

REPORT

Determination of several tests of ZINGA

Haarlem, May 6th, 2013

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Project number : 20120703

Report number : LAB13-0293-REP

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1 INTRODUCTION

1.1 Order

By order of Zingametall bvba in Eke, Belgium, the Centrum voor Onderzoek en Technisch Advies (COT bv) in Haarlem, The Netherlands, has determined several tests of Zinga.

The order to perform the tests has been given in the document, dated March 26th 2013, with reference BESTELBON 2012/274/JVA/GW.

1.2 Aim

The aim of these tests is to determine the reaction to fire and the adhesion of several Zinga applied metal panels, with a dry film thickness up to 180 micrometer and to measure the contents of metallic zinc, the density, the flash point, and the solid contents by mass, of Zinga paste.

1.3 General information

Table 1: Received samples

COT sample number	Samples	Received
19-02-13/0077	2 steel test panels, coated with Zinga Dimensions 90 x 250 x 5 mm	19 February 2013
09-01-13/0013*	Zinga (zinc PASTE)	9 January 2013

*: used for the execution of the wet tests.

2 PROCEDURE

The coatings have been applied at Zingametall on the steel panels.

Specified Dry Film Thickness

Zinga: up to 180 µm

2.1 Dry Film Thickness

The dry film thickness of the coatings on the 2 steel panels has been determined according to ISO 2808.

General data

Principle	: Electromagnetic non-destructive method
Apparatus	: Elcometer 456 (COT E009)
Adjusting	: At zero and a foil of 123 µm
Measurements	: 10 per panel
Ambient temperature	: 23 ± 2 °C
Surface temperature	: 23 ± 2 °C

On each panel ten measurements have been carried out and the values have been corrected with the average value of ten measurements at the non-coated, blasted backside of the panels. The minimum, the maximum, the average and the standard deviation have been reported.

The analysis has been performed on March 26th 2013.

2.2 Adhesion (Cross-Cut test)

The adhesion of the coating has been determined according to ISO 2409. The test has been done on 2 coated steel panels. The spacing between the cuts is 3 mm.

The analysis has been performed on March 26th 2013.

2.3 Reaction To Fire

The determination of the reaction to fire has been performed according to EN 13501-1:2002 (*fire classification of construction products and building elements*). The results of the test have been presented in the Annex.

The analysis has been performed between March 15th and April 19th 2013, by the accredited laboratory Efectis, in Rijswijk.

2.4 Contents of Metallic Zinc in dry film

The determination of the Metallic Zinc content in the dry film, has been performed according to BS 4652 (Specification for zinc-rich priming paint (organic media), by using the titration method with Potassium di-chromate.

For the Metallic Zinc content, the results of the measurements and the average value have been reported in Table 5, as percentage by mass.

The analysis has been performed between March 15th and March 26th 2013.

2.5 Solid contents by mass

The determination of the solid contents has been performed according to ISO 3251 (COT working instruction 20.01.01), using an oven at 105 ± 5 °C.

The samples has been weighed, placed in the oven for 3 hours and weighed again. The percentage solid contents have been calculated.

The results of the solid contents are presented in Table 6 and have been reported as percentage by mass.

The measurements has been performed twice, the average value have been reported.

The analysis has been performed on March 5th 2013.

2.6 Flash Point

The determination of the flash point of Zinga is performed according to ISO 1523 (*determination of flash point- Closed cup Equilibrium method*).

The results of the test have been presented in Table 6, reported in degrees centigrade (°C).

The analysis has been performed between March 7th and March 15th 2013, by the accredited laboratory RPS, in Breda.

2.7 Density

The determination of the density has been performed according to ISO 2811-1/2 (COT working instruction 30.01.03) using a pyknometer.

The average value has been reported.

The analysis has been performed on March 5th 2013.

3 RESULTS

3.1 Dry Film Thickness

Table 2: Results dry film thickness
(COT sample number 19-02-13/0077)

Dry Film Thickness (micrometers)		
	Panel 1	Panel 2
Minimum	107	89
Maximum	162	156
Average	132	134
Standard deviation	21	19
Measurements	10	10

3.2 Adhesion (Cross- Cut)

Table 3: Results cross cut test
(COT sample number 19-02-13/0077)

Cross-cut test ISO 2409	Zinga	
	Panel 1	Panel 2
Min. - max. DFT (µm)	107 - 162	89 - 156
Average DFT (µm)	132 ± 21	134 ± 19
Adhesion (classification)	0-1	1

3.3 Reaction to fire

The performance and results of the fire tests have been presented in 3 reports. They are added to this report as an Annex.

