

Design Note A4

Fire Resistant Ratings

June 2021

Fire Technical Opinion

The Fire Resistance Rating (FRR) for brick veneer has been reviewed by BRANZ's fire engineers as of 20 October 2020, in Report Number FC11917-001 ISSUE 1.

This Design Note provides additional advice and detail drawings on the design of brick veneers for fire, and a copy of the BRANZ Fire Technical Opinion is included from Page 4 of this file.

Application

The information contained in this document applies as follows:

1. 70mm to 110mm clay brick veneer.
2. Fire Resistance Rating of up to 60/60/60 in accordance with AS 1530.4-2005/2014, depending on stud size and internal lining as per manufacturer's fire rating specification.
3. Timber or steel framing.
4. Plasterboard lining, fixed to manufacturer's specification.
5. Stud height as specified by the plasterboard manufacturer to maximum 10m to eaves as defined by NZS 3604.
6. Two storey maximum height.
7. Weep holes permitted at ground level.
8. Weep holes at above ground level to comply with the New Zealand Building Code Acceptable Solution for Fire Safety C/AS2 paragraph 5.4 as a Type A area. A Type A area is no greater than 0.1 m² and must be separated from other Type A area by at least 1.5 m.
9. Risk Group SH, SM, SI, CA, WB, WS, VP as per Table 1.

Procedure

1. Design Building.
2. Refer to Table 1 for Risk Group.
3. Select appropriate risk group and whether sprinklers are installed.
4. Refer to Table 2 for applicability to selected Risk Group based on whether sprinklers are fitted. "No Requirement" means there is no need for a fire rating. 'N/A' means that a fire rating does not apply. 'No Application' means that a fire rating higher than 60 minutes is needed.
5. Note any conditions such as storage height and distance to the boundary.
6. Refer to plasterboard manufacturer's literature for appropriate wall linings, stud sizes and installation specifications based on required FRR (30/03/03 or 60/60/60), and wall height.
7. Select appropriate wall ties and spacing.
8. Refer to The Brickery® literature for suitable brick thickness and method of installation.
9. If no suitable system is available refer to The Brickery®.

