Assessment Report

AR24015

The likely fire resistance performance of Protecta FR Boards installed in vertical non-loadbearing framed wall systems

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1.1 Document Revision Schedule

Revision #	Date	Description
1	25/03/2024	Initial issue for Client review
2	12/04/2024	Minor changes as per client request

1.2 Signatories

Report	Name	Signature	Date
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2. Introduction

The objective of the report is to assess the likely fire resistance performance of Protecta FR Board systems installed in vertical framed wall systems if tested to AS1530.4:2014

The following variations were considered in the assessment:

- Application of the provided test reports if tested to AS 1530.4:2014
- Use of 90 x 45mm timber stud as opposed to 95 x 45mm studs
- Introduction of additional linings for cosmetic purposes
- Comparison of C16 graded timber to NZ/AS standard timber

3. Primary and Secondary Information

The following test reports and information were considered in the assessment:

Test report #	Laboratory	Information type	Test Standard
WF397660	Warringtonfire, UK	Primary	EN 1363-1:2012
WF411541	Warringtonfire, UK	Primary	EN 1363-1:2012
WF434269	Warringtonfire, UK	Primary	EN 1363-1:2012
WF509658	Warringtonfire, UK	Primary	EN 1363-1:2020
ETA-23/0496	N/A	Secondary	-

4. Assessment Results

4.1 General Results

In the current assessment the likely performance of the following tested systems was positively assessed if tested to AS1530.4-2014 with permissible variant stated below and system-specific variations provided in Sections 4.2-4.5 for the respective system.

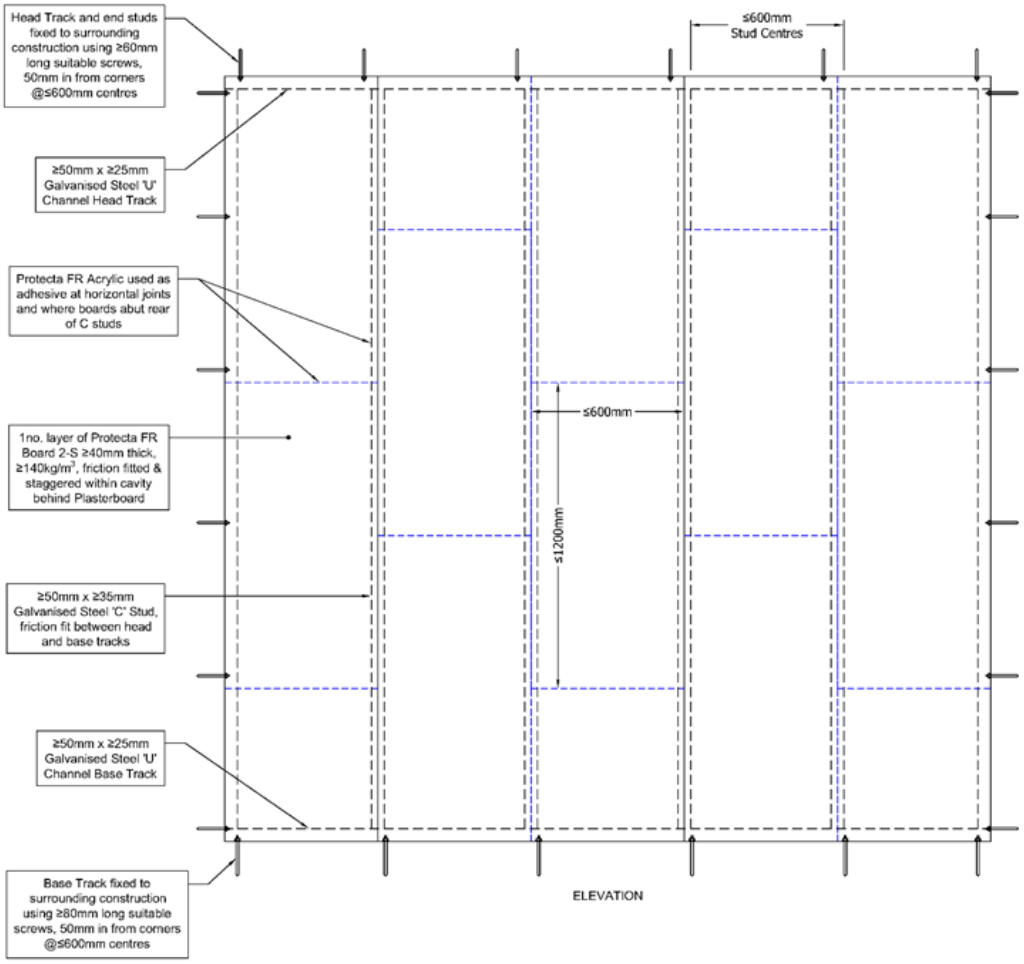
System	Framing	Lining	FR Board*	Test report	Assessed FRL
A	Steel C studs 50x35x0.55mm	12.5mm Standard plasterboard	40mm thick, one layer	WF397660	-/60/60
B	Timber studs 63x38mm with 220 microns WFT of Protecta Interior Paint FR-1	12mm particle board with 220 microns WFT of Protecta Interior Paint FR-1	40mm thick, one layer	WF411541	-/60/60
C	Timber studs 95x45mm	None	60mm thick, 2-S, one layer as stud lining and wall infill	WF434269	-/45/45
D	Timber studs 95x45mm with 220 microns WFT of Protecta Interior Paint FR-1	None	40mm thick, two layers	WF509658	-/90/60

* - two 5x5mm beads of Protect FR Acrylic sealant shall be applied to any Board-to-Board and Board-to-Stud junction. Each bead shall be approximately 10mm from the respective face of the board.

