BULLETIN

BRANZ
THE RESOURCE CENTRE FOR BUILDING EXCELLENCE

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RECOMMENDED TIMBER CLADDING PROFILES

- Changes in the species and quality of timber available, coupled with research on the weatherproofing of buildings, has led to revision of recommended timber cladding profiles.
- The profiles recommended in this bulletin are designed to minimise the possibility of water penetration in exposed conditions when used in conjunction with underlays and wind barriers, as required by NZS 3604 *Timber framed buildings.*

1.0 SCOPE

1.0.1 This bulletin is aimed at all those who machine, supply or specify timber claddings.

1.0.2 It explains the factors which help resist water penetration in timber cladding systems and recommends weatherboard profiles which make the best use of these factors.

1.0.3 Profiles may be varied from those shown but dimensions marked as the minimum on the diagrams should be adhered to.

1.0.4 NZS 3617:1979 *Specification for profiles of weatherboards, fascia boards and flooring* gives profiles of some types of weatherboards. Research and experience has shown that changes can be made to these profiles to improve weathertightness.

1.0.5 NZS 3604 *Timber framed buildings* Section 11 has some requirements for overlap and spacing of some types of weatherboards. These are noted on the diagrams in this bulletin.

1.0.6 The profiles shown in this bulletin are for general guidance and are the optimum for all conditions and materials. All profiles, and particularly those for rusticated and shiplap boards, are a compromise between a number of factors such as material thickness, weathergroove size, coverage and cost. The fact that some profiles may allow water to penetrate in some exposed conditions is recognised by NZS 3604 Timber framed buildings which requires wind barriers in some circumstances (see NZS 3604 11.5.2.6).

1.0.7 Factors such as workmanship, the way the board is cut, underlay and fixings all have an important effect on the performance of the finished cladding.

2.0 LEAKS IN TIMBER WEATHERBOARDS

2.0.1 Several processes, acting alone or together, can cause water to penetrate through joints in claddings (see Figure 1).

2.1 Surface Tension

2.1.1 Surface tension causes water to cling to building surfaces. This tendency is stronger on rough or porous surfaces, such as the face of rough sawn timber. Surface tension causes water to remain attached to or creep across a surface, even the underside of a horizontal or slightly upwardly sloped surface.

2.2 Capillary Attraction

2.2.1 Capillary attraction causes water to rise upwards or creep sideways in cracks or gaps between surfaces which are less than 2 mm apart. It happens in joints which look as if they are tight.

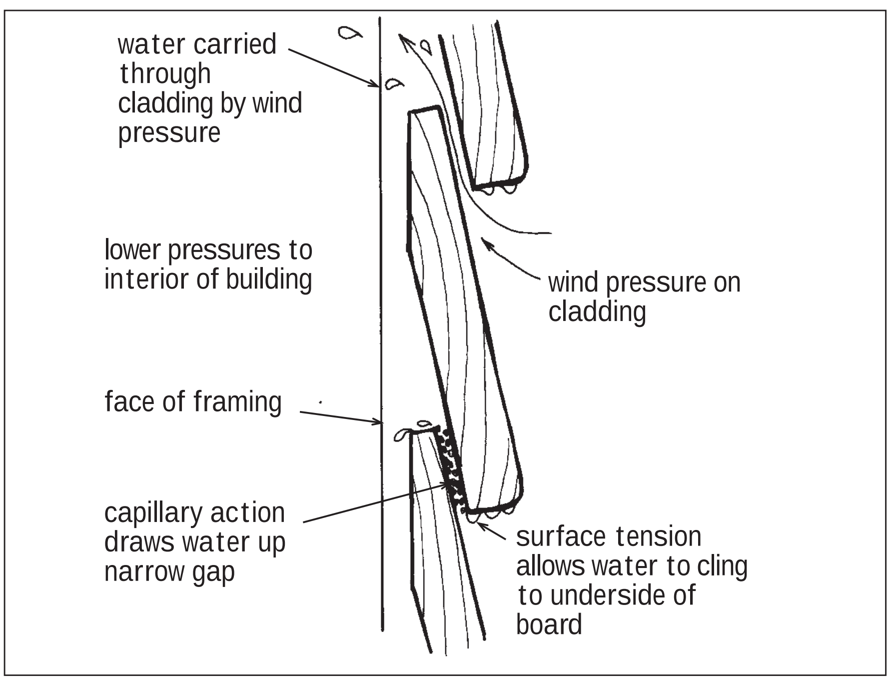

Figure 1. Surface tension, capillary action and wind pressure action on claddings.

