Test Report

Test Number PF19022

Client: Tech Coatings

Fire resistance test for wall timber penetrations

Test method AS 1530.4:2014

Report Date 14/08/2019

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Signatories:

REPORT	NAME	SIGNATURE	DATE
Prepared by:	Alexey Kokorin (Technical Manager)		14/08/2019
Authorized by:	Andrew Bain (Authorized signatory)		14/08/2019

Test Details

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

Sponsor:
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 – 60 min to demonstrate FRL (60/60/60).

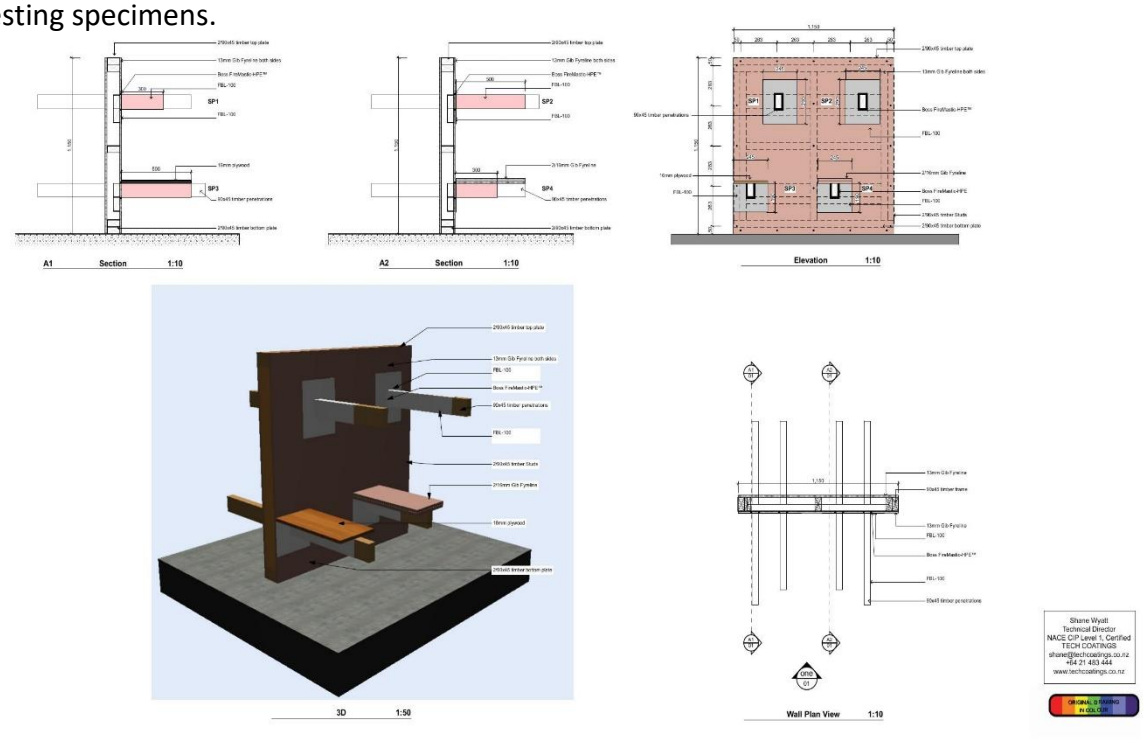
Testing products:
Testing products were selected by Client and accepted by Laboratory in "as supplied" condition based on Client description as follows:

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)

Documentation:
Testing products were verified and tested based on Client description, refer to Specimens description below. Data sheets for both testing products were provided by Applicant. Testing specimens' drawings were provided by Applicant.

Design Overview:

GBTL 60 13mm fire rated plasterboard, one layer each side, on timber frame penetrated by 4 testing specimens.



Termination of The Test:

The test was discontinued at 66 minutes.

Use of Report

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 vertical 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 AS1530.4:2014.

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 AS1530.4:2014.

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 AS1530.4:2014.

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 AS1530.4:2014.

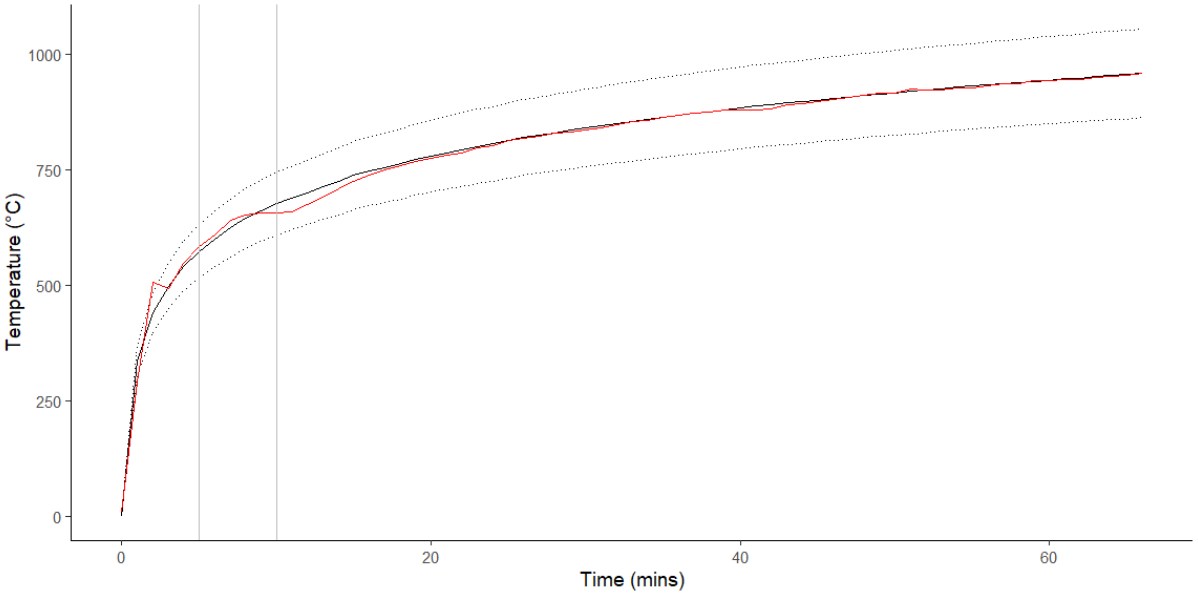
Dimensional measurements:
All linear measurements are made with equipment calibrated by ISO/IEC 17025 certified laboratory accredited by a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS1530.4:2014

Deviations from Standard:
There was no deviation from the standard over the test period.

