NICHOLLS & MAHER NICMA CD STRUCTURAL F11 PLYWOOD

DESIGN, INSTALLATION & MAINTENANCE GUIDE

NICHOLLS & MAHER NZ LTD

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General

PURPOSE

This guide outlines the design, installation and maintenance requirements for NICMA CD Structural F11 Plywood.

SKILLS REQUIRED

This guide is intended for qualified tradespeople and competent DIYers. All specifiers and installers must have the appropriate skills, product knowledge and access to all relevant technical information. Where restricted building work applies, the designer and/or installer must hold an LBP licence or be supervised by someone with the applicable licence.

FOR MORE HELP

Visit nicma.co.nz for more information and technical support. Please note that the information in this document is subject to change and should be considered a guide only.

WARRANTY

Refer to nicma.co.nz warranty information.

PRODUCT DESCRIPTION

- **Material:** Plywood sheets manufactured in accordance with AS/NZS 2269.0:2012
- **Stress grade:** F11
- **Surface grade:** CD
- **Sizes, profile and treatment:**

NICMA Structural Plywood

- Lengths: 2400 mm and 2700 mm (7 mm and 9 mm only)
- Width: 1200 mm
- Thicknesses: 7 mm, 9 mm, 12 mm, 15 mm and 17 mm
- Profile: standard
- Treatment: H3.2.

NICMA Flooring Plywood

- Lengths: 2400 mm and 2700 mm
- Width: 1200 mm
- Thickness: 19 mm
- Profile: tongue and groove
- Treatment: H3.2.

NICMA Roofing Plywood

- Length: 2700 mm
- Width: 1200 mm
- Thickness: 15 mm
- Profile: tongue and groove
- Treatment: H3.2 or untreated.

SCOPE OF USE

NICMA CD Structural F11 Plywood can be used:

- in load-bearing applications, including bracing and as a rigid air barrier
- as a flooring or deck substrate
- as a roof substrate.

Refer to the NICMA CD Structural F11 Plywood pass™ for a detailed scope of use and limitations.

MORE INFO

Design considerations

NICMA CD Structural F11 Plywood CAD and pdf details are available for use by designers and specifiers. Refer to nicma.co.nz for more information. Note the details indicate typical use of NICMA plywood but do not provide the full details required for construction.

When specifying and installing NICMA CD Structural F11 Plywood, ensure its intended use is within the scope and limitations of the pass™.

Plywood and fixings must be durable for at least 15 years or no less than 50 years if used as a structural element, such as a diaphragm.

NICMA STRUCTURAL PLYWOOD

Rigid air barrier

When specifying NICMA Structural Plywood as a rigid air barrier, the plywood must comply with paragraph 9.1.7.2 of E2/AS1. A rigid air barrier is required in Extra High wind zones under E2/AS1 and may be used in other wind zones. It is also required for external walls of unlined attached garages.

To meet the requirements of paragraph 9.1.7.2 of E2/AS1, the plywood must:

- have sheet edges fixed over solid framing
- be over-fixed with a flexible wall underlay from Table 23, installed as per paragraph 9.1.7.1, and folded into reveals as per 9.1.5 (a)
- have cavity battens at maximum 600 mm centres
- be finished below at the underside of the plate or bearer.

Wall bracing

When specifying NICMA 7 mm and 9 mm Structural Plywood as a wall bracing element the designer must calculate the brace demand for the building as specified in NZS 3604:2011, Section 5. The designer must consider both earthquake and wind demand based on the size and the design (subfloor, roof pitch, cladding weights, etc) of the structure.

The distribution of the bracing and the spacing of the bracing lines to obtain the correct bracing line values of no less than 100 bracing units is the minimum objective.

