

**Test on polyisocyanurate foam system at 50-kW/m²
irradiance in accordance with AS/NZS 3837:1998**

Report number FNK 10180

CSIRO job number NK6457

Date of Issue: 26 July 2011

Client

Australian Urethane Systems Pty Ltd

Commercial-in-confidence



CSIRO – Materials Science and Engineering
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SUMMARY

SPONSORED INVESTIGATION REPORT No. FNK 10180

TEST ON POLYISOCYANURATE FOAM SYSTEM AT 50-kW/m²
IRRADIANCE IN ACCORDANCE WITH AS/NZS 3837:1998

Sample Identification:

Pire 45 (DPE 1807 PIR)

Sponsor:

Australian Urethane Systems Pty Ltd
25 Garling Road
KINGS PARK NSW
AUSTRALIA

Manufacturer:

Australian Urethane Systems Pty Ltd
25 Garling Road
KINGS PARK NSW
AUSTRALIA

Job Number:

NK6457

Test Date:

19 July 2011

Description of Sample:

The sponsor described the tested specimen as polyisocyanurate foam. The specimen contained flame retardant additives.

Nominal thickness: 50 mm
Nominal density: 47 kg/m³ to 48 kg/m³
Colour: light yellow

Documentation:

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

Test Agreement and form FTAF33 dated 14 July 2011.

Conditioning of Specimens:

Prior to the test, the specimens were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 10%.

Test Method:

Tests were performed in accordance with Australian/New Zealand Standard 3837:1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter. All test specimens were exposed in the horizontal orientation with the standard pilot operating.

Nominally 100 x 100-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-m², and this is the area used in calculations. The specimen was restrained using a wire grid.

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.

Six specimens were tested at an irradiance level of 50-kW/m².

The nominal exhaust system flow rate for all tests was 0.024-m³/s.

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

Duration of Test:

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

1. 2 minutes have passed since all flaming from the specimen ceased; and
2. the average mass loss over a 1 minute period has dropped below 150-g/m²;
3. 60 minutes have elapsed; or
4. the specimen fails to ignite after a 10 minute exposure.

Note: the mass loss test end criterion was not used for this test.

Observations:**Specimen 1**

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 27 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Specimen 2

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 30 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Specimen 3

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 27 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Specimen 4

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 42 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Specimen 5

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 29 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Specimen 6

The specimen started to smoke immediately after exposure to the test. The specimen ignited at 41 seconds. The test was terminated when two minutes had passed since all flaming from the specimen ceased.

Results:

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

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TESTED BY:



Heherson Alarde
Testing Officer



Garry E Collins
Manager, Fire Testing and Assessments

26 July 2011

Test Details:

Date of test: 19/7/11
 Test Report Date: 26/7/11
 Ethanol burn ('C' factors): 0.048386

	Irradiance (kW/m ²)	Time to sustained burning (s)	Test duration (s)	Thickness (mm)	Specimen mass (g)	Mass remaining (g)	Mass loss (g)	Percent of mass pyrolysed (%)	Average rate of mass loss (g/m ² .s)	Peak HRR (kW/m ²)	Average HRR (first 60s after ign)	Average HRR (first 180s after ign)	Average HRR (first 300s after ign)	Total heat released (MJ/m ²)	Average EHC (MJ/kg)	Average specific extinction area (m ² /kg)
Sample 1	50	27	950	50	18.83	5.23	13.60	72.23	3.50	86.9	68.8	48.6	40.6	15.13	9.79	18.9
Sample 2	50	30	845	50	19.75	6.55	13.20	66.84	3.50	85.7	68.8	63.8	56.6	26.64	17.76	58.0
Sample 3	50	27	950	50	20.2	5.90	14.30	70.79	3.50	86.6	72.1	66.4	59.4	30.12	18.54	41.7
Sample 4	50	42	1040	50	20.89	6.9	14.00	67.02	3.48	58.6	50.0	51.3	46.2	16.86	10.60	39.9
Sample 5	50	29	630	50	18.97	8.5	10.50	55.35	3.52	77.2	68.9	62.0	53.4	20.97	17.57	10.3
Sample 6	50	41	855	50	20.6	7.6	13.00	63.11	3.49	76.2	69.7	63.0	55.5	27.80	18.82	17.8
Mean		32.7	878.3		19.9	6.8	13.1	65.9	3.5	78.5	66.4	59.2	51.9	22.9	15.5	31.1
SD		6.9	141.2		0.8	1.2	1.4	6.1	0.0	10.9	8.1	7.3	7.1	6.2	4.2	18.3

