# ASSESSMENT REPORT

An assessment of Horizontal and Vertical linear joint seals in a light weight partition wall if tested in with AS 1530.4-2014 and assessed in accordance with AS4072-2005

## EWFA Report No:

55712700.1

## Report Sponsor:

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Testing. Advising. Assuring.

# DOCUMENT REVISION STATUS

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# 1 INTRODUCTION

This report presents an assessment of the fire resistance performance of linear gap sealing systems in lightweight partition walls when tested in accordance with EN1366 4:2006+A1:2010 and assessed in accordance with AS1530.4-2014 and assessed in accordance with AS4072-2005.

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 6, 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 tests 18776A and 18787A, being tests on horizontal and vertical linear joint seals in a lightweight partition wall - type: Soudseal FR and Firecryle FR in accordance with EN1366 4:2006+A1:2010. The test was sponsored by Soudal NV and was conducted by Exova Warringtonfire gent Belgium Pty Ltd.

Permission has been granted from Soudal NV for the data to be used in the preparation of this report.

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

# 3 VARIATION TO TESTED PROTOTYPES

The proposed construction shall be as tested in 18776A and 18787A and consideration shall be given to the likely fire raring performance in accordance with AS1530.4-2014.

**Table 1: Schedule of Components for 60 minutes FRL system**

| ID | Description | |
|---|---|---|
| 1 | **Name** | **Flexible partition wall** |
| | **Material** | The standard flexible partition walls are composed of a metal framework, covered on both sides with a single layer of fire rated plasterboard13 mm thick.<br>The partition wall cavity is insulated with rock wool (thickness: 50 mm; density: 35 kg/m³). |
| 2 | **Name** | **Rigid wall** |
| | **Description** | Concert, Masonry , Blockwork , AAC walls that are thicker than 75mm .<br>These wall must have been tested or assessed by others to achieve an FRL of -/120/120. |
| 3 | **Name** | **Solid floor** |
| | **Description** | The horizontal edge connections consist of concrete. |
| 4 | **Name** | **Hybrid sealant: Soudaseal® FR** |
| | **Material** | SMX polymers |
| | **Size** | 20mm width ×13mm thickness |
| 5 | **Name** | **Acrylic sealant: Firecryl® FR** |
| | **Material** | Acrylic |
| | **Size** | 20mm width ×13mm thickness |

**Table 1: Schedule of Components for 120 minutes FRL system**

| ID | Description | |
|---|---|---|
| 1 | **Name** | **Flexible partition wall** |
| | **Material** | The standard flexible partition walls are composed of a metal framework, covered on both sides with a double layer of fire rated plasterboard (2×13mm thick)<br>The partition wall cavity is insulated with rock wool (thickness: 50 mm; density: 35 kg/m³). |
| 2 | **Name** | **Rigid wall** |
| | **Description** | Concert , Masonry , Blockwork , AAC walls that are thicker than 100mm .<br>These wall must have been tested or assessed by others to achieve an FRL of -/120/120. |
| 3 | **Name** | **Solid floor** |
| | **Description** | The horizontal edge connections consist of concrete. |
| 4 | **Name** | **Hybrid sealant : Soudaseal® FR** |
| | **Material** | SMX polymers |
| | **Size** | 20mm width ×26mm thickness |
| 5 | **Name** | **Acrylic sealant : Firecryl® FR** |
| | **Material** | acrylic dispersion |
| | **Size** | 20mm width ×26mm thickness |

# 4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-2014 for the determination of the FRL of a linear joint seal.

# 5 FORMAL ASSESSMENT SUMMARY

On the basis of the discussion presented in this report, it is the opinion of this testing authority that if the tested prototypes described in Section 2 had been varied as in Section 3, they will achieve the fire resistance performances below when tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7.

