LYSAGHT SUPABRIDGE®

DESIGN & INSTALLATION MANUAL

BRIDGING AND INSULATION SYSTEM FOR LYSAGHT SUPAPURLIN® STRUCTURES

INSPIRATION TO BUILD BETTER

AUSTRALIAN STANDARDS

Australian Standard	Definition
AS 1301.448:2019	Methods of test for pulp and paper, Method 448: Tensile strength of paper and paperboard (constant rate of elongation method, 20 mm/min) (ISO 1924-2:2008, MOD)
AS 1397:2021	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1530.2-1993	Methods for fire tests on building materials, components and structures, Part 2: Test for flammability of materials
AS 1562.1:2018	Design and installation of sheet roof and wall cladding - Part 1: Metal
AS 4040.0-1992	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 4040.3:2018	Methods of testing sheet roof and wall cladding, Method 3: Resistance to wind pressures for cyclone regions
AS 4100:2020	Steel structures
AS 4200.1:2017	Pliable building membranes and underlays Materials
AS 4200.2:2017	Pliable building membranes and underlays Installation
AS 5637.1:2015	Determination of fire hazard properties, Part 1: Wall and ceiling linings
AS/NZS 1170.0:2002	Structural design actions - Part 0: General principles
AS/NZS 1170.1:2002	Structural design actions Part 1: Permanent , Imposed and other actions
AS/NZS 1170.2:2021	Structural design actions, Part 2: Wind actions
AS/NZS 1530.3:1999	Methods for fire tests on building materials, components and structures Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release (Reconfirmed 2016)
AS/NZS 3100:2022	Approval and test specification — General requirements for electrical equipment
AS/NZS 4201.1:1994	Pliable building membranes and underlays — Methods of test, Method 1: Resistance to dry delamination
AS/NZS 4201.2:1994	Pliable building membranes and underlays — Methods of test, Method 2: Resistance to wet delamination
AS/NZS 4201.4:1994	Pliable building membranes and underlays — Methods of test, Method 4: Resistance to water penetration
AS/NZS 4201.5:1994	Pliable building membranes and underlays — Methods of test, Method 5: Emittance
AS/NZS 4389:2015	Roof safety mesh
AS/NZS 4600:2018	Cold-formed steel structures
AS/NZS 4859.1:2018	Thermal insulation materials for buildings, Part 1: General criteria and technical provisions
AS/NZS 4859.2:2018	Thermal insulation materials for buildings Part 2: Design

Contents

1.0 LYSAGHT SUPABRIDGE®

1.0 INTRODUCTION & GENERAL NOTES

The LYSAGHT SUPABRIDGE® roofing system provides an innovative and safe alternate solution to roof raisers for compliance to Section J requirements of the National Construction Code (NCC). Section J is applicable to class 2 – 9 buildings.

The heart of the system is the unique and simple integrated LYSAGHT SUPABRIDGE® bridging system that replaces traditional purlin bridging to allow for installation of safety wire and uncompressed insulation within the roof purlin space. This system integrates seamlessly with LYSAGHT SUPAPURLINS®, SUPAZEDS® and/or SUPACEES®

This publication has been prepared with a view of providing designers, specifiers, fabricators, builders and erectors the relevant data to enable easy selection, specification and detailing of a roof or wall system using the new LYSAGHT SUPABRIDGE® system with the SUPAPURLIN® profile range.

This publication complements the SUPAPURLINS® SUPAZEDS® & SUPACEES® DESIGN AND INSTALLATION GUIDE FOR BUILDING PROFESSIONALS and should be used in conjunction with that document.

The information contained herein includes:

Product features, applications and benefits

Product detailing, installation and assembly

Design capacity information

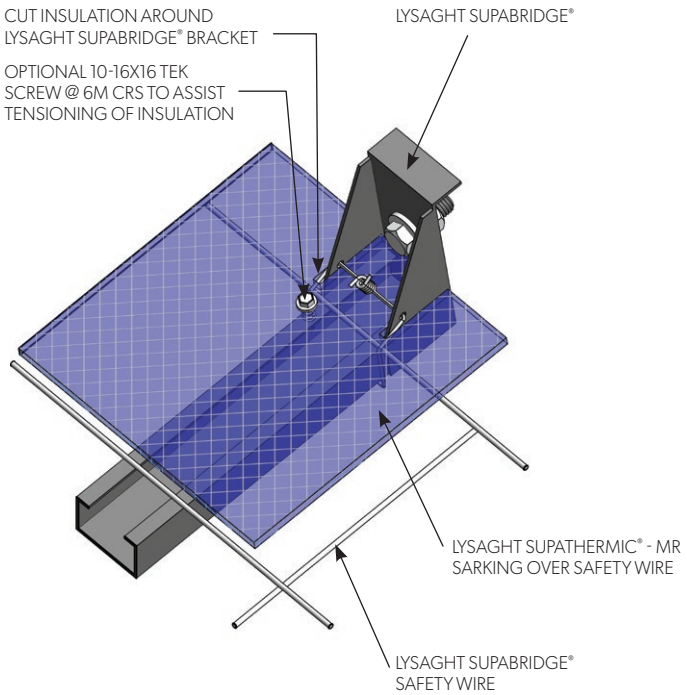
Information on design, construction and installation issues including profile orientation

Product dimensional data

Product ordering

Sample specification detail

FIGURE 1.0-1:



1.1 WARRANTY

Lysaght has always had the most comprehensive product warranties on the market that cover not only the corrosion performance of the material but also the structural and serviceability performance of a wide range of products. Lysaght can back their products with over 150 years' experience and credibility. The Lysaght brand is widely recognised as setting the benchmark on quality products and is trusted and respected by our customers and competitors nationwide. This tradition of warranty protection is now available on the range of LYSAGHT SUPAPURLIN® and LYSAGHT SUPABRIDGE® profiles. This warranty compliments the warranties available for the LYSAGHT® roof and wall cladding profiles that are commonly fixed to the purlins. The warranty is available subject to application and project size. Additional warranty periods with additional coating treatments are available subject to inquiry.

1.2 CORROSION PROTECTION & MATERIAL COMPATIBILITY

Some building materials and environmental conditions can be detrimental to coated steel products. These include contact with or exposure to run-off from:

- Industrial, agricultural, marine or other aggressive atmospheric conditions;
- Incompatible metals, like lead or copper;
- Building materials subject to cycles of dryness and wetness, or which have excessive moisture content such as improperly seasoned timber.
- Materials which have been treated with preservatives, like CCA or tanalith-treated timber.

A zinc coating of Z350 (350 g/m^2 minimum coating mass) is the standard coating class provided with LYSAGHT® Zed & Cee sections as well as SUPABRIDGE™ sections. This will provide a long and trouble-free life. For enclosed buildings and open-sided rural buildings, in a non-aggressive environment.

A non-aggressive environment maybe characterised as 1000m from rough surf, 750m from industrial emission and fossil fuel combustion, and 300m from calm salt waters. Consideration must be given to the nature of activities performed within the building. For more severe corrosive environments a Z450 (450 g/m^2 minimum coating mass) will be required. This heavier coating mass will be available in special circumstances and is subject to a minimum order quantity and extended lead times.

Direct contact of incompatible materials with the coating must be avoided. In such applications, and in very corrosive environments, suitable paint systems can be obtained from paint manufacturers: you can seek advice from our Information Line. In applications where particular attention is required for corrosion, or the build-up of substances like dust or grain, then consideration should be given to the shape of the sections (either Zed, or Cee, or Zed with down turned lip); orientation of the sections; and coating class. Further information is available from your nearest Lysaght Service Centre.

1.3 FEATURES APPLICATIONS & BENEFITS

When compared to Section J solutions utilising roof spacers, the SUPABRIDGE™ system provides a number of benefits.

1. Cost:
   a. The SUPABRIDGE™ system eliminates the need and costs for additional roof spacer components and their installation.
   b. The SUPABRIDGE™ system replaces traditional bridging systems and utilises standard purlin bolt connections, no need for additional tools.
2. Structural Performance:
   a. The SUPABRIDGE™ system allows direct fixing of sheeting or sheeting clips directly to the SUPAPURLIN® flange thus ensuring
      i. The maximum sheeting capacities are achieved via direct connection to thicker structural purlin members.
      ii. Lateral restraint is provided to purlins via direct connection of roof sheets to the purlins.
   b. In accordance with Australian Standards, Lysaght have conducted comprehensive testing of SUPAPURLIN® sections using the SUPABRIDGE™ bridging system to determine the structural capacities of SUPAPURLIN® using the SUPABRIDGE™ system.
3. Insulative Performance:
   a. Incorporated into the SUPABRIDGE™ system the SUPATHERMIC™ insulation range allows for a number of insulation configurations to achieve superior R-Values in accordance with NCC 2022 Section J requirements. The SUPATHERMIC™ product range provides the following benefits;
      i. Certified system R-Values for a variety of building configurations from R3.17 to R6.22.
      ii. Fire performance backed by testing to AS 1530.2 and AS/NZS 1503.3
      iii. Lightweight and compact providing easier installation on site
      iv. The system provides for "Blanket free" insulation solutions, providing a fibre-free, non-allergenic solution that is also easy to install.
4. Design:
   a. The SUPABRIDGE™ system utilises the purlin depth to provide required insulation and thus lowers the roof height as compared to roof spacer systems
5. Safety:
   a. The SUPABRIDGE™ system incorporates Roof Safety wire tested to AS/NZS 4389 and has been tested at UNSW and independently certified as a suitable fall restraint system for commercial / industrial roofing applications.
   b. The SUPABRIDGE™ system provides clear vision of the roof purlins
      i. Eliminating potential for roof spacer "roll over" during sheeting installation
      ii. Providing easy visualisation for roof fastener affixing.
   c. The SUPATHERMIC™ thermo cellular flame-retardant bubble core insulation system does not use Glass wool fibres removing the need for specialist PPE for installation.
6. Construction:
   a. The SUPABRIDGE™ system utilises existing traditional trades for integrated bridging, safety wire, insulation and roofing installation.
   b. The SUPABRIDGE™ system utilises fewer components than roof spacer systems reducing installation time and costs.
   c. SUPABRIDGE™ components are delivered pre-assembled and readily adjustable on site using traditional Purlin bolts significantly reducing installation time and costs.

1.4 APPLICABLE CLADDING PRODUCTS

The SUPABRIDGE™ system has been designed and tested for use with the full LYSAGHT® roofing and walling range, including ZENITH® cladding products. References in this manual to TRIMDEK®, SPANDEK® and KLIP-LOK® are purely by way of example only (representing the most popular roofing products in industrial applications) and not meant to convey any lack of compatibility between SUPABRIDGE™ and other LYSAGHT® roofing and walling products.

1.5 CLIMATE ZONE CONSIDERATIONS

1.5.1 CLIMATE ZONE 1

For applications in high humidity areas of climate Zone 1 such as Darwin or FNQ, consideration may be given to use of a Class 1 Vapour barrier such as Thermoseal 753 HD in lieu of SUPATHERMIC - 11, which is a Class 2 Vapour barrier.

TABLE 1.5.1-1:

Vapour Control Membrane (VCM) Classification

Vapour permeance (see Note) µg/N.s			
Class	**VCM Category**	**Min. (≥)**	**Max. (<)**
Class 1	Vapour barrier	0.0000	0.0022
Class 2		0.0022	0.1429
Class 3	Vapour permeable	0.1429	1.1403
Class 4		1.1403	No max.
	ASTM-E96 Method B Wet Cup – 23˚C 50%RH		

Note: Vapour permeance is the inverse of vapour resistance. It shall be calculated as follows: Vapour permeance µg/N.s = 1/(Vapour resistance MN .s/g)

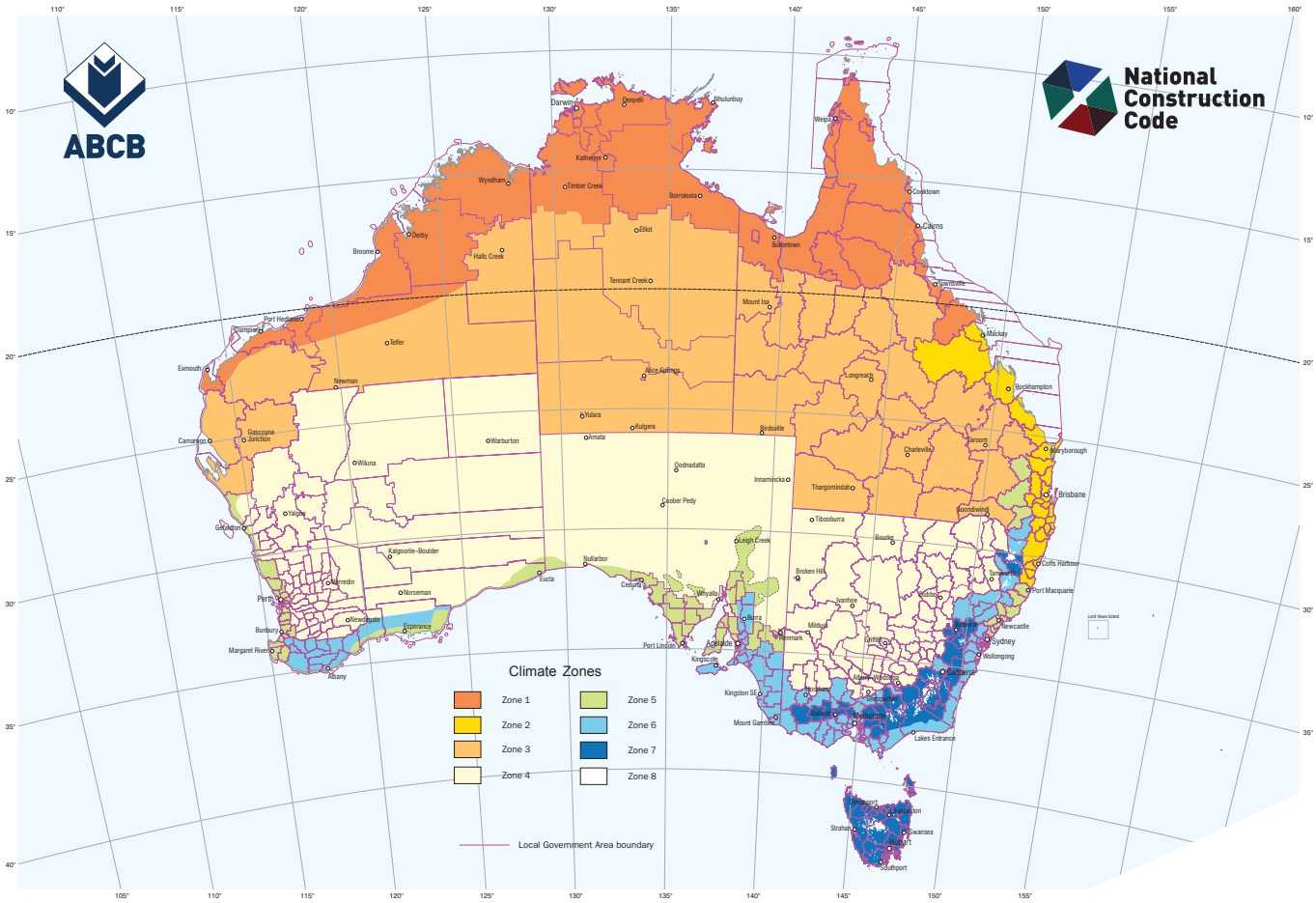
For systems utilising a Thermal Break Strip (TBS) this will result in a reduction of Rv 0.2 to the Rv Values published herein, if all other system elements are maintained.

For systems not utilising a Thermal Break Strip (TBS) this will result in a reduction of Rv 0.4 to the Rv Values published herein, if all other system elements are maintained.

1.5.2 CLIMATE ZONES 7 AND 8

The Published Rv Values in this document are for Summer or Heat flow down / inwards calculations. For climate zones requiring Winter or Heat flow up / outwards solutions please see your local Lysaght Branch for specialist assistance.

FIGURE 1.5.2-1:

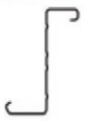


2.0 PRODUCT RANGE

The SUPABRIDGE™ system is applicable to the LYSAGHT SUPAPURLIN® range of Cee's and Zed's in the following sizes;

FIGURE 2.0-1:

TABLE 2.0-2:

Product	Depth (mm)	Thickness (mm)	Grade	Coating class	Purlin bolt requirements	Purlin shape and name	Bridging system
SZ/SC 150	152	1.0	G550	Z350	M12, grade 4.6 OR 8.8	SUPAZED®  SUPACEE® 	SUPABRIDGE™ bridging system at 1500mm centres to purlin top flange with 1 row of SUPABRIDGE™ bridging to purlin bottom flange at Midspan M12, Grade 4.6 bolts required for bridging to purlin connection
		1.2	G500				
		1.5	G450				
		1.9	G450				
		2.4	G450				
SZ/SC 200	203	1.2	G550				
		1.5	G500				
		1.9	G450				
		2.4	G450				
SZ/SC 250	254	1.5	G500				
		1.9	G450				
		2.4	G450				
SZ/SC 300	300	1.9	G450				
		2.4	G450				
		3.0	G450				
SZ/SC 350	350	2.4	G450				SUPABRIDGE™ SB - C150 bridging system at 1500mm centres M12, Grade 4.6 bolts required for bridging to purlin connection
		3.0	G450				
SZ/SC 400	400	2.4	G450				
		3.0	G450				
		3.2	G450				

2.1. SUPABRIDGE™ TELESCOPING BRIDGING MEMBERS

SUPABRIDGE™ is available in 2 depths and 4 telescoping sizes with both fixed (standard purlin to purlin connections) and adjustable end brackets (for ridge and fascia purlin connections). The four telescoping sizes cater for various purlin spacings between 300mm to 1300mm. The Standard 110mm SUPABRIDGE™ (SB110) brackets are used for all projects utilising a ceiling space with the 170mm SUPABRIDGE™ (SB170) bracket required for Open shed applications without a ceiling space or projects requiring higher R-Values.

