

# LYSAGHT® KLIP-LOK® 406



Structural Solutions



Roofing & Walling Solutions



House Framing Solutions

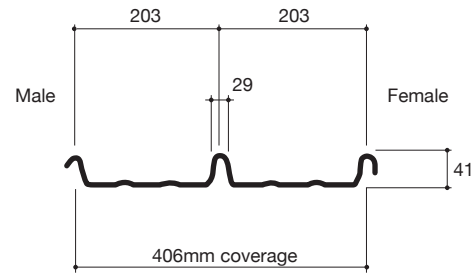


## PRODUCT DESCRIPTION

LYSAGHT® KLIP-LOK® 406 profile is a strong, durable, versatile and long length roofing and walling profile. It is designed to have a locked-action rib for positive concealed clip fixing. Its smart fluted pans, locked-action rib design and concealed fastening allow multiple effective usage on applications such as low-pitched roofs, vertical as well

as horizontal ribbed walling.

LYSAGHT® KLIP-LOK® 406 profile has an effective cover width of 406mm and a rib height of 41mm. It is roll-formed from genuine High Tensile ZINCALUME® G550 steel and is available in a range of COLORBOND® steel proprietary paint systems and colours.



## PRODUCT APPLICATIONS

The profile can be used for any roof and wall cladding, fascia and soffit. It is designed to perform at a minimum recommended roof pitch of 2° (1 in 29), vertical and horizontal ribbed walling.

## PRODUCT FEATURES & BENEFITS

### 1. CONCEALED FIXING

Fixing clips can effectively secure LYSAGHT® KLIP-LOK® 406 steel cladding to steel or timber supports without puncturing the sheet. Fastening screws are not visible because of its positive concealed clip fixing, thereby achieving smooth, clean lines in architectural design.

### 2. RAINWATER DRAINAGE AND WATERPROOF SYSTEM

LYSAGHT® KLIP-LOK® 406 profile provides a lightweight but extremely strong waterproof cladding system. Its wide fluted pans and high ribbed design disperses rainwater quickly and efficiently to the outer perimeters of the roof. Thus, LYSAGHT® KLIP-LOK® 406 steel cladding is an excellent choice for severe rainfall intensity areas in Asia.

### 3. ALL WEATHER PERFORMANCE

LYSAGHT® KLIP-LOK® 406 steel profile has exceptional strength even though it is light weight. It has excellent wind resistance too. Its first class resistance against corrosion, discolouration and tropical dirt staining, while requiring no or minimal maintenance, makes it the best all-weather performer.

### 4. SIMPLE & LOW-COST FIXING

Long, straight lengths of LYSAGHT® KLIP-LOK® 406 profile can be laid in place and easily aligned. Fixing with our clips is simpler and faster than ever before. The smaller number of clips for a given area provides extra economy. LYSAGHT® KLIP-LOK® 406 profile is available in long lengths, therefore in most jobs, you can have one sheet from ridge to gutter without end laps.

### 5. PROVEN BY TEST RESULTS

The steel profile is tested and proven by NATA registered laboratory at Lysaght Technology Centre and CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Australia.

### 6. OTHER BENEFITS

- Conforms to International Building Codes and Standards
- Manufactured under strict processes governed by ISO9001 Quality Management System and ISO14001 Environmental Management System.
- Genuine material warranty (terms & conditions apply)
- Genuine Product Certification



## PHYSICAL PROPERTIES

	STANDARD	NON-STANDARD*
<b>Base Metal Thickness in mm (BMT)</b>	0.48mm	0.60mm
<b>Total Coated Thickness in mm (TCT)</b>	0.53mm	0.65mm
<b>Effective Cover Width</b>	406mm	406mm
<b>Rib Depth</b>	41mm	41mm
<b>Minimum Recommended Roof Pitch / Slope</b>		
Sheet length without end lap	2° (1 in 29)	
Sheet length with end lap	3° (1 in 20)	
<b>Grade of Steel (mPa)</b>	G550 ZINCALUME® steel (550N/mm <sup>2</sup> yield strength)	
<b>Tolerances</b>	Length +0, -15mm Width ± 2mm	
<b>Packing</b>	In strapped bundles of 1 tonne maximum mass	
<b>Custom Cut Lengths</b>	Any measurement to a maximum transportable length	
<b>Coating Class</b>	AZ150	
<b>Finishes</b>	ZINCALUME® steel	
	COLORBOND® steel	
	Clean COLORBOND® ULTRA steel	
	Clean COLORBOND® XPD steel	
	Clean COLORBOND® XPD Pearlescent steel	