Table 1. Risk Groups

AS	Risk Group	Applies to:
C/AS1	SH Buildings with sleeping (residential) and outbuildings	<ul style="list-style-type: none"> Detached dwellings with a single household unit such as: stand-alone houses. Low-rise multi-unit dwellings where each household unit has its own escape route that is independent of all other household units such as: Attached townhouses. Stacked household units where there is no more than one household unit above another with each household unit having a single storey and an escape height less than 4.0 m. Detached dwellings where fewer than six people (not including members of the residing family) pay for accommodation such as: boarding houses, homestays, bed and breakfasts. Outbuildings
C/AS2	SM Sleeping (non-institutional)	<ul style="list-style-type: none"> Permanent accommodation such as: Apartment buildings and other buildings which consist of more than one household unit (other than low-rise multi-unit dwellings in the scope of risk group SH). Transient accommodation such as: Hotels, motels, serviced apartments, hostels, backpackers, cabins at holiday parks. Buildings where six or more people pay for accommodation (such as boarding houses/homestays/ bed and breakfast). Wharehenui and other community sleeping spaces such as halls (even if used occasionally). Sheltered housing such as refuges, reintegration for prisoners, homeless shelters etc. Educational accommodation such as: University halls of residence, school boarding hostels etc.
	SI Care or detention	<ul style="list-style-type: none"> Care activities such as: Institutions, hospitals including outpatients and day procedures (excluding special care facilities such as operating theatres, intensive care units, prisons, delivery and recovery rooms and hyperbaric chambers or other such places that require stay in place strategies). Aged care facilities. Residential care in institutions, hospices. Medical day treatment: i.e. medical centres and dental practices using sedation or treatment rooms where people are unable to self-evacuate without assistance; e.g. for dialysis or chemotherapy. Care in the community houses and homes. Detention facilities (excluding prisons) such as: Police stations, court buildings and hospitals with detention facilities.
	CA Public access and educational facilities	<ul style="list-style-type: none"> Crowd activities such as: Halls, theatres and cinemas. Recreation and event centres (including tiered seating for up to 2000 people and with any primary egress for more than 100 people at the level of the playing surface). Educational institutions without sleeping including schools and early childhood centres. Churches and other places of worship. Restaurants and cafes, shops and shopping malls. Exhibition, retail areas including car showrooms and trade fair space. Public libraries with less than 2.4m storage height. Spaces for viewing open air activities (does not include spaces below a grandstand), open grandstands, roofed but unenclosed grandstand, uncovered fixed seating). Personal service activities such as: Dentists, doctors (except as included within risk group SI), banks, beautician and hairdressing salons.
	WB Business, commercial and low level storage	<ul style="list-style-type: none"> Professional activities such as: Offices (including professional services such as law and accountancy practices). Laboratories, workshops (including mechanics workshops). May contain storage with a capable height of storage of less than 3.0 m. Industrial activities such as: Factories, processing and manufacturing plants (excluding foamed plastics) with a capable height of storage of less than 3.0 m. Storage activities such as: Buildings or parts of buildings capable of storage no more than 5.0 m in height. Warehouses and storage buildings (other than those listed above), capable of storage more than 5.0 m in height, but a height to the apex no greater than 8.0 m and total floor area of no more than 4200 m². Temperature controlled storage with a capable height of storage of less than 3.0 m, other than some limited areas in processing areas, or up to a maximum area of 500 m² with a maximum capable of storage height of 5.0 m. Intermittently occupied buildings (other than outbuildings) such as: Light aircraft hangers, buildings containing fixed plant and or fixed machinery and spray painting operations, whether or not in a spray booth.
	WS High level storage or potential for fast fire growth	<ul style="list-style-type: none"> Storage activities such as: Warehouses with a capable height of storage of over 5.0 m or over 8.0 m to the apex and total floor area greater than 4200 m². Temperature controlled storage outside of the scope of risk group WB. Service activities such as: Trading and bulk retail wholesalers with a storage height greater than 3.0 m. Supermarkets with shelving over 3.0 m in height. Exhibition, retail areas and trade fair space with a storage height greater than 3.0 m.
	VP Vehicle storage and parking	<ul style="list-style-type: none"> Vehicle parking - within a building or a separate building including: Car parking buildings. Vehicle parking or stacking within buildings. Goods vehicle parking. Service vehicle and unloading areas. Car storage warehouses.

Table 2. Fire Resistance Ratings

Risk Group	Unsprinklered Property Rating	Sprinklered Property Rating
SH	30/30/30	No requirement
SM	60/60/60	30/30/30
SI	N/A	60/60/60
CA	No application	60/60/60
WB*	No application	60/60/60*
WS	No application	60/60/60
VP	60/60/60	30/30/30

Extract from C/AS1 Paragraph 5.1 and C/AS2 table 2.4

30/30/30

60/60/60

Note *Building must be 15 m or greater from the boundary.