The NICMA 7 mm Structural Plywood has been tested by Scion to the test standard P21 in two vertical system configurations-

- 7 mm Pine CD F11 H3.2 – 2400 x 1200 mm wall panel
- 7 mm Pine CD F11 H3.2 – 2700 x 1200 mm wall panel

Table 1: Wall bracing values

Bracing element	BU wind	BU Earthquake
2400 mm high x 1200 mm wide	140 (117 BU/m) Limited by the serviceability load capacity	160 (BU/m) Limited by the serviceability load capacity
2700 mm high x 1200 mm wide	131 (109 BU/m) Limited by the serviceability load capacity	143 (119 BU/m) Limited by the serviceability load capacity
Note: NZS 3604:2011 (Clause 5.4.2) limits the bracing ratings for walls on timber floors to 120 BU/m and the bracing ratings for walls on concrete floors to 150 BU/m. Refer to NZS 3604:2011.		

The NICMA 9 mm Structural Plywood has been tested by Scion to the test standard P21 in two vertical system configurations-

- 9 mm Pine CD F11 H3.2 – 2400 x 1200 mm wall panel
- 9 mm Pine CD F11 H3.2 – 2700 x 1200 mm wall panel

Table 2: Wall bracing values

Bracing element	BU wind	BU Earthquake
2400 mm high x 1200 mm wide	153 (128 BU/m) Limited by the serviceability load capacity	177 (147BU/m) Limited by the serviceability load capacity
2700 mm high x 1200 mm wide	142 (118 BU/m) Limited by the serviceability load capacity	159 (133 BU/m) Limited by the serviceability load capacity
Note: NZS 3604:2011 (Clause 5.4.2) limits the bracing ratings for walls on timber floors to 120 BU/m and the bracing ratings for walls on concrete floors to 150 BU/m. Refer to NZS 3604:2011.		

Wall Construction is to be:

- 2400 or 2700 x 1200 mm wall.
- 90 x 45 H1.2 SG8 timber with studs at 600 mm centres, no nogs.
- 7 mm or 9 mm PINE CD F11 H3.2 2700 X 1200 mm or 2400 x 1200 mm plywood sheets, fixed vertically on one side.
- Sheets fixed with 50 x 2.8 hot dip galvanised flat head nails at 150 mm centres to plates and external studs, 300 mm to centre stud with first nail at 50 mm from each nailing intersection and 12 mm minimum edge distances all around.
- Wall connected to the floor with M12 hold down bolts to bottom plate and Handibracs.

NICMA 7 mm and 9 mm - Wall Bracing CAD and pdf details are available for use by designers and specifiers. Refer to nicma.co.nz for more information.

Ceiling diaphragm

Ceiling diaphragms must be specified in accordance with NZS 3604:2011 (refer to section 13, paragraph 5.6) or designed specifically to comply with AS/NZS 1170 [set].

For large rooms where bracing lines exceed 5 m, a ceiling diaphragm may be installed if at least 100 bracing units are used in each wall. The length of the diaphragm must not exceed twice the width between braced walls, and NICMA CD Structural Ply must cover the entire diaphragm area.

Fixings: 140 mm x 35 mm top capping fixed on top of the plate around the perimeter.

Non-structural wall or ceiling linings

NICMA Structural Plywood can also be used as wall or ceiling linings. Framing for NICMA CD Structural Ply sheets must be supported by timber framing with the following spacings:

Table 2: Framing centres for wall and ceiling linings

Wall lining		Ceiling lining	
Stud centres (mm)	Nogging centres (mm)	Joist/truss centres (mm)	Nogging centres (mm)
400	1200	450	800
450	1200	600	600
600	800	900	480
		1200	480

Fixings:

- 40 x 2.0 mm jolt headnails with panel adhesive
- mechanical gun-driven pins with panel adhesive (recommended)
- 6 g x 32 mm, countersunk, coarse thread woodscrews.

NICMA FLOORING PLYWOOD

Internal flooring substrate

Floor framing must be designed in accordance with NZS 3604:2011 (section 7) or AS/NZS 1170 [set], considering floor loadings of 1.5 kPa, 2.0 kPa and 3.0 kPa, as detailed in NZS 3604:2011 (section 1).

Maximum joist spacings: 400 mm centres under a maximum 2 kPa floor load.

Other floor loadings: require specific design.

