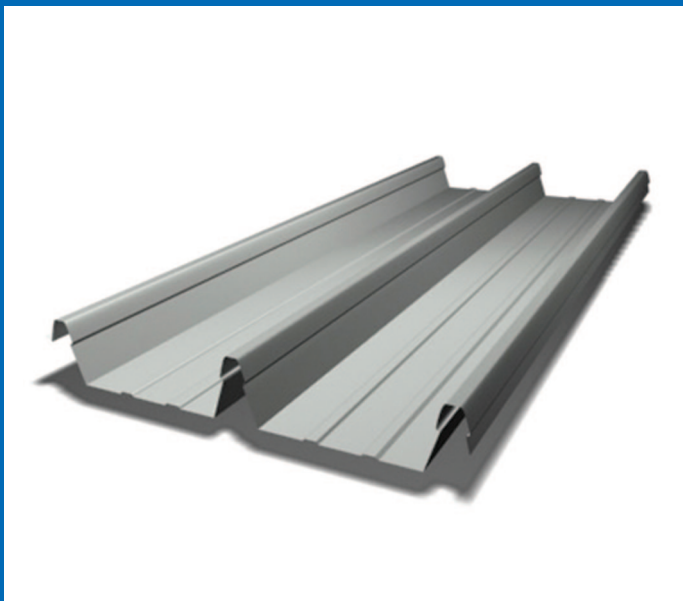




LYSAGHT® KLIPLOK® 406



DESIGN
FLEXIBILITY



DURABILITY/
SECURITY



HI-TECH
PRODUCTION



RECYCLING



COLOUR
CHOICES



THERMAL
EFFICIENCY



WARRANTY



Contents

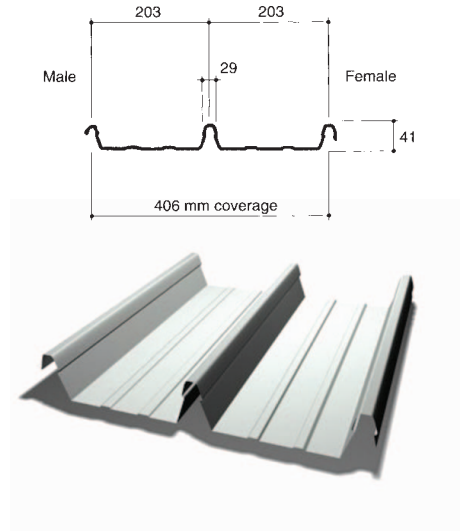
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Product System

1. PRODUCT PROFILE

LYSAGHT® KLIPLOK® 406 steel cladding is designed to have an interlock action rib for positive concealed clip fixing. Roll-formed with precision from genuine High Tensile G550 ZINCALUME® steel, it is available in a range of attractive and durable Clean COLORBOND® proprietary paint systems. Designed to perform at a minimum recommended roof pitch of 2° (1 in 29), LYSAGHT® KLIPLOK® 406 provides a lightweight but extremely strong waterproof cladding system. With its wide fluted pans and high ribs

design, LYSAGHT® KLIPLOK® 406 disperse rainwater quickly and efficiently to the outer perimeters of the roof, thus making it an excellent choice for severe rainfall intensity areas in Asia. Tested and proven by NATA registered laboratory at BlueScope Lysaght (Research & Development) Sydney – Australia and CSIRO (Commonwealth Scientific and Industrial Research Organisation Australia), LYSAGHT® KLIPLOK® 406 remains as one of the most trusted and reliable product for the past few decades.



2. PHYSICAL PROPERTIES

Profile	LYSAGHT® KLIPLOK® 406 (Regular/Standard)			LYSAGHT® KLIPLOK® 406 (Extreme/Non Standard)		
Steel Grade (MPa)	G550 ZINCALUME® steel			G550 ZINCALUME® steel		
Effective Width of Coverage	406mm			406mm		
Depth of Rib	41mm			41mm		
Minimum Recommended Roof Pitch	2° (Sheet length without end lap) (1 in 29)			2° (Sheet length without end lap) (1 in 29)		
Base Metal Thickness (BMT)	0.48mm			0.60mm		
Total Coated Thickness (TCT)	0.53mm			0.65mm		
Finishes	ZINCALUME®	Clean COLORBOND® steel	Clean COLORBOND® ULTRA steel	ZINCALUME®	Clean COLORBOND® steel	Clean COLORBOND® ULTRA steel
		Clean COLORBOND® XPD steel			Clean COLORBOND® XPD steel	
	Clean COLORBOND® XPD Pearlescent steel			Clean COLORBOND® XPD Pearlescent steel		
Mass per Unit Area (kg/m ²)	5.606	5.692	5.763	6.947	7.033	7.104
Mass per Unit Length (kg/m)	2.276	2.311	2.340	2.821	2.855	2.884
Coverage (m ² /tonne)	178.370	175.693	173.523	143.939	142.191	140.766
Tolerances	LENGTH +0, -15mm. WIDTH +/- 2mm					
Packing	In strapped bundles of 1 tonne maximum mass					
Custom Cut Lengths	Any measurement to a maximum transportable length					

3. PRODUCT BENEFITS

Like other products in the LYSAGHT® range, LYSAGHT® KLIPOK® 406 presents a list of long term benefits and values to customers:-

- ✓ Concealed Fixing Method – total leak-proof solution and aesthetically pleasing
- ✓ Tested and proven by NATA registered laboratory in LYSAGHT® TECHNOLOGY (Chester Hill, Sydney – Australia)
- ✓ Tested by CSIRO (Commonwealth Scientific and Industrial Research Organisation – Australia)
- ✓ Conforms to International Building Codes and Standards
- ✓ Manufactured under strict processes governed by ISO9002 (Quality Management System) and ISO14001 (Environment Management System)
- ✓ Excellent Wind Resistance
- ✓ Exceptional strong but light weight
- ✓ Superior against severe rainfall intensity
- ✓ First class resistance against Corrosion, Discolouration and Tropical Dirt Staining
- ✓ Certified Class 'O' by Malaysian Fire & Rescue Department
- ✓ Requires no or minimal maintenance
- ✓ All weather performance
- ✓ Genuine LYSAGHT® Material Warranty
- ✓ Genuine LYSAGHT® Product Certification

4. DESIGN CRITERIAS

SUPPORT SPACINGS NON-CYCLONIC AREAS

The maximum support spacings shown in Table 1 are based on testing 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 wall spacings are the maximum recommended for buildings up to 10m high in Region B Terrain Category 3 conditions ($V_s=38\text{m/s}$ & $V_u=60\text{m/s}$ using $C_{pe}=0.65$, $C_{pi}=0.2$ & $KI=2.0$).

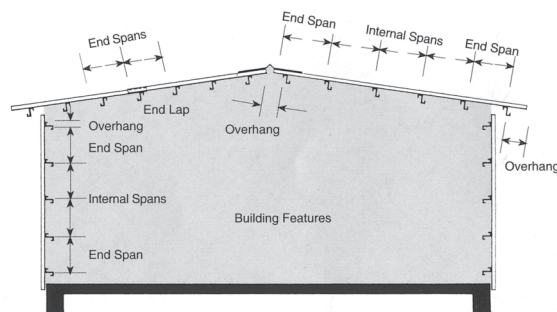
These spacings may be reduced by the Serviceability and Strength Limit States for the particular project under consideration.