2.3 Wind Pressure

2.3.1 Wind pressure blows water across surfaces and through gaps, especially if surface tension is holding the water to the surface or if capillary action is drawing water into an area where a wind pressure differential can force it through a gap.

2.3.2 Wind pressure can force water through gaps more than 2 mm wide even though capillary action is no longer active.

3.0 MINIMISING LEAKS

3.0.1 The chance of leaks in timber cladding occurring because of the factors described in Section 2.0 can be minimised by the following measures.

3.1 Surface Finish

3.1.1 Smooth surfaces will reduce the effects of surface tension. A dressed rather than a rough sawn surface will shed water more readily. Table 1 on page 4 shows the recommended size and placement of weathergrooves in different types of finishes. The table refers to the finish of the meeting surfaces, which may be dressed even if the main external surface is sawn, as can occur in rusticated boards.

3.2 Painting

3.2.1 Surface coatings such as paints and some stains and water repellents reduce the effects of both surface tension and capillary action. Coatings reduce the likelihood of droplets of water clinging to the surface of the cladding material. Capillary or wind action is then less likely to be able to force water through the cladding joint. This is one reason for priming or painting surfaces prior to placing two surfaces together. The surfaces of the weathergrooves should also be coated to be fully effective.

3.2.2 All sharp edges on the external face of the boards should be slightly rounded (the ideal is a 3 mm radius, although any rounding of the edge will be beneficial) to reduce the possibility of the paint cracking at this point (this does not include the edges of weathergrooves – see 4.1.1).

3.2.3 Care should be taken not to fill the weathergrooves with paint.

3.2.4 All four surfaces and all cut edges should be primed.

3.3 Weathergrooves

3.3.1 Research at BRANZ has shown that weathergrooves can be effective in reducing water entry provided they are:

- positioned correctly
- the correct size to suit the circumstances
- of the correct profile.

3.4 Wind Pressures

3.4.1 Air leakage in a cladding will force water through even very small gaps. A step or break in a surface, if less than 6 mm, will not prevent wind-driven water bridging the break. This water can then continue to flow across the surface of the material and into the structural fabric of a building.

3.4.2 Differential wind pressures between the cladding cavity and the outside can be reduced by fixing an airtight underlay, in the form of a building paper or other sheet material, behind the cladding

3.4.3 The underlay must be continuous behind the cladding and all gaps such as those around window reveals and services penetrations must be sealed.

3.4.4 The cladding profiles shown in this bulletin must be backed by an effective underlay or a wind barrier as defined by NZS 3604:1999 *Timber framed buildings.*

4.0 DESIGNING CLADDING PROFILES

4.0.1 The following factors have been considered in the design of the profiles in this bulletin.

4.1 The Shape of Weathergrooves

4.1.1 Edges of weathergrooves must be sharp, preferably with the vertical cut at 90^0 to the face of the member. Rounded edges should be avoided (see Figure 2A). In practice, this ideal may be modified for rebated profiles, such as rusticated and shiplap boards, to assist in strengthening the profile (see Figure 2B).

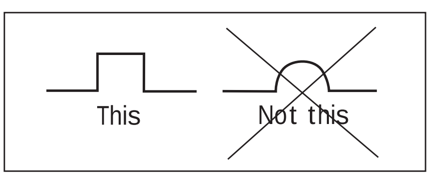

Figure 2. The correct shape of weathergrooves.