Mass	Mass per unit area (kg/m <sup>2</sup> )		Mass per unit length (kg/m)		Coverage (m <sup>2</sup> /tonne)	
	Standard	Non Standard	Standard	Non Standard	Standard	Non Standard
ZINCALUME®	5.606	6.947	2.276	2.821	178.370	143.939
COLORBOND® Clean COLORBOND® XPD Clean COLORBOND® XPD Pearlescent	5.692	7.033	2.311	2.855	175.693	142.191
Clean COLORBOND® ULTRA	5.763	7.104	2.340	2.884	173.523	140.766

Note: For Non-Standard orders, a minimum order quantity and delivery lead time is applicable. Please refer to our sales representative or customer services officers for more information.

## DESIGN CRITERIA

### SUPPORT SPACING FOR NON-CYCLONIC AREAS

The maximum support spacing shown in Table 1 are based on testing carried out in accordance with AS1562-1992, "Design and Installation of Sheet Roof and Wall Cladding -

Part 1: Metal" and AS4040.1-1992 "Methods of Testing Sheet Roof and Cladding Method 1: Resistance to Concentrated Loads". These roof support spacings are the maximum recommended for adequate performance of the roof cladding under foot traffic loading.

The maximum wall spacing are based on wind

pressure calculation refer to AS 1170.2:2011. The pressure considered is based on buildings up to 10m high in Region B, Terrain Category 3,  $M_s = 0.85$ ,  $M_i = 1.0$  with the assumption of  $C_{pi} = +0.20$ ,  $C_{pe} = -0.65$ ,  $K_f = 2.0$ .

Spacing may be reduced by the Serviceability and Strength Limit States for the particular project under consideration.

TABLE 1: LYSAGHT® KLIP-LOK® 406 Maximum Allowable Support Spacing - Non-Cyclonic Areas

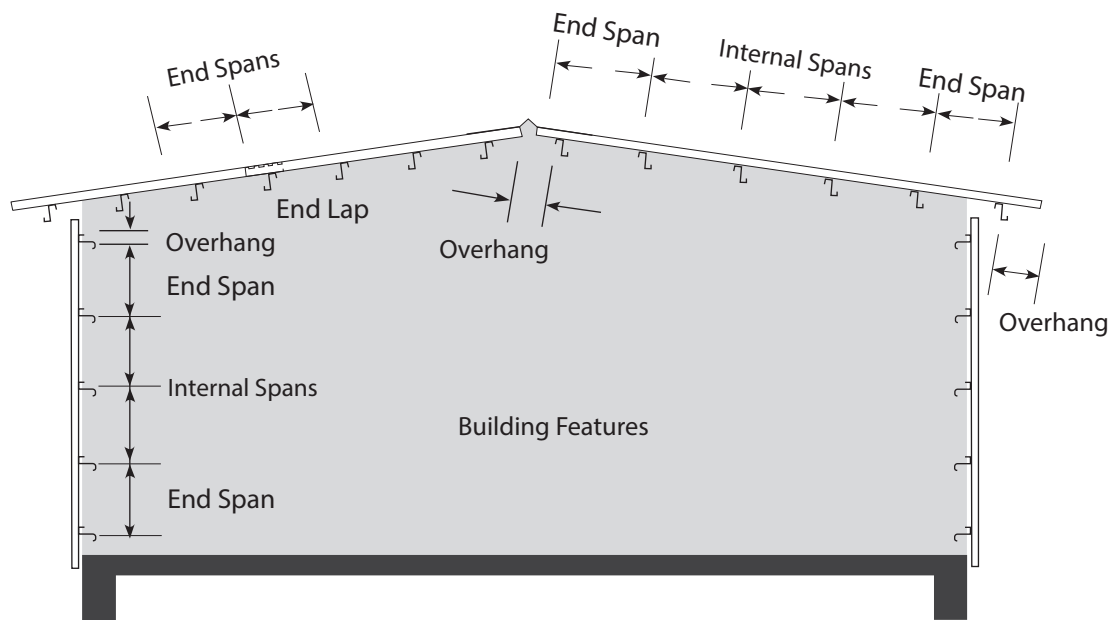
	STANDARD (0.53mm TCT)	NON-STANDARD # (0.65mm TCT)
<b>ROOF</b>		
Single Span	1700mm	2000mm
End Span	2000mm	2300mm*
Internal Span	2300mm	2700mm*
Unstiffened Overhang +	200mm	300mm
<b>WALL</b>		
Single Span	2300mm	2500mm
End Span	2400mm	3000mm
Internal Span	2400mm	3000mm
Overhang +	400mm	600mm