Table 1: Maximum Allowable Support Spacings – NON CYCLONIC AREAS

	TYPE OF SPAN	LYSAGHT® KLIPOK® 406	
		0.53mm TCT	0.65mm TCT
ROOF	Single Span	1700mm	2000mm
	End Span	2000mm	2300mm*
	Internal Span	2300mm	2700mm*
	Unstiffened Overhang +	200mm	300mm
WALL	Single Span	2300mm	2500mm
	End Span	2400mm	3000mm
	Internal Span	2400mm	3000mm
	Overhang +	400mm	600mm

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

+ Overhang - not meant for human traffic



**LIMIT STATE WIND PRESSURES
(NON-CYCLONIC AREAS)**

The wind pressure capacities are based on tests conducted at NATA registered testing laboratory at LYSAGHT® TECHNOLOGY in 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 provides pressure versus span graphs for Serviceability and Strength Limit State Design. Serviceability Limit State is based on a deflection limit of: (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® KLIPLOK® 406 WIND CAPACITIES (kPa) – Limit State Format (Non-Cyclonic)

LYSAGHT® KLIPLOK® 406												
Base Metal Thickness	Type of Span	Limit State	Span (mm)									
			900	1200	1500	1800	2100	2400	2700	3000	3300	3600
0.48mm	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
0.60mm	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



Linkway at Tanglin Halt, Singapore



Private Religious Complex, Sabah

SUPPORT SPACINGS CYCLONIC AREAS

Table 3: Maximum Allowable Support Spacing for LYSAGHT® KLIPILOK® 406 for Cyclonic Regions

LYSAGHT® KLIPILOK® 406									
BASE METAL THICKNESS	TYPE OF SPAN	WITHOUT CYCLONIC WASHERS				WITH CYCLONIC WASHERS			
		W41C (147.6km/hour) 2.017kPa	W50C (180.0km/hour) 3.000kPa	W60C (216.0km/hour) 4.320kPa	W70C (252.0km/hour) 5.860kPa	W41C 5.860kPa 2.017kPa	W50C (180.0km/hour) 3.000kPa	W60C (216.0km/hour) 4.320kPa	W70C (252.0km/hour) 5.860kPa
0.48mm	End	1465	1135	805	585	1465	1135	805	585
	Internal	1790	1365	990	745	1790	1365	990	745
0.60mm	End	1915	1375	1020	770	1915	1375	1020	770
	Internal	2380	1915	1240	930	2380	1915	1240	930

Notes on Table 3:

1. Fastening procedures and methods to comply with the strict recommendations of BlueScope Lysaght
2. Parameters for determining the cyclonic design wind pressures are:
 $K = 1.5$ (low pressure zone local factor); $C_{pi} = +0.65$; $C_{pe} = -0.90$
 V_d = Design fast wind speed (e.g. W41C = 41m/s)
 The design wind pressure is obtained from: $P_d = (C_{pi} - Kc_{pe}) V_d^2 \times 0.6 \times 10^{-3}$ [kPa].
3. Some batten spacings are governed by walk-on requirements.
4. Specification of batten must be of high tensile steel, with a minimum Base Metal Thickness of 1.00mm and minimum yield stress of 550MPa (for more info, please consult BlueScope Lysaght).

Table 4: LYSAGHT® KLIPILOK® 406 (Allowable Wind Pressure kPa) for Cyclonic Regions

SPAN	0.48mm BMT			0.60mm BMT		
	Single	End	Internal	Single	End	Internal
600	12.00	5.60	7.00	21.00	7.20	9.00
900	8.40	3.73	4.67	11.20	4.80	6.00
1200	4.72	2.80	3.50	6.30	3.60	4.50
1500	3.02	1.92	2.60	4.03	2.56	3.20
1800	2.10	1.60	2.00	2.80	2.13	2.67
2100	1.32	1.37	1.71	1.76	1.83	2.29
2400	0.89	1.20	1.50	1.18	1.60	2.00
2700	0.62	1.09	1.33	0.83	1.22	1.78
3000	-	-	-	0.60	0.89	1.48

Note on Table 4:

- (1) The performance of LYSAGHT® KLIPILOK® 406 has been established using cyclic test criteria as specified in NBTC Technical Record 440. The allowable spans in the quick selection tables were obtained by linear interpolation of the design pressures established from those tests and conservative applications of the local pressure factors. These criteria are considered unnecessarily restrictive for use on larger or more complex buildings of the type normally designed by the architect and engineer.
- (2) Racking strength provided by the cladding has not been tested and should not be allowed for in the design.
- (3) Spans calculated using the Allowable Wind Pressure Tables may variously be governed by fastener load limits, moment induced buckling of the sheeting, or deflection. The resultant pressures are calculated using AS1170 Part 2, 1989 SAA Loading Code – Wind Forces.

The various conditions which affect the design wind speeds, such as geographic location, terrain category etc, are to be taken from AS1170 Part 2, 1989 SAA Loading Code – Wind Forces. The resulting four standardised cyclone wind speeds, 41, 50, 60 and 70m/s (designated as W41C, W50C, W60C and W70C respectively) are used in selection of batten spacing for each of our cladding, most of which vary in their spanning capacity.

**RAINWATER RUN-OFF FOR
LYSAGHT® KLIPLOK® 406**

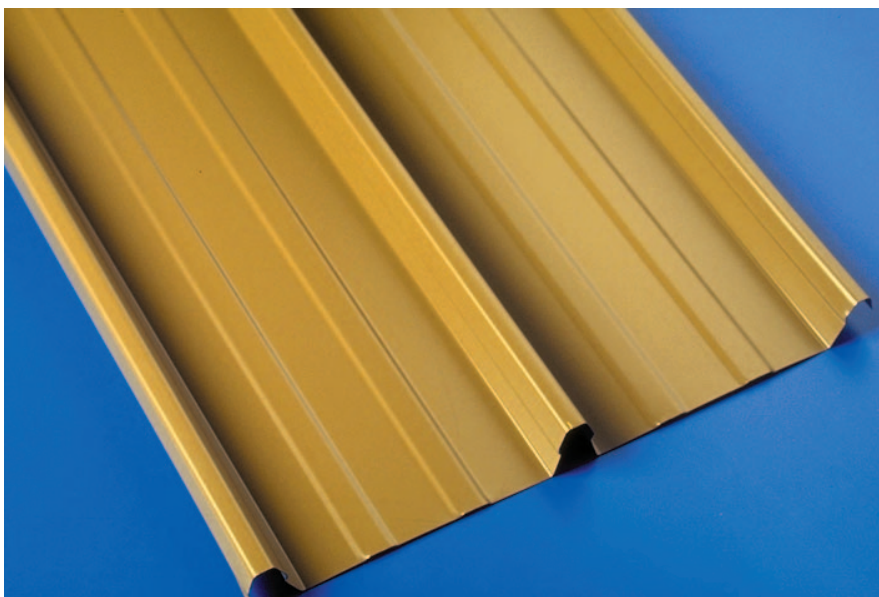
The drainage or run-off capacity of roof sheeting is another limitation on the total length of sheet run that must be considered in roof design and construction. As a guide, Table 5 lists the maximum recommended length of roof run for LYSAGHT® KLIPLOK® 406 at the roof slopes and rainfall intensities shown. These are based

on CSIRO (Commonwealth Scientific and Industrial Research Organisation – Australia) and BlueScope Lysaght 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 5: Maximum Roof Run (in metres) for roof slopes and rainfall intensities