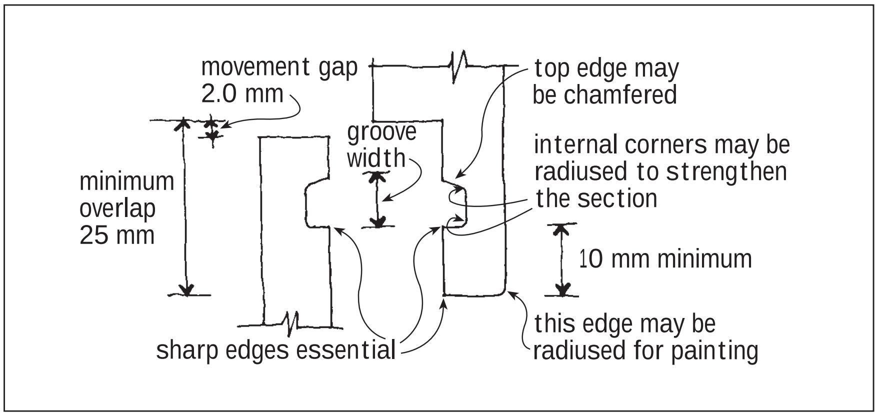

Figure 2B. Modified weathergroove shape for rusticated and shiplap weatherboards only.

4.2 Location of Weathergrooves

4.2.1 Weathergrooves should be located between overlapping cladding elements as far from the exposed edge of a joint as practicable, and preferably never less than 10 mm away. Closer than this, the weathergroove will not be as effective in preventing water penetration. This applies to both vertical and horizontal joints.

4.2.2 Where possible, weathergrooves must be provided to both faces of overlapping profiles. They must be aligned with each other to be fully effective. However, it is not always possible to cut weathergrooves into both surfaces of some profiles because the timber at the lap may be too thin.

Table 1. Summary of weathergroove applications, minimum sizing and placement (based on BRANZ research).

Use	Material Finish	Groove Placement	Groove No. & Size(1)
Horizontal weatherboards	rough sawn	30 mm up from lower edge	1 @ 9 mm x 9 mm
		30 mm up from lower edge	2 opposing @ 6 mm x 6 mm
	dressed	30 mm up from lower edge	2 opposing @ 4 mm x 4 mm
	dressed and primed	20 mm up from lower edge	1 @ 4 mm x 4 mm
		10 mm up from lower edge	2 opposing @ 4 mm x 4 mm
Battens Vertical board & batten Vertical shiplap cladding	rough sawn on rough sawn	10 mm in from edges	2 opposing @ 9 mm x 9 mm
	rough sawn on dressed	10 mm in from edges	2 opposing @ 9 mm x 9 mm
	dressed on dressed	10 mm in from edges	2 opposing @ 6 mm x 6 mm
	primed on primed	10 mm in from edges	2 opposing @ 4 mm x 4 mm
Note (1)	The sizes of weathergrooves recommended in this table are suitable only if an airtight wind barrier is present to prevent differential wind pressures through the cladding.		

4.3 Size of Weathergrooves

4.3.1 The profiles given in this bulletin are suitable for dressed and primed boards. For unprimed or rough sawn surfaces refer to Table 1, which is a summary of preferred weathergroove applications, sizes and placement.

4.4 Allowance for Movement

4.4.1 If kiln-dried weatherboards are fixed in place in dry weather they will absorb moisture and expand in width when the atmospheric humidity rises. If they have been butted tightly against one another there will be no room for the expansion to take place and they will tend to cup and split. This can occur in profiles such as rusticated boards and rebated bevel-back boards but not in bevel-back boards which can slide across one another. A 2 mm gap is allowed for expansion between the boards.

4.4.2 To ensure that the minimum gap is provided a gauge mark can be machined into the face of the board as a guide to the fixer (this is optional). Other methods include using a purpose-made gauge or a packer such as a 2 mm diameter galvanised nail.

4.5 Weathergrooves in Vertical Joints

4.5.1 Weathergrooves in vertical boards or board and batten systems should be at least 10 mm in from the edge of each member to be effective (and a maximum of 12 mm to be in accordance with NZBC E2/AS1), and sized according to Table 1. The batten should lap the board by at least 30 mm (see Figure 9).

4.5.2 Weathergrooves cut in rough sawn timber battens fixed over rough sawn boards will not stop wind-blown water from penetrating the joints unless the surfaces are painted or otherwise sealed. When using rough sawn boards and battens the battens should be dressed on the back face to make them more effective.

4.5.3 The best solution is dressed profiles with matching weathergrooves in both faces. In thin or easily split timber the thickness of the weatherboard at the laps should be increased, to reduce the chance of splitting.

4.6 The Size of the Overlap

4.6.1 The dimension of the overlap of the boards has an important influence on their ability to resist penetration by wind-driven water. Basically the larger the overlap the better it resists penetration.

