



ASSESSMENT REPORT

The fire resistance performance of various linear joints in wall constructions protected with Fulafoam FR and FulafoamPRO FR if tested in accordance with AS1530.4-2014 and assessed in accordance with AS4072.1-2005

EWFA Report No:

42676600

Report Sponsor:

HB Fuller Company Australia Pty Ltd
16-24 Redgum Drive
Dandenong South VIC 3175

DOCUMENT REVISION STATUS

Date Issued	Issue No	Description
29/07/2016	42676600	Initial Issue

CONTACT INFORMATION

Exova Warringtonfire Aus Pty Ltd - ABN 81 050 241 524

NATA Registered Laboratory

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

New South Wales

Suite 2002a, Level 20
44 Market Street
Sydney NSW 2000
Australia

T: +61 (0)2 8270 7600
F: +61 (0)2 9299 6076

Victoria

Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia

T: +61 (0)3 9767 1000
F: +61 (0)3 9767 1001

Queensland

Northpoint, Unit 29, Level 6
231 North Quay
Brisbane QLD 4000
Australia

T: +61 (0)7 3238 1700
F: +61 (0)7 3211 4833

CONTENTS

1	INTRODUCTION	4
2	TESTED PROTOTYPES	4
3	VARIATION TO TESTED PROTOTYPES	4
4	REFERENCED TEST PROCEDURES	4
5	FORMAL ASSESSMENT SUMMARY	4
6	DIRECT FIELD OF APPLICATION	5
7	REQUIREMENTS	5
8	VALIDITY	5
9	AUTHORITY	6
9.1	Applicant Undertakings and Conditions of Use	6
9.2	General Conditions of Use	6
9.3	Authorisation on Behalf of Exova Warringtonfire Aus Pty Ltd	6
9.4	Date of Issue	6
9.5	Expiry Date	6
APPENDIX A	- SUMMARY OF SUPPORTING DATA	7
A.1	Test Report –253-09TV	7
APPENDIX B	- ASSESSMENT OF SPECIFIC VARIATIONS	8
B.1	Relevance of test data with respect to AS1530.4-2014	8

1 INTRODUCTION

This report presents an assessment of the fire resistance performance of various linear joints in wall constructions protected with Fulafoam FR and FulafoamPRO FR if tested in accordance with AS1530.4-2014 and assessed in accordance with AS4072.1-2005.

The tested prototypes described in Section 2 of this report, when subject to the proposed variations described in Section 3 and tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5.

The validity of this assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in Appendix A together with a summary of the critical issues leading to the assessment conclusions including the main points of argument.

2 TESTED PROTOTYPES

This assessment is based on reference test report 253-09TV which comprised eight linear joint seals installed in a wall construction and tested in accordance with EN1366-4: 2006. The test was undertaken by TUV Estonia Ltd and sponsored by OU Krimelte who has given permission for the use of test data in this assessment.

Refer to Appendix A for a full summary of the test data.

3 VARIATION TO TESTED PROTOTYPES

The proposed construction is to be as tested in 253-09TV, subject to the following variations:

- Consideration will be given to the performance of the tested specimens if tested in accordance with AS1530.4-2014

4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-2014 Section 10 and AS4072.1-2005.

5 FORMAL ASSESSMENT SUMMARY

Based on the discussion presented in this report, it is the opinion of this testing authority that if the specimen described in section 2 had been modified within the scope of section 3, it will achieve the performance as stated below if tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7:

Service No.	Seal configuration	Joint Width (mm)	Joint Depth (mm)	Wall material	FRL
I	Full depth of wall	40	100	Min. 100mm thick concrete or masonry	-/180/-
II		30	100		-/180/30
III		20	100		-/180/30
IV		10	100		-/180/60
V		40	200	Min. 200mm thick concrete or masonry	-/180/120
VI		30	200		-/180/180
VII		20	200		-/180/180
VIII		10	200		-/180/180

6 DIRECT FIELD OF APPLICATION

This assessment applies to linear joint seals in walls exposed to fire from either side.

7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS 1530.4-2014.