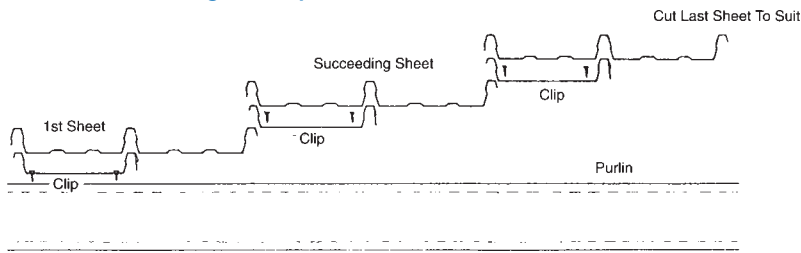
LYSAGHT® Sheet Profile	Rainfall Intensity (mm/hour)	Roof Slope				
		1 in 29 (2°)	1 in 20 (3°)	1 in 12 (5°)	1 in 7.5 (7.5°)	1 in 6 (10°)
LYSAGHT® KLIPLOK® 406	250	76	86	100	113	124
	300	63	71	83	94	103
	400	47	53	63	70	77
	500	38	43	50	56	62



Choa Chu Kang Sport Complex, Singapore

Fastening Method & 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 inch)	Overall length of the screw measured from under the head (mm)
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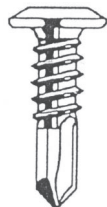
Recommended Fasteners

	Steel Supports Thickness Up to 4.5mm	Exceeds 4.5mm	Timber supports Grade Hardwood	Softwood
Directly to support	No.10 – 24 x 16 mm wafer head self drilling and tapping screw	Teks 5 No.12 – 24 x 32 mm wafer-head self drilling and tapping screw	No. 10 – 12 x 25 mm wafer-head type 17 self drilling wood screw. 3.75 mm x 50 mm flat-head spiral threaded nail (on special orders)	No. 10 – 12 x 46 mm wafer-head type 17 self drilling wood screw
Over Insulation Blanket	Increase to 22 mm long screw, if required		Increase to 22 mm long screw, if required 3.75 mm x 50 mm flat-head spiral threaded nail (on special orders)	No change

Clip – Fixing Application:

Fastener Description	Max. attachment (mm)	Drilling capacity (mm)
MTEKS 10-24x16 WAF	0 – 8	6.5
MTEKS 10-24x22 WAF	0 – 14	6.5

Description	Materials
Fasteners	Zinc Aluminium Alloy
Nails	Galvanised Steel
Blind Rivets	Aluminium
Sealing washers	EPDM Washer



Features of the fastener:

- Forged drill point
- Strip out resistant
- Higher pullout load
- Zinc alloy proven corrosion protection

Mechanical Properties:

Single shear strength	6 800 N
Axial tensile strength	11 900 N
Torsional strength	8.4 Nm

Tested on "Undriven" screw

Ultimate Average Pullout Data:

Base thickness	G450 steel
1.0 mm	2 800 N
1.2 mm	3 500 N
1.6 mm	4 300 N
1.9 mm	5 800 N
2.4 mm	7 800 N
3.2 mm	9 500 N

Tested under laboratory conditions

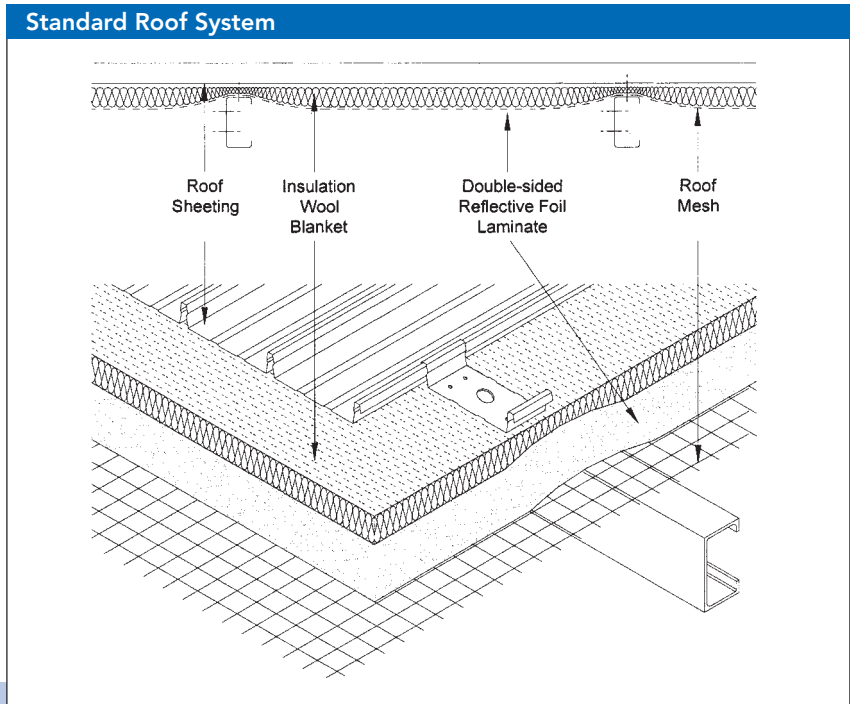
Noise & Heat Control

Rain Noise

To reduce rain noise on metal roof sheeting, an insulation mineral wool blanket can be placed in between 2 metal roof cladding. Anyway, as long as the insulation blanket is held hard against the underside of the roof sheeting this will dampens the rain induced vibration at point of impact and a marked noise reduction is achieved. Otherwise, noise will only be reduced by transmission loss through the mineral wool blanket. (Note: When using an insulation mineral wool blanket, care should be taken to ensure that it is fully protected from moisture).

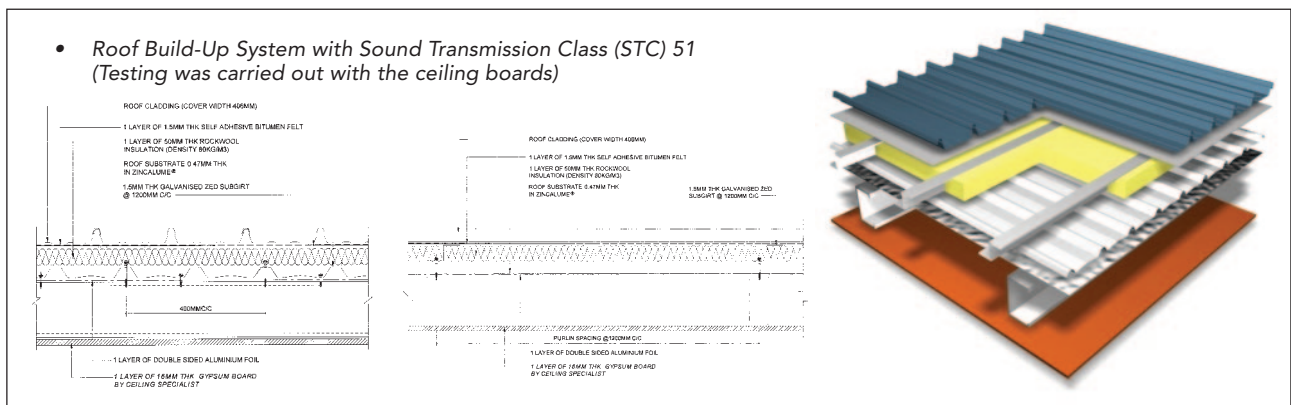
Heat Control

The effective method to control the heat is to drape a membrane of the reflective foil laminate over the supports before laying the sheeting or insulation blanket. The laminate can also provide a vapour barrier to minimise condensation. The insulation blanket is often provide the additional heat insulation to overall system.