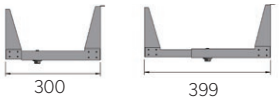
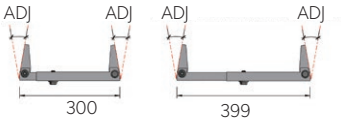
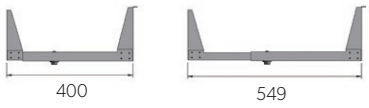
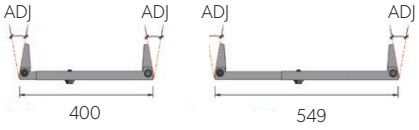
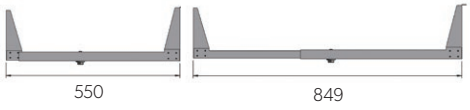
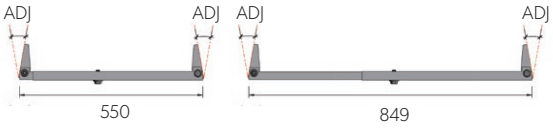
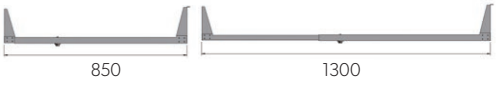
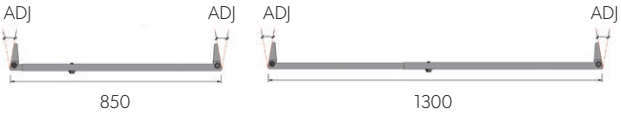
- 300*mm - 400mm
- 400mm - 550mm
- 550mm - 850mm
- 850mm - 1300⁺mm

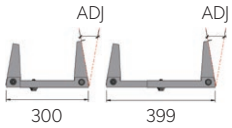
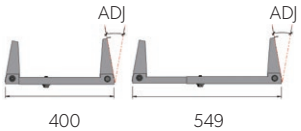
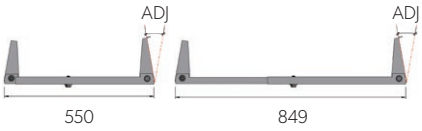
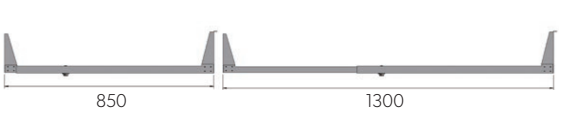
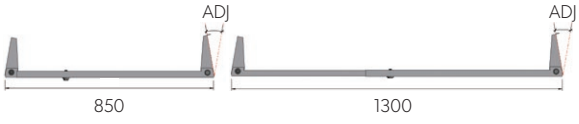
*For purlin spacings less than 300mm, the 300-400mm brackets maybe readily cut down on site to accommodate

⁺The SUPABRIDGE™ system is not suitable for purlin spacings greater than 1300mm

TABLE 2.1-1:

SUPABRIDGE™ Bracket configurations

SUPABRIDGE™ Bracket sizes	Standard 110 Bracket (Buildings with Ceilings)	Adjustable angle (both side) 110 Bracket (Buildings with Ceilings)
Length adjustable between 300mm - 400mm		
Length adjustable between 400mm - 550mm		
Length adjustable between 550mm - 850mm		
Length adjustable between 850mm - 1300*mm		

	Standard 170 Bracket (Open Warehouse Buildings without Ceilings)	Adjustable angle (both side) 170 Bracket (Open Warehouse Buildings without Ceilings)
Length adjustable between 300mm - 400mm		
Length adjustable between 400mm - 550mm		
Length adjustable between 550mm - 850mm		
Length adjustable between 850mm - 1300*mm		

The optimal purlin spacing for the system is 1300mm as this aligns with both roofing safety wire and insulation widths. For spacings below 1300mm roofing safety wire and insulation may be readily cut onsite to accommodate purlin spacings.

In addition to the fixed angle SUPABRIDGE™ sizes, SUPABRIDGE™ is available with adjustable end brackets to facilitate connections at fascia purlins and or ridge purlins. The adjustable end brackets can accommodate roof pitches up to 20 degrees (20° range adjustment outboard - 20° range adjustment inboard).

* The SUPABRIDGE™ system is not suitable for purlin spacings greater than 1300mm. SUPABRIDGE™ brackets will however expand to a maximum of 1350mm to cater for minor onsite spacing inconsistencies.

2.2. SUPATHERMIC™ INSULATION RANGE

The SUPATHERMIC™ range incorporates both tradition blanket and sarking products as well as the primary aluminium foil lined bubble core insulation products.

2.2.1 SUPATHERMIC™ - 11

SUPATHERMIC™ - 11 simultaneously performs as a thermal break, vapour barrier, and radiant heat barrier. This next generation multi-layered cellular insulation is fibre-free, non-allergenic, and formaldehyde free providing an installer safe solution which is also easy to install.

FIGURE 2.2.1-1:

SUPATHERMIC™ - 11 insulation layers

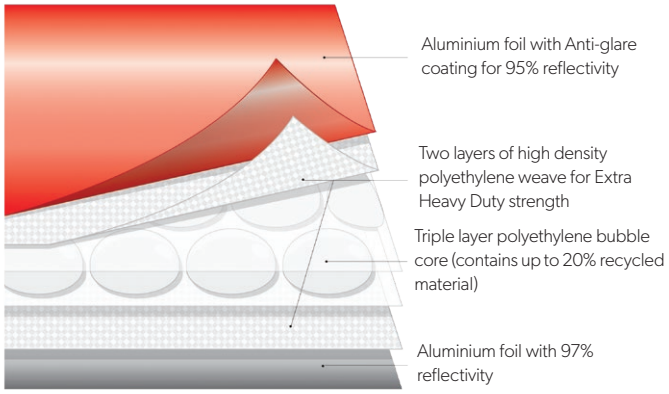


TABLE 2.2.1-2:

Product Detail - SUPATHERMIC™-11

Roll width	Roll Length	Thickness	Coverage Area	Roll Weight
1350mm	22.25m	11mm	30m^2	12.5kg (approx.)

TABLE 2.2.1-3:

SUPATHERMIC™ - 11 complies with AS/NZS 4859.1 and AS 4200.1 and should be installed in accordance with AS 4200.2. The product is rated in accordance with the following;

Test	Description	Parameter
ASTM E - 408	Emissivity	Reflective Silver 0.03 / Anti-Glare 0.05
AS/NZS 4859.1 APP - 1	Surface Corrosion	Pass
ASTM 1530.2	Flammability Index	Low (≤ 5)
ATSM 1530.3	Early Fire Hazard	0/0/0/1
AS 1301.448	Duty Rating, *Tensile Strength*	EXTRA HEAVY DUTY
TAPPI T470	Duty Rating, *Edge Tear Resistance*	EXTRA HEAVY DUTY
AS/NZS 4201.1	Resistance to Dry Delamination	Pass
AS/NZS 4201.2	Resistance to Wet Delamination	Pass
AS/NZS 4201.4	Water Control Classification	Water Barrier
ASTM E-96	Vapour Classification (VCM)	Class 2, Vapour Barrier
AS/NZS 3100	Electrical Conductivity	Electrically Conductive

NB; SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 can be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.

2.2.2 SUPATHERMIC™ - MR SARKING

SUPATHERMIC™ - MR Sarking bonds aluminium foil with a high strength reinforced polymer mesh via a flame retardant adhesives to provide a radiant heat barrier that is simple to install.

FIGURE 2.2.2-1:

SUPATHERMIC™ - MR Sarking insulation

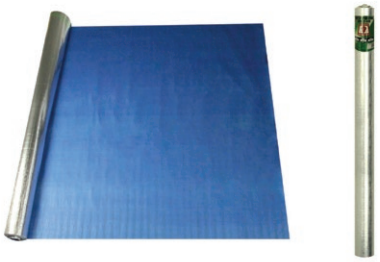


TABLE 2.2.2-2:

Roll width	Roll Length	Thickness	Roll Area
1350mm	30m	≤1mm	40.5m^2
	60m		81m^2

TABLE 2.2.2-3:

SUPATHERMIC™ - MR Sarking complies with AS/NZS 4859.1 and AS 4200.1 and should be installed in accordance with AS 4200.2. The product is rated in accordance with the following;

Test	Description	Parameter
AS/NZS 4201.5	Method of test Emittance	Reflective - Silver side 0.03/ Antiglare side 0.05
AS/NZS 4859.1 APP - 1	Surface	Pass
ATSM 1530.2 - 1993 (R2016)	Flammability	Low <5
AS 1301.448	Duty Rating, *Tensile Strength*	Machine direction min 12.5kN/M
		Lateral direction min 7.5kN/M
TAPPI T470	Edge tear resistance	Machine direction min 80N
		Lateral direction min 80N
AS/NZS 4201.1	Resistance to Wet	Pass
AS/NZS 4201.2	Resistance to Dry Delamination	Pass
AS/NZS 4201.4	Resistance to water	Water Barrier
AS/NZS 3100	Electrical	Electrically Conductive

2.2.3 SUPATHERMIC™ MR-PB SARKING

SUPATHERMIC™ MR-PB Sarking bonds Aluminium foil layers with a high density kraft paper via a flame retardant adhesives to provide a vapour barrier and radiant heat barrier that is simple to install.

FIGURE 2.2.3-1:

SUPATHERMIC™ MR-PB Sarking insulation

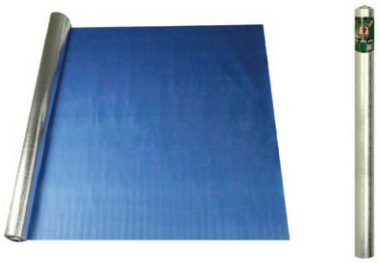


TABLE 2.2-2:

Roll width	Roll Length	Thickness	Roll Area
1350mm	30m	≤1mm	40.5m^2
	60m		81m^2

TABLE 2.2.3-3:

SUPATHERMIC™ MR-PB Sarkings complies with AS/NZS 4859.1 and AS 4200.1 and should be installed in accordance with AS 4200.2. The product is rated in accordance with the following;

Test	Description	Parameter
AS/NZS 4201.5	Method of test Emittance	Reflective - Silver side 0.03/ Antiglare side 0.05
AS/NZS 4859.1 APP - 1	Surface	Pass
ATSM 1530.2 - 1993 (R2016)	Flammability	Low <5
AS 1301.448	Duty Rating, *Tensile Strength*	Machine direction min 12.5kN/M
		Lateral direction min 7.5kN/M
TAPPI T470	Edge tear resistance	Machine direction min 80N
		Lateral direction min 80N
AS/NZS 4201.1	Resistance to Wet	Pass
AS/NZS 4201.2	Resistance to Dry Delamination	Pass
AS/NZS 4201.4	Resistance to water	Water Barrier
AS/NZS 3100	Electrical	Electrically Conductive

2.2.3 SUPATHERMIC™ - 80

SUPATHERMIC™ - 80 is a bonded blanket insulation used for open warehouse applications serving as a radiant heat barrier. The foil facing to the blanket may be either the traditional silver faced foil or white faced to provide an improved ceiling aesthetic without compromising insulative performance. The 1300mm foil facing is centrally bonded to the 1200mm wide blanket to provide alignment with the SUPABRIDGE™ purlin spacings.

FIGURE 2.2.3-1:

SUPATHERMIC™ - 80

TABLE 2.2.3-2:

Product Detail - SUPATHERMIC™ - 80

Roll width	Roll Length	Thickness	Coverage Area	Roll Weight
1200mm + 2 x 50mm overlap flap	15lm	75mm	18m^2	18kg (approx.)

SUPATHERMIC™ - 80 complies with AS/NZS 4859.1 and should be installed in accordance with AS 4200.2. The product is rated in accordance with the following

TABLE 2.2.3-3:

Test	Description	Parameter
AS/NZS 4201.5	Method of test Emittance	Reflective - Silver side 0.0.3/ Antiglare side 0.05
AS/NZS 4859.1 APP - 1	Surface corrosion	Pass
ATSM 1530.1 - 1994 (R2016)	Combustibility	Non-Combustible
ATSM 1530.2 - 1993 (R2016)	Flammability Index	Low <5
AS/ISO 9705 AND AS 5637.1	Fire assessment Classification	Group 1
AS 1301.448	Duty Rating, *Tensile Strength*	Machine direction min 12.5kN/M
		Lateral direction min 7.5kN/M
TAPPI T470	Edge tear resistance	Machine direction min 80N
		Lateral direction min 80N
AS/NZS 4201.1	Resistance to Wet Delamination	Pass
AS/NZS 4201.2	Resistance to Dry Delamination	Pass
AS/NZS 4201.4	Resistance to water penetration	Water Barrier
AS/NZS 3100	Electrical	Electrically Conductive

2.2.4 SUPATHERMIC™ - 100

SUPATHERMIC™ - 100 is a bonded blanket insulation used for open warehouse applications serving as a radiant heat barrier. The foil facing to the blanket may be either the traditional silver faced foil or white faced to provide an improved ceiling aesthetic without compromising insulative performance. The 1300mm foil facing is centrally bonded to the 1200mm wide blanket to provide alignment with the SUPABRIDGE™ purlin spacings.

FIGURE 2.2.4-1:

SUPATHERMIC™ - 100

TABLE 2.2.4-2:

Product Detail - SUPATHERMIC™ - 100

Roll width	Roll Length	Thickness	Coverage Area	Roll Weight
1200mm + 2 x 50mm overlap flap	10lm	100mm	12m^2	20kg (approx.)

SUPATHERMIC™ - 100 complies with AS/NZS 4859.1 and should be installed in accordance with AS 4200.2. The product is rated in accordance with the following

TABLE 2.2.4-3:

Test	Description	Parameter
AS/NZS 4201.5	Method of test Emittance	Reflective - Silver side 0.0.3/ Antiglare side 0.05
AS/NZS 4859.1 APP - 1	Surface corrosion	Pass
ATSM 1530.1 - 1994 (R2016)	Combustibility	Non-Combustible
ATSM 1530.2 - 1993 (R2016)	Flammability Index	Low <5
AS/ISO 9705 AND AS 5637.1	Fire assessment Classification	Group 1
AS 1301.448	Duty Rating, *Tensile Strength*	Machine direction min 12.5kN/M
		Lateral direction min 7.5kN/M
TAPPI T470	Edge tear resistance	Machine direction min 80N
		Lateral direction min 80N
AS/NZS 4201.1	Resistance to Wet Delamination	Pass
AS/NZS 4201.2	Resistance to Dry Delamination	Pass
AS/NZS 4201.4	Resistance to water penetration	Water Barrier
AS/NZS 3100	Electrical	Electrically Conductive

2.3. SUPATHERMIC™ - TBS 4410

SUPATHERMIC™ - TBS 4410 is black polyethylene foam with an adhesive one side used as a thermal break strip in steel frame construction as required in the NCC.

AVAILABILITY

SUPATHERMIC™-TBS 4410 - R0.2 Thermal Break Strip is 10mm thick and 48mm wide and is available in 10m long rolls.

FIGURE 2.3-2:

SUPATHERMIC™-TBS 4410

TABLE 2.3.-1:

Property	Test Method	UOM	Data
Hardness	ASTMD-2240	Shore 00	30
Force to compress 25% compression	ISO 844	kPa	35
Compression set- @ 25% compression	ISO 1856C	%	19
Water absorption (7 days)	N/A	%	<0.5
Dimensional change on heating 22 hours @ 70˚C (%) - MD	CNS 10487	%	-2
Dimensional change on heating 22 hours @ 70˚C (%) - CD		%	-0.6
Tensile strength - MD	ISO 1926	kPa	305
Tensile strength - CD			205
Percentage elongation - MD		%	150
Percentage elongation - CD			160
Thermal conductivity (k factor)			
Thermal conductivity 50/90	ASTM C518-2017		
Thermal conductivity and thermal resistance calculated in accordance with AS/NZS 4859.1, Clause 2.3.3.5		W/m.k	0.29
Material R-Value	N/A		>R0.02
Service temperature	N/A	˚C	-40 - 90
Application temperature			10 - 40
180˚ peel adhesion	PSTC - 101	kPa	>305

2.4. SUPABRIDGE™ SAFETY WIRE

SUPABRIDGE™ safety wire is manufactured in Australia from Australian Steel. The 1200mm wide x 50 metre long rolls are specifically designed to align to the SUPABRIDGE™ optimum spacings of 1300mm. The galvanised wire is 2mm diameter with the mesh size being 300mm x 150mm in line with Australian Standard Requirements.

SUPABRIDGE™ utilises roof safety wire that meets the requirements of AS/NZS 4389. Additionally the SUPABRIDGE™ system has been tested at UNSW and independently certified as a suitable fall restraint system for commercial / industrial roofing applications.

3.0 SUPABRIDGE™ INSULATIVE PROPERTIES

3.1 THERMAL INSULATION PERFORMANCE

The SUPABRIDGE™ system comprising LYSAGHT SUPAPURLINS®, SUPABRIDGE™, SUPATHERMIC™ insulation and safety wire can be optimised to suit a range of building applications providing Summer Rv values from between R3.17 m^2xK/W to >R6.22 m^2xK/W. Higher R-Values are achievable via a mixture of insulation material for bespoke building solutions and advise should be sought from Lysaght for projects seeking higher thermal R-Values.

Rv calculations for the system are based on:

- AS/NZS 4859.1 – Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 – Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods
- ISO 13789:2017 – Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void has been calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacings or purlin base metal thickness, than nominated in the tables, thermal bridging will change and alter Total R.
- Calculations assume safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. Tables in this manual may not be reproduced except in full. Results may not be quoted without reference to the attached notes and drawings.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

The data in this section is partitioned by Building types. Building types are grouped into two types - Open Warehouse and Closed Buildings, with Closed buildings having ceilings. Building element arrangements for each building type and sub type are set out at 3.1.1 through to 3.1.2.