4.6.2 NZS 3604 *Timber framed buildings* specifies minimum overlaps for some types of profiles. These minimum requirements are noted on the diagrams in this bulletin.

5.0 RECOMMENDED PROFILES FOR WEATHERBOARDS

5.0.1 Warp-control grooves are not shown on the back of the profiles recommended in this bulletin. It is the responsibility of manufacturers to include those grooves they consider necessary to prevent warping and cupping of their board material.

5.0.2 Using the principles set out in the previous sections, the following standard sections (shown here at half full size) are recommended:

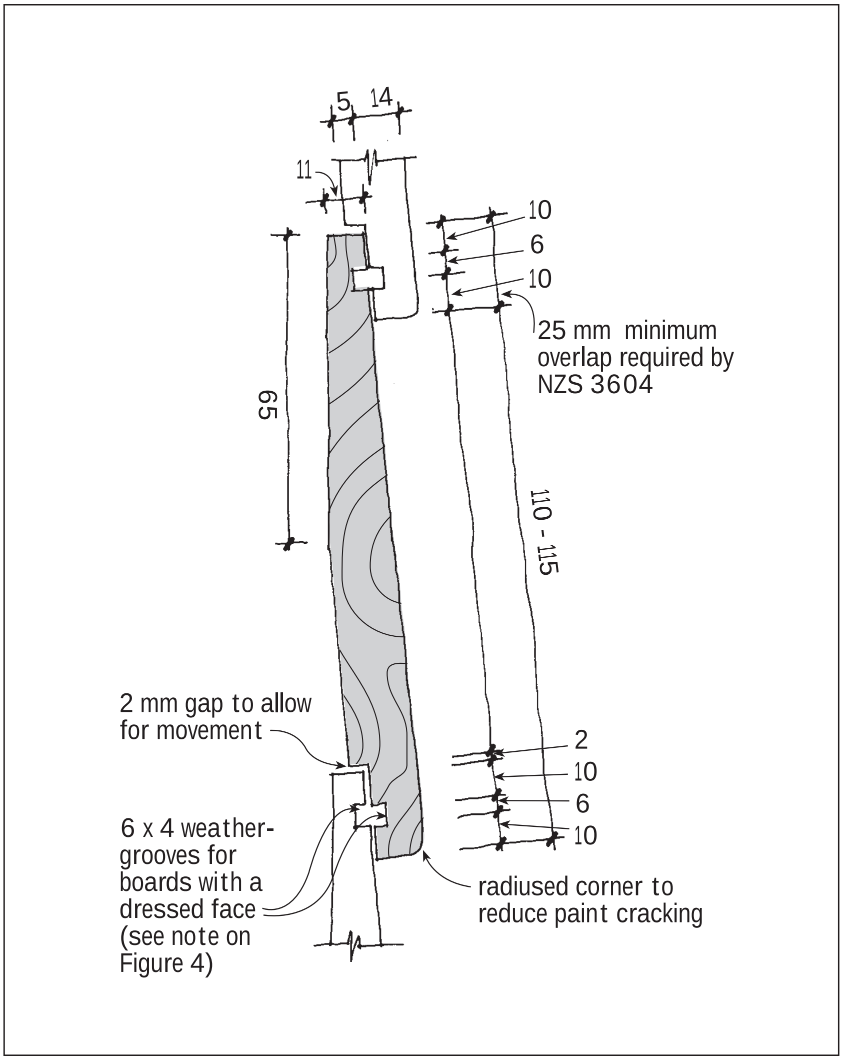

Figure 3. Ex 150 x 25 mm rebated bevel-back weatherboards.