Acoustic roof system (Please see page 13 for specification)

As a result of laboratory measurement of airborne sound transmission loss of BlueScope Lysaght Acoustic Roof System, PSB Corporation (testing group) had rated the roof system tested on October 10, 2002 as having a sound transmission class 51 (STC 51). The test was conducted in accordance with ASTM E90 – 97.

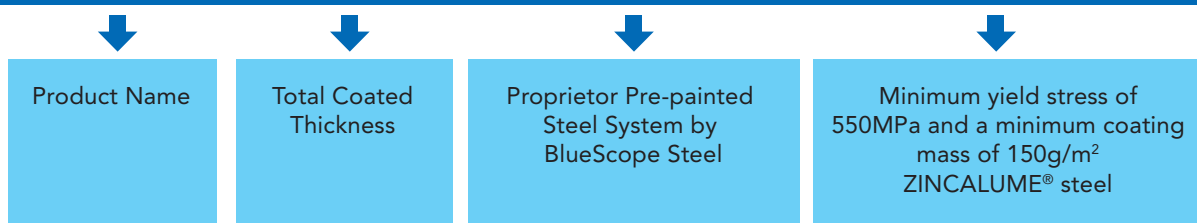


Suggested Specifications

Suggested Specifications for LYSAGHT® KLIPLOK® 406

1) Atmospheric Condition: **benign exposure in marine environment (>1000m from breaking surf)**

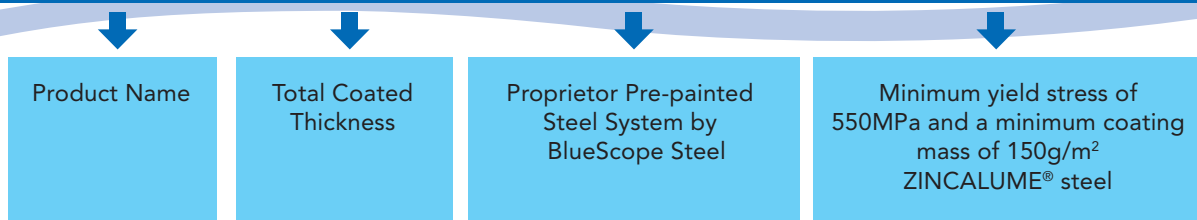
LYSAGHT® KLIPLOK® 406, 0.53mm TCT in Clean COLORBOND® steel (G550-AZ150)



Note: No minimum quantity requires for material order

2) Atmospheric Condition: **moderate exposure in marine environment (>400 from breaking surf)**

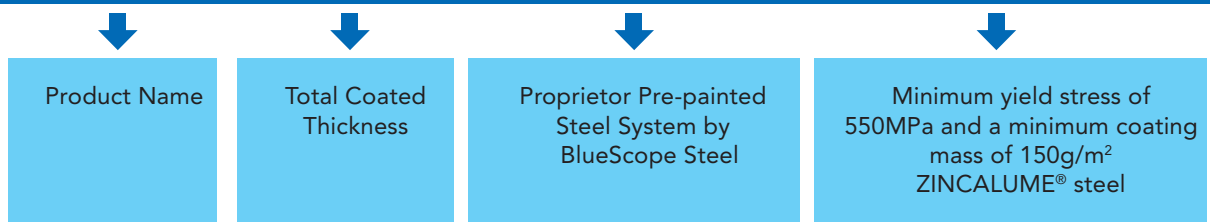
LYSAGHT® KLIPLOK® 406, 0.53mm TCT in Clean COLORBOND® XPD steel (G550-AZ150)



Note: Minimum quantity requires for material order.
Please contact our office in your respective area (country)

3) Atmospheric Condition: **moderate exposure in marine environment (>400 from breaking surf)**

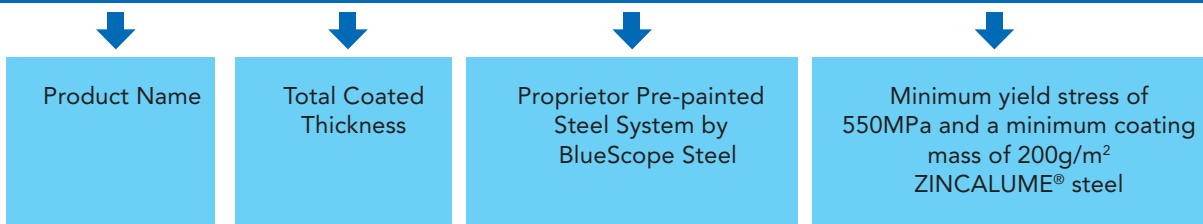
LYSAGHT® KLIPLOK® 406, 0.53mm TCT in Clean COLORBOND® XPD Pearlescent steel (G550 AZ150)



Note: Minimum quantity requires for material order.
Please contact our office in your respective area (country)

4) Atmospheric Condition: **severe marine environment (100m – 200m from breaking surf, <50m from calm still water)**

LYSAGHT® KLIPILOK® 406, 0.54mm TCT in Clean COLORBOND® Ultra steel (G550-AZ200)



*Note: Minimum quantity requires for material order.
Please contact our office in your respective area (country)*

Singapore Expo, Singapore



Specifications for Acoustic Roof System

A. ROOF PROFILE

The profiled steel roof cladding shall have an effective coverage width of 406mm with rib height of 41mm spaced at 203mm between rib centre. The sheets should be installed with compatible proprietary interlocking clips, which lock over the male rib. The clips should lock firmly into the underside of the centre and female ribs and in turn fastened to support with Class 3 (conforming to AS3566) wafer-head self-drilling zinc-coated fasteners. The clips shall be concealed and no fasteners are to penetrate the cladding.

The steel roof cladding shall comply to 5 basic International Building Codes and Standards: (1) AS1562 – 1992 (Design and Installation of Sheet Roof and Wall Cladding – Part I), (2) AS4040.1 – 1992 (Methods of Testing Sheet Roof and Wall Cladding Method I: Resistance to Concentrated Loads), (3) AS4040.2 – 1992 (Resistance to Wind Pressure for Non-Cyclonic Regions), AS4055 – 1992 (Wind Load for Housing – Cyclonic and Non-Cyclonic Regions) and (4) AS1170.2 – 1989 (SAA Loading Code, Part 2: Wind Loads). In addition to that, the steel roof cladding shall also be certified Class 'O' by Malaysian Fire and Rescue Department or complying to AS1530 and AS2728 (Pre-painted Organic Film / Metal Laminate Products), and shall conform to AS1580 (ASTM Test Method B117) as well as AS2105 (Taber Abrasion Resistance).

The steel roof cladding shall have a minimum Base Metal Thickness (BMT) of 0.48mm, roll-formed and manufactured from high tensile steel

with a minimum yield strength of 550MPa and minimum coating mass of 150g/m² (55% aluminium, 43.5% zinc and 1.5% silicon) or coating mass of 200g/m² for cladding installed in severe marine environment (conforming to AS2001 – 1993 & MS1196).

