589	(0,970)	-	-
290	(0,240)	(0,240)	(0,598)	(0,984)	-	-
300	(0,240)	(0,240)	(0,606)	-	-	-
310	(0,240)	(0,240)	(0,614)	-	-	-

B.- GENERAL SPECIFICATIONS SUPPLIED BY THE TEST SPONSOR

TECHNICAL DATA SHEET

Type	:	**NATIONAL GUARD ZINC PHOSPHATE EPOXY PRIMER**
Description	:	Quick drying, two component, anticorrosive epoxy primer for the protection of metallic surfaces with high resistance in salts spray .
Shade	:	Grey
Composition	:	**Resin:** epoxy resin **Pigments fillers:** zinc phosphate, active zinc oxide, fillers, pigments **Solvents:** aromatic - alcohol

Technical data

Gloss	:	Mat
Specific Weight	:	1,35 (±0,05) kg/lt
Theoretical cover	:	8-10 m^2 / lt (50 μm)
Solids	:	52 % by volume
VOC	:	373 g/lt

Drying time (25 ˚C)

Off dust	:	15 min (50μm)
Touch dry	:	30 min (50μm)
Recoating	:	12 hr (50μm)
Full drying time	:	24 hr (50μm)

The times above are indicative and depend on the thinning percentage, moisture and temperature.

Application

When applied on a surface and full cured, it can be recoated with any coating system.
Application methods:

- → Air spray (diameter 1,8-3,0mm, pressure 3-5 bar), after the material is thinned 10-20% [viscosity is 20-30" (Ford Cup N.4)]
- → Airless spray, after the material is thinned 0-10%
- → Brush-roller, after the material is thinned 20-30%

Suggested layer thickness	: 50-75 μm
Application temperature	: 5 - 40 ˚C
Suggested thinners	: Thinner N.401

Storage

For 12 months in a dry and cool place (5-30 ˚C).

Safety – Precautions

Please consult the Material Safety Data Sheet. It is offered after request.

PASSIVE FIRE PROTECTION of Steel from Cellulosic Fires

NATIONAL INTUMESCENT PAINT
solvent based for External & Internal use

01/2009

PRODUCT DESCRIPTION : an industrial thin-film Intumescent Solvent-based coating, for Fire Protection – FP, of structural steelwork for time intervals as 30' min, 45'min, 60' min, 90' min and 120' min.

PRINCIPAL CHARACTERISTICS :

- Suitable to be exposed Externally, to weathering conditions, as also Internally on covered buildings.
- Provides fire protection from 30' minute to 2 hours.
- Very sensitive to humidity, rain or water in general, if left uncovered, without any finish coat.
- Easy to apply.
- The Assessment report is provided from the Spanish laboratory LGAI Technological Center sa, based on the new European legislation **EN 13381-part 4 & 8 : 2008**.
- Not suitable for immersion in water or metal structure cavities filled with water.

COLOURS: **White**, other basic shades per request.

GLOSS : **MAT**, with gloss 0-10% -LANGE GLOSS (under angle of 60°) as per ISO 2813

PACKAGING : **20 kg** (15 ltrs) metallic drum

BASIC DATA @ 20° C & 350 microns D.F.T.

Mass Density	approx. 1,33 ± 0,05 kgr / ltr
Solids contents per Weight	approx. 76%
Solids contents per Volume	approx. **63%**
VOC (supplied)	max. 390 gr/ltr (Directive 1999/13/EC, SED)
Recommended Dry Film Thickness	**200 - 350** microns, per coat. An experienced applicator can applied up to 700-1.000 microns per coat, depending on section factor and time of FP, but over coating time will be extended significant.
Theoretical Spreading	3,15 m2/ltr or 2,37 m2/kgr → 200 microns

NATIONAL PAINTS FACTORIES CO. LTD.
P.O.BOX 5822 SHARJAH -UAE

PASSIVE FIRE PROTECTION of Steel from Cellulosic Fires

NATIONAL INTUMESCENT PAINT
solvent based for External & Internal use

01/2009

Rate 1,80 m2/ltr or 1,35 m2/kgr → 350 microns
1,26 m2/ltr or 0,95 m2/kgr → 500 microns,
0,90 m2/ltr or 0,68 m2/kgr → 700 microns

Touch Dry after 4 hours (at 25° C & 60% RH) at 350 microns
after 8 hours (at 25° C & 60% RH) at 700 microns