Structural floor diaphragm: may be specified if it meets all requirements of NZS 3604:2011 (section 7.3) and has adequate wall bracing units as required.

Substrate for a membrane roof or deck

Membrane roofs and decks covered by E2/AS1 must meet the following criteria:

Minimum fall:

- Roofs: 2.0 degrees (1:30)
- Decks: 1.5 degrees (1:40)

Maximum deck area: 40 m^2

Internal gutters: A minimum fall of 1:100 with no cross seams.

Level access decks: Must have removable raised surfaces.

NICMA Flooring Plywood must be specified in accordance with E2/AS1.

All fixings (materials and spacings) must comply with E2/AS1 and NZS 3604:2011. The slope must be designed in accordance with E2/AS1.

NICMA ROOFING PLYWOOD

A roofing underlay that complies with E2/AS1 is recommended when installing profile metal sheets and singles.

For use as a self-supporting, pitched roofing substrate, specify framing at minimum:

- 900 mm centres in all wind zones up to and including Very High
- 800 mm centres for all Extra High wind zones and roof pitches 9° to 12°.

All fixings (materials and spacings) must comply with E2/AS1 and NZS 3604:2011. NICMA recommends 60 x 2.8 mm ring shank, galvanised or stainless nails at a minimum of 150 mm centres.

APPEARANCE OF NICMA CD STRUCTURAL F11 PLYWOOD

Surface checking of the face veneer can occur due to changes in moisture content, particularly:

- after H3.2 treatment, as the drying process affects the wood
- with exterior exposure or in conditions with fluctuating moisture levels.

When the aesthetic finish of the plywood is important:

- limit the duration of exterior exposure
- apply appropriate surface coatings or use weather protection.

Pre-installation

HEALTH AND SAFETY

- Ensure adequate ventilation or use mechanical dust extraction when cutting or drilling.
- Support boards properly when cutting and fixing.
- Wear safety equipment, including dust masks and eye protection.
- Follow tool manuals and keep tools sharp.
- Plan and monitor safe work practices, especially when working at height.
- Clear the work area before starting.

Refer to:

- Small Construction Sites Health and Safety Toolkit
- Health and Safety at Work Quick Reference Guide

HANDLING AND STORAGE

- Handle sheets carefully to avoid damage, particularly to edges. Avoid stepping on or dragging sheets over each other.
- Unload manually on edge; if unloading mechanically, ensure sheets are supported or on a pallet. Consider a spreader bar when using a crane or Hiab.
- Storage is critical. Keep in a dry, well-ventilated area, away from direct sunlight. Improper storage may affect product performance and appearance.
- Stack on a flat, dry surface with supports no more than 450 mm apart and at least 150 mm off the ground. Cover with a tarpaulin to keep sheets dry. If storing for more than 14 days, keep indoors.

TOOLS AND EQUIPMENT REQUIRED

- Jigsaws, bench saws, circular skill saws, drills, moisture meters and standard carpentry tools.
- Follow best trade practices and the manufacturer's instructions.

Installation

PREPARATION

- Ensure the proposed use is within the scope and limitations of the pass™.
- Where applicable, refer to the building consent and construction details, NICMA CD Structural F11 Plywood CAD and pdf details, NZS 3604:2011 and Acceptable Solution E2/AS1.
- Inspect panels for visual defects before installation to meet aesthetic requirements.
- Verify the moisture content of the timber framing and sheets is below 18 % before applying membranes, coverings or coatings.
- Confirm framing meets the Design Requirements and provides adequate support for sheet edges and ends.
- The framing and substrate must be straight and true and within the tolerances specified in section 2 of NZS 3604:2011 Timber-framed buildings or Nash Standard Part 2: 2009 Light steel-framed buildings.
- For high visual finishes (e.g., membrane roofing and decking), protect plywood from moisture during construction with weatherproof covers and/or temporary roofing.

