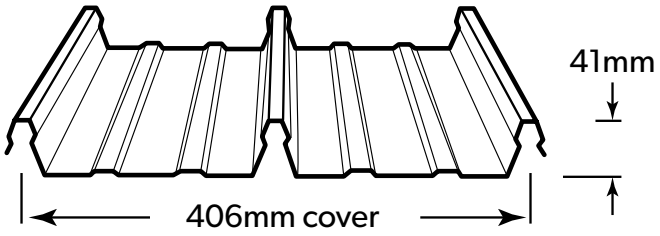
KLIP-LOK® 406

DESIGN & INSTALLATION GUIDE

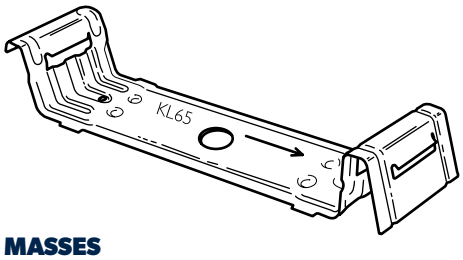
INSPIRATION TO BUILD BETTER

LYSAGHT KLIP-LOK® 406

KLIP-LOK® 406 is a strong, durable, versatile, long spanning, concealed-fix roof and wall cladding with exceptional waterproofing characteristics. Smart fluted pans and a lock-action rib design enables use on low pitched roofs. KLIP-LOK® 406 is available in long lengths, therefore on most jobs you can have one sheet from ridge to gutter without end-laps. Long, straight lengths of KLIP-LOK® 406 can be laid in place and easily aligned because fixing with our clips is simple and fast. The smaller number of clips for a given area provides extra economy.



KL65 fixing clip for KLIP-LOK® 406



MATERIAL SPECIFICATIONS

Next generation ZINCALUME® aluminium/zinc/magnesium alloy coated steel complies with AS 1397 G550, AM125 (550 MPa minimum yield stress, 125g/m^2 minimum coating mass).

COLORBOND® is pre-painted steel for exterior roofing and walling. It is the most widely used. The painting complies with AS/NZS 2728 and the steel base is an aluminium/zinc alloy-coated steel complying with AS 1397. Minimum yield strengths are G550 (550 MPa). Minimum coating mass is AM100 (100g/m^2).

COLORBOND® Metallic is pre-painted steel for superior aesthetic qualities displaying a metallic sheen.

COLORBOND® Ultra is pre-painted steel for severe coastal or industrial environments (generally within about 100-200 metres 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 coating mass is AM150 (150g/m^2).

COLORBOND® Stainless is a pre-painted steel and is used for severe and coastal 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.

The base metal thickness is 0.48mm.

COLOURS

KLIP-LOK® 406 is available in an attractive range of colours in COLORBOND® factory pre-painted steel and in unpainted ZINCALUME® steel.

AVAILABILITY

Not available in VIC or SA, QLD and WA by enquiry only.

COLORBOND® STEEL WITH THERMATECH® TECHNOLOGY

COLORBOND® steel's core colour range in the Classic and Matt finish features our specially designed Thermatech® solar reflectance technology. Thermatech® reflects more of the sun's heat on hot, sunny days which may help increase your comfort while reducing your dependence on air conditioning. Thermatech® is available in all core colours except Night Sky®.

LENGTHS

Sheets are supplied custom cut.

MASSES

	BMT (mm)	kg/m	kg/m^2	m^2/t
ZINCALUME® steel	0.48	2.28	5.62	178
COLORBOND® steel	0.48	2.32	5.71	175

TOLERANCES

Length: + 0mm, – 15mm, Width: + 4mm, – 4mm

MAXIMUM SUPPORT SPACINGS

The maximum recommended support spacings are based on testing in accordance with AS 1562.1, AS 4040.0 and AS 4040.1.

Roof spans consider both resistance to wind pressure and light roof traffic (traffic arising from incidental maintenance) and assessment of ease of installation.

Wall spans consider resistance to wind pressure only and assessment of ease of installation.

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, M_t=1.0 with the following assumptions made:

ROOFS:

C_{pi}=+0.20, C_{pe}=-0.90, K_l=2.0 for single and end spans, K_l=1.5 for internal spans.

WALLS:

C_{pi}=+0.20, C_{pe}=-0.65, K_l=2.0 for single and end spans, K_l=1.5 for internal spans.

These spacings may vary by serviceability and strength limit states for particular projects.