The following variations were positively assessed for the full range of tested systems

- Increase in the length of a wall of identical construction
- Decrease in height
- Increase in thickness of the wall
- Increase in thickness of component materials
- Increase in cross-sectional dimensions of the framing element(s);
- Decrease in linear dimensions of boards or panels but not thickness
- Decrease in stud spacing
- Decrease in distance of fixing centres

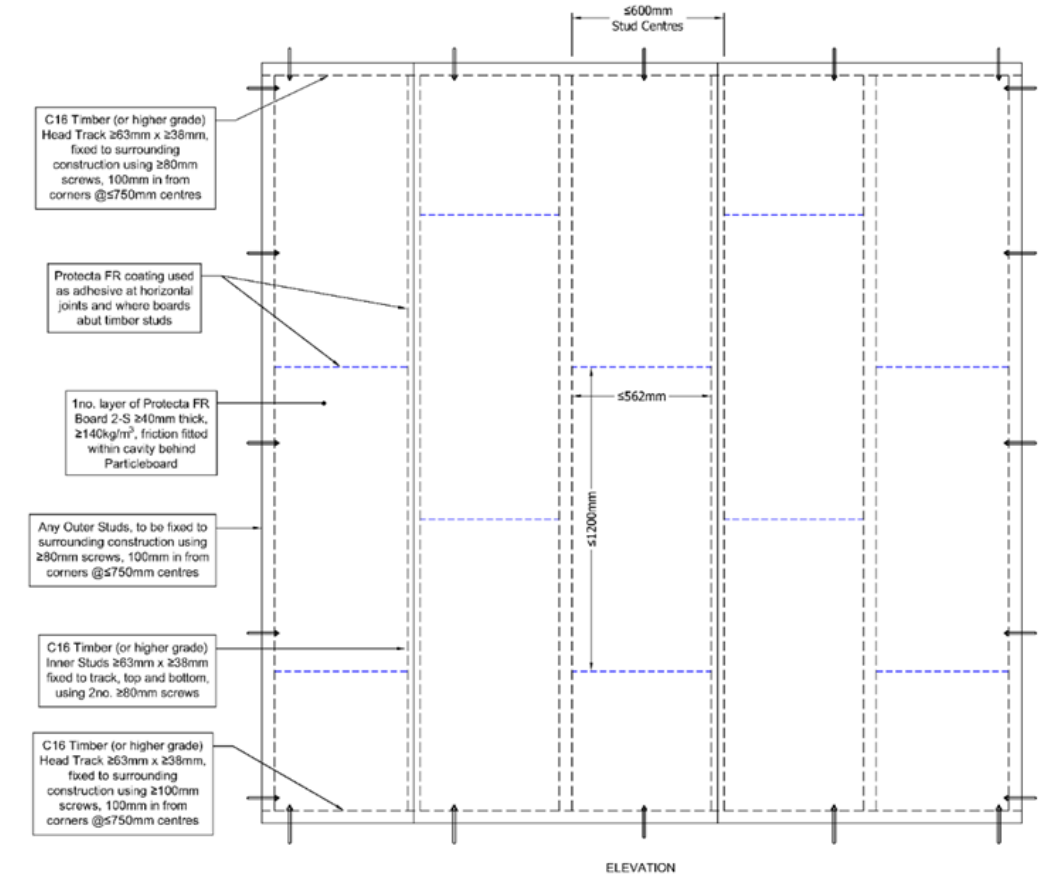
4.2 System-Specific Variations – System A



The following variations were positively assessed for test WF397660:

- Substitution of standard 12.5mm plasterboard for tested fire-rated or standard plasterboard of equal or greater thickness
- Increase in steel thickness up to a maximum of 2 mm

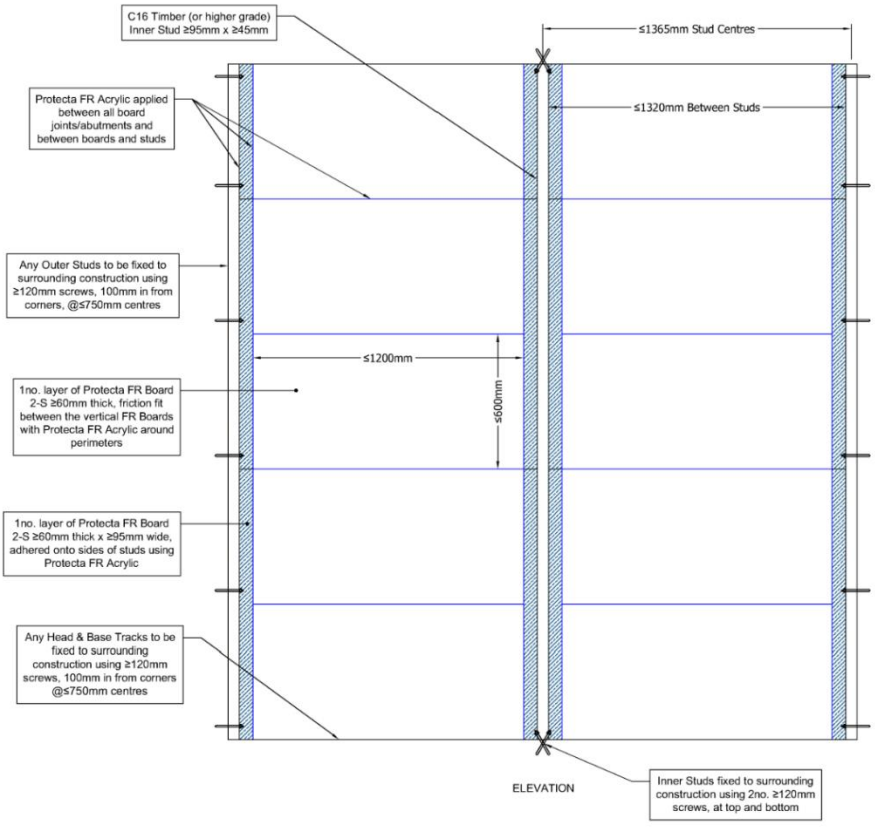
4.3 System-Specific Variations – System B