Timber: Internal lining only

Timber: Internal lining only

1 x 10 mm GIB Fyreline or Standard
-Standard needs at least 90 mm studs

1 x 13 mm GIB Fyreline

1 x 13 mm GIB Standard

2 x 10 mm GIB Fyreline

Steel: Internal lining

Steel: Internal lining only

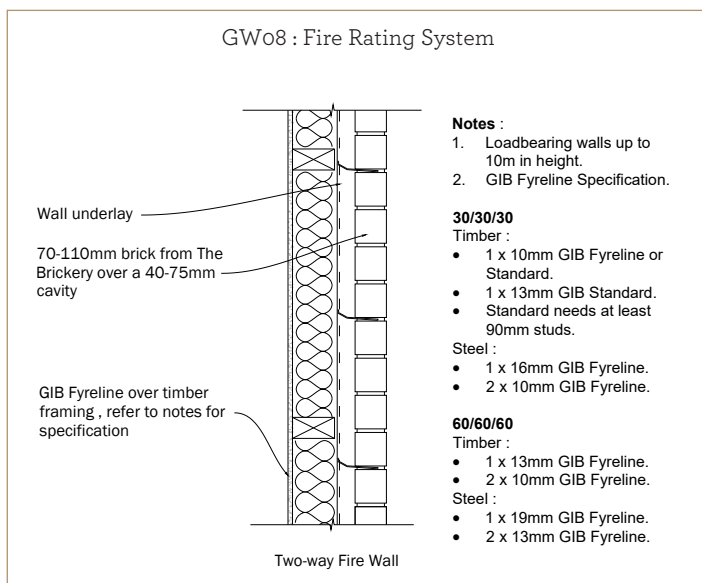
1 x 16 mm GIB Fyreline

1 x 19 mm GIB Fyreline

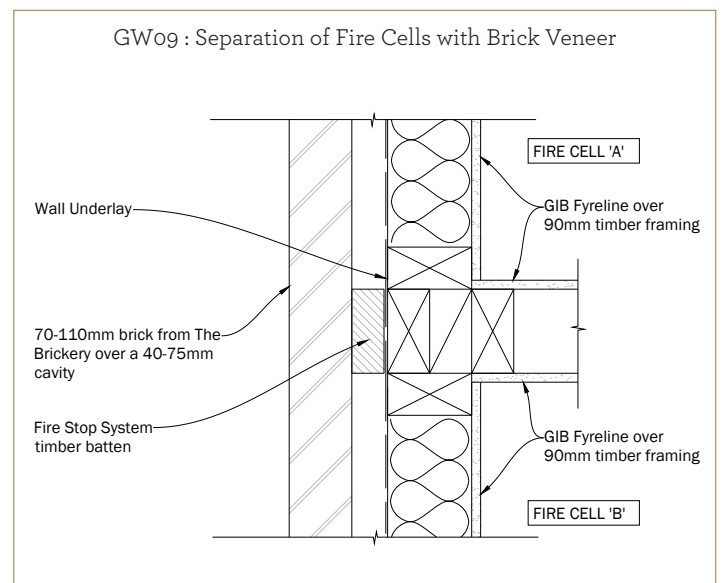
2 x 10 mm GIB Fyreline

2 x 13 mm GIB Fyreline

Typical Wall Cross Section



Plan View – Separation of Fire Cells





FIRE Technical Opinion

FC11917-001 ISSUE 1

**FIRE RESISTANCE OF CLAY BRICK & PAVERS MANUFACTURERS ASSOCIATION MEMEBERS
CLAY BRICK VENEER ON STEEL OR TIMBER FRAMED LOADBEARING WALLS**

CLIENT

Clay Brick & Paver Manufacturers Association (NZ)
145 Khyber Pass Road
Grafton
Auckland, 1023
New Zealand



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ASSESSMENT OBJECTIVE

To assess the fire resistance of Clay Brick & Pavers Manufacturers Association members clay brick veneer on steel or timber framed loadbearing walls.

CONCLUSION

Fire resistance rating

It is considered that the fire resistance in accordance with AS 1530.4-2005 or 2014 of any fire rated timber or steel stud plasterboard faced wall system up to at least an FRR of 60/60/60 from either side, established by test or assessment, will not be prejudiced if the plasterboard to one face of the wall is replaced with a 70 mm, 80 mm, 90 mm, 100 mm or 110 mm thick Clay Brick & Pavers Manufacturers Association members veneer brick wall provided that the veneer is not loadbearing. Any weep holes at ground level are not considered to be detrimental to the wall for an FRR of at least 60/60/60.

Compliance with NZBC Acceptable Solutions C/AS1 and C/AS2

The wall may be up to two storeys high and any weep holes above ground level meet the requirements of the New Zealand Building Code Acceptable Solution for Fire Safety C/AS2 paragraph 5.4 as a Type A area and C/AS2 for residential buildings such as houses, townhouses and small multi-unit dwellings. A Type A area is no greater than 0.1 m² and must be separated from other Type A area by at least 1.5 m.

LIMITATION

This report is subject to the accuracy and completeness of the information supplied.


BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

This assessment report may only be quoted or reproduced in full.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in BRANZ Services Agreement for this work.

The results reported here relate only to the item/s described in this report.

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01	20 October 2020	20 October 2025	Initial Issue



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1. INTRODUCTION

This report gives BRANZ's assessment of the fire resistance of Clay Brick & Pavers Manufacturers Association members clay brick veneer on steel or timber framed loadbearing walls. Fire exposure is from either side, the bricks may be 70 mm to 110 mm thick and the wall can include weep holes.

2. BACKGROUND

In BRANZ assessment report FAR 2487, it was considered that the fire resistance of any fire rated timber or steel stud plasterboard faced wall system with an FRR of up to 60/60/60, established by test or assessment, will not be prejudiced if the plasterboard on one face of the wall is replaced with a 70 mm thick veneer brick wall, provided that the veneer is not loadbearing. This applied to fire from either face.

In BRANZ fire resistance test report FR 1062 a loadbearing timber framed wall lined on one side with two layers of 14.5 mm fire rated plasterboard and on the other side with 7.5 mm construction plywood and 94 mm clay bricks tied to the timber framing was tested in accordance with ISO 834-1975 and found to achieve 138 minutes Stability, Integrity and Insulation. The 4,000 mm high brick wall was exposed to the furnace heating and not loaded.

3. DISCUSSION

3.1 Test Standard

BRANZ assessment report FAR 2487 used test data in accordance with AS 1530.4-1997 and BRANZ fire resistance test report FR 1062 describes a test carried out to ISO 834-1975. A review has been undertaken between the 1997, 2005 and 2014 versions of AS 1530.4 and ISO 834-1975 with respect to wall testing. Based on the review it is considered the changes in versions would not have changed the reported performance of the walls. Therefore, it is expected that were the walls tested in accordance with AS 1530.4-2005 and 2014 a similar result for Integrity and Insulation would be achieved.

3.2 Wall fire resistance

BRANZ assessment report FAR 2487 established that a 70 mm brick veneer replacing one lining of a steel or timber framed plasterboard wall would not be detrimental to the wall achieving its tested or assessed FRR up to 60/60/60. This applies to fire from either the brick veneer face or the plasterboard lined face.

Australian Standard for Masonry Structures AS 3700-2018, Section 6 covers Design For Fire Resistance, and clause 6.3.3, copied below, specifically relating to walls based on test results.

6.3.3 Design of walls based on test results

Where the design of a wall is based on test results, the following shall apply:

- (a) *The results shall be from tests in relation to structural adequacy in accordance with AS 1530.4, on a specimen or specimens built using the same type of masonry unit.*



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For the purpose of this Clause the masonry units shall be regarded as being of the same type where—

- (i) *for clay units, clay and shales are of the same mineralogy and geological type, blended in the same proportions and manufactured by similar processes.*

The Australian standard is considered to be a useful guide with respect to masonry walls, therefore bricks from other manufactures may be considered to have the same fire resistance properties when they meet this definition. Therefore, it is considered that any brick manufactured by members of the Clay Brick & Pavers Manufacturers Association, which meets this definition can be used.

BRANZ assessment report FAR 2487 discussed nominal 70 mm thick bricks. It is proposed to include nominal 80 mm, 90 mm, 100 mm or 110 mm thick bricks. As these are thicker than nominal 70 mm thick bricks, it is considered they would not be detrimental to the FRR of the walls in which they are used.

The clay bricks described in BRANZ fire resistance test report FR 1062 were installed in a wall with two layers of plasterboard and a layer of 7.5 mm structural plywood. Whilst this includes a greater thickness of plasterboard and a plywood lining than would be typical of a wall with an FRR of 60/60/60, the clay brick wall was 4,000 mm high, directly exposed to the furnace heating conditions and exhibited minimal deflection. At 60 minutes the deflection of the wall was 10 mm and the temperature rise on the fire unexposed face of the clay bricks had not exceeded 100°C. This demonstrated the ability of the brick ties to retain the bricks in place and for the wall to experience minimal deformation. In that respect it is considered that if the wall was extended to a height sufficient for a two storey building, when exposed from the brick face, it would remain in place and maintain the FRL of the wall for at least an FRR of 60/60/60.