Test Conditions

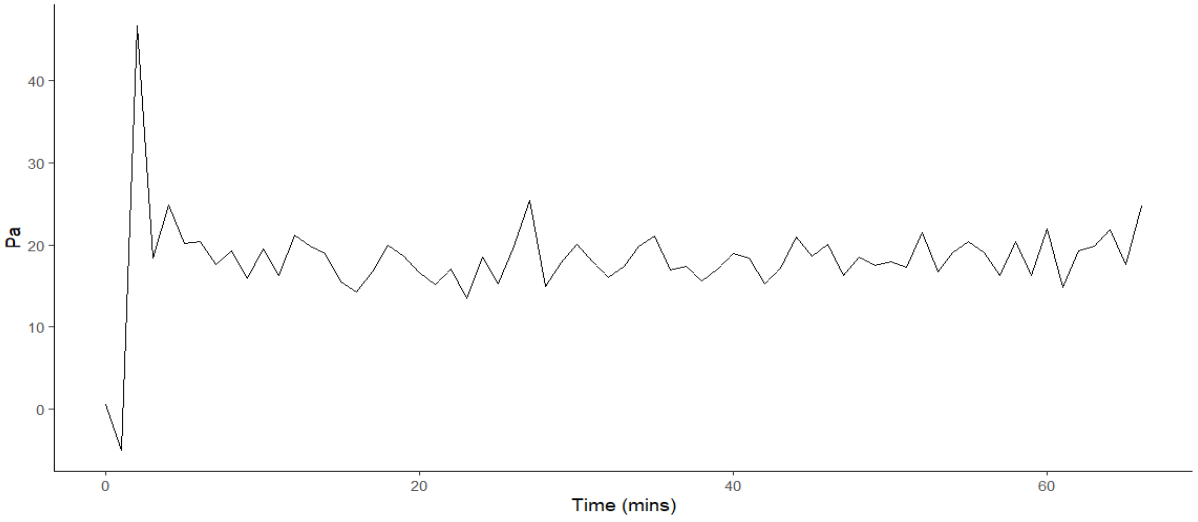
Furnace Temperature

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



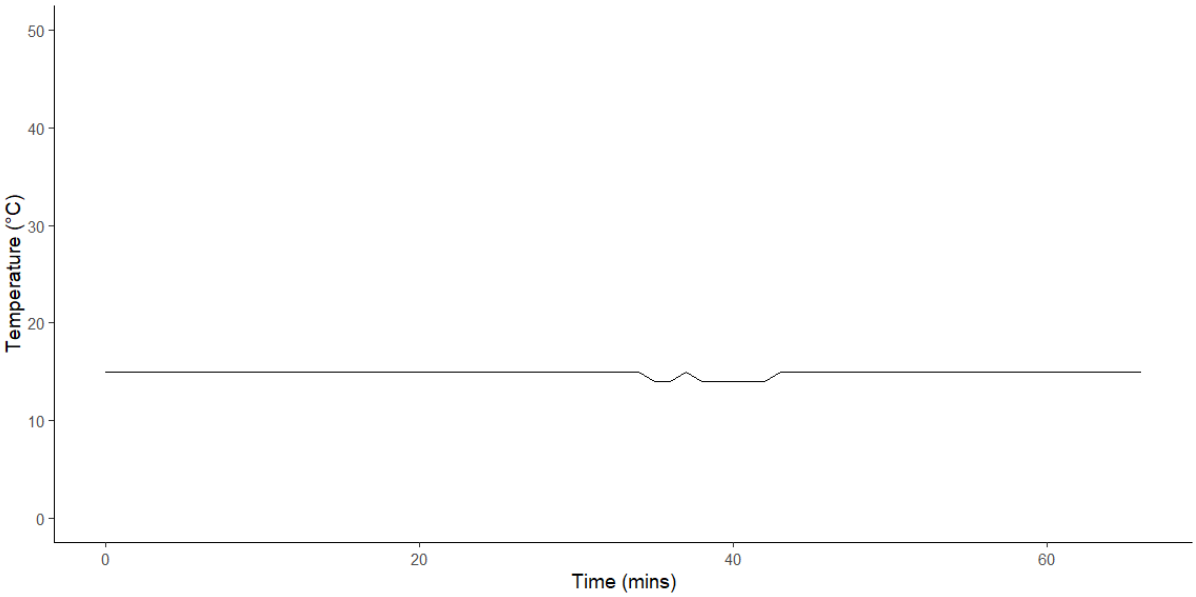
Pressure Readings

After the first 15 minutes of the test the furnace pressure was maintained at 18 ± 3 Pa with respect to atmosphere. Probe was located 500mm above furnace floor and set to 18 pascals.



Ambient Temperature:

The ambient temperature of the test area at the commencement of the test was 15°C.



Test Specimens details

Thermocouple Positions Table

Specimen	ThermoCouple_ID	ThermoCouple_Number
1	SpTC5	5
1	SpTC6	6
1	SpTC7	7
1	SpTC8	8
2	SpTC1	1
2	SpTC2	2
2	SpTC3	3
2	SpTC4	4
3	SpTC13	13
3	SpTC14	14
3	SpTC15	15
3	SpTC16	16
4	SpTC9	9
4	SpTC10	10
4	SpTC11	11
4	SpTC12	12

Observations

Key: U = unexposed face. E = Exposed face.