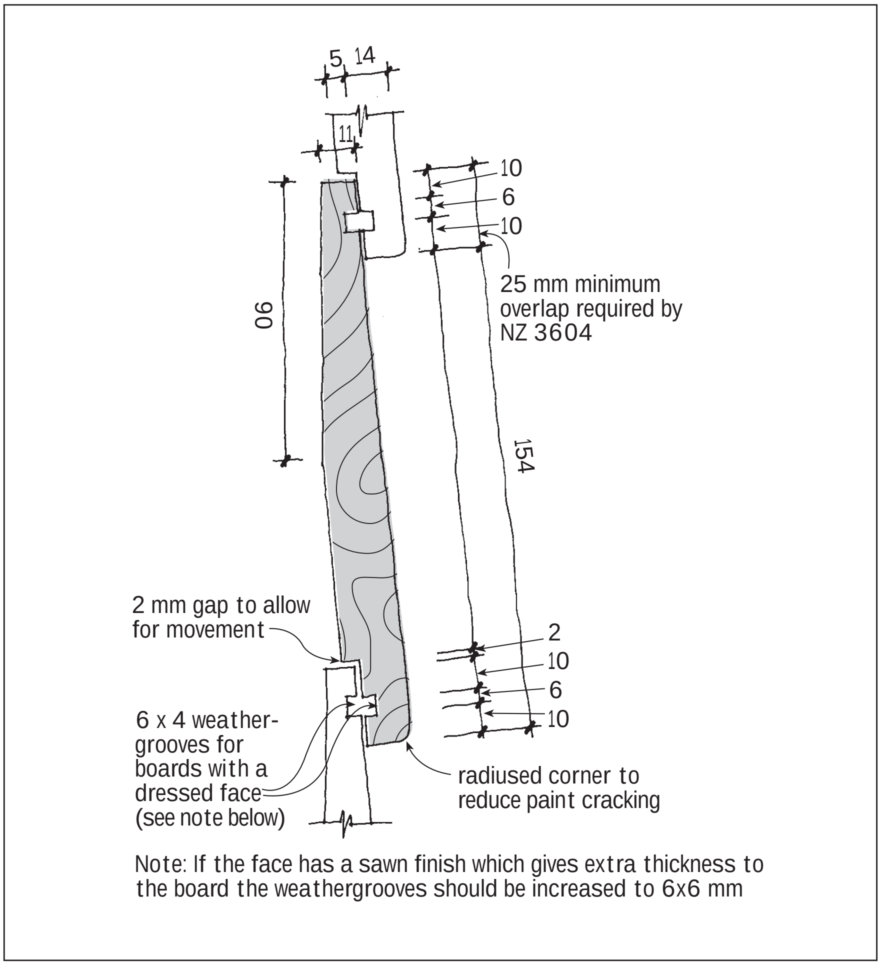

Figure 4. Ex 200 x 25 mm rebated bevel-back weatherboards.

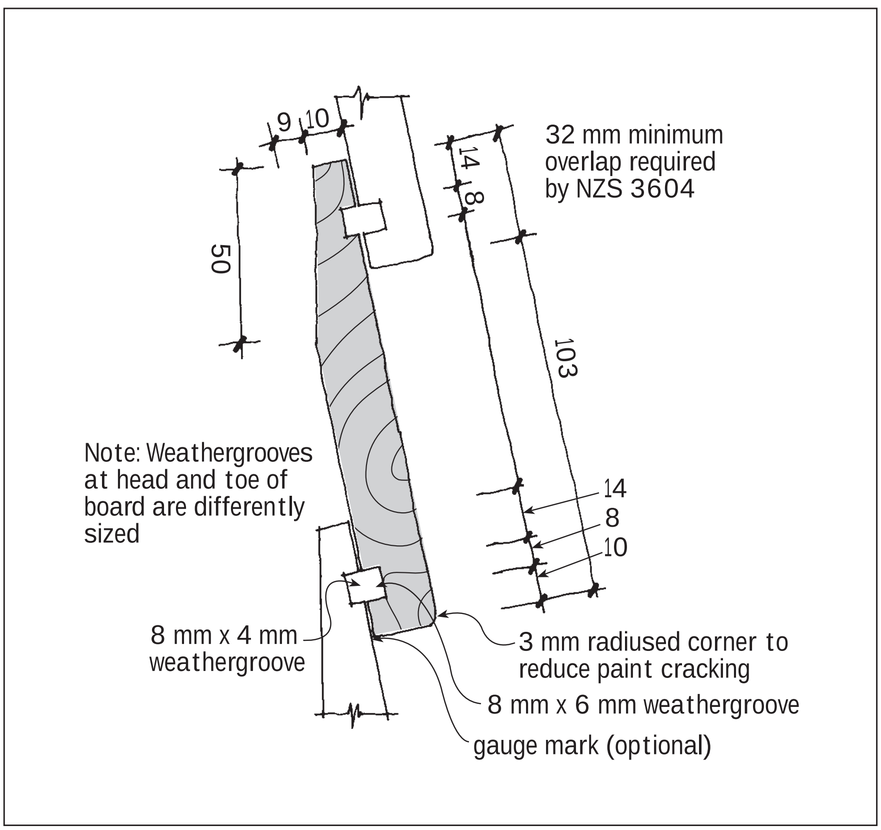

Figure 5. Ex 150 x 25 mm bevel-back weatherboards.