The supporting construction shall be capable of providing effective support of the proposed construction for the required fire resistance period (FRL).

Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

8 VALIDITY

This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report be reviewed on or, before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms that:
to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and

they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and

they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

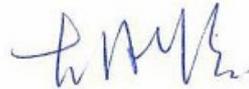
9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:



D. Nicholson

Reviewed by:



S. Hu

9.4 DATE OF ISSUE

29/07/2016

9.5 EXPIRY DATE

31/07/2021

APPENDIX A - SUMMARY OF SUPPORTING DATA

A.1 TEST REPORT –253-09TV

A.1.1 Test Sponsor

A.1.1.1 OU Krimelte, Suur-Paala 10, Tallinn, 13619, Estonia.

A.1.2 Test Laboratory

A.1.2.1 TUV Estonia Ltd, Masina 11, Tallinn, 10144, Estonia

A.1.3 Date of Test

A.1.3.1 The fire resistant test was conducted on 26th January 2009.

A.1.4 Test Standard:

A.1.4.1 The test is stated to have been conducted in accordance with EN 1366-4: 2006 and EN 1363-1: 1999

A.1.5 Summary of test:

A.1.5.1 A supporting construction built of light weight concrete blocks was constructed with two parts. The thickness of the upper half was 100mm and the thickness of the lower half was 200mm. Four vertical linear joints were located in the upper half and four in the lower half. Height of the joints was 1000mm and widths of 10mm, 20mm, 30mm and 40mm. The joints were filled throughout with a "Fire rated polyurethane foam" confirmed by the manufacturer to be identical to Fulafoam FR and FulafoamPRO FR. The joints were then covered on both sides of the wall with strips of sheet steel fasted to the wall with screws.

A.1.5.2 Refer to the test report for the full description of tested specimens.

A.1.6 Test Results

A.1.6.1 The test was terminated after a period of 181 minutes.

A.1.6.2 The fire resistance performance of the control joints was monitored for the duration of the test and it satisfied the performance criteria in accordance with EN 1366-4: 2006 for the following periods:

Service No.	Joint Width	Joint Depth	Insulation (mins)	Integrity (mins)
I	40	100	25	181
II	30	100	39	181
III	20	100	45	181
IV	10	100	80	181
V	40	200	166	181
VI	30	200	181	181
VII	20	200	181	181
VIII	10	200	181	181

APPENDIX B - ASSESSMENT OF SPECIFIC VARIATIONS

B.1 RELEVANCE OF TEST DATA WITH RESPECT TO AS1530.4-2014

B.1.1 General

B.1.1.1 The fire resistance test 253-09TV was conducted in accordance with EN 1366-4: 2006, which refers to the general requirements of EN1363-1: 1999. These standards differ from AS1530.4-2014 and the significance of these differences is discussed below.

B.1.2 Discussion

Temperature Regime

B.1.2.1 The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4-2014 follows the same trend as EN1363-1:1999.

B.1.2.2 The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4-2014 and EN1363-1:1999 are not appreciably different.

Furnace Thermocouples

B.1.2.3 The furnace thermocouples specified in AS1530.4-2014 are type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire of diameter of less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.

B.1.2.4 The furnace thermocouple specified in EN1363.1:1999 is made from folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen with the thermocouple hot junction protected by a pad of insulating material.

- The plate part is to be constructed from 150 ±1 mm long by 100 ±1 mm wide by 0.7 ±0.1 mm thick nickel alloy sheet strips.
- The measuring junction is to consist of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1, contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter 1 mm, the hot junctions being electrically insulated from the sheath.
- The thermocouple hot junction is to be fixed to the geometric centre of the plate, by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate or may be screwed to it to facilitate replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate, and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.
- The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 ±1 mm by 97 ±1 mm by 10 ±1 mm thick with a density of 280 ±30 kg/m³.

B.1.2.5 The relative location of the furnace thermocouples for the exposed face of the specimen, for AS1530.4-2014 and EN1363.1:1999, is 100mm ±10mm and 100mm ±50mm respectively.