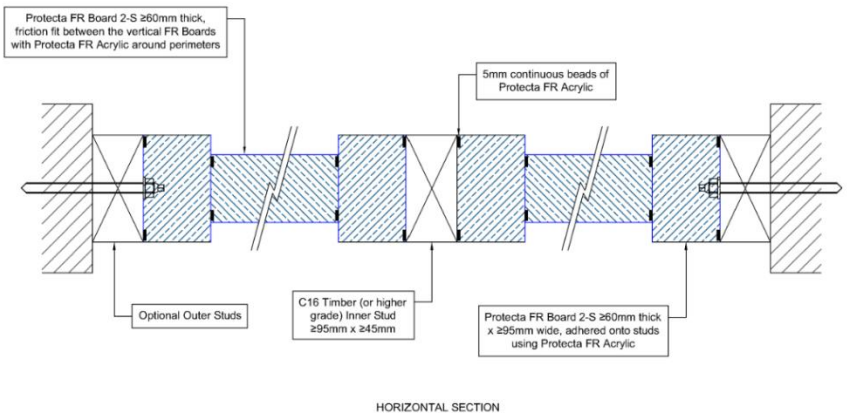


The following variations were positively assessed for test WF411541:

- Use of F8, MGP10, and SG10 graded timber (or higher grade) in place of C16 graded timber
- Increase in timber density

4.4 System-Specific Variations – System C



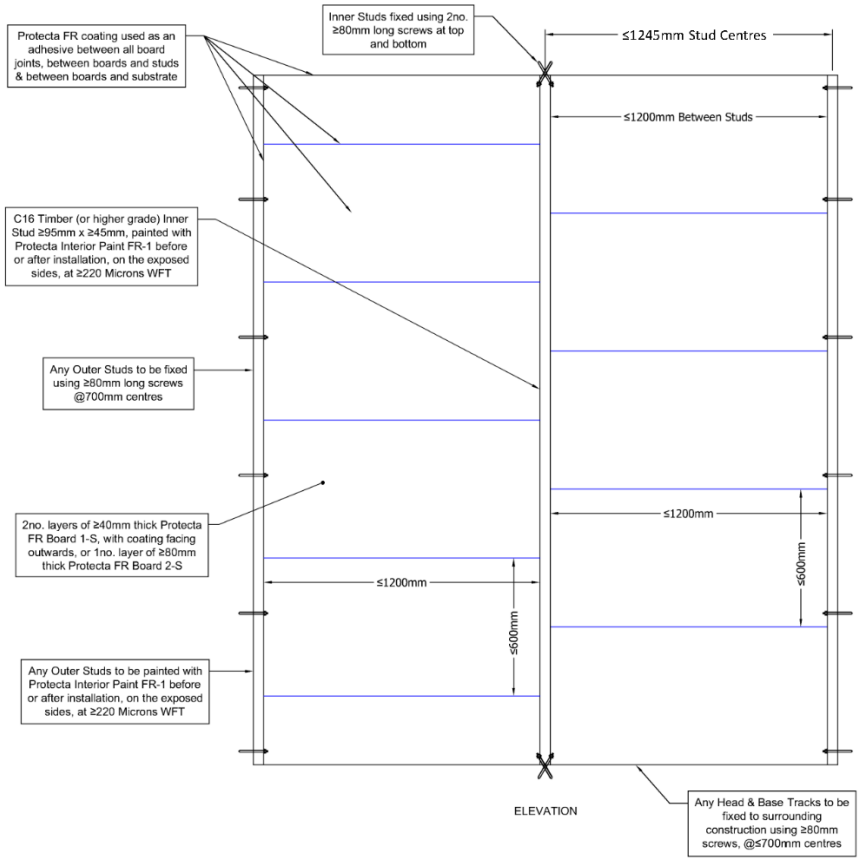


HORIZONTAL SECTION

The following variations were positively assessed for test WF434269:

- Introduction of additional non-combustible linings for cosmetic purposes, fixed to timber studs in accordance with lining manufacturers' requirements
- Use of 90 x 45mm timber stud as opposed to 95 x 45mm studs
- Use of F8, MGP10, and SG10 graded timber (or higher grade) in place of C16 graded timber
- Increase in timber density
- Removal of outer studs and top/bottom plates when boards are installed directly against concrete walls or floors of density ≥ 650 kg/m^3.