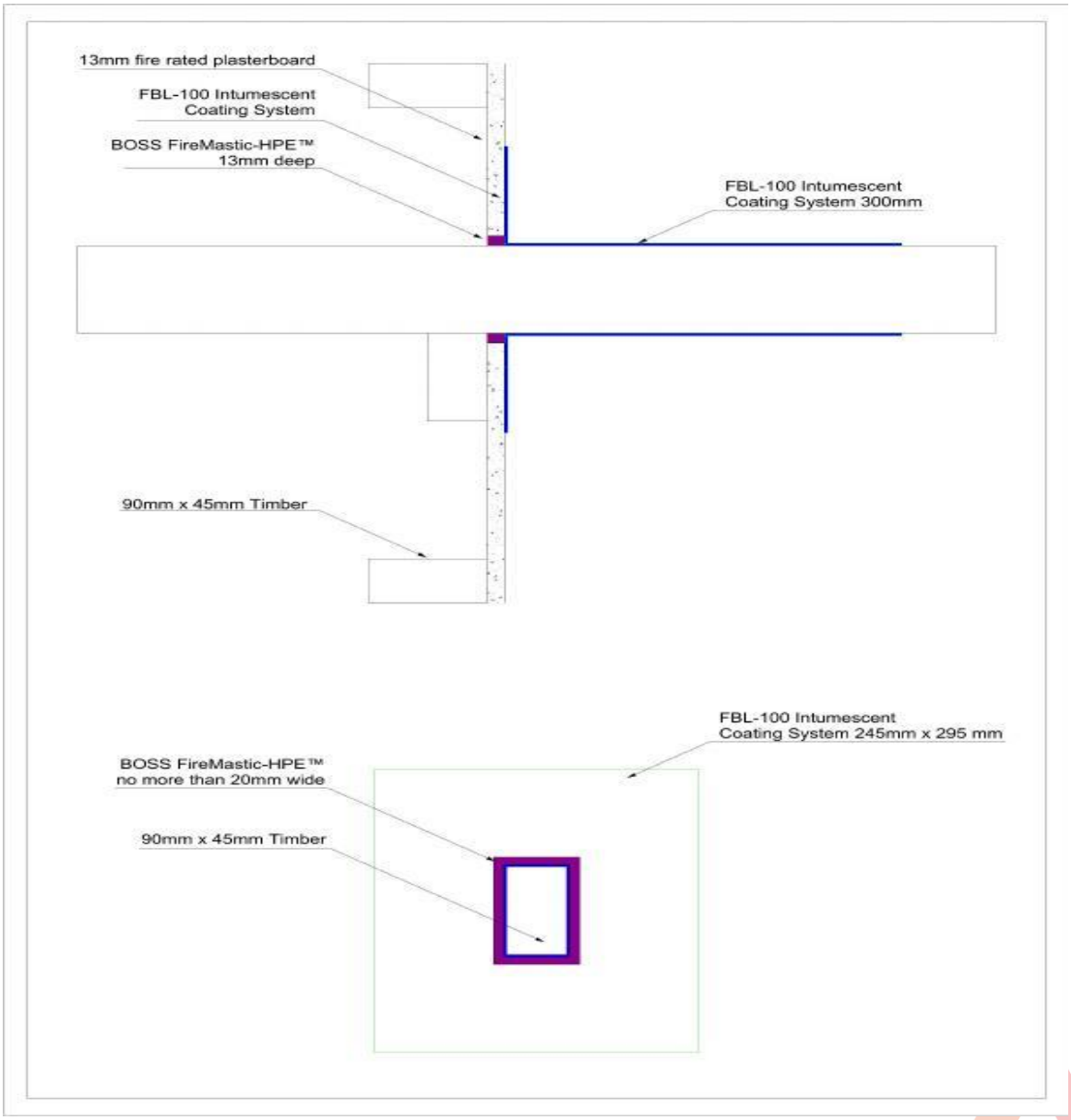
Time Minutes	Test Face	Observations
1	U	Soke release at specimens 3 and 4
2	U	Smoke release specimen 2
5	U	Smoke release specimen 1
6	E	Paper falling off plasterboard
7	E	All timbers now burning
9	E	Ply now burning
10	E	Paper now completely burnt off plasterboard, gypsum holding together
13	U	Small smoke release now from all specimens
16	E	Ply started charring
19	U	Heavy smoke release from specimen 3 and 4
21	E	All specimens now fully burnt and exposed ends charring
25	U	Heavy smoke release to specimen 3
26	NA	Minimal smoke release to specimens 1,2 and 4
34	E	Ply and timber have fallen off specimen 3
36	E	Timber fallen off specimen 1
39	E	Timber fallen off specimen 2
42	U	Excess smoke releases all specimens
50	E	Timber fallen off specimen 4
55	E	Plasterboard starting to crack
66	NA	Test stopped
69	NA	The unexposed face shows the initial signs of charring against the plasterboard

Specimens

Specimen 1

The test is carried out to determine the performance of a timber penetration passing through a 60/60/60 13mm plasterboard wall system, protected by BOSS FireMastic-HPE™ and FBL-100

The test specimen penetrates the test wall and extrudes 500mm on either side of the test wall. The test specimen is supported on the unexposed side by solid fixings to a steel frame.



Product Tested

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

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)

The preparation and application of FBL-100 and BOSS FireMastic-HPE™ was completed by Tech Coatings.

Test results

Structural adequacy	66
Integrity	66
Insulation	66

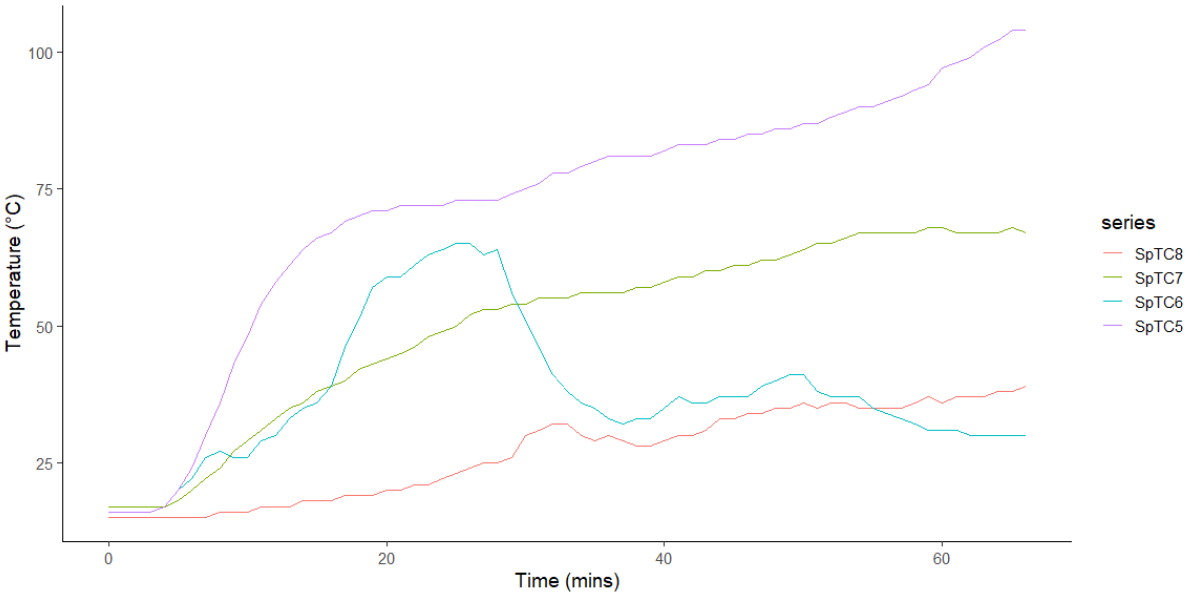
Schedule of Materials

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)
- 90mm x 45mm H1.2 radiata pine framing timber (frame)
- 90mm x 45mm x 1116mm, of H1.2 Radiata pine framing timber (penetration)