3.1.1 OPEN WAREHOUSE BUILDING

Typically, Class 7b or Class 8 buildings under the NCC, as the name suggests an Open warehouse is a building without a ceiling.

CLASS 7 BUILDINGS

CLASS 8 BUILDINGS

A range of SUPABRIDGE™ Bracket and SUPATHERMIC™ insulation combinations are available for Open Warehouses as shown in Table 3.1.1-1

OPEN WAREHOUSE BUILDING INSULATION OPTIONS PREVIEW

TABLE 3.1.1-1:

Building Type	Ceiling Type	SUPABRIDGE™ Bracket Size	Purlin Size Range	Insulation Layers			Indicative R Value*	Section	Manual Section
				Top Layer	Thermal Break Strip	Bottom Layer			
Open	Nil	SB 170	SC/SZ 200-300	SUPATHERMIC™ - 11	LYSAGHT SUPATHERMIC® - TBS	SUPATHERMIC™-80	>R4.0	3.1.1.1	OB Option 1 - Open Building - SB 170 - ST11-STTBS-ST80
				SUPATHERMIC™ - 11	LYSAGHT SUPATHERMIC® - TBS	SUPATHERMIC™-100	>R4.3	3.1.1.2	OB Option 2 - Open Building - - ST11-STTBS-ST100
		SB 150	SC/SZ 350-400	SUPATHERMIC™ - 11	LYSAGHT SUPATHERMIC® - TBS	SUPATHERMIC™-100	>R3.6	3.1.1.3	OB Option 3 - Open Building - SB 150 - ST11-STTBS-ST100

* indicative based a nominal purlin, 1300mm purlin spacing and roof pitch 5°-9°. Some combinations of values may fall below the indicative range. Please review detailed tables for specific information.

3.1.1.1 OB OPTION 1 - OPEN WAREHOUSE BUILDING - SUPABRIDGE™ SB 170 / SUPATHERMIC™ - 80 / SUPATHERMIC™ - TBS 4410 / SUPATHERMIC™ - 11.

FIGURE 3.1.1.1-1:

Open Warehouse building (without ceiling) insulation configuration

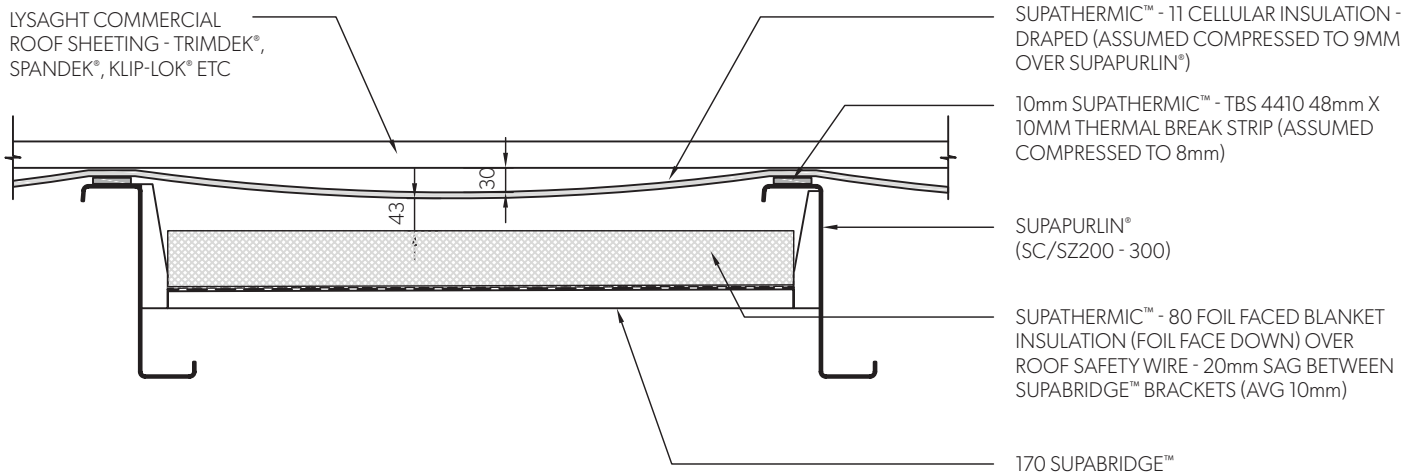


TABLE 3.1.1.1-2:

SUPABRIDGE™ insulative performance - OPEN WAREHOUSE Option 1

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
System Ab3 Open Warehouse	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.8 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire.	(no Ceiling)	SC/SZ 20012	3.81	4.07	3.81	4.07	3.78	4.05	3.73	3.98	3.68	3.92
			20024	3.65	3.94	3.65	3.94	3.63	3.92	3.58	3.86	3.53	3.80
			25015	3.81	4.07	3.81	4.07	3.78	4.05	3.73	3.98	3.68	3.92
			25024	3.69	3.98	3.69	3.98	3.67	3.96	3.62	3.89	3.57	3.83
			30019	3.79	4.06	3.79	4.06	3.77	4.04	3.71	3.97	3.66	3.91
			30030	3.68	3.97	3.68	3.97	3.66	3.95	3.61	3.88	3.56	3.83

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings - Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

For Open warehouse applications the insulation system comprises 3 insulative layers. In order of installation these are;

1. SUPATHERMIC™ - 80 foil faced blanket
2. SUPATHERMIC™ - TBS 4410 thermal break strip
3. SUPATHERMIC™ - 11 cellular insulation and thermal break

SUPATHERMIC™ - 80 foil face blanket is placed in between purlins over SUPABRIDGE™ 170 brackets and safety wire components. The standard blanket is designed for the optimal purlin spacing of 1300mm to provide a close foil fit to the purlins and to mold around SUPABRIDGE™ 170 brackets. For purlin spacings under 1300mm the SUPATHERMIC™ - 80 will need to be cut on site to fit neatly between the purlins.

SUPATHERMIC™ - TBS 4410 thermal break strip is then applied to the tops of the SUPAPURLIN®.

SUPATHERMIC™ 11 is then installed over the purlins and SUPATHERMIC™ - TBS 4410 tape as per AS 4200.2 (reflective face down) with all joins lapped and taped, as per AS 4200.2 clause 3.3.1, providing both insulation and an additional thermal break between the roof framing and roof sheeting. SUPATHERMIC™-11 must be draped[1] in between purlins to provide an airspace between the insulation and roof sheeting as shown in Fig 3.1.1.1-1.

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

3.1.1.2 OB - OPTION 2 - OPEN WAREHOUSE BUILDING - SUPABRIDGE™ SB 170 / SUPATHERMIC™ - 100 / SUPATHERMIC™ - TBS 4410 / SUPATHERMIC™ - 11.

FIGURE 3.1.1.2-1:

Open Warehouse building (without ceiling) insulation configuration

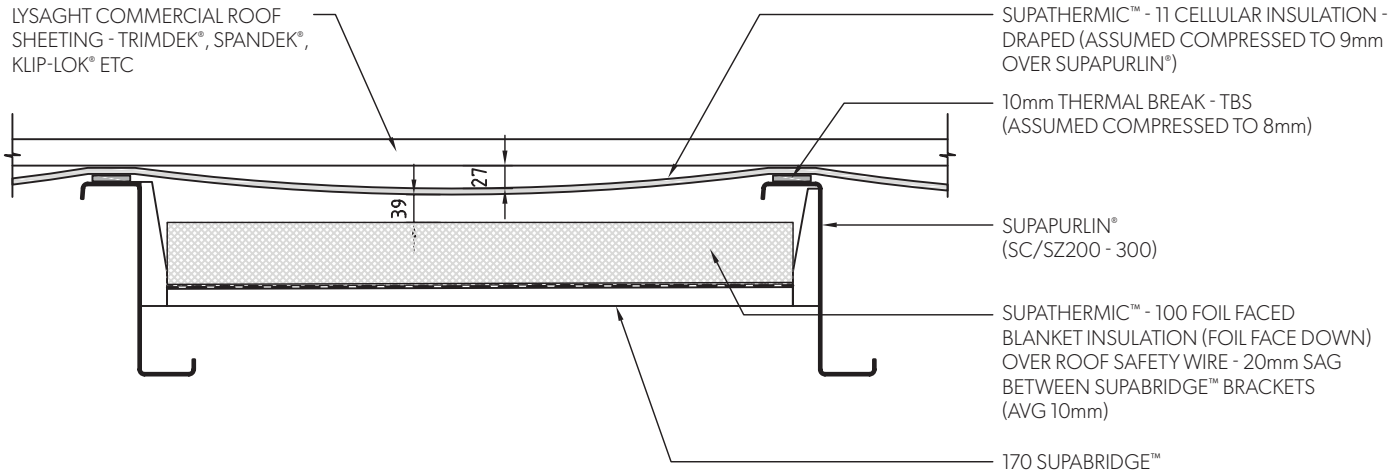


TABLE 3.1.1.2-1:

SUPABRIDGE™ insulative performance - OPEN WAREHOUSE Option 2

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
Open Warehouse	LYSAGHT® roofing, LYSAGHT SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire.	(no Ceiling)	SC/SZ										
			20012	4.03	4.34	4.03	4.34	4.03	4.34	4.00	4.30	3.97	4.27
			20024	3.85	4.19	3.85	4.19	3.85	4.19	3.82	4.16	3.80	4.13
			25015	4.03	4.34	4.03	4.34	4.03	4.34	4.00	4.30	3.97	4.27
			25024	3.90	4.23	3.90	4.23	3.90	4.23	3.87	4.20	3.84	4.17
			30019	4.01	4.33	4.01	4.33	4.01	4.33	3.98	4.29	3.96	4.26
			30030	3.89	4.22	3.89	4.22	3.89	4.22	3.86	4.19	3.84	4.16

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 – Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

For Open warehouse applications the insulation system comprises 3 insulative layers. In order of installation these are;

1. SUPATHERMIC™ - 100 foil faced blanket
2. SUPATHERMIC™ - TBS 4410 thermal break strip
3. SUPATHERMIC™ - 11 cellular insulation and thermal break

SUPATHERMIC™ - 100 foil face blanket is placed in between purlins over SUPABRIDGE™ 170 brackets and safety wire components. The standard blanket is designed for the optimal purlin spacing of 1300mm to provide a close fit to the purlins and to mold around SUPABRIDGE™ 170 brackets.

For purlin spacings under 1300mm the SUPATHERMIC™ 100 will need to be cut on site to fit neatly between the purlins.

SUPATHERMIC™ - TBS 4410 thermal break strip is then applied to the tops of the SUPAPURLIN®.

SUPATHERMIC™ - 11 is then installed over the purlins and SUPATHERMIC™ - TBS tape as per AS 4200.2 (reflective face down) with all joins lapped and taped as per AS 4200.2 clause 3.3.1 providing both insulation and an additional thermal break between the roof framing and roof sheeting. SUPATHERMIC™ 11 must be draped[1] in between purlins to provide an airspace between the insulation and roof sheeting as shown in Fig 3.1.1.2-1 [1].

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40) With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

3.1.1.3 OB OPTION 3 - OPEN WAREHOUSE BUILDING - SUPABRIDGE™ SB C150 / SUPATHERMIC™ - 100 / SUPATHERMIC™ - TBS 4410 / SUPATHERMIC™ - 11.

Suitable for SUPAPURLIN® sizes 350 and 400mm this option utilises the standard LYSAGHT® 350 series bridging at 1500mm centres to support the safety wire and insulation. Airspaces and SUPATHERMIC™ - 11 drape is shown in Figure 3.1.1.3-1.

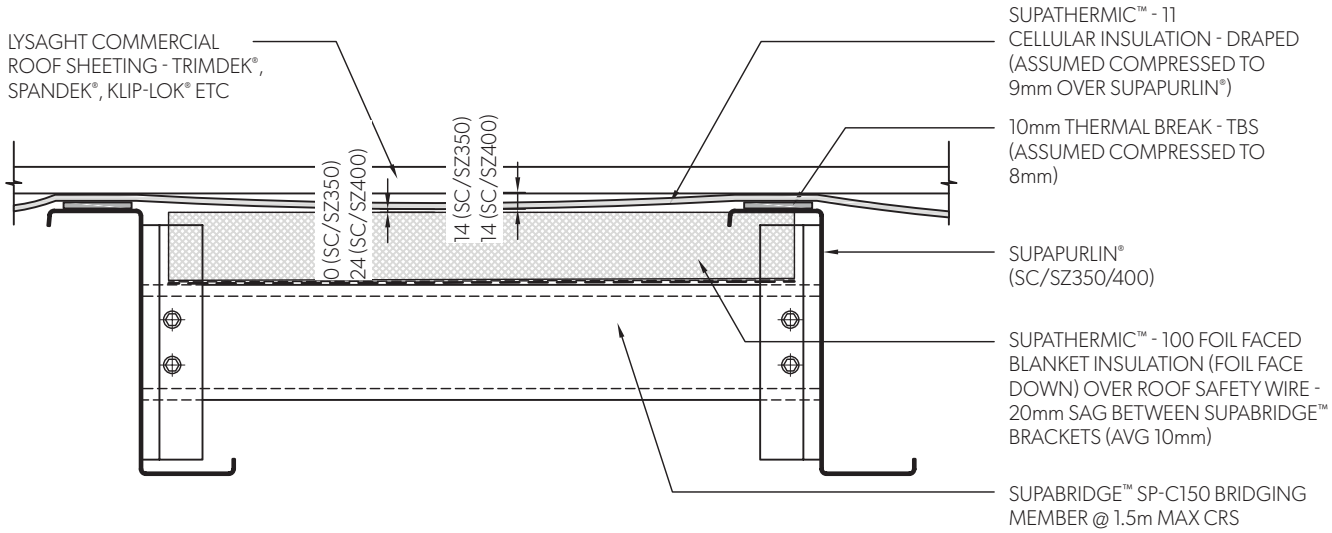


TABLE 3.1.1.3-1:

SUPABRIDGE™ insulative performance - OPEN WAREHOUSE Option 3

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
System Ab4 Open Warehouse	LYSAGHT® roofing SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), LYSAGHT SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ SP-C150, safety wire.	(no Ceiling)	SC/SZ 35024	3.43	3.64	3.43	3.64	3.43	3.64	3.43	3.64	3.43	3.64
			SC/SZ 35030	3.39	3.61	3.39	3.61	3.39	3.61	3.39	3.61	3.39	3.61
			SC/SZ 40024	3.83	4.10	3.83	4.10	3.83	4.10	3.83	4.10	3.83	4.10
			SC/SZ 40032	3.75	4.04	3.75	4.04	3.75	4.04	3.75	4.04	3.75	4.04

Calculations based on

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications"
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

As shown, at Figure 3.1.1.3-1 the system arrangement, in order of installation is;

- 350 or 400 SUPAPURLIN®
- SUPABRIDGE™ SB C150 Series 350 bridging
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 100 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 0mm airspace (for SC/SZ 350) 24mm airspace (for SC/SZ 400)
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11 Insulation installed ridge to eave directly over SUPATHERMIC™ - TBS 4410 Thermal Break strip with 14mm drape between purlins[1]
- 14mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

3.1.2 CLOSED BUILDINGS WITH CEILINGS

Closed buildings with ceilings are typically Class 5,6 or 9 buildings as defined by NCC 2022.

TABLE 3.1.2-1:
Closed buildings with ceilings

 **CLASS 5 BUILDINGS**	Class 5 buildings are office buildings that are used for professional or commercial purposes, excluding Class 6, 7, 8 or 9 buildings. Examples of Class 5 buildings are offices for lawyers, accountants, general medical practitioners, government agencies and architects.
 **CLASS 6 BUILDINGS**	Class 6 buildings are typically shops, restaurants and cafés. They are a place for the sale of retail goods or the supply of services direct to the public. Some examples are: • A dining room, bar, shop or kiosk part of a hotel or motel • A hairdresser or barber shop • A public laundry • A market or showroom • A funeral parlour • A shopping centre
 **CLASS 9 BUILDINGS**	Class 9 buildings are buildings of a public nature. Class 9 buildings include three sub classifications: Class 9a, Class 9b and Class 9c. Class 9a buildings are generally hospitals which are referred to in the NCC as health-care buildings Class 9b buildings are assembly buildings in which people may gather for social, theatrical, political, religious or civil purposes. They include schools, universities, childcare centres, pre-schools, sporting facilities, night clubs, or public transport buildings. Class 9c buildings are aged care buildings.

TABLE 3.1.2-2:
Closed building insulation options overview:

Building Type	Ceiling Type	SUPABRIDGE™ Bracket Size	Purlin Size Range	Insulation Layers			Indication R Value*	Section
				Top Layer	Thermal Break Strip	Bottom layer		
Closed	Horizontal	SB 110	SC/SZ 150-300	SUPATHERMIC™ - 11		SUPATHERMIC™ - MR	>R4.0	3.1.2.1
				SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - MR	>R4.2	3.1.2.2
				SUPATHERMIC™ - MR	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R4.3	3.1.2.3
		SB 170	SC/SZ 200-300	SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R5.45	3.1.2.4
				SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 100	>R5.83	3.1.2.5
		SB-C150	SC/SZ 350-400	SUPATHERMIC™ - MR-PB	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R4.61	3.1.2.6
Closed	Raked / Parallel	SB 110	SC/SZ 150-300	SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R4.13	3.1.2.7
		SB 170	SC/SZ 200-300	SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R5.13	3.1.2.8
				SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 100	>R5.50	3.1.2.9
		SB-C150	SC/SZ 350-400	SUPATHERMIC™ - MR-PB	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R4.38	3.1.2.10

* Indicative based on 300mm ceiling depth, SS/SZ 20012 purlin, 1300mm purlin spacing and roof pitch 5°-9°. Some combination of values may fall below the indicative range. Please review detailed tables for specific information.

For all these applications the insulation principles remain the same utilising two reflective insulation layers sandwiching air spaces.