Table 1- Results of tests

Figure 1 - Heat Release Rate

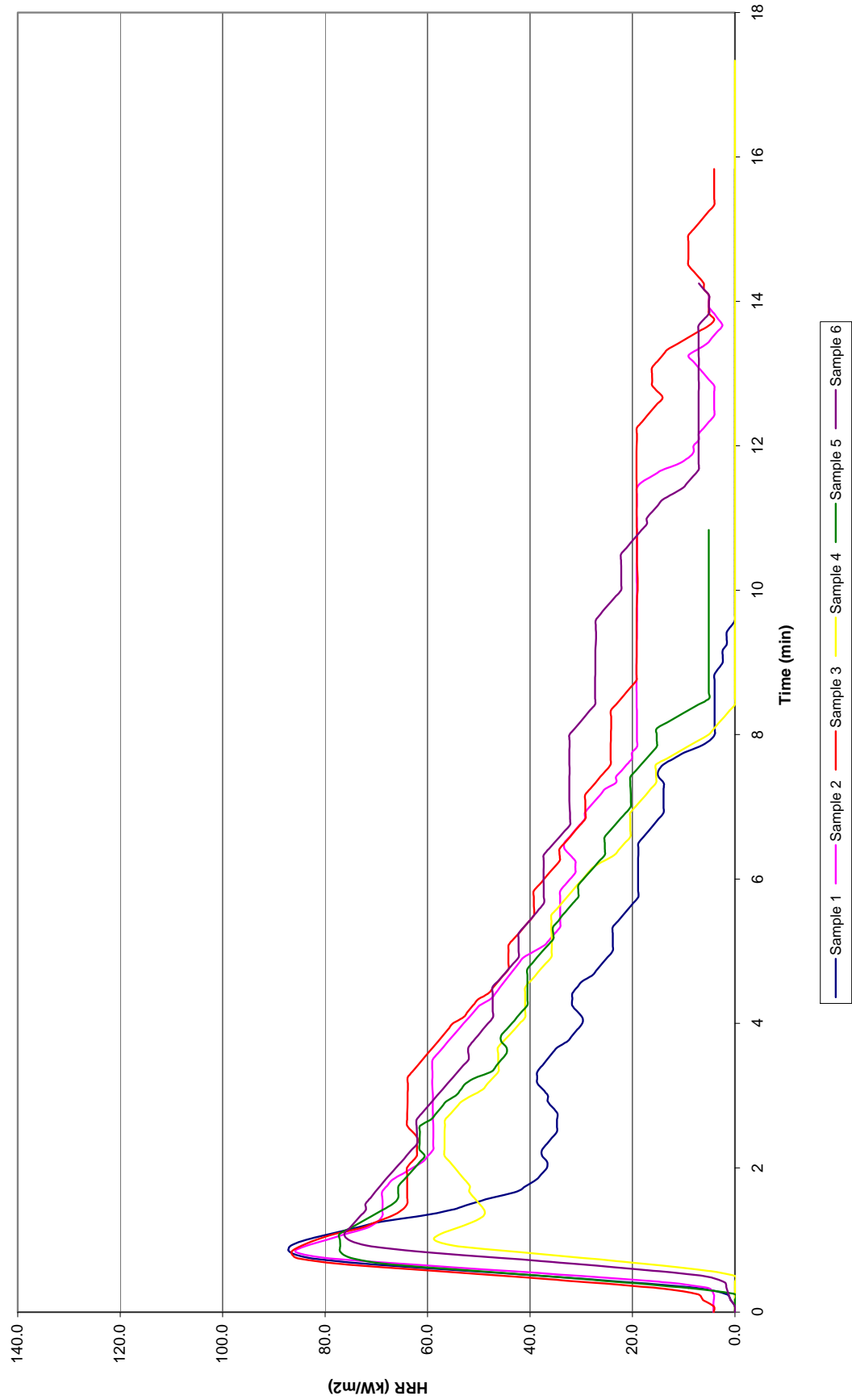


Figure 2 - Effective Heat of Combustion



Certificate of Assessment 1-1570

Certificate of Assessment

NK6457

No. 1570

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This is to certify that the specimen described below was tested by the CSIRO Division of Materials Science and Engineering in accordance with Australian/ New Zealand Standard 3837, Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter, 1998, at 50 kW/m², on behalf of:

Australian Urethane Systems Pty Ltd
25 Garling Road
KINGS PARK NSW
AUSTRALIA

A full description of the test specimen and the complete test results are detailed in the Division's sponsored investigation report numbered FNK 10180.

SAMPLE

IDENTIFICATION: Pire 45 (DPE 1807 PIR)

DESCRIPTION OF**SAMPLE:**

The sponsor described the tested specimen as polyisocyanurate foam. The specimen contained flame retardant additives.

Nominal thickness: 50 mm
Nominal density: 47 kg/m³ to 48 kg/m³
Colour: light yellow

SAMPLE**CLASSIFICATION:**

Group Number: Group 1
(In accordance with Specification A2.4 of the Building Code of Australia.)

Average specific extinction area: 31.1 m²/kg
(Refer to Specification C1.10a section 3(c) of the Building Code of Australia.)

Testing Officer: Heherson Alarde Date of Test: 19 July 2011

Issued on the 26th day of July 2011 without alterations or additions.



Garry E Collins
Manager, Fire Testing and Assessments



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