4.5 System-Specific Variations – System D



The following variations were positively assessed for test WF509658:

- Introduction of additional non-combustible linings for cosmetic purposes, fixed to timber studs in accordance with lining manufacturers' requirements
- Use of 90 x 45mm timber stud as opposed to 95 x 45mm studs
- Use of F8, MGP10, and SG10 graded timber (or higher grade) in place of C16 graded timber
- Increase in timber density
- Removal of outer studs and top/bottom plates when boards are installed directly against concrete walls or floors of density ≥ 650 kg/m^3.

5. Validity of the Assessment

The assessment report is valid till 12/04/2029.

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

This Assessment does not provide an endorsement by Fire TS Lab of the actual data provided.

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

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

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

This Assessment is based on the information provided and experience available at the time of writing. The published procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement and it is recommended that this document be reviewed on or before the stated expiry date. If contradictory evidence becomes available to the assessing authority, the assessment will be unconditionally withdrawn and the report sponsor will be notified in writing. Similarly, the assessment should be re-evaluated, if the assessed construction is subsequently tested since actual test data is deemed to take precedence.

The information contained in this document shall not be used for the assessment of variations other than those in the conclusions above. This document is valid providing no modifications are made to the systems described in this document.

All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

6. Authority

By using this document as evidence of compliance of 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 the structure be subject to a fire test by a recognized 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 testing authority to withdraw the assessment.

Appendix A – Discussion

Use of 90 x 45mm timber stud as opposed to 95 x 45mm studs

Tests WF434269 and WF509638 used European Redwood C16 timber studs measuring 95 x 45mm to construct the separating element.

Test WF434269 included a non-loadbearing timber stud naked wall with 60mm Protecta FR Boards installed between each stud. Additional sections of 60mm Protecta FR Boards were installed as stud facings. Integrity failure and insulation of the system occurred at 56 minutes between the timber studs and stud facings, therefore the system demonstrated the ability to achieve an FRL of -/30/30. Although the failure occurred at the timber stud, and a reduction in timber depth may result in an earlier integrity failure, it is not likely to affect the performance of the system by a magnitude great enough to require a reduction of the FRL.

Test WF509638 included a non-loadbearing timber stud naked wall with two layers of 40mm Protecta FR Boards installed between each stud. No integrity failure was observed at the conclusion of the test, while insulation of the system occurred at 85 minutes, therefore the system demonstrated the ability to achieve an FRL of -/90/60. The substitution of 90 x 45mm timber is not likely to have a substantial influence on the performance of the system, as the thermal resistance of the system would remain constant.

In the opinion of the laboratory, the substitution of 90 x 45mm for 95 x 45mm is not likely to negatively influence the achieved performance of the tested systems, and can therefore be positively assessed.

Introduction of additional linings for cosmetic purposes.

Test WF397660 included a non-loadbearing steel stud partition wall lined with 12.5mm Knauf Wallboards on each side, with 40mm Protecta FR Boards installed into the wall cavity. No integrity failure was observed at the conclusion of the test, while insulation of the system occurred at 85 minutes, therefore the system demonstrated the ability to achieve an FRL of -/60/60. In the opinion of the laboratory, the substitution of the 12.5mm standard plasterboard for a fire-rated plasterboard of equal or greater thickness is not likely to negatively influence the system's performance

In the opinion of the laboratory, if the 12.5mm Knauf Wallboard was installed to either of the tested systems of WF434269 or WF509638, it is not likely to negatively influence the performance of the system. Furthermore, in the opinion of the laboratory, the addition of other proven non-combustible cladding or lining systems used for cosmetic purposes would not negatively influence the system’s performance. Additional lining shall be fixed to timber studs in accordance with the lining manufacturers’ requirements.

Comparison of C16 graded timber to NZ/AS standard timber

Tests WF411541, WF434269 and WF509638 used European Redwood C16 timber studs measuring 95 x 45mm to construct the separating element. A technical analysis was conducted to compare the properties of C16 timber, as indicated by BS EN 338:2016, to the equivalent timber design standards of Australia and New Zealand. BS EN 338:2016 establishes a system of strength classes for general use in design codes. It gives characteristic strength and stiffness properties and density values for each class to which BS EN 14081.1 refers. To compare the properties between standards, the bending, compression and tension strength parallel to the grain was considered, as well as the modulus of elasticity. The density of timber was not considered in this comparison, due to the wide range of densities between timber species that can be classed as C16 timber. The table below depicts a summary of the minimum requirements for grade C16 timber in accordance with BS EN 338:2016:

Grade	Bending Strength (MPa)	Compression Strength (MPa)	Tension Strength (MPa)	Average Modulus of Elasticity (GPa)
`C16	16.0	17.0	8.5	8.0

AS1720.1:2010 establishes the design properties for structural graded timber for use in Australia. The timber industry uses two grading systems for solid timber - the visual stress grading (F-grading system) for both softwoods and hardwoods and the machine stress grading (MGP-grading system) specifically for pine timber. A summary of the characteristic values for design for bending and shear in beams and tension and compression parallel to grain relative to F-grade are listed below.

