JAMES COOK CYCLONE STRUCTURAL TESTING STATION

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WITHDRAWAL STRENGTH OF GROOVED NAILS IN PINE

Part 2 — RECOMMENDATIONS as BATTEN / RAFTER JOINTS

TECHNICAL REPORT No. 17

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CYCLONE TESTING STATION

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Part 2

Recommendations as Batten/Rafter Joints

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Technical Report No. 17

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1. INTRODUCTION

2.1 Nail Types

The nails were all nominally 75 mm long and varied in diameter of ungrooved section from 3.15 mm to 3.75 mm. Figure 1 shows the nails tested. They were supplied by Mayne Industries (National nail), Sidney Cooke, Bostitch, Able Staples and Jambro. Two different nails were supplied by Jambro, a

The pine rafters were either 70 x 35 mm or 90 x 35 mm. The intent in dressing the battens and driving the nails flush was to ensure that each nail had the same penetration into the pine. However this intent was somewhat thwarted because the actual length varied between nail types. The hand driven nails were 75 mm from point to bottom of the head. The power driven ones measured 75 mm to the top of the head. No attempt was made to correct this apparent anomoly as it did represent the actual situation, some nails were longer than others.

Table 1 gives details of each nail type.

TABLE 1

DETAILS OF GROOVED NAILS

Brand	Hand or	Type of	Measurements (mm)			No. of
			[illegible]	[illegible]	[illegible]	[illegible]

research aspect, there is little practical value in recommending separate details for joints made from each of the pine species. For the builder, the classification "seasoned pine" is sufficient. This broad classification has been used throughout this publication.

2.3 Design Strengths

2.3.1 Grooved nails

The design strength for each type of nail was derived using the factoner

different strength. However it is suggested that the values listed in

2.1.1. External resource coefficients

local zones of suction that occur near corners or at abrupt changes in slope. Figure 2 broadly indicates the Wind Loading Code requirements for roofs of low rise buildings in this regard. The sketch assumes the wind acting normal to the length of the building, and dimension "d" is

and pressurizes the roof space.

The relatively short duration of wind squalls associated with thunderstorm activity means that the probability of windbourne debris from the other buildings is small. Therefore, in areas not likely to be affected by tropical cyclones it is reasonable to expect house windows to remain intact during a wind storm. The internal pressure in such cases is much

pressure coefficient is the arithmetic sum of the two coefficients. Table 3 summarizes total pressure coefficients for roofs, according to the provisions of AS 1170/2 - 1981.

3.1.4 Design wind speeds

Table 4 lists the basic wind speeds for a fifty year return period for the capital cities of Australia, together with the design wind speeds for 6 m height in terrain categories 1, 2 and 3.

TABLE 4

WIND SPEEDS FOR CAPITAL CITIES

City	Basic wind	Design Wind Speeds (m/s) at 6 m height for		
		Terrain	Terrain	Terrain

The draft clarifies an anomoly in the current code in respect of wind acting parallel to the length of the building. It allows progressive

TABLE 5

PRESSURE COEFFICIENTS FOR ROOFS
(from draft AS 1170/2 - 1983

Parameters (for $\theta = 0°$)	Roof pitch	Roof area code (see Figure 3)	Non cyclonic ($Cp_i = 0.2$)			Cyclonic ($Cp_i = 0.8$)		
			Cp for roof area at distance			Cp for roof area at distance		
			1h from end	2h from end	3h from end	1h from end	2h from end	3h from end
$h/d = 3/8$	10°	□	1.1	1.1	1.1	1.7	1.7	1.7
		▨	1.55	1.55	1.55	2.15	2.15	2.15
		▦	2.0	2.0	2.0	2.6	2.6	2.6
		□	1.1	0.7	0.6	1.7	1.3	1.2

represent typical cases. The single storey building is equivalent to a house 7 x 14 m with wall height 2.7 m above ground.

The table illustrates the influence of both transverse and longitudinal

W.A. Deutsher Pty Ltd
Jambro Pty Ltd
Mayne Industries
Sidney Cooke Fasteners Pty Ltd

7. REFERENCES

Holmes, J.D. (1978), Mean and Fluctuating Internal Pressures Induced by Wind. James Cook University, Wind Engineering Report 5/78.

