PAB09

LYSAGHT PRODUCT ADVISORY BULLETIN

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DESIGN PRELIMINARIES

PERMALITE® ALUMINIUM CLADDING PRODUCTS

Aluminium is a long lasting, durable, lightweight alternative to other cladding materials particularly in corrosive environments. Aluminium provides high thermal insulation and minimal maintenance to remain corrosion-free. It is easier to transport and erect because it is significantly lighter than many alternate cladding materials.

Aluminium's formability, high strength-to-weight ratio, corrosion resistance, and ease of recycling make it the ideal material for a wide range of building applications. It is almost uniquely suited for projects in harsh industrial and marine environments.

The outstanding benefit of PERMALITE® Aluminium Cladding Products is their long-term durability in aggressive environments.

PRODUCT SELECTION

WALLS

When you design PERMALITE® aluminium cladding into your building you have a range of profiles from which to choose. Whilst cladding obviously needs to keep out the weather, it also has significant effects on the looks, cost and durability of a building.

ROOFS

There are many factors in designing roofs including:

- the shape: is the roof to be 'flat' or pitched or curved?
- the supporting structure and support spacing;
- the wind forces that the roof must sustain;
- the pitch which affects the looks, the profile's ability to efficiently carry rain to the gutters, and fixing details;
- thermal expansion of long sheets;
- the attributes of other materials used in the roof design.

This bulletin doesn't attempt to cover the structural design details of supports or aesthetics: there are many other texts and Australian Standards that cover these areas.

The appropriate design will depend on your particular needs and circumstances. You should get advice from the relevant specialists where required.

For more detailed information regarding the content of this Bulletin refer to "PERMALITE® - Aluminium Roofing Solutions" available at: www.permalite.com.au

MATERIALS

All PERMALITE® aluminium roofing profiles and flashings are produced from marine grade aluminium alloy entirely. No coatings or claddings are required to enhance performance or economy; you don't have to consider coating thickness.

Due to this PERMALITE® aluminium sheeting is deemed to comply with Table 3.5.1a Acceptable Corrosion Protection for Sheet Roofing under Note 6 of the Building Code of Australia.

The quality of the paint systems used on PERMALITE® aluminium roofing products is an additional bonus to the durability of the sheet itself.

LT7®, ALSPAN®, WAVELINE® and V-RIB® are manufactured entirely from aluminium alloy 5251 or 5052 produced by Lysaght to AS/NZS 1734. Alloy 5251/5052 are high strength marine grade alloys with specifically formulated to provide exceptional resistance to corrosion in marine or industrial environments.

FINISHES AND PAINT SYSTEMS

The profiles are available in three finishes:

- Mill Finish – an unpainted smooth lustrous finish which will dull relatively quickly and enhances corrosion resistance.
- Stucco Finish – stucco embossed mill finish, which reduces the specular reflectance of mill finish sheet.
- Painted Finish – a range of quality painted finishes are available as detailed below.

PERMALITE® roof and wall sheet may be supplied as single-sided or double-sided coated systems.

POLYESTERS

The new generation of BlueScope polyester paints have outstanding colour and gloss retention characteristics. This, coupled with their resistance to scratching during transportation and installation; make these paints suitable for the majority of severe marine and industrial environments.

FLUOROCARBONS

In certain applications and colours, fluorocarbon paints may offer improved colour and gloss retention levels over polyester paints. However fluorocarbon paints have a lower scratch resistance and as such are more susceptible to damage during transportation and installation.

COLOUR RANGE

The PERMALITE® cladding colour range consists of 7 colours as outlined at www.permalite.com.au. Additionally, most standard COLORBOND® steel colours based on minimum order quantities of 3.0 tonne. Other colours available on application with minimum order quantities and extended lead times.

TIMBER AND METAL COMPATIBILITY

Under no circumstances should galvanised steel, ZINCALUME® steel, lead, copper, brass, or copper alloys be placed in contact with aluminium, nor should you permit water run off from these materials to discharge onto aluminium sheets.

Care must be taken to avoid contact with building materials such as unseasoned or chemically treated timber, lime cement, concrete, mortar or plaster during construction and to provide impermeable barriers against long term contact.

In most situations the face of a dissimilar timber support, against which the sheeting is fastened, must be painted with chromate based primers/bituminous paint or in the case of metal purlins / battens or supports, a good quality (and appropriate width i.e. support width + 20mm) adhesive PVC or polyethylene tape with a minimum thickness of 250microns.

Under severe marine and/or aggressive industrial environments Denso tape or closed cell polyethylene tape should be used to completely fill the sheet/structure interface to avoid moisture retention by capillary action. Permalite will provide advice in such situations.

WIND FORCES ON ROOFS

Winds create considerable forces on both the topside and the underside of roof cladding, and you must consider these forces in the design and fixing of any roof. The forces are:

- inward forces tending to collapse the roof cladding inwards, caused by wind acting directly on the windward side; and
- outward forces tending to lift the roof cladding from its framing, and the entire roof structure from the rest of the building. Outward forces can be caused both by uplift from negative wind pressures, outside the building; and by positive wind pressure inside the building.

