MRTFC
MULTI-RESIDENTIAL TIMBER FRAMED CONSTRUCTION

External 90/90/90 Fire Rated Plywood Faced Wall System.

Introduction

The purpose of this information bulletin is to provide the necessary building practice that must be followed to replicate the construction of a fire tested wall system, utilising a plywood clad exterior layer and timber post framing that achieves a fire resistant level (FRL) of 90/90/90 or – /90/90.

Background

Multi-residential timber framed construction (MRTFC) was introduced to Australia in building regulations in 1994, being Amendment Nº7 of the BCA 90.

The method of construction for these developments was prescribed in the Code, and was limited to a maximum of three storeys for Class 2 residential use (over a lower level of car parking), and a maximum of two storeys for Class 3 buildings.

In most instances these buildings required the external walls to be fire resistant. These walls can be built from timber framing protected by fire resistant linings or brickwork. In addition, the exterior part of the wall must be weatherproofed.

Traditionally, standard fire resistant walls have been used to meet the required fire resistance, and then covered with a weather resistant cladding. Refer to MRTFC Information Bulletin Nº5 for a description of these systems.

The systems described in this Information Bulletin utilise the weather resistant cladding as an integral part of the wall's fire resistance. This has been done to reduce the number of layers of linings and/or material required to meet the necessary fire resistance performance.

To assist the wall in meeting the required fire resistance, additional protection to the timber studs is provided by utilising nail laminated timber studs for the framing.

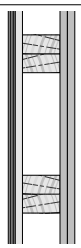
Where are External Fire Rated Walls Required?

In most instances, external walls for Type A and B buildings (2 or 3 storey apartment buildings) are required to be fire resistant. For Type C buildings, walls built less than 1.5 m from a fire source feature (boundary or nearby building) are required to be fire resistant.

Levels of fire resistance (FRL) vary depending on building classification, distance from fire source feature (boundary or another building), and on whether the wall is loadbearing or non-loadbearing.

Generally, external fire resistant walls for Class 2 and 3 buildings (apartments or hotels), have fire resistance requirements of FRL 90/90/90 (loadbearing) or FRL –/90/90 (non-loadbearing).

Plywood Faced Fire Rated Exterior Wall System

Frame Configuration	FRL	R_w	Wall Linings & Cladding (External Side of Wall)	Framing	Wall Linings (Internal Side of Wall)
EXTERNAL LIGHTWEIGHT CLAD WALL – NAIL LAMINATED POST SYSTEM					
	90/90/90 or – /90/90	N/A	1 x 12mm Structural or Exterior Grade Plywood + Building Paper + 1 x 16mm Fire Grade Moisture Resistant Plasterboard against studs	Nail Laminated Studs (2 studs side-by-side)	2 x 13mm Fire Grade Plasterboard

Sizing of Framing Members

Generally, the size of the studs required for fire resistance is double the thickness of studs required to support normal structural loads.

This is generally achieved by nail laminating two studs together, thereby doubling the structural thickness. For example, where 90 x 35mm studs would be structurally adequate, two 90 x 35mm studs are nail laminated together to produce 90 x 70mm studs for fire resistance. Where 70 x 45mm studs would be structurally adequate, two 70 x 45mm studs are nail laminated together to produce 70 x 90mm studs for fire resistance.

In theory, one stud is used to supports the load while the second stud is sacrificial and is allowed to char. The combined section size is enough to provide the additional fire resistance required.

Note that a stud size of 70 x 35mm is not permitted in loadbearing walls.

Studs are to be laminated in accordance with AS1684 : 1999 'Residential Timber Framed Construction', Clause 2.4 Stud Lamination. This Standard specifies nail laminating as follows.

For studs up to 38mm thick, 1 x 75mm nail at 600mm centres.

For studs greater than 38mm and not exceeding 50mm thick, 1 x 90mm nail at 600mm centres.

Nail Diameter

Machine Driven	Hardwood and Cypress	3.05mmØ
	Softwood	3.33mmØ
Plain Shanked	Hardwood and Cypress	3.15mmØ
	Softwood	3.75mmØ

Noggings are required at a maximum of 1350mm centres and sized in accordance with AS1684.