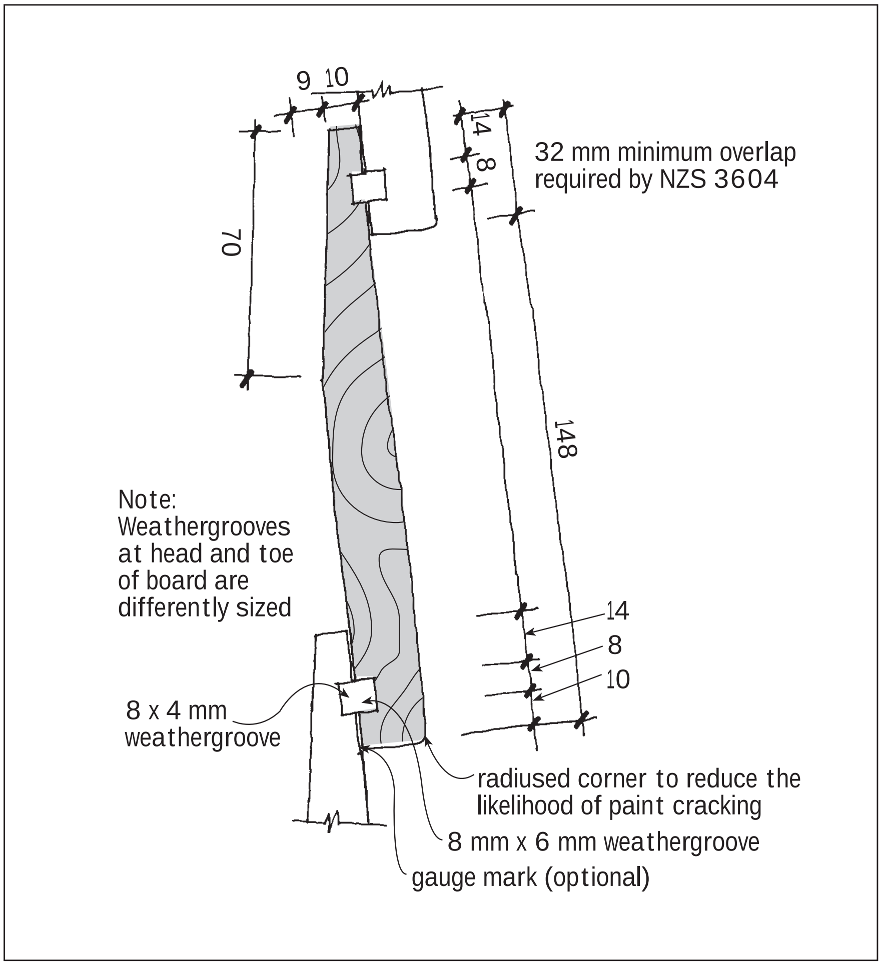

Figure 6. Ex 200 x 25 mm bevel-back weatherboards.