Note: When thick insulation material is not carried over the purlin or when the material is used with independent top hat, the spanning capabilities may be stretched. Advice may be given on a case-by-case basis. Please refer to BlueScope Lysaght Singapore's sales representative.

\* When used in conjunction with heat insulation materials such as fibreglass blanket, the maximum support spacing should not exceed 2300mm.

+ Overhang is not meant for human traffic.

# Non-standard orders are subject to minimum order quantity and delivery lead time.



## LIMIT STATE WIND PRESSURES FOR NON-CYCLONIC AREAS

The wind pressure capacities are based on tests conducted at NATA registered testing laboratory at Lysaght Technology in Chester Hill, Sydney, Australia. Testing was conducted in accordance with AS1562.1 - 1992, 'Design and Installation of Sheet Roof and Wall Cladding', and AS4040.2 - 1992, 'Resistance to Wind Pressure for Non-Cyclonic Regions'.

The table for wind pressure capacities below provides pressure versus span graphs for Serviceability and Strength Limit State Design. Serviceability Limit State is based on a deflection limit of :  $(\text{span}/120) + (P/30)$ , where P is the maximum fastener pitch.

The pressure capacities for Strength Limit State have been determined by testing the cladding to failure (ultimate capacity). These

pressures are applicable when the cladding is fixed to minimum material thickness of 1.0mm. To obtain the design capacity of the sheeting, a capacity reduction factor of 0.90 should be applied.

A non-cyclonic area is defined as one in which a tropical cyclone is unlikely to occur in accordance with AS1170.2 - 1989, "SAA Loading Code, Part 2: Wind Loads".

TABLE 2: LYSAGHT® KLIP-LOK® 406 Wind Capacities (kPa) - Limit State Format (Non-Cyclonic)

<b>[A] Standard (Based Metal Thickness = 0.48mm)</b>											
Type of Span	Limit State	Span (mm)									
		900	1200	1500	1800	2100	2400	2700	3000	3300	3600
Single	Serviceability	2.69	2.38	2.07	1.78	1.49	1.20	0.92	0.64	-	-
	Strength	4.90	4.80	4.55	4.20	3.65	3.05	2.35	1.70	-	-
End	Serviceability	2.41	2.17	1.96	1.77	1.61	1.46	1.32	1.18	1.02	0.84
	Strength	4.00	3.85	3.70	3.40	3.00	2.60	2.20	1.85	1.60	1.40
Internal	Serviceability	2.82	2.76	2.66	2.53	2.37	2.19	1.98	1.75	1.51	1.27
	Strength	4.60	3.95	3.40	2.95	2.60	2.30	2.05	1.85	1.65	1.50

<b>[B] Non-Standard* (Based Metal Thickness = 0.60mm)</b>											
Type of Span	Limit State	Span (mm)									
		900	1200	1500	1800	2100	2400	2700	3000	3300	3600
Single	Serviceability	4.82	4.12	3.47	2.88	2.34	1.83	1.34	0.87	-	-
	Strength	8.80	7.60	6.55	5.60	4.75	4.00	3.25	2.60	-	-
End	Serviceability	4.57	4.27	3.94	3.54	3.11	2.66	2.21	1.80	1.44	1.14
	Strength	6.50	5.20	4.10	3.30	2.85	2.60	2.40	2.25	2.00	1.65
Internal	Serviceability	5.05	4.71	4.36	4.00	3.62	3.25	2.86	2.47	2.07	1.67
	Strength	7.40	6.40	5.50	4.75	4.15	3.60	3.10	2.90	2.30	1.85

\* For Non-Standard orders, a minimum order quantity and delivery lead time is applicable. Please refer to our sales representative or customer service officers for more information.