B. FLASHINGS & OTHERS

Flashings, cappings, trims and rainwater goods shall be manufactured from the same material as the steel roof cladding to achieve material compatibility. Material Warranty against Corrosion, Discolouration and Tropical Dirt Staining to be provided by manufacturer after completion of jobs, installation procedures and fixing methods to strictly follow the standards and recommendations of the Manufacturer.

C. OPTION FOR PRE-PAINTED STEEL

(please choose one of them)

Coated sheet shall be factory coiled painted and oven-baked to AS2728 (Prepainted organic film/ metal laminate products)

- 1) Clean COLORBOND® steel:**
Recommended for benign exposure in marine environment (>1000m from breaking surf)
Top coat : Custom formulated polyester paint system of 20µm over 5µm universal corrosion inhibitive epoxy primer
Reverse coat : Custom formulated Shadow Grey. Wash coat of 5 µm over 5 µm of corrosion inhibitive epoxy primer

- 2) Clean COLORBOND® XPD steel**
Recommended for moderate exposure in marine environment (>400 from breaking surf)
Top coat : PVF² of 20µm over 5µm corrosion inhibitive epoxy primer
Reverse coat : Snowgum Green wash coat of 5 µm over 5 µm of corrosion inhibitive epoxy primer

- 3) Clean COLORBOND® XPD Pearlescent steel**
Recommended for moderate exposure in marine environment (>400 from breaking surf)
Top coat : PVF² of 20µm over 5µm corrosion inhibitive epoxy primer
Reverse coat : Snowgum Green wash coat of 5 µm over 5 µm of corrosion inhibitive epoxy primer

- 4) Clean COLORBOND® Ultra steel**
Recommended for severe marine environment (100m – 200m from breaking surf, <50m from calm still water)
Top coat : Custom formulated system of 20µm over 5µm of custom formulated corrosion inhibitive epoxy primer
Reverse coat : Custom formulated Polyester system in standard Bass Grey of 5 µm over 5 µm of custom formulated corrosion inhibitive epoxy primer

D. SUBSTRATE

The substrate shall be 0.47mm thick corrugated profile with a cover width of 700mm. Nominal rib height and width of 24mm and 41mm respectively. The trapezoidal ribs shall have a nominal pitch of 87.5mm center to center and with anti-capillary side lap feature.

Each fixing position shall have 4 fasteners.

E. SUBGIRT

1.5mm thick galvanized Zed girt section shall be installed over the substrate to accommodate sound insulation material (its also a spacer between substrate and metal roof cladding).

F. MINERAL WOOL INSULATION

The sound insulation material is mineral wool as indicated with 80kg/m³ density, to a 50mm thickness. The thermal conductivity of insulation should be 0.033 w/mk at 20°C (0.235 BTU in/ft²h °F at 68°F) and must comply with Australian standard 1530: Part 3 – 1976.

G. RADIANT & VAPOUR BARRIER

The solar radiant barrier shall consist of a tough high density polyethylene core reinforcement and 2 pressure laminated aluminium & metalised film (on bothside).

The centre core shall be of high tensile strength to enable the radiant barrier to be tear-proof and be able to support itself.



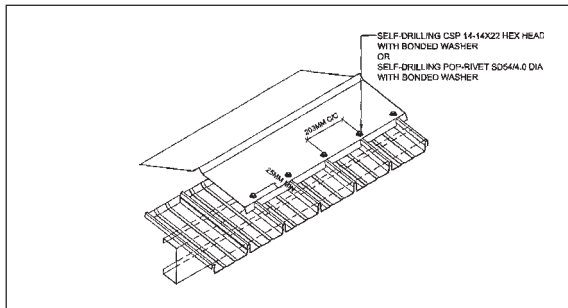
Choa Chu Kang Sport Complex, Singapore



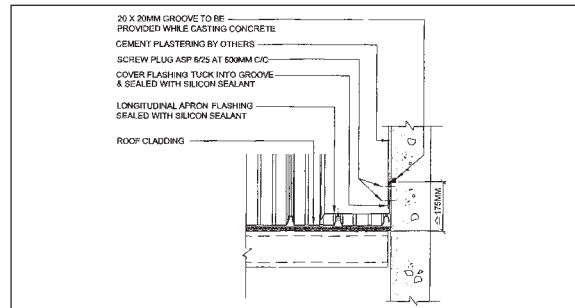
Changi Airport, Singapore

Standard Flashings/Cappings

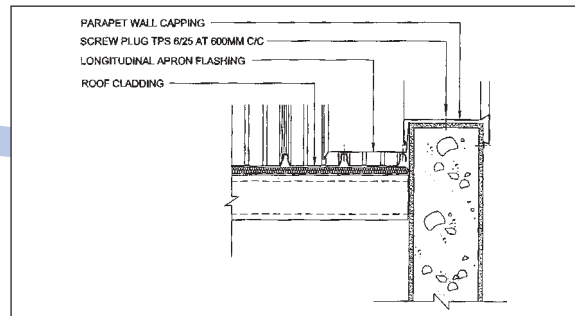
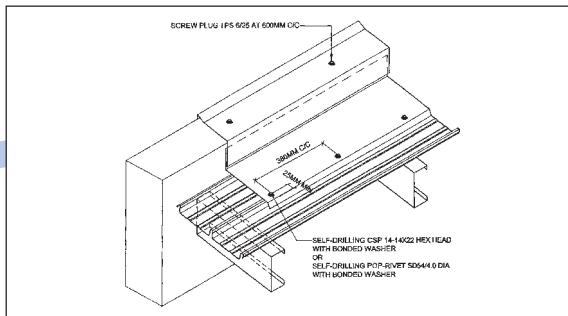
Ridge Capping



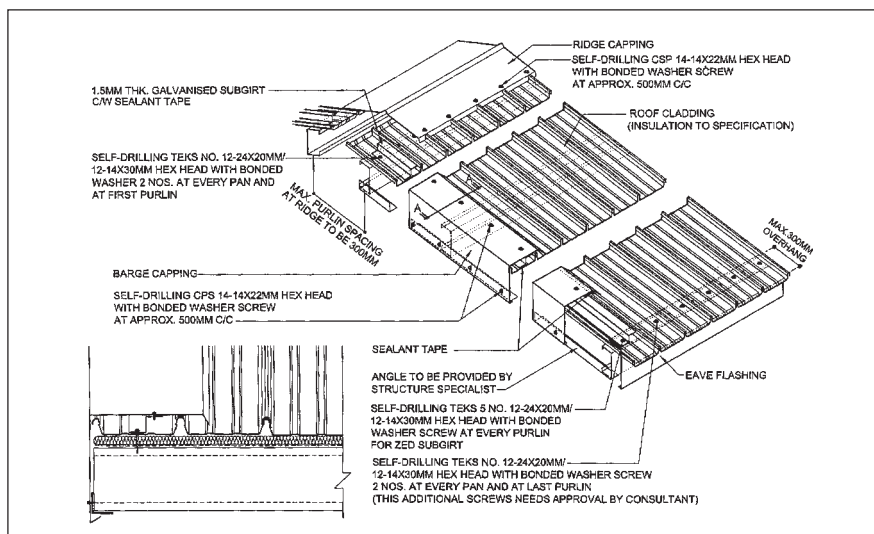
Side-lap Detail, Apron & Cover Flashings