3.4 Metallic Zinc contents in dry film

Table 4: Results contents Metallic Zinc in dry film

COT Sample number	Sample	Metallic Zinc content in dry film (% m/m)	Average of Metallic Zinc content in dry film (% m/m)
09-01-13/0013	1	ZINGA Zinc paste	92.2
	2	ZINGA Zinc paste	92.5
			92.4

3.5 Density, Solid contents by mass, Flash point

Table 5: Results density, solid content by mass and flash point

COT Sample number	Sample	Density (kg/dm ³)	Percentage Solids (% m/m)	Flash point (°C)
09-01-13/0013	ZINGA Zinc paste	2.71	78.8	41

CENTRUM VOOR ONDERZOEK
EN TECHNISCH ADVIES (COT bv)

A handwritten signature in blue ink, appearing to read 'E.S.J. van Nieuwkoop'.

E.S.J. van Nieuwkoop
Laboratory Technician

A handwritten signature in blue ink, appearing to read 'Dr. B.P. Alblas'.

Dr. B.P. Alblas
Manager Laboratory



ANNEX

Efectis reports

**Reaction to fire testing of
ZINGA 2 x 90 µm
Ignitability test according to EN ISO 11925-2:2010**

Report no.	2013-Efectis-R0165a/LNE/BKJX
Sponsor	COT bv Postbus 2113 NL-2002 CC Haarlem The Netherlands
Author(s)	E. van der Laan M.Sc. A.J. Lock
Project number	2013165
Date of issue	May 8, 2013
Number of pages	4

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1. PRODUCT IDENTIFICATION

ZINGA 2 x 90 µm, further referred to as 'the product'.

2. ABSTRACT

Determination of the **ignitability** properties of the product, by **direct small flame impingement** according to EN ISO 11925-2:2010, with the objective to obtain the reaction to fire classification according to EN 13501-1:2007+A1:2009.

3. DETAILS OF THE PRODUCT TESTED

3.1. INTENDED APPLICATION

The product will be used as a coating on steel.

3.2. IMPORTER

COT bv
Postbus 2113
NL-2002 CC Haarlem
The Netherlands

3.3. MANUFACTURER

ZINGAmetall bvba

3.4. PRODUCT DESCRIPTION

According to the sponsor the product is composed of:
Film Galvanising system

The product has a density of approx. 2.7 kg/dm³.
For a layer thickness of 2x 90 µm DFT 0.97 kg/m² is used.

4. DETAILS OF THE EXAMINATION

4.1. SAMPLES

Sampling procedure	The samples were submitted by the sponsor.
Age	At the time of receipt: no information received.
Date of receipt	February 14, 2013

4.2. SPECIMEN PREPARATION

Substrate used	Steel 5.5 mm
Method of fixing	Sprayed

4.3. CONDITIONING

Prior to the examinations, the specimens were conditioned over a period of at least two weeks at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) % according to § 4.1 of EN 13238:2010.

4.4. EXAMINATION

Number of tests	A total of twelve single ignitability tests were carried out according to EN ISO 11925-2.
Deviations from the test method	None
Harmonised Product Standard	At the time of examination of the product, the sponsor was not aware of a related existing Harmonised Product Standard.
Date of examination	April 16, 2013

The results are given in Table 1.

5. CONCLUSIONS

A formal classification is to be assessed in accordance with EN 13501-1, "Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests".

Remarks:

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Regarding the precision of the test method, following Annex B of EN ISO 11925-2, the absolute repeatability/reproducibility for this test method is estimated to lie within 3 s to 5 s for all times measured.

Yours faithfully,



E. van der Laan M.Sc.
Project leader reaction to fire



A.J. Lock
Project leader reaction to fire

APPENDIX: RESULTS

Table 1: Ignitability classification parameter results

Flame application time: 30 s					
Sample	Ignition of sample	Maximum flame height	t ₁₅₀	Afterburning time	Ignition of filter Paper
	{Y=Yes/N=No}	[mm]	[s]	[s]	{Y=Yes/N=No}
Surface ignition					
1	Y	30	not reached	0	N
2	Y	29		0	N
3	Y	30		0	N
4	Y	28		0	N
5	Y	29		0	N
6	Y	28		0	N
Average		29			
Classification parameters	150 mm not reached within 30 s				N
Edge ignition					
1	Y	15	not reached	0	N
2	Y	12		0	N
3	Y	14		0	N
4	Y	14		0	N
5	Y	13		0	N
6	Y	17		0	N
Average		4			
Classification parameters	150 mm not reached within 60 s				N

Observations of physical behaviour of the test specimen: None

Reaction to fire testing of ZINGA 2 x 90 µm Single Burning Item test according to EN 13823:2010

Report no.	2013-Efectis-R0165b/LNE/BKJX
Sponsor	COT bv Postbus 2113 NL-2002 CC Haarlem The Netherlands
Author(s)	E. van der Laan M.Sc. A.J. Lock
Project number	2013165
Date of issue	May 8, 2013
Number of pages	11

PRODUCT IDENTIFICATION

ZINGA coating 2 x 90 µm, further referred to as 'the product'.

1. ABSTRACT

Determination of the reaction to fire properties of the product, when exposed to the thermal attack by a **Single Burning Item** according to EN 13823:2010, with the objective to obtain the reaction to fire classification according to EN 13501-1:2007+A1:2009.

