

Test on a prefinished aluminium sheet at 50-kW/m² irradiance in accordance with ISO 5660-Part 1:2015(E)

Fire Testing Report

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Report Number: FNKI 12514
Quote Number: NKI8314

Date: 14 February 2020
Version: A

Client: SPS Building

Commercial-in-confidence

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New Zealand

Test Report Details

Document: Fire Testing Report

Test Standard: ISO 5660-Part 1:2015(E) at 50-kW/m² irradiance




Client: SPS Building

Quote Number: NKI8314

Test Report Status and Revision History

VERSION	STATUS	DATE	DISTRIBUTION	COMMENT	ISSUE NO.
Draft	Draft for internal review	7 February 2020	CSIRO		Draft
A	Final for issue	14 February 2020	SPS Building		FNKI 12514

Test Report Authorisation

AUTHOR	REVIEWED BY	AUTHORISED BY
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1 Summary

Sponsored Investigation Report Number FNKI 12514

Test on a prefinished aluminium sheet at 50-kW/m² irradiance in accordance with ISO 5660-Part 1:2015(E)

2 Test Details

2.1 Sample Identification

Alucobond Alucolux

2.2 Sponsor

SPS Building
220b Bush Road
ROSEDALE AKL 0632
NEW ZEALAND

2.3 Manufacturer

Alucobond (Far East) Pty Ltd
6 Shenton Way, 40-05
OUE DOWNTOWN 1, 068809
SINGAPORE

2.4 Job Number

NKI8314

2.5 Test Date

12 December 2019

2.6 Description of Sample

The sponsor described the tested specimen as a polyvinylidene fluoride (PVDF) coated aluminium sheet.

Nominal thickness of PVDF:	28 µm to 45 µm
Nominal thickness of aluminium sheet:	3 mm ± 0.15 mm
Nominal total thickness:	3 mm
Nominal density:	2730 kg/m ³
Nominal mass:	8.19 kg/m ²
Colour:	black

2.7 Documentation

The following documents were supplied by the sponsor as a full and complete description of the sample:

- Test Agreement and form FTAF33 dated 26 November 2019.

3 Method

3.1 Conditioning of Specimens

Prior to the test, the specimens were conditioned to constant mass at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 10\%$.

3.2 Test Method

Tests were performed in accordance with International Standard ISO 5660-1:2015 Reaction-to-fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method) and Smoke production rate (dynamic measurement). All test specimens were exposed in the horizontal orientation with the standard pilot operating.

Three specimens were tested at an irradiance level of 50-kW/m^2 . Nominally $100 \times 100\text{-mm}$ specimens were tested as supplied. Specimens were tested with the use of an edge frame. The edge frame reduces the test surface area to 0.0088-m^2 and this is the area used in calculations.

For the test, specimens were wrapped in aluminium foil so that the four edges and the bottom of the specimen were covered. The foil formed a shallow tray that retained any molten material during testing.

The nominal exhaust system flow rate for all tests was $0.024\text{-m}^3/\text{s}$.

A measured quantity of ethanol was burnt to obtain a C factor to be used in the Heat Release Rate calculations.

3.3 Departure from Standard

In performing heat release rate calibration to determine the orifice constant, C , an alternative procedure was employed as specified in Clause 10.2.4 of ISO 5660-1:2015(E) by burning a measured quantity of absolute ethanol.

The test data presented in this report is based on a 15 minute exposure to the test as per the client's request and not based on a 30 minute exposure as required by Clause 11.3.5 (b) of ISO 5660-1:2015(E).

3.4 Duration of Test

The test is terminated when any one of the following is applicable:

1. 32 minutes after time to sustained flaming;
2. The specimen fails to ignite after a 30 minute exposure;
3. O_2 concentration returns to pre-test value for at least 10 minutes; or
4. The mass of the specimen becomes zero for sixty seconds.