Grade	Bending Strength (MPa)	Compression Strength (MPa)	Tension Strength (MPa)		Average Modulus of Elasticity (GPa)
			Hardwood	Softwood	
F4	12	8.6	7	5.8	6.1
F5	14	11	9	7.3	6.9
F7	18	13	11	8.9	7.9
F8	22	18	13	12	9.1
F11	31	22	18	15	10.5
F14	36	27	22	19	12
F17	42	34	25	22	14
F22	55	42	34	29	16
F27	67	51	42	34	18.5
F34	84	63	51	42	21.5

The MGP grading system is specific to pine and assumes a minimum strength group of SD6. F-graded timber can be substituted with MGP-graded timber, but the reverse is not possible. The MGP property tables include bearing strength, density and additional information required to determine the strength of joints – as well as

characteristic values for bending and shear of beams, tension and compression and elastic moduli parallel to the grain. For the purpose of assessment, a summary of the characteristic values for design for bending and shear in beams and tension and compression parallel to grain relative to MGP grade are listed below.

Grade	Bending Strength (MPa)	Compression Strength (MPa)	Tension Strength (MPa)	Average Modulus of Elasticity (GPa)
MGP 10	17	18	7.7	10
MGP 12	28.0	24.0	12.0	12.7
MGP 15	39.0	30.0	18.0	15.2
A17	40.0	35.0	24.0	16.0

NZS AS1720.1:2022 establishes the design properties for structural graded timber for use in New Zealand. The timber industry uses a grading system for verified timber, which combines visual stress grading and machine stress grading into one stress grade (SG). A summary of the characteristic values for design for bending and shear in beams and tension and compression parallel to grain relative to stress grade are listed below.

Grade	Bending Strength (MPa)	Compression Strength (MPa)	Tension Strength (MPa)	Average Modulus of Elasticity (GPa)
SG6	10.0	15.0	4.0	6.0
SG8	14.0	18.0	6.0	8.0
SG10	20.0	20.0	8.0	10.0
SG12	28.0	25.0	14.0	12.0
SG15	41.0	35.0	23.0	15.2

Comparing the requirements across equivalent standards, it was determined that the characteristic properties of C16 timber were similar to those of grades F8, MGP10, and SG10. In the opinion of the laboratory, the substitution of C16 timber to the equivalent NZ/AS standard timber is not likely to negatively influence the performance of the tested specimens and can be positively assessed.

Appendix B – Supporting Data

Test WF397660

The test was conducted as per EN 1363-1:2012 and EN 1364-1:2015 on 21/03/2018. No departures from the testing method occurred.

The tested system was a non-loadbearing steel stud partition wall lined with 12.5mm Knauf Wallboards on each side, with 40mm Protecta FR Insulation installed into the wall cavity. The steel studs were installed at 600mm centres and fixed between the top and bottom tracks. Protecta FR Insulation boards were cut to size and installed between studs. Polyseam Formulation 08A sealant was applied to horizontal butt joints between Protecta Boards, vertical butt joints to steel studs and to internal 'C' channel joins. One layer of 12.5mm Knauf Wallboard was installed to each side of the steel framing, fixed at 300mm centres. The vertical plasterboard joints and screw holes were finished with Knauf Paper Tape and Knauf Joint filler.

Tested System	**Integrity (min)**			**Insulation (min)**	
	Cotton Pad	Continuous Flaming	Gap Gauges	Average	Maximum
Non-Loadbearing Steel Stud Wall	73 NF	73 NF	72	72	67

The test was discontinued at 73 minutes. A visual 6mm gap gauge failure was recorded 1200mm in from the left side, near mid-height of the specimen, constituting integrity failure. Insulation failure occurred by virtue of integrity failure.

Test WF411541

The test was conducted as per EN 1363-1:2012 and EN 1364-1:2015 on 21/03/2019. No departures from the testing method occurred.

The tested system was a non-loadbearing timber stud partition wall lined with 12mm Kronospan P2 E1 Particleboard on each side, which was then coated with a 220um layer of Protecta Interior Paint FR-1. 40mm Protecta FR Board was installed into the wall cavity.

The European Redwood C16 timber studs measuring 38mm x 63mm were installed at 600mm centres and fixed between the top and bottom plates. A row of nogs was installed at 550mm from the top plate.

Protecta FR boards were cut to size and installed between studs. Protecta FR Coating was applied to horizontal butt joints between Protecta Board vertical butt joints to timber studs. One layer of 12mm Kronospan P2 E1 Particleboard was installed to each side of the timber framing, fixed at 200mm centres. The cladding included three vertical joints, measuring 2400mm and a horizontal joint at 550mm from the top of the specimen, in line with the row of nogs. A 220um (WFT) coating of Protecta Interior Paint FR-1 was applied to both sides of the separating element.

Tested System	Integrity (min)			Insulation (min)	
	Cotton Pad	Continuous Flaming	Gap Gauges	Average	Maximum
Non-Loadbearing Timber Stud Wall	79	80	81 NF	79	79

The test was discontinued at 81 minutes. A cotton pad was applied near the junction of a horizontal and vertical joint, approximately 100mm from the top of the vertical boards which resulted in the ignition of the cotton pad and therefore integrity failure. Continuous flaming occurred one minute later from the same location. Insulation failure occurred by virtue of integrity failure.

Test WF434269

The test was conducted as per EN 1363-1:2012 and EN 1364-1:2015 on 27/10/2020. No departures from the testing method occurred.