2. DETAILS OF THE PRODUCT TESTED

2.1 INTENDED APPLICATION

The product will be used as a coating on steel.

2.2 IMPORTER

COT bv
Postbus 2113
NL-2002 CC Haarlem
The Netherlands

2.3 MANUFACTURER

ZINGAmetall bvba

3. PRODUCT DESCRIPTION

According to the sponsor the product is from inside out composed of:
Film Galvanising system

The product has a density of approx. 2.7 kg/dm³.
For a layer thickness of 2x 90 µm DFT 0.97 kg/m² is used.

4. DETAILS OF THE EXAMINATION

4.1 SAMPLES

Sampling procedure	The specimens were submitted were prepared and submitted by the sponsor.
Age	At the time of receipt: no information received.
Date of receipt	February 14, 2013

4.2 SPECIMENS

Substrate used	Steel, thickness approx. 5.5 mm (class A1/A2 according to EN 13238:2010)
Specimen preparation	The long specimen wing was not provided with a vertical joint at a distance of 200 mm from the inner corner and a horizontal joint at a distance of 500 mm from the bottom. See photographs of the SBI test at the end of the report.

4.3 CONDITIONING

Prior to the examinations, the specimens were conditioned over a period of at least two weeks at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) % according to § 4.1 of EN 13238.

4.4 EXAMINATION

Method of mounting and fixing	The panels were positioned with an air gap of 80 mm to the backing board.
Deviations from the test method	None
Harmonised Product Standard	At the time of examination of the product, the sponsor was not aware of a related existing Harmonised Product Standard.
Number of tests	A total of three Single Burning Item tests were carried out, all in accordance with EN 13823.
Date of examination:	March 27, 2013

The results are given in Table 1.

Table 1: Single Burning Item classification parameter results

Test parameter	Test number	1	2	3	Classification parameter
	Sample variant	Coating 2 x 90 µm			
FIGRA _{0,2 MJ}	[W/s]	0	0	0	0
FIGRA _{0,4 MJ}	[W/s]	0	0	0	0
THR _{600s}	[MJ]	0.3	0.2	0.1	0.2
LFS	{Yes, No}	No	No	No	No
SMOGRA	[m ² /s ²]	0.0	0.0	0.0	0.0
TSP _{600s}	[m ²]	24	18	23	21
Flaming droplets/particles		No	No	No	No
Flaming ≤ 10 s	{Yes, No}	No	No	No	No
Flaming > 10 s	{Yes, No}	No	No	No	No

FIGRA Fire growth rate: Maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a THR-threshold of 0.2 MJ or 0.4 MJ.

THR_{600s} Total heat release from the specimen during the first 600s of exposure to the main burner flames.

LFS Lateral flame spread over the long specimen wing.

SMOGRA Smoke growth rate: Maximum of the quotient of smoke production rate from the specimen and the time of its occurrence.

TSP_{600s} Total smoke production from the specimen during the first 600s of exposure to the main burner flames.

Observations of physical behaviour of the test specimen: None

5. CONCLUSIONS

A formal classification is to be assessed in accordance with EN 13501-1, “Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests”.

Graphs of Rate of Heat Release ($HRR_{av}(t)$), Rate of Smoke Production ($SPR_{av}(t)$), Total Heat release ($THR(t)$), Total Smoke Production ($TSP(t)$), $FIGRA_{0.2 MJ}$, $FIGRA_{0.4 MJ}$ and SMOGRA, are presented hereafter followed by some photographs of the test setup and test results.

Remarks:

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Regarding the estimated precision of the test method, the following information is given in Annex B of EN 13823.

Table B.2 – Average relative standard deviations

	$FIGRA_{0.2 MJ}$	$FIGRA_{0.4 MJ}$	$THR_{600 s}$	SMOGRA	$TSP_{600 s}$
Average (s_r / m)	14 %	15 %	11 %	15 %	18 %
Average (s_R / m)	23 %	25 %	21 %	40 %	44 %

Yours faithfully,



E. van der Laan M.Sc.
Project leader reaction to fire



A.J. Lock
Project leader reaction to fire

APPENDIX: CHARTS

- Chart 1 Rate of Heat Release ($HRR_{av}(t)$) [kW]
- Chart 2 Rate of Smoke Production ($SPR_{av}(t)$) [m^2/s]
- Chart 3 Total Heat release ($THR(t)$) [MJ]
- Chart 4 Total Smoke Production ($TSP(t)$) [m^2]
- Chart 5 $FIGRA_{0.2 MJ}$ [W/s]
- Chart 6 $FIGRA_{0.4 MJ}$ [W/s]
- Chart 7 SMOGRA [m^2/s^2]