\*\* Any support spacing greater than the recommended data as shown in the maximum support spacing table, no foot-traffic load is allowed.

## RAINWATER RUN-OFF FOR LYSAGHT® KLIP-LOK® 406

The drainage or run-off capacity of roof sheeting is another limitation on the total length of sheet run that must be considered in roof design and construction. As a guide, Table 3 lists the maximum recommended length of roof run for LYSAGHT® KLIP-LOK® 406 profile at

the roof slopes and rainfall intensities. These are based on CSIRO Australia (Commonwealth Scientific and Industrial Research Organisation) and BlueScope Lysaght's calculation of the behaviour of LYSAGHT® roofing profiles under peak rainfall conditions.

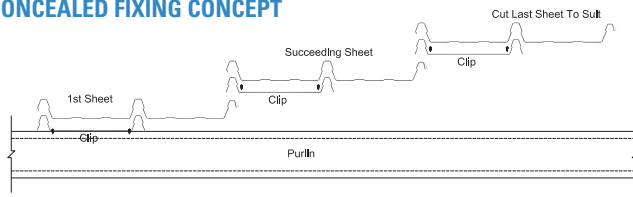
The roof run is the total length of roof sheeting draining rainwater in one direction including any end laps, expansion joints or steps that may be present in the roof.

TABLE 3: LYSAGHT® KLIP-LOK® 406 - Maximum Roof Run (in metres) for Roof Slopes and Rainfall Intensities

Rainfall Intensity (mm/hour)	Roof of Pitch / Slope				
	1 in 29 (2°)	1 in 20 (3°)	1 in 12 (5°)	1 in 7.5 (7.5°)	1 in 6 (10°)
250	187	219	273	325	374
300	156	183	227	271	311
400	117	137	170	203	234
500	93	110	136	163	187

# FASTENING METHOD & TYPE OF FASTENERS

## THE CONCEALED FIXING CONCEPT



\*Note: Two fasteners required per clip.

## Identification of Fastener

The format of the number code is:

**10 - 24 x 16**

Screw gauge (Thread outside diameter)

Thread pitch (Thread per pitch)

Overall Length of screw measured from under the head (mm)

## RECOMMENDED FASTENERS

	Steel Supports		Timber Supports	
	Thickness	Grade	Hardwood	Softwood
Directly to support	Up to 4.5mm	Exceeds 4.5mm	No. 10 - 12 x 25mm wafer-head type 17 self drilling wood screw; 3.75mm x 50mm flat-head spiral threaded nail (on special orders)	No. 10 - 12 x 46mm wafer-head type 17 self drilling wood screw
	No. 10 - 24 x 16mm wafer-head self drilling and tapping screw	Teks 5 No. 12 - 24 x 32mm wafer-head self drilling and tapping screw		
Over Insulation blanket	Increase to 22mm or longer screw if required	Same as above	Increase to > 25mm or longer screw if required; 3.75mm x 50mm flat-head spiral threaded nail (on special orders)	Same as above

\*Note : Recommended fasteners should conform to Class 3 AS3566 Standard."

## NOISE & HEAT CONTROL

### [A] REDUCTION OF RAIN NOISE

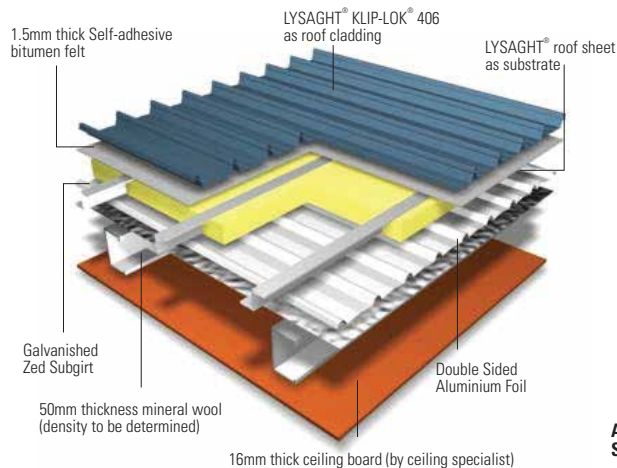
To further reduce noise created by rainfall on metal roof, an insulation mineral wool blanket can be placed in between two metal roof cladding in BlueScope Lysaght's Acoustic Roof System. As long as the insulation blanket is held tightly against the underside of the roof sheeting, this will dampen the rain induced vibration at the point of impact and a marked noise reduction would be achieved.