B.1.2.6 The furnace control thermocouples required by EN1363.1:1999 are less responsive than those specified by AS1530.4-2014. This variation in sensitivity can produce a potentially more onerous heating condition for specimens tested to EN1363.1:1999, particularly when the furnace temperature is changing quickly in the early stages of the test.

Specimen Thermocouples

B.1.2.7 For penetration sealing systems, thermocouples are fixed in generally similar locations on the unexposed face: on the supporting construction and/or seal and on the penetrating service adjacent at the plane of penetration.

B.1.2.8 AS1530.4-2014 specifies thermocouple locations for linear gap seals (control joints), as follows:

- At least three on the surface of the seal, with one thermocouple for each 0.3 m² of surface area, up to a maximum of five, uniformly distributed over the area (one thermocouple being located at the centre of the seal).
- On the surface of the seal 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.

- On the surface of the separating element 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.

B.1.2.9 If the unexposed face of the seal is recessed in the separating element, the thermocouples shall only be fitted to the seal if the joint width is greater than, or equal to, 12mm.

B.1.2.10 EN1366-4:2006 specifies that at least three specimen thermocouples be located at the centre line of the linear joint seals, and four on separating element only 15mm from the edge. Other thermocouples may be applied where the laboratory personnel consider it necessary, as evenly as possible, where the temperature reached is thought to be higher than elsewhere.

Furnace Pressure

B.1.2.11 It is a requirement of AS1530.4-2014 and for EN1363-1:1999 that for vertical elements, a furnace gauge pressure of 15 ± 3 Pa is established at the centre of lowest penetration.

B.1.2.12 The parameters outlining the accuracy of control of the furnace pressure in AS1530.4-2014 and EN1363-1:1999 are also not appreciably different.

Specimen Size

B.1.2.13 It is the requirement of AS1530.4-2014 that a control joint specimen be at least 1m long, this requirement is met by the specimen tested in 253-09TV.

Performance Criteria

B.1.2.14 AS 1530.4-2014 specifies the following performance criteria for building materials and structures:

- Integrity
- Insulation

Integrity

B.1.2.15 The integrity criteria differ slightly between AS 1530.4-2014 and EN1363.1:1999.

B.1.2.16 While a specimen maintains its insulation performance, the specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4-2014 if it collapses or sustains flaming or other conditions on the unexposed face, which ignite the cotton pad when applied for up to 30 seconds.

B.1.2.17 Specimens shall be deemed to have failed the integrity criterion in accordance with AS 1530.4-2014 when any of the following occur:

- Collapses
- sustained flaming on the non-fire side in excess for 10 seconds
- Ignition of cotton pad within 30 seconds when applied.

B.1.2.18 Except for minor technical variations, the integrity criteria in EN1363.1:1999 are generally applied in a comparable manner.

Insulation

B.1.2.19 Failure in relation to insulation shall be deemed to have occurred when the temperature of any of the relevant thermocouples attached to the unexposed face of the test specimen rises by more than 180 K above the initial temperature.

B.1.2.20 The general insulation criteria of AS 1530.4-2014 and EN1363.1:1999 are not appreciably different.

B.1.3 Application of Test Data from 253-09TV to AS1530.4-2014

B.1.3.1 The variations in furnace heating regimes, furnace thermocouples and the responses of the different thermocouple types to the furnace conditions are not expected to have significant effect on the outcome of the referenced fire resistance test.

B.1.3.2 The relative locations of the specimen thermocouples are similar however; EN1366-4 requires three thermocouples located on each control joint, and four thermocouples on the seal separating element Junction. These thermocouples are 15mm from the edge whereas AS1530.4:2014 requires those to be 25mm from the edge of the seal.

- B.1.3.3 Due to the closer location it will however make test results in accordance EN1366-4:2006 more onerous than those to AS1530.4-2014.
- B.1.3.4 Based on the above discussion it is considered that the results relating to the integrity and insulation performance of the tested seals in 253-09TV can be safely and conservatively be used to assess the FRL in accordance with AS1530.4-2014 and AS4072.1-2005.