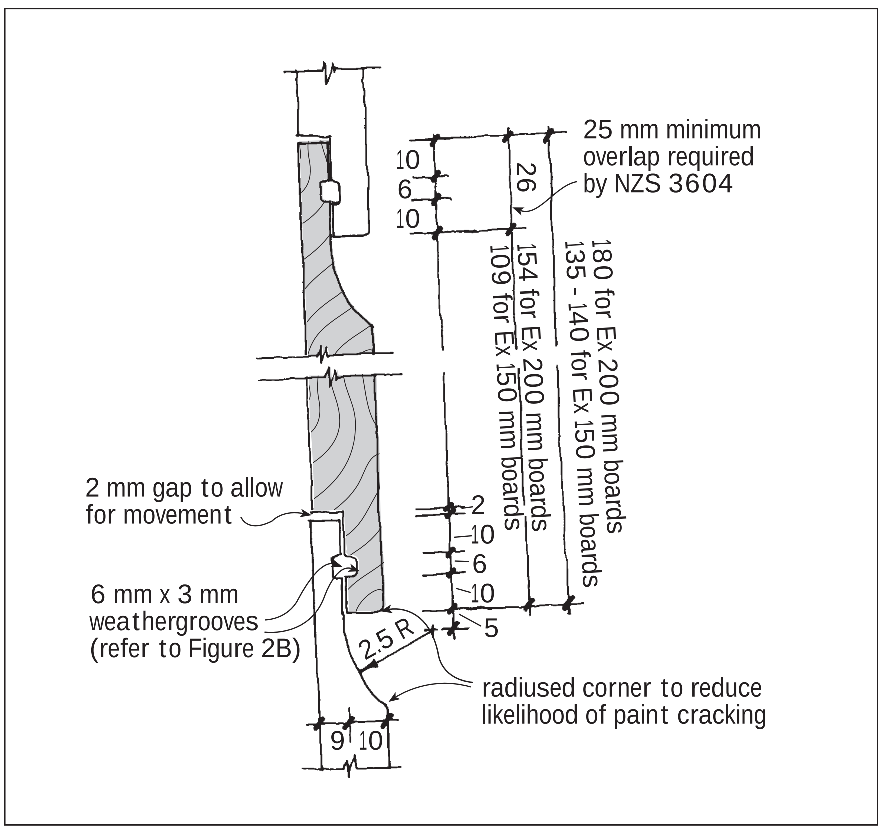

Figure 7. Ex 200 x 25 and 150 x 25 mm rusticated weatherboards.

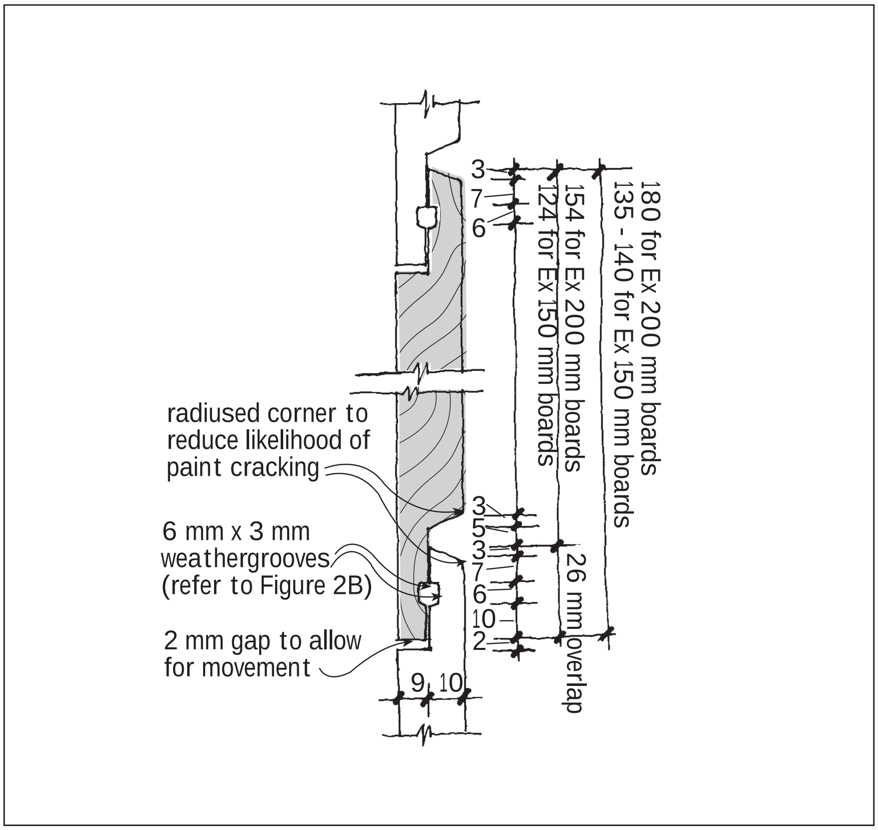

Figure 8. Ex 200 x 25 and 150 x 25 mm vertical shiplap weatherboards.