Otherwise, noise will only be reduced by transmission loss through the mineral wool blanket in a standard roof system.

BlueScope Lysaght's Acoustic Roof System has been rated and approved by PSB Corporation (testing group). The system was last tested on 10 October 2002 and proven to meet requirements of Sound Transmission Class 51 (STC 51). The test was conducted in accordance with ASTM E90 - 97.

### [B] HEAT CONTROL

The effective method to control heat is to lay reflective foil laminate over the supports before laying the sheeting or insulation blanket. The insulation blanket over the foil laminate in conjunction with vapour barrier allows condensation control. An insulation blanket is often provided to improve heat insulation to the overall system.



**Acoustic Roof System (STC51)**

# SUGGESTED SPECIFICATIONS FOR EXTREME ENVIRONMENTS

## [A] MODERATE MARINE ENVIRONMENT

Suggested Specifications for LYSAGHT® KLIP-LOK® 406	
Total Coated Thickness (TCT)	0.53mm TCT
BlueScope Steel Proprietary Pre-painted Steel System	COLORBOND® steel or Clean COLORBOND® XPD steel* or Clean COLORBOND® XPD Pearlescent steel*
Steel Grade	G550 (Minimum yield strength of 550 mPa)
Minimum Coating Mass of ZINCALUME® steel	AZ150 (150g/m <sup>2</sup> )

## [B] SEVERE MARINE ENVIRONMENT

Suggested Specifications for LYSAGHT® KLIP-LOK® 406	
Total Coated Thickness (TCT)	0.54mm TCT
BlueScope Steel Proprietary Pre-painted Steel System	Clean COLORBOND® ULTRA steel
Steel Grade	G550 (Minimum yield strength of 550 mPa)
Minimum Coating Mass of ZINCALUME® steel	AZ200 (200g/m <sup>2</sup> )

\*Note: Minimum order quantity is required. Please contact our Sales Representative or Customer Service for more information.

# SIMPLE INSTALLATION INSTRUCTIONS FOR LYSAGHT® KLIP-LOK® 406 ROOFING SHEETS



## REMINDER!

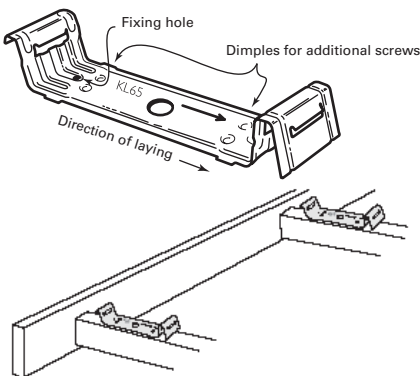
If you are working at height 2 metres and above, you must wear a safety harness with a shock absorbing twin tail lanyard attached to either a life line or an anchorage point.

In addition, the use of Ausmesh 300 is recommended to assist in the prevention of falls during roof sheet laying. Contact BlueScope Lysaght Singapore for more information on Ausmesh 300.

### 1. PREPARATION FOR INSTALLATION

When lifting roofing sheets onto roof frames to prepare for installation, ensure all sheets have overlapping female rib facing the side where fastening is to commence.

### 2. FIX THE FIRST ROW OF KL 65 CLIPS



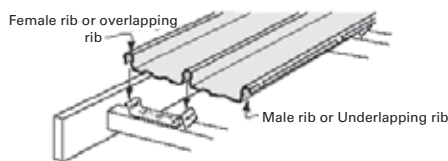
Fix the first row of clips (KL65 clips shown)

The first run of KL 65 clips have to be positioned and fastened, one onto each purlin, so that they will correctly engage in the female and centre ribs of the first sheeting when the sheeting is placed over them.