**Table 2: result summary for test No.18776A**

| Position | *DESCRIPTION* | | | |
|---|---|---|---|---|
| | **Orientation** | **Type** | **Width × Thickness [mm]** | **FRL** |
| 1 | Horizontal | Soudaseal® FR | 20×13 | -/60/60 |
| 2 | Horizontal | - | 0×13 | -/60/60 |
| 3 | Vertical | Soudaseal® FR | 20×13 | -/60/60 |
| 4 | Vertical | - | 0×13 | -/60/60 |
| 5 | Horizontal | Firecryl® FR | 20×13 | -/60/60 |
| 6 | Horizontal | - | 0×13 | -/60/60 |
| 7 | Vertical | Firecryl® FR | 20×13 | -/60/60 |
| 8 | Vertical | - | 0×13 | -/60/30 |

**Table 3: result summary for test No.18787A**

| Position | *DESCRIPTION* | | | |
|---|---|---|---|---|
| | **Orientation** | **Type** | **Width × Thickness [mm]** | **FRL** |
| 1 | Horizontal | Soudaseal® FR | 20×25 | -/120/120 |
| 2 | Horizontal | - | 0×25 | -/120/120 |
| 3 | Vertical | Soudaseal® FR | 20×25 | -/120/120 |
| 4 | Vertical | - | 0×25 | -/120/120 |
| 5 | Horizontal | Firecryl® FR | 20×25 | -/120/120 |
| 6 | Horizontal | - | 0×25 | -/120/120 |
| 7 | Vertical | Firecryl® FR | 20×25 | -/120/120 |
| 8 | Vertical | - | 0×25 | -/120/90 |