Penetration Details

The annular gap at the timber/wall interface is filled with BOSS FireMastic-HPE™ to a nominal depth of 13mm. A 1000 µ DFT patch, approximately 245mm x 290mm, of FBL-100 is applied to wall at the timber/wall interface. FBL-100 is applied to all four sides of the timber, by brush to achieve a DFT of 1000 µ, 300mm along its length.

Specimen 1 Thermocouple Temperature Readings

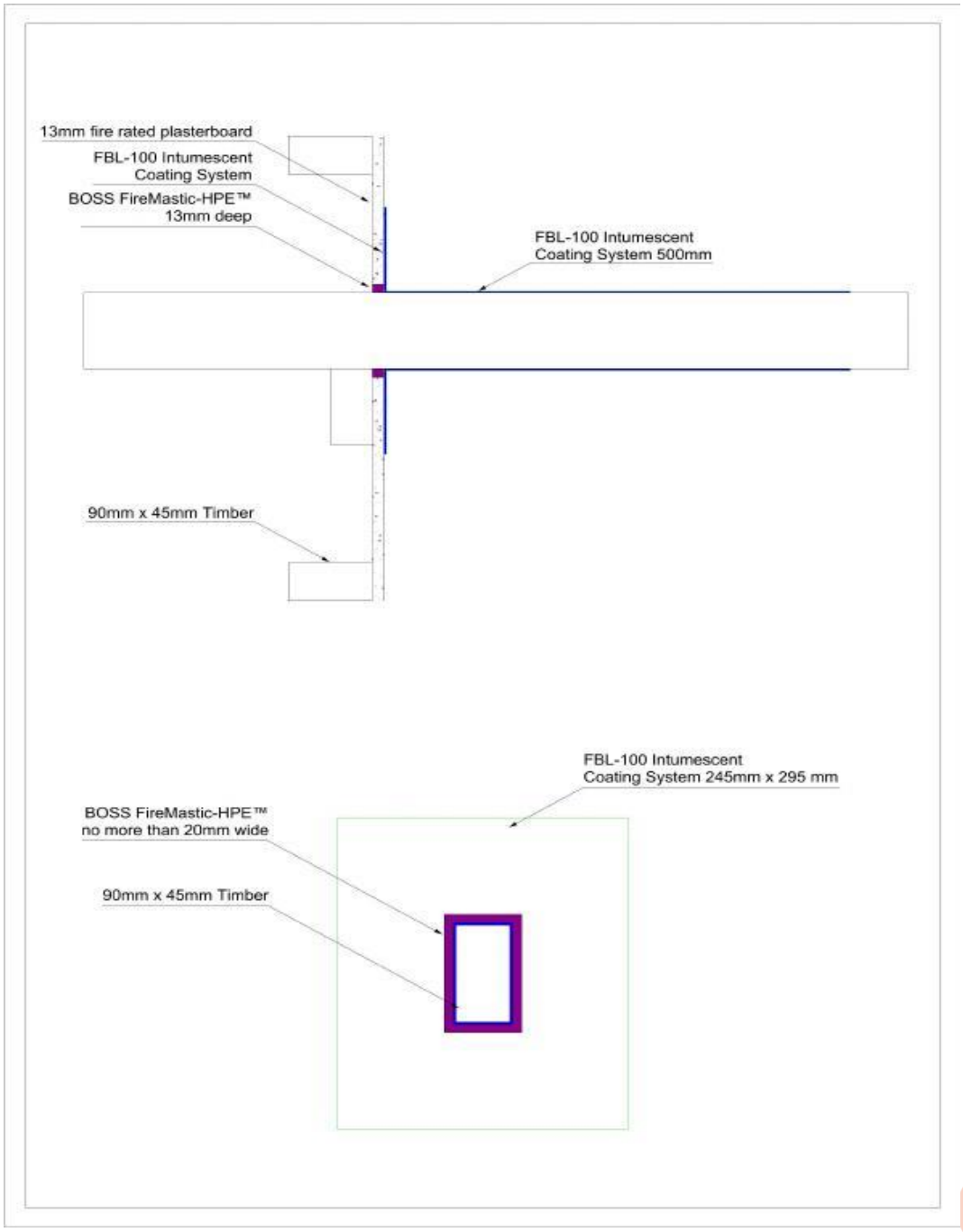


Specimen 1 before test and after test

Specimen 2

The test is carried out to determine the performance of a timber penetration passing through a 60/60/60 13mm plasterboard wall system, protected by BOSS FireMastic-HPE™ and FBL-100

The test specimen penetrates the test wall and extrudes 600mm on the exposed side and 500mm on the un-exposed side. The test specimen is supported on the unexposed side by solid fixings to a steel frame.



Product Tested

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

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)

The preparation and application of FBL-100 and BOSS FireMastic-HPE™ was completed by Tech Coatings.

