

# DESIGN PRELIMINARIES

## PRODUCT SELECTION

When you design steel cladding into your building you have a wide range of profiles from which to choose. Whilst roofing and walling obviously have to keep out the weather, they also have significant effects on the looks, cost and durability of a building.

If you are unsure about any product feature, visit [www.lysaght.com](http://www.lysaght.com), call our information line or seek advice from the relevant specialists.

### WALLS

The design of walling from a steel perspective is fairly straightforward. Once you have made the aesthetic decision of which profile to use, the main considerations are the support spacings, fixing details and the details of flashing.

### 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 them. The aesthetic aspects of steel roofing and walling, and its installation, have particular characteristics and you should get advice from relevant specialists where required.

This bulletin gives tables of recommended support spacings and the maximum roof length for pitch and rainfall intensity for LYSAGHT® steel roofing products.

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

## MATERIALS AND FINISHES

Our most widely used cladding profiles are listed in Tables 1.1 and 1.2. They are available in COLORBOND® pre-painted steel, or in unpainted ZINCALUME® magnesium/aluminium/zinc alloy-coated steel.

### MATERIAL SPECIFICATIONS

- Next generation ZINCALUME® aluminium/zinc/magnesium alloy coated steel complies with AS 1397 G550, AM125 (550 MPa minimum yield stress, 125g/m<sup>2</sup> minimum coating mass).
- COLORBOND® pre-painted steel for exterior roofing and walling. The painting complies with AS/NZS 2728 and the steel base is an aluminium/zinc/magnesium alloy-coated steel complying with AS 1397. Minimum yield strengths are G550 (550 MPa), or G300 (300 MPa) depending on profile. Minimum coating mass is AM125 (125g/m<sup>2</sup>).
- COLORBOND® Metallic pre-painted steel for superior aesthetic qualities displaying a metallic sheen.
- COLORBOND® Ultra pre-painted steel for severe coastal or industrial environments (generally within about 100m - 200m of the source). The painting complies with AS/NZS 2728 and the steel base is an aluminium/zinc alloy-coated steel complying with AS 1397. Minimum yield strength is G550 (550 MPa). Minimum coating mass is AM150 (150g/m<sup>2</sup>).
- SUPERDURA® Stainless steel is a pre-painted stainless steel for severe coastal or industrial environments. The painting complies with AS/NZS 2728 and the steel

base is a stainless steel complying with AISI/ASTM Type 430; UNS No. S43000.

Check with your local LYSAGHT® office for availability of profiles, materials, finishes, colours, accessories; and for suitability of the product.

Tables 1.1 and 1.2 list general information for profile selection. Refer to our publications on specific products for detailed specifications. There are also publications on ZINCALUME® steel and COLORBOND® pre-painted steel from our information line.

## SUPPORT SPACING AND OVERHANG

The maximum recommended support spacings for end and internal spans are shown in Tables 1.1 and 1.2. For roofs the maximum recommended support spacing is based on data in accordance with AS 1562.1 Design and installation of sheet roof and wall cladding: Metal, and AS 4040.1 Methods of testing sheet roof and wall cladding—Resistance to concentrated loads.

The roof spacings in the tables are recommended to produce adequate performance of claddings under concentrated loading (incidental for maintenance).

For support spacings in wind conditions, refer to Lysaght publications on specific products for wind pressure data.

The overhang is the projection of the sheet past a support.

The minimum overhang must consider:

- The minimum recommended end distance of the cladding's fastener / clip.
- The industries requirement for projection of the cladding into a gutter (box, valley or eaves).

The maximum overhang is shown in Table 1.1 and 1.2.

For roofs the maximum overhang is a guide and is based on a nominal incidental load applied adjacent to the free edge. All roof overhangs should be treated as a non-trafficable area. When a roof overhang exceeds the guide then added care should be considered with respect to providing stiffening or support to minimise the potential of damage from accidental loading.

In all cases, cladding is fixed to a support of 1.0mm minimum base metal thickness (BMT) and minimum yield stress of G550. If you want to use metal battens thinner than 1.0mm, seek advice from our information line.

## MAXIMUM LENGTHS OF ROOFING

The valleys (or pans) of roofing have to carry water to the gutters. In heavy rain, the valleys overflow, 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 (refer to the LYSAGHT® Roofing & Walling Installation Manual - Table 2.14.1).

The maximum recommended roof lengths for drainage for each profile are given in the LYSAGHT® Roofing & Walling Installation Manual - Table 2.14.1.

## LOW ROOF PITCHES

Unless there is adequate positive fall in a roof, there is danger of ponding, which can lead to a reduced service life, or reduced rainwater capacity. Reduced service life is of particular importance in more severe environment.

At low slopes, say around 2° or less slope, all roof supports must be in the one plane because slight variations can result in zero or negative fall. This may occur during construction, or even after completion of the building as the result of construction tolerances/practices, settlement, timber warping or shrinking, or extra loadings (like air conditioners) or suspended services.

Minimum recommended roof slopes are listed in Table 1.1. As a guide, wherever possible, you should design for a minimum slope of 1 in 30 (2°).