MAXIMUM SUPPORT SPACINGS (MM)

	BMT
Type of Span	**0.48mm**
Roofs	
Single span	1500
End span	1800
Internal span	2100
Unstiffened eaves overhang	200
Stiffened eaves overhang	600

Table data are based on supports of 1mm BMT. For material less than 1.0mm thick, refer to the TOPSPAN® Design and Installation Manual and Selection Tables, or seek advice from our information line. The data is governed by the ease installation of side lapping of the sheets at long spans.

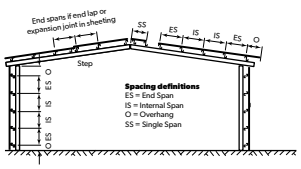
KLIP-LOK® 406 LIMIT STATE WIND PRESSURE CAPACITIES (KPA) 0.48 BMT

Span Type	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	4.41	4.30	4.10	3.75	3.25	2.70	2.10	1.53	-	-
End	Serviceability	2.41	2.17	1.96	1.77	1.61	1.46	1.32	1.18	1.02	0.84
	Strength	3.60	3.45	3.30	3.05	2.70	2.35	2.00	1.70	1.45	1.30
Internal	Serviceability	2.82	2.76	2.66	2.53	2.35	2.05	1.80	1.65	1.50	1.27
	Strength	4.10	3.55	3.05	2.65	2.35	2.05	1.80	1.65	1.50	1.35

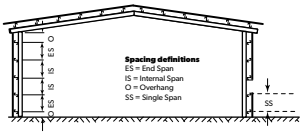
* A capacity reduction factor off = 0.9 has been applied to strength capacities. Table values are based on supports of G550 steel, 1mm BMT.

SPAN TYPES

Roofing & Walling Profiles



Walling Profiles Only



LIMIT STATES WIND PRESSURES

KLIP-LOK® 406 offers the full benefits of the latest methods for modelling wind pressures. The wind pressure capacity table is determined by full scale tests conducted at Lysaght's NATA-registered testing laboratory, using the direct pressure-testing rig.

Testing was conducted in accordance with AS 1562.1 and AS 4040.2 based on a deflection limit of (span/120) + (maximum fastener pitch/30).

The pressure capacities for strength have been determined by testing the cladding to failure (ultimate capacity). These pressures are applicable when the cladding is fixed to a minimum of 1.0mm, G550 steel.

For material less than 1.0mm thick, refer to the TOPSPAN® Design and Installation Guide and Selection Tables, or seek advice from our information line.

ADVERSE CONDITIONS

If this product is to be used in marine, severe industrial, or unusually corrosive environments, ask for advice from our information line.

MAXIMUM ROOF LENGTHS FOR DRAINAGE (M)

Peak Rainfall Intensity (mm/hr)	Roof Slopes (degrees)					
	1	2	3	5	7.5	10
100	375	467	548	682	813	934
150	250	311	365	454	542	623
200	188	234	274	341	406	467
250	150	187	219	273	325	374
300	125	156	183	227	271	311
400	94	117	137	170	203	234
500	75	93	110	136	163	187

MINIMUM ROOF PITCH

You can use KLIP-LOK® 406 on roof pitches from as low as 1° (1 in 50). It can also be used on walls.

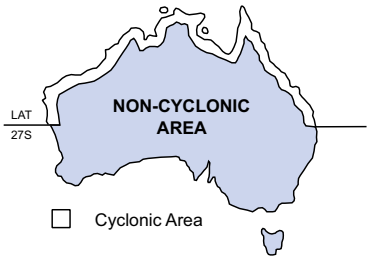
Maximum roof lengths for drainage measured from ridge to gutter (m). Penetrations will alter the flow of water on a roof.

Refer to the LYSAGHT® Roofing & Walling User Manual for more information.

NON-CYCLONIC AREAS

The information in this brochure is suitable for use only in areas where a tropical cyclone is unlikely to occur as defined in AS/NZS 1170.2.

For information on the use of LYSAGHT® products in cyclonic conditions, refer to the Cyclonic Area Design Manual which is available by download on our website: www.lysaght.com.