TABLE A1

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 33 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see	Type of	Batten Spacing	Joint Type* for Rafter Spacing of (mm)

TABLE A2

SUITABLE TYPES OF GROOVED NAILS

TABLE A3

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 33 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200

TABLE A4

SUITABLE TYPES OF GROOVED NAILS

TABLE A5

SUITABLE TYPES OF GROOVED NAILS

TABLE A6

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 41 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	A	A	A
	metal tile	370	A	A	A	B
	sheet	600	A	A	B	B
	sheet	900	B	B	C	D
Cp = 0.95	sheet	1200	B	B	D	NS

TABLE A7

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 41 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm) 450	600	900	1200
	heavy tile	330	A	A	A	A
	metal tile	370	A	A	B	B
	sheet	600	A	B	B	C
	sheet	900	B	B	D	E
Cp = 1.1	sheet	1200	B	C	E	NS
	heavy tile	330	A	A	A	B
	metal tile	370	A	A	B	B
	sheet	600	B	B	C	E
	sheet	900	B	C	E	NS
Cp = 1.55	sheet	1200	C	E	NS	NS
	heavy tile	330	A	A	B	B
	metal tile	370	A	B	B	D
	sheet	600	B	B	E	NS

TABLE A8

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 41 m/s (see Table 4)

	Roof area	Type	Batten	Joint Type*

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 47 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm) 450	600	900	1200
	heavy tile	330	A	A	A	A
	metal tile	370	A	A	A	B
	sheet	600	A	A	B	B
	sheet	900	A	B	B	D
Cp = 0.7	sheet	1200	B	B	D	NS
	heavy tile	330	A	A	A	B
	metal tile	370	A	A	B	B
	sheet	600	A	B	B	D
	sheet	900	B	B	E	NS
Cp = 0.95	sheet	1200	B	D	NS	NS
	heavy tile	330	A	A	A	B

TABLE A10

SUITABLE TYPES OF GROOVED NAILS

(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 47 m/s (see Table 4)

TABLE A11

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 47 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	A	A	B
	metal tile	370	A	A	B	B
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE A12

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 47 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 2 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	A	B	B

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 52 m/s (see Table 4)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	A	A	A
	metal tile	370	A	A	A	B
	sheet	600	A	B	B	C
	sheet	900	B	B	D	E

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 52 m/s (see Table 4)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 52 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 52 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area	Type	Batten	Joint Type*

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 42 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 42 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 42 m/s (see Table 4)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 42 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	B	B	C
	metal tile	370	B	B	C	D
	sheet	600	B	C	E	NS
	sheet	900	D	E	NS	NS
Cp = 2.1	sheet	1200	E	NS	NS	NS

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 51 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm) 450	600	900	1200
	heavy tile	330	A	A	B	B
	metal tile	370	A	B	B	D
	sheet	600	B	B	E	NS
	sheet	900	C	E	NS	NS
Cp = 1.3	sheet	1200	E	NS	NS	NS
	heavy tile	330	A	B	B	C
	metal tile	370	B	B	C	E
	sheet	600	B	D	NS	NS
	sheet	900	D	NS	NS	NS
Cp = 1.55	sheet	1200	NS	NS	NS	NS

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 51 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

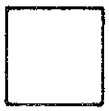
Roof area Code (see Fig. 2 or Fig. 3)	Type of Roofing	Batten Spacing (mm)	Joint Type* for Rafter Spacing of (mm)			
			450	600	900	1200
	heavy tile	330	A	B	B	C
	metal tile	370	B	B	C	E
	sheet	600	B	D	NS	NS

TABLE A 23

SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 51 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area	Type	Batten	Joint Type*

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 51 m/s (see Table 4)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 60 m/s (see Table 4)

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SUITABLE TYPES OF GROOVED NAILS

(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 60m/s (see Table 4)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 60 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see	Type of	Batten Spacing	Joint Type* for Rafter Spacing of (mm)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Roof area Code (see	Type of	Batten Spacing	Joint Type* for Rafter Spacing of (mm)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 65 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area Code (see	Type of	Batten Spacing	Joint Type* for Rafter Spacing of (mm)

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 65 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof pitch	Type	Batten	Joint Type*

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SUITABLE TYPES OF GROOVED NAILS
(two nails/batten into seasoned JD4 pine rafters)

Design Wind Speed = 65 m/s (see Table 4)
(For appropriate pressure coefficient, see Table 3 or Table 5)

Roof area	Type	Batten	Joint Type*