The tested system was a non-loadbearing timber stud naked wall with 60mm Protecta FR Boards installed between each stud. Additional sections of 60mm Protecta FR Boards were installed as stud facings.

The European Redwood C16 timber studs measuring 45mm x 95mm were installed at approximately 1365mm centres and fixed between top and bottom plates, resulting in two openings measuring 1320mm x 3000mm and one opening measuring 180mm x 3000mm. The vertical edges of the timber studs within the opening were faced with sections of 60mm Protecta FR Boards, trimmed to 95mm, and installed with the coated side of the board to the timber stud. This reduced the two large openings to approximately 1200mm. 60mm Protecta FR Boards were installed in the remaining large openings, with the coated faces of the boards on the fire and non-fire sides of the separating element. A 5mm bead of Protecta FR Acrylic sealant was applied around all board-board and board-stud joints. This method was repeated for the remaining opening, using cut-to-size 60mm Protecta FR Boards

Tested System	**Integrity (min)**			**Insulation (min)**	
	Cotton Pad	Continuous Flaming	Gap Gauges	Average	Maximum
Non-Loadbearing Timber Stud Wall	60 NF	56	60 NF	56	56

The test was discontinued at 60 minutes. At 56 minutes, continuous flaming occurred at the centre stud, between the stud and 60mm Protecta FR Board sections and therefore constituted integrity failure. Insulation failure occurred by virtue of integrity failure.

Test WF509638

The test was conducted as per EN 1363-1:2020 and EN 1364-1:2015 on 8/11/2022. No departures from the testing method occurred.

The tested system was a non-loadbearing timber stud naked wall with two layers of 40mm Protecta FR Boards installed between each stud.

The European Redwood C16 timber studs measuring 45mm x 95mm were installed at approximately 1245mm centres and fixed between top and bottom plates, resulting in two openings measuring 1200mm x 3000mm, and one measuring 420mm x 3000mm. 40mm Protecta FR Boards were installed in the openings, with the coated faces of the boards on the fire and non-fire sides of the separating element. Horizontal board-board joints were staggered. A 5mm bead of Protecta FR Acrylic sealant was applied around all board-board and board-stud joints.

Tested System	Integrity (min)			Insulation (min)	
	Cotton Pad	Continuous Flaming	Gap Gauges	Average	Maximum
Non-Loadbearing Timber Stud Wall	92 NF	92 NF	92 NF	85	86

The test was discontinued at 92 minutes. Integrity failure was not observed during the testing period. The mean insulation failure criteria was exceeded at 85 minutes.

Assessment ETA-23/0496

A European Technical Assessment was conducted according to Article 29 of the Regulation (EU) No 305/2011 on 22/08/2023. The assessment was based on the following tests:

- Test WF397660
- Test WF411541
- Test WF434269
- Test WF509638

It was determined that the classifications of the above tests apply within the following field of application:

- Decrease in height
- Increase in thickness of the wall
- Increase in thickness of component materials
- Decrease in linear dimensions of boards or panels but not thickness
- Decrease in stud spacing
- Decrease in distance of fixing centres
- Increase in the number of horizontal joints, not more than 550mm ± from the top edge
- Increase in number of vertical joints

For tests WF43426 and WF509638, the ETA allowed for the optional detail of removing outer studs and top/bottom plates in the case that the boards are installed directly against concrete walls or floors of density ≥ 650 kg/m^3.

Appendix C – Applicability of Test Results

The range of tests considered in this assessment were tested in accordance with EN 1363.1:2012, EN 1363.1:2020 and EN 1364.1:2015. A comparative technical analysis was conducted to determine the differences between the tested standards and AS 1530.4:2014, and whether the results are likely to be similar if tested to AS 1530.4.

Furnace Temperature measurement

The furnace thermocouples of AS1530.4 shall be K-type mineral insulated metal sheathed (MIMS) with a stainless-steel sheath having wire diameter less than 1.0 mm and an overall diameter of 3 mm. The MIMS thermocouple shall be supported such that the measuring junction protrudes a minimum of 25mm from the support. The thermocouples shall be replaced every 40 h.

The minimum number of thermocouples used to measure furnace temperature shall be the greater of four, or for planar or multiple specimen tests, the nearest whole number to the area of the furnace opening in square metres multiplied by 0.6. Thermocouples located initially 100 mm from the face of the test specimen and maintained, where practicable, at a distance of 50 to 150 mm during the test. The thermocouples used to measure the temperature of the furnace shall be uniformly distributed so as to give a reliable indication of the average temperature in the vicinity of the test specimen.

The furnace thermocouples of EN 1363.1 shall be plate thermometers comprised of a folded austenitic nickel-based superalloy plate, a 1-3mm K type MIMS thermocouple and an inorganic insulation pad. The folded metal plate shall have the nominal dimensions 150mm x 100mm x 0.7mm. The inorganic insulation pad shall have the nominal dimensions 97mm x 97mm x 10mm. The thermocouple hot junction shall be fixed to the geometric centre of the plate by a small strip made from the same material as the plate. Before the plate thermometers are first used, the folded plate part shall be aged in a preheated oven at 1 000 °C for 1 h, or in a fire resistance furnace for 90 min during a standard temperature/time curve test. The thermocouple and the insulation pad shall be replaced after 50 h exposure in the furnace.