Test results

Structural adequacy	66
Integrity	66
Insulation	66

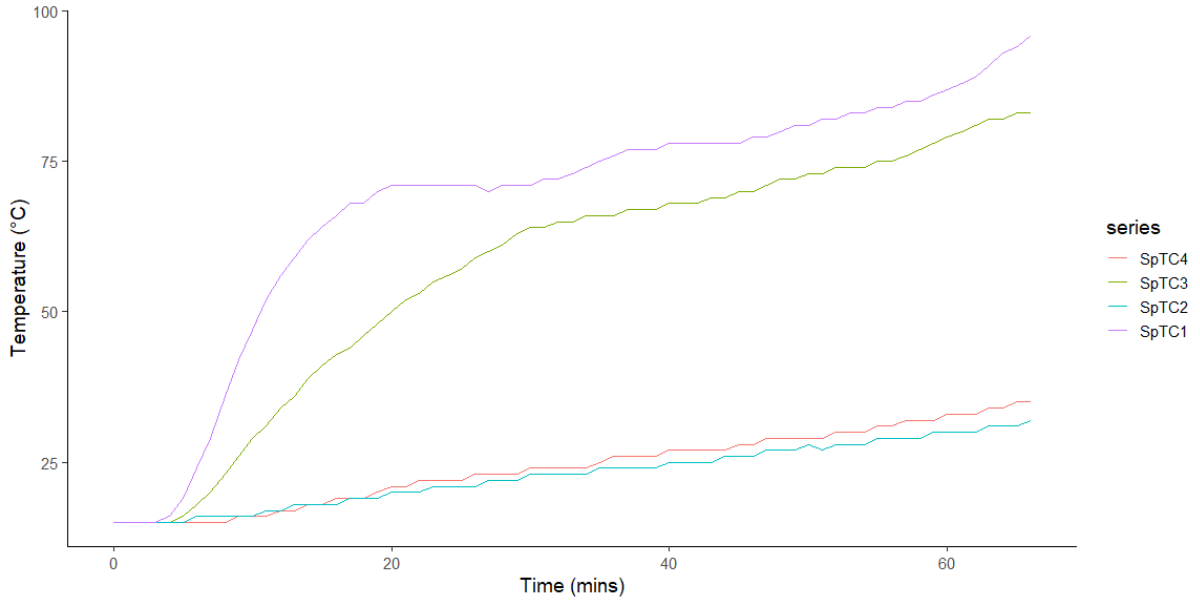
Schedule of Materials

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)
- 90mm x 45mm H1.2 radiata pine framing timber (frame)
- 90mm x 45mm x 1216mm, of H1.2 Radiata pine framing timber (penetration)

Penetration Details

The annular gap at the timber/wall interface is filled with BOSS FireMastic-HPE™ to a nominal depth of 13mm. A 1000µ DFT patch, approximately 245mm x 290mm, of FBL-100 is applied to wall at the timber/wall interface. FBL-100 is applied to all four sides of the timber, by brush to achieve a DFT of 1000µ, 500mm along its length.

Specimen 2 Thermocouple Temperature Readings

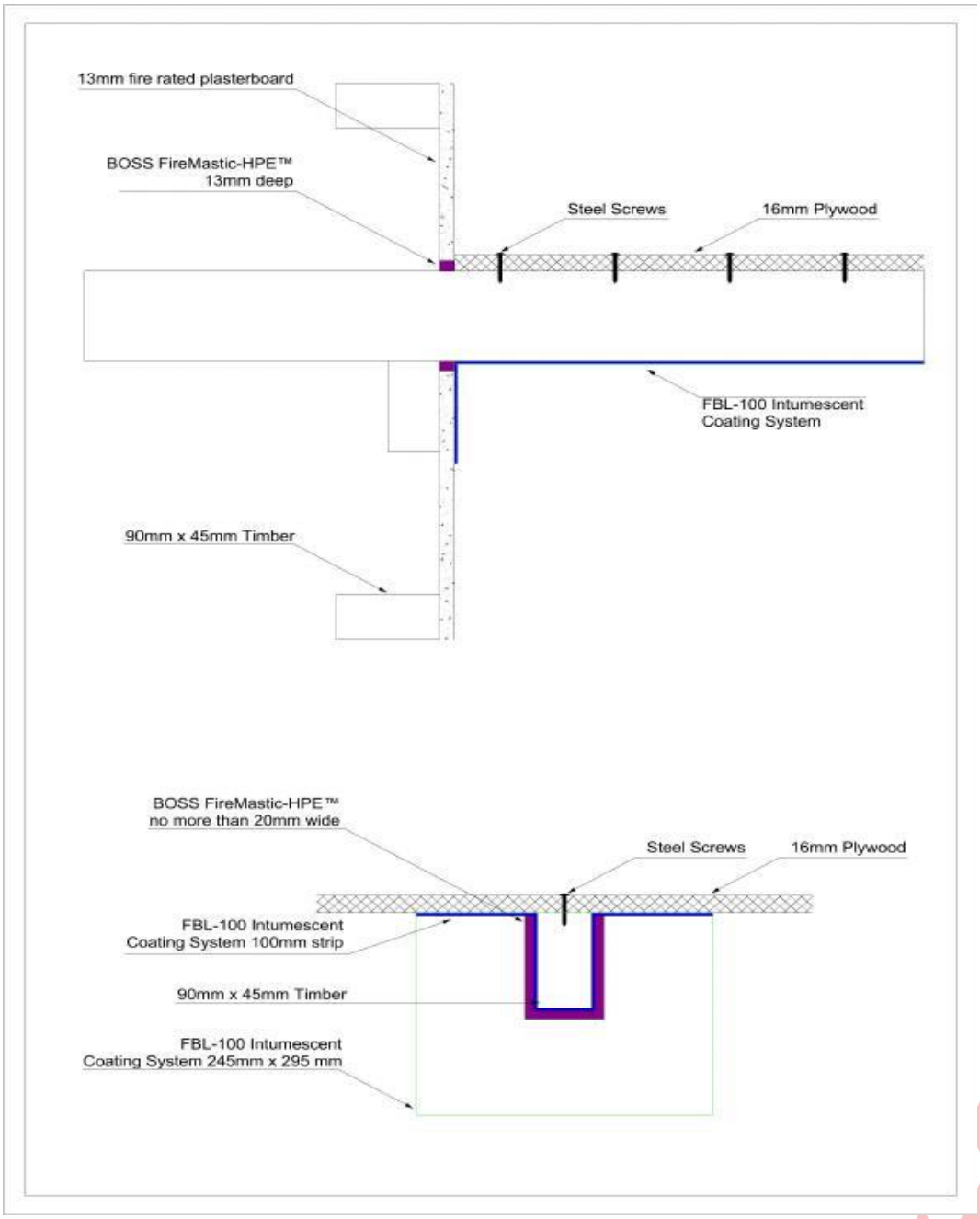


Specimen 2 before test and after test

Specimen 3

The test is carried out to determine the performance of a timber penetration passing through a 60/60/60 13mm plasterboard wall system topped with a combustible material, protected by BOSS FireMastic-HPE™ and FBL-100.