Roof slopes lower than the recommended minimum may be available subject to enquiry and will be dependent upon the roof application and building details. Lower roof slopes may require additional provisions to be adhered to. Please call your nearest service centre for advice.

## 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.

## CODES AND PERFORMANCE TESTS

AS 1562.1 specifies the design and installation of sheet metal roof and wall cladding. LYSAGHT® roofing profiles satisfy all the requirements of this standard, including the ability of the roof to resist outward forces and concentrated loads. The testing is performed according to AS 4040.

Metal roofing products must comply with the performance specifications, and be checked by stringent tests, in accordance with the standard. Such tests have been carried out on all our claddings and the results have been used in the preparation of the fixing and installation recommendations in this manual.

## ENVIRONMENTAL CONDITIONS

Coated steel products can be damaged by some environmental conditions including industrial, agricultural, marine, intensive animal farming, swimming pools or other aggressive conditions.

If any of our products are to be used in these conditions, or unusually corrosive environments, seek advice from our information line.

Keep the product dry and clear of the ground. If stacked or bundled product becomes wet for extended periods, separate it, wipe it with a clean cloth and stack it to dry thoroughly.

## TRANSPORTATION

Because our roofing and walling is manufactured by continuous processes, sheet lengths can be supplied up to the limits of transport regulations, which vary from state to state.

KLIP-LOK 700 HI-STRENGTH® cladding is available in extra long lengths via an on-site mobile rollformer. This service is available nationally, subject to enquiry.

## PAINT AND COLORBOND® STEEL

The pre-painted finish of COLORBOND® steel can be damaged by some handling, installation or maintenance activities. If damage occurs to the COLORBOND® pre-painted finish, refer to Technical Bulletin TB-2, published by BlueScope.






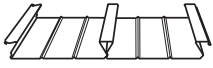




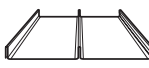



Replacement of severely damaged COLORBOND® steel should consider that the replacement sheet may not match perfectly due to the possible long term fading of the installed sheets exposed to weathering.

You may overpaint whole roofs and paint accessories to match specific colours. The overpaint guidelines are also discussed in Technical Bulletin TB-2, published by BlueScope.

# SPECIFICATIONS - ROOFING

**Table 1.1**

Specifications of roofing & walling profiles.

	BMT	Mass <sup>(1)</sup>	Cover Width	Rib Depth	Roof Pitch Minimum <sup>(2)</sup>	Maximum recommended spacing of supports <sup>(7)</sup>											
						ROOFS			Eaves Overhang <sup>(3)</sup>		WALLS						
						Single	End	Internal	Unstiffened	Stiffened	Single	End	Internal	Overhang			
	mm	kg/m <sup>2</sup>	mm	mm	Degrees	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
CUSTOM ORB®	0.42	4.23	762	16	5 (1 in 12)	700	900	1200	200	300	1800	2500	2700	200			
	0.48	4.81	762	16	5 (1 in 12)	800	1300	1700	250	350	1800	2700	2700	250			
CUSTOM BLUE ORB®	0.60	6.1	762	17	5 (1 in 12)	1600	1600	1800	200	300	2400	3000	3300	200			
	0.80	8.0	762	17	5 (1 in 12)	1800	1800	2600	400	600	2400	3200	3600	400			
CUSTOM ORB ACCENT 21®	0.40	4.4*	762	21	3 (1 in 20)	750	950	1350	150	400	1800	2400	2400	150			
	0.48	5.2*	762	21	3 (1 in 20)	950	1500	1900	200	450	1800	2700	2700	200			
CUSTOM ORB ACCENT 35®	0.48	5.5*	724	35	2 (1 in 30)	1300	1600	2400	200	600	2100	2700	2700	200			
																	
FLATDEK® <sup>(5)</sup>	0.42	6.04	250	45	2 (1 in 30)	2000	2600	3000	-	-	-	-	-	-	-	-	-
																	
FLATDEK® II <sup>(4)</sup>	0.42	5.20	620	45	2 (1 in 30)	2400	2800	3200	-	-	-	-	-	-	-	-	-
																	
INTEGRITY® 820	0.42	4.56	820	48	2 (1 in 30) <sup>(6)</sup>	2100	2300	2800	150	300	2600	3400	3600	150			
	0.48	5.19	820	48	1 (1 in 50)	2500	2550	3050	200	350	2700	3600	3600	200			
KLIP-LOK® 406	0.48	5.56	406	41	1 (1 in 50)	1500	1800	2100	200	600	-	-	-	-			
																	
KLIP-LOK 700 HI-STRENGTH®	0.42	4.61	700	43	2 (1 in 30) <sup>(6)</sup>	1650	1750	2200	150	450	2600	3200	3850	150			
	0.48	5.24	700	43	1 (1 in 50)	2050	2350	2800	200	500	3000	3450	3900	200			
	0.60	6.51	700	43	1 (1 in 50)	2350	3000	3600	250	550	3300	3600	3900	250			
KLIP-LOK CLASSIC® 700	0.42	4.61	700	41	2 (1 in 30) <sup>(6)</sup>	-	1800	2200	200	500	-	2150	3250	300			
	0.48	5.24	700	41	1 (1 in 50)	1800	2000	2500	150	450	-	2700	2700	450			
LONGLINE 305® (Not Tapered)	0.70	9.64	305	48	1 (1 in 50)	1800	2000	2500	150	450	-	2700	2700	450			
																	