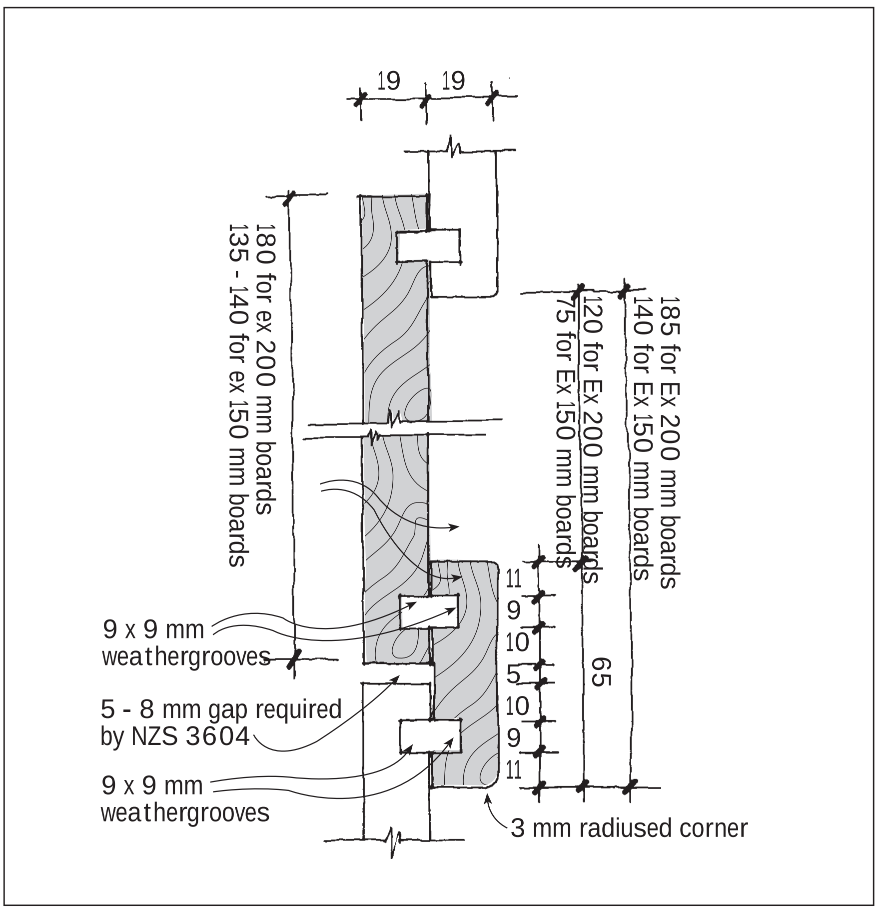

Figure 9. Ex 200 x 25 and 150 x 25 mm vertical board and batten.

6.0 CODES AND STANDARDS

Building Industry Authority, Wellington
New Zealand Building Code Handbook and Approved Documents

Standards New Zealand, Wellington.
NZS 3617:1979 Specification for profiles of weatherboards, fascia boards and flooring
NZS 3604:1999 Timber framed buildings.

7.0 FURTHER READING

BRANZ Bulletins
315 Wood Primers
343 Moisture in Timber
361 Weathergrooves
373 Specifying Timber

BRANZ Publications
Good Timber Cladding Practice
Good Exterior Coating Practice
Selecting Timber

8.0 CREDITS

BRANZ acknowledges the input to this bulletin in the form of critical comment from:
Clair Benge: Building Industry Authority
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MISSION

To be the leading resource for the
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HEAD OFFICE AND RESEARCH STATION

Moonshine Road, Judgeford
Postal Address - Private Bag 50908, Porirua City, New Zealand.
Telephone - (04) 235-7600, FAX - (04) 235-6070
http://www.branz.org.nz

NEW ZEALAND REGIONAL OFFICES

AUCKLAND
Telephone - (09) 303-4902
Fax - (09) 303-4903
The Building Technology Centre
Victoria Park, 17 Drake Street
Auckland
PO Box 90-524
Auckland Mail Centre

CHRISTCHURCH
Telephone - (03) 366-3435
Fax - (03) 366-8552
GRE Building
79-83 Hereford Street
PO Box 496

AUSTRALIAN OFFICE

SYDNEY
Telephone - (00612) 8339-1881
Fax - (00612) 8339-1884
Unit 32, 56 O'Riordan Street, Alexandria NSW 2015, Australia.
PO Box 323, Mascot, NSW 1460

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