Generally the greatest wind forces imposed on roofs are due to the outward forces. Because the dead weight of roofing materials is relatively small, the outward forces must be resisted by the roof fasteners.

It is very important that the battens and roof framing are adequately fixed to the rafters and walls, and that under extreme conditions the wall framing is anchored to the footings. Special anchoring provisions may apply in cyclonic areas. Specialist advice should be sought in these circumstances.

All PERMALITE® sheeting has been tested in accordance with AS 4040.1, AS 4040.2 and AS 4040.3.

THERMAL EXPANSION

Although aluminium has twice the coefficient of expansion of steel, (24 x 10-6 compared to 12 x 10-6 °C) the effect of this is often over estimated.

Usually aluminium cladding is fixed to a steel structure, which, under the same thermal influence, expands or contracts also.

The combination of these factors results in a low relative expansion between the aluminium cladding and the steel structure. It has been observed in practice that the theoretical expansion of an aluminium roof, relative to the steel structure on which it is fixed, is reduced by up to 50%.

Note: As an approximation, aluminium expands 1.2mm/m over 50° temperature change.

The PERMALITE® Positive Fix System (Figure 1) provides for thermal expansion of the roofing sheet by "hard" fixing at the top of the sheet slope with "expansion" fixing being used to accommodate expansion towards the lower end of the sheet slope.

COMBUSTIBILITY

PERMALITE® aluminium claddings have been tested to AS/NZS 1530.3 with the following combustibility results:

Ignitability Index: 0

Spread of Flame Index: 0

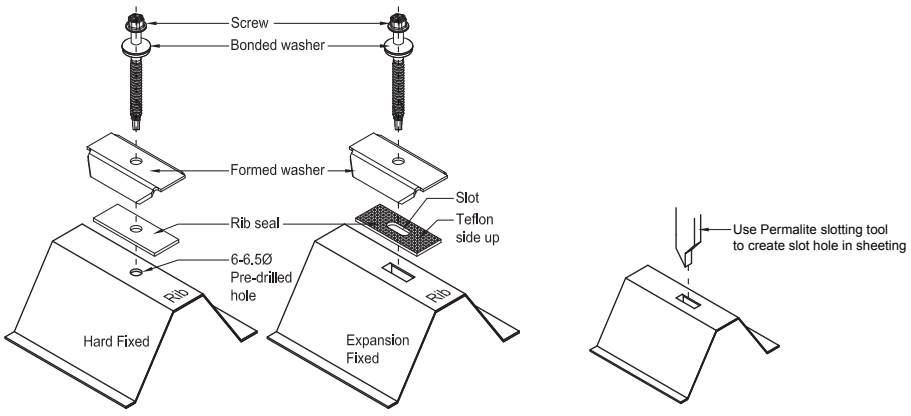
Heat Evolved Index: 0

Smoke Developed Index: 2

And as such, complies with clause C1.12 of the Building Code of Australia as a non-combustible material.

Refer to "PERMALITE® - Aluminium Roofing Solutions" Section 9.0 Certification of Non Combustibility.

Figure 1:
PERMALITE® Positive Fix fastening system.



ENVIRONMENTAL CONDITIONS

Aluminium products are generally specified for severe environmental conditions including industrial, agricultural, marine, intensive animal farming, swimming pools or other aggressive conditions. To get the best performance from our products in these conditions, or other unusually corrosive environments, seek advice from our technical representatives.

See Figure 2 for comparative warranty details.

MAXIMUM LENGTHS OF ROOFING

The valleys (or pans) of roofing have to carry water to the gutters.

If in heavy rain, the valleys overfill, water can flow into the roof through the side-laps and flashings.

Factors affecting waterproof and drainage capacity of the laps of a profile include:

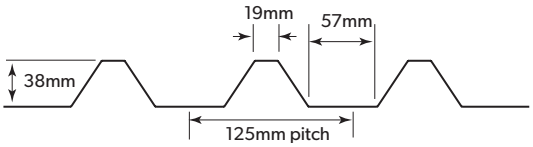
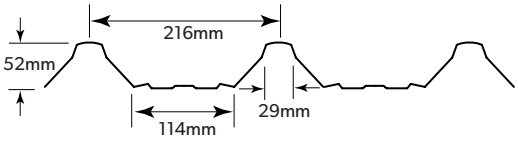
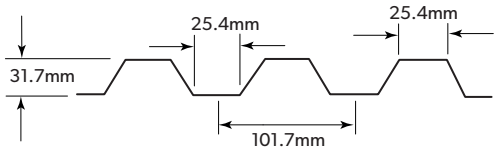
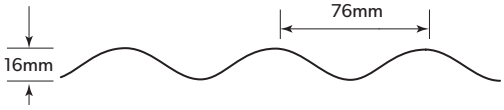
- the width and depth of the valleys or pans;
- the pitch of the roof—rain flows faster on a steeper pitch;
- rainfall intensity for the geographical area;
- the length of the roof from ridge to gutter; and
- penetrations that cause nearby valleys to carry extra rain diverted from valleys obstructed by the penetration