4 Results and Observations

Observations

4.1.1 SPECIMEN 1

The specimen began to smoke after 54 seconds exposure to the test. Some flashing was observed on the specimen. The specimen failed to ignite after a 32 minute exposure to the test. The test was terminated when 32 minutes have elapsed.

4.1.2 SPECIMEN 2

The specimen began to smoke after 60 seconds exposure to the test. Some flashing was observed on the specimen. The specimen failed to ignite after a 32 minute exposure to the test. The test was terminated when 32 minutes have elapsed.

4.1.3 SPECIMEN 3

The specimen began to smoke after 57 seconds exposure to the test. Some flashing was observed on the specimen. The specimen failed to ignite after a 32 minute exposure to the test. The test was terminated when 32 minutes have elapsed.

4.2 Results of Tests

The results of tests as specified in the Standard are summarised in Table 1 and Table 2.

Test Details:

Test Number:	K112514
Date of test:	12/12/19
Test Report Date:	14/02/20
Ethanol burn ('C' factor):	0.039703

Table 1 Heat Release Rates (HRR) Results at 15 Minutes Exposure

	IRRADIANCE (kW/m ²)	EXHAUST SYSTEM FLOW RATE (m ³ /s)	TIME TO SUSTAINED BURNING (s)	TEST DURATION (s)	THICKNESS (mm)	SPECIMEN MASS (g)	SPECIMEN MASS AT SUSTAINED FLAMING (g)	MASS REMAINING (g)	MASS LOSS (g/m ²)	AVERAGE RATE OF MASS LOSS (g/m ² .s)	SPECIMEN MASS LOSS $M_{A,10-90}$ (g/m ² .s)	PEAK HRR (kW/m ²)	AVERAGE HRR (FIRST 180s AFTER IGN)	AVERAGE HRR (FIRST 300s AFTER IGN)	TOTAL HEAT RELEASED (MJ/m ²)
Sample 1	50	0.024	900	2.97	79.25	77.45	205	2.27	2.27	5.4	1.6	1.2	0.37		
Sample 2	50	0.024	900	2.93	78.89	78.29	68	2.27	2.27	4.2	0.2	0.5	0.15		
Sample 3	50	0.024	900	2.93	79.01	77.8	136	2.27	2.28	0.0	0.0	0.0	0.00		
Mean			900.0			77.9	136.4	2.27	2.3	3.2	0.6	0.6	0.17		
SD			0.0			0.4	68.2	0.0	0.0	2.8	0.9	0.6	0.2		

Note: The data used in the table above is based on a 15 minute exposure of the test samples as per the client’s requirements. Refer to clause 3.3 of this report for further details.

Table 2 Average Specific Extinction Area (ASEA) & Smoke Production Results at 15 Minutes Exposure

	EXPOSED SURFACE AREA (m ²)	AVERAGE SPECIFIC EXTINCTION AREA (m ² /kg)	AVERAGE SEA OVER FLAMING PHASE (m ² /kg)	SMOKE PRODUCTION: NON-FLAMING PERIOD (m ² /m ²)	SMOKE PRODUCTION: FLAMING PERIOD (m ² /m ²)	TOTAL SMOKE PRODUCTION (m ² /m ²)
Sample 1	0.0088	99.0	N/A	0.0	4.0	4.0
Sample 2	0.0088	279.4	N/A	0.0	3.8	3.8
Sample 3	0.0088	152.6	N/A	0.0	4.2	4.2
Mean		177.0		0.0	4.0	4.0
SD		92.7		0.0	0.2	0.2

Note: The data used in the table above is based on a 15 minute exposure of the test samples as per the client’s requirements. Refer to clause 3.3 of this report for further details.