Longitudinal Apron Flashings

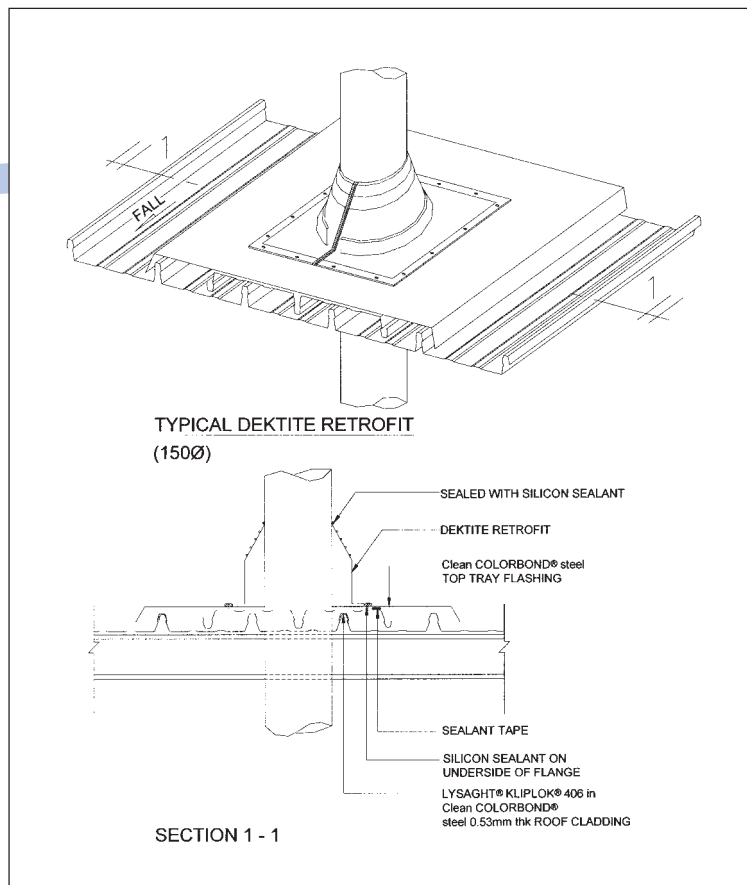
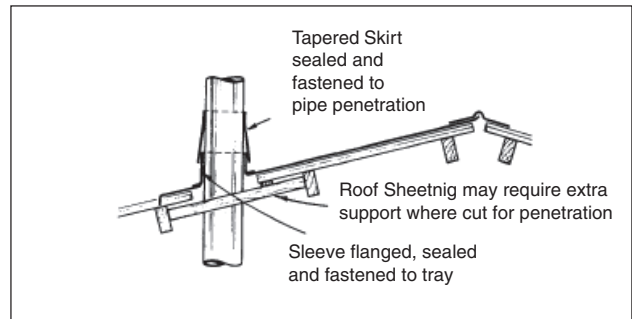
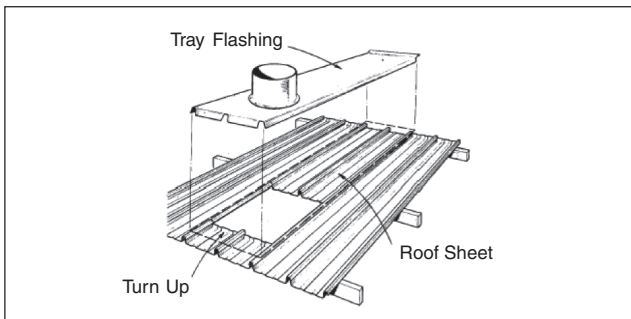


Recommended Barge Capping for High Rise Buildings

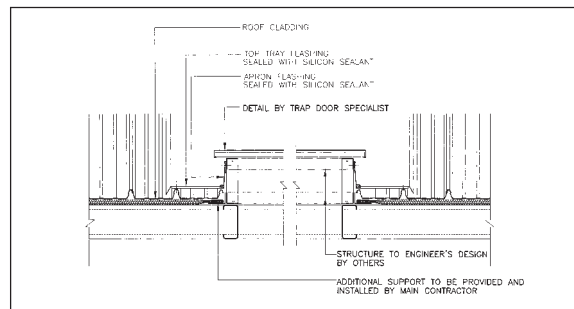
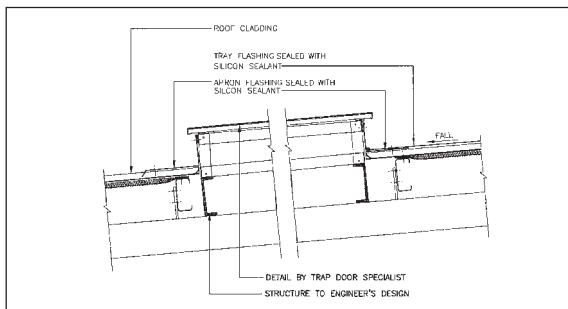


Roof Penetration

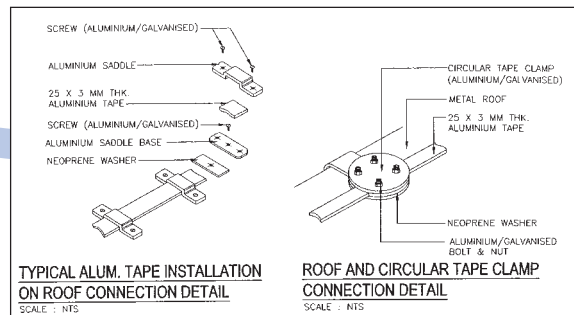
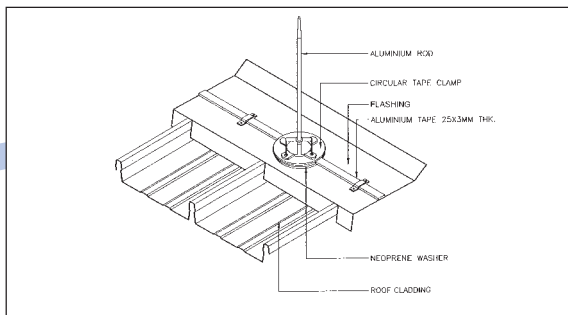
Wherever a roof penetration requires one or more of the sheet ribs to be cut, framing must be provided to support the cut ends of the roof sheeting each side of the penetration.



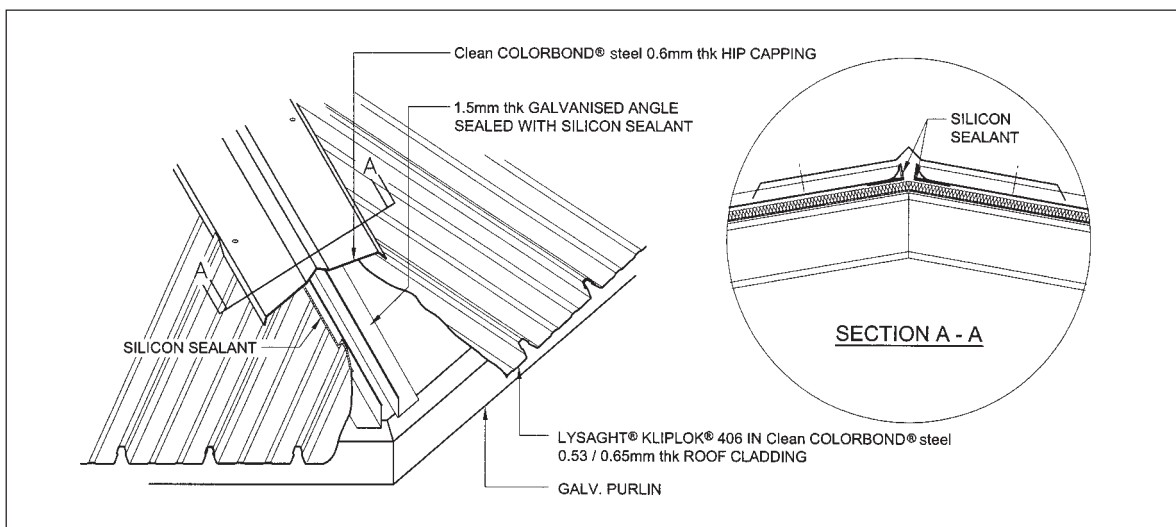
Trap Door



Lightning Conductor



Hip Capping



Method Statement

1. GENERAL PREPARATION

Delivery

Always check the material upon delivery. Check for damage and check material quantities against the delivery order. Note any damage or shortage at the time of delivery.