Insulation performance for Closed Buildings with ceilings benefit from the additional airspace beneath the SUPABRIDGE™ system. As a consequence, we have provided certified insulative performance based on 4 ceiling depths. These ceiling depths are measured below the roof sheeting. Rv values are provided for both Parallel / Raked Ceilings and traditional Horizontal ceilings. For Horizontal ceilings average ceiling depths should be used. Average ceiling depths for Horizontal ceilings have also been provided for 5 roof pitch ranges.

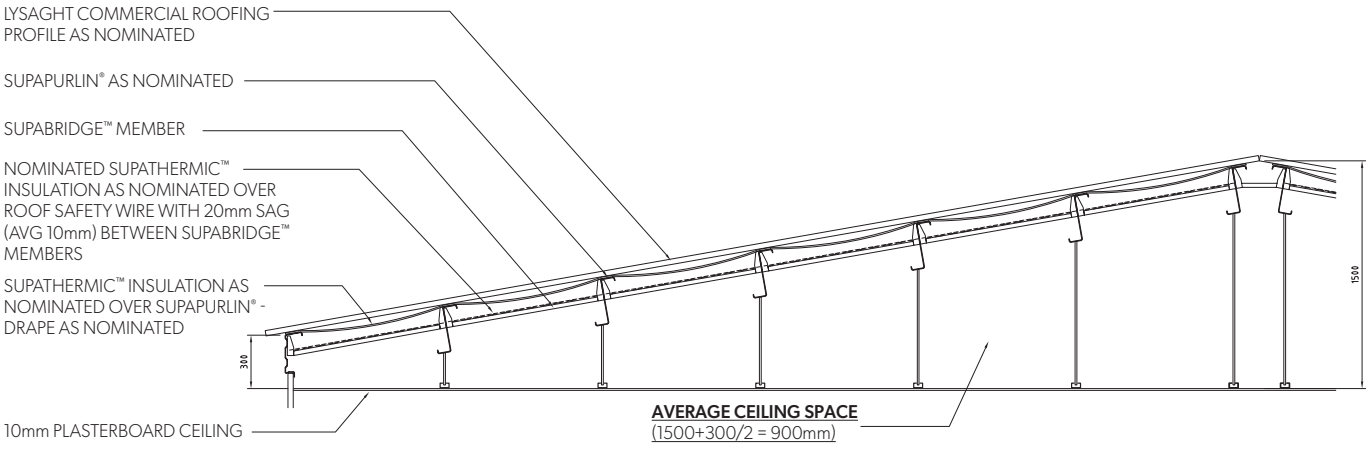
TABLE 3.1.2-3:

Minimum Ceiling Depth	Pitch				
	0° - 4°	5° - 9°	10° - 14°	15° - 22°	22.5°
	Average Ceiling Depth				
300mm	475mm	914mm	1363mm	1973mm	2371mm
600mm	775mm	1214mm	1663mm	2273mm	2671mm
900mm	1075mm	1514mm	1963mm	2573mm	2971mm
1200mm	1375mm	1814mm	2263mm	2873mm	3271mm

For applications where a ceiling space is greater than the average ceiling depth noted, increased R_V maybe assumed

FIGURE 3.1.2-4:

SUPABRIDGE™ horizontal ceiling space



HORIZONTAL CEILINGS – SUPABRIDGE™ 110 BRACKETS

SUPABRIDGE™ 110 brackets provide an economical thermal solution to provide Summer R-Values in excess of R3.7 for many applications. SUPABRIDGE™ 170 may be used in those situations where SUPABRIDGE™ 110 brackets are unable to provide project Rv requirements. SUPABRIDGE™ - 110 brackets are suitable to use with LYSAGHT SUPAPURLIN® sizes between SC/SZ 200 and SC/SZ 300.

There are 3 insulation arrangements for SB110 Brackets and Horizontal ceilings.

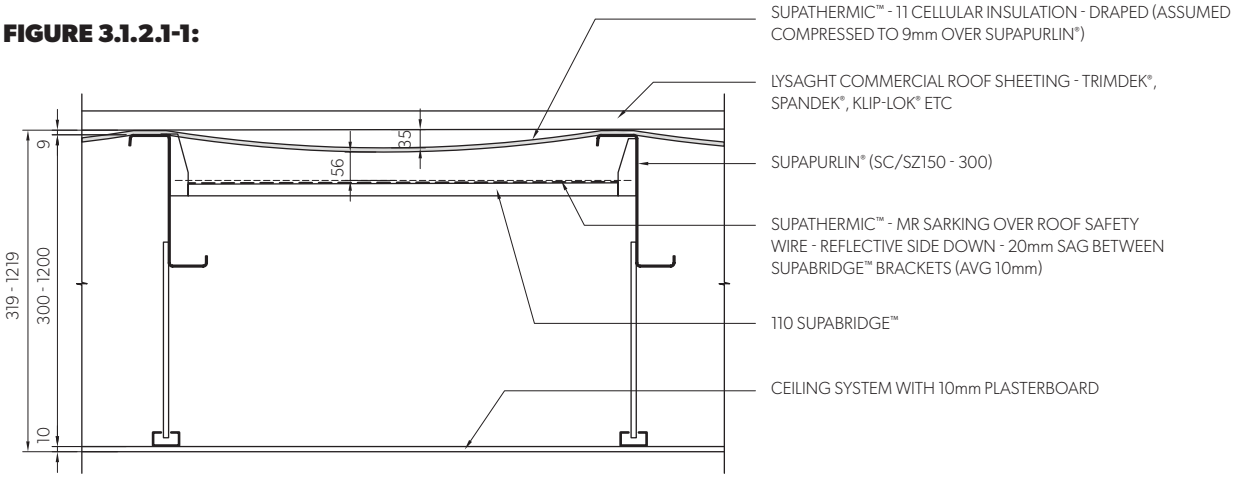
TABLE 3.1.2-5 :

Building Type	Ceiling Type	SUPABRIDGE™ Bracket Size	Purlin Size Range	Insulation Layers			Indicative R Value	Section	Manual Section
				Top Layer	Thermal Break Strip	Bottom Layer			
Closed	Horizontal	SB 110	SC/SZ 150-300	SUPATHERMIC™ - 11		SUPATHERMIC™ - MR	>R4.0	3.1.2.1	OB Option 1 - Closed Building - Horizontal Ceiling - SB 110-ST11--STMR
				SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - MR	>R4.2	3.1.2.2	OB Option 2 - Closed Building - Horizontal Ceiling - SB 110-ST11--STTBS-STMR
				SUPATHERMIC™ - 11	SUPATHERMIC™ - TBS	SUPATHERMIC™ - 80	>R4.4	3.1.2.3	OB Option 3 - Closed Building - Horizontal Ceiling - SB 110 - ST11--STTBS -ST80

3.1.2.1 CB OPTION 1 CLOSED BUILDING – HORIZONTAL CEILING SUPABRIDGE™ - 110 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - MR.

This option is suitable for lower pitch applications below 14° with light coloured roofs (Solar Absorptance ≤ 0.40) providing Summer R-Values >R3.7 in this range. For roof pitches greater than 14° the addition of SUPATHERMIC™ - TBS 4410 is required to achieve R-Values >R3.7. This is covered at section 3.1.2.2

FIGURE 3.1.2.1-1:



As shown, at Figure 3.1.2.1-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB110 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 100 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- SUPATHERMIC™ - MR Sarking installed directly above the SUPABRIDGE™ safety wire
- 61mm airspace
- SUPATHERMIC™ - TBS 4410 Thermal Break strip to top flange of the SUPAPURLIN®
- SUPATHERMIC™ - 11[1] insulation installed ridge to eave directly over purlins with 35mm drape[1] between purlin
- 38mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.1-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
Buildings with SUPABRIDGE™ 110 Brackets and Horizontal Ceilings													
			Void Average Depth:	475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, (no thermal break tape), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ 15012	4.04	4.23	3.89	4.07	3.64	3.80	3.38	3.51	3.32	3.45
			15024	3.98	4.19	3.84	4.03	3.60	3.76	3.34	3.48	3.28	3.42
			20012	4.07	4.25	3.92	4.09	3.67	3.82	3.40	3.53	3.35	3.47
			20024	4.00	4.20	3.86	4.04	3.61	3.77	3.47	3.63	3.30	3.43
			25015	4.06	4.25	3.92	4.09	3.67	3.82	3.40	3.67	3.35	3.32
			25024	4.01	4.21	3.88	4.06	3.63	3.79	3.49	3.50	3.18	3.30
			30019	4.05	4.24	3.92	4.09	3.66	3.81	3.40	3.66	3.21	3.32
			30030	4.01	4.20	3.87	4.05	3.63	3.78	3.48	3.63	3.17	3.30
			Void Average Depth:	775mm		1214mm		1663mm		2273mm		2671mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, (no thermal break tape), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ 15012	4.13	4.33	3.90	4.08	3.64	3.79	3.37	3.50	3.31	3.45
			15024	4.07	4.29	3.84	4.04	3.59	3.76	3.32	3.61	3.27	3.41
			20012	4.16	4.36	3.93	4.10	3.67	3.82	3.52	3.66	3.34	3.47
			20024	4.09	4.30	3.86	4.05	3.60	3.77	3.46	3.62	3.28	3.43
			25015	4.16	4.36	3.93	4.10	3.67	3.82	3.52	3.66	3.34	3.47
			25024	4.10	4.31	3.88	4.06	3.62	3.78	3.48	3.63	3.30	3.44
			30019	4.15	4.35	3.92	4.10	3.66	3.81	3.52	3.66	3.33	3.46
			30030	4.10	4.31	3.87	4.06	3.62	3.78	3.47	3.63	3.30	3.43
			Void Average Depth:	1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, (no thermal break tape), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ 15012	4.20	4.41	3.92	4.10	3.65	3.80	3.50	3.65	3.32	3.45
			15024	4.14	4.36	3.86	4.06	3.60	3.77	3.45	3.61	3.27	3.42
			20012	4.23	4.44	3.95	4.13	3.67	3.83	3.53	3.67	3.34	3.47
			20024	4.16	4.38	3.88	4.07	3.61	3.78	3.47	3.63	3.29	3.43
			25015	4.23	4.44	3.95	4.12	3.67	3.83	3.53	3.67	3.34	3.47
			25024	4.18	4.39	3.90	4.09	3.63	3.79	3.48	3.64	3.30	3.44
			30019	4.22	4.43	3.94	4.12	3.67	3.82	3.52	3.67	3.34	3.47
			30030	4.17	4.39	3.90	4.08	3.63	3.79	3.48	3.64	3.30	3.44
			Void Average Depth:	1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, (no thermal break tape), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ 15012	4.25	4.47	3.94	4.12	3.65	3.81	3.50	3.66	3.32	3.46
			15024	4.19	4.42	3.88	4.08	3.60	3.77	3.46	3.62	3.28	3.42
			20012	4.29	4.50	3.97	4.15	3.68	3.83	3.53	3.68	3.35	3.48
			20024	4.21	4.44	3.90	4.10	3.62	3.79	3.47	3.63	3.29	3.43
			25015	4.29	4.50	3.97	4.15	3.68	3.83	3.53	3.68	3.35	3.48
			25024	4.23	4.45	3.92	4.11	3.64	3.80	3.49	3.64	3.31	3.44
			30019	4.28	4.49	3.96	4.14	3.68	3.83	3.53	3.67	3.34	3.47
			30030	4.23	4.45	3.92	4.11	3.63	3.80	3.49	3.64	3.30	3.44

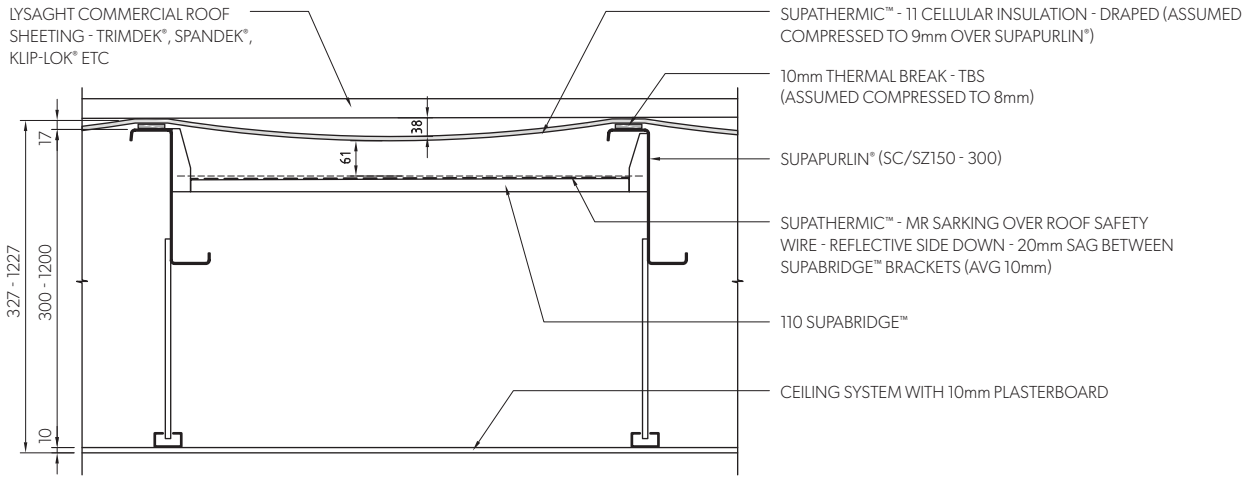
Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

3.1.2.2 CB OPTION 2 CLOSED BUILDING - HORIZONTAL CEILING SUPABRIDGE™ - 110 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - MR.

This option ads an additional Thermal Break strip to CB Option 1 Closed Building – Horizontal Ceiling SB 110-ST-STMR to provide greater Summer R-Values.

FIGURE 3.1.2.2-1:



As shown, at Figure 3.1.2.2-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB110 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - MR Sarking installed directly above the SUPABRIDGE™ safety wire,
- 61mm airspace
- SUPATHERMIC™ - TBS 4410 Thermal Break strip to top flange of the SUPAPURLIN®
- SUPATHERMIC™ - 11[1] insulation installed ridge to eave directly over purlins with 38mm drape between purlins
- 38mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.2-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPABRIDGE™ 110 BRACKETS & HORIZONTAL CEILINGS (with TBS)													
			Void Average Depth:	475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ 15012	4.20	4.37	4.04	4.20	3.78	3.92	3.62	3.75	3.43	3.54
			15024	4.15	4.34	4.00	4.17	3.75	3.89	3.58	3.71	3.39	3.51
			20012	4.22	4.39	4.06	4.21	3.80	3.93	3.64	3.76	3.45	3.55
			20024	4.17	4.35	4.01	4.18	3.76	3.90	3.59	3.72	3.40	3.52
			25015	4.22	4.38	4.06	4.21	3.81	3.94	3.64	3.76	3.45	3.55
			25024	4.18	4.35	4.03	4.18	3.77	3.91	3.60	3.73	3.42	3.53
			30019	4.21	4.38	4.06	4.21	3.80	3.93	3.64	3.76	3.45	3.55
			30030	4.17	4.35	4.02	4.18	3.77	3.91	3.60	3.73	3.42	3.53
			Void Average Depth:	775mm		1214mm		1663mm		2273mm		2671mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ 15012	4.29	4.48	4.13	4.30	3.89	4.04	3.61	3.73	3.43	3.54
			15024	4.25	4.44	4.08	4.27	3.85	4.01	3.57	3.71	3.38	3.50
			20012	4.32	4.50	4.16	4.32	3.91	4.06	3.64	3.76	3.45	3.55
			20024	4.26	4.45	4.10	4.28	3.86	4.02	3.58	3.72	3.39	3.51
			25015	4.32	4.50	4.16	4.32	3.91	4.06	3.64	3.76	3.45	3.55
			25024	4.28	4.46	4.11	4.29	3.87	4.03	3.59	3.73	3.40	3.52
			30019	4.31	4.49	4.15	4.32	3.91	4.05	3.63	3.76	3.44	3.55
			30030	4.27	4.46	4.11	4.29	3.87	4.03	3.59	3.72	3.40	3.52
			Void Average Depth:	1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ 15012	4.39	4.57	4.09	4.25	3.92	4.06	3.63	3.75	3.43	3.54
			15024	4.34	4.54	4.05	4.22	3.88	4.03	3.59	3.73	3.41	3.53
			20012	4.42	4.59	4.12	4.27	3.95	4.09	3.66	3.78	3.46	3.56
			20024	4.36	4.55	4.07	4.23	3.89	4.04	3.62	3.74	3.42	3.53
			25015	4.41	4.59	4.12	4.27	3.95	4.09	3.66	3.78	3.46	3.56
			25024	4.37	4.56	4.08	4.24	3.90	4.05	3.63	3.75	3.42	3.53
			30019	4.41	4.59	4.11	4.27	3.94	4.08	3.65	3.77	3.46	3.56
			30030	4.37	4.56	4.08	4.24	3.90	4.05	3.62	3.75	3.42	3.53
			Void Average Depth:	1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - MR Sarking, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ 15012	4.47	4.65	4.13	4.28	3.95	4.09	3.66	3.78	3.46	3.57
			15024	4.43	4.62	4.09	4.25	3.91	4.07	3.62	3.75	3.43	3.54
			20012	4.49	4.67	4.15	4.30	3.98	4.12	3.68	3.79	3.48	3.58
			20024	4.44	4.63	4.10	4.26	3.93	4.08	3.63	3.76	3.44	3.55
			25015	4.49	4.67	4.15	4.30	3.98	4.12	3.68	3.79	3.48	3.58
			25024	4.45	4.64	4.12	4.27	3.94	4.08	3.65	3.77	3.45	3.56
			30019	4.49	4.67	4.15	4.30	3.98	4.11	3.68	3.79	3.48	3.58
			30030	4.45	4.64	4.11	4.27	3.94	4.08	3.65	3.77	3.45	3.56

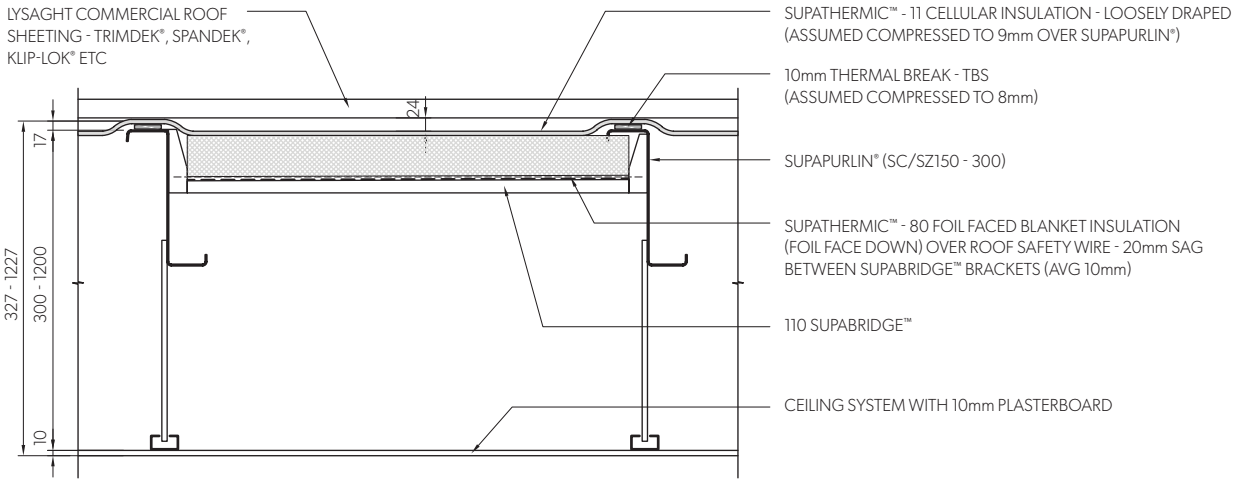
Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2: Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

3.1.2.3 CB OPTION 3 CLOSED BUILDING - HORIZONTAL CEILING SUPABRIDGE™ - 110 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80.