The maximum recommended roof lengths for drainage for each profile are detailed in "PERMALITE® - Aluminium Roofing Solutions" available at www.permalite.com.au

SPECIFICATIONS - ROOFING

Table 1.1

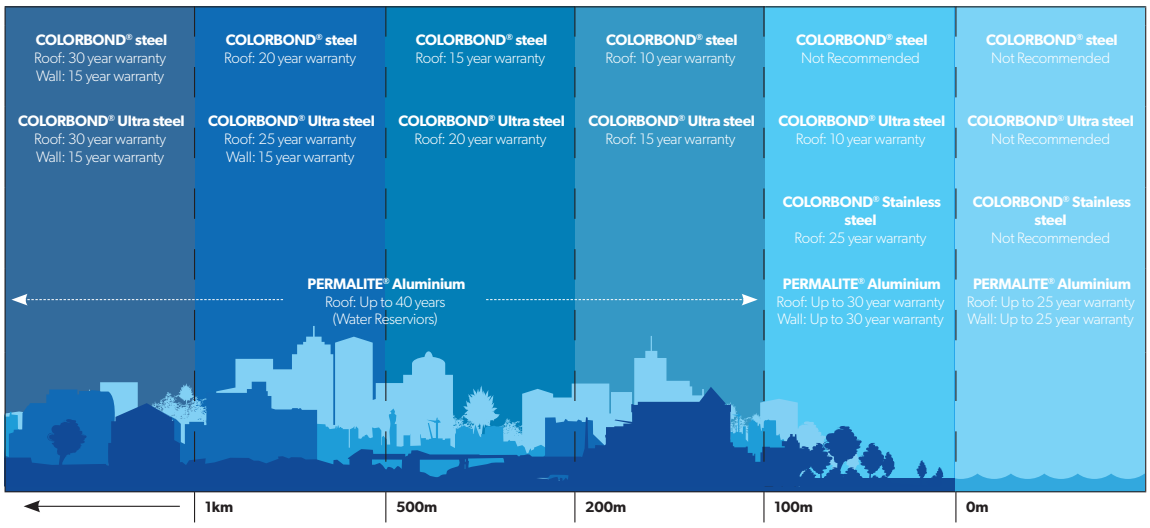
Specifications of roofing & walling profiles.

	BMT	Cover Width	Rib Depth	Mass [1]	Roof Pitch Minimum
LT7®	mm	mm	mm	kg/m²	Degrees
	0.70	875	38	2.645	1°
	0.90	875	38	3.401	1°
	1.20	875	38	4.534	1°
ALSPAN™	0.70	864	52	2.679	1°
	0.90	864	52	3.444	1°
	1.20	864	52	4.592	1°
V-RIB®	0.70	915	31.7	2.529	3°
	0.90	915	31.7	3.252	3°
	1.20	915	31.7	4.336	3°
WAVELINE®	0.70	762	16	2.340	5°
	0.70	990	16	2.338	5°
	0.90	762	16	3.009	5°
	0.90	990	16	3.006	5°

[1] Masses are for unpainted mill finish PERMALITE® aluminium, unless otherwise marked (*). * which are indicative masses only.
The information in this table is for general guidance only. For more detailed information refer to the manual "PERMALITE® - Aluminium Roofing Solutions" available at www.permalite.com.au

Figure 2:

Comparative warranty* for BlueScope products



*Subject to application. Conditions apply. Visit lysaght.com

PRODUCT DESCRIPTIONS

All descriptions, specifications, illustrations, drawings, data, dimensions, and weights contained in this publication and websites containing information from Lysaght are approximations only. They are intended by Lysaght to be a general description for information and identification purposes and do not create a sale by description. Lysaght reserves the right at any time to:

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b) Alter specifications shown in its publications and websites to reflect changes made after the date of publication.

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This publication is intended to be an aid for all trades and professionals involved with specifying and installing LYSAGHT® products and not be a substitute for professional judgement.

Terms and conditions of sale are available at lysaght.com/terms

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AUSTRALIAN STANDARDS

Australian Standard	Definition
AS/NZS 1530.3:1999	Methods for fire tests on building materials, components and structures Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release (Reconfirmed 2016)
AS/NZS 1734:1997	Aluminium and aluminium alloys - Flat sheet, coiled sheet and plate (Reconfirmed 2020)
AS 4040.1-1992 (Reconfirmed 2016)	Methods of testing sheet roof and wall cladding - Method 1: Resistance to concentrated loads
AS 4040.2-1992 (Reconfirmed 2016, Amendment 1:2018)	Methods of testing sheet roof and wall cladding, Part 2: Resistance to wind pressures for non-cyclone regions
AS 4040.3 :2018	Methods of testing sheet roof and wall cladding, Method 3: Resistance to wind pressures for cyclone regions

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FOR YOUR NEAREST SUPPLIER VISIT:

LYSAGHT.COM

FOR SALES ENQUIRIES CALL 13 30 38
FOR TECHNICAL ENQUIRIES CALL 1800 641 417