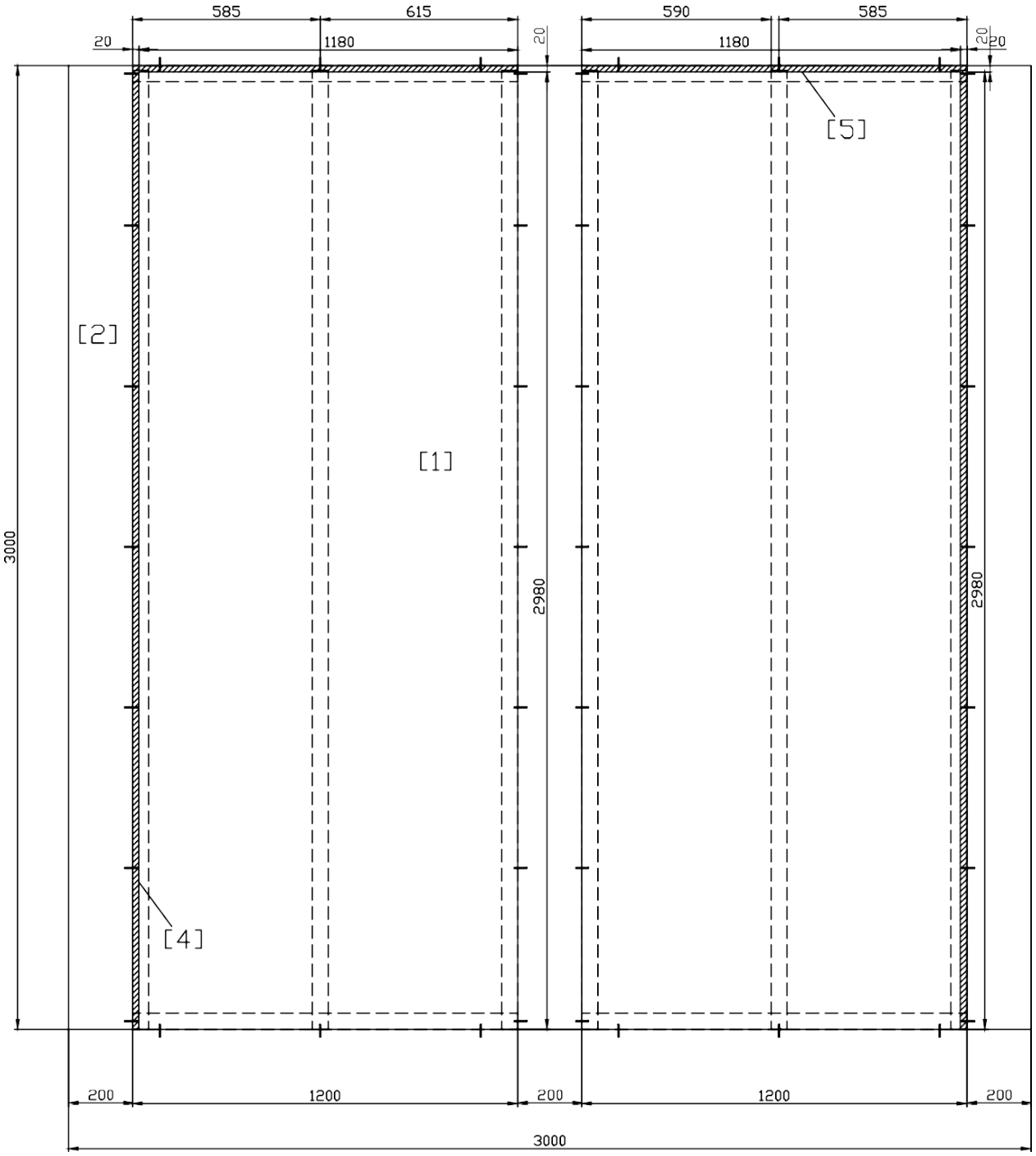


**Figure 1: Front view of lightweight partition wall with 13mm thick Soudaseal and Firecryl joint seals**

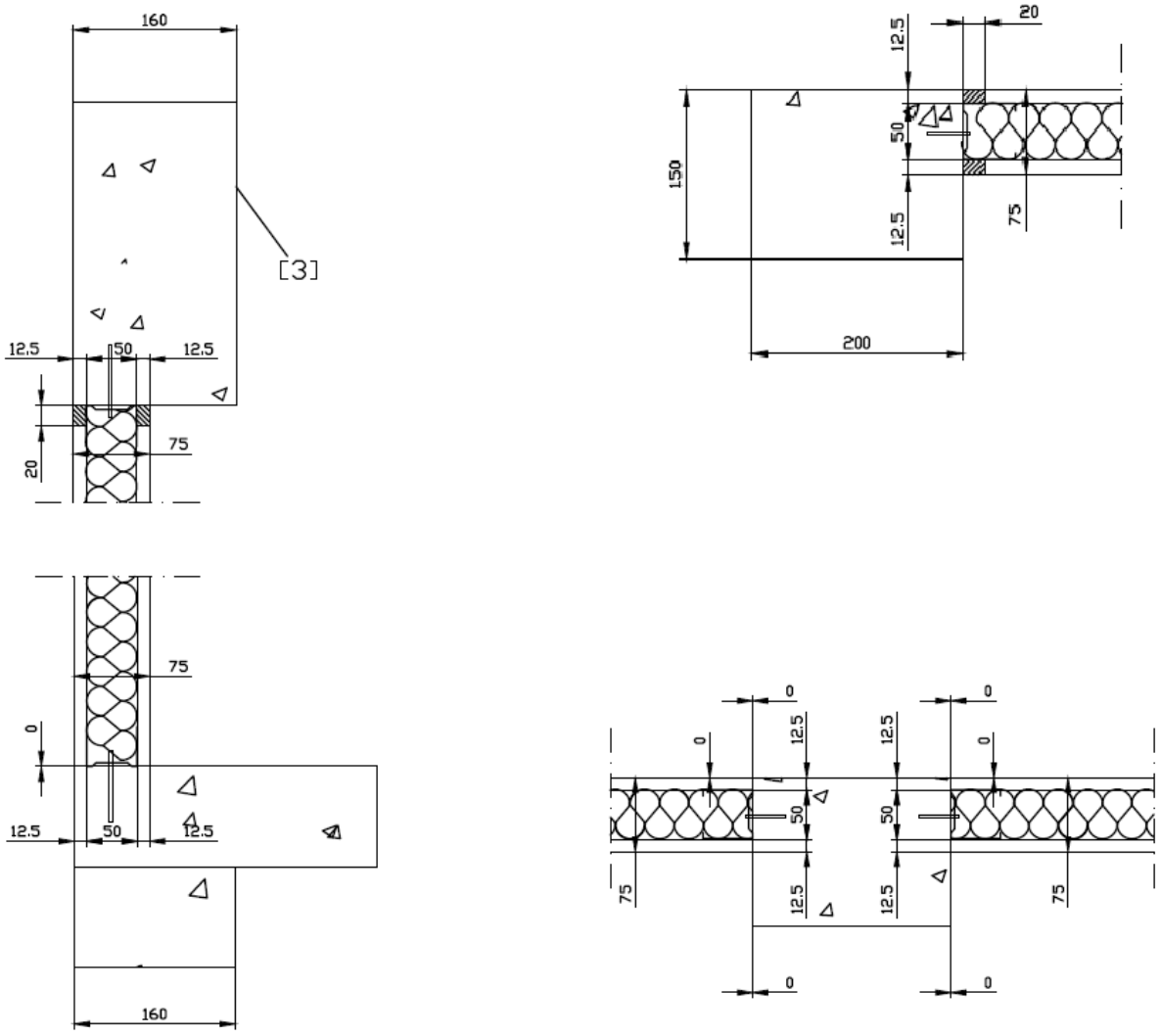


**Figure 2: Horizontal and vertical sections of lightweight partition wall with 13mm thick Soudaseal and Firecryl joint seals**