This option adds SUPATHERMIC™ - 80 foil faced blanket to the system provide increased R-Values at roof pitches above 4° and provide summer >R3.7 for roof pitches above 14°.

FIGURE 3.1.2.3-1:



As shown, at Figure 3.1.2.3-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB110 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11 insulation[1] installed ridge to eave directly over purlins with 24mm drape between purlins to sit over the SUPATHERMIC™ - 80
- 24mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.3-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPABRIDGE™ 110 BRACKETS & HORIZONTAL CEILINGS, R1.8 BLANKET (with TBS)													
		Void Average Depth:		475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ										
			15012	4.25	4.43	4.22	4.40	4.07	4.24	3.91	4.06	3.79	3.94
			15024	4.21	4.39	4.18	4.37	4.03	4.20	3.85	4.02	3.74	3.89
			20012	4.28	4.44	4.25	4.42	4.10	4.26	3.93	4.07	3.82	3.95
			20024	4.22	4.40	4.20	4.38	4.04	4.22	3.87	4.03	3.75	3.90
			25015	4.27	4.44	4.25	4.42	4.11	4.26	3.93	4.07	3.82	3.95
			25024	4.23	4.41	4.21	4.39	4.06	4.23	3.88	4.04	3.78	3.93
			30019	4.26	4.44	4.24	4.41	4.09	4.25	3.93	4.07	3.81	3.95
			30030	4.22	4.41	4.21	4.39	4.06	4.22	3.88	4.03	3.78	3.92
		Void Average Depth:		775mm		1214mm		1663mm		2273mm		2671mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ										
			15012	4.59	4.70	4.48	4.60	4.28	4.39	4.06	4.17	3.92	4.03
			15024	4.55	4.68	4.45	4.58	4.25	4.37	4.03	4.15	3.90	4.01
			20012	4.59	4.71	4.50	4.61	4.29	4.41	4.08	4.18	3.94	4.04
			20024	4.56	4.69	4.46	4.59	4.26	4.38	4.04	4.16	3.91	4.02
			25015	4.59	4.71	4.50	4.61	4.29	4.41	4.08	4.18	3.94	4.04
			25024	4.57	4.69	4.47	4.59	4.27	4.39	4.05	4.17	3.91	4.03
			30019	5.28	5.19	5.17	5.08	4.94	4.86	4.70	4.62	4.54	4.47
			30030	5.28	5.19	5.17	5.08	4.94	4.86	4.70	4.62	4.54	4.47
		Void Average Depth:		1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ										
			15012	4.67	4.79	4.42	4.53	4.29	4.41	4.07	4.18	3.93	4.04
			15024	4.64	4.77	4.39	4.51	4.27	4.39	4.04	4.16	3.90	4.02
			20012	4.68	4.80	4.43	4.54	4.31	4.42	4.08	4.19	3.94	4.05
			20024	4.65	4.78	4.40	4.52	4.28	4.40	4.05	4.17	3.91	4.02
			25015	4.68	4.80	4.43	4.54	4.31	4.42	4.08	4.19	3.94	4.05
			25024	4.66	4.78	4.41	4.53	4.28	4.40	4.06	4.17	3.92	4.03
			30019	5.38	5.29	5.08	5.00	4.96	4.87	4.70	4.62	4.55	4.47
			30030	5.38	5.29	5.08	5.00	4.96	4.87	4.70	4.62	4.55	4.47
		Void Average Depth:		1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ										
			15012	4.75	4.87	4.45	4.56	4.32	4.43	4.09	4.19	3.94	4.05
			15024	4.72	4.85	4.43	4.55	4.29	4.41	4.06	4.18	3.92	4.03
			20012	4.76	4.88	4.47	4.57	4.33	4.44	4.10	4.21	3.96	4.06
			20024	4.73	4.86	4.44	4.55	4.30	4.42	4.07	4.18	3.93	4.04
			25015	4.76	4.88	4.47	4.57	4.33	4.44	4.10	4.21	3.96	4.06
			25024	4.74	4.86	4.44	4.56	4.31	4.42	4.08	4.19	3.94	4.04
			30019	4.76	4.88	4.46	4.57	4.33	4.44	4.10	4.20	3.96	4.06
			30030	4.73	4.86	4.44	4.56	4.31	4.42	4.08	4.19	3.93	4.04

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

HORIZONTAL CEILINGS – SUPABRIDGE™ 170 BRACKETS

The SUPABRIDGE™ 170 bracket is 60mm deeper than the SUPABRIDGE™ 110 bracket providing greater insulative airspace and improved thermal performance. It is suitable for use with SUPAPURLIN® from SC / SZ 200 to SC / SZ 300.

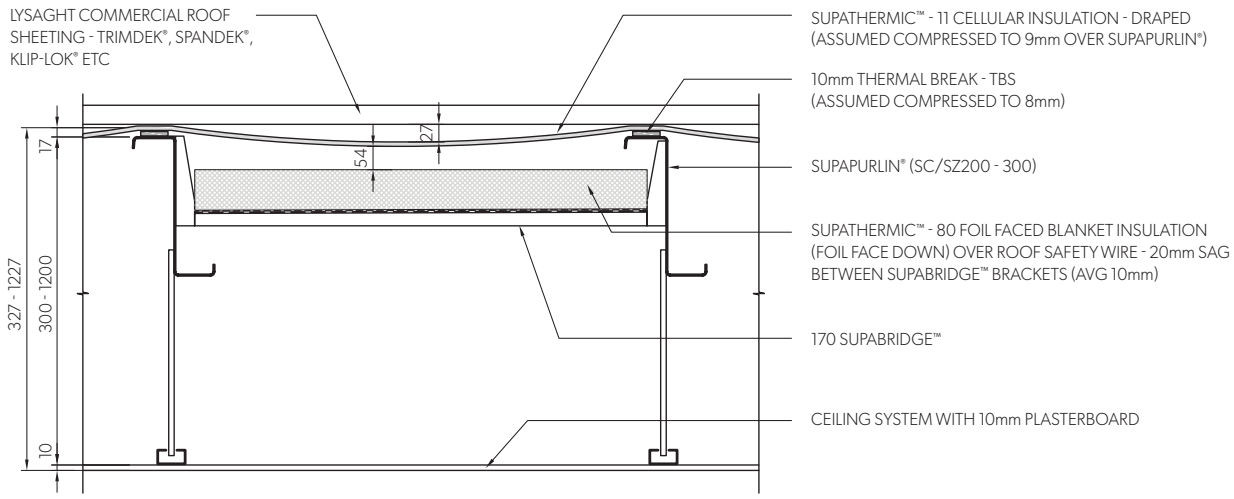
There are two insulation options for the SB170 brackets with horizontal ceilings.

TABLE 3.1.2.3-3:

Building Type	Ceiling Type	SUPABRIDGE™ Bracket Size	Purlin Size Range	Insulation Layers			Indicative R Value	Section	Manual Section
				Top Layer	Thermal Break Strip	Bottom Layer			
Closed	Horizontal	SB 170	SC/SZ 200-300	SUPATHERMIC™-11	SUPATHERMIC™-TBS	SUPATHERMIC™-80	>R4.9	3.1.2.5	CB Option 4 - Closed Building - Horizontal Ceiling - SB 170 - ST11-STTBS-ST80
				SUPATHERMIC™-11	SUPATHERMIC™-TBS	SUPATHERMIC™-100	>R3.6	3.1.2.6	CB Option 5 - Closed Building - Horizontal Ceiling - SB 170 - ST11-STTBS-ST100

3.1.2.4 CB OPTION 4 CLOSED BUILDING - HORIZONTAL CEILING SUPABRIDGE™ - 170 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80.

FIGURE 3.1.2.4-1:



As shown, at Figure 3.1.2.4-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB170 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 54mm airspace
- SUPATHERMIC™ - TBS 4410 installed directly to the top flange of the SUPAPURLIN®
- SUPATHERMIC™ - 11[1] Insulation installed ridge to eave directly over SUPATHERMIC™ - TBS 4410 and purlins with 27mm drape between purlins
- 27mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.4-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
System Cb170	**BUILDINGS WITH SUPABRIDGE™ 170 BRACKETS & HORIZONTAL CEILINGS (with TBS)**												
		Void Average Depth:		475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ 20012	5.24	5.53	5.18	5.45	4.97	5.23	4.76	4.99	4.61	4.83
			20024	5.16	5.46	5.09	5.39	4.89	5.17	4.66	4.92	4.51	4.75
			25015	5.24	5.52	5.18	5.45	4.99	5.24	4.76	4.99	4.61	4.83
			25024	5.17	5.47	5.12	5.41	4.92	5.19	4.68	4.93	4.55	4.79
			30019	4.36	4.82	4.32	4.76	4.20	4.61	4.05	4.42	3.95	4.30
			30030	4.21	4.68	4.17	4.64	4.05	4.49	3.92	4.31	3.82	4.20
		Void Average Depth:		475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ 20012	5.37	5.67	5.21	5.49	4.99	5.25	4.76	5.00	4.61	4.83
			20024	5.28	5.60	5.13	5.43	4.91	5.19	4.67	4.93	4.52	4.82
			25015	5.37	5.66	5.21	5.49	4.99	5.25	4.76	5.00	4.61	4.90
			25024	5.30	5.61	5.15	5.44	4.93	5.20	4.69	4.94	4.53	4.84
			30019	5.36	5.66	5.20	5.48	4.98	5.24	4.76	4.99	4.60	4.89
			30030	5.30	5.61	5.14	5.44	4.92	5.20	4.69	4.94	4.53	4.83
		Void Average Depth:		1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ 20012	5.45	5.76	5.24	5.52	5.01	5.27	4.77	5.01	4.61	4.84
			20024	5.36	5.69	5.15	5.45	4.92	5.20	4.70	4.95	4.54	4.84
			25015	5.45	5.76	5.24	5.52	5.01	5.27	4.77	5.00	4.61	4.90
			25024	5.38	5.70	5.17	5.47	4.94	5.21	4.72	4.96	4.54	4.84
			30019	5.44	5.75	5.23	5.51	5.01	5.27	4.76	5.00	4.61	4.89
			30030	5.38	5.70	5.17	5.47	4.94	5.21	4.71	4.96	4.53	4.84
		Void Average Depth:		1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ 20012	5.51	5.82	5.26	5.54	5.01	5.27	4.78	5.01	4.62	4.84
			20024	5.42	5.75	5.17	5.48	4.93	5.21	4.68	4.94	4.52	4.77
			25015	5.51	5.82	5.26	5.54	5.01	5.27	4.78	5.01	4.62	4.84
			25024	5.44	5.77	5.20	5.50	4.95	5.23	4.70	4.95	4.54	4.78
			30019	5.50	5.81	5.25	5.54	5.00	5.27	4.75	4.99	4.61	4.83
			30030	5.44	5.77	5.19	5.49	4.95	5.22	4.70	4.95	4.54	4.78

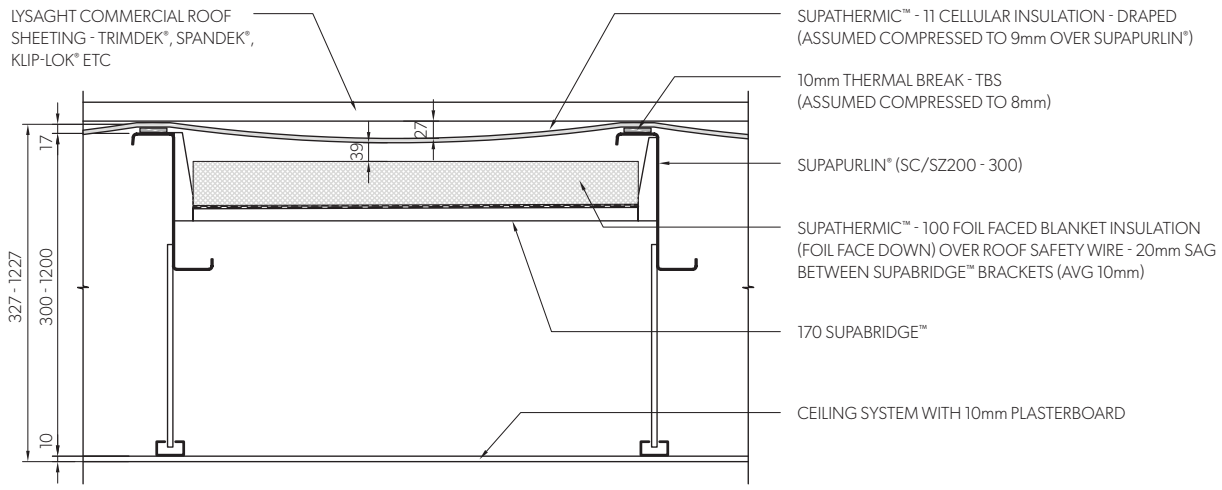
Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

3.1.2.5 CB OPTION 5 CLOSED BUILDING - HORIZONTAL CEILING SUPABRIDGE™ - 170 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 100.

This option mirrors 3.1.2.5 with the addition of SUPATHERMIC™ - 100 for additional thermal performance.

FIGURE 3.1.2.5-1:



As shown, at Figure 3.1.2.5-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB170 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 100 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 39mm airspace
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11[1] Insulation installed ridge to eave directly over purlins with 27mm drape between purlins.
- 27mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.5-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPABRIDGE™ 110 BRACKETS & HORIZONTAL CEILINGS (with TBS)													
		Void Average Depth:		475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - 11, SUPATHERMIC™ - TBS thermal break tape (48mm wide), SUPATHERMIC™ - 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ 20012	5.51	5.83	5.50	5.83	5.38	5.68	5.17	5.46	5.03	5.31
			20024	5.41	5.75	5.41	5.75	5.27	5.60	5.09	5.39	4.95	5.24
			25015	5.50	5.82	5.50	5.82	5.36	5.67	5.17	5.46	5.03	5.31
			25024	5.43	5.77	5.43	5.77	5.29	5.62	5.11	5.41	4.94	5.24
			30019	4.54	5.04	4.54	5.04	4.46	4.94	4.34	4.79	4.26	4.68
			30030	4.38	4.90	4.38	4.90	4.30	4.80	4.19	4.66	4.11	4.56
		Void Average Depth:		475mm		914mm		1363mm		1973mm		2371mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - 11, SUPATHERMIC™ - TBS thermal break tape (48mm wide), SUPATHERMIC™ - 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ 20012	5.63	5.97	5.54	5.86	5.39	5.70	5.18	5.47	5.04	5.31
			20024	5.54	5.89	5.44	5.79	5.28	5.61	5.09	5.40	4.95	5.33
			25015	5.63	5.96	5.54	5.86	5.39	5.70	5.18	5.47	5.04	5.40
			25024	5.56	5.91	5.47	5.81	5.31	5.63	5.12	5.42	4.97	5.35
			30019	5.62	5.96	5.53	5.85	5.38	5.69	5.17	5.46	5.03	5.39
			30030	5.55	5.90	5.46	5.80	5.30	5.63	5.11	5.42	4.97	5.34
		Void Average Depth:		1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - 11, SUPATHERMIC™ - TBS thermal break tape (48mm wide), SUPATHERMIC™ - 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ 20012	5.71	6.06	5.56	5.89	5.39	5.70	5.19	5.48	5.04	5.32
			20024	5.62	5.98	5.47	5.82	5.29	5.63	5.07	5.39	4.93	5.31
			25015	5.71	6.05	5.56	5.89	5.39	5.70	5.19	5.48	5.04	5.40
			25024	5.64	6.00	5.49	5.83	5.32	5.65	5.10	5.41	4.95	5.33
			30019	5.70	6.05	5.55	5.88	5.38	5.69	5.18	5.47	5.03	5.40
			30030	5.63	5.99	5.49	5.83	5.31	5.64	5.09	5.40	4.95	5.33
		Void Average Depth:		1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - 11, SUPATHERMIC™ - TBS thermal break tape (48mm wide), SUPATHERMIC™ - 100 foil faced R2.5 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ 20012	5.77	6.12	5.58	5.91	5.40	5.71	5.19	5.48	5.05	5.32
			20024	5.67	6.04	5.49	5.84	5.30	5.64	5.08	5.39	4.93	5.23
			25015	5.77	6.12	5.58	5.91	5.40	5.71	5.19	5.48	5.05	5.32
			25024	5.70	6.06	5.51	5.86	5.33	5.66	5.10	5.41	4.95	5.25
			30019	5.76	6.11	5.57	5.91	5.39	5.70	5.16	5.46	5.04	5.31
			30030	5.69	6.06	5.51	5.85	5.32	5.65	5.10	5.41	4.95	5.25