This is on the understanding that the wall has been designed to meet structural and serviceability requirements under ambient conditions. This will determine wall heights and is limited to building constructed in accordance with AS 3604 which has a 10 m height limit to the highest point on the roof.


3.3 Weep holes

3.3.1 Fire resistance rating

The discussion in section 3.2 above regarding fire resistance does not take into account the presence of weep holes. When the weep holes are at the bottom of a wall, they will be in the negative pressure zone of the furnace with ambient air being drawn through them. This will not cause the passage of flames and hot gasses therefore is not considered to be detrimental to the fire resistance of the wall.

3.3.2 Compliance with NZBC Acceptable Solutions C/AS1 and C/AS2

Where weep holes are placed at any other location than at the bottom of the wall there is the possibility for flames and hot gasses to pass through the wall. However, in the New Zealand Building Code Acceptable Solution for Fire Safety C/AS2, it is permitted to have non-fire rated openings (unprotected areas) in walls provided they meet certain criteria. For weep holes C/AS2 paragraph 5.4 may be applied. This defines a Type A area as no greater than 0.1 m² with each Type A area being separated 1.5 m from other Type A areas. Weep holes are

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typically 10 mm wide and the height of the brick, approximately 75 mm. This gives an area of 0.00075 m² which qualifies as a Type A area. Therefore, spacing weep holes at 1.5 m would meet the requirements of the New Zealand Building Code Acceptable Solution for Fire Safety C/AS2 and can also be applied to C/AS1 for residential buildings such as houses, townhouses and small multi-unit dwellings.

4. CONCLUSION

4.1 Fire resistance rating

It is considered that the fire resistance in accordance with AS 1530.4-2005 or 2014 of any fire rated timber or steel stud plasterboard faced wall system up to at least an FRR of 60/60/60 from either side, established by test or assessment, will not be prejudiced if the plasterboard to one face of the wall is replaced with a 70 mm, 80 mm, 90 mm, 100 mm or 110 mm thick Clay Brick & Pavers Manufacturers Association members veneer brick wall provided that the veneer is not loadbearing. Any weep holes at ground level are not considered to be detrimental to the wall for an FRR of at least 60/60/60.

4.2 Compliance with NZBC Acceptable Solutions C/AS1 and C/AS2

The wall may be up to two storeys high and any weep holes above ground level meet the requirements of the New Zealand Building Code Acceptable Solution for Fire Safety C/AS2 paragraph 5.4 as a Type A area and C/AS2 for residential buildings such as houses, townhouses and small multi-unit dwellings. A Type A area is no greater than 0.1 m² and must be separated from other Type A area by at least 1.5 m.



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FC11917-002 ISSUE 1

Technical Opinion Summary



This is to certify that the specimen described below has been examined by BRANZ on behalf of the sponsor.

Sponsor

Clay Brick & Paver Manufacturers Association (NZ)
145 Khyber Pass Road
Grafton
Auckland, 1023
New Zealand

Reference BRANZ Reports FC11917-001 ISSUE 1

Referenced Standard AS1530.4-2005 and 2014

Specimen Name: Clay Brick & Paver Manufacturers Association (NZ) members 70 mm, 80 mm, 90 mm, 100 mm or 110 mm thick clay bricks

Specimen Description: 70 mm, 80 mm, 90 mm, 100 mm or 110 mm thick clay bricks used as a veneer on steel or timber framed plasterboard lined walls with an FRR of at Least 60/60/60. The veneer may include weep holes no greater than 0.1 m² in area and must be separated from other weep holes by at least 1.5 m

Orientation: Exposure from either side

The assessed results are as follows

FRR = 60/60/60*

- In conjunction with C/AS2 paragraph 5.4

Issued by

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Senior Fire Safety Engineer
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Reviewed by

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Regulatory authorities are advised to examine FC11917-001 ISSUE 1 before approving any product.

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