Test Report

Test Number PF19055

Client: Tech Coatings NZ Limited

Fire resistance test for Concrete Midfloor (25mm timber infill topped with 75mm thick reinforced concrete) with 300µm of FBL-100 intumescent coating

Test method AS 1530.4:2014

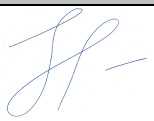
Report Date 22/11/2019

Table of Contents

Document revision schedule

Revision #	Date	Discription
1	22/11/19	Initial Issue for Client review

Signatories:

REPORT	NAME	SIGNATURE	DATE
Prepared by:	Alexey Kokorin (Technical Manager)		22/11/2019
Authorized by:	Andrew Bain (Authorized signatory)		22/11/2019

Test Details

Testing Authority:
Passive Fire Inspection & Test Services Ltd
1/113 Pavillion Drive
Mangere
Auckland 2022

Client:
Tech Coatings NZ Limited, 12 Tokomaru Street, Welbourn, New Plymouth 4312, New Zealand

Test Specification Fire Resistance:
Failure shall be deemed to have occurred when one of the following occurs:
a) Temperature rise, If the mean unexposed face temperature increases by more than 140 °C above its initial specimen temperature value.
b) the temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180 °C
c) Integrity failure shall be deemed to have occurred upon ignition of the cotton pad when glowing or flaming occurs or for a period of 30 seconds.
d) Flaming to the unexposed face for 10 seconds or longer shell be deemed Integrity failure.

Testing scope:
AS 1530-2014 Part 4 Section 4 – 180 min to demonstrate FRL (-/180/180). The test is carried out to determine what insulation value 300µm of FBL-100 gives the test specimen. Additionally, to make observations on timber behaviour, such as start of charring and when timber falls off.

Testing products:
Testing products were selected by Client and accepted by Laboratory in "as supplied" condition based on Client description as follows:

- FBL-100 - halogen free, low VOC, acrylic co-polymer latex thin film intumescent coating

Documentation:
Testing products were verified and tested based on Client description and following documents:

- FBL-100 intumescent coating – general and technical information brochure (date and revision are not specified)

- FBL-100_TPS_PUR60, 8th June 2019 (TC19_015)– Technical specification
- 66759-TC19_015---TC19_016-31-Oct-2019-CQAv0.2 – Coating Audit details
- Report CSIRO Reference number: FCO-2817/4543 dated 26-May-2015

Design overview:

Concrete Midfloor consisting of 155mm x 25mm rough sawn radiata pine timber infill topped with 75mm thick reinforced concrete. Concrete slab with timber infill was done by laboratory.

Testing date:
11/11/2019

Termination of The Test:
The test was discontinued at 122 minutes.

Use of Reports (Mandatory disclaimer according to AS 1530-2014 clause 2.16.2 (W)):

This report details the methods of construction, test conditions and the results obtained when the specific element of construction described herein was tested follow the procedure outlined in AS 1530.4. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

Equipment

Furnace:
1200X1200 Indicative Furnace designed to operate to AS1530.4:2014

Temperature:
Furnace Temperature measurements were controlled with 4 X Type K MIMS thermocouples set within 50-100 mm from the face of the specimens referenced from AS1530.4:2014. All thermocouples are calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

Pressure measurement:
Kepware Siemens Data logging system including multi-channel recording data at 5 second intervals. Calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

Ambient Temperature:
Ambient temperature was recorded 15 minutes before the test was commenced, at the start of the test and monitored during the test. All thermocouples are calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014

Specimen thermocouples:
Specimen Thermocouples were installed to the unexposed vertical face using Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4:2014. All thermocouples are calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