Figure 1 Heat Release Rate (HRR)

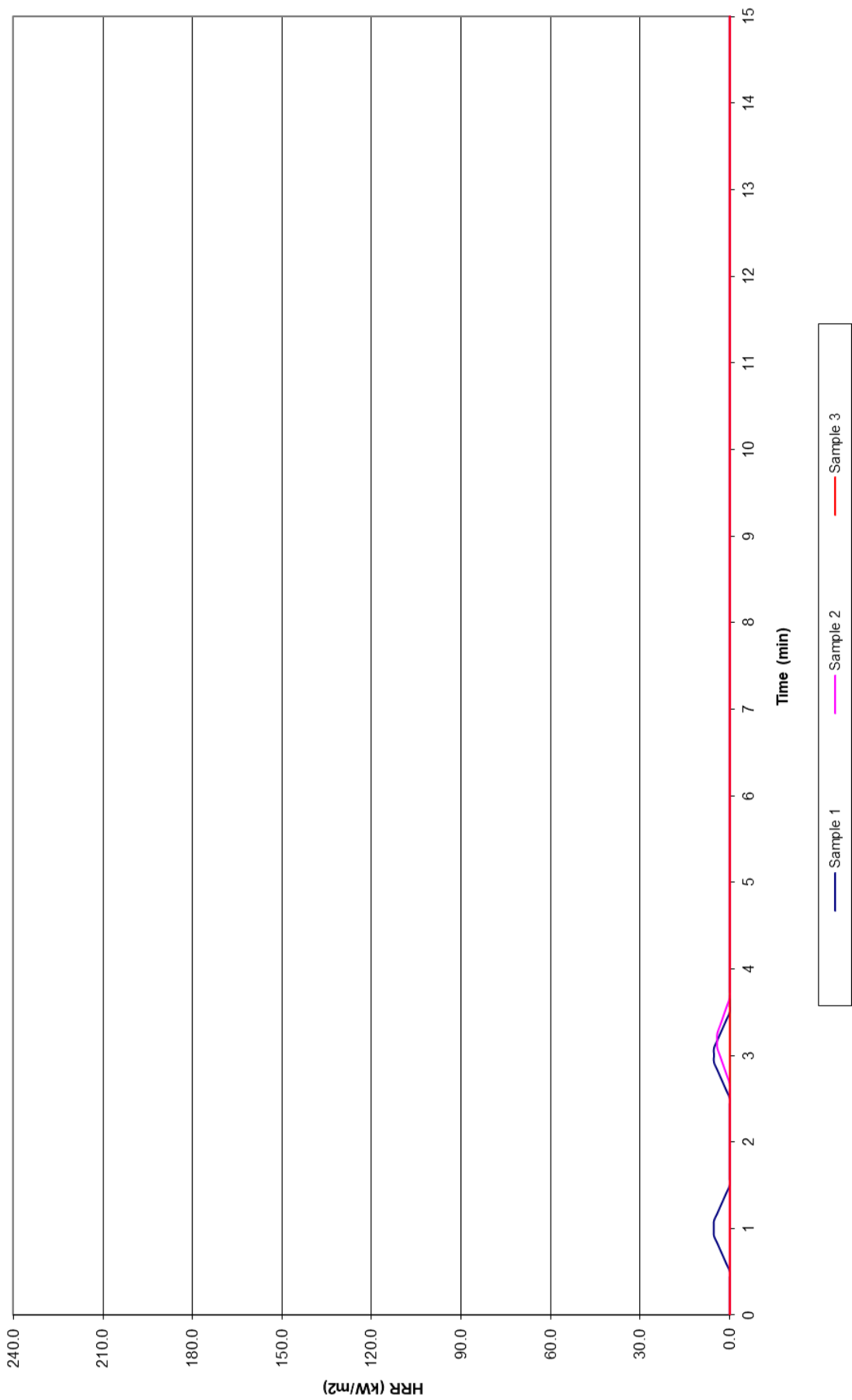


Figure 2 Effective Heat of Combustion (EHC)