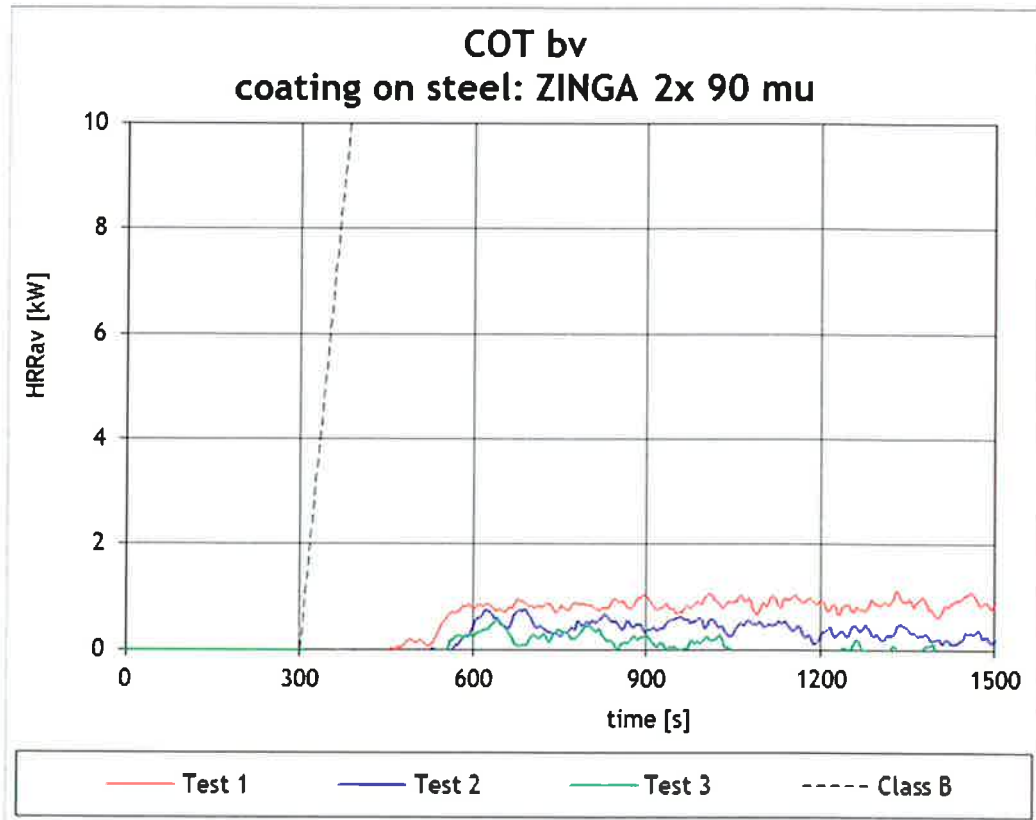


Chart 1: Rate of Heat Release (HRR_{av}(t)) [kW]

