

# DESIGN PRELIMINARIES

## ZENITH™ ROOFING & WALLING RANGE

### 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® ZENITH™ 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

The profiles available in Lysaght's ZENITH™ roofing and walling range 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 1397:2011 G300, AM125 (300 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 2728:2013 and the steel base is an aluminium/zinc/magnesium alloy-coated steel complying with AS 1397:2011. Minimum yield strength, or is G300 (300 MPa). 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).

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 1562.1:1992 Design and installation of sheet roof and wall cladding: Metal, and AS 4040.1:1992 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 0.55mm minimum base metal thickness (BMT) and minimum yield stress of G550. If you want to use metal battens thinner than 0.55mm, seek advice from our information line.

## MAXIMUM LENGTHS OF ROOFING

The valleys (or pans) of roofing have to carry water to the gutters. If 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 (Figure 4.1 of LTBO4 - Maximum Roof Lengths for Drainage).

The maximum recommended roof lengths for drainage for each ZENITH™ profile are given in ZENITH® Roofing & Walling Design and Installation Manual - Maximum Roof Lengths for Drainage.

## 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 1562.1:1992 specifies the design and installation of sheet metal roof and wall cladding. LYSAGHT® ZENITH™ 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.

## 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 generally be supplied up to the limits of transport regulations, which vary from state to state.

## 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.

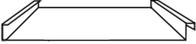
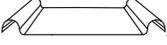
Replacement of severely damaged COLORBOND® steel should consider that the replacement sheet may not match perfectly due to the possible long term fading of the installed sheets exposed to weathering.

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>(3)</sup>											
						ROOFS			Eaves Overhang		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
 LONGLINE 305® (Not Tapered)	0.70	9.70	305	48	1 (1 in 50)	1800	2000	2500	150	450	2000	2700	2700	450			
 ENSEAM™	0.55	6.91	265	38	3	600	600	600	50	-	900	900	1200	100			
	0.75	9.09	265	38	3	700	700	700	50	-	1000	1000	1300	100			
	0.55	5.92	465	38	3	Must be fixed on ply with screw fixing at 450mm c/c			50	-	450	450	450	100			
	0.75	6.88	465	38	3	Must be fixed on ply with screw fixing at 450mm c/c			50	-	550	550	550	100			
 IMPERIAL™	0.55	5.48	325	27	1 (or 3 for end lapped)	For all span type: Fixed clip at 350 at roof edge. Sliding clip at 700 at general area <sup>(4)</sup>			50	-	For all span type: Fixed clip at 350 at wall edge. Sliding clip at 700 at wall area <sup>(4)</sup>		100				
	0.75	7.42	325	27	1 (or 3 for end lapped)	For all span type: Fixed clip at 450 at roof edge. Sliding clip at 800 at general area			50	-	For all span type: Fixed clip at 450 at wall edge. Sliding clip at 800 at wall area <sup>(4)</sup>		100				
	0.55	5.09	525	27	1 (or 3 for end lapped)	Not suitable for roofing applications											
	0.75	6.89	525	27	1 (or 3 for end lapped)	Not suitable for roofing applications											
 BAROQUE™	0.55	6.65	275	25	5	LYSAGHT BAROQUE™ cladding must be fixed to Ply at max 600mm c/c only for wind region A and terrain category 3 for higher wind regions, check with your Lysaght representative					LYSAGHT BAROQUE™ cladding must be fixed to Ply at max 600mm c/c only for wind region A and terrain category 3 for higher wind regions, check with your Lysaght representative						
	0.75	8.76	275	25	5												
	0.55	5.79	475	25	5												
	0.75	7.61	475	25	5												

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

<sup>(2)</sup> See Section 2.8, ZENITH™ Roofing & Walling Design and Installation Manual.

<sup>(3)</sup> See Section 2.5, ZENITH™ Roofing & Walling Design and Installation Manual.

<sup>(4)</sup> For installation on steel batten support, only the fixed clip can be used. These should be used at nominated centers at building edges and all other areas as denoted at Figure 12.2.1 and 12.2.2 in the ZENITH™ Roofing & Walling Design and Installation Manual.

# SPECIFICATIONS - WALLING

**Table 1.2**

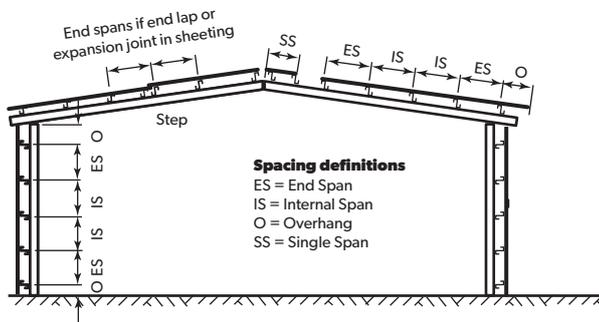
Specifications of profiles for **walling only**.

	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
 DOMINION™	0.55	5.88	285	25	1200	1200	1500	100
	0.75	7.43	285	25	1300	1200	1500	100
	0.55	5.31	485	25	900	900	1200	100
	0.75	6.71	485	25	1000	1000	1300	100

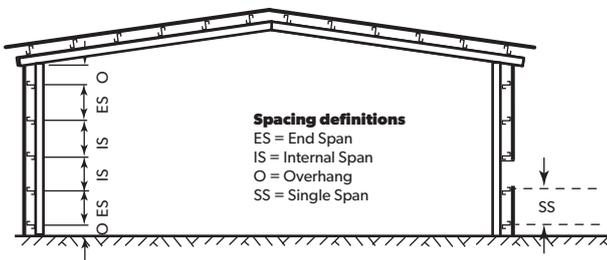
<sup>(1)</sup> Masses are for unpainted ZINCALUME® steel.

<sup>(2)</sup> See Section 2.5, ZENITH™ Roofing & Walling Design and Installation Manual.

## Roofing & Walling Profiles



## Walling Profiles Only



## PRODUCT DESCRIPTIONS

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