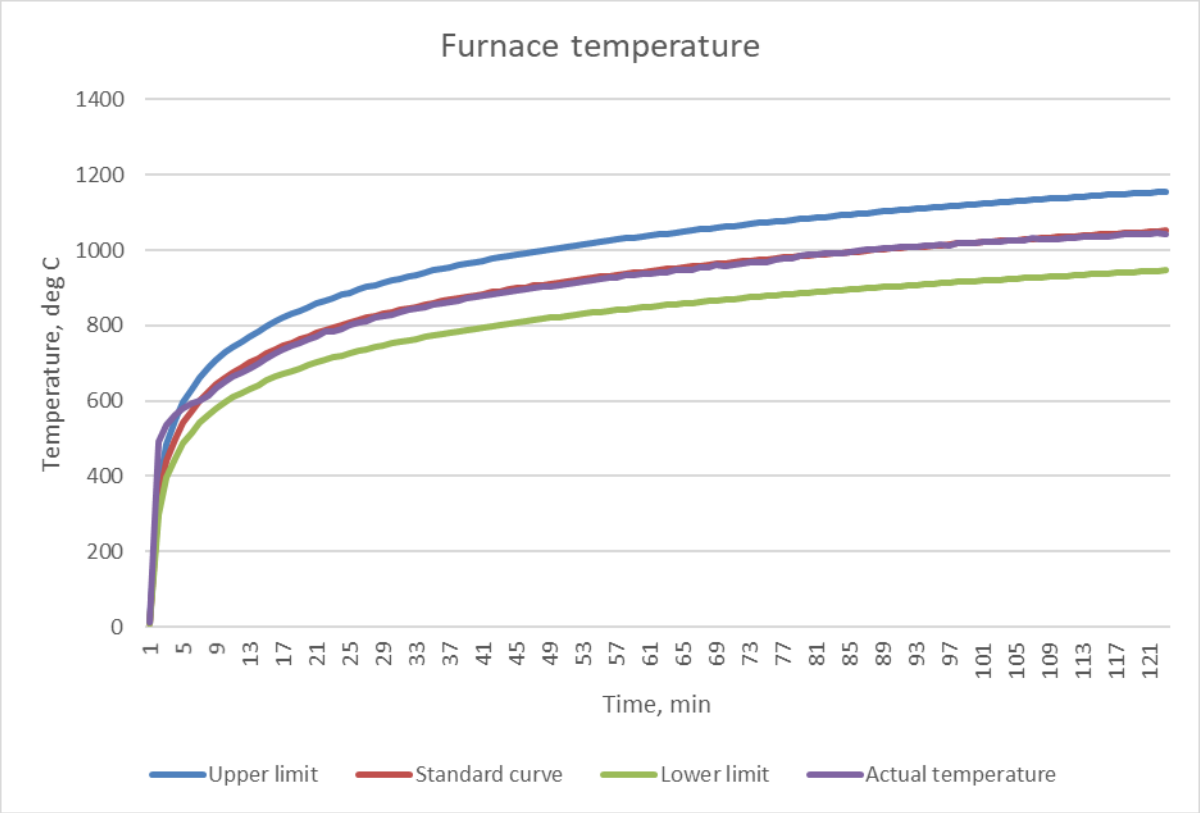
Dimensional measurements:
All linear measurements are made with equipment calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

Deviations from Standard:
There were no other deviations from the standard over the test period.