The plate thermometer shall be located in a plane 100 mm from the exposed face of the separating element. At least one thermometer shall be provided for every 1,5 m2 of the heated area of the test construction, subject to a minimum number of four thermometers for each test construction. These thermometers shall be symmetrically distributed with respect to the heated area of the test construction. For vertical test constructions, the plate thermometers shall be oriented so that side 'A' faces the walls of the furnace opposite the test construction being evaluated.

It was determined that the furnace thermocouple requirements of AS1530.4 are deemed to be more onerous. The MIMS thermocouples are likely to be more sensitive to temperature changes than the insulated plate thermometers.

Furnace Pressure conditions

AS 1530.4 requires that the furnace shall be operated such that a pressure of zero is established at a height of 500 mm above the notional floor level for the specimen. An average value of 8.0 Pa per metre height shall be assumed in assessing the furnace pressure conditions.

EN 1364.1 requires that the furnace shall be operated so that the neutral pressure plane (a pressure of zero) is established 500mm above the notional floor level. Where a pressure greater than 20 Pa is expected at the top of the vertical test specimen, the nominal pressure of the furnace shall not exceed 20 Pa. This requirement may result in adjustment of the height of the neutral pressure plane. It can be assumed that the pressure gradient will be approximately 8,5 Pa per metre height of the furnace.

The furnace pressure conditions of EN 1364.1 are more onerous, however the furnace pressure across the range of tests was within the allowable tolerance of AS 1530.4.

Specimen Size

AS 1530.4 requires that the specimen shall be full size. Where the dimensions of the full-size specimen exceed that of the furnace opening, the minimum dimensions of the specimen shall be 3000 mm x 3000 mm for vertical specimens

EN 1364.1 requires that if, in practice, the height or width of the construction is 3 m or smaller, then that dimension of the test specimen shall be tested at full size. If any dimension of the construction is greater than 3 m, then that dimension shall be tested at not less than 3 m when tested without a supporting construction.

The specimen size requirements are similar between standards

Specimen Construction

AS 1530.4 requires that where sheets are vertically installed, there shall be at least two vertical joints and one horizontal joint in the specimen, if these are intended to be used in practice. Where the test specimen can incorporate at least two full-width sheets, the outside edge of the full-size board on the exposed face shall be unrestrained. Where the difference between the size of the furnace opening and the full width of the sheet is less than 1000 mm, one small sheet shall be attached to the restrained edge of the specimen on the exposed face. Where the difference is greater than 1000 mm, the full-size sheet shall be fixed in the centre of the specimen with smaller sheets of equal width on both sides.

EN 1364.1 requires that the test specimen shall contain as many full-width boards or panels as possible. Where the test specimen can incorporate at least two full-width boards or panels, the free edge shall be adjacent to a full-width board or panel on the exposed face. When it is not possible to incorporate two full-width boards or panels into the test specimen, the single full-width board or panel shall be located in the centre of the specimen, with smaller boards or panels of equal width on each side. The

smaller boards or panels shall not be less than 500 mm wide. If the element incorporates vertical joints in practice, then the test specimen shall incorporate a vertical joint. This joint shall be located between 350 mm and 650 mm in from the free edge and shall be on the outer layer of the unexposed face. If the element incorporates horizontal joints in practice, then the test specimen shall incorporate a horizontal joint. This joint shall be located between 350 mm and 650 mm in from the top edge and shall be on the outer layer on the unexposed face.

The specimen construction requirements of EN 1364.1 are deemed to be slightly more onerous, however, for the applications in this assessment, the requirements are similar

Specimen Thermocouples

AS 1530.4 requires that the thermocouples used for insulation measurement shall be K-type and have a wire diameter not exceeding 0.5mm. Each thermocouple shall have the tail of its measuring junction attached by silver soldering to the face of a 12 mm x 0.2 mm copper disc. Each thermocouple shall be covered with a 30mm x 30mm x 2.0mm thick inorganic insulating pad, cut to accommodate the thermocouple wires. The pad material shall have a density of 900 ±100 kg/m3. The disc and pad shall be pressed against the surface in such a way as will ensure that the disc is in firm contact with the surface of the test specimen. The measuring and recording equipment shall operate with a tolerance of ±4K

EN 1363.1 requires that the thermocouples used for insulation measurement shall be K-type and have a wire diameter of 0.5mm. K Type thermocouple wires shall be soldered to the face of a 12 mm x 0.2 mm copper disc. It is also permitted to use thermocouples whose wires have been twisted together and then soldered to the copper disc. Each thermocouple shall be covered with a 30mm x 30mm x 2.0mm thick silicate-fibre-based insulating pad, cut to accommodate the thermocouple wires. The pad material shall have a density of 900 ±100 kg/m3. The disc and pad shall be fixed to the specimen, taking care to ensure that the air gap between them, if any, is a minimum. The measuring and recording equipment shall operate with a tolerance of ±4K

The specimen thermocouple requirements are similar between standards

Thermocouple Positioning

AS 1530.4 requires that to measure the average temperature rise on the unexposed face of the specimen, five thermocouples shall be used. One thermocouple shall be placed close to the centre and the rest shall be placed close to the centre of each quarter section.

The maximum temperature thermocouples shall be attached as follows:

- At the head of the specimen at mid-width.
- At the head of the specimen in line with a stud.