Exterior Fire Resistant Lining

Fire Grade Plasterboard – (against studs).

16mm moisture resistant fire grade plasterboard is to be fixed to the outside of the studs. Boards may be installed either horizontally or vertically. Butt joints should be staggered from joints in the plywood cladding.

Fixing must be in accordance with the manufacturer's instructions, or at minimum use clouts that are 2.5mmØ or 2.8mmØ x 50mm long or 32mm long screws.

Fastener Spacings (for horizontal sheeting) are to be:–

Field of the board – Use 2 nails at 50mm apart or 1 screw at 300mm maximum centres.

Recessed edge – Fasten at each stud using 1 nail or screw.

Butt joints – Fasten with nails at 150mm maximum centres or screws at 200mm maximum centres.

Plywood Faced Fire Rated Exterior Wall System

Plywood Cladding (Outermost Layer)

The plywood cladding must be a minimum 12mm thickness structural or exterior grade with a minimum dry density of 450kg/m3. Any grooved profiles in the face of the sheet must not exceed a maximum depth of 5mm.

The plywood must be preservative treated to a minimum hazard level of H3, in accordance with AS1604.3 'Preservative Treatment of Veneer Based Wood Products'.

Sheets should be installed vertically. Vertical joints are to be ship-lapped over studs, with a 3mm expansion gap between. Horizontal joints are to be butt joints and backed by nogging.

A breather type building paper is required between the plywood and the moisture resistant fire grade plasterboard.

Plywood is to be fixed over plasterboard with corrosion resistant 2.8mmØ x 65mm flat head nails penetrating into studs a minimum of 28mm. Fixings to all edges of the plywood sheet are to be at 150mm centres, and at 300mm centres to intermediate studs. Where plywood sheets abut, nails are to be staggered in adjoining sheets.

The external face of the plywood should be finished to avoid mechanical surface breakdown, and to maximise the appearance and durability.

Refer to the Plywood Association of Australia brochure 'Featuring Plywood in Buildings' for further information on installing and finishing plywood.

Internal Lining

Internal linings are to be 2 layers of 13mm fire grade plasterboard.

The plasterboard is fixed to the studs, and joints sealed in accordance with the lining manufacturer's recommendations. Sheets can be installed either vertically or horizontally. Butt joints must be offset in adjoining sheets.

Fixing must be in accordance with the manufacturer's instructions, or at minimum, use clouts that are 2.5mmØ or 2.8mmØ x 50mm long or 32mm long screws for the first layer, and 2.5mmØ or 2.8mmØ x 65mm long clouts or 45mm long screws for the second layer.

Fastener Spacings (for horizontal sheeting) are to be:-

First Layer – Nails or screws at 600mm maximum centres to edges and the field of the board.