Dry in depth after 16 hours (for carriage or structure handling) at 350 microns

after 24 hours (for carriage or structure handling) at 700 microns

Full Cure **after** 7 days at 350 microns *
after 12 days at 700 microns

Minimum Over Coating Interval : min. 24 hours, with itself

Table with Over Coating Intervals of NATIONAL INTUMESCENT PAINT , with appropriate alkyd Finish coating, as slow drying NATIONALKYD FP 22 @ 25° – 35° C:

Average DFT, of Fire Intumescent Paint System, solvent-based	200 – 400 microns	450 – 700 microns	750 – 1.000 microns	➢ 1.100 microns
Minimum Over coating time	24 hours	48 hours	60 hours	72 hours
Maximum desired Over coating time	4 days	4 days	4 days	4 days

- Special care must be shown, to safely protect all painted surfaces with plastic covers, when only FP product has applied and awaits for the Finish coat application, in order to avoid humidity absorption or conduct with water of any kind, from the FP product.

Maximum Over Coating Interval, without finish coat : 6 months, under fully covered and dry conditions, without to have absorbed any humidity or be wetted with rain water or

PASSIVE FIRE PROTECTION of Steel from Cellulosic Fires

NATIONAL INTUMESCENT PAINT
solvent based for External & Internal use

01/2009

snow. Id such a case, all wetted film must be thoroughly removed and replaced with new coats.

Shelf life (cool and dry place, up to 35° C) **:** at least 12 months.

Flash Point over 29° C

Recommended Primers, for NATIONAL INTUMESCENT PAINT @ 75-100 microns minimum DFT

National Guard zinc phosphate epoxy primer for Internal and External areas

Recommended Substrate Conditions and Temperatures

♦ We suggest to clean the steel substrate with abrasive blast clean to Sa 1 1/2-2 1/2 ISO 8501-1:1988, with minimum surface profile 30 microns for DFT up to 500 microns, and minimum surface profile 50 microns for DFT more than 700 microns. Abrasive used for blasting should be dry and free from dirt, oil, grease or contamination and have content of water soluble matter not exceeding 0,05%.

♦ We suggest to remove weld spatter and to smooth weld seams and sharp edges

♦ We suggest to clean the primed steel substrate film, from Oils, Fats, Grease, dirt, etc in accordance with SSPC-SP1 solvent cleaning.

♦ We suggest to clean properly all damaged primed surfaces, happened either during transportation our structure erection, repaint locally and afterwards to apply the Fire Intumescent paint.

♦ We suggest that the steel substrate temperature, to be well above 10° C and not above 45° C and at least 3°C above the Dew point, during application and Curing periods.

♦ We suggest that the relative Humidity, during application and Curing periods to be less than 85%.

Instructions in order to Use properly this product

♦ We suggest that you stir very well, with mechanical agitator for 5' – 15' minutes, depending on the existed atmospheric temperatures and conditions.

♦ We suggest that the temperature of the paint, before the application starts, should preferably be over 15° C , otherwise extra solvent **Thinner No 102**, may be required to obtain application viscosity.

♦ We note that too much solvent results in reduced sag resistance and slower curing.

♦ We suggest that you maintain always adequate Ventilation during all application procedures and curing periods.

PASSIVE FIRE PROTECTION of Steel from Cellulosic Fires

NATIONAL INTUMESCENT PAINT
solvent based for External & Internal use

01/2009

- ♦ We suggest that the product flow pump hoses diameter to be at least 3/8 " in.

Methods of Application

Airless Spray pump,	we suggest 60:1 amplifying mode pump and above
Recommended Thinner	Thinner **No 102**
Volume of Thinner	0-5%, depending upon the required DFT and application conditions.
Nozzle Orifice	0.015'' – 0.018'', depending upon the required DFT
Nozzle Pressure	120-150 Bar (1.700– 2.125 p.s.i.)
Nozzle Angle	20° – 50°, depending on shape of steel structure .

Brush / Roller

Recommended Thinner Thinner **No 102**

Multiple coats have to be applied in order to obtain the required DFT

Cleaning Solvent Thinner No.102. We suggest that you clean thoroughly, all pump parts, every day, after the end of works, in order to keep all parts hem in proper condition.

Safety Precautions For this product and recommended thinners, please refer to the relevant Material Safety Data Sheets - MSDS. This is a solvent based paint and care should be taken to avoid inhalation of spray mist or vapor as well as contact between the wet paint and exposed skin or eyes.

Note : We suggest that every 10-12 yrs, to check thoroughly all metallic structure for any paint defects , in order to maintain properly and keep your FP system, always in appropriate use.