The test specimen penetrates the test wall and extrudes 600mm on the exposed side and 500mm on the un-exposed side. The test specimen, on the exposed side of the supporting element is topped with a 245mm x 500mm sheet of 16mm plywood, fixed in place with steel screws. The test specimen is supported on the unexposed side by solid fixings to a steel frame.



Product Tested

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

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)

The preparation and application of FBL-100 and BOSS FireMastic-HPE™ was completed by Tech Coatings.

Test results

Structural adequacy	66
Integrity	66
Insulation	66

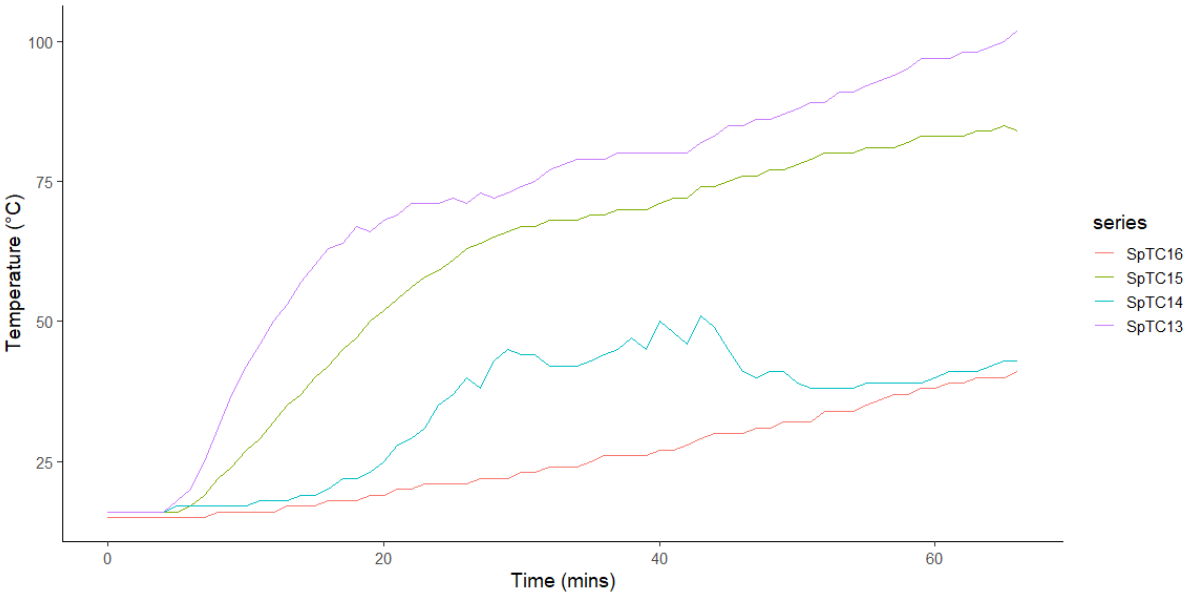
Schedule of Materials

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)
- 90mm x 45mm H1.2 radiata pine framing timber (frame)
- 90mm x 45mm x 1116mm, of H1.2 Radiata pine framing timber (penetration)
- 16mm Plywood

Penetration Details

The annular gap at the timber/wall interface is filled with BOSS FireMastic-HPE™. The timber/plywood interface and a 100mm strip on the underside of the plywood, either side of the timber is coated with FBL-100 to a DFT of 1000µ. A 1000µ DFT patch, approximately 245mm x 190mm, of FBL-100 is applied to the wall at the timber/wall/plywood interface. FBL-100 is applied to the exposed three sides of the timber to 500mm out from the wall, by brush to a DFT of 1000µ