Test Conditions

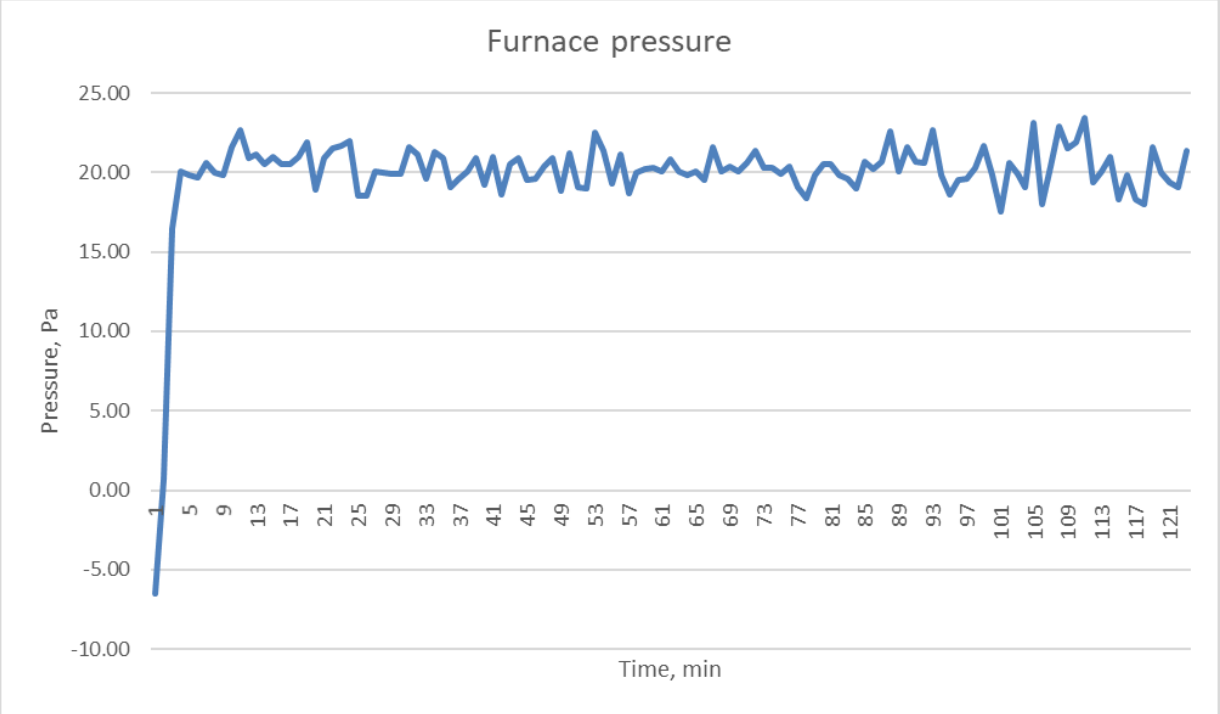
Furnace Temperature

The furnace was controlled to follow the temperature/time relationship specified in AS 1530.4-2014 as closely as possible.



Pressure Readings

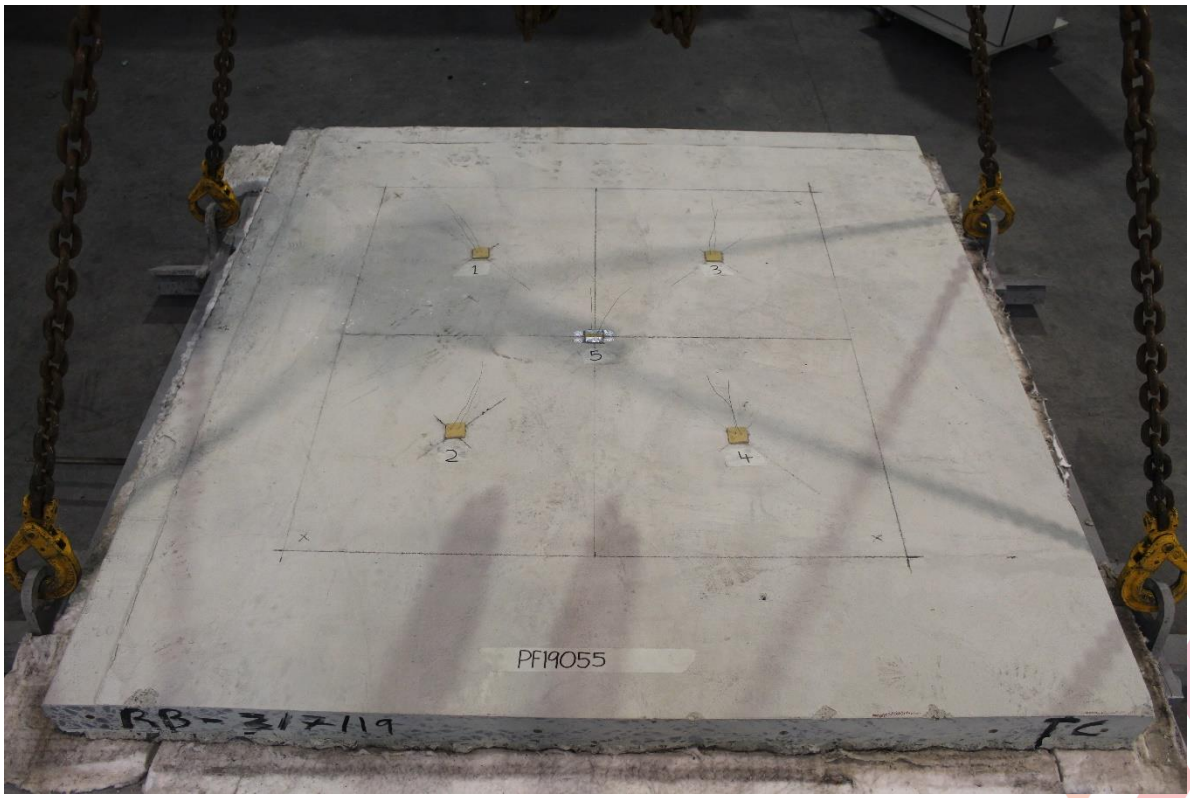
After the first 10 minutes of the test the furnace pressure was maintained at 20 ± 3 Pa with respect to atmosphere. Probe was located 100mm below furnace top and set to 20 pascals.