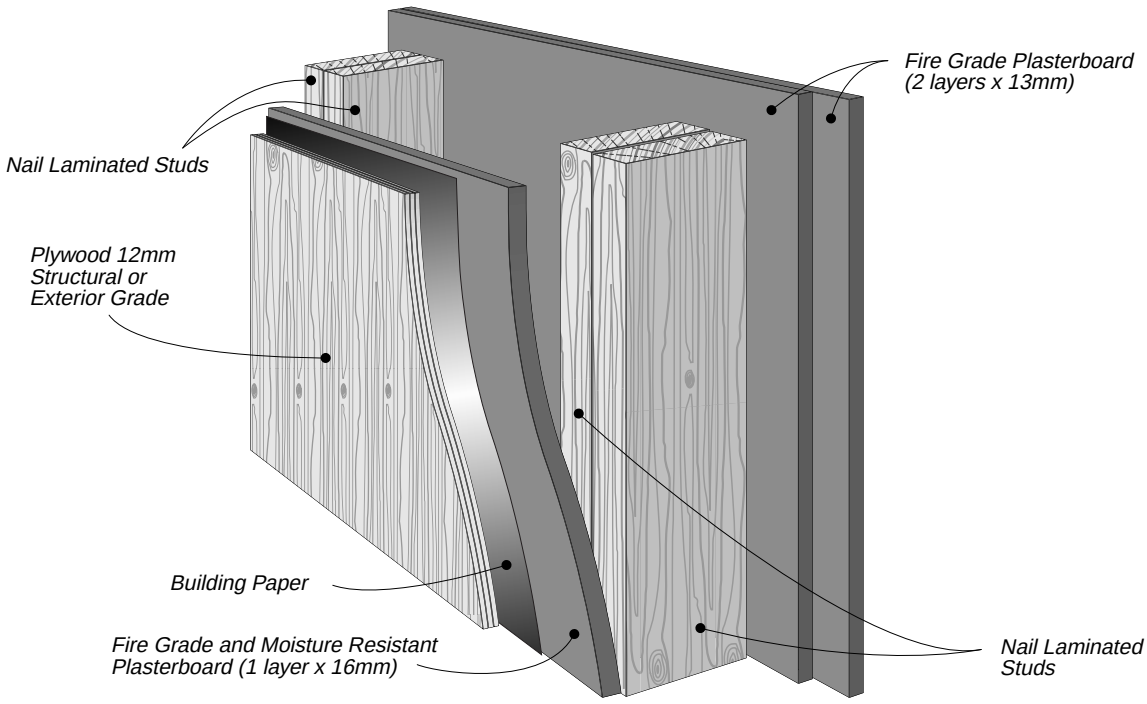
Second Layer –

Field of the board – Use 2 nails at 50mm apart or 1 screw at 300mm maximum centres.

Recessed edge – Fasten at each stud using 1 nail or screw.

Butt joints – Fasten with nails at 150mm maximum centres or screws at 200mm maximum centres.

EXTERNAL LIGHTWEIGHT CLAD WALL – NAIL LAMINATED POST SYSTEM



Reference Material

1. Building Code of Australia – Australian Building Codes Board.
2. CSIRO Test Certificate – N°1159
3. AS1684 'Residential Timber Framed Construction Standard' – Standards Australia.
4. 'Featuring Plywood in Buildings' – Plywood Association of Australia.
5. AS1604 'Timber – Preservative Treated – Sawn and Round' – Standards Australia.

Technical Advice

Further technical information and assistance is available from the following Timber Advisory Services.

NEW SOUTH WALES
Timber Development Association NSW Ltd.
13 - 29 Nichols Street, Surry Hills NSW 2010.
Tel: (02) 9360 3088. Fax: (02) 9360 3464.

QUEENSLAND
Timber Research and Development Advisory Council of Queensland.
500 Brunswick Street, Fortitude Valley Qld 4006.
Tel (07) 3358 1400. Fax: (07) 3358 1411.

VICTORIA
Timber Advisory Centre.
180 Whitehorse Road Blackburn VIC 3130.
Tel: (03) 9877 2011. Fax: (03) 9877 6663.

SOUTH AUSTRALIA
Timber Development Association of SA Inc.
113 Anzac Highway, Ashford, SA 5035.
Tel: (08) 8297 0044. Fax: (08) 8297 2772.

WESTERN AUSTRALIA
Timber Advisory Centre (WA).
Homebase Expo
55 Salvado Road, Subiaco WA 6008.
Tel: (08) 9380 4411. Fax: (08) 9380 4477.

TASMANIA
Tasmanian Timber Promotion Board.
Suite 22/11 Morrison St
Hobart, TAS 7000.
Tel: (03) 6224 1033. Fax: (03) 6224 1030.

PLANTATION TIMBER ASSOCIATION OF AUSTRALIA
830 High Street, Kew East, Vic 3102.
Tel: 1800 007 463
Fax: (03) 9859 2466.

PLYWOOD ASSOCIATION OF AUSTRALIA
3 Dunlop Street, Newstead, Old 4006.
Tel: (07) 3854 1228. Fax: (07) 3252 4769.

Members of the National Timber Development Council

- Forest and Wood Product Research and Development Corporation.
- Australian Timber Importers Federation.
- Timber Development Association (NSW) Ltd.
- Forest Products Association.
- Victoria Association of Forest Industries.
- Timber Promotion Council of Victoria.
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- Tasmanian Timber Promotion Board.
- National Association of Forest Industries.
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- Queensland Timber Board.
- Timber Development Association (SA).
- Plantation Timber Association of Australia.
- Forest Industries Federation (WA).

Important Notice

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