Fire Crunch Australian Certified Building Solutions

FireCrunch

PARTY WALL - SINGLE 19mm SHEET

K-FIRE 19 SL4 -
SHAFT LINER SYSTEM

INSTALL: using **19mm K-FIRE**

19mmTG **SL4** Sheet-size 2700 x 600mm

PARTY WALL : Systems are designed to provide a separating **FIRE WALL** construction between adjacent tenancies **in Class 1 to 10 buildings.**

NATA Labs Australia Fire Tested Systems **AS1530.4** and more

Acoustic Rw 62 + ctr = 50
FRL../60/60 (Timber Frame) NON LOADBEARING
FRL90/90/90 (STEEL Frame) LOADBEARING

- **FIRE PROOF**
- **FLOOD PROOF**
- **IMPACT RESISTANT**
- **TERMITE PROOF**
- **MOULD & BACTERIA PROOF**

NATA CERTIFIED NO METAL CORROSIVE CHLORIDE $MgSO_4$ Sulphate Board

FIRE TESTED BY NATA / CSIRO & OTHERS

NOTE: FCA ref, is FireCrunch Australia

firecrunch.com.au

NEW FireCrunch SHAFT LINER K-FIRE 19 - SL4

Less time , money, materials and increases the ROI

FIRECRUNCH K FIRE 19 SL4 "SHAFTLINER" FRL 90/90/90 TO …120/120/120 is a fast, easy and lightweight DISCONTINUOUS FIRE WALL, Rw52 net ctr acoustic Firewall system for applications IN PARTY WALLS ,COMMON WALLS FIRE SEPARATION WALLS between townhouses, units and apartments.

Unlike other party wall systems the FIRECRUNCH "SHAFTLINER" **has only 3 components**

FIRECRUNCH SL4 IS A NON-ORGANIC COMPOSITE CLADDING, NO TREE DESTRUCTION FOR PLASTERBOARD PAPER LININGS **replaces Heavily Co2 pollutive Fyrchek plasterboard AND AT A LOWER PRICE**

Its impervious to weather rain etc , **until roof cover is on** , and **won't degrade in water at all ,unlike plasterboard**

COMPARES DIRECTLY WITH CSR, BORAL, AND HEBEL FIREWALLS AT A FAR BETTER RATE WHILE…

USING A HIGH CARBON CAPTURE TREE FRIENDLY CLADDING AND 19MM SHAFT LINER PRODUCT MgSO4, and not heavy CO2 POLLUTIVE 25mm Fyrchek,. …….. or similar FireCRUNCH ,HELPS MEET good citizen, NEW FEDERAL GOVT GUIDELINES FOR 2030 in DIVERSION TO LOW Co2 products

FireCrunch cladding is BETWEEN 30 AND 50% LESS than the advertised cladding cost rate of Fyrchek (MR) Moisture resistant plasterboard PLUS

NO SPECIAL EXPENSIVE SUPPORT EQUIPMENT

NATA LABS TESTED PRODUCTS

AS 1530.1, AS 1530.4, AS 3837,AS 5637, AS 717.1, AS 4964

- **No cranes**
- **No gantries**
- **No "H" STUD joiners**
- **No "U" TRACK**
- **No extra hard to fix 16mm FYRCHEK fire protection OVERLAP at floor & truss junctions.**
- **No special cementitious glues or compounds.**
- **Our unique self-fitting T&G board FIXES IN HALF THE TIME**

Lock the system in place with our special **SL 19 aluminium brackets, which** FireCrunch supplies for the correct placement of the boards. The FAST SET TG fire joints are GUN IN sealed with standard AS 1530.4 fire rated sealant using regular off the shelf screws which are **all available from your local TRADES supplier.**

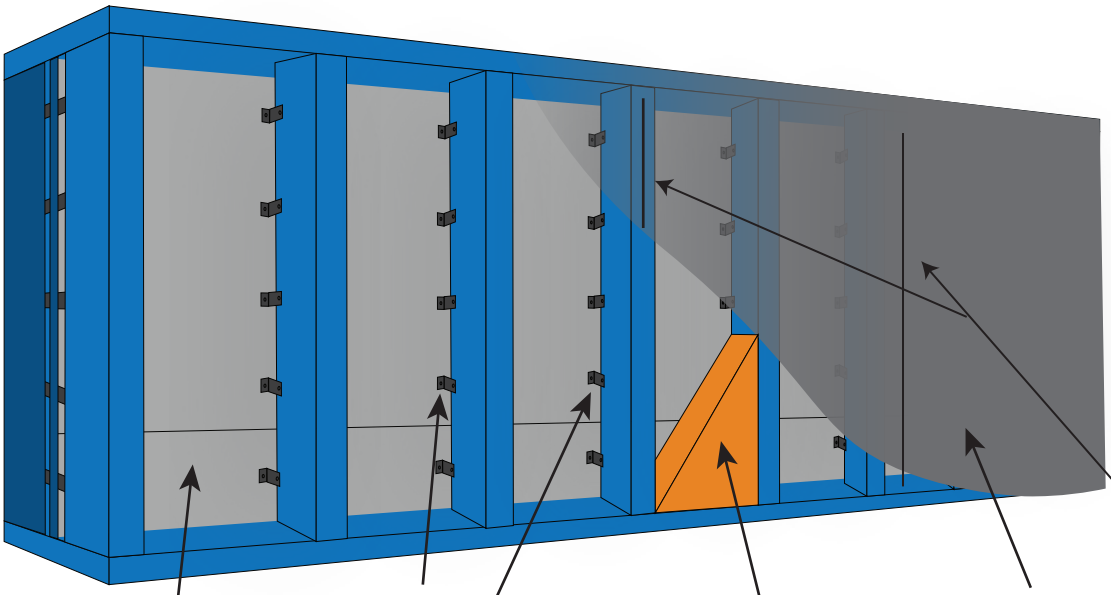
FIRECRUNCH K FIRE 19 SHAFTLINER is a lightweight, fast-to-install, easy-to-understand **SYSTEM** which will save you time, resources, on site labour **& most importantly money.** See price comparison below

The K 19 system will improve your time management on-site and improve your bottom line.

FIRECRUNCH is fully tested by NATA certified labs in Australia, & approved for use in all party wall fire applications. And ….is acoustic Rw 52 net of ctr to FRL 60,.90 AND 120 MINUTES

FireCrunch is a registered business name owned by X-FIRE INTERNATIONAL PL AND Licensed to Firecrunch Australasia Pty Ltd ABN 37 620 875 041 AN ASIC REGISTERED AUSTRALIAN CORPORATION

FireCrunch K19- SL4 SHAFT LINER FIRE WALL SYSTEM FRL 90/90/90



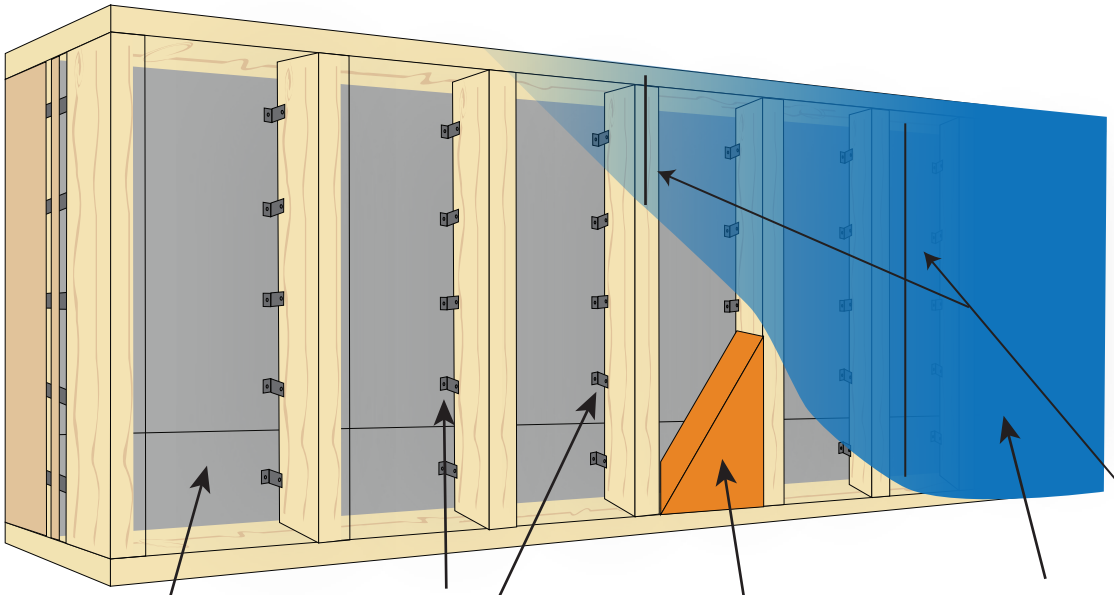
1 LAY FIRST 19MM PANEL HORIZONTAL T SIDE UP ,FILL GROOVE SIDE WITH RECC FIRE SEALANT .THEN INSERT A VERTICAL 19mm 2700 X 600 PANEL GROOVE SIDE DOWN.
FILL GROOVE SIDE WITH FIRE SEALANT AS 1530.4 PUSH T G SHEETS TOGETHER AND AFFIX ALUMINIUM BRACKETS

2 FIX 75 X 45 ALUMINIUM BRACKETS TO STUD AND BOARD,BOTH SIDES ,ALLOW MIN 20mm SPACE FROM STUD TO BOARD IN EACH PANEL AND SCREW FIX

3 92 x45 STEEL STUDS CFS 1.15 BMT. PLUS INSERT R 2.5/ 90mm GLASS WOOL BATT BETWEEN STUDS BOTH SIDES

4 cLOSE OFF EACH SIDE WITH ONE 10mm K CLAD FCA SHEET EACH SIDE VERTICAL SET WITH STUD BACKED 6mm WIDE VERTICAL FIIRE JOINT SHEETS FILL 6MM GAP WITH RECC FIRE SEALANT

FIRECRUNCH K-19 SL 4 SHAFT LINER TIMBER FIRE WALL SYSTEM FRL 60/60



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COST COMPARISON -2024 -- FACT SHEET FCA

FIRECRUNCH SHAFT LINER K FIRE 19 V CSR ,Boral and Hebel

Using faster simpler construction = AS1530.4 NATA CSIRO

Based on a 12m long 80 m2 FIRE WALL ground level

- **HEBEL 8 hrs x 2 men @$65 p/h** **$1040**
- CSR /BORAL 8 hrs x 2 men @ $65 p/h $1040
- **FIRECRUNCH 4hrs x 2 men @ $65 p/h** **$ 520**

1st Floor

- HEBEL 12hrs x 2 men @ $65 p/h $1560
- CSR /BORAL 10 hrs x 2 men @ $65 p/h $1300
- **FIRECRUNCH 4hrs x 2 x men @ $65 p/h** **$ 520**

Truss zone

- HEBEL 8 hrs x 2 men @ $65 ph $1040
- CSR /BORAL 6 hrs x 2 x men @ $65 ph $ 780
- **FIRECRUNCH 4 hrs x 2 x men @ $65 ph** **$ 520**

No gantry HIRE REQUIRED WITH FIRECRUNCH K FIRE 19- SL4 .

Hebel also REQUIRES mix up of glue with water on site.

CSR/ BORAL also has to *fit an extra 16mm board* ,at the floor bearers joints & truss zones

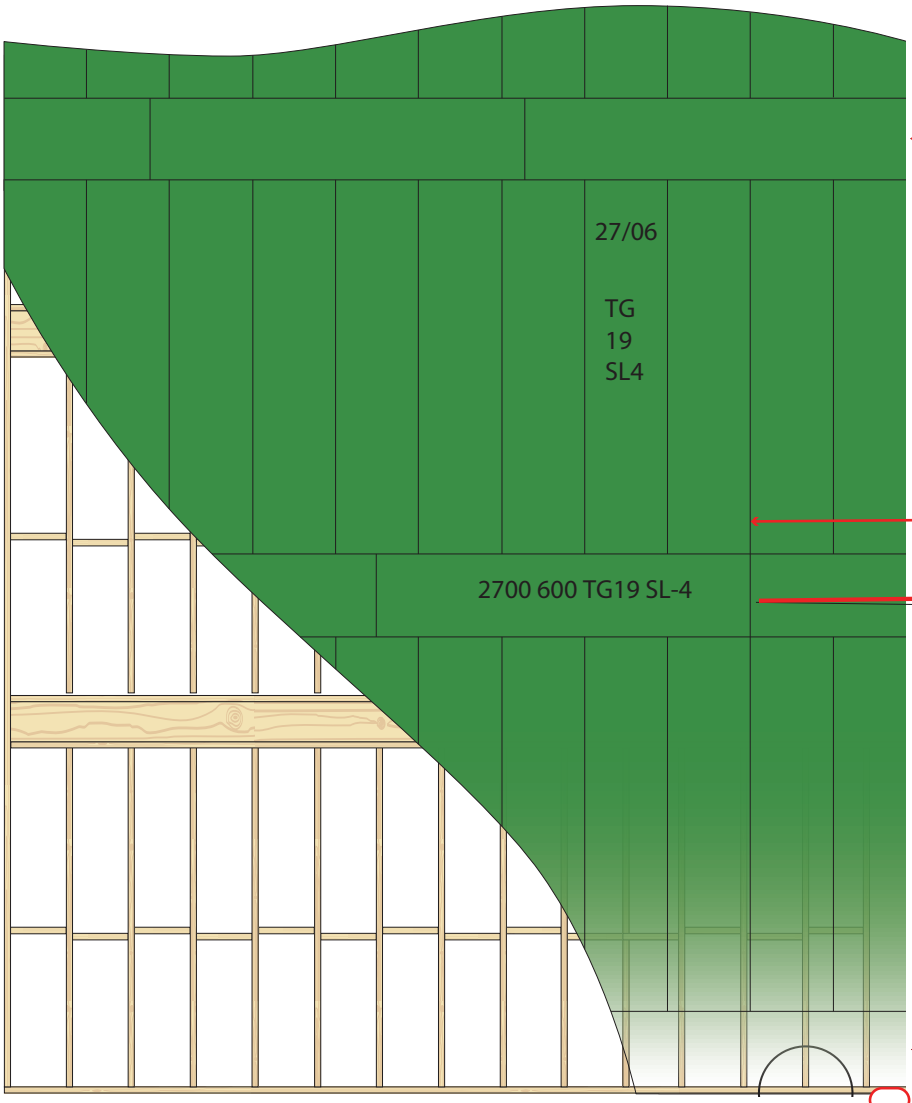
OVERALL LABOUR COMPARISON 80 m2

- HEBEL $ 3,640.=45.50 per m2 PLUS GANTRY
- CSR /BORAL $3,120 = $39.00 per m2 PLUS U TRACK ,H STUDS
- **FIRECRUNCH $1,560 = $19.50 per m2 NO GANTRY , U TRACK OR H STUDS ,MgSO4 cladding**

COMPARISON Based on an 80m2 shaft liner double stud frame fire wall timber or steel AS1530.4

- **HEBEL** **$45.50 m2**
- CSR / BORAL $39.00 m2
- FireCrunch $19.50 m2

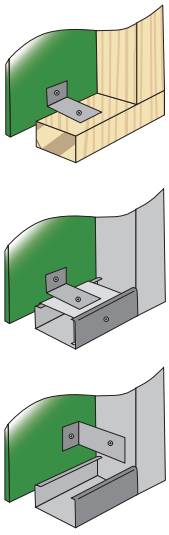
FIRECRUNCH K-FIRE19 SL4
SHAFT LINER FIRE SEPARATION PARTY WALL

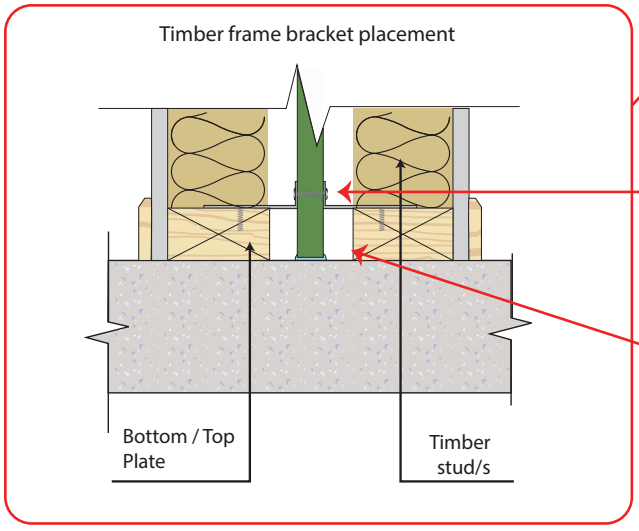


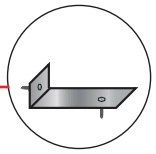
19mm TG:SHEETS
size 2700 x 600mm
Laid Horizontal
groove side DOWN.

19mm TG:SHEETS
size 2700 x 600mm
Laid vertical groove side DOWN TO FIX INTO HORIZONTAL T SIDE UP

19mm TG:SHEET
size 2700 x 600mm
Laid Horizontal
groove side DOWN.







ALUMINIUM STUD BRACKET
size 45 x 75mm
1.60 BMT

Bottom Plate

Fire Crunch Australian Certified Building Solutions

K-FIRE 19 SL4 SHAFT LINER USER BENEFITS

FIRE AND ACOUSTIC PARTY WALL FRL up to .../90/90
GENERAL DESCRIPTION AND SPECIFICATION

THE FireCrunch K-FIRE 19 SYSTEM IS DESIGNED TO USE THINNER WALLS AND LESS SECURING MATERIALS, WHILE MAINTAINING A HIGH 90 minute FRL AND A HIGH ACOUSTIC VALUE Rw62 PLUS CTR =NET Rw 50

Faster installs less material and thinner walls providing more end user space.

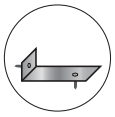
K-FIRE MgSO4 composite sheets also eliminate the weather issues always experienced by builders in protec-tion of the central 25mm plaster board with expensive H studs and U track before the roof can be assembled in place , often requiring expensive removal and replace-ment. **MgSO4 cladding is impervious to water or flooding.**

This eliminates the cumbersome heavy 25mm thick 3m x .06 mm CENTRAL PLASTERBOARD sheets , which then require H studs and U tracks to be fixed into position to hold these central fire panels in vertical secured positions before the firebreak aluminium clips can be installed.

K FIRE 19 uses 4 sided TG panels allowing a vertical and horizontal fast sheets erection with simpler 1.6mm BMT 45mm x 75mm right angled brackets screw fixed to the vertical stud sides and base plate.

The first 2700 x 600 panel is laid horizontally with fire AS 1530.4 sealant gunned into groove side down ,on base plate. On completion OF THE HORIZONTAL LAY ,the same size 2700 x 600 vertical set panels set vertically into each other and interlock with the horizontal TG joint . These are installed in half the time without H studs or U track FURTHER REDUCING DIRECT HARD labour cost and the material costs with overall cost benefits at least 30% less/ m2.

Components Description table



ALUMINIUM STUD BRACKET size 45 x 75mm 1.60 BMT

TEK Screw:
10g x 20mm
HEX HEAD **SCREW for fixing to FirecCrunch sheet.** .

TEK Screw:
10g x 30mm
HEX HEAD SCREW for **Stud and Plate fixing.**

• **R2.5 G/wool batts**

• 4 hr FIRE RATED Sealant (AS/1530)

What u need FOR TIMBER OR STEEL FRAME

1 • K-FIRE 19 - SL4 SHEETS TG 2700 x 600mm

2 • K CLAD 10mm SHEETS 2400 x 1200, 2700 x 1200 OR 3000 x 1200mm

3 • 75mm x 45mm A19 ALUMINIUM FIXING BRACKETS (FCA SUPPLIES

4 • HEX HEAD SCREWS 20mm or 30mm

5. • AS/1530.4 FIRE SEALANT FOR GROOVES

System	FRL	Acoustic	Insulation	Description	O/A Size
FCA 01 Timber frame	../60/60	Rw+ CTR = 50	R2.5 G/WOOL x 90mm	• 10mm K-CLAD TE • 90mm x 45mm Timber FRAME • R2.5 Glasswool batts to cavity • 20mm MIN space • 19mm K-FIRE **19-SL4** Size 2700 x 600mm • 20mm MIN AIR space • R2.5 Glasswool batts to each cavity • 1 x 10mm K-CLAD TE each side frame	260mm
FCA 02 Steel frame	../90/90	Rw+ CTR = 50	R2.5 G/WOOL x 90mm	• 10mm K-CLAD TE • 92 x 45mm Steel stud Frame BMT 1.15 • R2.5 Glasswool batts to cavity • 20mm MIN space • 19mm K-FIRE 19 SL4 size 2700 x 600mm • 20mm MIN space • R2.5 Glasswool batts to cavity • 1 x 10mm K-CLAD TE each side frame	260mm

INSTALL SEQUENCE

DOUBLE STUD FRAME PARTY WALL - SINGLE 19mm SHEET
K-FIRE 19 SL4 SHAFT LINER SYSTEM

1) Fix aluminium brackets to the bottom plate or the stud at 450mm or 600mm or to suit stud layout with 10g x 30mm hex head Tek screws. Fix the aluminium bracket 20mm into the cavity space with the long leg being attached to the stud & the short leg into the cavity TO ENABLE TO 20mm air gap SEPARATION.
2) Fix the next run of aluminium brackets to the vertical studs set at 450mm or 600mm or to suit stud layout at 580mm from the FFL. Fix the aluminium brackets 20mm into the cavity space with the long leg being attached to the side of the stud & the short leg into the cavity.
3) Continue this aluminium bracket layout for the length of the party wall.
4) Fill the groove side of the T&G 2700mm x 600mm panel with 4 hr fire rate sealant & lay the panel horizontally & fit the panel with the groove side down at the junction of the concrete slab or substrate. Stand FIRST VERTICAL PANEL against the already fitted aluminum bracket, AND SCREW INTO 19mm SL Sheet to Ensure a complete locked seal at the first TG joint.
5) Fix off the panel to the aluminum brackets from the rear of the frame with 10g x 20mm hex head Tek screws. Repeat this pattern until the length of the party wall is reached. Fill the bottom end short width GROOVE END with the fire sealant in the groove end and turn the first 2700 X 600 SHEETS VERTICALLY AND SLOT INTO THE top of the HORIZONTAL PANEL TOP TG JOINT (SEE PAGE 2 ABOVE) Continue fixing the vertically fixed sheets to the 600mm horizontal PANEL, set TG sheet joints into the length of the 600 width horizontal panel until all ground floor sheets are in place. See page 8 below.

   KEY POINT

   THE ALUMINIUM BRACKETS SHOULD BE FIXED TO STUDS ON ONE SIDE BEFORE INSTALLING SHEETS SO THEY ARE READY FOR EASY SCREW FIXING.
6) Fix aluminium brackets for the vertically laid panels at 680mm & 2400mm from FFL & at 450mm or 600mm STUD WIDTHS (see page 5) or to suit stud layout screw fixed to the side of the stud with 10g x 30mm Hex head Tek screws with the long leg of the aluminium bracket attached to the stud & the short leg set 20mm into the cavity to enable the 20mm separation. between frame and shaft liner panel
7) Continue this aluminium bracket layout for the length of the party wall.
8) Fill the grooves of the T&G 2700mm x 600mm panel, (2700mm & 600mm sides) with 4 hr fire rated sealant & stand the panel vertically & fit the panel with the groove side down to the TONGUE junction of the first horizontal run. Stand the panel against already fitted aluminium bracket, AND SCREW FIX ensuring a complete FIT.
9) Fix off the SHAFT LINER panel to the aluminium brackets from the rear OF THE FIRST SIDE OF THE FIRE WALL with 10g x 20mm hex head Tek screws. Repeat this pattern until the length of the party wall is reached filling the GROOVE side OF EACH OF THE 2 700mm joints of the T&G panel with 4hr fire rated sealant as you go. Repeat this pattern until the apex of the roof is reached.
10) When complete repeat the aluminium bracket layout on the stud wall of the adjacent unit & screw off aluminium brackets to stud with 10g x 30mm Hex head Tek screws & 10g x 20mm to the panel. THEN ERECT THE 2ND FRAME REPEATING THESE INSTRUCTIONS
11) Fill all perimeter junctions at the vertical walls & roof with AS 1530.4 4hr fire rated sealant as required & check that all joints & junctions are filled with fire rated sealant. Prior to internal linings being installed ensure that R2.5 Glass wool batts are in place IN EACH WALLS 90MM CAVITY & the 20mm minimum gap is achieved. Note that all electrical & plumbing penetrations through the wall are treated with the appropriate fire rated collars.

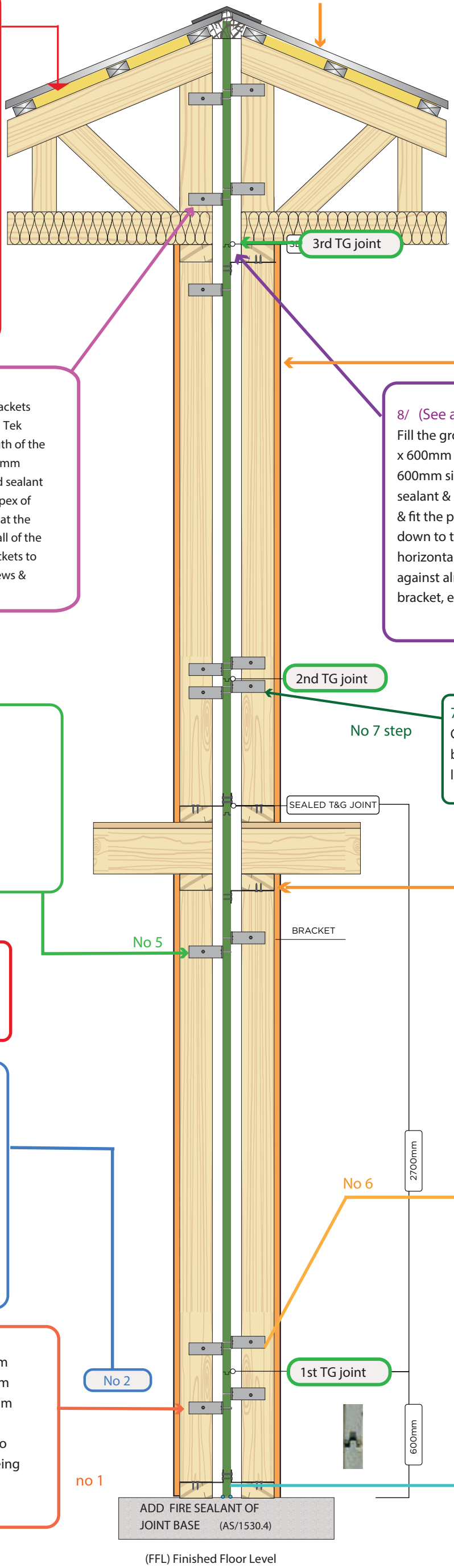
INSTALL SEQUENCE

PARTY WALL - SINGLE 19mm SHEET **K-FIRE 19 - SHAFT LINER SYSTEM**

INSULATION: R2.5
Glasswool batts or
climate zone spec

Ref to: see FireCrunch K-Roof manual or BUSH FIRE manual.
https://firecrunch.com.au/technical-specifications/

10/ Fill all perimeter junctions at the vertical walls & Roof with 90mm R2.5 G/wool batts 4hr fire rated sealant as required & check that all joints & junctions are filled with fire rated sealant. Prior to internal linings being installed ensure that R2.5 Glasswool batts are in place & the 20mm minimum gap is achieved. Note that all electrical & plumbing pene-trations through the wall are treated with the appropriate fire rated collars.



FIRE SEAL
all JOINTS with
AS/1530.4 fire
Sealant

10mm TE board
K-CLAD

No 9 step

9/ Fix off the panel to the aluminium brackets from the rear with 10g x 20mm hex head Tek screws. Repeat this pattern until the length of the party wall is reached filling the side 2700mm joints of the T&G panel with 4hr fire rated sealant as you go. Repeat this pattern until the apex of the roof is reached. When complete repeat the aluminium bracket layout on the stud wall of the adjacent unit & screw off aluminium brackets to stud with 10g x 30mm Hex head Tek screws & 10g x 20mm to the panel. .

8/ (See also STEP 4)
Fill the grooves of the T&G 2700mm x 600mm panel, (2700mm & 600mm sides) with 4 hr fire rated sealant & stand the panel vertically & fit the panel with the groove side down to the junction of the first horizontal run. Stand the panel against already fitted aluminium bracket, ensuring a complete seal.

No 5 step

5/ Fix off the panel to the alumini-um brackets from the rear with 10g x 20mm hex head Tek screws. Repeat this pattern until the length of the party wall is reached filling the end 600mm joints of the T&G panel with 4hr fire rated sealant as you go.

No 7 step

7/
Continue this aluminium bracket layout for the length of the party wall.

10mm TE board K-CLAD

No 3 Step

3/
Continue this aluminium bracket layout for the length of the party wall.

6/
Fix aluminium brackets for the vertically laid panels at 680mm & 2400mm from FFL & at 450mm or 600mm or to suit stud layout to the side of the stud with 10g x 30mm Hex head Tek screws with the long leg of the aluminium bracket attached to the stud & the short leg set 20mm into the cavity.

2/
Fix the next run of aluminium brackets to the studs at 450mm or 600mm or to suit stud layout at 580mm from the FFL. Fix the aluminium brackets 20mm into the cavity space with the long leg being attached to the side of the stud & the short leg into the cavity.

4/
Fill the tongue of the T&G 2700mm x 600mm panel with 4 hr fire rate sealant & lay the panel horizontal-ly & fit the panel with the groove side down at the junction of the concrete slab or substrate. Stand the panel against already fitted aluminium bracket, ensuring a complete seal.

1/
Fix aluminium brackets to the bottom plate or the stud at 450mm or 600mm or to suit stud layout with 10g x 30mm hex head Tek screws.
Fix the aluminium bracket 20mm into the cavity space with the long leg being attached to the stud & the short leg into the cavity.

recommended products web site

(FFL) Finished Floor Level

Fire Crunch Australian Certified Building Solutions

CERTIFICATION 1A 2 RISF AND FLASHOVER DEFINITIONS

DEFINITION FLASHOVER AND (RISF)
RESISTANCE TO INSIPIENT SPREAD OF FIRE
FIRECRUNCH PRODUCTS ARE ALL (GROUP 1) C1- 10 FIRE PRODUCTS

AUTHENTICATED FROM FIRE TESTS CARRIED OUT BY NATA LABS CSIRO NSW, DTS TESTING AND NATA LABS RESOLUTE LABORATORIES, QLD. UNDER ALTERNATIVE PERFORMANCE SYSTEMS (APS) with additional independent assessment by an Australian Registered Fire Engineer, as required under (NCC) National Construction Code 2022, see firecrunch.com.au/certifications.

NATA AUSTRALIAN FIRE STANDARDS GROUP NUMBERS

AS/ ISO/ 9705-2003 / AS/1530.4 , AS/ 5637.1:2020 Group C1 .10
The National Construction Code of Australia (NCC) stipulates the classification of materials by Group Number, which indicates the amount of time taken for the material being tested to reach flashover under AS/ ISO 9705 — 2003 test conditions. FCA QUALIFIES RISF 39 MINUTES

The NCC define flashover to be a Heat Release Rate of 1 Mw, so materials are classified, in accordance with NCC 2016 spec C1.10 by the time taken for the Heat Release Rate, as measured during the AS/ ISO 9705 test, to reach 1 Mw per the schematic below; AS/ 5367.1
SEE WEB SITE firecrunch.com.au/certifications

• **Group 1**
- Materials classified as Group 1 do not reach flashover after ten minutes exposure to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW.

• **Group 2**
- Materials classified as Group 2 reach flashover after ten minutes of exposure to a 100 kW heat source.

• **Group 3**
- Materials classified as Group 3 reach flashover after 2 minutes, but before 10 minutes of exposure to a 100 kW heat source.*

• **Group 4**
- Materials are classified as Group 4 is they reach flashover before 2 minutes of exposure to a 100 kW heat source. The NCC and **AS/5637.1:2015** also define the smoke growth rate index, or SMOGRARC as a quantity which may be obtained from the smoke obscuration measurements obtained in the **ISO/ 9705 , test AS/ 3837**

RISF

Resistance to the incipient spread of fire , in relation to a ceiling membrane, means the ability of the membrane to insulate the space between the ceiling and roof, or ceiling and floor above, so as to limit the temperature rise of materials in this space to a level which will not permit the rapid and general spread of fire throughout the space.

AS/1530.4 , AS/5637 TO 2025 FCA

Acoustics tests see below.

Acoustic Lab
Banyo QLD 4014
Australia

Indicative Measurement of Airborne Sound Insulation of Building Elements in Accordance with ISO10140 Measurement Procedure, Weighted Sound Reduction Index (R_w) Calculation in Accordance with AS/NZS ISO 717.1

Performed on – FireCrunch Walls

Date: 27/07/2015

Clients: FireCrunch

ADDRESS
PO BOX 370
PYRMONT NSW 2009

Fire Crunch

Alternative Australian
Certified Building Solutions

Written by: C. Titry
Date: 11/08/2015

Report AC-011-15/CT

1. Relevant standards

The measurements leading to the results presented in this report have been undertaken in accordance with standards which specify a method for measuring the airborne sound insulation of building elements:

- *ISO10140-1:2010 Acoustics –Laboratory measurement of sound insulation of building elements – Part 1: Application rules for specific products*
- *ISO10140-1:2010/Amd.1:2012 Acoustics –Laboratory measurement of sound insulation of building elements – Part 1: Application rules for specific products—Amendment 1*
- *ISO10140-2:2010 Acoustics – Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*
- *ISO10140-4:2010 Acoustics – Laboratory measurement of sound insulation of building elements – Part 4: Measurement procedures and requirements*

The calculation method leading to the rating of the sound insulation of the samples tested is defined in:

- *AS/NZS ISO 717.1:2004 Acoustics—Rating of sound insulation in buildings and of building elements, Part 1: Airborne sound insulation*

It uses the results of the tests defined in ISO10140 to determine a single figure performance guide known as the "Weighted Average Sound Reduction Index", which is expressed in terms of a number of dB, followed by the suffix "R_w".

The test facility and equipment were in accordance with:

- *ISO10140-5:2010 Acoustics – Laboratory measurement of sound insulation of building elements – Part 5: Requirements for test facilities and equipment*

Repeatability has been estimated in accordance with:

- *ISO12999-1:2014 Acoustics – Determination and application of measurement uncertainties in building acoustics – Part 1: Sound insulation*

2. Testing facilities description

The test facilities consist of two acoustically "live" reverberant plane-parallel rooms. The Source room has a volume of 72m^3 and the Receiving room a volume of 82m^3. Sizes of the room (in m) and walls thickness are:

	H	W	D	Wall thickness
Source	3.26	5.21	4.23	Wall 259mm - Ceiling 428mm
Receiving	3.4	5.44	4.42	Wall 259 or 371mm - Ceiling 568mm

Internal and external walls consist of three layers of 13mm plasterboards which are installed on independent timber structures. All cavities are filled with R3.5 glasswool. Both rooms are isolated from the ground by a high density glass wool blanket foundation, and from the common specimen holder by a viscoelastic polyurethane mastic infill. Both rooms incorporate exposed elements that provide additional reflective surfaces to enhance sound diffusion within the room volumes.

A 2990mm wide x 2380mm high test specimen aperture separates the two rooms.

3. Description of procedure

Measurements were undertaken by Christophe Titry (testing officer)

Noise generation

A “Pink Noise” was generated as the reference sound spectrum. It was amplified and fed through to the omnidirectional source unit which was used to evenly radiate sound in a spherical distribution. This unit consists of twelve individual loud speakers configured around a dodecahedron.

Sound pressure levels readings of Source and Receiving rooms

Sound pressure levels (L1 and L2) were measured in the Source room and the Receiving room simultaneously via a calibrated microphone attached to a rotating boom. The booms were set in motion and readings were continuously averaged and recorded throughout the sweep (Radius = 1.1m) which last for a period of one minute.

L1 and L2 were measured for two source locations.

Background Sound pressure levels readings in Receiving room

Background noise level (B2) was measured in the Receiving room via a calibrated microphone for a period of one minute.

T2 Reverberation Time measurements

The Omni sound source was then moved into the Receiving room to undertake reverberation time measurements (T2). The sound field was built up within the Receiving room and abruptly cut off. The decay of the sound levels within the room was then measured. The build-up and decay readings were taken seven times along the path of the rotating microphone, rotating at a speed of 150 sec /revolution, for one source position. Reverberation times were undertaken in accordance with *WASO3382-2 Acoustics – Measurement of room acoustic parameters – Part 2: Reverberation time in ordinary rooms.*

Measured L1, L2, B2 & T2 processing

All measurements were performed in each one-third octave band of centre frequency 100 to 5000 Hz and were processed in order to get the “Weighted Average Sound Reduction Index”, R_w.

4. Equipment

Table 1 presents the list of the equipment used.

Table 1 – Equipment used for measurements

t n e m p i u q E r e r u t c a f u n a M p y T		
Acoustic Analyser	*Norsonic*	NOR140 S/N 1405434 – Calibrated 13/01/2015 NOR140 S/N 1406170 – Calibrated 19/01/2015
Microphone	*Norsonic*	1225 S/N 142515 – Calibrated 13/01/2015 1225 S/N 212914 – Calibrated 19/01/2015
Preamplifier	*Norsonic*	1209 S/N 14250 – Calibrated 13/01/2015 1206 S/N 20436 – Calibrated 19/01/2015
Filter	*Norsonic*	1/3 octave S/N1405434 – Calibrated 13/01/2015 1/3 octave S/N1406170 – Calibrated 19/01/2015
Sound Calibrator	*Brüel & Kjær*	4231 - S/N 2558216 – Calibrated 02/09/2014
Digital Psychrometer	*Reed*	8706 - S/N 9811576 – Calibrated 29/10/2014
Wireless Transmission	*Sennheiser/Norsonic*	eW 100 G2 / Nor520A
Amplifier - Loudspeaker	*Brüel & Kjær*	2716 Power amplifier - 4269 loudspeaker
Rotating microphone boom	*Brüel & Kjær* *Norsonic*	3923 Nor265

5. Tested product identification and description

The test samples were walls and consisted of FireCrunch 10mm boards on Rondo steel stud frames, they were installed within the aperture that separates the Source and Receiving rooms. The boards joints and edges were sealed with Fuller Firesound sealant.

Walls tested

- Test 1 (from source to receiving room): FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – frame filled 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – 20mm gap – frame filled with 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – curing time less than one hour
- Test 2 (from source to receiving room): FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – frame filled 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – FireCrunch board 10mm (950kg/m3) – curing time less than two hours
- Test 3 (from source to receiving room): FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres (no boards in receiving room) – curing time less than three hours.

6. Air temperature and humidity

Table 2 presents the air temperature and humidity for each test.

Table 2 Temperature and humidity summary

Test	Temp. Wet-bulb (℃) Src / Rec	Temp. Dry-bulb (℃) Src / Rec	Humidity (%) Src / Rec	Ref. #
Test #1	13.9 / 14.0	24.2 / 23.7	30.7 / 32.9	AC737WA7/2015
Test #2	13.1 / 13.8	21.7 / 22.5	36.8 / 36.9	AC738WA7/2015
Test #3	14.1 / 14.0	24.1 / 23.8	31.9 / 32.7	AC739WA7/2015

7. Sound Reduction index of the specimen

Table 3 presents the sound reduction index in each one-third octave band, the weighted sound reduction index and the adaption terms for each test.

Table 3 Sound reduction index for each 1/3 octave band, R_w, C and C_{tr}

Frequency (Hz)	R (Sound Reduction Index) (dB)		
	Test #1	Test #2	Test #3
	Ref. AC737WA7/2015	Ref. AC738WA7/2015	Ref. AC739WA7/2015
100	≥ 35.1‡	3 . 6	2 5 . 8 1
5	2 1 6 . 6	3 2 3	3 . 8 1
160	≥ 44‡	9 . 7	3 5 . 1 2
200	≥ 48.3‡	5 . 0	4 0 2
250	≥ 53.3‡	2 4	2 . 1 2
315	≥ 58‡	9 . 1	4 9 . 2 2
400	≥ 62.4‡	6 . 6	4 2 . 4 2
500	≥ 63.8‡	8 . 7	4 4 . 6 2
630	≥ 65.6‡	1 5	1 . 8 2
800	≥ 68.2‡	4 . 4	5 7 . 0 3
1000	≥ 72.3‡	2 . 6	5 8 . 1 3
1250	≥ 76.3‡	2 . 9	5 1 . 3 3
1600	≥ 75.7‡	1 . 9	5 9 . 3 3
2000	≥ 77‡	7 . 4	5 5 . 2 3
0	0 5 2 9 . 1	7 7 . 5	4 2 . 6 2
0	5 1 3 2 . 2	7 1 . 5	4 2 . 6 2
4000	≥ 78.1‡	6 . 0	5 4 . 0 3
5000	≥ 81.2‡	8 . 5	5 3 . 4 3
R_w	**62**	**49**	**29**
C	**-4**	**-2**	**-1**
C_{tr}	**-10**	**-6**	**-2**

Table 4 presents the corrections details for the tests (refers to symbol ‡ in Table 3).

Table 4 Corrections details for the specimen

		) z H (y c n e u q e r F t n et sm e mT o c l o b
AC737WA	5000	L2_1 was within 6 dB above the background noise level (-1.3 dB correction for L2)
AC737WA	100	*R1* larger than R'max (49.8 *d*B) - 15 dB (No correction)
AC737WA	160	*R1* larger than R'max (56.6 *d*B) - 15 dB (No correction)
AC737WA	200	*R1* larger than R'max (59.3 *d*B) - 15 dB (No correction)
AC737WA	250	*R1* larger than R'max (61.8 *d*B) - 15 dB (No correction)
AC737WA	315	*R1* larger than R'max (66.2 *d*B) - 15 dB (No correction)
AC737WA	400	*R1* larger than R'max (71.9 *d*B) - 15 dB (No correction)
AC737WA	500	*R1* larger than R'max (74.1 *d*B) - 15 dB (No correction)
AC737WA	630	*R1* larger than R'max (76.2 *d*B) - 15 dB (No correction)
AC737WA	1200	*R1* larger than R'max (77.1 *d*B) - 15 dB (No correction)
AC737WA	1000	*R1* larger than R'max (79.6 *d*B) - 15 dB (No correction)
AC737WA	1250	*R1* larger than R'max (82.7 *d*B) - 15 dB (No correction)
AC737WA	1600	*R1* larger than R'max (85.5 *d*B) - 15 dB (No correction)
AC737WA	2000	*R1* larger than R'max (89.4 *d*B) - 15 dB (No correction)
AC737WA	4000	*R1* larger than R'max (91.3 *d*B) - 15 dB (No correction)
AC737WA	5000	*R1* larger than R'max (84.2 *d*B) - 15 dB (No correction)
AC737WA	5000	L2_2 was within 6 dB above the background noise level (-1.3 dB correction for L2)
AC737WA	160	*R2* larger than R'max (56.6 *d*B) - 15 dB (No correction)
AC737WA	200	*R2* larger than R'max (59.3 *d*B) - 15 dB (No correction)
AC737WA	250	*R2* larger than R'max (61.8 *d*B) - 15 dB (No correction)
AC737WA	315	*R2* larger than R'max (66.2 *d*B) - 15 dB (No correction)
AC737WA	400	*R2* larger than R'max (71.9 *d*B) - 15 dB (No correction)
AC737WA	500	*R2* larger than R'max (74.1 *d*B) - 15 dB (No correction)
AC737WA	630	*R2* larger than R'max (76.2 *d*B) - 15 dB (No correction)
AC737WA	1200	*R2* larger than R'max (77.1 *d*B) - 15 dB (No correction)
AC737WA	1000	*R2* larger than R'max (79.6 *d*B) - 15 dB (No correction)
AC737WA	1250	*R2* larger than R'max (82.7 *d*B) - 15 dB (No correction)
AC737WA	1600	*R2* larger than R'max (85.5 *d*B) - 15 dB (No correction)
AC737WA	2000	*R2* larger than R'max (89.4 *d*B) - 15 dB (No correction)
AC737WA	4000	*R2* larger than R'max (91.3 *d*B) - 15 dB (No correction)
AC737WA	5000	*R2* larger than R'max (84.2 *d*B) - 15 dB (No correction)

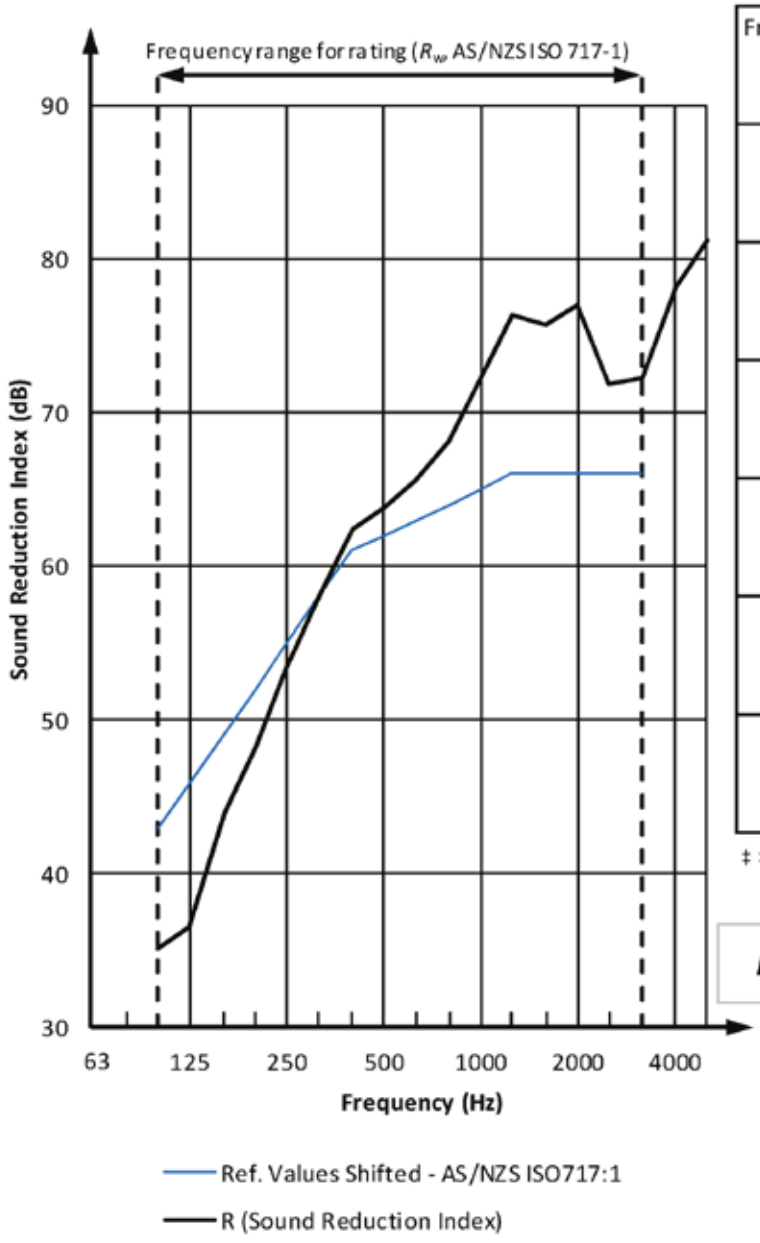
Annexe A – R_w One-sheet reports

Sound reduction index, *R*, in accordance with ISO 10140-2

Area of separating element: 7.12 m²
Source room volume: 72 m³
Receiving room volume: 82 m³
Date: 27/7/2015
Client: FireCrunch

Humidity (%, S/R): 30.7 / 32.9 ±3
Temperature (°C, S/R): 24.2 / 23.7 ±0.6
Static pressure (hPa): 1025 ±0.5%

AC737WA7/2015



Frequency f Hz	*R* 1/3 octave dB	*R* 1/1 octave dB
100	≥ 35.1‡	
125	36.6	37.2
160	≥ 44‡	
200	≥ 48.3‡	
250	≥ 53.3‡	51.5
315	≥ 58‡	
400	≥ 62.4‡	
500	≥ 63.8‡	63.7
630	≥ 65.6‡	
800	≥ 68.2‡	
1000	≥ 72.3‡	71.1
1250	≥ 76.3‡	
1600	≥ 75.7‡	
2000	≥ 77‡	74.3
2500	71.9	
3150	72.2	
4000	≥ 78.1‡	75.6
5000	≥ 81.2‡	

‡ : See report for details

$R_w(C;C_{tr})$ = 62 (-4;-10)

Evaluation based on laboratory measurement results obtained in one-third octave bands by an engineering method.

Wall: (from source to receiving room) FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – frame filled 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – 20mm gap – frame filled with 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – joints and edges sealed with Fuller Firesound sealant

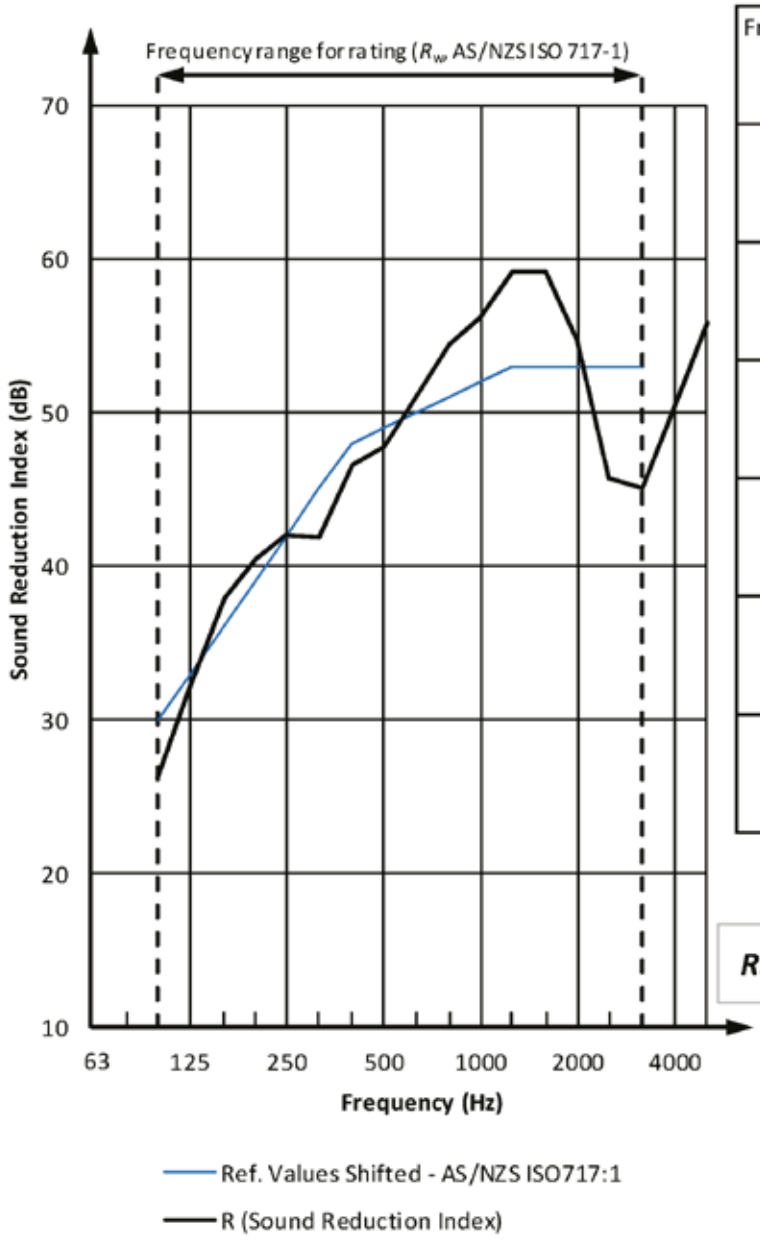
FireCrunch board

Sound reduction index, *R*, in accordance with ISO 10140-2

Area of separating element: 7.12 m²
Source room volume: 72 m³
Receiving room volume: 82 m³
Date: 27/7/2015
Client: FireCrunch

Humidity (%, S/R): 36.8 / 36.9 ±3
Temperature (°C, S/R): 21.7 / 22.5 ±0.6
Static pressure (hPa): 1025 ±0.5%

AC738WA7/2015



Frequency f Hz	*R* 1/3 octave dB	*R* 1/1 octave dB
100	26.3	
125	32	29.8
160	37.9	
200	40.5	
250	42	41.4
315	41.9	
400	46.6	
500	47.8	48.1
630	51	
800	54.4	
1000	56.2	56.2
1250	59.2	
1600	59.1	
2000	54.7	49.8
2500	45.7	
3150	45.1	
4000	50.6	48.5
5000	55.8	

$R_w(C;C_{tr})$ = 49 (-2;-6) dB

Evaluation based on laboratory measurement results obtained in one-third octave bands by an engineering method.

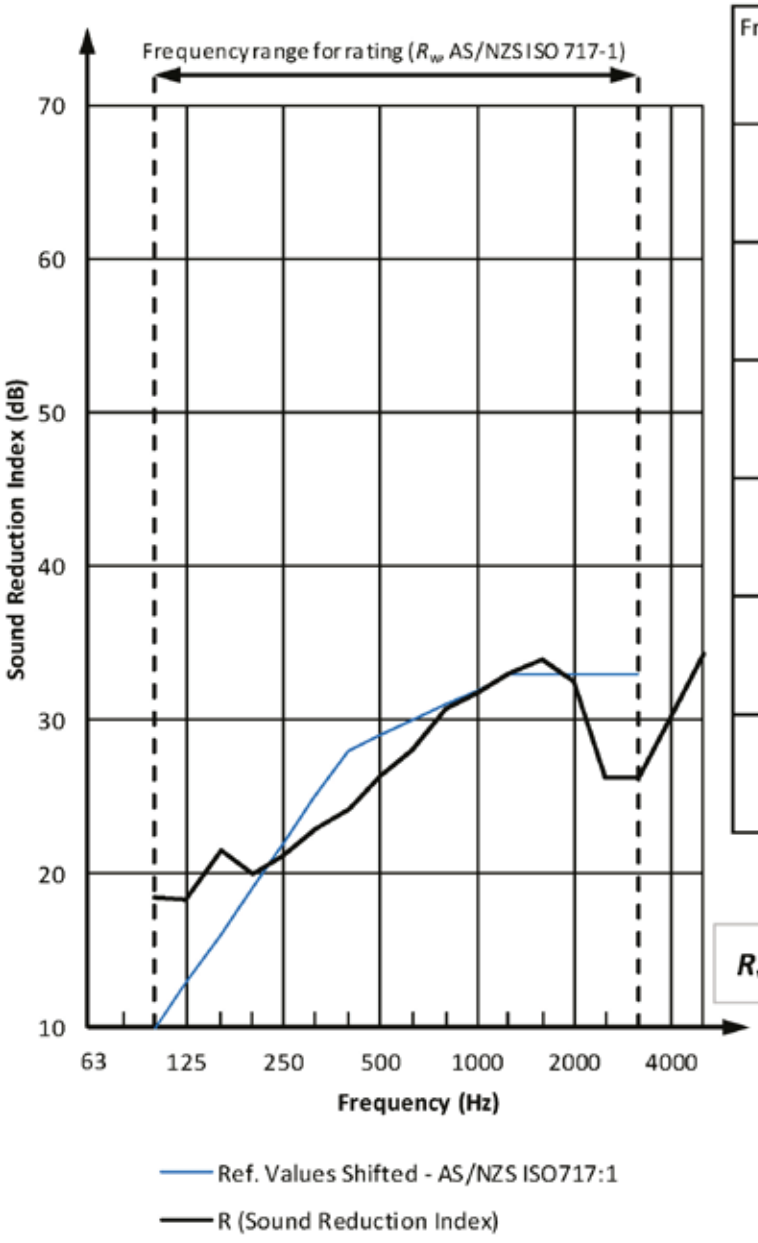
Wall: (from source to receiving room) FireCrunch board 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres – frame filled 90mm Fletcher insulation Pink Partion 32 (25.6kg/m3) – FireCrunch board 10mm (950kg/m3) – joints and edges sealed with Fuller Firesound sealant

Sound reduction index, *R*, in accordance with ISO 10140-2

Area of separating element: 7.12 m²
Source room volume: 72 m³
Receiving room volume: 82 m³
Date: 27/7/2015
Client FireCrunch

Humidity (%, S/R): 31.9 / 32.7 ±3
Temperature (°C, S/R): 24.1 / 23.8 ±0.6
Static pressure (hPa): 1025 ±0.5%

AC739WA7/2015



Frequency f Hz	*R* 1/3 octave dB	*R* 1/1 octave dB
100	18.5	
125	18.3	19.2
160	21.5	
200	20	
250	21.2	21.2
315	22.9	
400	24.2	
500	26.4	25.9
630	28.1	
800	30.7	
1000	31.8	31.8
1250	33.1	
1600	33.9	
2000	32.5	29.5
2500	26.2	
3150	26.2	
4000	30.4	29.1
5000	34.3	

$R_w(C;C_{tr})$ = 29 (-1;-2) dB

Evaluation based on laboratory measurement results obtained in one-third octave bands by an engineering method.

Wall: (from source to receiving room) FireCrunch board | 10mm (950kg/m3) on 90mm 0.55BMT Rondo steel studs at 600mm centres (no boards in receiving room) – joints and edge sealed with Fuller Firesound sealant.

Date	2 June, 2023
Reference	PKA100 FCA R01v 1
Project	Fire Crunch Acoustic Opinion
Contact	Ian Ritchie
Email	Ian.Ritchie@firecrunch.com.au
Company	Fire Crunch Australia
File	PKA100FCA R01v1 FireCrunch Corridor Wall Acoustic Opinion.docm

Dear Ian ,

Re: Fire Crunch Corridor Wall Acoustic Opinion

The purpose of this letter is to provide an acoustic opinion for the Fire Crunch corridor wall system , and compare to the airborne sound insulation requirements of the National Construction Code (NCC), Building Code of Australia (BCA), separating sole -occup ancy units with corridors .

FireCrunch Board

The primary product for assessment is the 10mm FireCrunch (9.5kg/m ^{2}, 950kg/m ^{3}) board which is a magnesium oxide lining.

The FireCrunch Board was tested at the Kilargo Acoustic Laboratory (now Resolute Acoustic Laboratory) in Banyo, QLD [Ref: AC -011 -15/CT dated March 2015] .

Kilargo Acoustic Laboratory Test	Wall Description	Airborne R_w (C_{tr})
AC739WA7/2015	10mm FireCrunch board (9.5kg/m ^{2}) one side of 90mm Rondo steel studs 0.55BMT (cc 600mm)	29 (-2)
AC738WA7/2015	10mm FireCrunch board (9.5kg/m ^{2}) 90mm Rondo steel studs 0.55BMT (cc 600mm) 90mm Fletcher Pink Partition batts (25kg/m ^{3}) 10mm FireCrunch board (9.5kg/m ^{2})	49 (-6)

Sound Insulation Requirements

The National Construction Code (NCC), previously the Building Code of Australia (BCA), in Volume 1 Section F 7 "Sound Transmission and Insulation" states that walls separating places of occupancy in Class 2 and 3 buildings must "safeguard occupants from illness or loss of amenity as a result of undue sound being transmitted".

The following summarises the BCA sound insulation requirements, brevity necessitates detail in the BCA taking precedence over the tables below.

Wall Description	Airborne	BCA 2022	BCA 2019
Separating SOUs with corridor, stairway, lobby or different classification	$R_w \geq 50$	F7D6(1)(b)	F5.5(a)(ii)
Separating SOU habitable area with services from another SOU	$R_w + C_{tr} \geq 40$	F7D7(1)(a)	F5.6(a)(i)

Acoustic Assessment

This acoustic assessment is based on PKA's extensive experience calculating the acoustic properties of lightweight and masonry floor systems ,

The acoustic predictions contained in this assessment are the expected values when tested in an acoustic laboratory and results are calculated in according with the relevant Australian Standards as per the National Construction Code (NCC):

- Airborne R_w and C_{tr} in accordance with AS/NZS ISO 717.1 -2004 Acoustics - Rating of sound insulation in buildings and of b uilding elements - Airborne sound insulation

These acoustic predictions result in tolerances within $R_w \pm 2$ when validated against acoustic laboratory test results and other supporting information, which have their own inherent variability.

Reference	Wall Description	Airborne R_w (C_{tr})
Kilargo Acoustic Laboratory AC738WA7/2015	10mm FireCrunch board (9.5kg/m ^{2}) 90mm Rondo steel studs 0.55BMT (cc 600mm) 90mm Fletcher Pink Partition batts (25kg/m ^{3}) 10mm FireCrunch board (9.5kg/m ^{2})	49 (-6)
Acoustic Opinion PKA100FCA R01	2x10mm FireCrunch board (9.5kg/m ^{2}) min. 90mm Rondo steel studs 0.55BMT (cc 600mm) min. 90mm glasswool insulation (20kg/m ^{3}) 10mm FireCrunch board (9.5kg/m ^{2})	5 2 (-7)

Yours faithfully ,

Joel Parry -Jones , Principal

PKA Acoustic Consulting

Date	**September 16, 2019**	
To	**Peter Jones**	**National Coordinator FireCrunch Australasia Pty Ltd/ Fire Combat Australia Pty Ltd**
From	**Yuguang Li**	
Subject	**Construction of External Walls under BCA Volume Two Part 3.7.4**	**Fire Safety Engineer YGL Consulting Pty Ltd**
Job No	**2017j0113**	
Document No	**CA-07**	

1 Introduction

Revision E

YGL Consulting has been engaged to review the proposed typical external wall construction by FireCrunch Australasia Pty Ltd / Fire Combat Australia Pty Ltd, in the context of the National Construction Code (NCC) 2019 Volume Two the Building Code of Australia (BCA) Part 3.10.4 and AS 3959-2009 'Construction of buildings in bushfire prone areas'.

Any other issues such as planning control are not the subject of this analysis.

The fire engineering analysis is based on the following.

Resolute Roof and Floor/Ceiling Tests

- Test Report – Fire resistance: Testing Performed on a representative roof section comprising steel roofing sheet, insulation, timber framing and FCA board, Test Date 06/12/17, Report Date 16/01/18, RTL Report No TR-F013.02 (PR0039), Test ID FR013S4/2017, Measurement of fire resistance in general accordance with AS1530.4—2014 Sections 1, 2 & 4;
- Test Report – Fire resistance: Testing Performed on a horizontal separating element, floor/ceiling system, Test Date 05/12/17, Report Date 16/01/18, RTL Report No TR-F012.02 (PR0039), Test ID FR012S4/2017, Measurement of fire resistance in general accordance with AS1530.4—2014 Sections 1, 2 & 4;

Resolute Steel/Timber Wall Tests

- Test Report – Fire resistance: Testing Performed on a steel framed, stud wall with one layer of R2.5 x 90mm thick earthwool and sheeted with two layers of 10mm thick SE FireCrunch board each side, Test Date 05/09/18, Report Date 13/09/18, RTL Report No TR-F026.01 (PR0057), Test ID FR34.S3/2018, Measurement of fire resistance in general accordance with AS1530.4—2014 Sections 1, 2 & 3;
  - The test results indicated an **FRL of -/120/120**
- Test Report – Fire resistance: Testing Performed on a timber framed, stud wall with one layer of R2.5 x 90mm thick earthwool and sheeted with a single layer of 10mm thick SE FireCrunch board each side, Test Date 04/09/18, Report Date 12/09/18, RTL Report No TR-F025.01 (PR0057), Test ID FR33.S3/2018, Measurement of fire resistance in general accordance with AS1530.4—2014 Sections 1, 2 & 3;

- The test results indicated an **FRL of -/60/60**

- Test Report – Fire resistance: Testing Performed on A timber framed, discontinuous double stud wall with two layer of R2.5 x 90mm thick earthwool and sheeted with a single layer of 10mm thick SE FireCrunch board each side, Test Date 03/09/18, Report Date 17/09/18, RTL Report No TR-F024.01 (PR0057), Test ID FR32.S3, Measurement of fire resistance in general accordance with AS1530.4—2014 Sections 1, 2 & 3;
  - The test results indicated an **FRL of -/90/90**

CSIRO Full Scale Steel Framed Wall Tests

- Fire-resistance test on a load-bearing vertical separating element Test Report, Number FSV 1708B, 7 March 2016 by CSIRO Fire Testing and Assessments
  - Certificate of Test No. 2674B (**FRL 93/74/76**)
- Fire-resistance test on a load-bearing vertical separating element Test Report, Number FSV 1711B, 7 March 2016 by CSIRO Fire Testing and Assessments
  - Certificate of Test No. 2707B (**FRL 98/98/89**)
- Likely fire performance of a load bearing framed wall system lined with FireCrunch FCA /MBE-10 K Clad boards with cavity insulation Assessment Report, Number FCO-3165a, 7 March 2016 by CSIRO Fire Testing and Assessments
  - An **FRL of 90/90/90** would be achieved, if
  - The load applied to the wall system does not exceed 18.3 kN/m (maximum load applied to the
  - tested prototype wall system);
  - The wall cavity insulation comprises mineral wool slabs with a density of not less than 75 kg/m3;
  - The wall cavity insulation is installed as a single piece to completely fill the wall void without through joints or gaps.

CSIRO Combustibility Test for Materials In Accordance With AS 1530.1-1994

- Certificate of Test, REPORT No.: FNC12169, Issued on the 6th day of July 2018, with the Designation:
  - The material is NOT deemed COMBUSTIBLE according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.

2 Requirements under BCA Volume Two 2019

BCA 2019 Volume Two has the following relevant Deemed-to-Satisfy (DtS) requirements applicable to wall construction Bushfire Attack Level FZ (BAL–FZ) in bushfire prone areas:

Part 3.10.5 Construction in bushfire prone areas

Acceptable Construction Manuals

3.10.5.0 Application

3.10.5.0 is replaced with the following clause in New South Wales:

Performance Requirement P2.7.5 is satisfied, for—

(a) a Class 1 building; or

(b) a Class 10a building or deck associated with a Class 1 building,

located in a designated bushfire prone area, if it is constructed in accordance with the following:

(c) AS 3959 except—

(i) as amended by Planning for Bush Fire Protection; and

(ii) for Section 9 for Bushfire Attack Level FZ (BAL-FZ).

(d) NASH Standard – Steel Framed Construction in Bushfire Areas except—

(i) as amended by Planning for Bush Fire Protection; and

(ii) for buildings subject to Bushfire Attack Level FZ (BAL-FZ).

(e) the requirements of (c), or (d) above as modified by the development consent following consultation with the NSW Rural Fire Service under section 4.14 of the Environmental Planning and Assessment Act 1979 if required; or

(f) the requirements of (c), or (d) above as modified by development consent with a bushfire safety authority issued under section 100B of the Rural Fires Act 1997 for the purposes of integrated development.

Explanatory information:

In New South Wales, buildings subject to BAL-FZ must comply with specific conditions of development consent for construction at this level.

A Building Solution complies with the BCA if it complies with the Performance Requirements of the BCA according to Clause A2.0. The Assessment Methods of A2.2 (2) (b)(ii)&(d) will be used to determine compliance with the Performance Requirements of the BCA which is identified as P2.7.5 'Bushfire areas. The BCA Volume Two P2.3.4 and Clause A2.2/A5.2 are reproduced below.

P2.7.5 Buildings in bushfire prone areas

A Class 1 building or a Class 10a building or deck associated with a Class 1 building that is constructed in a designated bushfire prone area must, to the degree necessary, be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the—

(a) potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire; and

(b) intensity of the bushfire attack on the building.

A2.2 Performance Solution

…

(2) A Performance Solution must be shown to comply with the relevant Performance Requirements through one or a combination of the following Assessment Methods:

(a) Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements.

(b) A Verification Method including the following:

(i) The Verification Methods provided in the NCC.

(ii) Other Verification Methods, accepted by the appropriate authority that show compliance with the relevant Performance Requirements.

(c) Expert Judgement.

(d) Comparison with the Deemed-to-Satisfy Provisions.

…

A5.2 Evidence of suitability—Volumes One and Two

(1)Subject to A5.4, A5.5 and A5.6, evidence to support that the use of a material, product, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy Provision may be in the form of any one, or any combination of the following:

(f) Another form of documentary evidence, such as but not limited to a Product Technical Statement, that—

(i) demonstrates that a material, product, form of construction or design fulfils specific requirements of the BCA; and

(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice or other publications have been relied upon to demonstrate it fulfils specific requirements of the BCA.

3 Compliance of the Wall Construction Method

3.1 AS 3959 Wall Construction

AS 3959-2009 Section 9.4 'EXTERNAL WALLS' has the following provisions for wall construction for BAL-FZ.

The exposed components of external walls shall be:

(a) Non-combustible material.

NOTE: Examples include, but are not limited to, the following (with a minimum of 90 mm in thickness):

(a) Full masonry or masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone.

(b) Precast or in situ walls of concrete or aerated concrete.

(c) Earth wall including mud brick.

or

(b) A system complying with AS 1530.8.2 when tested from the outside.

or

(c) A system with an FRL of 30/30/30 or −/30/30 when tested from the outside.

or

(d) A combination of any of Items (a), (b) or (c) above.

3.2 Proposed Wall Construction

Under BCA Vol Two Part 3.7.4.0 NSW Variations, the Class 1 building construction subject to BAL-FZ must comply with the DA conditions, while buildings subject to other Bushfire Attack Levels are to comply with the BCA P2.3.4, if constructed to AS 3959.

The proposed construction method is based on the AS 3959 BAL-FZ construction method and has not been tested to a full scale test under AS1530.8.2 (although tested to AS1530.4 by Resolute). it is our understanding that it is not considered as deemed-to-satisfy under the BCA NSW Variations where DA conditions require the construction methods are to be tested to AS1530.8.2.

The proposed external wall construction method primarily involves the following:

- A timber framed single stud wall (90mmx45mm)
- The cavity is protected by one layer of R2.5 x 90mm thick earthwool or glasswool
- The timber stud is sheeted with one (1) layer of 10mm thick SE FireCrunch boards each side

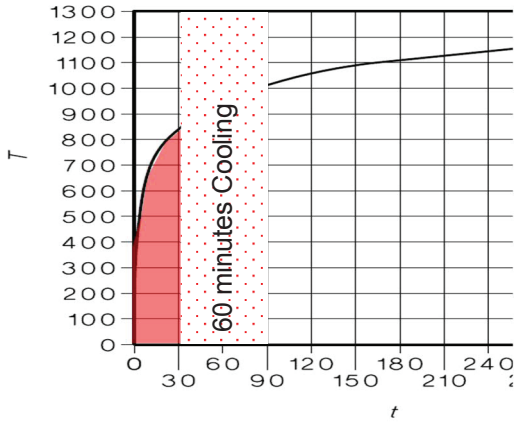
3.3 Qualitative Analysis of Proposed Wall System

3.3.1 Comparison of Fire Severity between AS1530.8.2 and AS1530.4 Tests

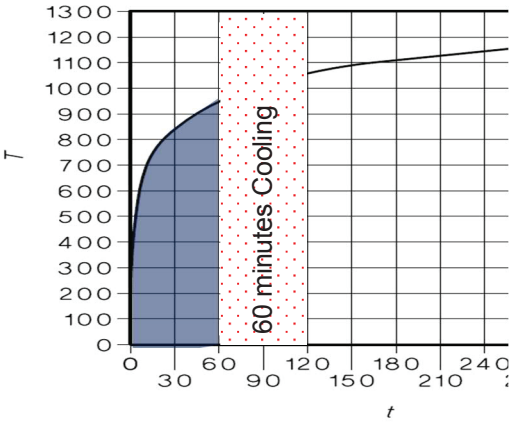
Under AS3959 Section 9.6.1, any element of construction or system that satisfies the test criteria of AS 1530.8.2 may be used in lieu of the applicable requirements. The test procedure under AS 1530.8.2-2007 'Methods for fire tests on building materials, components and structures Part 8.2: Tests on elements of construction for buildings exposed to simulated bushfire attack—Large flaming sources' requires that test duration is 90 min comprising a 30 min heating phase and a subsequent 60 min period (removed from the furnace).

The Resolute timber wall test referenced in this report involves a 60 minutes heating phase and 60 minutes cooling/observation phase (removed from the furnace). AS1530.4 and 1530.8.2 both require the test specimen to be subject to the same standard temperature-time curve which reach 842°C and 945°C at 30 minutes and 60 minutes respectively prior to the observation phase, as indicated in time temperature curves in Figure 1 below.

For AS1530.8.2 (30 minutes heating +60 minutes observation) and AS1530.4 (60 minutes heating +60 minutes observation) tests, the temperature of the latter test is 103°C higher. Note the heating in latter test (AS1530.4 60 minutes test) lasts 30 minutes longer and the radiant heat relates to the power of four of the temperature (K), hence the resulting energy per unit area received by the test specimen would be multiple times higher. It should be noted that the test specimen is removed from the furnace during the observation phase for both tests and not subject to elevated surrounding temperature after the heating phase.



AS1530.8.2
30 min heating +
60 min observation
(removed from furnace)



AS1530.4
60 min heating +
60 min observation
(removed from furnace)

Time (*t*) Min	Prescribed furnace temperature (*T*)°C
0	20
5	576
10	679
15	738
30	841
60	945
90	1006
120	1049
180	1110
240	1153
360	1213

Figure 1 AS1530.8.2 (30 minutes heating +60 minutes observation) vs AS1530.4 (60 minutes heating+60 minutes observation)

3.3.2 Resolute Test Observation

As documented in the test report referenced in Section 1 of this document, a fire resistance test on a single stud timber framing protected by insulation and FCA boards was undertaken by Resolute Testing Laboratory.

As documented in Resolute Report No TR-F025.01 (PR0057), the specimen under test achieved the FRL of -/60/60 in accordance with AS1530.4 -2014. The measured integrity and insulation values are 62 minutes and 62 minutes respectively.

The specimen representing the proposed wall system has been subject to the exposure under AS1530.4 temperature curve for 62 minutes and found to achieve an insulation value of 62 minutes.

The report documents the following observations under selected items of the AS 1530.8.2 clause 13.8 Performance Criteria. The Resolute test only passes the temperature rise criterion at 67 minutes in

lieu of the required 90 minutes. As the aforementioned test documented in Section 1 was subject to more severe test conditions (i.e. 60 minutes heating period in lieu of 30minues), the furnace temperature at 60 minutes standard test time is 103K higher than 30 minutes test time. Should the proposed wall system be subject to a 30 minutes standard heat time, it is likely that the system is capable of passing the temperature criteria (rise of 140K average and 180K maximum) during the observation phase (i.e. the temperature rise would have been 103K lower).

Therefore, it is expected that the proposed external wall assembly would achieve performance similar to a compliant system tested to AS1530.8.2.

AS 1530.8.2 13.8 Performance Criteria (shortened to agreed scope)	Time to failure (min)	Position of failure
Sustained flaming for more than 10 s on the non-fire side for the duration of the 120 min test period	No failure	-
Flaming on the fire-exposed face more than 30 min after completion of heating	109	Centre of wall approx. 150mm down from top
Mean and maximum temperature rises greater than 140 K and 180 K	67	TC11 exceeded max
	67	TC12 exceeded max
	68	Group3 exceeded ave
	112	TC16 NFS upper joint
Mean and maximum temperature of internal faces exceed 250°C and 300°C respectively more than 30 min after completion of heating phase	92	TC1 max and TC1& TC2 ave

Figure 2 Resolute Test (60 minutes heating+60 minutes cooling) using AS1530.8.2 criteria

3.3.3 Conclusion

Based on the above discussion and referenced test results, it is considered that the proposed system would be able to withstand the heating duration of 30 minutes required by AS1530.8.2 and subsequent 60 minutes observation period and not cause ignition and flaming on the unexposed side.

It is our opinion that:

- The proposed wall system would be able to:
  - achieve an FRL of -60/60, and
  - likely be able to withstand the test duration of 30 minutes heating and subsequent 60 minutes observation period and not cause ignition and flaming on the unexposed side, provided that the installation details are to be in accordance with the test specimen as documented in Resolute Report No TR-F025.01 (PR0057) referenced in Section 1;

The wall construction is considered to meet the relevant Performance Requirements P2.7.5. The analysis undertaken incorporates a qualitative methodology under BCA A2.2 (2) (b)(ii)&(d) to assess the performance solution for compliance with the relevant Performance Requirements of BCA.

4 Recommendations

The following list primarily relates to the fire safety strategy proposed under the performance solution and does not provide a comprehensive list of fire safety measures required by the DtS provisions of the BCA.

- The wall construction shall comprise:
  - A timber framed single stud wall (90mmx45mm);
  - The cavity is protected by one layer of R2.5 x 90mm thick earthwool;

- The timber stud is sheeted with one (1) layer of 10mm thick SE FireCrunch boards each side; and
- The installation details are to be in accordance with the test specimen as documented in Resolute Report No TR-F025.01 (PR0057) referenced in Section 1; and
- Any wall penetrations shall be treated in accordance with the relevant provisions under AS3959-2009 Section 9

- This fire engineering review is based on the wall construction details described in this document; should the construction method be changed, a further fire engineering review shall be undertaken to assess its validity;
- This review is for the typical external wall construction proposed by FireCrunch Australasia Pty Ltd/Fire Combat Australia Pty Ltd under BCA Volume Two 2019 Part 3.10.5/AS3959-2009, and the appropriateness of applying this proposed wall construction method for individual projects shall be reviewed by a building certifier or fire safety engineer.

Kind regards,

Yuguang Li

Fire Safety Engineer

Fire Crunch Australian Certified Building Solutions

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