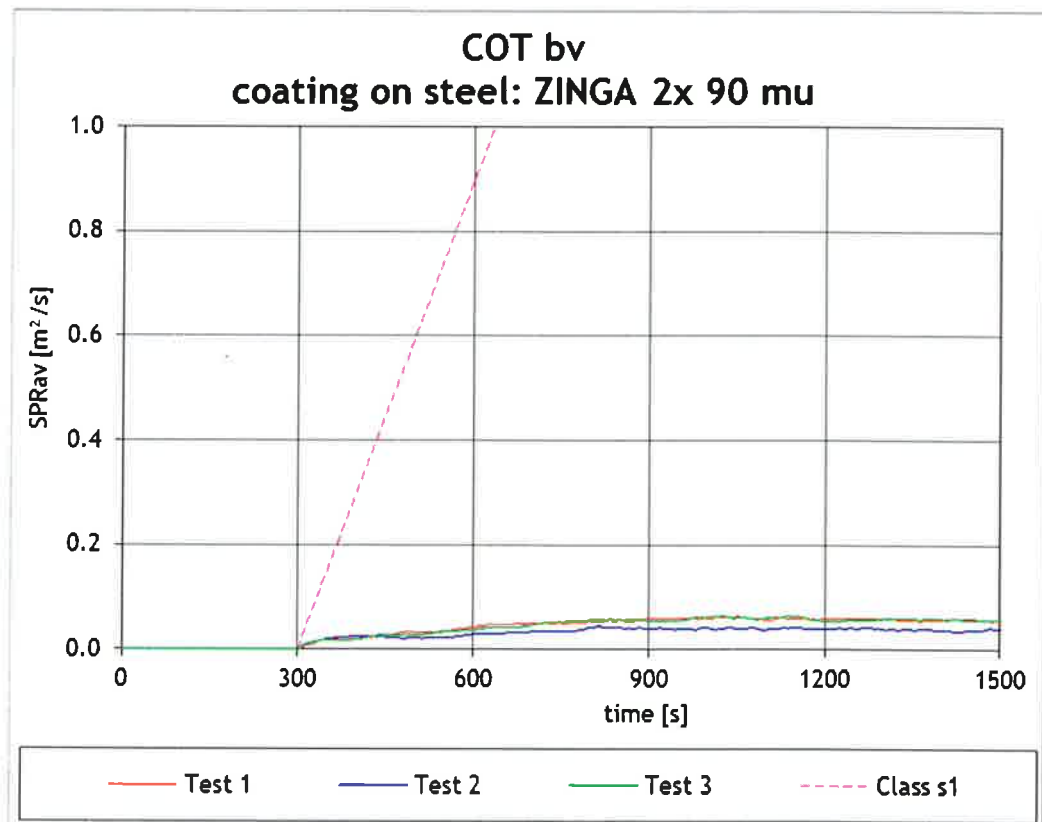
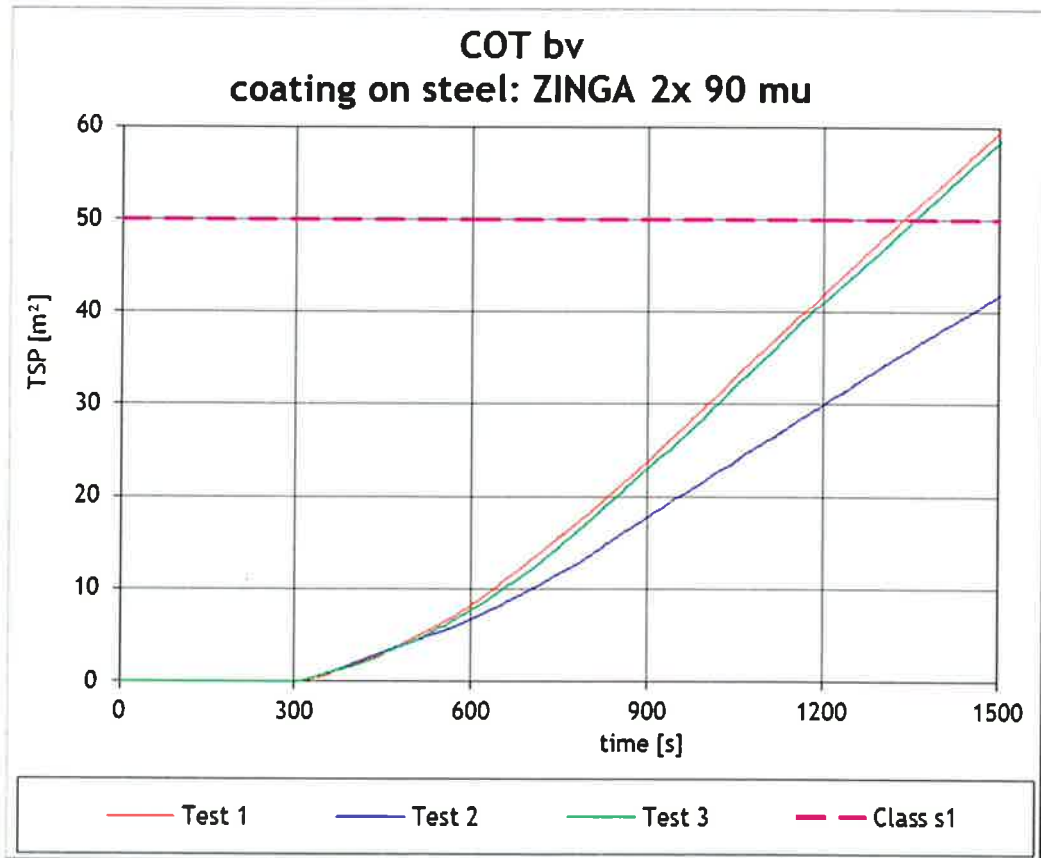
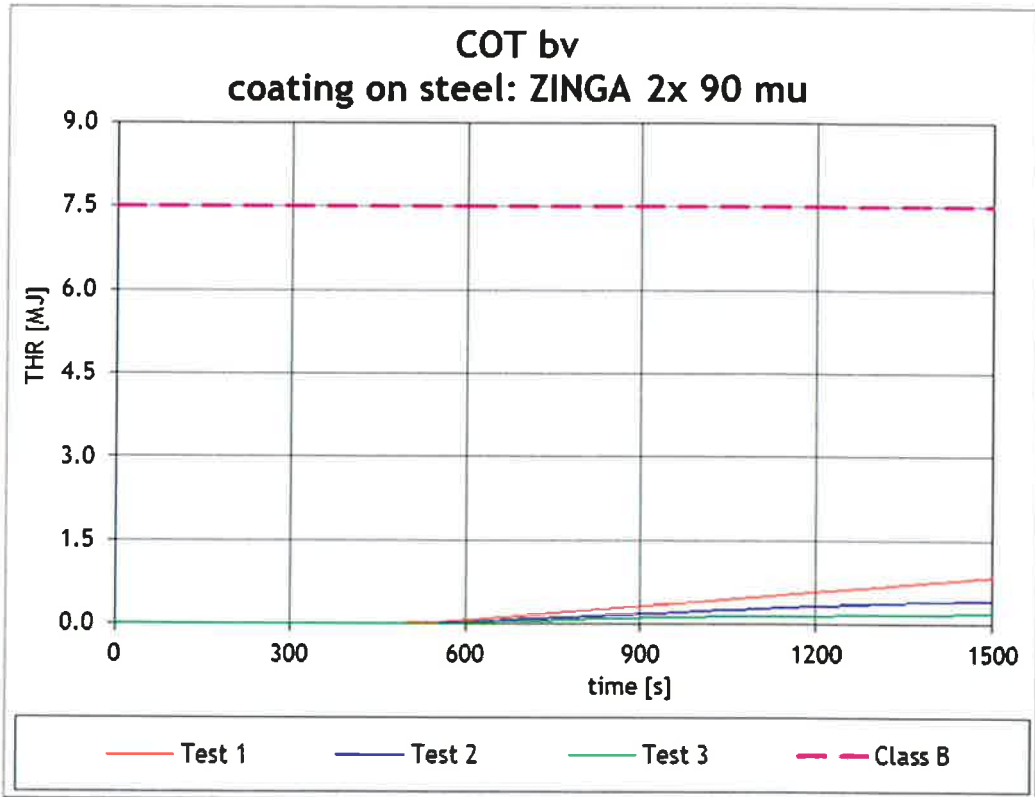