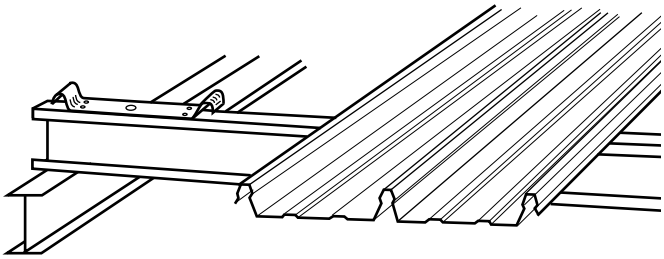


INSTALLATION

INSTALLATION PROCEDURE

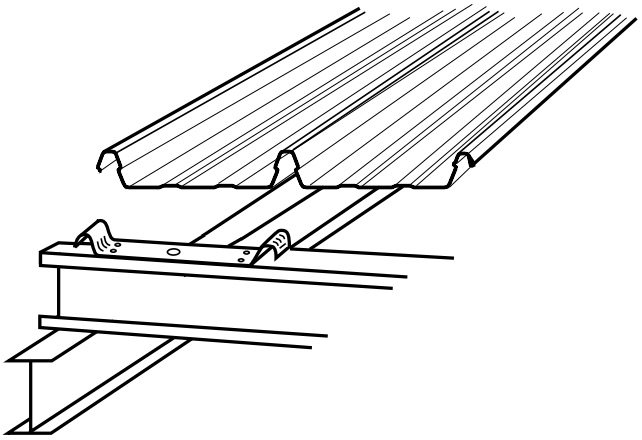
STEP 1

When lifting sheet lengths onto the roof frame ready for installation, make sure all sheets have the overlapping ribs facing towards the side where fastening is to commence. The first run of clips must be located and fastened, one to each support, so that they will correctly engage in the overlapping and centre ribs of the first sheet when it is located and locked over them. To do this, fasten clips to the purlins at each end of the sheet, having positioned them so that the first sheet will be in correct relation to other building elements. Align and fasten the remainder of the first run of clips using a string line or the first sheet as a straight edge



STEP 2

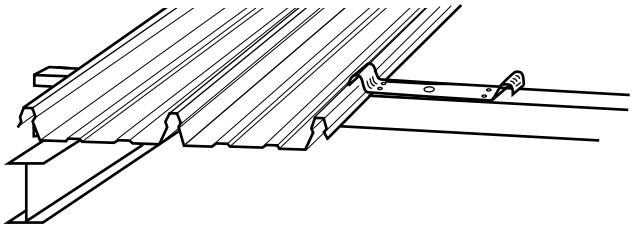
Position the first sheet longitudinally in relation to gutter overhang and locate it over the fastened run of clips, positioning the centre rib first, and engage the centre and overlapping ribs onto all clips by foot pressure.



STEP 3

Position and fasten the next run of clips, one to each support, with the short return leg of the clip over the underlapping rib of the installed sheet.

If the clip fouls one of the spurs spaced along the outer free edge of the underlapping rib, the spur can be flattened with a blow from a rubber mallet to allow the clip to seat down over the rib.



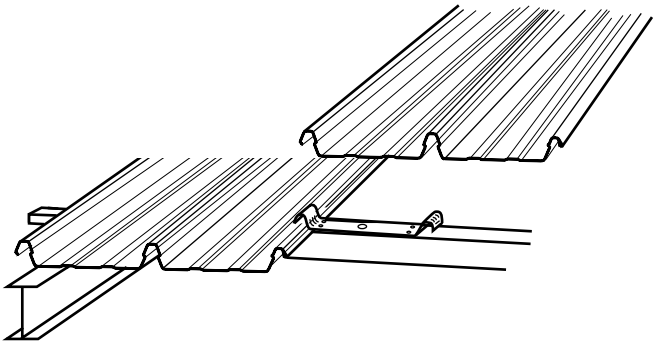
STEP 4A

Place the second sheet over the second run of clips, again positioning the centre rib first. A string line stretched across the bottom alignment of the sheets can be used to check that the ends of the sheets are in line.

Fully engage the interlocking ribs and the centre rib over each clip.

This can be achieved by walking along the full length of the sheet being installed with one foot in the tray next to the overlapping rib and the other foot applying pressure to the top of the interlocking ribs at regular intervals.

Also apply foot pressure to the top of the centre rib over each clip. For complete interlocking, which is essential, the spurs of KLIP-LOK® 406 along the underlapping rib must be fully engaged in the shoulder of the overlapping rib.



STEP 4B

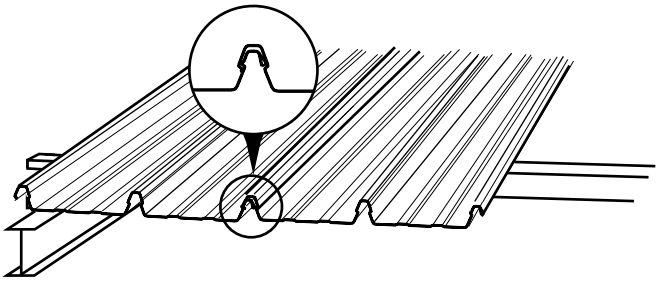
See illustration of 'Step 4b' below.