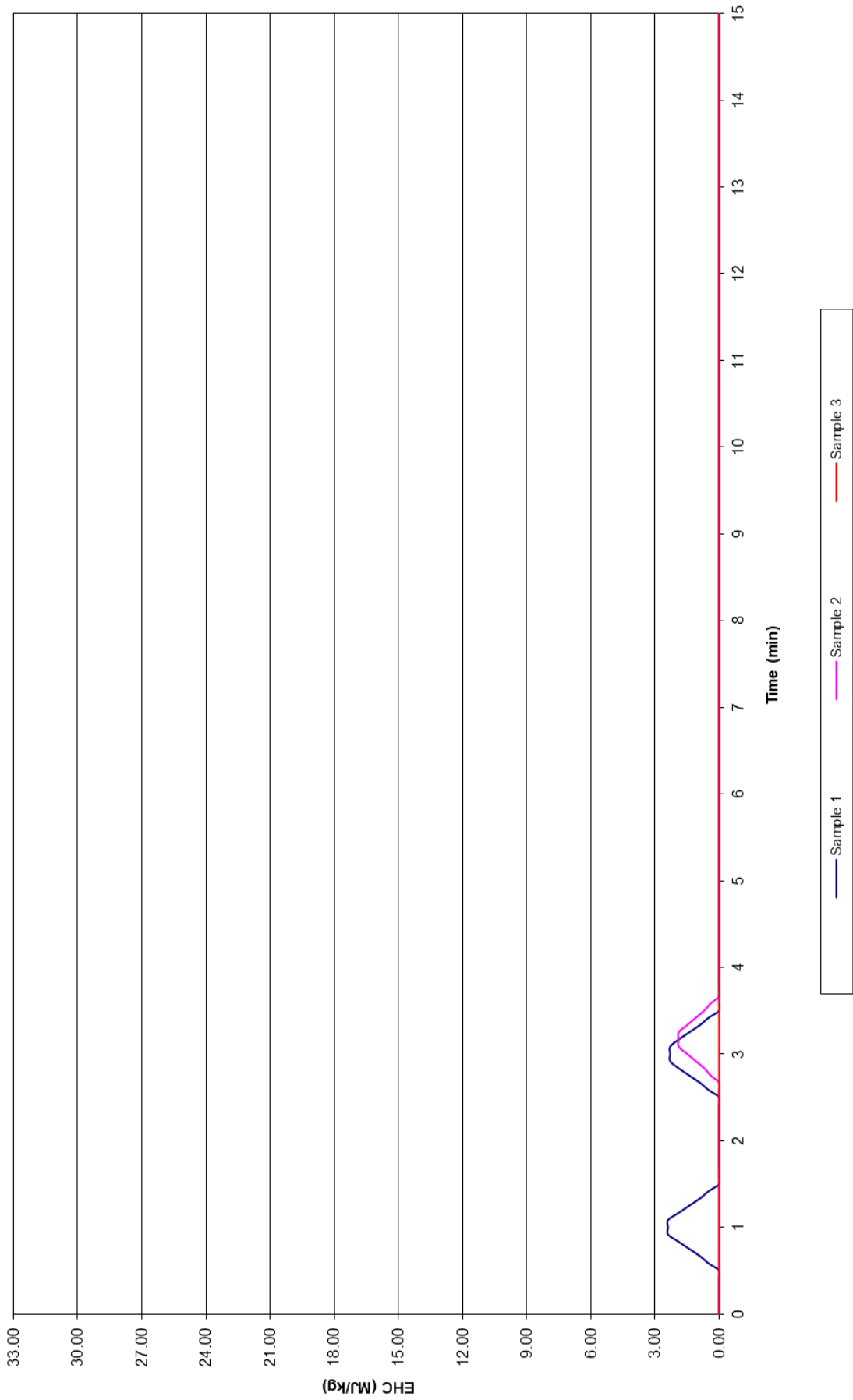
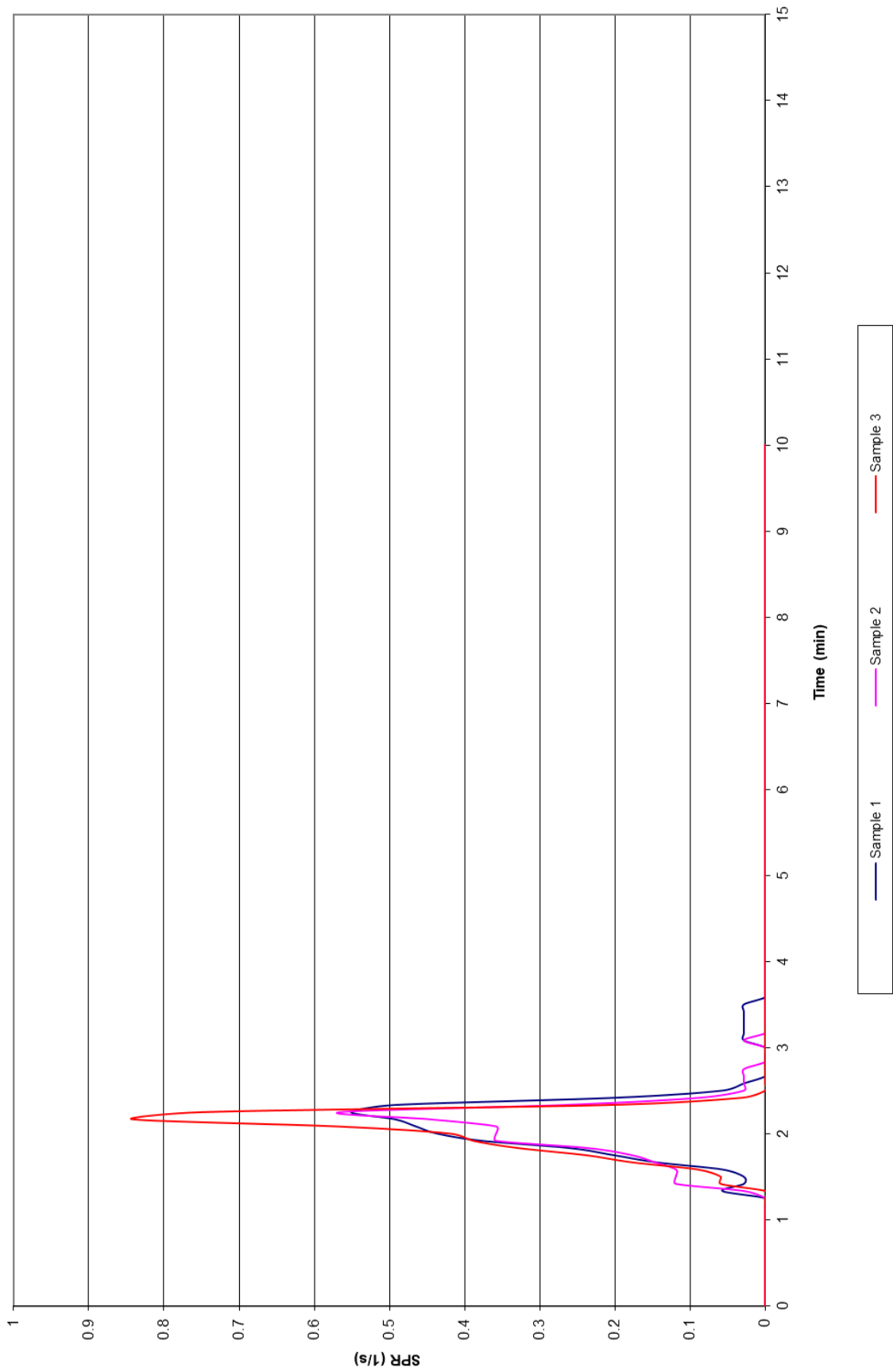


Figure 3 Rate of smoke production per unit area



End of Report

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