Handling

- Handling panel bundles and individual panels with care to avoid damages that can result from buckling and or bending of panels.
 - To lift the sheet bundles with crane directly from the delivery truck onto the roof frame for large building projects.
 - For long length sheets the use of spreader bar and approved sling is recommended.
 - For small to medium size projects, without mechanical handling facilities, sheets can be unloaded by hand and passed up to the roof at a time. For personal safety and to preserve the surface finish, sheets should be handled wearing clean dry gloves
- Do not slide sheets over the rough surfaces or over each other and do not drag tools etc over sheets.



- Store the panels and other materials in a dry, well-ventilated area and away from traffic. Elevate one end of the bundles so that any moisture that may have accumulated during transportation can run off.
- Be sure that air can be circulated freely around the bundles to avoid build-up of moisture.
- Never store the material in direct contact with the ground.



- Wear clean non-marking, soft-soled shoes when walking on the panels to avoid shoe marks on damage to the finish.
- Generally keep the load evenly distributed over both feet and not concentrate load on the heel or toe.
- When walking on roof sheeting:
 - Walk on the pans when you walk parallel to the ribs
 - Walk over or close to the roofing supports (i.e. the purlins) when you walk across the ribs
- Always take particular care when walking on wet or newly laid sheets – particularly on steeply pitched roofs
- If roof is subjected to heavy floor traffic during construction, provision of temporary working platform can minimise damage to finishing of the roof material.

Marking out

- A pencil of any color may be used except BLACK or so called LEAD pencils because the graphite content in black pencils can create an electric cell when wet and thus cause deterioration of the finish.
- Other recommended marking tools are a string line with chalk dust and a fine, felt-tipped marker.

Cutting

- Use of a power saw with a metal cutting steel blade is the best way to cut sheets on site because it generates larger and cooler particles than abrasive discs.
- Where possible, cutting should be minimised by using factory supplied cut-to-length sheets.
- Sheets cut on site should, where practicable, be cut on the ground, with the exterior colour finish of prepainted sheet facing down. Care should be taken to ensure hot swarf does not come into contact with nearby Clean COLORBOND® steel sheets.
- DO NOT cut over the top of other coated products where debris may fall onto clean sheets.
- Where cutting must be carried out near sheets already installed, the area around the cut must be masked and the stream of hot particles directed away from completed work.

Drilling

The area around the hole should be masked to shield the product from hot swarf.

Clean Up

Ensure that metallic particles are swept off sheet surfaces immediately following any cutting, drilling, etc.



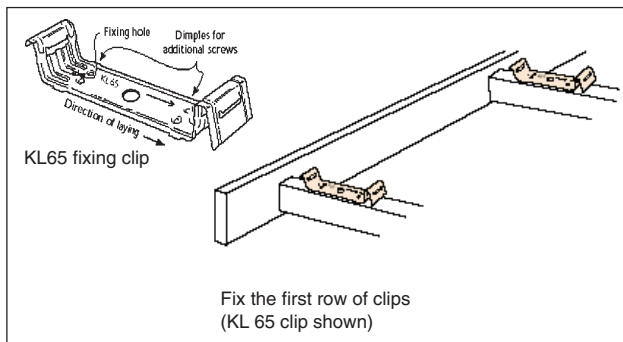
2. GENERAL ROOFING INSTALLATION PROCEDURE

- Prior to commencement of fixing, the installer should ensure that purlins, girts or battens are truly in place and that the slope requirements are met. Any adjustments found necessary should be made prior to proceeding with fixing, as they will be difficult or impossible to rectify later.
- When lifting sheets on to the roof frame ready for laying and fastening, care should be taken to make sure all sheets are the correct way up with the overlapping side towards the edge of the roof from which installation will commence. Otherwise sheets will have to be turned over and/or turned end for end. Sheet bundles should be placed over or near purlin supports, not at mid span of the purlins.
- The first sheet should be positioned with particular care before fastening, to ensure that it lies straight and square and is correctly located in relation to order building elements:
 - i. Transversely in relation to the barge-fascia or end-wall, bearing in mind the type of flashing or capping treatment to be used;
 - ii. Longitudinally in relation to gutter and ridge or barge-fascia or parapet or transverse wall.
- Roof sheets should overhang about 50mm into gutters.
- To prevent the LYSAGHT® KLIPLOK® 406 from sliding downward in the fixing clips, on very steep pitches, each sheet under the flashing or capping should be pierced-fix along the top of the sheets.

3. INSTALLATION OF LYSAGHT® KLIPILOK® 406 ROOFING SHEETS

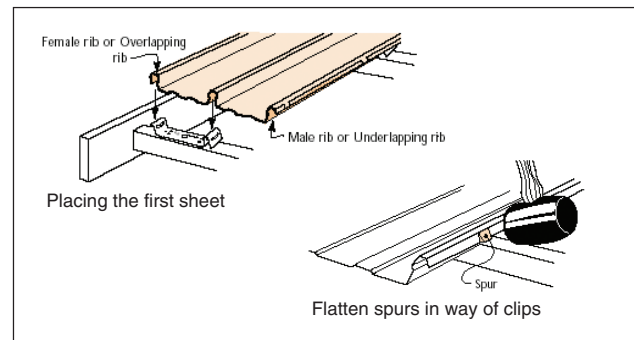
- a) When lifting roofing sheets earlier onto roof frames, ready for installation, make sure all sheets have overlapping female rib facing towards the side where fastening is to commence.

b) Fix the first row of KL 65 clips



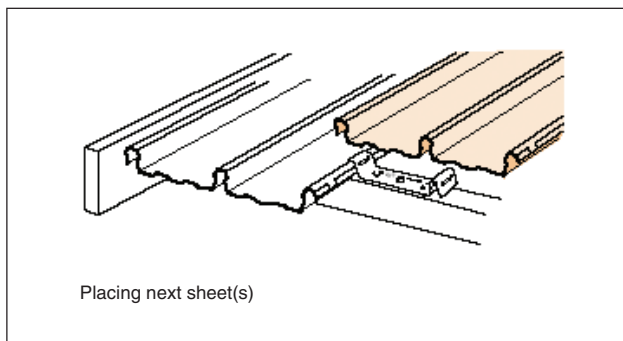
- The first run of KL65 clips have to be located and fastened, one onto each purlins, so that they will correctly engage in the female and centre ribs of the first sheeting when it is located over them. Fasten clips to the purlins at each of the sheet, having positioned them so that the first run of 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.