SPANDEK®	0.42	4.61	700	24	3 (1 in 50) <sup>(5)</sup>	1300	1800	2400	300	600	2500	3000	3300	300			
	0.48	5.24	700	24	3 (1 in 50) <sup>(5)</sup>	2000	2200	3000	400	700	3000	3000	3300	400			
SPANRIB®	0.42	4.56	820	48	2 (1 in 30) <sup>(6)</sup>	2100	2300	2800	150	300	2600	3400	3600	150			
	0.48	5.19	820	48	1 (1 in 50)	2500	2550	3050	200	350	2700	3600	3600	200			
TRIMDEK®	0.42	4.23	762	29	2 (1 in 30)	1100	1300	1900	150	300	2400	3000	3000	150			
	0.48	4.81	762	29	2 (1 in 30)	1600	1850	2600	200	350	2700	3000	3000	200			

<sup>(1)</sup> Masses are for unpainted ZINCALUME® steel, unless otherwise marked (\*). \* which are indicative masses only.

<sup>(2)</sup> See Section 2.5, LYSAGHT® Roofing & Walling Installation Manual.

<sup>(3)</sup> See Section 10.6, LYSAGHT® Roofing & Walling Installation Manual for explanation of 'stiffened'.

<sup>(4)</sup> FLATDEK® & FLATDEK® II are Home Improvement profiles.

<sup>(5)</sup> Slope of 2° (1 in 30) is below the minimum recommended however is available subject to enquiry. Please refer to Section 2.5, LYSAGHT® Roofing & Walling Installation Manual.

<sup>(6)</sup> Slope of 1° (1 in 50) is below the minimum recommended however is available subject to enquiry. Please refer to Section 2.5, LYSAGHT® Roofing & Walling Installation Manual.

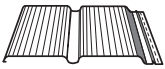
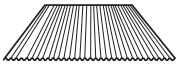




<sup>(7)</sup> See Section 2.3, LYSAGHT® Roofing & Walling Installation Manual.

LYSAGHT® Roofing & Walling Installation Manual available at [www.lysaght.com/installation/roofing-and-walling](http://www.lysaght.com/installation/roofing-and-walling)

# SPECIFICATIONS - WALLING

**Table 1.2**

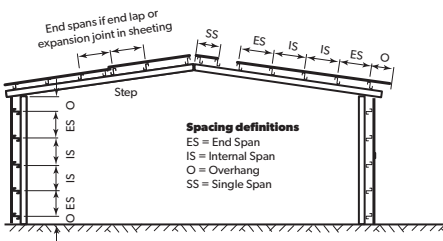
Specifications of profiles for walling only.

	BMT	Mass <sup>(1)</sup>	Cover Width	Rib Depth	Maximum recommended spacing of supports <sup>(2)</sup>			
					Single	End	Internal	Overhang
	mm	kg/m <sup>2</sup>	mm	mm	mm	mm	mm	mm
EASYCLAD® 	0.42	4.46	300	19	-	1500	1500	100
MINI ORB® 	0.42	3.93	820	6	1200	1500	1500	100
MULTICLAD® 	0.35	3.23	840	12	1400	1800	1800	150
	0.42	3.84	840	12	1700	1800	1800	150
PANELRIB® 	0.35	3.19	850	4	1100	1200	1200	150
	0.42	3.80	850	4	1200	1200	1200	150
TRIMWALL® 	0.35	3.56	762	29	2100	2900	3000	150
WALLCLAD® 	0.35	3.56	762	16	1800	2400	2400	150

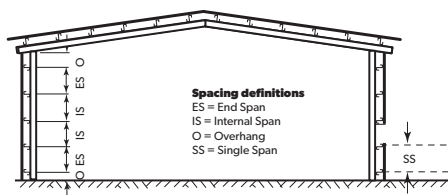
<sup>(1)</sup> Masses are for unpainted ZINCALUME® steel.

<sup>(2)</sup> See Section 2.3, LYSAGHT® Roofing & Walling Installation Manual.

## Roofing & Walling Profiles



## Walling Profiles Only



## AUSTRALIAN STANDARDS

Australian Standard	Definition
AS 1397:2021	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS/NZS 2728:2013	Prefinished/ pre-painted sheet metal products for interior/ exterior building applications – Performance requirements
AS 1562.1:2018	Design and installation of sheet roof and wall cladding – Part 1: metal
AS 4040.1-1992 (Reconfirmed 2016)	Methods of testing sheet roof and wall cladding - Method 1: Resistance to concentrated loads

FOR DETAILED PRODUCT INFORMATION, MANUALS AND PROJECT CASE STUDIES VISIT:

[WWW.LYSAGHT.COM](http://WWW.LYSAGHT.COM)

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