SHEET PREPARATION

- Cut sheets using a fine-tooth hand or power skill saw. Smooth edges with a plane or 120-150 grit sandpaper.
- Predrill 2.4 mm pilot holes, 2-3 mm deeper than screw depth, to prevent splitting where sheets are to be fixed with screws.
- No predrilling is required for nails or finishing gun pins.
- Use a construction adhesive compatible with plywood treatment and any applied membrane.

GENERAL FIXING AND INSTALLATION

- Add blocking where necessary to ensure sheets are supported at all edges.
- Use string lines to ensure straightness for the first sheet run.
- Use a 5 mm bead of construction adhesive at the sheet perimeter, along all cut edges, and on intermediate timbers and blocking.
- Position and fix the first sheet securely before continuing with additional sheets.
- Ensure fixings do not penetrate the surface by more than 1 mm. All fastener heads must be recessed below the level or flush with the sheet face.
- Keep sheets in firm contact with the supporting timber before nailing, and do not allow nails to lift sheets above the support.
- Angle nails towards the centre of the supporting timber for stronger fastening.
- Leave expansion gaps as follows:
    - 2–3 mm between sheets
    - 5 mm at the perimeter (e.g., floor-to-wall, ceiling-to-wall or membrane edges)
    - 10-20 mm for continuous runs of 10–15 m.

NICMA STRUCTURAL PLYWOOD

Rigid air barrier installation

Install in accordance with paragraph 9.1.7.2 of E2/AS1.

Ensure:

- cavity battens are at minimum 600 mm centres
- plywood is over-fixed with a flexible wall underlay from Table 23 and installed as per paragraph 9.1.7.1
- the flexible wall underlay is folded into reveals as per paragraph 9.1.5 (a)
- the sheet edges are finished below with the underside of the plate or bearer.

Wall or ceiling lining installation

- Fix using one of the following:
  - 40 x 2.0 mm jolt head nails with panel adhesive
  - mechanical gun-driven pins with panel adhesive (recommended)
  - 6 g x 32 mm, countersunk, coarse-thread wood screws.
- Fix at a maximum of 300 mm centres at sheet edges, 12 mm from the edge. Fix at a maximum of 300 mm centres on intermediate supports.
- Use galvanised flat-head nails for back nailing over rafters.

Ceiling diaphragm installation

- Install in accordance with NICMA Structural Plywood wall or ceiling lining instructions.
- Secure with 140 mm x 35 mm top capping fixed to the perimeter.

NICMA FLOORING PLYWOOD

Flooring installation

- Minimum ground clearance must be 450 mm from the underside of the joist for subfloor installations.
- Subfloor spaces must be adequately ventilated, providing at least 3500 mm^2 of open vent area for every 1 m^2 of floor.
- Install a damp-proof course (DPC) if moisture is likely in sub-floor areas.
- Install sheets perpendicular to the joist run using a staggered brick-bond pattern. Sheets must span at least three joists, except at floor edges, where infill sheets may be used if required.
- Fixings must comply with section 10 of AS/NZS 1860.2-2006 or Table 2.2 of NZS 3604:2011. Minimum fixings:

  For timber:
  - 65 mm x 2.8 mm hot-dipped galvanised annular grooved flooring gun nails
  - if hand fixing, 60 x 2.8 mm hot-dipped galvanised jolt head nails or 60 x 3.15 mm hot-dipped galvanised countersunk annular grooved flooring nails, applied by hand or gun
  - 50 mm x 10 g countersunk, self-drilling wood screws for 19 mm plywood.

  For steel:
  - 45 mm x 10 g countersunk extended point self-tapping screws.
  - Do not use jolt or bullet-head nails.
  - Fixings to I-Beam joists must be screws.
  - Fix at a maximum of 150 mm centres at sheet edges (12 mm from edge) and 300 mm centres through the sheet body.