Specimen 3 Thermocouple Temperature Readings

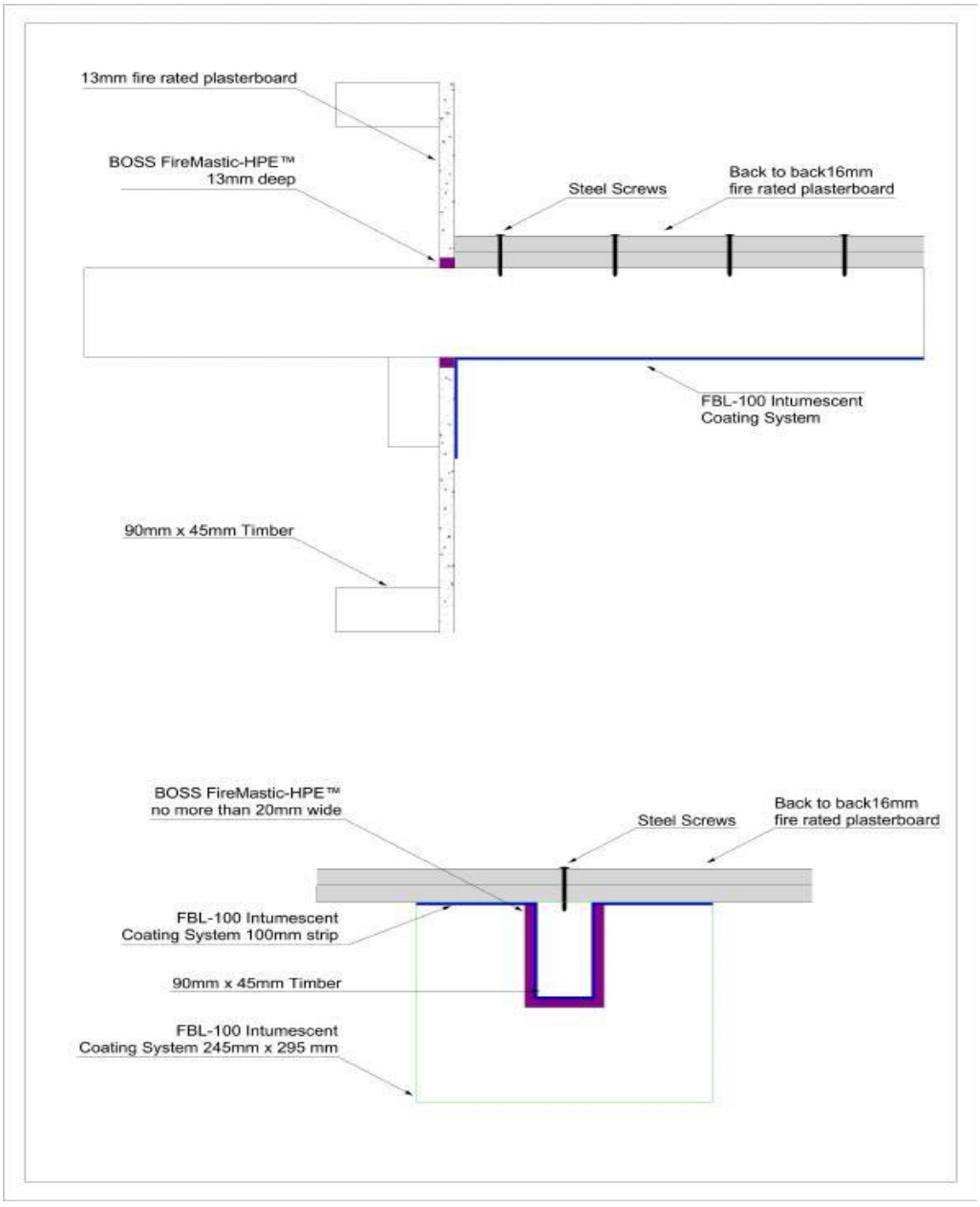


Specimen 3 before test and after test

Specimen 4

The test is carried out to determine the performance of a timber penetration passing through a 60/60/60 13mm plasterboard wall system topped with a non-combustible material, protected by BOSS FireMastic-HPE™ and FBL-100.

The test specimen penetrates the test wall and extrudes 500mm on the exposed side and 500mm on the un-exposed side. The test specimen, on the exposed side of the supporting element is topped with 2 sheets of back to back 245mm x 500mm 16mm fire rated plasterboard, fixed in place with steel screws. The test specimen is supported on the unexposed side by solid fixings to a steel frame.



Product Tested

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

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)

The preparation and application of FBL-100 and BOSS FireMastic-HPE™ was completed by Tech Coatings.

Test results

Structural adequacy	66
Integrity	66
Insulation	66

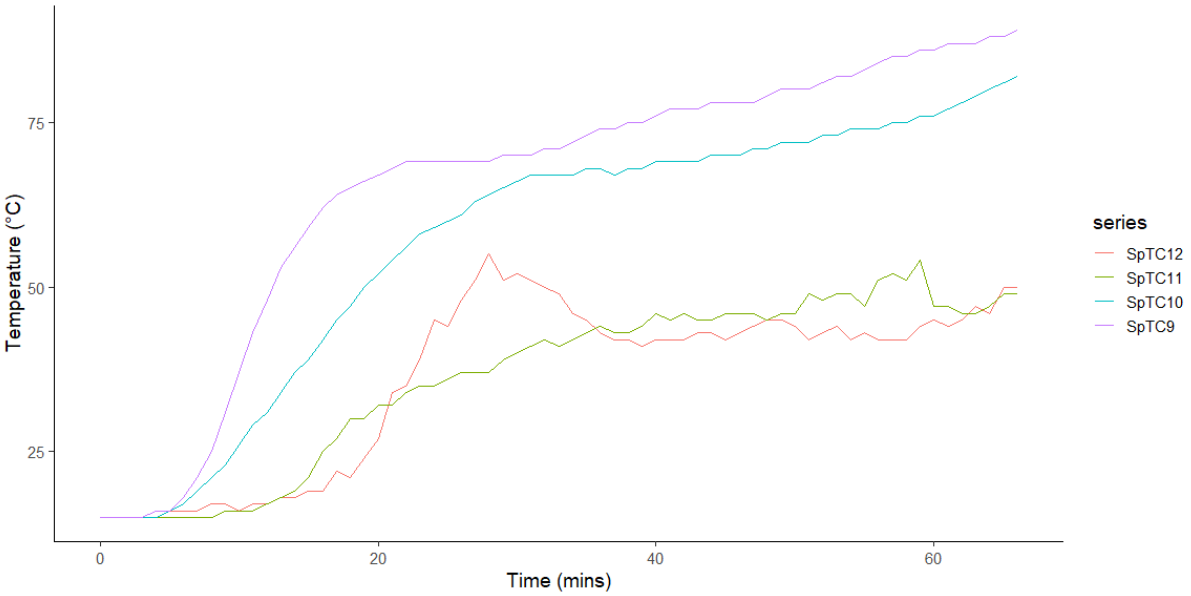
Schedule of Materials

- BOSS FireMastic-HPE™ - graphite-based intumescent sealant (graphite-based, thixotropic, one-part acrylic emulsion)
- FBL-100 - halogen free, low VOC, acrylic co- polymer latex thin film Intumescent Coating System (ICS)
- 90mm x 45mm H1.2 radiata pine framing timber (frame)
- 90mm x 45mm x 1116mm, of H1.2 Radiata pine framing timber (penetration)
- 16mm fire rated plasterboard x2 layers (penetration on exposed side)

Penetration Details

The annular gap at the timber/wall interface is filled with BOSS FireMastic-HPE™. The timber/plasterboard interface and a 100mm strip on the underside of the plasterboard, either side of the timber is coated with FBL-100 to a DFT of 1000µ. A 1000µ DFT patch, approximately 245mm x 190mm, of FBL-100 is applied to the wall at the timber/wall/plasterboard interface. FBL-100 is applied to the exposed three sides of the timber to 300mm out from the wall, by brush to a DFT of 1000µ.