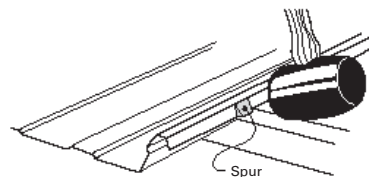
Fasten clips to the purlins at each sheet, having positioned them so that the first run of clips will be in correct relation with the building elements.

Align and fasten the remainder of the first run of clips using a string as a straight edge.

### 3. PLACE THE FIRST SHEET



Placing the first sheet

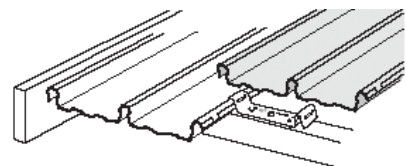


Flatten spurs in way of clips

Position the first roof sheet over the fastened run of clips, having fastened the clips longitudinally in relation to the eaves overhang, and then fully engage on clips by

applying foot pressure to the centre and female ribs over each clip. If the clips foul up one of the spurs spaced along the outer free edge of the male rib, the spur can be flattened with a blow from a rubber mallet to allow the clip to sit down over the rib.

### 4. FIX THE NEXT (AND SUBSEQUENT) CLIPS & SHEETS



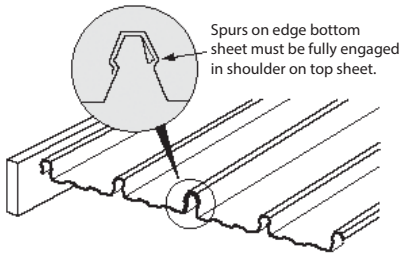
Placing nest sheet (s)

Position the next run of clips, one to each purlin, engage over the male ribs of the installed sheet and fasten each clip with the recommended wafer-head fasteners.

Place the second sheet over the second run of clips with the female rib overlapping the male rib of the first preceding sheet, and the centre rib over the centre rib's up-stand of the clips.



## 5. ENSURE ROOFING SHEETS INTERLOCK COMPLETELY



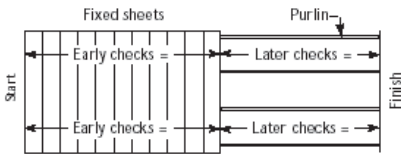
Spurs must engage fully

The interlocking ribs and centre rib should be fully engaged over each clip.

The full engagement can be done by walking along the full length of the roof sheeting being installed, with one foot in the tray next to the overlapping female rib and the other foot applying pressure to the top of the interlocking rib at regular intervals.

A distinct 'click' will be heard as the spurs along the edge of the male rib snap into the shoulder along the female rib.

## 6. CHECK ALIGNMENT PERIODICALLY

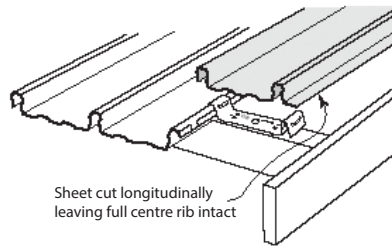


Check alignment periodically

Occasionally check the roofing sheets to ensure they are still parallel to the first sheet. This can be checked by taking two measurements across the width of the fixed sheet.

The string line can be used to ensure that the ends of the roofing sheets are in line.

## 7. POSITIONING THE FINAL SHEET



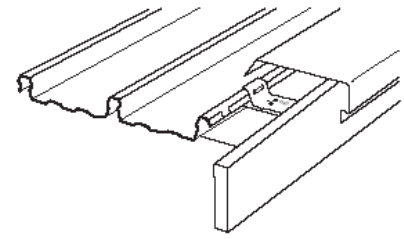
Placing last sheet where half a sheet will fit

If the space left between the last fixed sheet and the fascia or parapet is more than half the width of a LYSAGHT® KLIP-LOK® sheet, cut the final sheet along its length leaving the centre rib complete.

Place the cut sheet onto a row of clips, the same way as it would be done for a full sheet.

Where the space left between the last fixed sheet and the fascia or parapet cannot fit half the width of a LYSAGHT® KLIP-LOK® sheet, fix the edge of the final sheet at each purlin with a clip that has been cut into half.

## 8. FLASHINGS / CAPPINGS



Placing last sheet where half a sheet won't fit

Upon completion of the roofing sheets installation, the flashing will be suited to the requirements on site to complement and improve the total waterproof / watertight roof system.