**(Note: 12.5mm pasteboard showed in this figure is replaced with 13mm thick fire rated plasterboard)**

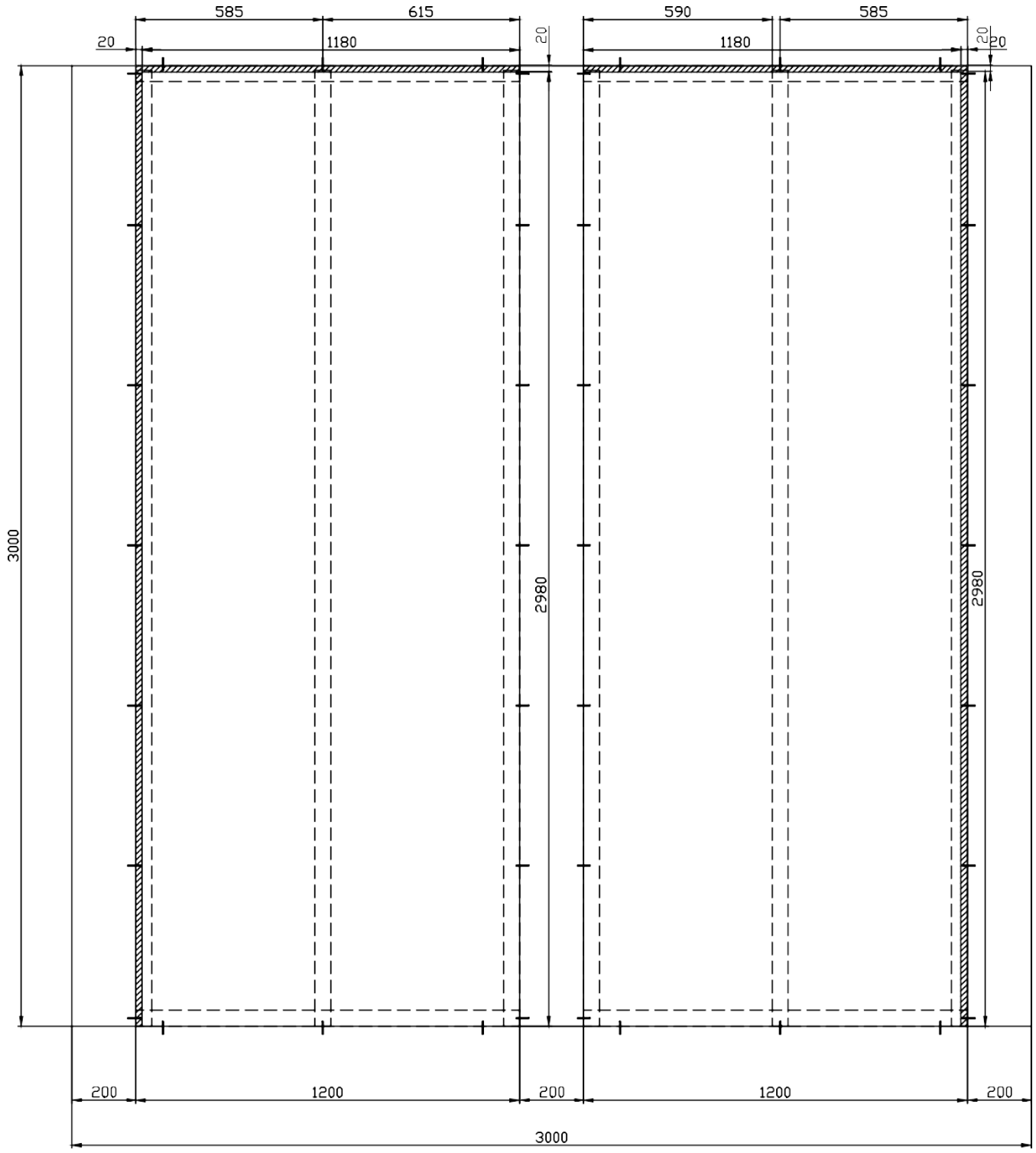


**Figure 3: Front view of lightweight partition wall with 26mm thick Soudaseal and Firecryl joint seals**

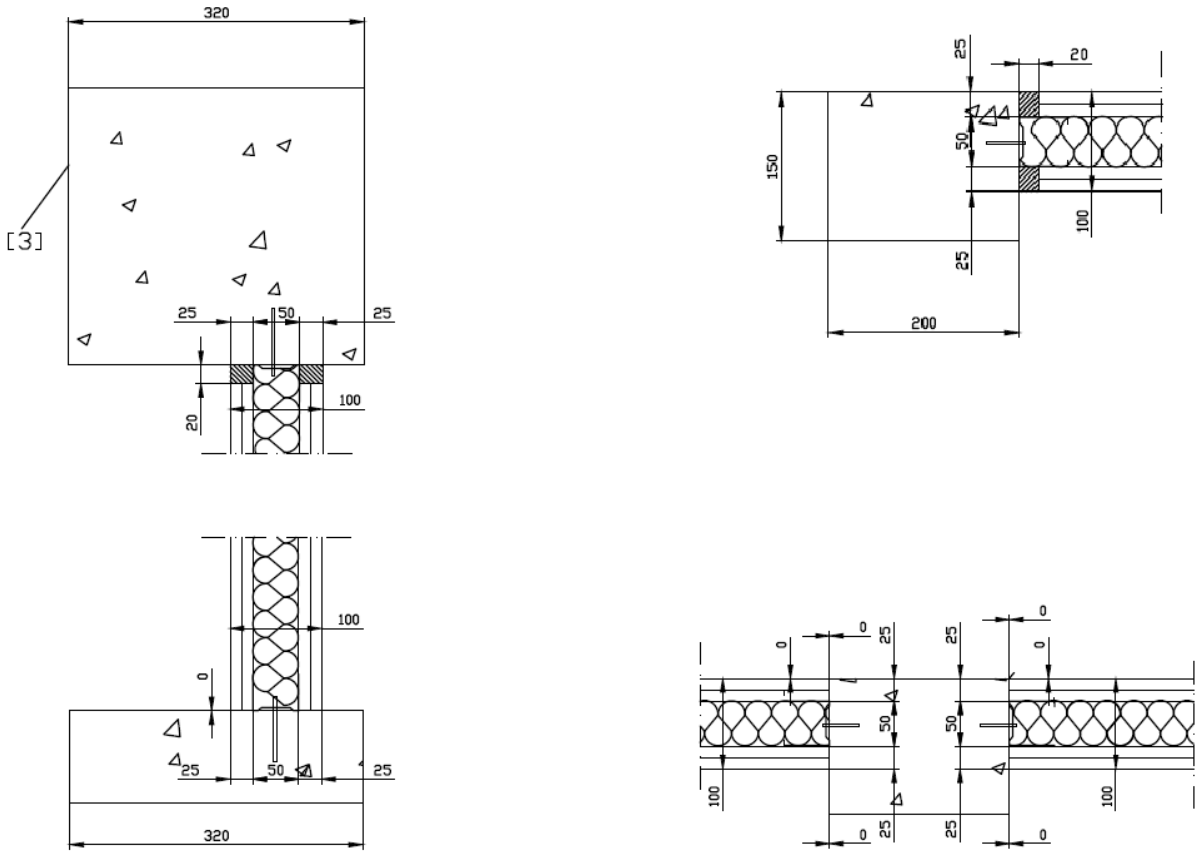


**Figure 4: Horizontal and vertical sections of lightweight partition wall with 26mm thick Soudaseal and Firecryl joint seals**

**(Note: 2×12.5mm pasteboard showed in this figure is replaced with 2×13mm thick fire rated plasterboard)**

# 6 DIRECT FIELD OF APPLICATION

The results of the referenced assessment are applicable to linear joint seals in lightweight walls.

# 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 AS1530.4-2014.

The supporting wall construction shall be capable of providing effective support of the proposed construction for the required fire resistance period. Refer to table 1 in section 3 for specific FRL requirements for the wall systems included as support construction in this assessment.

All services shall be supported in the manner in which they are assessed as described in Section 3. 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 fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions.

Because of the nature of fire 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



## 9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

| Prepared by: | Reviewed by: |
|---|---|
|  |  |
| Rami Al Darwish | Omar Saad |

## 9.4 DATE OF ISSUE

15 August 2018

## 9.5 EXPIRY DATE

31 August 2023

# APPENDIX A. SUMMARY OF SUPPORTING DATA

## A.1 TEST REPORT – 18776A

A.1.1 **Report Sponsor**

A.1.1.1 Soudal NV

A.1.2 **Test Laboratory**

A.1.2.1 Exova Warringtonfire gent Pty Ltd, Belgium

A.1.3 **Test Date**

A.1.3.1 The fire resistance test was conducted on 09/01/2018.

A.1.4 **Test Standards**

A.1.4.1 The test was conducted in accordance with EN 1366-4:2006+A1:2010.

A.1.5 **Variations to Test Method**

A.1.5.1 None

A.1.6 **General Description of Tested Specimen**

A.1.6.1 The test specimens are joint seals between a lightweight partition wall and the adjacent solid wall and solid floor plate.

A.1.6.2 The supporting constructions with the test specimens are mounted into a concrete frame with inner dimensions 3 meters x 3 meters. The whole unit was placed up against the furnace so that it constitutes one of the outer walls thereof. The dimensions of the concrete frame are invariable regardless of the actions of the test specimens during the test.

A.1.7 **Instrumentation**

A.1.7.1 The test report states that the instrumentation was in accordance with EN 13501-2

A.1.8 **Test results**

A.1.8.1 The test specimen achieved the following result:

| | DESCRIPTION | | | FRL (MINUTES) | | | |
|---|---|---|---|---|---|---|---|
| **Position** | **Orientation** | **Type** | **Width × Thickness [mm]** | **Thermal insulation I(*)** | **Integrity – E(*)** | | |
| | | | | **ΔTM = 180°C** | **Ignition cotton pad** | **continuous flames** | **Failure gap gauge** |
| 1 | Horizontal | Soudaseal ® FR | 20×12,5 | 66 (1) | **66 (1)** | **66 (1)** | **66 (1)** |
| 2 | Horizontal | - | 0×12,5 | 66 (1) | | | |
| 3 | Vertical | Soudaseal ® FR | 20×12,5 | 66 (1) | | | |
| 4 | Vertical | - | 0×12,5 | 60 | | | |
| 5 | Horizontal | Firecryl® FR | 20×12,5 | 66 (1) | | | |
| 6 | Horizontal | - | 0×12,5 | 66 (1) | | | |
| 7 | Vertical | Firecryl® FR | 20×12,5 | 66 (1) | | | |
| 8 | Vertical | - | 0×12,5 | 57 | | | |

(*) Classification according to EN 13501-2.

(1) The test was stopped after 66 minutes at the test sponsor's request.

## A.2 TEST REPORT – 18787A

A.2.1 **Report Sponsor**

A.2.1.1 Soudal NV

A.2.2 **Test Laboratory**

A.2.2.1 Exova Warringtonfire gent Pty Ltd, Belgium

A.2.3 **Test Date**

A.2.3.1 The fire resistance test was conducted on 09/01/2018.

A.2.4 **Test Standards**

A.2.4.1 The test was conducted in accordance with EN 1366-4:2006+A1:2010.

A.2.5 **Variations to Test Method**

A.2.5.1 None

A.2.6 **General Description of Tested Specimen**

A.2.6.1 The test specimens are joint seals between a lightweight partition wall and the adjacent solid wall and solid floor plate.

A.2.6.2 The supporting constructions with the test specimens are mounted into a concrete frame with inner dimensions 3 meters × 3 meters. The whole unit was placed up against the furnace so that it constitutes one of the outer walls thereof. The dimensions of the concrete frame are invariable regardless of the actions of the test specimens during the test.

A.2.7 **Instrumentation**

A.2.7.1 The test report states that the instrumentation was in accordance with EN 13501-2

A.2.8 **Test results**

A.2.8.1 The test specimen achieved the following result:

| | **DESCRIPTION** | | | **FRL (MINUTES)** | | | |
|---|---|---|---|---|---|---|---|
| **Position** | **Orientation** | **Type** | **Width x Thickness [mm]** | **Thermal insulation – I(*)** | ***Integrity – E(*)*** | | |
| | | | | **ΔTM = 180°C** | **Ignition cotton pad** | **continuous flames** | **Failure gap gauge** |
| 1 | Horizontal | Firecryl® FR | 20×25 | 132 (1) | **132 (1)** | **132 (1)** | **132 (1)** |
| 2 | Horizontal | - | 0×25 | 132 (1) | | | |
| 3 | Vertical | Firecryl® FR | 20×25 | 130 | | | |
| 4 | Vertical | - | 0×25 | 104 | | | |
| 5 | Horizontal | Soudaseal ® FR | 20×25 | 132 (1) | | | |
| 6 | Horizontal | - | 0×25 | 132 (1) | | | |
| 7 | Vertical | Soudaseal ® FR | 20×25 | 132 (1) | | | |
| 8 | Vertical | - | 0×25 | 115 | | | |

(*) Classification according to EN 13501-2.

(1) The test was stopped after 66 minutes at the test sponsor's request.

# APPENDIX B. ASSESSMENT OF SPECIFIC VARIATIONS

## B.1 RELEVANCE OF EN1366-4:2006 DATA WITH RESPECT TO AS1530.4-2014

### B.1.1 General

B.1.1.1 The fire resistance tests 18787A and 18776A were 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 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.

### B.1.3 Furnace Thermocouples

B.1.3.1 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.1.3.2 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.

B.1.3.3 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.

B.1.3.4 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.

B.1.3.5 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.

B.1.3.6 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.1.3.7 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.1.3.8 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 specimen tested to EN1363.1: 1999, particularly when the furnace temperature is changing quickly in the early stages of the test.

### B.1.4 Specimen Thermocouples

B.1.4.1 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.1.4.2 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.1.4.3 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.

B.1.5 **Furnace Pressure**

B.1.5.1 It is the requirement of AS1530.4-2014 that a pressure of 20+3 Pa be maintained at the top of vertical penetrating service and the services are included in the zone where positive pressure exceeds 10 Pa, and for EN1363-1: 1999 a minimum pressure of 15 Pa is required at the centre of the lowest test specimen.

B.1.5.2 Test report shows that pressure at mid height of the vertical specimen is 20 Pa. This value satisfies pressure criteria in accordance with the requirements of AS1530.4-2014.

B.1.5.3 The parameters outlining the accuracy of control of the furnace pressure in AS1530.4-2014 and EN1363-1: 1999 are also not appreciably different.

B.1.6 **Specimen Size**

B.1.6.1 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 13492A.

B.1.7 **Criteria of Failure**

B.1.7.1 AS1530.4-2014 specifies the following performance criteria for linear gap sealing systems (control joints):

*Structural Adequacy:*

B.1.7.2 Not applicable

*Integrity:*

B.1.7.3 Failure in relation to integrity shall be deemed to have occurred if the specimen:

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

*Insulation:*

B.1.7.4 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.1.7.5 The integrity and insulation criteria specified in EN1366-4:2006 are not appreciably different from AS1530.4-2014.

B.1.8 **Application of Test Data from 13492A to AS1530.4-2014.**

B.1.8.1 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.1.8.2 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.1.8.3 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.1.8.4 Based on the above discussion it is considered that the results relating to the integrity and insulation performance of the tested penetrations in 18787A and 18776A can be safely and conservatively be used to assess the FRL in accordance with AS1530.4-2014.

# APPENDIX C. ALTERNATIVE FIRE-RESISTANT GRADE PLASTERBOARD

1. The fire-resistant grade plasterboard manufactured in accordance with AS2588 of the same or greater thickness than specified in this assessment. The plasterboard shall also have been tested or assessed by others for the required fire resistance as a wall or ceiling element as appropriate to the design. Refer the manufacturers below for support of the product as a wall or ceiling element.

    - BGC Fireboard www.bgc.com.au/plasterboard
    - CSR Gyprock Fyrchek www.gyprock.com.au
    - Elephant Plasterboard www.elephantplasterboard.co.nz
    - GIB Fyreline www.gib.co.nz
    - Knauf FireShield www.knaufplasterboard.com.au
    - Midland Fire resistant plasterboard www.midlandplasterboard.com.au
    - USG Boral Firestop www.boral.com.au/plasterboard