Chart 2: Rate of Smoke Production (SPR_{av}(t)) [m²/s]



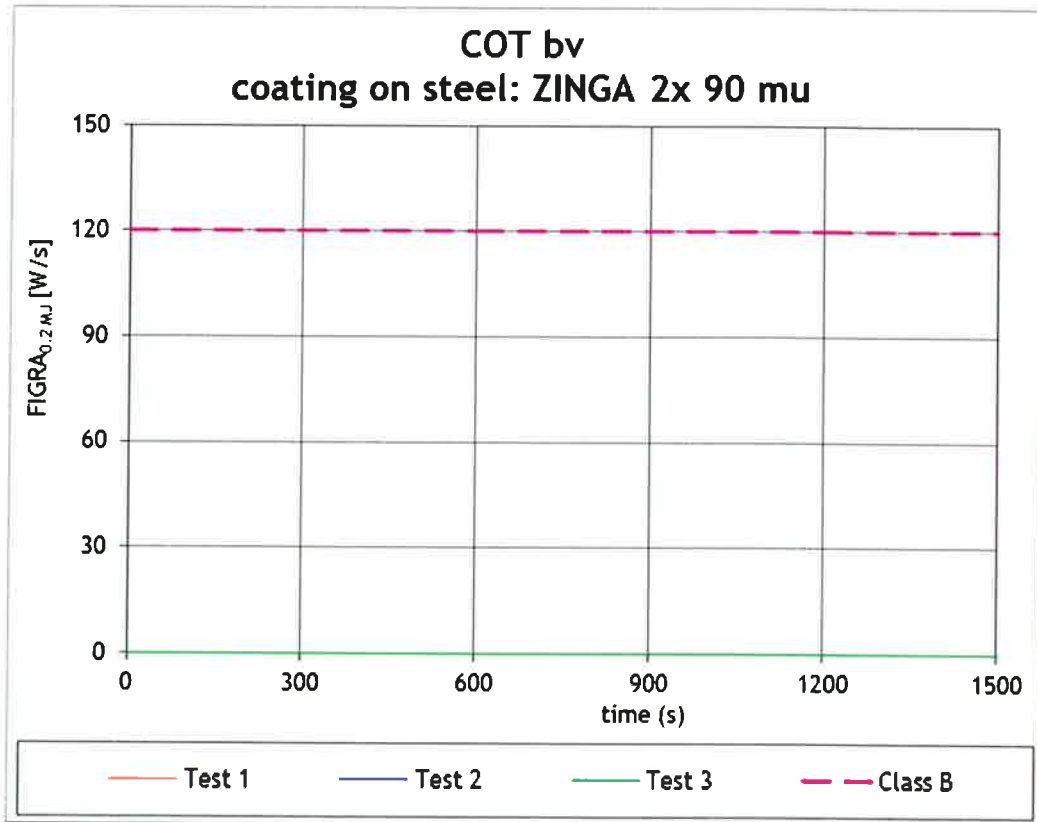


Chart 5: FIGRA_{0.2 MJ} [W/s]