Calculations based on:

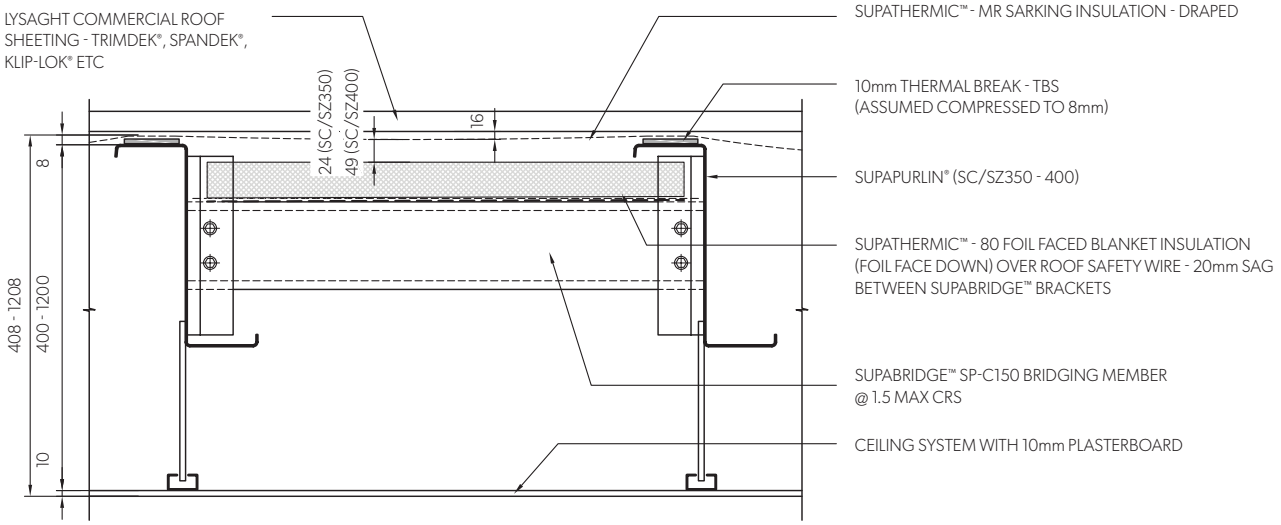
- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

HORIZONTAL CEILINGS – SUPABRIDGE™ C150 BRACKETS

Suitable for SC/SZ 350 -400 purlins the SB C150 bridging system utilises the standard Lysaght bridging system for these purlin sizes, albeit at 1500mm centres to support the roof safety wire.

3.1.2.6 CB OPTION 6 CLOSED BUILDING - HORIZONTAL CEILING SUPABRIDGE™ - C150 / SUPATHERMIC™ - MR - PB / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80.

FIGURE 3.1.2.6-1:



As shown, at Figure 3.1.2.6-1 the system arrangement in order of installation is;

- SUPAPURLIN®
- SUPABRIDGE™ SB C-150 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 24mm for SC/SZ350 / 49mm for SC/SZ400
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ MR-PB[1] insulation installed ridge to eave directly over the SUPAPURLIN® and SUPATHERMIC™ TBS 4410 with 16mm drape between purlins
- 16mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.6-2:

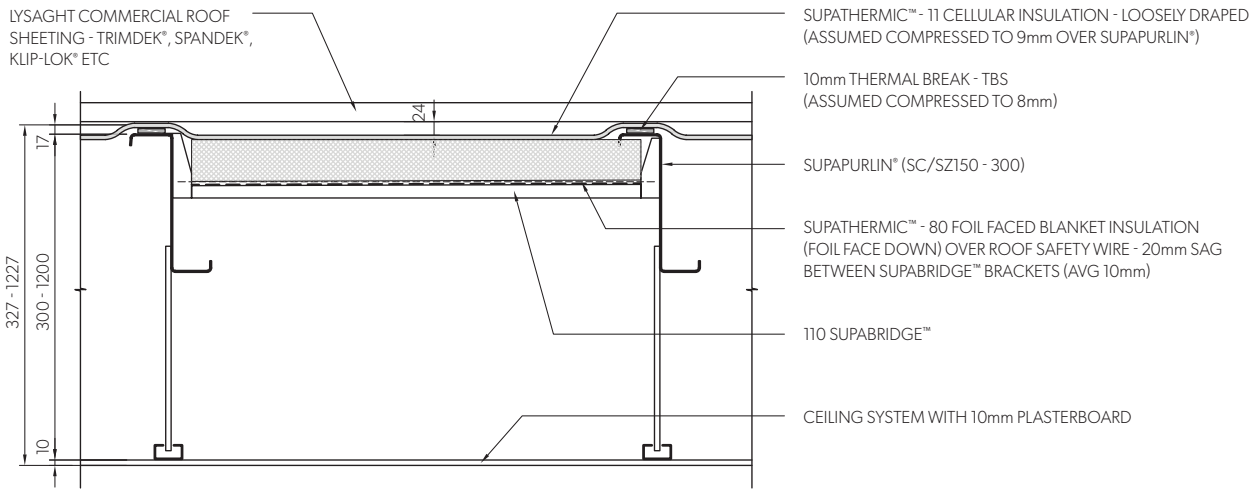
Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPABRIDGE™ 110 BRACKETS & HORIZONTAL CEILINGS (with TBS)													
		Void Average Depth:		575mm		1014mm		1463mm		2073mm		2471mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR-PB sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm horizontal ceiling.	300mm minimum void depth	SC/SZ 35024	4.42	4.66	4.38	4.61	4.23	4.45	4.02	4.22	3.87	4.06
			SC/SZ 35030	4.40	4.64	4.35	4.59	4.20	4.43	3.99	4.20	3.84	4.04
			SC/SZ 40024	3.56	3.96	3.54	3.92	3.45	3.82	3.33	3.66	3.24	3.55
			SC/SZ 40032	3.44	3.85	3.41	3.82	3.34	3.72	3.22	3.57	3.14	3.47
		Void Average Depth:		775mm		1214mm		1663mm		2273mm		2671mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR-PB sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm horizontal ceiling.	600mm minimum void depth	SC/SZ 35024	4.50	4.74	4.40	4.63	4.24	4.46	4.02	4.22	3.87	4.06
			SC/SZ 35030	4.47	4.72	4.37	4.61	4.21	4.44	3.99	4.20	3.85	4.04
			SC/SZ 40024	4.52	4.76	4.42	4.65	4.26	4.47	4.04	4.23	3.89	4.07
			SC/SZ 40032	4.48	4.73	4.38	4.62	4.22	4.44	4.00	4.21	3.85	4.05
		Void Average Depth:		1075mm		1514mm		1963mm		2573mm		2971mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR-PB sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm horizontal ceiling.	900mm minimum void depth	SC/SZ 35024	4.58	4.83	4.43	4.66	4.25	4.47	4.03	4.23	3.88	4.06
			SC/SZ 35030	4.55	4.81	4.40	4.64	4.22	4.45	4.00	4.21	3.85	4.04
			SC/SZ 40024	4.60	4.85	4.45	4.68	4.27	4.48	4.04	4.24	3.89	4.08
			SC/SZ 40032	4.56	4.81	4.41	4.65	4.23	4.46	4.01	4.21	3.86	4.05
		Void Average Depth:		1375mm		1814mm		2263mm		2873mm		3271mm	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR-PB sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm horizontal ceiling.	1200mm minimum void depth	SC/SZ 35024	4.64	4.90	4.45	4.69	4.26	4.48	4.03	4.23	3.88	4.07
			SC/SZ 35030	4.61	4.87	4.42	4.66	4.23	4.46	4.01	4.21	3.85	4.05
			SC/SZ 40024	4.66	4.91	4.47	4.70	4.28	4.50	4.05	4.25	3.90	4.08
			SC/SZ 40032	4.62	4.88	4.43	4.67	4.24	4.47	4.01	4.22	3.86	4.05

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

3.1.2.7 CB OPTION 7 CLOSED BUILDING - RAKED CEILING SUPABRIDGE™ - 110 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80.

FIGURE 3.1.2.7-1:



As shown, at Figure 3.1.2.7-1 the system arrangement in order of installation, is;

- SUPAPURLIN®
- SUPABRIDGE™ SB 110 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11 insulation installed ridge to eave directly over TBS and purlins with loose 24mm drape between purlins
- 24mm airspace
- TRIMDEK®, SPANDEK® or KLIPLOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.) Interpolation within the table is permissible to determine approximate Rv.

TABLE 3.1.2.7-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPATHERMIC™ 11. LYSAGHT SUPABRIDGE™ 110 BRACKETS & RAKED PARALLEL CEILINGS, R1.8 BLANKET (with TBS)													
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, parallel ceiling.	300mm void depth	SC/SZ	15012	4.16	4.33	3.98	4.13	3.83	3.98	3.69	3.83	3.61	3.74
				15024	4.11	4.30	3.93	4.10	3.79	3.95	3.65	3.80	3.57	3.71
				20012	4.18	4.34	3.99	4.15	3.85	3.99	3.71	3.84	3.63	3.75
				20024	4.12	4.30	3.94	4.10	3.80	3.95	3.66	3.81	3.58	3.72
				25015	4.15	4.32	3.98	4.13	3.84	3.98	3.70	3.84	3.62	3.75
				25024	4.11	4.29	3.94	4.10	3.80	3.95	3.67	3.81	3.58	3.72
				30019	3.62	3.91	3.49	3.76	3.39	3.64	3.29	3.52	3.23	3.45
				30030	3.52	3.82	3.40	3.68	3.30	3.56	3.21	3.45	3.15	3.38
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, parallel ceiling.	600mm void depth	SC/SZ	15012	4.64	4.76	4.38	4.49	4.15	4.26	3.94	4.05	3.82	3.92
				15024	4.62	4.74	4.35	4.47	4.13	4.24	3.92	4.03	3.79	3.90
				20012	4.65	4.77	4.39	4.50	4.16	4.27	3.96	4.06	3.83	3.93
				20024	4.62	4.75	4.36	4.48	4.13	4.24	3.92	4.03	3.80	3.91
				25015	4.65	4.76	4.39	4.50	4.16	4.27	3.95	4.05	3.83	3.93
				25024	4.62	4.75	4.36	4.48	4.14	4.25	3.93	4.04	3.81	3.91
				30019	4.64	4.76	4.38	4.49	4.15	4.26	3.95	4.05	3.83	3.93
				30030	4.62	4.74	4.36	4.48	4.13	4.24	3.93	4.03	3.80	3.91
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, parallel ceiling.	900mm void depth	SC/SZ	15012	4.77	4.90	4.39	4.50	4.22	4.33	3.99	4.10	3.86	3.96
				15024	4.75	4.88	4.37	4.49	4.20	4.31	3.97	4.08	3.83	3.94
				20012	4.79	4.91	4.41	4.51	4.24	4.34	4.01	4.11	3.87	3.97
				20024	4.76	4.88	4.38	4.49	4.21	4.32	3.98	4.09	3.84	3.95
				25015	4.79	4.91	4.40	4.51	4.24	4.34	4.01	4.11	3.87	3.97
				25024	4.76	4.89	4.38	4.50	4.21	4.32	3.98	4.09	3.85	3.95
				30019	4.78	4.90	4.40	4.51	4.23	4.34	4.00	4.10	3.87	3.97
				30030	4.76	4.89	4.38	4.49	4.21	4.32	3.98	4.09	3.85	3.95
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, parallel ceiling.	1200mm void depth	SC/SZ	15012	4.86	4.98	4.44	4.55	4.27	4.38	4.02	4.13	3.88	3.99
				15024	4.83	4.97	4.42	4.54	4.24	4.36	4.00	4.11	3.86	3.97
				20012	4.87	4.99	4.46	4.56	4.28	4.39	4.04	4.14	3.90	4.00
				20024	4.84	4.97	4.43	4.54	4.25	4.37	4.01	4.12	3.87	3.97
				25015	4.87	4.99	4.46	4.56	4.28	4.39	4.04	4.14	3.90	4.00
				25024	4.85	4.98	4.43	4.55	4.26	4.37	4.02	4.12	3.87	3.98
				30019	4.87	4.99	4.45	4.56	4.28	4.39	4.03	4.14	3.89	3.99
				30030	4.84	4.97	4.43	4.55	4.26	4.37	4.01	4.12	3.87	3.98

Calculations based on:

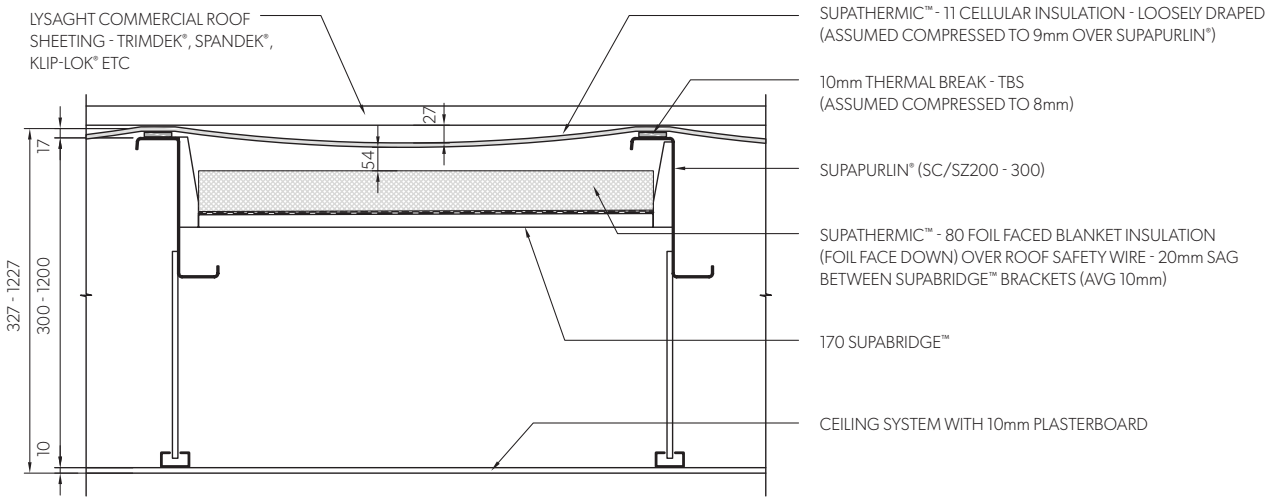
- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part 2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

RAKED / PARALLEL CEILINGS – SUPABRIDGE™ 170 BRACKETS

These options cover those situations where the building has raked ceilings rather than horizontal ceilings i.e. the building ceiling runs parallel to the roof plane providing a parallel ceiling void. The SUPABRIDGE™ 170 bracket provides additional depth and insulative airspace and are suitable for SUPAPURLIN® C/Z's between 200 and 300mm.

3.1.2.8 CB OPTION 8 CLOSED BUILDING – RAKED / PARALLEL CEILING SUPABRIDGE™ - 170 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80.

FIGURE 3.1.2.8-1:



As shown, at Figure 3.1.2.8-1 the system arrangement in order of installation, is;

- SUPAPURLIN®
- SUPABRIDGE™ SB170 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 54mm airspace
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11[1] insulation installed ridge to eave directly over TBS and purlins with 27mm drape between purlins
- 27mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.8-2:

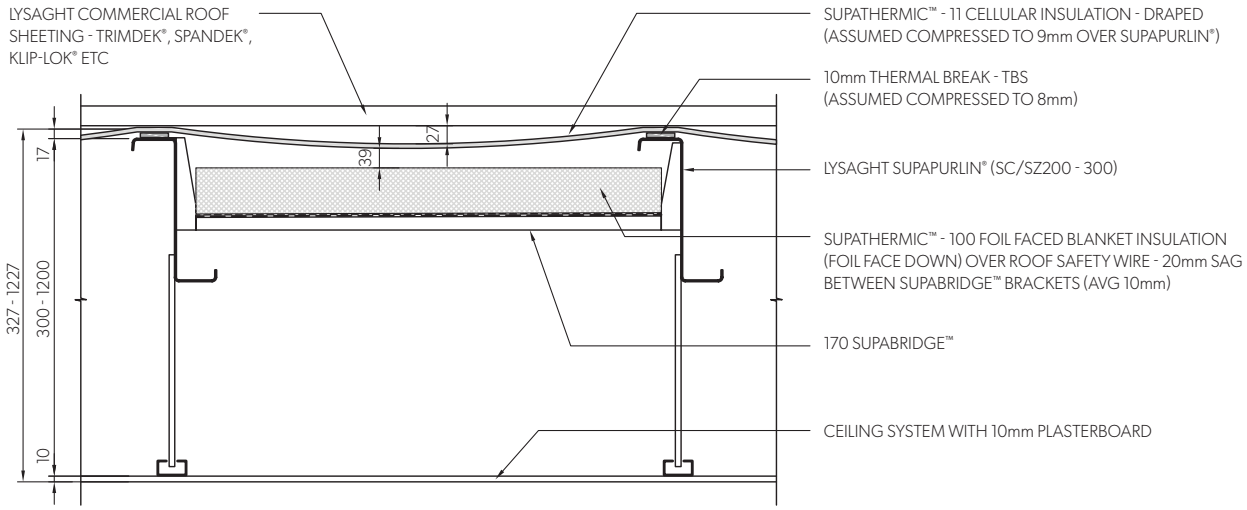
Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPABRIDGE™ 170 BRACKETS & RAKED PARALLEL CEILINGS, R1.8 BLANKET (with TBS)													
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	300mm depth	SC/SZ	20012	5.09	5.36	4.88	5.13	4.69	4.93	4.51	4.73	4.39	4.60
				20024	5.00	5.29	4.79	5.06	4.61	4.87	4.44	4.67	4.32	4.55
				25015	5.05	5.33	4.85	5.11	4.67	4.91	4.49	4.72	4.38	4.59
				25024	4.98	5.28	4.79	5.06	4.62	4.87	4.44	4.67	4.33	4.55
				30019	4.28	4.71	4.14	4.54	4.02	4.39	3.90	4.24	3.82	4.15
				30030	4.13	4.58	4.00	4.42	3.89	4.28	3.78	4.14	3.70	4.05
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	300mm depth	SC/SZ	20012	5.40	5.70	5.10	5.37	4.87	5.11	4.64	4.86	4.49	4.71
				20024	5.31	5.63	5.02	5.31	4.78	5.05	4.56	4.81	4.41	4.64
				25015	5.39	5.70	5.10	5.37	4.87	5.11	4.64	4.86	4.49	4.71
				25024	5.33	5.64	5.04	5.32	4.80	5.06	4.57	4.81	4.44	4.67
				30019	5.38	5.68	5.09	5.36	4.85	5.10	4.63	4.85	4.48	4.70
				30030	5.32	5.64	5.03	5.32	4.79	5.06	4.56	4.81	4.43	4.66
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	900mm depth	SC/SZ	20012	5.53	5.84	5.19	5.47	4.92	5.18	4.69	4.92	4.53	4.75
				20024	5.44	5.77	5.11	5.41	4.85	5.12	4.60	4.85	4.45	4.68
				25015	5.52	5.84	5.19	5.47	4.92	5.18	4.69	4.91	4.53	4.75
				25024	5.46	5.79	5.13	5.42	4.87	5.13	4.62	4.86	4.46	4.70
				30019	5.51	5.83	5.18	5.46	4.91	5.17	4.68	4.91	4.53	4.74
				30030	5.45	5.78	5.12	5.42	4.86	5.13	4.61	4.86	4.46	4.69
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	1200mm depth	SC/SZ	20012	5.60	5.93	5.25	5.53	4.98	5.23	4.72	4.95	4.56	4.78
				20024	5.51	5.85	5.16	5.46	4.89	5.16	4.63	4.88	4.47	4.71
				25015	5.60	5.92	5.25	5.53	4.98	5.23	4.72	4.95	4.56	4.78
				25024	5.54	5.87	5.18	5.48	4.91	5.18	4.65	4.89	4.51	4.74
				30019	5.59	5.92	5.24	5.52	4.96	5.22	4.71	4.94	4.55	4.77
				30030	5.53	5.87	5.18	5.48	4.90	5.17	4.64	4.89	4.50	4.73

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications"
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

3.1.2.9 CB OPTION 9 CLOSED BUILDING -RAKED / PARALLEL CEILING SUPABRIDGE™ - 170 / SUPATHERMIC™ - 11 / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 100.

FIGURE 3.1.2.9-1:



As shown, at Figure 3.1.2.9-1 the system arrangement in order of installation, is;

- SUPAPURLIN®
- SUPABRIDGE™ SB170 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 100 foil faced blanket installed directly above the SUPABRIDGE™ safety wire
- 39mm airspace
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - 11[1] insulation installed ridge to eave directly over TBS and purlins with 27mm drape between purlins
- 27mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

1 (NB SUPATHERMIC™ - 11 is suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). With light coloured roofs SUPATHERMIC™ - 11 may be expected to have shrinkage rates below 1%. To allow for this shrinkage, installed drape should be approx. double that nominated to ensure a final drape as nominated.)

TABLE 3.1.2.9-2:

Application	Roofing Components	Total R-Values for roof pitch		0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)		900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size										
BUILDINGS WITH SUPATHERMIC™ 11, SUPABRIDGE™ 170 BRACKETS & RAKED PARALLEL CEILINGS, R2.5 BLANKET (with TBS)													
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 100 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	300mm minimum void depth	SC/SZ										
			20012	5.35	5.66	5.20	5.50	5.08	5.37	4.93	5.20	4.82	5.08
			20024	5.26	5.59	5.11	5.43	4.99	5.30	4.84	5.13	4.74	5.02
			25015	5.31	5.63	5.18	5.48	5.06	5.35	4.91	5.19	4.80	5.07
			25024	5.24	5.57	5.11	5.42	4.99	5.30	4.84	5.13	4.74	5.02
			30019	4.46	4.94	4.37	4.82	4.30	4.74	4.20	4.62	4.13	4.53
			30030	4.30	4.80	4.22	4.69	4.15	4.61	4.06	4.50	4.00	4.42
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 100 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	600mm minimum void depth											
			20012	5.66	6.00	5.43	5.74	5.26	5.56	5.06	5.33	4.92	5.19
			20024	5.56	5.92	5.33	5.67	5.16	5.48	4.95	5.26	4.82	5.11
			25015	5.66	6.00	5.42	5.74	5.26	5.55	5.05	5.33	4.92	5.19
			25024	5.59	5.94	5.36	5.69	5.18	5.49	4.97	5.27	4.86	5.14
			30019	5.64	5.98	5.41	5.73	5.24	5.54	5.04	5.32	4.91	5.18
			30030	5.58	5.93	5.35	5.68	5.17	5.49	4.97	5.27	4.85	5.13
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 100 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	900mm minimum void depth											
			20012	5.79	6.14	5.52	5.84	5.33	5.63	5.10	5.39	4.96	5.23
			20024	5.69	6.06	5.42	5.77	5.22	5.55	5.00	5.31	4.88	5.17
			25015	5.79	6.14	5.52	5.84	5.32	5.63	5.10	5.39	4.96	5.23
			25024	5.71	6.08	5.45	5.78	5.24	5.56	5.02	5.32	4.90	5.18
			30019	5.77	6.13	5.50	5.83	5.31	5.62	5.09	5.38	4.95	5.22
			30030	5.71	6.07	5.44	5.78	5.24	5.56	5.02	5.32	4.89	5.18
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ - 100 foil faced R1.80 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, parallel ceiling.	1200mm minimum void depth											
			20012	5.87	6.22	5.57	5.90	5.37	5.67	5.13	5.42	4.99	5.26
			20024	5.77	6.15	5.48	5.83	5.26	5.59	5.03	5.34	4.88	5.17
			25015	5.86	6.22	5.57	5.90	5.37	5.67	5.13	5.42	4.99	5.26
			25024	5.79	6.16	5.50	5.84	5.28	5.61	5.05	5.35	4.92	5.21
			30019	5.85	6.21	5.56	5.89	5.34	5.65	5.12	5.41	4.98	5.25
			30030	5.78	6.16	5.49	5.84	5.28	5.60	5.04	5.35	4.92	5.21

Calculations based on:

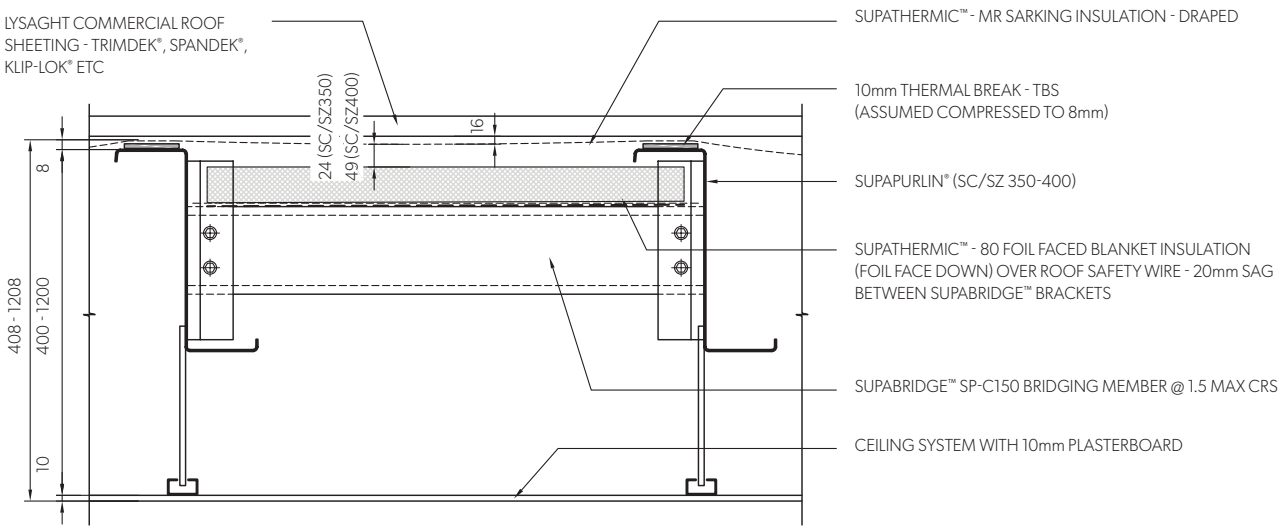
- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications"
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

RAKED / PARALLEL CEILINGS – SUPABRIDGE™ C150 BRACKETS

These options cover those situations where the building has raked ceilings rather than horizontal ceilings i.e. the building ceiling runs parallel to the roof plane providing a parallel ceiling void. The SUPABRIDGE™ C150 bracket provides both bridging and safety wire and insulation support for 350mm and 400mm SUPAPURLIN® C/Zs.

3.1.2.10 CB OPTION 10 CLOSED BUILDING – HORIZONTAL CEILING SUPABRIDGE™ - C150 / SUPATHERMIC™ - MR - PB / SUPATHERMIC™ - TBS / SUPATHERMIC™ - 80 - 350 / 400 SUPAPURLIN®.

FIGURE 3.1.2.10-1:



As shown, at Figure 3.1.2.10-1 the system arrangement in order of installation, is;

- 350 or 400 SUPAPURLIN®
- SUPABRIDGE™ SB C150 Series 350 bridging
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - 80 foil faced blanket installed directly above the SUPABRIDGE safety wire
- 24mm airspace (for SC/SZ 350) 49mm airspace (for SC/SZ 400)
- SUPATHERMIC™ - TBS 4410 Thermal Break strip
- SUPATHERMIC™ - MR-PB sarking insulation installed ridge to eave directly over SUPATHERMIC™ - TBS 4410 Thermal Break strip with 16mm drape between purlins
- 16mm airspace
- TRIMDEK®, SPANDEK® or KLIP-LOK® roof sheeting

TABLE 3.1.2.10-2:

Application	Roofing Components	Total R-Values for roof pitch			0° - 4°		5° - 9°		10° - 14°		15° - 22°		22.5°	
		Purlin Spacing (mm)			900	1300	900	1300	900	1300	900	1300	900	1300
		Ceiling	Purlin Size											
System Erb170	**BUILDINGS WITH SUPATHERMIC™ MR, SUPABRIDGE™ SB-C150 BRACKETS & RAKED PARALLEL CEILINGS, R1.8 BLANKET (with TBS)**													
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR Sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm raked ceiling.	400mm depth	SC/SZ	35024	4.34	4.58	4.15	4.38	4.01	4.22	3.83	4.02	3.71	3.89
				35030	4.31	4.56	4.12	4.35	3.98	4.19	3.80	4.00	3.68	3.87
				40024	3.55	3.94	3.43	3.79	3.34	3.68	3.23	3.54	3.15	3.44
				40032	3.42	3.83	3.32	3.69	3.23	3.59	3.13	3.45	3.05	3.36
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR Sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm raked ceiling.	600mm depth	SC/SZ	35024	4.53	4.78	4.29	4.52	4.11	4.32	3.90	4.09	3.76	3.94
				35030	4.50	4.76	4.26	4.50	4.08	4.30	3.88	4.07	3.74	3.93
				40024	4.54	4.79	4.31	4.53	4.12	4.33	3.92	4.10	3.78	3.96
				40032	4.50	4.76	4.27	4.50	4.09	4.30	3.88	4.08	3.74	3.93
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR Sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm raked ceiling.	900mm depth	SC/SZ	35024	4.63	4.88	4.38	4.61	4.18	4.39	3.95	4.14	3.80	3.98
				35030	4.60	4.86	4.36	4.59	4.15	4.37	3.92	4.12	3.78	3.97
				40024	4.64	4.89	4.40	4.63	4.19	4.40	3.97	4.16	3.82	4.00
				40032	4.60	4.86	4.36	4.60	4.16	4.37	3.93	4.13	3.78	3.97
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ - TBS 4410 thermal break tape (48mm wide), SUPATHERMIC™ - MR Sarking, SUPATHERMIC™ - 80 foil faced R1.80 blanket insulation, SUPABRIDGE™ C150 brackets, safety wire, 10mm raked ceiling.	1200mm depth	SC/SZ	35024	4.70	4.96	4.44	4.67	4.22	4.43	3.98	4.17	3.82	4.01
				35030	4.67	4.93	4.41	4.65	4.19	4.41	3.95	4.15	3.80	3.99
				40024	4.72	4.97	4.46	4.69	4.23	4.45	3.99	4.19	3.84	4.02
				40032	4.68	4.94	4.42	4.66	4.20	4.42	3.96	4.16	3.81	3.99

Calculations based on:

- AS/NZS 4859.1 Thermal insulation materials for buildings. Part 1: General criteria and technical provisions.
- AS/NZS 4859.2 Thermal insulation materials for buildings Part2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.
- ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods.
- ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods.
- Journal of Building Physics Paper "Reflective insulation assemblies for above – ceiling applications".
- RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESTIMATION METHODS".
- NCC 2022 Section J.
- BCA Performance solution – Final report – replicated at 8.0 in this manual.
- Depth of ceiling void calculated for 10m roof width in direction of slope. Total R-Values (m^2.K/W) include indoor and outdoor air films. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R.
- Assumes safety wire sags 20mm between SUPABRIDGE™ members to provide a 10mm average sag. This table may not be reproduced except in full. Results may not be quoted without reference to the above notes and drawing.
- Calculated by James Fricker, F.AIRAH F.IEAust CPEng NER APEC Engineer IntPE(Aus). Interpolation within the table is permissible to determine approximate Rv.

[1] (NB SUPATHERMIC™ - 11 is only suitable for use with light coloured roofs (Solar Absorptance (SA) ≤ 0.40). For medium coloured roofs (SA < 0.4 ≤ 0.60) or dark coloured roofs (SA > 0.60) SUPATHERMIC™ - MR must be used rather than SUPATHERMIC™ - 11. With light coloured roofs SUPATHERMIC™ - 11 can be expected to have shrinkage rates below 1%. To allow for this shrinkage installed drape should be approx. double that nominated to ensure a final drape as nominated.)

3.2 ACOUSTIC INSULATION PERFORMANCE

The SUPABRIDGE™ system incorporating SUPATHERMIC™ insulation layers has been independently assessed for acoustic performance.

The predicted transmission loss (or the noise reduction expected from one side to the other of a given material), has been calculated using the INSUL proprietary software program. The results of the assessment are presented using the Rw descriptor (also known as the weighted sound reduction index). The Rw is effectively an average single weighted number which represents the transmission loss of a material across all frequencies (for example, averaging its low frequency performance to reduce noise from distant thunder and its high frequency performance to reduce noise generated by a whistle). A higher Rw represents an improvement in the transmission loss or Noise Reduction.

A second term, being the Rw+Ctr is also presented. The Rw + Ctr provides more targeted information on the low frequency performance of a material. The Ctr value is negative and so the Rw + Ctr is lower than the Rw of a material. A higher Rw + Ctr represents an improvement in the low frequency transmission loss of a material.

The Sound Transmission Class (STC) value represents another descriptor for the transmission loss of a material and in most cases, is comparable to the Rw; albeit calculated differently. As for Rw, a higher STC represents an improvement in the transmission loss or Noise Reduction.

Acoustic (Rw, Rw+Ctr and STC) performance data for both Open Warehouse and Buildings with Ceilings using the SUPABRIDGE™ system is set out below.

TABLE 3.2-1:

NO CEILING / OPEN WAREHOUSE	Metal Roof BMT (mm)	R_w	RW + C_{tr}	STC
LYSAGHT® roofing with SUPATHERMIC™ - 11 insulation, SUPATHERMIC™ - TBS 4410, SUPATHERMIC™ - 80, safety wire on SUPABRIDGE™ - SB110 brackets bolted @ 1500mm c/c to SUPAPURLIN® @ 1300mm c/c	0.42	23	19	24
	0.48	24	20	25

BUILDINGS WITH CEILINGS	Ceiling Void (from underside of roof sheet to top of ceiling)	Metal Roof BMT (mm)	R_w	RW + C_{tr}	STC
LYSAGHT® roofing with SUPATHERMIC™ - 11 insulation, SUPATHERMIC™ - MR Sarking, safety wire on SUPABRIDGE™ - SB110 brackets bolted @ 1500mm c/c to SUPAPURLIN® @ 1300mm c/c and 10mm plasterboard ceiling	300	0.42	35	29	36
		0.48	36	30	37
	600	0.42	35	31	36
		0.48	37	33	38
	900	0.42	36	33	36
		0.48	38	35	38
	1200	0.42	36	33	36
		0.48	38	35	38
LYSAGHT® roofing with SUPATHERMIC™ - 11 insulation, SUPATHERMIC™ - 80 FF Blanket, safety wire on SUPABRIDGE™ - SB110 brackets bolted @ 1500mm c/c to SUPAPURLIN® @ 1300mm c/c and 10mm plasterboard ceiling	300	0.42	39	32	40
		0.48	41	34	42
	600	0.42	41	35	41
		0.48	42	37	42
	900	0.42	41	35	41
		0.48	42	37	42
	1200	0.42	41	35	41
		0.48	42	37	42

Acoustic data has been developed using a predictive software package and should be considered an estimate only.
Acoustic testing should be undertaken to confirm these values for any critical applications.

3.3 COMBUSTIBILITY PERFORMANCE

3.3.1 STRUCTURAL COMPONENTS

BlueScope's steel products have been tested to AS/NZS 1530.3 Simultaneous Determination of ignitability, flame propagation, heart release and smoke release. The typical results for GALVASPAN® / GALVABOND® are set out at in Table 3.3.1-1.