Ambient Temperature:

The ambient temperature of the test area at the commencement of the test was 20 °C.

Test Specimens details



The slab has been constructed with a 1.45m x 1.45m x 75mm concrete topping on a 900mm^2 bed of 150 x 25 rough sawn h3.2 timber infills.

The slab has been cast with vibrated 30mpa structural concrete to a depth of 75mm above the timber infill and 100mm depth to the entire perimeter of 150mm wide thus encapsulating the timber infills with concrete leaving a flush joint on the exposed side between timber infill and concrete. D12 reinforcing bars have been installed on 20mm plastic chairs leaving top reinforcement cover of 31mm concrete. The slab has been trowelled to a smooth finish.

The slab has been internally air cured for 10 weeks

FBL-100 was applied to the test specimen at a nominal DFT of 300µm. Coating was provided by Client. Application was performed by Client according to Client internal procedures in one layer. Application from one angle direction, no additional application for timber joints.

Application conditions:

Timber moisture content – 16-19%

Temperature – 18deg C

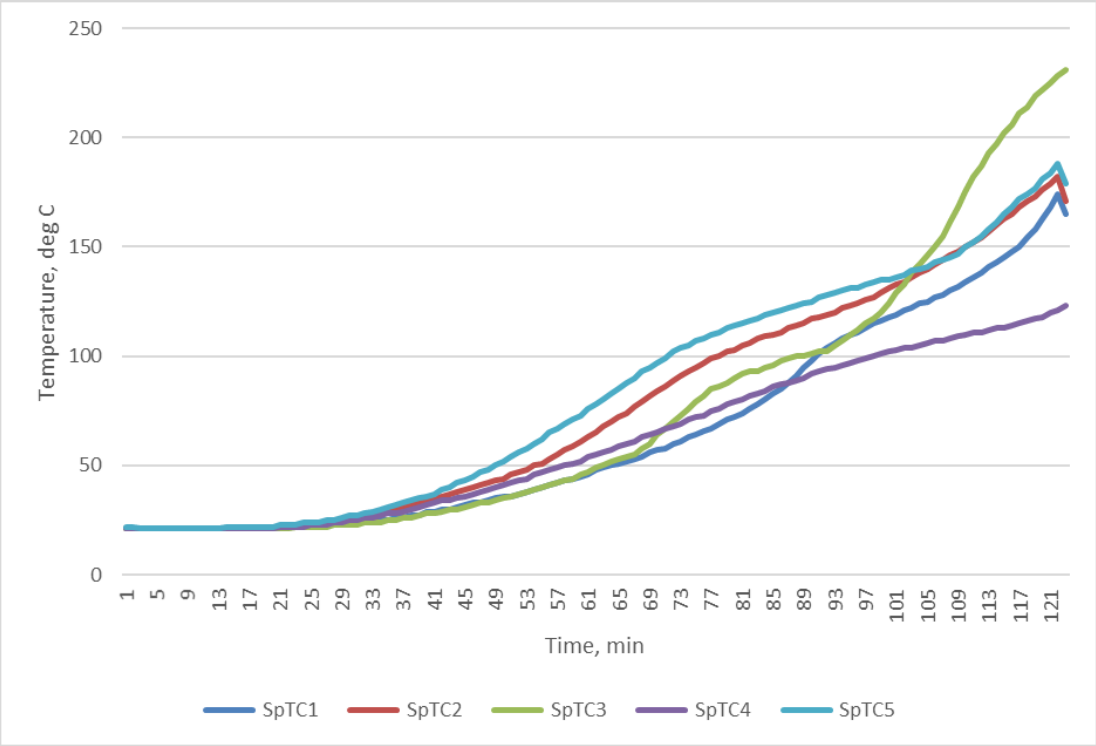
Relative Humidity – 63%

Actual film thickness readings:

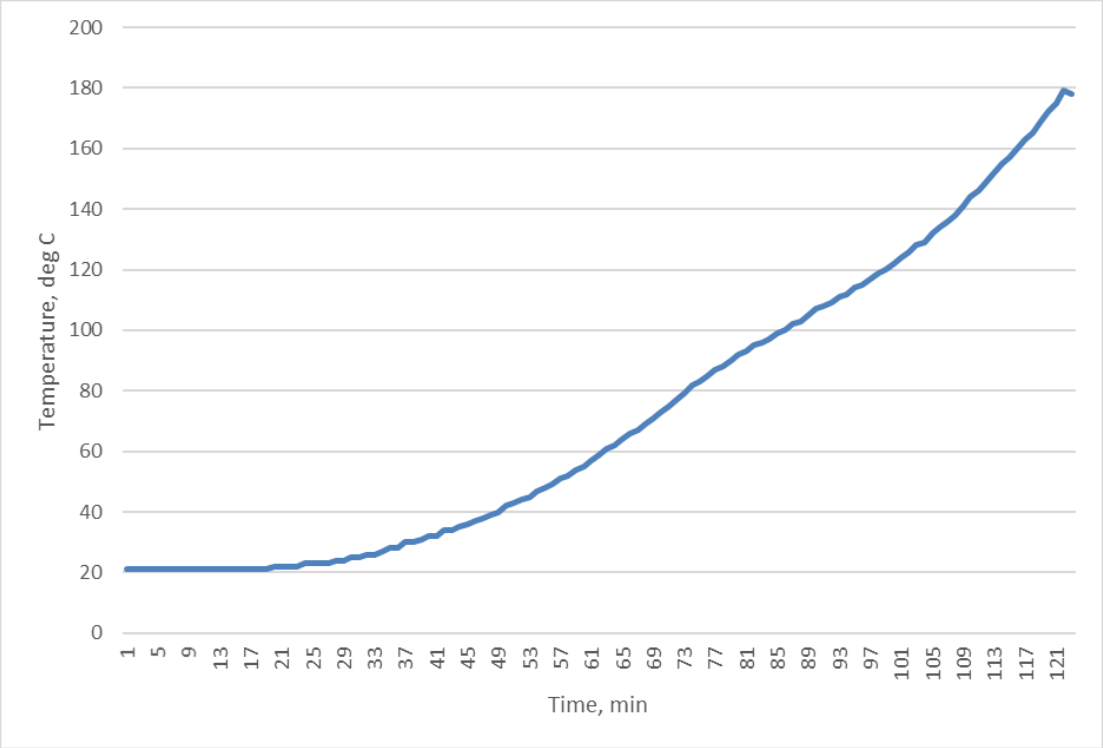
Wet film reading – 450 µm

DFT – average of 26 readings 306 µm

Individual Thermocouple Temperature Readings



Average Temperature Reading



Test results

Structural adequacy	Not applicable
Integrity	122 minutes
Insulation	115 minutes*

*Average temperature exceeded failure criteria

Observations

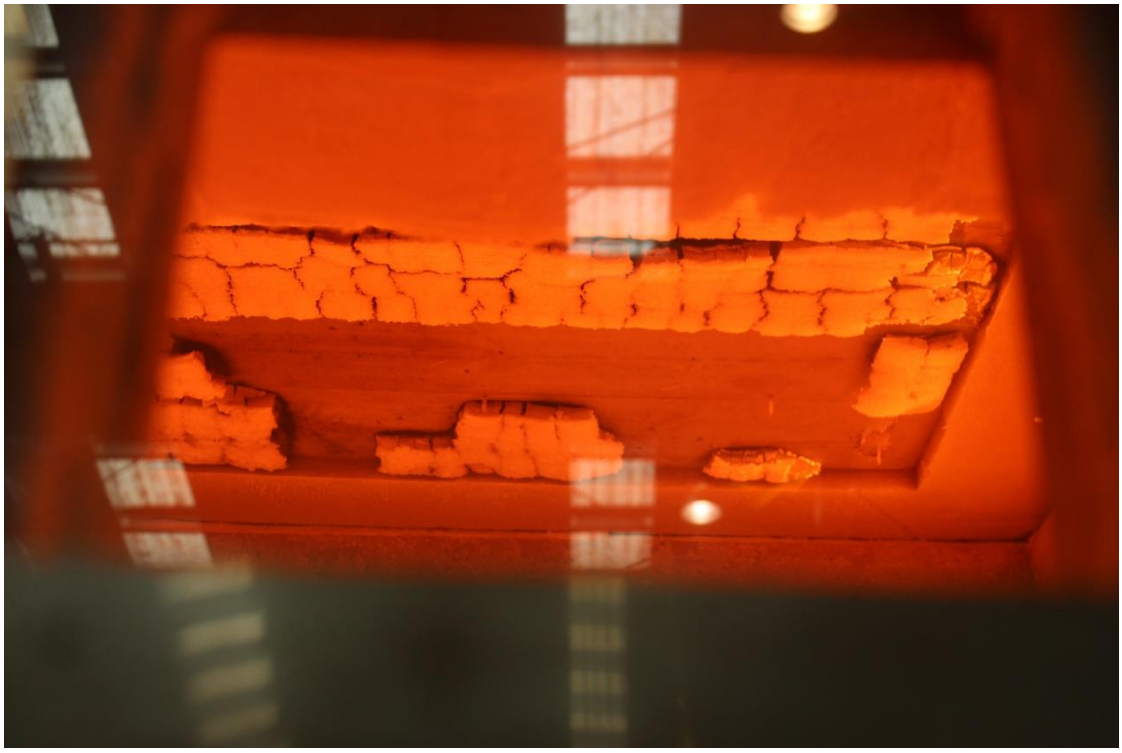
Time Minutes	Test Face	Observations
3	E	Intumescent coating start activation
5	E	No visual combustion of timber noted*
10	E	No visual combustion of timber noted*
15	E	No visual combustion of timber noted*
17	E	Visible flames started to appear*
25	E	Charing on joints, transverse cracks on timber started developing, intense flame*
30	U	No change
54	E	First piece of timber fell down
58	E	Second piece of timber fell down
60	U	No change
80	E	Less than 50% of timber left on specimen
90	U	No change
120	U	No change
122		Test discontinued

Key: U = unexposed face. E = Exposed face

* It should be noted, that visual observations were made upon Client request for Client's research purpose only. Evaluation of fire spread and substrate combustion rating is not in scope of AS 1530.4 and this test. Actual temperature inside the furnace was recorded and described in "Furnace temperature" section of current report.

Additional photographs

At 81 minutes:



After the test:

Summary of Test Results

Specimen	Actual Integrity (min)	Actual insulation (min)	FRL
75mm reinforced concrete slab with 25mm thick timber infill coated by 300 µm DFT FBL-100 inturmescent coating	**122 NF**	**115**	**-/120/90**

NF – No failure during the test

This report shall not be reproduced, except in full

The test results relate only to the specimens of the product in the form in which were tested. differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product, which is supplied or used, is fully represented by the specimens, which were tested.

The specimens were supplied by the sponsor and PFITS laboratory was not involved in any selection or sampling procedure

The results of these fire tests may be used to directly assess fire hazard, but it should be recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions.