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Fire Compliance Manual U-STUCCO USA

PRODUCT ADVICE U-STUCCO™ FRX

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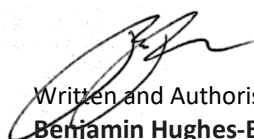
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CONDITIONS AND LIMITATIONS

This assessment report does not provide an endorsement by Ignis Solutions Pty Ltd of the actual product evaluated.

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 hazards under all conditions. The design and nature of the building is to be appropriately considered.

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.

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 is reviewed on or, before, the stated expiry date.

This report is prepared in good faith and with due care for information purposes only, and should not be relied upon as providing any warranty or guarantee. In particular, attention is drawn to the nature of the inspection and investigations undertaken and the limitations these impose in determining with accuracy the state of the building, its services or equipment and life safety.

Ignis Solutions' involvement in the Project is limited to the role outlined in section 2 'Scope of Service' of the Letter. This report reflects that role. Any reliance on, or use of, this report for purposes outside the scope of service is at the user's own risk.

Ignis Solutions shall not be held liable for any loss or damage resulting from any defect of the building or its services or equipment or for any non compliance of the building or its services or equipment with any legislative or operational requirement, whether or not such defect or non-compliance is referred to or reported upon in this report, unless such defect or non-compliance should have been apparent to a competent engineer undertaking the evaluation of the type undertaken for the purpose of preparation of this report.

Ignis Solutions has carefully reviewed and applied to the best of our ability the requirements of local Legislation, the NCC and the International Fire Engineering Guidelines.

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Part

A

executive summary

1 EXECUTIVE SUMMARY

1.1 General

Ignis Solutions has been engaged to evaluate the U-STUCCO™ FRX Render for use on buildings under the National Construction Code – Building Code of Australia –Volume One 2019 as well as Amendment 1.

The U-STUCCO™ FRX Render has been tested in accordance with AS 1530.1:1994 and demonstrated to be non-combustible. In addition the render has had two tests in accordance with AS 5113 large scale external wall tests where an EW, being a full pass, has been achieved.

The U-STUCCO™ FRX Render can be applied to steel structures to enhance their Fire Resistance Levels as well as being applied in Bushfire Prone Areas.

1.2 Scope and Purpose

The U-STUCCO™ FRX Render is suitable to be used, on the interior or exterior side of the wall substrate with a Fire Resistance Level or without a Fire Resistance Level on buildings of Type A, B, C or residential construction.

External Use

The U-STUCCO™ FRX Render is suitable to be used as the external most lining of a wall.

External Bushfire

The U-STUCCO™ FRX Render is suitable to be installed on the exposed components of an external wall and maintain compliance with the requirements of AS 3959, Clause G5.2 and Part 3.7.4 of the BCA for bushfire prone areas up to BAL 19.

Steel Protection

The U-STUCCO™ FRX Render is suitable to be installed over steel elements to enhance their Fire Resistance Levels. Section 4 provides details of enhancements from an FRL of 30 minutes, 60 minutes, 90 minutes and 120 minutes.

1.3 National Construction Code Compliance

1.3.1 Volume One – Building Code of Australia

Clause A5.1 (1) evidence to support the use of a material meets the nominated Performance Requirements and Deemed-to-Satisfy Provisions complying with a combination of Performance Solutions and Deemed-to-Satisfy Solutions.

Clause A5.2 sub-clause (1)(e) as evidence to support that the U-STUCCO™ FRX Render meets the nominated Performance Requirements and Deemed-to-Satisfy Provision under a certificate from a professional engineer.

Performance Requirement CP2 (external application) – Spread of Fire – The U-STUCCO™ FRX Render does not contribute to the spread of fire provided the design and installation comply with the requirements of Thermal Cladding Solutions installation requirements as well as this evaluation report.

Performance Requirement CP4 (internal application) – Spread of fire and generation of smoke and heat, and any toxic gases – The U-STUCCO™ FRX Render does not contribute to the spread of fire, generate excessive smoke, heat or toxic gases likely to limit the tenable conditions during occupant evacuation from being maintained.

- **C1.10 (a)(ii)** Wall linings and ceiling linings

- **Non-Combustible** Material tested to be non-combustible

GP5.1 Bushfire

i. G5.2 Protection

1. AS 3959:2018 – Construction of buildings in bushfire-prone areas, section 4 BAL – Low to Section 6 BAL FZ.

1.3.2 State and Territory Variations

The U-STUCCO™ FRX Render can be used in all States and Territories within Australia.

Part

B

conditions limitations and installation

2 FIRE SAFETY MEASURES

2.1 Conditions and Limitations

This evaluation is limited to the details within this evaluation report including the above compliance elements, product description and scope. This evaluation report is to be read, considered and used as a whole document.

The application surface must be structural sound, clean free of dust, mould, dirt, silicones and paint products. The application surface needs to be smooth and free from defects. Major cracks, holes or voids should be prepared prior to application. The surface shall be wet especially on highly porous and absorbing surfaces or at high temperatures.

The following figure details the application process.

<h1>01</h1> <h2>MIXING</h2>	<h1>02</h1> <h2>COVERAGE</h2>	<h1>03</h1> <h2>APPLICATION</h2>
<p>Pour a TCX 20kg bag into a mixing container, followed by 14 to 15 litres of water and mix between 10 to 12 minutes.</p> <ol style="list-style-type: none"> 1. Add approximately 2/3 of the required water (10L) into the container then empty the whole bag and start the mixing process. 2. About 3 minutes after step 1, add the remaining 1/3 of water (5L) and continue mixing for 7 to 9 minutes. <p>A plastering machine can be used.</p> <p>Mixing should be done mechanically at a low speed until the mixture reaches a homogenous consistency.</p> <p>Note: Additional water can be added to the mix to a maximum of 0.5L.</p>	<p>A 20kg bag of TCX covers 10.00 m2 at 5mm thickness.</p> <p>Coverage may vary due a number of factors including but not limited to:</p> <ul style="list-style-type: none"> - ambient temperature - surface temperature - surface porosity - mixing methods - application methods - amount of water - wall type - metal lath type. 	<p>Gauge sticks (long, narrow strip of aluminium bars) at desired thickness should be placed on the surface at equal distances to control the thickness and consumption of the material.</p> <p>Prepared material should be applied between these sticks using a steel trowel or plastering machine then levelled with a straight edge.</p> <p>Various finishes can be achieved with different techniques, which gives you the flexibility to get creative!</p>

Part

C

external wall application

3 EXTERNAL WALL APPLICATION

3.1 Introduction

The following details the use and compliance of the U-STUCCO™ FRX Render on external applications. External elements of buildings of Type A or B construction are required to be of non-combustible construction. In addition, each wall element is to satisfy fire hazard properties.

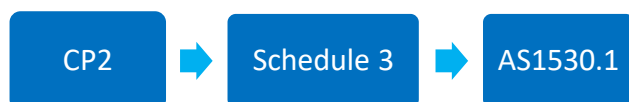
Ignis Labs has undertaken testing of the U-STUCCO™ FRX Render in accordance with AS 1530.1:1994 for non-combustibility as well as AS/NZS 1530.3:1999 for fire hazard properties.

Whilst the U-STUCCO™ FRX Render satisfies the requirements for external walls to be non-combustible, the material has been subject to two tests in accordance with AS 5113 large scale external wall tests.

3.2 BCA DtS Compliance Requirement

The BCA has the provision for other and ancillary use and components. The compliance pathway for the U-STUCCO™ FRX Render under the BCA is detailed below. This includes the provision of non-combustibility, external façade large scale external wall test as well as fire hazard properties.

Non-Combustibility



External facade



Fire hazard properties other area use



The following details the BCA Deemed-to-Satisfy provisions for compliance of the U-STUCCO™ FRX S Render material.

The relevant provisions of compliance under the BCA is Performance Requirement CP4. The BCA Deemed to Satisfy provisions include Clause C1.10 and BCA Specification C1.10 Clause 4 for wall and ceiling linings.

For other uses not covered by Clause 4 of BCA Specification C1.10, Clause 7 of BCA Specification C1.10 is applicable. Testing of the full material assembly is required to satisfy AS/NZS 1530.3.

3.3 BCA Performance Requirement

CP2 Spread of fire

(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—

- (i) to *exits*; and
- (ii) to *sole-occupancy units* and *public corridors*; and

Application:

CP2(a)(ii) only applies to a Class 2 or 3 building or Class 4 part of a building.

- (iii) between buildings; and
- (iv) in a building.

- (b) Avoidance of the spread of fire referred to in (a) must be appropriate to—
- (i) the function or use of the building; and
 - (ii) the *fire load*; and
 - (iii) the potential *fire intensity*; and
 - (iv) the *fire hazard*; and
 - (v) the number of *storeys* in the building; and
 - (vi) its proximity to *other property*; and
 - (vii) any active *fire safety systems* installed in the building; and
 - (viii) the size of any *fire compartment*; and
 - (ix) *fire brigade* intervention; and
 - (x) other elements they support; and
 - (xi) the *evacuation time*.

CP4

To maintain tenable conditions during occupant evacuation, a material and an assembly must, to the degree necessary, resist the spread of fire and limit the generation of smoke and heat, and any toxic gases likely to be produced, appropriate to—

- (a) the *evacuation time*; and
- (b) the number, mobility and other characteristics of occupants; and
- (c) the function or use of the building; and
- (d) any active *fire safety systems* installed in the building.

Application:

CP4 applies to linings, materials and assemblies in a Class 2 to 9 building.

3.4 Verification Method

CV3 Fire spread via external walls

Compliance with CP2 to avoid the spread of fire via the *external wall* of a building is verified when—

- (a) compliance with CP2(a)(iii) to avoid the spread of fire between buildings, where applicable, is verified in accordance with CV1 or CV2, as appropriate; and
- (b) the *external wall* system—
 - (i) has been tested for external wall (EW) performance in accordance with AS 5113; and
 - (ii) has achieved the classification EW; and
 - (iii) if containing a cavity, incorporates cavity barriers and these cavity barriers have been included in the test performed under (i) at the perimeter of each floor; and
- (c) in a building of Type A construction, the building is protected throughout by a sprinkler system (other than a FPAA101D or FPAA101H system) complying with Specification E1.5 and has—
 - (i) sprinkler protection to balconies, patios and terraces, and where overhead sprinkler coverage is not achieved alongside the *external wall*, sidewall sprinkler heads are provided at the *external wall* for the extent of the balcony, patio or terrace where overhead sprinkler coverage is not achieved; and
 - (ii) for a building with an *effective height* greater than 25 m—
 - (A) monitored stop valves provided at each floor level arranged to allow the isolation of the floor level containing the stop valve while maintaining protection to the remainder of the building; and
 - (B) the sprinkler system being capable of providing sufficient flow to serve the design area required by AS 2118.1 for the relevant hazard class on each floor level plus the design area required by AS 2118.1 for the floor level above, except where the former level is—
 - (aa) the floor level below the uppermost roof; or
 - (bb) any floor level that is wholly below ground; and

- (d) in a building of Type B construction, the building is—
 - (i) a Class 5, 6, 7 or 8 building or Class 4 part of a building; or
 - (ii) a Class 2, 3 or 9 building that—
 - (A) is protected throughout by a sprinkler system (other than a FPAA101D or FPAA101H system) complying with [Specification E1.5](#); or
 - (B) has any openings in *external walls* separated by a slab or other horizontal construction complying with [C2.6\(a\)\(iv\)](#) as if the building were of Type A construction.

3.5 BCA Deemed to Satisfy Provision

Non-combustible means—

- (a) applied to a material — not deemed *combustible* as determined by AS 1530.1 — Combustibility Tests for Materials; and
- (b) applied to construction or part of a building — constructed wholly of materials that are not deemed *combustible*.

C1.10 Fire hazard properties

- (a) The *fire hazard properties* of the following internal linings, materials and assemblies within a Class 2 to 9 building must comply with [Specification C1.10](#):
 - (i) Floor linings and floor coverings.
 - (ii) Wall linings and ceiling linings.
 - (iii) Air-handling ductwork.
 - (iv) Lift cars.
 - [NSW C1.10\(a\)\(v\)](#)
 - (v) In Class 9b buildings used as a theatre, public hall or the like—
 - (A) fixed seating in the audience area or auditorium; and
 - (B) a proscenium curtain *required* by [Specification H1.3](#).
 - (vi) Escalators, moving walkways and non-*required* non *fire-isolated stairways* or pedestrian ramps subject to [Specification D1.12](#).
 - (vii) *Sarking-type materials*.
 - (viii) Attachments to floors, ceilings, *internal walls, common walls, fire walls* and to internal linings of *external walls*.
 - (ix) Other materials including insulation materials other than *sarking-type materials*.

- (c) The requirements of (a) do not apply to a material or assembly if it is—

[Vic C1.10\(c\)\(xv\)](#)

- (xv) any other material that does not significantly increase the hazards of fire.

3.6 BCA Specification C1.10 – Clause 4

4. Wall and ceiling linings

- (a) A wall or ceiling lining system must comply with the *group number* specified in [Table 3](#) and for buildings not fitted with a sprinkler system complying with [Specification E1.5](#) have—
 - (i) a *smoke growth rate index* not more than 100; or
 - (ii) an *average specific extinction area* less than 250 m²/kg.
- (b) A *group number* of a wall or ceiling lining and the *smoke growth rate index* or *average specific extinction area* must be determined in accordance with AS 5637.1.

3.7 BCA Specification C1.10 – Clause 7

Material or assembly location	Flammability Index	Spread-of-Flame Index	Smoke-Developed Index
Other materials or locations and insulation materials other than <i>sarking-type materials</i> . Notes 2 and 3	—	9	8 if the <i>Spread-of-Flame Index</i> is more than 5

3.8 Fire Hazard Properties

BCA Clause C1.10 establishes fire hazard properties of internal linings, materials and assemblies within a Class 2 to 9 building to comply with Specification C1.10. The requirements of BCA Clause C1.10(a) apply to floor coverings establishing a Critical Radiant Heat Flux (CHF), walls and ceilings where a Group number is to be determined as well as insulation and other materials where the Spread-of-Flame Index and Smoke-Developed Index is to be established.

Except as varied by Victorian provision Vic C1.10(c)(xv), BCA Clause C1.10(c) establishes that the requirements of (a) do not apply to a material or assembly if it is under (xv) any other material that does not significantly increase the hazard of fire.

The U-STUCCO™ FRX Render has been tested in accordance with AS 1530.1:1994 and documented in Ignis Labs test report IGNL-2036-01-01 I02 R00 dated 07 March 2020 as being non-combustible. An indicative test has been undertaken in accordance with AS 1530.3:1999 and documented in Ignis Labs test report IGNL-3156-03 I01 R00 dated 21 January 2020. The test resulted in a Spread of Flame Index of 0 and a Smoke Developed Index of 0.

It is the opinion of Ignis Solutions that based on the material being tested and being a non-combustible material demonstrates that it does not significantly increase the hazard of fire. Therefore, the compliance with non-combustibility establishes sufficient evidence for compliance with BCA Clause C1.10(c)

Based on the above, the U-STUCCO™ FRX render is subject to the exception established under BCA Clause C1.10(c) where a Group Number is not required to be established in accordance with BCA Specification C1.10 and that compliance with BCA Clause C1.10 is maintained. Clause C1.10(c) is deleted in Victoria. The following testing details the results of the indicative test.

[1530.3 Methods for fire tests on building materials, components and structures – Simultaneous determination of ignitability, flame propagation, heat release and smoke release full assembly test](#)
Ignis Labs has undertaken testing of the U-STUCCO™ FRX render and documented in certificate IGNL-3156-03 I01 R00 dated 21 January 2020. The test was an indicative single specimen test and produced the following results:

Clause C1.10(a)(ii) – Spec C1.10 Clause 7 Note 3(a)	AS 1530.3:1999
IGNL-3156-03 I01 R00	dated 21.01.20
Spread of Flame	0
Smoke Developed Index	0

3.9 External Wall tests

Two external wall tests in accordance with AS 5113 has been undertaken which has involved the U-STUCCO™ FRX render. The first test included rendering over a QT panel. The second test included rendering over the Steadiform PVC and concrete formwork.

3.9.1 Test 1 – QT Panel and U-STUCCO™ FRX

The test included 50mm QT Systems Conpolcrete panels fixed to steel studs with 10mm non-combustible cement render. The QT System was fixed to two layers of 13mm fire grade plasterboard in accordance with Clause 5.4.4 of AS 5113-2016 Amendment 1:2018 which has been used to represent the non-combustible inner leaf.

The wall system consists of the following wall elements from the non-fire affected side. The construction of the wall is detailed below.

- 2 x 13mm Fire rated plasterboard | CSR Fyrecheck (fixed to test wall sub-frame)
- Steel Top hats 20x25x50x25x20 1.15BMT fixed to stud frame through the fire grade plasterboard at 450mm spacings.
- 50mm QT panel horizontally installed with QT Buttons and fixed with 12-14 x 50mm Metal hex screws.
- The vertical joint as well as the horizontal joint located at 2.4m above the combustion chamber were installed as control joints with a 10mm gap. Polyurethane backing rod was installed and the gap sealed with Bostic FireBan One to a depth of 10mm.
- 10mm non-combustible concrete render was installed over the completed QT Conpolcrete wall system.

FIGURE 1:

QT AND U-STUCCO™ FRX SYSTEM INSTALLATION



TABLE 1:

SPECIMEN RESULTS AND CLASSIFICATIONS

Classification Criteria	Related Classification Measure	Pass/Fail
5.4.5(a) T_{w5m}	$\leq 600^{\circ}\text{C}$	Max 717°C spike @ 15 min <10s PASS
5.4.5(b) $T_{\text{Insulation}5m}$	$\leq 250^{\circ}\text{C}$	Max 55°C PASS
5.4.5(b) $T_{\text{Cavity}5m}$	$\leq 250^{\circ}\text{C}$	Max 101°C PASS
5.4.5(c) $T_{\text{unexposedside}0.9m}$	$\leq 180^{\circ}\text{C}$	Max 27°C PASS
5.4.5(d) flaming	No flaming	No flaming PASS
5.4.5(d) openings	No openings	No openings PASS
5.4.5(e) spread	No spread beyond specimen	No spread occurred PASS
5.4.5(f) debris flaming	$\leq 20s$	No Flaming debris PASS
5.4.5(g) debris mass	$\leq 2kg$	No debris PASS
Classification		EW

FIGURE 2:

AS 5113 TEST START AND 10 MINUTES

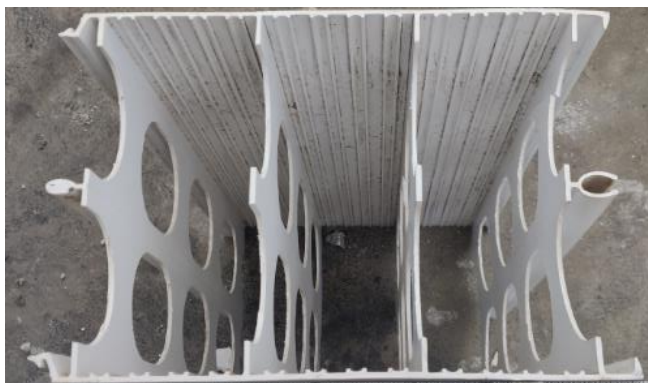


3.9.2 Test 2 – Steadiform and U-STUCCO™ FRX

The test included 10mm render applied over the Steadiform PVC formwork. The formwork, as detailed below is a 300mm x 200mm PVC structure which is filled with concrete.

FIGURE 3:

AS 5113 TEST LEVEL 1 THERMOCOUPLES



The resultant temperatures of the test is detailed below. The temperatures on Level 2 remained below 600°C. Given no cavities are present no measurement is needed. During the test no debris fell from the wall. In addition, the U-STUCCO™ FRX Render protected the PVC from the impact of fire. Nor evidence of fire spread of the PVC occurred.

FIGURE 4:

AS 5113 TEST LEVEL 1 THERMOCOUPLES

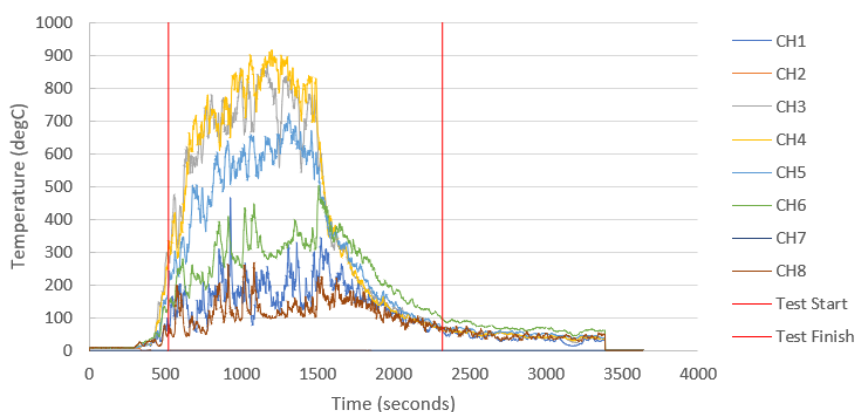


FIGURE 5:

AS 5113 TEST LEVEL 2 THERMOCOUPLES

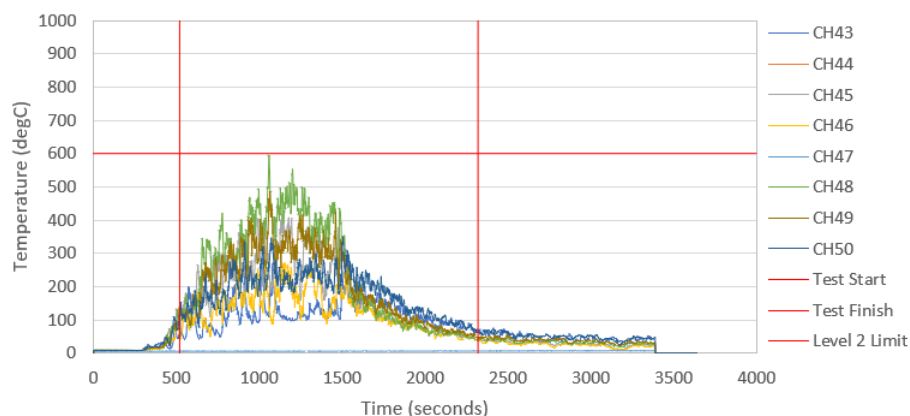


TABLE 1:

SPECIMEN RESULTS AND CLASSIFICATIONS

Classification Criteria	Related Classification Measure	Pass/Fail
5.4.5(a) T_{w5m}	$\leq 600^{\circ}\text{C}$	Max 600°C spike @ 9 min 1s PASS
5.4.5(b) $T_{\text{Insulation}5m}$	$\leq 250^{\circ}\text{C}$	N/A
5.4.5(b) $T_{\text{Cavity}5m}$	$\leq 250^{\circ}\text{C}$	N/A
5.4.5(c) $T_{\text{unexposedside}0.9m}$	$\leq 180^{\circ}\text{C}$	-
5.4.5(d) flaming	No flaming	No flaming PASS
5.4.5(d) openings	No openings	No openings PASS
5.4.5(e) spread	No spread beyond specimen	No spread occurred PASS
5.4.5(f) debris flaming	$\leq 20s$	No Flaming debris PASS
5.4.5(g) debris mass	$\leq 2kg$	No debris PASS
Classification		EW

FIGURE 6:

AS 5113 TEST START AND 10 MINUTES



3.10 Application

The above testing demonstrates that the U-STUCCO™ FRX satisfies the Deemed-to-Satisfy provisions of the BCA and is therefore suitable for use as other areas on a building. The material property testing is provided on the following pages.



CERTIFICATE

Material Fire Test Certificate

No. 2036-01-01 I02R00

ISSUED 07 March 2020
EXPIRY 06 March 2025

Sample Identification

TCS

Product Description

The tested material is an insulated render product predominantly a white Portland cement base which is a powdered solid, spray or trowelled on to a wall.

The test specimens are cylindrical and each have –

- (a). Nominal thickness: 45.21 mm
- (b). Nominal diameter 49.91 mm
- (c). Nominal mass: 40.44 g
- (d). Nominal density: 609 g/m³
- (e). Colour: white

Test Procedure

Five (5) samples were tested in accordance with Australian Standard 1530 Methods for fire tests on building materials, components and structures, Part 1- 1994: Combustibility Test for Materials.

Observation

Test Results

Mean furnace thermocouple temperature rise ΔT_f :	10.62°C
Mean specimen surface thermocouple temperature rise ΔT_s :	12.3°C
Mean duration of sustained flaming:	0 seconds
Mean mass loss:	17.13%

Combustibility

The material is NOT deemed COMBUSTIBLE according to the test criteria specified in clause 3.4 of as 1530.1- 1994.

Notes

These test results relate only to the behaviour of the test specimens of the material under the particular conditions of the test and they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

**AS 1530.1-1994:
COMBUSTIBILITY TEST
FOR MATERIALS**

PRESENTED TO

Thermal Cladding Solution
19 Endurance Avenue
Queanbeyan NSW 2620
Australia

TEST BODY

Ignis Labs Pty Ltd
ABN 36 620 256 617
3 Cooper Place
Queanbeyan NSW 2620



Benjamin Hughes-Brown PEng Aust CPEng NER APEC Engineer IntPE(Aust)
Chartered Professional Engineer
CPEng, NER (Fire Safety/Mech) 2590091, RPEQ1 1498, B/PB-C10-1875, EF-38994,
MFireSafety (UWS), B.Eng (UTS), GradDipBushFire (UWS), DipEngPrac (UTS), DipEng (CIT)



CERTIFICATE

Material Fire Test Certificate

IGNL-3156-03 101R00
 Date of Test 17-Oct-19
 ISSUED 21-Jan-20
 EXPIRY 20-Jan-25

AS 1530.3-1999:
 SIMULTANEOUS
 DETERMINATION OF
 IGNITABILITY, FLAME
 PROPAGATION, HEAT RELEASE
 AND SMOKE RELEASE

Specimen Identification

QT + TCS-FV

Specimen Description

The sponsor described the tested specimen as
 QT Eco series external wall panels

Test Method

One specimen was tested in accordance with Australian Standard 1530, Method for fire tests on building components and structures, Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release, 1999. For the test, each sample was clamped to the specimen holder in four places. A woven metal radiant panel was used in lieu of ceramic tiles. The testing of a single method is a deviation from the test method. The test was undertaken for indicative purposes only.

PRESENTED TO

Eco Cladding T/A QT Systems
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 Acacia Ridge QLD 4110
www.qt-systems.com.au

TEST ROOM

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Observations

Specimen did not ignite during the test but very light smoking started at approximately 472 s. Transmission was 100% throughout the duration of the test.

Parameter	Symbol	Unit	Results								
Specimen number			1	2	3	4	5	6	7	8	9
Ignition time	Ti	min	NA	NA	NA	NA	NA	NA	NA	NA	NA
Flame Propagation time	Tf	s	-	-	-	-	-	-	-	-	-
Heat release integral		kJ/m ²	-	-	-	-	-	-	-	-	-
Optical density (ignition)	D	/m	-	-	-	-	-	-	-	-	-
Optical density (non ignition)	D ₉₀	/m	0	-	-	-	-	-	-	-	-
Smoke release (ignition)	Log10(D)		-	-	-	-	-	-	-	-	-
Smoke release (non ignition)	Log10(D)NI		0	-	-	-	-	-	-	-	-

Calculation

Parameter	Mean	Standard Error	Comment
Ignition time	-	-	
Flame Propagation time	-	-	
Heat release integral	-	-	
Optical density (ignition)	-	-	
Optical density (non ignition)	0	-	
Smoke release	0	-	

Result

Indices	Range	Result	BCA Specification	CL.10
Ignitability	0-20	0	-	-
Spread of Flame	0-10	0	9	Pass
Heat Evolved	0-10	0	-	-
Smoke Developed	0-10	0	8	Pass



Test Technician
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Disclaimer

These test results relate only to the behaviour of the test specimens of the material under the particular conditions of the test, and they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

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CERTIFICATE

Material Fire Test Certificate

IGNL-4068-08 I01R00

Date of Test 11 July 2020
ISSUED 26 July 2020
EXPIRY 25 July 2025

AS 5113:2016 Fire propagation testing and classification of external walls of buildings

Sample Identification

TCS-PV-X

Product Description

The sponsor described the tested specimen as a 10mm concrete based single coat render. The render was installed over the Steadyform PVC formwork comprising 300mm x 200mm structure joined to create a wall 8m high and 2.6m wide with a wing wall of equivalent height and 1.5m wide.

Test Procedure

An external wall system was tested in accordance with British Standard 8414-2:2015 as modified by Australian Standard 5113:2016, Fire propagation testing and classification of external walls of buildings. The test included a crib fire for 30 minutes, in which after 20 minutes the crib collapsed. Observations continued for an additional 30 minutes.

Observations

The wall presented some crazing from moisture removal during the test and had a char effect from the products of combustion. No debris or flaming was present from the wall during the test.

Test Results

The following means and standard errors were obtained:

Classification Criteria	Related Classification Measure	Pass/Fail
5.4.5(a) T_{w5m}	$\leq 600^{\circ}\text{C}$	Max 600°C spike @ 9 min 1s PASS
5.4.5(b) $T_{insulator5m}$	$\leq 250^{\circ}\text{C}$	N/A
5.4.5(b) $T_{cavity5m}$	$\leq 250^{\circ}\text{C}$	N/A
5.4.5(c) $T_{unexposedside0.9m}$	$\leq 180^{\circ}\text{C}$	-
5.4.5(d) flaming	No flaming	No flaming PASS
5.4.5(d) openings	No openings	No openings PASS
5.4.5(e) spread	No spread beyond specimen	No spread occurred PASS
5.4.5(f) debris flaming	$\leq 20s$	No flaming debris PASS
5.4.5(g) debris mass	$\leq 2\text{kg}$	No debris PASS
Classification		EW

Notes

The result of fire tests may be used to directly assess fire Hazard, but it should be recognized that a single test Method will not provide a full assessment of fire hazard Under all fire conditions. This report details methods of construction, the test Conditions and the results obtained when the specific Element of construction described herein was tested Following the procedure outlined in as 5113. Any significant variation with respect to size, Constructional details, edge or end conditions, other than Those allowed under the field of direct application in the relevant test method, is not covered by this report. Because of the difficulty in quantifying the uncertainty of Measurement, it is not possible to provide a stated degree of accuracy of the result.

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CERTIFICATE

Material Fire Test Certificate

IGNL-3282-08 I01R00

Date of Test 04 December 2019
ISSUED 07 March 2020
EXPIRY 06 March 2025

AS 5113:2016 Fire propagation testing and classification of external walls of buildings

Sample Identification

QT Compolcrete panel with TCS-PV-X render

Product Description

The sponsor described the tested specimen as 50mm QT Systems Conpolcrete panels fixed to a steel stud with 10mm TCS-PV-X concrete based single coat render.

Test Procedure

An external wall system was tested in accordance with British Standard 8414-1:2015 as modified by Australian Standard 5113:2016, Fire propagation testing and classification of external walls of buildings. The test included a crib fire for 30 minutes, in which after 18 minutes the crib collapsed. Observations continued for an additional 30 minutes.

Observations

The wall presented some cracking from movement in the QT panel during the test and had a char effect from the products of combustion. No debris or flaming was present from the wall during the test.

Test Results

The following means and standard errors were obtained:

Classification Criteria	Related Classification Measure	Pass/Fail
5.4.5(a) T_{w5m}	$\leq 600^{\circ}\text{C}$	Max 717°C spike @ 15 min <10s PASS
5.4.5(b) $T_{insulation5m}$	$\leq 250^{\circ}\text{C}$	Max 55°C PASS
5.4.5(b) $T_{cavity5m}$	$\leq 250^{\circ}\text{C}$	Max 101°C PASS
5.4.5(c) $T_{max\text{ exposed side } 0.9m}$	$\leq 180^{\circ}\text{C}$	Max 27°C PASS
5.4.5(d) flaming	No flaming	No flaming PASS
5.4.5(d) openings	No openings	No openings PASS
5.4.5(e) spread	No spread beyond specimen	No spread occurred PASS
5.4.5(f) debris flaming	$\leq 20s$	No flaming debris PASS
5.4.5(g) debris mass	$\leq 2kg$	No debris PASS
Classification		EW

Notes

The result of fire tests may be used to directly assess fire Hazard, but it should be recognized that a single test Method will not provide a full assessment of fire hazard Under all fire conditions. This report details methods of construction, the test Conditions and the results obtained when the specific Element of construction described herein was tested Following the procedure outlined in as 5113. Any significant variation with respect to size, Constructional details, edge or end conditions, other than Those allowed under the field of direct application in the relevant test method, is not covered by this report. Because of the difficulty in quantifying the uncertainty of Measurement, it is not possible to provide a stated degree of accuracy of the result.

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Part

C

steel protection application

4 STEEL PROTECTION

4.1 Introduction

The following details the use and compliance of the U-STUCCO™ FRX render when applied to steel elements to enhance their Fire Resistance Levels.

4.2 BCA DtS Compliance Requirement

The BCA details that in accordance with Schedule 5 Clause 3 that the FRL of a building can be determined by calculation based on a tested prototype. The following evaluation considers the structural adequacy of steel elements where the limiting temperature is set to 545°C. The steel members FRL as calculated below determines the Structural Adequacy of the element.

The following details the relevant BCA DtS Clause.

A5.4 Fire-resistance of building elements

Where a *Deemed-to-Satisfy Provision* requires a building element to have an FRL, it must be determined in accordance with Schedule 5.

4.3 BCA Performance Requirement

CP1 Structural stability during a fire

A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to—

- (a) the function or use of the building; and
- (b) the *fire load*; and
- (c) the potential *fire intensity*; and
- (d) the *fire hazard*; and
- (e) the height of the building; and
- (f) its proximity to *other property*; and
- (g) any active *fire safety systems* installed in the building; and
- (h) the size of any *fire compartment*; and
- (i) *fire brigade* intervention; and
- (j) other elements they support; and
- (k) the *evacuation time*.

4.4 Steel Protection

4.4.1 Introduction

The properties of steel can change when it is subjected to heat. This is considered to be particularly important when steel is used to provide structural support for buildings and their features.

Therefore, it is imperative that the temperature of the steel is known so that adequate measures may be implemented, to the degree necessary, to ensure structural failure doesn't occur and/or affect life safety.

4.4.2 Assumptions

The calculations assume the following:

- Lumped-mass method.
- For the unprotected steel case, the heat entering the steel over the exposed surface area in a time step is equal to the heat required to raise the temperature of the steel by ΔT i.e. heat entering = heat to raise steel temperature.

- Density of steel remains constant and is not temperature dependent.
- Steel specific heat is temperature dependent.
- External surface of the insulation is the same temperature as the fire / fire gases.
- Internal surface of the insulation is the same temperature as the steel.
- Time delay due to moisture within the insulation is not taken into account.
- The density of the U-STUCCO™ FRX render is 600 kg/m³
- The insulation conductivity is 0.13 W/m.K
- The insulation Specific Heat is 1200 J/kg.K

4.4.3 Fire Type

The rate at which the steel member heats up to reach its limiting temperature is dependent on the temperature of the fire. Therefore, the spreadsheet permits the user to use the standard ISO 834 time-temperature curve or a specific time-temperature curve. This is selected from the 'Fire Curve' worksheet on the spreadsheet.

4.4.4 Insulation Material

The presence of insulation causes steel to heat up more slowly than when steel is unprotected. A number of insulation materials have been included within the spreadsheet, which are selected from a dropdown box and are automatically incorporated into the calculations once selected.

Should a material with different insulation properties be required to be analysed, the user may select 'Custom' from the Insulation Material dropdown box. They are then required to enter in the required Density, Thermal Conductivity and Specific Heat values for the insulation material within the relevant spreadsheet cells (highlighted in yellow).

The thickness of the insulation may be selected by entering the appropriate values into the spreadsheet. The user may also enter an insulation range by entering the maximum and minimum thickness values into the Insulation Thickness (A) and (B) spreadsheet cells.

4.4.5 Method of Calculating the Specific Heat (C_p) of Steel

The specific heat of the steel member can be calculated using the following equations:

$$c_p = 425 + 0.773T - 1.69 \times 10^{-3} T^2 + 2.22 \times 10^{-6} T^3 \quad 20^\circ\text{C} \leq T \leq 600^\circ\text{C}$$

$$c_p = 666 + \frac{13002}{(738 - T)} \quad 600^\circ\text{C} \leq T \leq 735^\circ\text{C}$$

$$c_p = 545 + \frac{17820}{(T - 731)} \quad 735^\circ\text{C} \leq T \leq 900^\circ\text{C}$$

$$c_p = 650 \quad 900^\circ\text{C} \leq T \leq 1200^\circ\text{C}$$

Where T is the temperature of the steel (°C).

4.4.6 Method of Calculating the Temperature of Unprotected Steel

The temperature of unprotected steel can be calculated using the following time based equation (modified from Buchanan):

$$T_s^j + \Delta T_s^{j+1} = \frac{F}{V} \frac{1}{\rho_s c_s} \left\{ h_c (T_f^{j+1} - T_s^{j+1}) + \sigma \varepsilon \left([T_f^{j+1} + 273]^4 - [T_s^{j+1} + 273]^4 \right) \right\} \Delta t$$

Where:

T_s^j	=	Temperature of steel at time step j (°C)
ΔT_s^{j+1}	=	Change of temperature of steel between time step j and $j+1$ (°C)
F	=	Surface area of steel per unit length (m ²)
V	=	Volume of steel per unit length (m ³)
ρ_s	=	Density of steel (kg/m ³)
c_s	=	Specific heat of steel (J/kg.K)
h_c	=	Convective heat transfer coefficient (W/m ² .K)
T_f^{j+1}	=	Temperature of the fire (K) at time step $j+1$ (°C)
T_s^{j+1}	=	Temperature of steel (K) at time step $j+1$ (°C)
σ	=	Stefan-Boltzmann constant (5.67×10 ⁻⁸ W/m ² K ⁴)
ε	=	Emissivity factor (dimensionless) – recommended default 0.5
Δt	=	Time step (seconds)

4.4.7 Method of Calculating the Temperature of Protected Steel

The temperature of protected steel can be calculated using the following time based equation (modified from Buchanan):

$$T_s^j + \Delta T_s^{j+1} = \frac{F}{V} \left(\frac{k_i}{d_i \rho_s c_s} \right) \left\{ \frac{\rho_s c_s}{\rho_s c_s + \left(\frac{F}{V} \right) \frac{d_i \rho_i c_i}{2}} \right\} (T_f^{j+1} - T_s^{j+1}) \Delta t$$

Where:

k_i	=	Thermal conductivity of the insulation (W/m.K)
d_i	=	Thickness of the insulation (m)
ρ_i	=	Density of the insulation (kg/m ³)
c_i	=	Specific heat of the insulation (J/kg.K)

All other variables are as per equation to calculate temperature of unprotected steel.

4.5 Application

The following tables provides the results of the above calculations and application of the U-STUCCO™ FRX render on structural members to increase their Fire Resistance Levels. The minimum thickness of render is 10mm.

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Welded Beams				
1000WB215	10	10	20	30
1000WB258	10	10	20	30
1000WB296	10	10	20	30
1000WB322	10	10	20	30
1200WB249	10	10	20	30
1200WB278	10	10	20	30
1200WB317	10	10	20	30
1200WB342	10	10	20	30
1200WB392	10	10	20	30
1200WB423	10	10	20	30
1200WB455	10	10	20	30
700WB115	10	15	30	40
700WB130	10	15	30	40
700WB150	10	15	30	40
700WB173	10	15	30	40
800WB122	10	20	30	40
800WB146	10	20	30	40
800WB168	10	20	30	40
800WB192	10	20	30	40
900WB175	10	20	30	40
900WB218	10	20	30	40
900WB257	10	20	30	40
900WB282	10	20	30	40
Welded Columns				
500WC440	10	10	20	30
500WC414	10	10	20	30
500WC383	10	10	20	30
500WC340	10	10	20	30
500WC290	10	10	20	30
500WC267	10	10	20	30
500WC228	10	10	20	30
400WC361	10	10	20	30
400WC328	10	10	20	30
400WC303	10	10	20	30
400WC270	10	10	20	30
400WC212	10	10	20	30
400WC181	10	10	20	30
400WC144	10	10	20	30
350WC280	10	10	20	30
350WC258	10	10	20	30
350WC230	10	10	20	30
350WC197	10	10	20	30

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Universal Beams				
610UB125	10	20	30	40
610UB113	10	20	30	40
610UB101	10	20	30	40
530UB92.4	10	20	30	40
530UB82.0	10	20	30	40
460UB82.1	10	20	30	40
460UB74.6	10	20	30	40
460UB67.1	10	20	30	40
410UB59.7	10	20	30	40
410UB53.7	10	20	30	40
360UB56.7	10	20	30	40
360UB50.7	10	20	30	40
360UB44.7	10	20	30	40
310UB46.2	10	20	30	40
310UB40.4	10	20	30	40
310UB32.0	10	20	30	40
250UB37.3	15	25	35	45
250UB31.4	15	25	35	45
250UB25.7	15	25	35	45
200UB29.8	20	30	40	50
200UB25.4	20	30	40	50
200UB22.3	20	30	40	50
200UB18.2	20	30	40	50
180UB22.2	20	30	40	50
180UB18.1	20	30	40	50
180UB16.1	20	30	40	50
150UB18.0	20	30	40	50
150UB14.0	20	30	40	50
Universal Columns				
310UC96.8	10	15	20	30
310UC158	10	15	20	30
310UC137	10	15	20	30
310UC118	10	15	20	30
250UC89.5	10	20	30	40
250UC72.9	10	20	30	40
200UC59.3	10	20	30	40
200UC52.2	10	20	30	40
200UC46.2	10	20	30	40
150UC37.2	20	30	40	50
150UC30.0	20	30	40	50
150UC23.4	20	30	40	50
100UC14.8	20	30	40	50

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Parallel Flange Channel				
380*100PFC	10	20	30	40
300*90PFC	10	20	30	40
250*90PFC	10	20	30	40
230*75PFC	15	25	40	60
200*75PFC	20	30	40	60
180*75PFC	20	30	40	60
150*75PFC	20	30	40	60
125*65PFC	20	40	50	65
100*50PFC	20	40	60	70
75*40PFC	20	40	60	70
Taper Flange Beams				
125*65TFB	20	40	50	70
100*45TFB	20	40	50	70
Equal Angles				
200EA26	10	10	20	30
200EA20	10	10	20	30
200EA18	10	10	20	30
200EA16	10	10	20	30
200EA13	10	10	20	30
150EA19	10	20	30	40
150EA16	10	20	30	40
150EA12	10	20	30	40
150EA10	10	20	30	40
125EA16	10	20	30	40
125EA12	10	20	30	40
125EA10	10	20	30	40
125EA8	10	20	30	40
100EA12	15	25	40	55
100EA10	15	25	40	55
100EA8	15	25	40	55
100EA6	15	25	40	55
90EA10	15	30	50	60
90EA8	15	30	50	60
90EA6	15	30	50	60
75EA10	15	40	50	70
75EA8	15	40	50	70
75EA6	15	40	50	70
75EA5	15	40	50	70
65EA10	30	45	60	70
65EA8	30	45	60	70
65EA6	30	45	60	70
65EA5	30	45	60	70
55EA6	30	45	60	75
55EA5	30	45	60	75

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Equal Angles				
50EA8	30	50	65	70
50EA6	30	50	65	70
50EA5	30	50	65	70
50EA3	30	50	65	70
45EA6	30	50	65	70
45EA5	30	50	65	80
45EA3	30	50	65	80
40EA6	30	50	65	75
40EA5	30	50	65	75
40EA3	30	50	65	75
30EA6	30	50	65	80
30EA5	30	50	65	80
30EA3	30	50	70	80
25EA6	30	60	70	80
25EA5	40	60	70	80
25EA3	40	60	70	80
Unequal Angles				
150*100UA12	10	20	40	60
150*100UA10	10	30	40	60
150*90UA16	10	20	40	50
150*90UA12	10	20	40	50
150*90UA10	10	20	40	50
150*90UA8	10	30	50	60
125*75UA12	10	30	40	60
125*75UA10	15	30	50	60
125*75UA8	15	35	50	65
125*75UA10	20	40	60	70
100*75UA10	20	40	60	70
100*75UA8	20	40	60	70
100*75UA6	20	40	60	70
75*50UA8	20	40	60	70
75*50UA6	25	45	60	75
75*50UA5	25	45	60	75
65*50UA8	20	40	60	70
65*50UA6	20	40	60	75
65850UA5	25	45	65	75
Rectangular Hollow Sections				
250*150*9	10	20	30	40
250*150*6	10	20	35	50
250*150*5	15	25	40	50
200*100*9	10	20	30	40
200*100*6	10	25	35	45
200*100*5	15	25	40	55
200*100*4	20	30	45	60

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Rectangular Hollow Sections				
150*100*6	10	25	40	50
150*100*5	15	30	45	60
150*100*4	15	35	50	60
150*50*5	15	30	50	60
150*50*4	15	35	50	65
150*50*3	20	40	55	70
125*75*6	15	25	40	60
125*75*5	15	30	45	60
125*75*4	20	35	50	70
125*75*3	20	40	55	70
100*50*6	15	30	45	60
100*50*5	15	30	50	70
100*50*4	20	35	55	70
100*50*3.5	20	40	55	70
100*50*3	25	40	60	70
75*50*6	15	30	45	60
75*50*5	15	35	50	65
75*50*4	20	40	55	70
75*50*3	20	45	60	75
Square Hollow Sections				
250*250*9	10	15	25	35
250*250*6	10	20	35	45
200*200*9	10	15	25	35
200*200*6	10	25	35	45
200*200*5	15	25	40	50
150*150*9	10	15	25	35
150*150*6	15	25	35	50
150*150*5	15	25	45	55
125*125*9	10	15	25	40
125*125*6	10	25	40	50
125*125*5	15	30	45	55
125*125*4	15	35	50	60
100*100*9	10	20	30	40
100*100*6	15	25	40	55
100*100*5	15	30	45	60
100*100*4	15	35	50	65
100*100*3	20	40	55	70
89*89*6	15	25	40	55
89*89*5	15	30	45	60
89*89*3.5	20	40	50	70
75*75*6	15	30	45	60
75*75*5	15	30	50	65
75*75*4	20	35	55	65
75*75*3.5	20	40	55	70

	U-STUCCO™ FRX Thickness of Steel Protection (mm)			
	30 mins	60 mins	90 mins	120 mins
Square Hollow Sections				
75*75*3	20	40	60	70
65*65*6	15	30	45	60
65*65*5	15	35	50	65
65*65*4	20	40	55	70
65*65*3	25	45	60	75
50*50*5	15	35	55	70
50*50*4	20	40	60	70
50*50*3	25	45	60	75
40*40*4	25	45	60	75
40*40*3	25	45	65	75
35*35*3	30	50	65	75
25*25*3	30	50	65	80

Part

D

bushfire application

5 BUSHFIRE APPLICATION

5.1 Introduction

The following details the use and compliance of the U-STUCCO™ FRX render when applied in a bushfire prone area.

5.2 BCA DtS Compliance Requirement

The National Construction Code under Volume One for Class 2-9 buildings and Volume Two for Class 1 and 10 buildings sets requirements for Class 1, 2, 3 or Class 10a building or deck located in a designated bushfire prone area to comply with the requirements of AS 3959:2018.

Clause A4.4 of BCA Volume One and Two, respectively, details that the NCC overrules in any difference arising between it and any Standard, Rule, Specification or provision in a document listed in Schedule 4. AS 3959 is listed within Schedule 4. With respect to the term non-combustible, the definition and application of non-combustible under Schedule 5 of BCA Volume One 2019 and Two are deemed to apply where AS 3959 references non-combustible.

5.3 AS 3959:2018 Construction in Bushfire Prone Areas

AS 3959 is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

Improving the design and construction of buildings to minimise damage from the effects of bushfire is but one of several measures available to property owners and occupiers to address damage during bushfire. Property owners should be aware that AS 3959 is part of a process that aims to lessen the risk of damage to buildings occurring in the event of the onslaught of bushfire. Other measures of mitigating damage from bushfire fall within the areas of planning, subdivision, siting, landscaping and maintenance.

It should be borne in mind that the measures contained in AS 3959 as well as this advisory note cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

AS 3959 is limited to sites where the Bushfire Attack Level (BAL) has been determined as BAL—LOW, BAL—12.5, BAL—19, BAL—29, BAL—40 or BAL—FZ. BAL means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.

5.4 External Wall AS 3959 Compliance

AS 3959-2018 Clause 5.4, 6.4, 7.4, 8.4 and 9.4 for BAL 12.5, BAL 19, BAL 29, BAL 40 and BAL FZ respectively details the requirements for external walls. The exposed components of an external wall that are less than 400mm from the ground or less than 400mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the wall requires specific requirements for compliance in accordance with AS 3959 for BAL 12.5 to BAL 19. This requirement is that the material must be tested in accordance with AS 1530.8.1 or be non-combustible. Within this location the U-STUCCO™ FRX render can be used. Outside of this location the U-STUCCO™ FRX render can be used. This is because AS 3959 does not

provide construction requirements for the exposed components of an external wall that are 400mm or more from the ground or 400mm or more above decks carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the wall in BAL 12.5 to BAL 19.

Exposed parts of an external walls of BAL 29 or 40 under Clause 8.4 of AS 3959 requires that material must be tested in accordance with AS 1530.8.1, be non-combustible or a combination of the requirements. This applies to the entire wall.

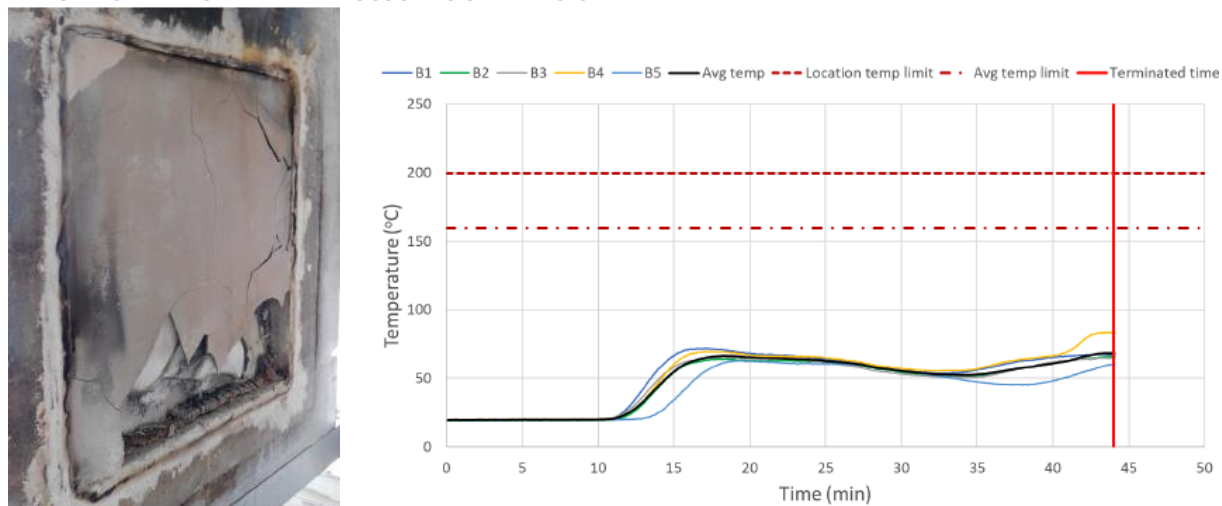
Exposed parts of an external walls of BAL FZ under Clause 9.4 of AS 3959 requires that materials must be tested in accordance with AS 1530.8.2 from the outside, be non-combustible, a system with a Fire Resistance Level (FRL) of 30/30/30 or a combination of the requirements.

The U-STUCCO™ FRX render is non-combustible. When applied to a wall that has a thickness of at least 90mm, compliance to a BAL 19.

Ignis Labs undertook testing of two wall systems in accordance with AS 1530.4. Test 1 included a standard wall system comprising of 10mm standard grade plasterboard over a timber frame, glasswool insulation, 6mm fibre cement sheet rendered with 10mm of U-STUCCO™ FRX render. This was recorded in Ignis Labs test report IGNL-3264-04-05R I01R00 dated 21.10.2020. The wall system achieved a 36 minute fire duration resulting in an FRL of at least -/30/30. The following images details an image of the end of the test as well as the thermocouples on the back of the wall. The inclusion of the U-STUCCO™ FRX render has improved the wall system to achieve an FRL of at least -/30/30.

FIGURE 7:

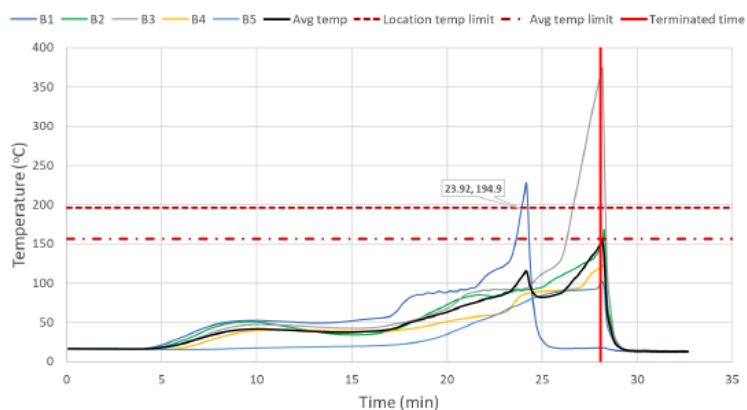
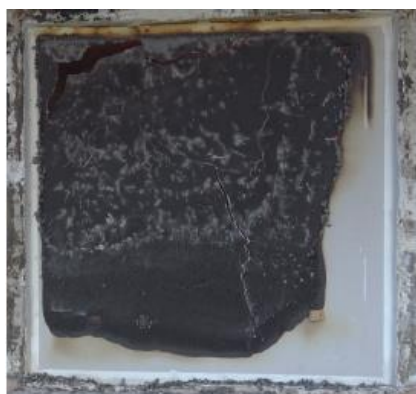
END OF TEST 1 IMAGE AND THERMOCOUPLES OF WALL SYSTEM



Ignis Labs undertook baseline testing of a standard wall system identical the Test 1 with the exception that the wall was not rendered with U-STUCCO™ FRX. Test 2 reference is IGNL-3264-06R I01 R00 dated 21.10.2020. The following figure details the results.

FIGURE 8:

END OF TEST 1 IMAGE AND THERMOCOUPLES OF WALL SYSTEM



The standard wall did not achieve an FRL of at least -/30/30. The wall failed at 23 minutes. Based on the above, the inclusion of a 10mm thick layer of U-STUCCO™ FRX improves the wall system such that it can be used in bushfire prone areas where a BAL-FZ.