A distinct "click" will be heard as the interlocking ribs fully engage.

When engaging KLIP-LOK® 406 interlocking ribs, stand only on the sheet being installed, that is the overlapping sheet, and not on the preceding sheet.

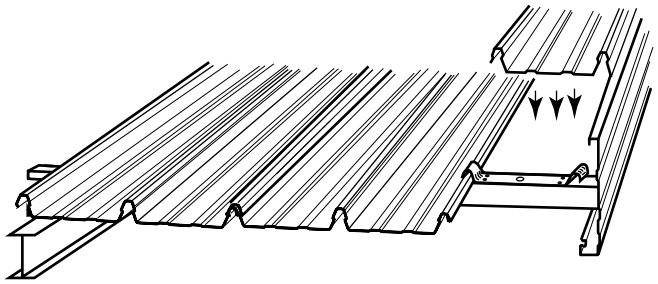
Install subsequent sheets by following steps 3 and 4 and make periodic checks that the installed sheets are aligned with the roof perimeter.

On walling applications a rubber mallet must be used to fully engage the inter-locking ribs and engage the centre ribs over the clips.



STEP 5A

Part sheet cut longitudinally leaving full centre rib.

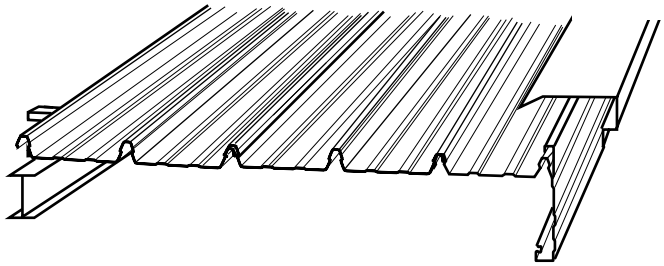


STEP 5

If the space left between the last full sheet and the fascia or parapet is more than a half sheet width, a sheet can be cut longitudinally, leaving the centre rib complete. This partial sheet can be fully clipped onto a row of clips as for a full sheet, before installing the capping or flashing. If the space left between the last full sheet and the fascia or parapet is less than a half sheet width, it can be covered by the capping or flashing. In this case, the last sheet should be secured by cutting sheet in halves and fastening the underlapping rib at each purlin with a half sheet.

Similarly, a half clip may also be used if required. In this case, where a partial sheet of less than two ribs is used, it is necessary to turn up the lip along the edge of the cut sheet.

This can then be covered by the capping or flashing.



STEP 5B

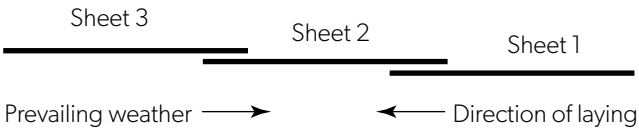
Last rib fastened with half sheet and covered by capping or flashing.

GENERAL INSTALLATION NOTES

1. Check that the top faces of all purlins or battens are lying in one plane, adjusting as necessary by packing or easing between these members and their supporting structure. Under no circumstances should packing be used directly under the fastening clips to adjust fall or alignment of roof.
   Accurate alignment ensures efficient locking of sheets and clips. Conversely, misalignment can interfere with the locking action, particularly on close support centres.
2. To maintain maximum holding power the first and last supports and clips should be at least 75mm from each end of the sheet.
3. Make spot checks for the alignment of sheets during laying to control fanning or creep (5 sheets = 2030mm coverage). To rectify alignment, sheets may be adjusted 2mm by pulling the clip away or pushing towards the sheet while fastening the clip.
4. For very steep roof or vertical wall applications, a positive fastener (screw or bolt) is required in each sheet length to prevent movement down the fastening clips. This is best positioned under or through the flashing or capping at the top end.
5. KLIP-LOK® 406 can be fastened over insulation wool blankets up to 50mm thick when the blanket is draped over supports before installation of clips.
6. Sheets should project a minimum 50mm into the gutter line.

Figure 1

Lay sheets towards prevailing weather.