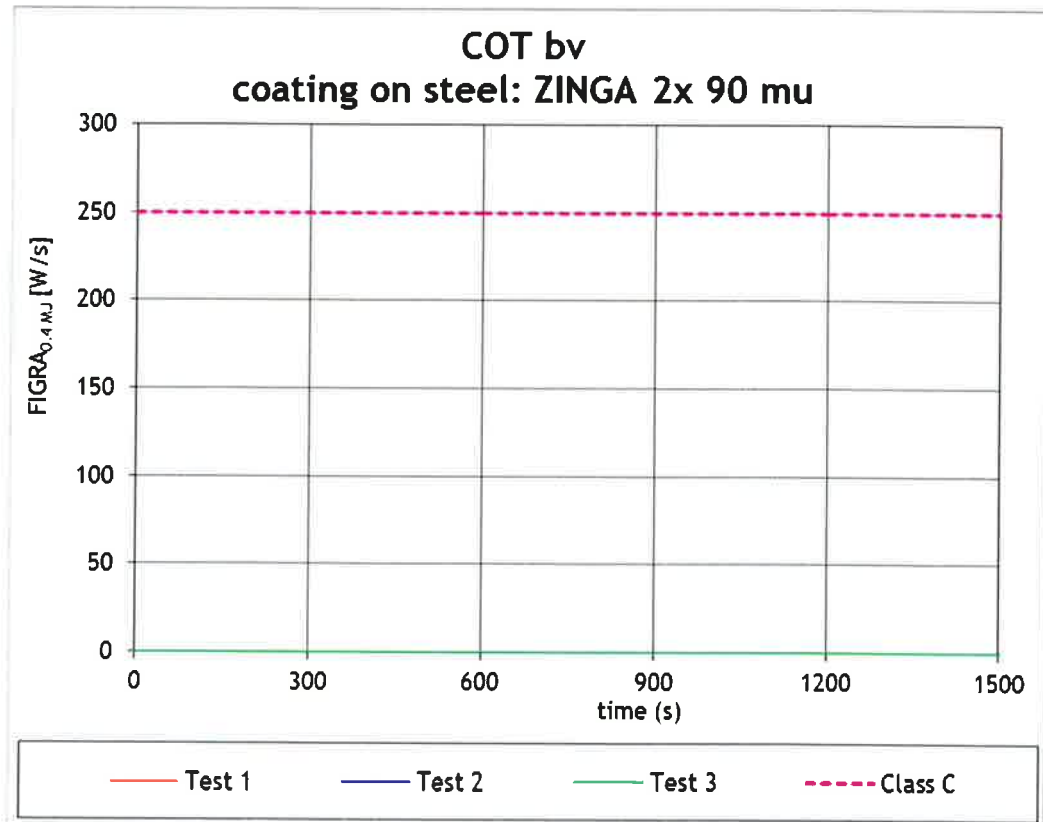
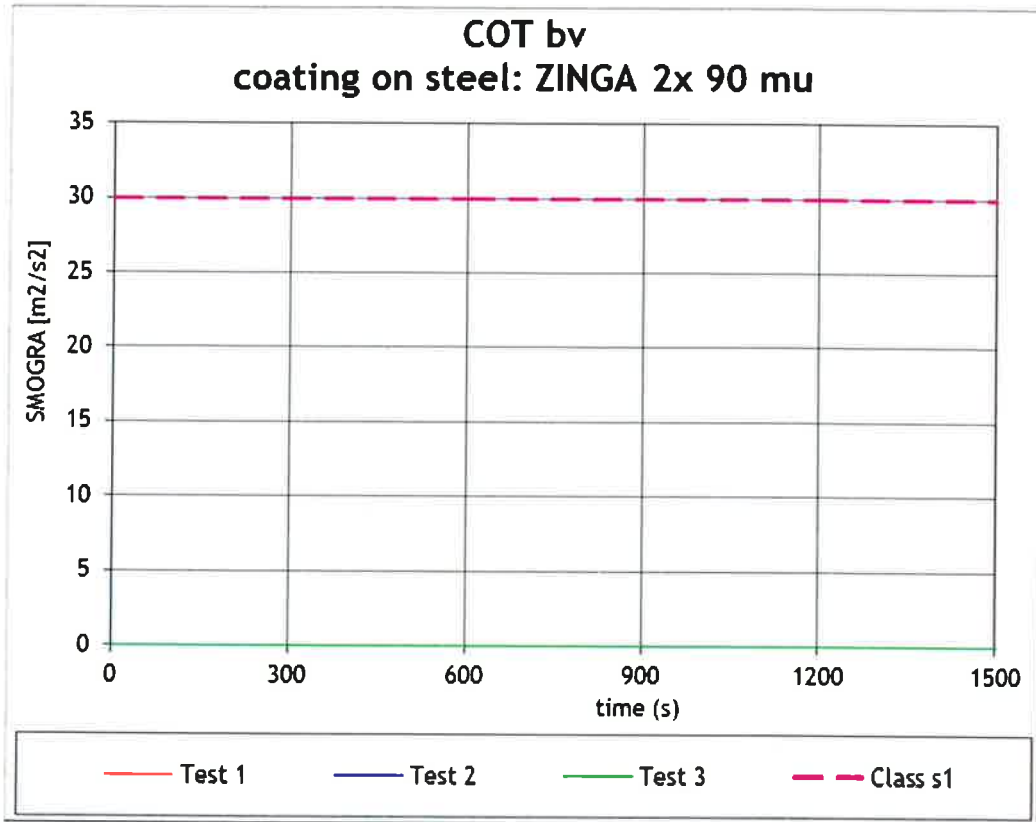