- At the junction of a horizontal and vertical joint in a framed or prefabricated wall system.
- At the mid-height of one fixed edge.
- At the mid-height of one free edge, 100 mm from the edge.
- At mid-width, where possible, with the centre of the pad 15 mm from the edge of a horizontal joint (positive pressure zone).
- At mid-height, where possible, with the centre of the pad 15 mm from the edge of a vertical joint (positive pressure zone).

EN 1364.1 requires that for test specimens that are uniform with respect to their expected thermal insulation, the average temperature of the unexposed face shall be measured by means of five thermocouples, one located close to the centre of the specimen and one close to the centre of each quarter section

Maximum temperature thermocouples shall be located:

- at the top of the specimen at mid-width.
- at the top of the specimen in line with a stud/mullion.
- at the junction of a stud and a rail, or at the junction of horizontal and vertical joints in a nonloadbearing wall system.
- at mid-height of the fixed edge.
- at mid-height of the free edge, 150 mm in from the edge of the test specimen
- at mid-width, where possible, adjacent to a horizontal joint (positive pressure zone).
- at mid-height, where possible, adjacent to a vertical joint (positive pressure zone).

The specimen thermocouple positioning requirements are similar between standards

Deflection Measurement

AS 1530.4 requires that the measurements shall be made at mid-height, at the centre of the specimen and 50 mm from the free edge.

EN 1364.1 requires that one deflection measurement shall be made at the centre of the test specimen

The specimen construction requirements of AS 1530.4 are deemed to be slightly more onerous, however, the minimum requirements were met across the range of tests.

Insulation Criteria

AS 1530.4 states that the specimen shall be deemed to have failed when the average temperature of the unexposed face of the test specimen exceeds the initial temperature by more than 140 K; or the temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180 K.

EN 1363.1 states that the measurement of insulation performance is made by thermocouples on the unexposed face compared to the initial temperature. The specimen shall maintain its separating function without an increase of the average temperature above the initial average temperature by more than 140 K; or an increase at any location (including the roving thermocouple) above the initial average temperature by more than 180 K.

The insulation criteria are similar between standards.

Integrity Criteria

AS 1530.4 states that the measurements of the integrity of the test specimen shall be made by cotton pad, gap gauges or sustained flaming. Integrity failure shall be deemed to occur when:

- Cotton Pad: The cotton pad in its frame shall be applied against the surface of the test specimen until ignition of the cotton pad or for a period of 30±2 s. Integrity failure shall be deemed to have occurred upon ignition of the cotton pad, defined as glowing or flaming.
- Flaming: sustained flaming on the surface of the unexposed face for 10 seconds or longer shall be deemed to be an integrity failure.
- Gap Gauges: Two gap gauges shall be employed without undue force to determine whether the 6 mm gap gauge can be passed into the furnace and travel 150mm along the gap; or whether the 25 mm gap gauge can be passed into the furnace

EN 1364.1 states that the integrity is the times in completed minutes for which the test specimen continues to maintain its separating function during the test without causing the ignition of a cotton pad applied, permitting the penetration of a gap gauge or resulting in sustained flaming. Integrity shall be determined in accordance with EN 1363-1:

- Cotton Pad: A cotton pad is employed by placing the frame against the surface of the test specimen for a maximum of 30 s, or until ignition (defined as glowing or flaming) of the cotton pad occurs. Charring of the cotton pad without flaming or glowing shall be ignored.
- Continuous Flaming: The occurrence and duration of any flaming on the unexposed surface, together with the location of the flaming, shall be recorded.
- Gap Gauge: Two gap gauges shall be employed without undue force to determine whether the 6 mm gap gauge can be passed into the furnace and travel 150mm along the gap; or whether the 25 mm gap gauge can be passed into the furnace

The integrity criteria are similar between standards.

It was determined that the standards are relatively similar, with only minor differences between the testing standards. In the opinion of the laboratory, it is not likely that the performance of the range of tests would be negatively influenced if tested in accordance with AS 1530.4. Therefore, the application of test data to AS 1530.4 can be positively assessed, and an equivalent FRL can be assigned.

Applicability of European Technical Assessment results to AS 1530.4

Assessment ETA-23/0496 determined that the classifications of the above tests apply within the following field of application:

- Decrease in height
- Increase in thickness of the wall
- Increase in thickness of component materials
- Decrease in linear dimensions of boards or panels but not thickness
- Decrease in stud spacing
- Decrease in distance of fixing centres
- Increase in the number of horizontal joints, not more than 550mm ± from the top edge
- Increase in number of vertical joints

AS 1530.4 states that 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 of the following changes have been made, provided no individual component is removed or reduced:

- Increase in the length of a wall of identical construction if the specimen was tested with one vertical edge unrestrained.
- Increase in thickness of the wall.
- Increase in timber density;
- Increase in cross-sectional dimensions of the framing element(s);
- Increase in steel thickness up to a maximum of 2 mm;
- Decrease in sheet or panel sizes;
- Decrease in stud spacing; or
- Decrease in fixing centres of wall sheet materials.

The field of application is deemed to be similar to that of AS 1530.4. In the opinion of the laboratory, a decrease in height, a decrease in linear dimensions of boards or panels but not thickness or an increase in number of vertical joints is not likely to negatively influence the performance of the tested systems. The field of application can be positively assessed, and additional variations of AS 1530.4 may be applied.