FASTENERS WITHOUT INSULATION

	Fix to Steel Single & lapped steel thickness ≥0.55 up to 1.0mm BMT	Fix to Steel Single steel thickness ≥1.0mm BMT up to 3.0mm BMT	Fix to Steel Total lapped thickness ≥1.00 BMT up to 3.8mm BMT	Fix to Timber Hardwood J1-J3	Fix to Timber Softwood J4
Clip Fixed	10-16x16, Metal Teks, WH 10-16x22, Metal Teks, WH	10-16x16, Metal Teks, WH 10-16x22, Metal Teks, WH	10-16x16, Metal Teks, WH 10-16x22, Metal Teks, WH	10-12x25, Type 17, WH	10-12x25, Type 17, WH
Side-laps	(If required) 10-16x16, Metal Teks, HH or Roof Zips M6-11x25 or M5-16x25 Designer Head or Sealed blind rivet ø4.8mm aluminium				

Notes:
1. For other steel thicknesses not specified please seek advice from screw manufacturer.
2. Values given are: gauge/threads per inch/lengths (mm). HH = Hex. Head, WH = Wafer Head.
3. Care is required during installation to prevent stripping of thin material. (Single ply.)
4. Screw specification as above or equivalent fastener.
5. All side-lapping screws with EPDM sealing washer.

WALKING ON ROOFS

Always walk in pans and over the supports if possible. Generally, keep your weight evenly distributed over the soles of both feet to avoid concentrating your weight on either heels or toes. Always wear smooth soft-soled shoes; avoid ribbed soles that pick up and hold small stones, swarf and other objects.

MAINTENANCE

Optimum product life will be achieved if all external walls and roofs are washed regularly. Areas not cleaned by natural rainfall (such as the tops of walls or roof areas sheltered by eaves) should be washed down every six months.

STORAGE AND HANDLING

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

Handle materials carefully to avoid damage: don't drag materials over rough surfaces or each other; don't drag tools over material; protect from swarf.

METAL & TIMBER COMPATIBILITY

Lead, copper, free carbon, bare steel and green or some chemically-treated timber are not compatible with this product. Don't allow any contact of the product with those materials, nor discharge of rainwater from them onto the product. Supporting members should be coated to avoid problems with underside condensation. If there are doubts about the compatibility of other products being used, ask for advice from our information line.

CUTTING

For cutting thin metal on site, we recommend a circular saw with a metal-cutting blade because it produces fewer damaging hot metal particles and leaves less resultant burr than does a carborundum disc.

Cut materials over the ground and not over other materials.

Sweep all metallic swarf and other debris from roof areas and gutters at the end of each day and at the completion of the installation. Failure to do so can lead to surface staining when the metal particles rust.

NOTCHING TOOL

A tool is available for on-site notching of transverse flashings and cappings.

TURN UP-DOWN TOOLS

On all roofs of pitches less than 15°, the high end of all sheets must be turned up to stop water from being driven under the flashing and into the building.

Similarly, the pans at the gutter end must be turned down to stop water running back along the underside of the sheets.

Tools are available for both applications.

FASTENERS

Where insulation is to be installed, you may need to increase the length of the screws given below, depending on the density and thickness of the insulation. When the screw is properly tightened:

- **into metal:** there should be at least three threads protruding past the support you are fixing to;
- **into timber:** the screw must penetrate the timber by the same amount that the recommended screw would do if there were no insulation.

SEALED JOINTS

For sealed joints use screws or rivets and neutral-cure silicone sealant branded as suitable for use with galvanised, ZINCALUME® or COLORBOND® steel.

SIMPLE, LOW-COST CONCEALED-FIXING

Fixing clips effectively secure KLIP-LOK® 406 to steel or timber supports without puncturing the sheet. With no exposed fasteners, the straight lines of your roof remain clean and smooth.

LATEST TESTING TECHNOLOGY

State-of-the-art testing methods have been used to determine the performance of KLIP-LOK® 406. The direct pressure testing rig at our NATA-registered testing laboratory has been used to develop the limit state performance tables of KLIP-LOK® 406.

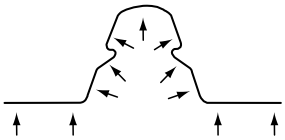
This results in a much better modelling of wind loads, compared to traditional air bag testing methods.

Our Lysaght brand has held the lead in Australian building products for over 150 years. This position has been maintained through meticulous research and development.

The data in this publication are obtained from our direct-pressure test rig which accurately reproduces the wind conditions experienced in the field.

Older air bag methods used by others distribute pressure unevenly, so that air bags can produce misleading results and inflated strengths (see diagram).

The rigid shape of an inflated airbag does not apply pressure to the ribs of secret-fixed cladding or adjacent to supports



Lysaght's direct pressure rig uses no air bags and applies pressure uniformly over the entire profile – including the ribs.

Uniform pressure distribution of our direct pressure rig which accurately reproduces the wind conditions experienced in the field.

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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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 metal roof and wall cladding, Part 1: Metal
AS4040.0-1992	Methods of testing sheet roof and wall cladding
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/NZS 1170.2:2021	Structural design actions, Part 2: Wind actions

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

WWW.LYSAGHT.COM

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