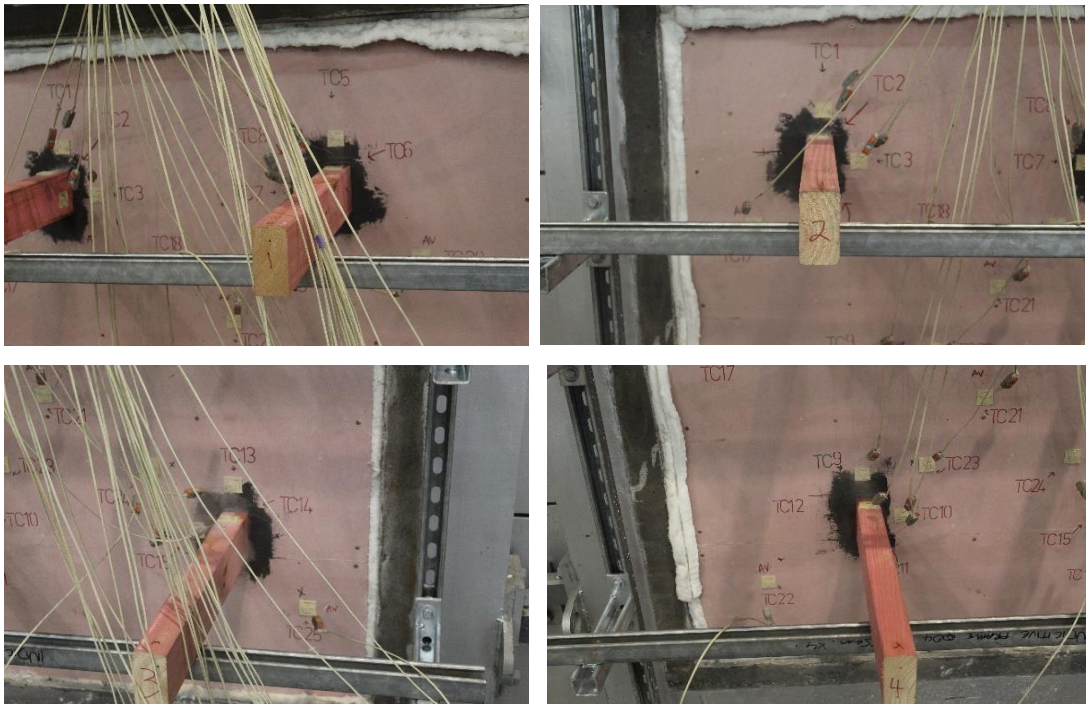
Specimen 4 Thermocouple Temperature Readings



Specimen 4 before test and after test

Photographs

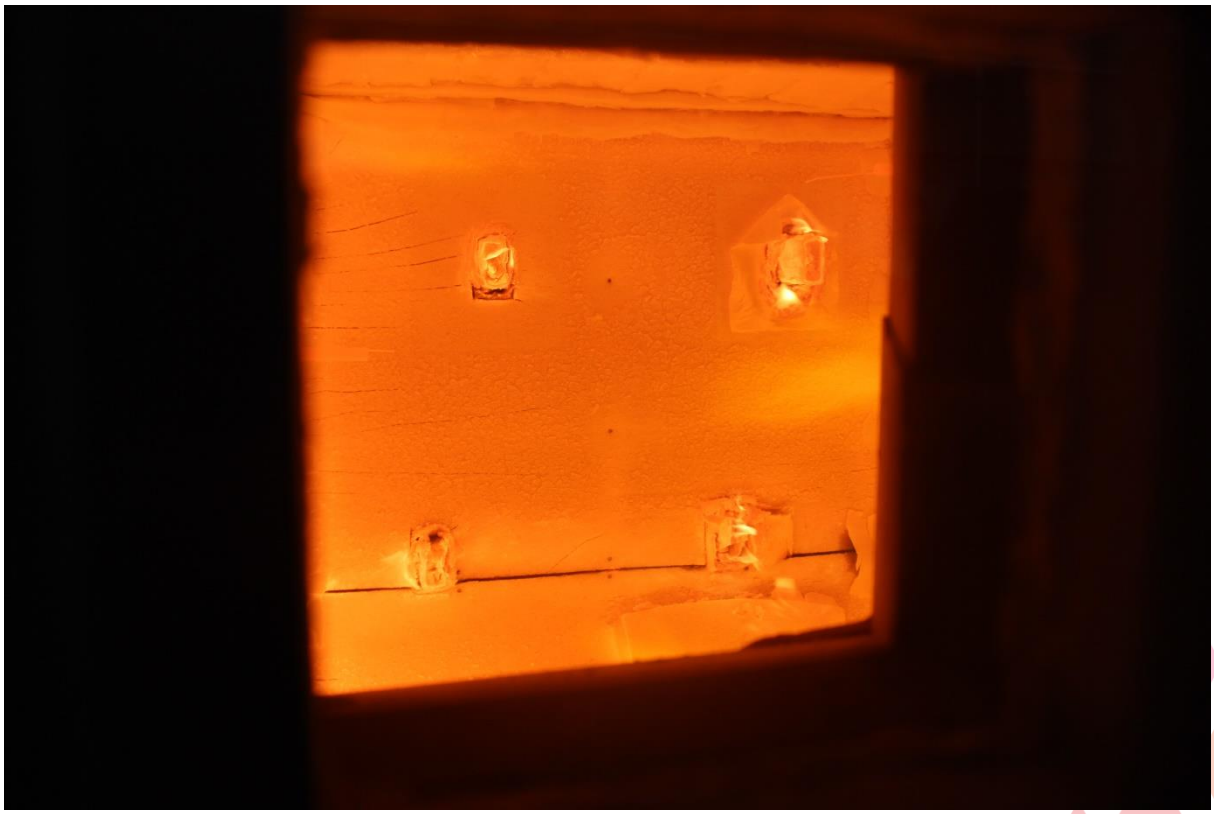
20-30 min – unexposed face



20-30 min – exposed face

60-65 min – unexposed face

60-65 min – exposed face



Summary of Test Results

Specimen 1 achieved FRL 60/60/60

Specimen 2 achieved FRL 60/60/60

Specimen 3 achieved FRL 60/60/60

Specimen 4 achieved FRL 60/60/60

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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.

Permissible variations to the tested specimen

The results of the fire test contained in the test report are directly applicable, without reference to the testing authority, to similar constructions where one or more following changes have been made:

- Results obtained from this prototype test may be applied to timber penetrations similar to those tested with:
    - increase in timber density;
    - increase in cross sectional dimensions.
- Results obtained from this prototype test may be applied when the combustible substrate is of a greater thickness or having a higher fire rating and is similar in nature to the one tested.
- Results obtained from this prototype test may be applied to framed wall systems of similar construction but that have:
    - increase in timber density of the framing;
    - increase in cross sectional dimensions of the framing;
    - increased thickness of wall lining material, of the same type tested;
    - decrease in stud spacing;
    - decrease in in fixing centres of the wall lining materials