To prevent LYSAGHT® KLIP-LOK® 406 sheets from sliding downwards in the fixing clips on very steep roof pitches or slopes, each sheet under the flashing or capping should be pierced-fix along the top of the sheets.

Note:

- The installation procedure for walls is similar to that described for roofs. To prevent LYSAGHT® KLIP-LOK® 406 sheets from sliding downwards in the fixing clips, you should pierce-fix through each sheet under the flashing or capping, along the top of the sheets.



COLORBOND® steel



ZINCALUME® steel



# ZINCALUME® steel and COLORBOND® steel

Strong brands, quality materials

LYSAGHT® PRODUCTS ARE MANUFACTURED FROM HIGH QUALITY ZINCALUME® STEEL AND COLORBOND® STEEL, WHICH ARE LEADING BRANDS WITH A WIDE RANGE OF APPLICATIONS. THESE PRODUCTS HAVE BEEN USED WITH STRIKING EFFECT BY LEADING ARCHITECTS TO CREATE THE LATEST IN MODERN BUILDING DESIGNS, THROUGH TO CLASSIC ROOFING STYLES FOR RESIDENTIAL PROJECTS.

## Zincalume®

ZINCALUME® steel is a premium metallic coated steel product that is composed of 55% aluminium, 43.5% zinc and 1.5% silicon. The zinc/aluminium alloy coating on ZINCALUME® steel imparts corrosion resistance of up to four times the life of galvanised steel.

ZINCALUME® steel is backed by a material warranty of up to 25 years\*

Typical applications featuring ZINCALUME® steel include roofing, wall cladding and gutters.

### Product Attributes

- Durable and strong.
- Superior corrosion resistance and has an excellent combination of physical and cut edge protection.
- Lightweight for easy handling.
- Thermally efficient roofing.
- Excellent flexibility in design, can be curved, for truly individual designs.
- Weather tight and secure when installed to manufacturer's specifications.
- Clear resin coating resists scuffing and handling marks.

\*Warranty terms and conditions apply

## Colorbond®

COLORBOND® pre-painted steel combines the superior strength of steel, the corrosion resistance and protection of a zinc/aluminium alloy (ZINCALUME® steel) coating that maintain its long lasting beauty with excellent colour retention.

It has been developed as a "Defence System Against Tropical Staining." Its unique oven-cured paint system prevents surface staining common to tropical environments caused mainly by temperature, moisture and air-borne contaminants.

COLORBOND® steel is backed by a material warranty of up to 25 years\*

### Product Attributes

- Available in a range of attractive colours.
- The zinc/aluminium alloy coating on ZINCALUME® steel, plus the oven-baked, prepainted finish on COLORBOND® steel provide superior corrosion resistance for long life.
- Thermally efficient. Roofs made from COLORBOND® steel absorb less heat, thus cools very quickly.
- Light weight compared to concrete and clay tiles (on a per area basis) - reduced load on supporting structures.
- Excellent flexibility in design, can be curved, for truly individual designs.
- Flexibility of design allows for both traditional straight roof sheeting as well as innovative curved roofing designs.
- Resists cracking, chipping and peeling.

LEAD, COPPER and STAINLESS STEEL are not compatible with COLORBOND® steel and ZINCALUME® steel. Direct contact should therefore, be avoided. Where inside condensation conditions are likely, coated steel girts should be used so that any ZINCALUME® steel to bare steel contact is avoided.

Stainless steel fasteners are not recommended for ZINCALUME® and COLORBOND® steel.





# Trusted Partner for Building Systems

## NS BLUESCOPE LYSAGHT SINGAPORE PTE LTD

18 BENOI SECTOR,  
JURONG TOWN,  
SINGAPORE 629851

TEL: 65-6264 1577 FAX: 65-6265 0951 / 6621 6636

www.[lysaght.com.sg](http://lysaght.com.sg)  
[lysaght.singapore@bluescope.com](mailto:lysaght.singapore@bluescope.com)  
For more information, please contact:  
**+65 6264 1577**

Web:



COATING



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RECYCLING



TERMITE PROOF



THERMAL EFFICIENCY



WARRANTY