Chart 6: FIGRA_{0.4 MJ} [W/s]



APPENDIX: PHOTOGRAPHS



Photo 1 and 2: Specimen 1 prior to testing



Photo 3 and 4: Specimen 1 after testing

CLASSIFICATION OF REACTION TO FIRE PERFORMANCE IN ACCORDANCE WITH EN 13501-1:2007+A1:2009

Classification no.	2013-Efectis-R0165c/LNE/BKJX
Sponsor	COT bv Postbus 2113 NL-2002 CC Haarlem The Netherlands
Product name	ZINGA 2 x 90 µm, coating on steel
Prepared by	Efectis Nederland BV
Notified body no.	1234
Author(s)	E. van der Laan M.Sc. A.J. Lock
Project number	2013165
Date of issue	May 8, 2013
Number of pages	5

1. INTRODUCTION

This classification report defines the classification assigned to **ZINGA 2 x 90 µm, coating on steel** in accordance with the procedures given in EN 13501-1:2007+A1:2009.

2. DETAILS OF CLASSIFIED PRODUCT

2.1. GENERAL

The product, **ZINGA 2 x 90 µm, coating on steel**, is defined as a coating on steel.

2.2. PRODUCT DESCRIPTION

Product description:
Film Galvanising system

2.3. IMPORTER/MANUFACTURER

COT bv
Postbus 2113
NL-2002 CC Haarlem
The Netherlands

ZINGAmetall bvba

3. STANDARDS, REPORTS, RESULTS AND CRITERIA IN SUPPORT OF THIS CLASSIFICATION

3.1. REPORTS

Name of Laboratories	Name of sponsor	Report ref. no.	Test method
Efectis Nederland BV The Netherlands	COT bv The Netherlands	2013-Efectis-R0165a 2013-Efectis-R0165b	EN ISO 11925-2:2010 EN 13823:2010

3.2. TEST RESULTS

Test method and test number	Parameter	No. tests	Results	
			Continuous parameter - mean (m)	Compliance with parameters
EN-ISO 11925-2				
surface flame impingement	Fs ≤150 mm	6	29	-
	ignition of filter paper		-	Compliant
Edge flame impingement	Fs ≤150 mm	6	14	-
	ignition of filter paper		-	Compliant
	ignition of filter paper		-	Compliant
EN 13823				
	FIGRA _{0.2MJ} [W/s]	3	0	-
	FIGRA _{0.4MJ} [W/s]		0	-
	THR _{600s} [MJ]		0.2	-
	LFS < edge		-	Compliant
	SMOGRA [m ² /s ²]		0.0	-
	TSP _{600s} [m ²]		21	-
	Flaming debris - flaming ≤ 10 s - flaming > 10 s		-	Compliant Compliant

3.3. CLASSIFICATION CRITERIA

Classification criteria of the Single Burning Item (SBI) test			
Class	Fire	Class	Smoke
A2	FIGRA _{0.2 MJ} ≤ 120 W/s LFS < edge of the long wing specimen THR _{600s} ≤ 7,5 MJ	s1	SMOGRA ≤ 30 m ² /s ² TSP _{600s} ≤ 50 m ²
B	FIGRA _{0.2 MJ} ≤ 120 W/s LFS < edge of the long wing specimen THR _{600s} ≤ 7,5 MJ	s2	SMOGRA ≤ 180 m ² /s ² TSP _{600s} ≤ 200 m ²
C	FIGRA _{0.4 MJ} ≤ 250 W/s LFS < edge of the long wing specimen THR _{600s} ≤ 15 MJ	Class	Droplets
		d0	No flaming droplets/particles
		d1	Flaming droplets/particles < 10 s
D	FIGRA ≤ 750 W/s	d2	Not d0 or d1

4. CLASSIFICATION AND FIELD OF APPLICATION

4.1. REFERENCE OF CLASSIFICATION

This classification has been carried out in accordance with clause 11 of EN 13501-1:2007+A1:2009.

4.2. CLASSIFICATION

The product, **ZINGA 2 x 90 µm, coating on steel**, in relation to its reaction to fire behaviour is classified:

B

The additional classification in relation to smoke production is:

S1

The additional classification in relation to flaming droplets / particles is:

d0

Reaction to fire classification: B - s1, d0

4.3. FIELD OF APPLICATION

This classification is valid for the following product parameters:

Thickness	2 x 90 µm
Surface density	Coverage 0.97 kg/m ²
Other properties	Zinc content in dry layer >96%, Unlimited pot and shelf life, Provides cathodic protection

This classification is valid for the following end use applications:

Substrate	Non-combustible (class A1/A2 according to EN 13238:2010)
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4.4. DURATION OF THE VALIDITY OF THIS CLASSIFICATION REPORT

There are no limitations in time on the validity of this report.

5. LIMITATIONS

This classification document does not represent type approval or certification of the product.

Yours faithfully,



E. van der Laan M.Sc.
Project leader reaction to fire



A.J. Lock
Project leader reaction to fire