Deck or roof substrate installation

For installation of NICMA Flooring Plywood as a deck or roof substrate:

- Use H3.2 treated NICMA Flooring Plywood.
- Ensure the deck is designed in accordance with E2/AS1.
- Ensure the selected membrane system is compatible with H3.2-treated plywood. Follow the membrane supplier's specifications.
- Substrate framing must support the plywood at a maximum of 400 mm centres each way for roofs and trafficable decks.
- Ensure adequate ventilation under membrane roofs and decks, with a minimum gap of 20 mm between the substrate underside and any insulation.
- Lay sheets to provide an adequate fall in accordance with E2/AS1 for efficient drainage. Follow the membrane supplier's/manufacturer's specifications for fall requirements.
- Chamfer all leading plywood edges with a 10 mm radius corner.

- Install minimum 20 x 20 H3.2 treated timber fillets in internal corners and drip edges, as required by the membrane specification or building consent. Rebate sheets where metal edge trims are detailed.
- Fixings:

  For timber:

  - 50 mm x 10 g countersunk, self-drilling stainless steel wood screws for 19 mm plywood.

  For steel:

  - 45 mm x 10 g countersunk, extended-point self-tapping stainless-steel screws.
- Fixings to I-Beam joists must be screws.
- Use screws at 150 mm centres around the perimeter of each panel and 200 mm centres throughout. Fixings should be a minimum 12 mm from sheet edges.

NICMA ROOFING PLYWOOD

Untreated plywood is suitable for ventilated trusses and for roof cavities above 12 °. For closed roof cavities and skillion roofs between 9 ° and 12 °, treated plywood must be used.

A roofing underlay that complies with E2/AS1 is recommended where profile metal sheets and singles are installed.

Minimum framing requirements for self-supporting, pitched roofing:

- 900 mm centres in all wind zones up to and including Very High
- 800 mm centres for all Extra High wind zones and roof pitches 9°–12°.

Lay plywood with staggered joints in a brick-bond pattern.

Square-edge plywood must be fully supported using a minimum of 75 mm x 50 mm framing. No nogging is required within the body of the roof when using tongue-and-groove plywood.

Allow an expansion gap of 2–3 mm at the sheet ends and edges.

Fixings (materials and spacings) must comply with E2/AS1 and NZS 3604:2011. NICMA recommends 60 x 2.8 mm ring shank, galvanised or stainless-steel nails at a minimum of 150 mm centres.

Maintain a continuous ventilation gap of 25 mm between the roof insulation and plywood.

FINISHING

- Fill or level all visible holes with a flexible wood filler and lightly sand. Where a membrane is applied, fill cracks and imperfections with a compatible filler to prevent visibility through the membrane.
- When used as a roofing substrate, install a building wrap in accordance with Table 23 of E2/AS1.
- Sand with 280–320 grit sandpaper between coats.
- Plywood can be subject to superficial surface defects, checking and bubbling, but this will not affect NZ Building Code compliance.
- Where NICMA Flooring Plywood is installed as a deck or roof substrate, prepare it according to the membrane supplier's requirements and E2/AS1.
- Ensure the membrane is installed by an approved registered applicator with the appropriate LBP license.
- Ensure all stormwater drainage is installed in accordance with E2/AS1.
- Check moisture content before membrane application.

Maintenance

Under normal conditions, NICMA CD Structural F11 Plywood requires no maintenance, provided the protective finish or coating is maintained correctly.

Periodically inspect the sheets for signs of damage caused by humidity or moisture. Plywood can be subject to superficial surface defects, checking and bubbling, but this will not affect NZ Building Code compliance.

Repair small holes (up to 90 mm x 90 mm) by patching or stopping using a suitable interior-grade filler. For larger holes (over 90 mm square), or those located within 90 mm of a bracing element, or if any bracing element is damaged, consult an LPP for advice.

In the event of water damage, remove the protective layer, then ensure the area is allowed to dry thoroughly before being assessed by an LBP for suitability of repair.

Follow the supplier's instructions for maintaining the finished layer or coating.

Typical maintenance includes:

- Regularly washing and/or wiping clean protective surfaces to remove mould, scale and/or soap deposits.
- Checking the sealant joints around fixtures.
- Checking the grout joints between ceramic tiles.
- Replacing any loose or defective grout as needed.

FOR MORE INFORMATION

Visit nicma.co.nz for additional information and technical support.

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