c) Place the first sheet



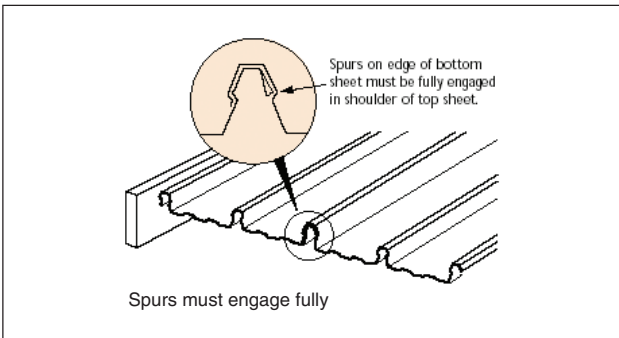
- Locate the first sheeting over the fasten run of clips, having fasten it longitudinally in relation to the eaves overhang and then fully engage on clips with foot pressure applied to the centre and female ribs over each clip.
- If the clips foul one of the spurs spaced along the outer free edge of 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.

d) Fix the next (and subsequent) clips & sheets



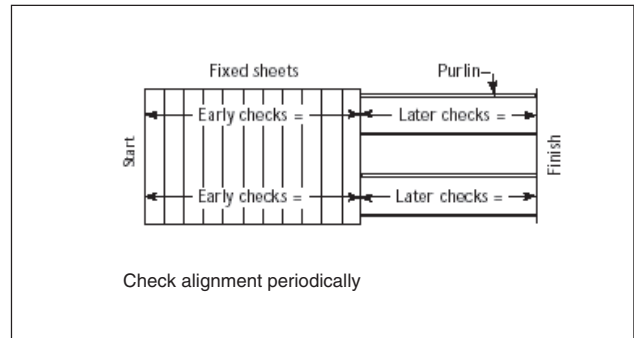
- Positioned the next run of clips, one to each purlins engage over the male ribs of the installed sheet and fasten each clip with the recommended wafer head fasteners.
- Place the second sheet over the second run of clips with the female rib overlapping the male rib of the first preceding sheet and the centre rib over the centre rib up-stand of the clips.

e) Make sure that the roofing sheets interlock completely



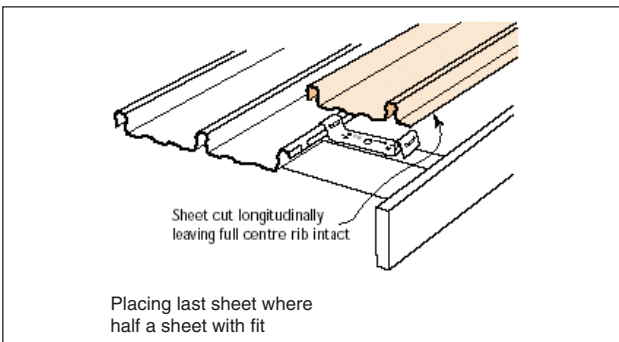
- The interlocking ribs and centre rib shall be fully engaged over each clip.
- The fully engagement can be done by walking along the full length of the sheeting being installed with one foot in the tray next to the overlapping female rib and the other foot applying pressure to the top of the interlocking 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.

f) Check alignment periodically

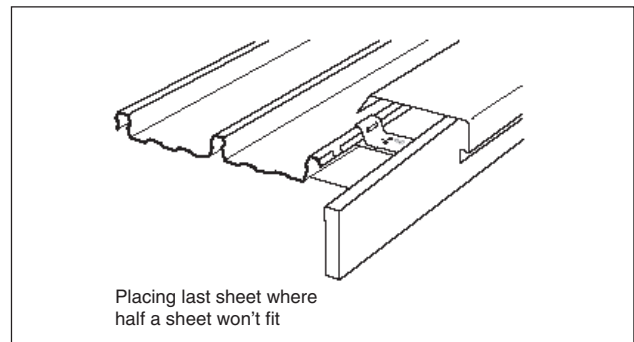


- Occasionally check that the sheets are still parallel with the first sheet, by taking two measurements across the width of the fixed sheeting.
- The string line can be used to ensure that the end of the roofing sheets is in line.

g) Place the last sheet



- Cut a sheet along its length leaving the centre rib complete if the space left between the last sheet and the fascia or parapet is more than half the width of a sheet.
- Place the cut sheet onto a row of clips, as for a full sheet.



- Fix the edge of the sheet at each purlin with a clip that has been cut in half if the space left between the last full sheet and the fascia or parapet is less than half the width of a sheet.

h) Flashings/ cappings

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

4. INSTALLATION OF LYSAGHT® KLIPILOK® 406 WALLING SHEETS

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



TIPS FOR INSPECTION

- ✓ Identify the type of roofing profile used
- ✓ Look out for any sign of corrosion to perforation
- ✓ Look out for any detachment of fasteners from roof and steel purlins/ structures
- ✓ Look out for any detachment of related flashing and capping
- ✓ Look out for roof penetrations such as vent pipes and trapdoors if there is any water stagnation
- ✓ Look out for any debris left during construction such as screws, nails and other trades debris
- ✓ Look out for the type of lightning conductor used (lead and copper are non-compatible materials)
- ✓ Look out for disengagement of LYSAGHT® KLIPILOK® 406 roof panel from each other
- ✓ Look out for deteriorated sealant used
- ✓ Look out for wall and flashing/capping abutments
- ✓ Look out for end laps and side laps of roof and flashing/capping

Cyberjaya Office Wing, Malaysia



Bedok Market at Blk 58, Singapore



Marine Terrace Market at Blk 50A, Singapore



Keppel Distri park, Singapore

Please contact our office in your respective area (country):

**BlueScope Lysaght
(Malaysia) Sdn Bhd**
No 6, Persiaran Kemajuan,
Seksyen 16, P.O.Box 2222,
Pusat Bisnes Bukit Raja,
40800 Shah Alam, Selangor Darul
Ehsan, Malaysia.
Tel: 603-55192000
Fax: 603-55105428

Penang
Tel: 604-320 0853/398 8935
Fax: 604-397 8553

Johore Bahru
Tel: 607-863 2660/2661
Fax: 607-863 3661

Pahang
Tel: 609-515 7836
Fax: 609-515 7834

Kuala Terengganu
Tel: 609-627 0337
Fax: 609-627 0338

www.bluescopesteel.com.my

**BlueScope Lysaght
(Singapore) Pte Ltd**
18 Benoi Sector,
Jurong Town
Singapore 629851.
Tel: 65-62641577
Fax: 65-62650951

www.bluescopesteel.com.sg

**BlueScope Lysaght
(Sabah) Sdn Bhd**
Lorong Kurma,
Off Jalan Kolombong,
88450 Kota Kinabalu,
P.O.Box 12152,
88823 Kota Kinabalu,
Sabah, Malaysia.
Tel: 6088-445161
Fax: 6088-421178

www.bluescopesteel.com.my

**BlueScope Lysaght
(Brunei) Sdn Bhd**
Industrial Complex,
Beribi Phase 1
6 Km., Jalan Gadong
Bandar Seri Begawan BE1118
Brunei Darussalam
Tel: 6732-447155
Fax: 6732-447154

www.bluescopesteel.com.bn

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