TABLE 3.3.1-1:

GALVASPAN® / GALVABOND® AS/NZS 1530.3 test results

	AS/NZS 1530.3	
	Test Results	**Range**
GALVABOND®/GALVASPAN®	*	
Ignitability Index	0	0-20
Spread of Flame Index	0	0-10
Heat Evolved Index	0	0-10
Smoke Developed Index	0	0-10

* Tested by CSIRO Infrastructure Technologies Report No.: FNE11600

3.3.2 INSULATION COMPONENTS

3.3.2.1 SUPATHERMIC™ - 11

SUPATHERMIC™ - 11 has been tested in accordance with AS 1530.2 and AS/NZS 1530.3.

TABLE 3.3.2.1-1:

SUPATHERMIC™ insulation test results

	AS1530.2 : 1993 (R2016)		AS 1530.3	
SUPATHERMIC™ - 11 Thermal Insulation	**Test results****	**Range**	**Test results***	**Range**
Ignitability Index	N/A		0	0-20
Spread of Flame Index			0	0-10
Heat Evolved Index			0	0-10
Smoke Developed Index			1	0-10
Flammability Index	1	0-100	N/A	
Spread Factor	0-length	0-40		
	0-width			
Heat factor	0-length	0-upward		
	0-width			

**** Tested by AWTA Product testing Test No: 7-589626-CV*
Tested by AWTA Product testing Test No: 17-000619

3.3.2.2 SUPATHERMIC™ FOIL FACED BLANKET

TABLE 3.3.2.2-1:

SUPATHERMIC™ blanket products have been tested in accordance with AS/NZS 1530.3, AS/ISO 9705 and AS 5637.1

SUPATHERMIC™ - 60, SUPATHERMIC™ - 80 and SUPATHERMIC™ - 100 Blanket insulation	AS/NZS 1530.3		AS/ISO 9705 and AS 5637.1	Bushfire Attack level
	Test Results*	Range	Fire Assessment Classification**	BAL Rating
GALVABOND® / GALVASPAN®				
Ignitability Index	0	0-20	Group 1	BAL 12.5 - 40
Spread of Flame Index	0	0-10		
Heat Evolved Index	0	0-10		
Smoke Developed Index	1	0-10		

*Tested by AWTA Product Testing Test No.: 19-001104 and 19-001105 SUPATHERMIC™ - 60 only
**Tested by AWTA Product Testing Test No.: Warrington Fire Test Australia Test No FAS190054

3.3.2.3 SUPATHERMIC™ SARKING

TABLE 3.3.2.3-1:

SUPATHERMIC™ sarking products have been tested to AS 1530.2 and are classified as non combustible under clause C1.9 (e) (vi) of the National Construction Code of Australia

SUPATHERMIC™ Sarking range	AS1530.2 : 1993 (R2016)	
	Test Results*	Range
Flammability Index	<5	0-100

3.4 SUPABRIDGE™ WALLING SYSTEM

3.4.1 THERMAL INSULATION PERFORMANCE

The SUPABRIDGE™ walling system comprising SUPAPURLINS®, SUPABRIDGE™ brackets, SUPATHERMIC™ insulation and safety wire can be optimised to suit a range of building applications providing summer and winter Rv values from between R2.74 m^2 to >R4.10 m^2 W in accordance with the NCC 2022 Section J calculation regime.

Higher R-Values may be achievable via a mixture of insulation materials for bespoke building solutions and advise should be sought from Lysaght for projects seeking higher thermal R-Values.

FIGURE 3.4.1-1:

SUPABRIDGE™ wall system overview

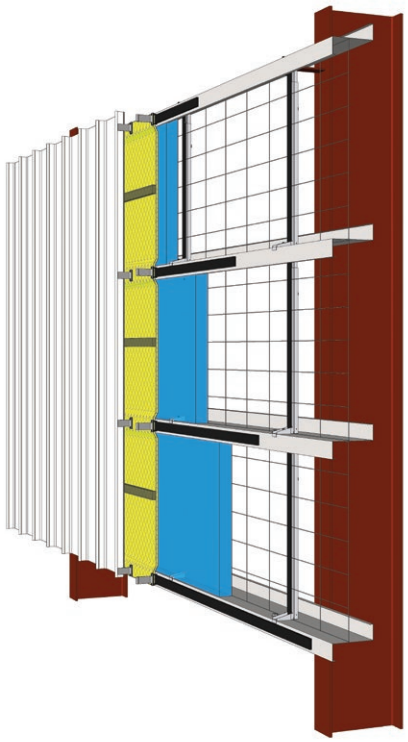
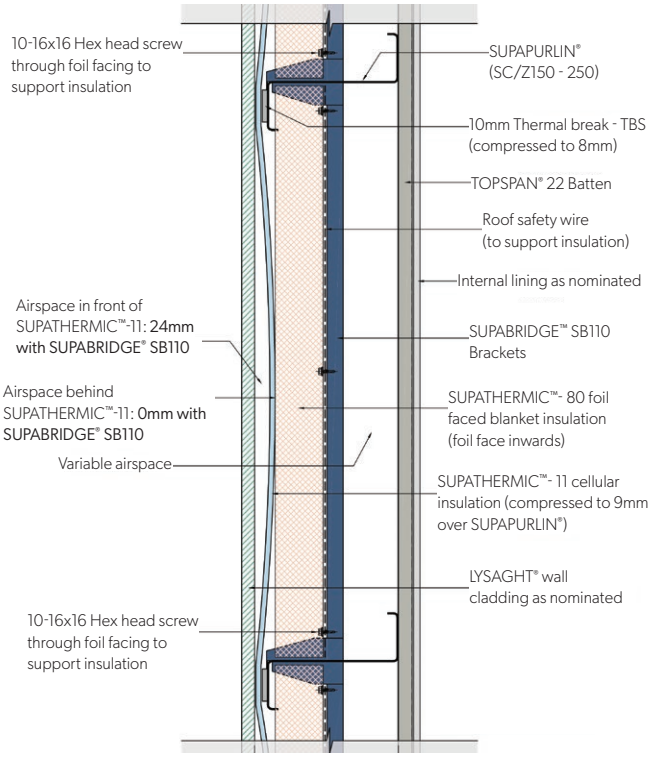
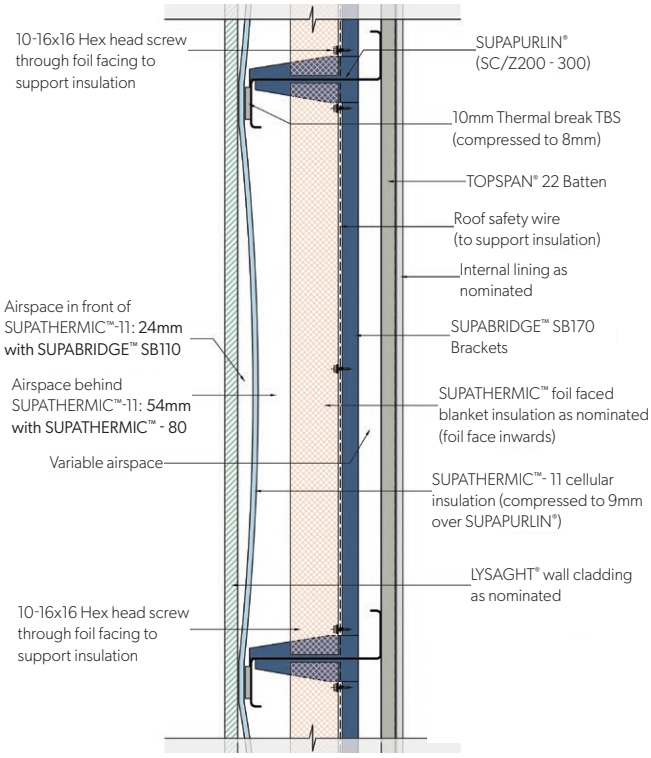


FIGURE 3.4.1-2:

SUPABRIDGE™ wall system detailed build up



SYSTEM WITH SUPABRIDGE™ 110



SYSTEM WITH SUPABRIDGE™ 170

TABLE 3.4.1-3: LYSAGHT SUPABRIDGE® SYSTEMS THERMAL PERFORMANCE FOR WALLS

Application	Walling Components	Plasterboard	Purlin Size	Purlin Spacing (mm) 900	1300	900	1300
BUILDINGS WITH LYSAGHT SUPATHERMIC™ BRACKETS & PLASTERBOARD WALL LINING, SUPATHERMIC™ 80 BLANKET (with TBS)							
	SUPABRIDGE® 110 Brackets			Winter		Summer	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced blanket insulation, SUPABRIDGE™ 110 brackets, safety wire, 22mm batten, 10mm plasterboard.	on 22mm batten	SC/Z 15012	2.94	3.11	2.81	2.97
			15024	2.86	3.05	2.74	2.92
			20012	2.98	3.15	2.85	3.00
			20024	2.89	3.08	2.77	2.94
			25015	2.98	3.15	2.85	3.00
			25024	2.91	3.10	2.79	2.95
	SUPABRIDGE® 170 Brackets			Winter		Summer	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 80 foil faced blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 22mm batten, 10mm plasterboard	on 22mm batten	SC/Z 20012	3.39	3.62	3.27	3.48
			20024	3.27	3.53	3.16	3.39
			25015	3.39	3.62	3.27	3.48
			25024	3.31	3.55	3.19	3.42
			30019	3.38	3.62	3.26	3.47
			30030	3.30	3.55	3.18	3.41
BUILDINGS WITH LYSAGHT SUPABRIDGE® 170 BRACKETS & PLASTERBOARD WALL LINING, SUPATHERMIC™ 100 BLANKET (with TBS)							
				Winter		Summer	
Closed Building	LYSAGHT® roofing, SUPAPURLIN®, SUPATHERMIC™ R0.2 TB thermal break tape (48mm wide), SUPATHERMIC™ - 11 cellular bubble insulation, SUPATHERMIC™ 100 blanket insulation, SUPABRIDGE™ 170 brackets, safety wire, 22mm batten, 10mm plasterboard.	on 22mm batten	SC/Z 20012	3.79	4.10	3.67	3.95
			20024	3.64	3.97	3.53	3.83
			25015	3.79	4.10	3.67	3.95
			25024	3.68	4.01	3.57	3.86
			30019	3.78	4.08	3.65	3.94
			30030	3.68	4.00	3.56	3.86

Calculations based on AS/NZS 4859.1 and AS/NZS 4859.2 Thermal insulation materials for buildings, and NCC 2022 Section J. For other purlin spacing or purlin base metal thickness, thermal bridging will change and alter Total R. Total R values (m^2.K/W) include indoor and outdoor air films. Plasterboard fixed to 22mm top hat battens vertically along purlin columns. Air gaps constant as surfaces vertical. Calculated by James Fricker, F.AIRAH F.EngAust CPEng NER APEC Engineer IntPE(Aus)

As shown Fig 3.4.1-2 the system buildup assumes plasterboard installation to the inner girt face via TOPSPAN™ 22 battens. Higher R-Values may be achievable via a mixture of additional insulation materials and greater separation of plasterboard from girts for bespoke building solutions and advise should be sought from Lysaght for projects seeking higher thermal R-Values.

4.0 STRUCTURAL PROPERTIES

4.1 MATERIAL SPECIFICATION

4.1.1 SUPAPURLIN®

SUPAPURLIN® and SUPABRIDGE™ sections are roll-formed from GALVASPAN® steel complying with AS 1397, in the grades shown. The number prefixed with Z indicates the minimum coating mass in g/m^2.

TABLE 4.1.1-1:

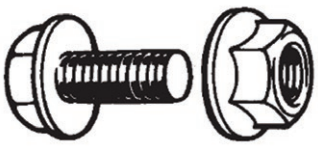
BMT (mm)	Grade	Coating Class
1.0	G550	Z350*
1.2	G500	Z350
1.5	G450	Z350
1.9	G450	Z350
2.4	G450	Z350
3.0	G450	Z350
3.2	G450	Z350

*Coatings for C10010/Z10010 may vary from centre to centre. Contact your local Lysaght Service Centre for advice.

4.1.2 LYSAGHT BOLT SPECIFICATION

Lysaght purlin bolts and nuts have an integrated washer with the nominal size of M12 required for SUPABRIDGE™ applications. Bolts shall be standard (grade 4.6) and must be tightened to a snug fit.

FIGURE 4.1.2-1:



4.2 HOLING OF PURLINS

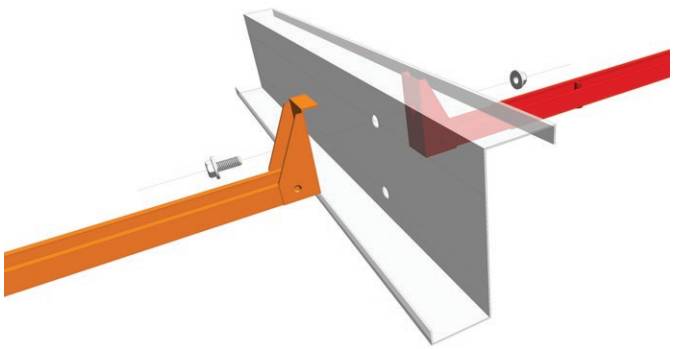
4.2.1 GENERAL

LYSAGHT SUPAPURLIN® profiles may be supplied punched or unpunched.

For the SUPABRIDGE™ system, punching is recommended to facilitate connection for the SUPABRIDGE™ member to the SUPAPURLIN® members with M12 purlin bolts.

FIGURE 4.2.1-1:

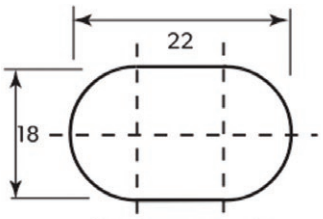
SUPABRIDGE™ general connection arrangement SB110 / SC-SZ150 - 300



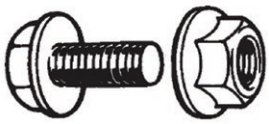
For the SUPABRIDGE™ system, utilising 150mm to 400mm purlin sizes, the holes are elongated with dimensions of 18mm x 22mm for M12 purlin bolts. The long dimension of 22mm is measured in the direction of the purlin length.

FIGURE 4.2.1-2:

Purlin Punching



M12 Purlin Bolt



Where additional holes are required for connection to cleats etc, these are done to industry standards at cleats supports (where the purlin is bolted through the web to the cleat at end supports and internal supports), and at ends of laps.

Non-standard holing may be available subject to enquiry. Negotiation for special projects will be subject to minimum order quantities and extended lead time.

The purlin hole sizes are in accordance with the requirements of Australian Standard AS/NZS 4600 Cold Formed Steel Structures.

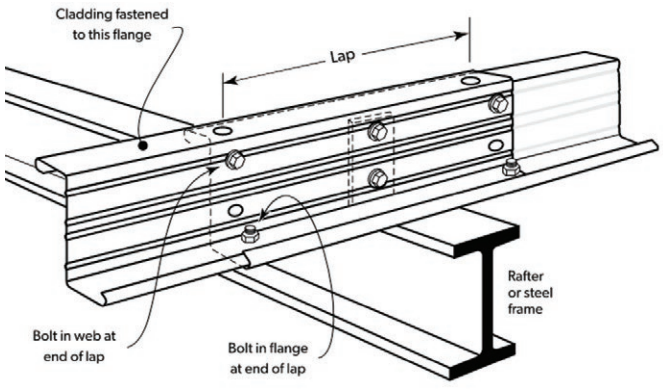
4.2.2 STANDARD HOLE PATTERNS & LOCATIONS

There are two standard punching patterns available and the locations along the length of the purlin will depend upon the purpose of the holes. The patterns/location of the holes are;

- CLEAT CONNECTIONS two (2) holes in the web located at the gauge lines. This is for fixing of the purlin at cleats and for installation of SUPABRIDGE™ members.

FIGURE 4.2.2-1:

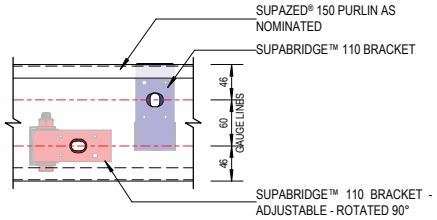
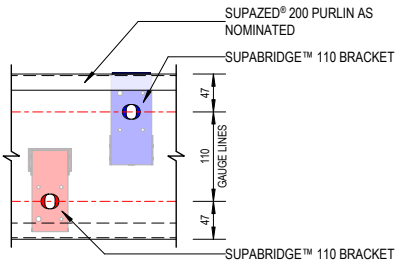
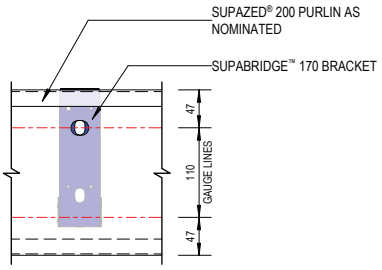
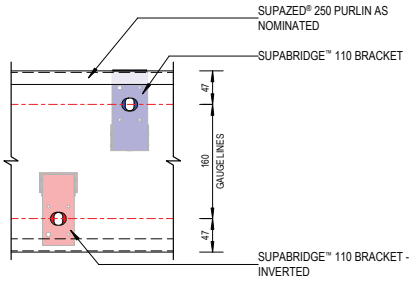
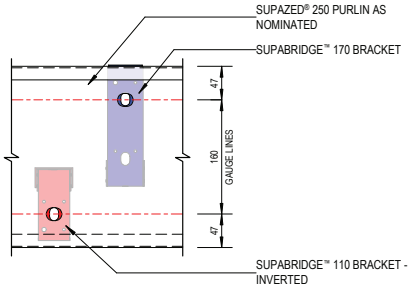
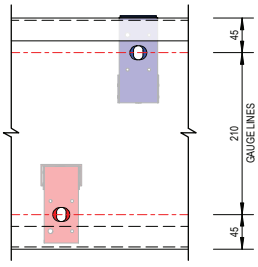
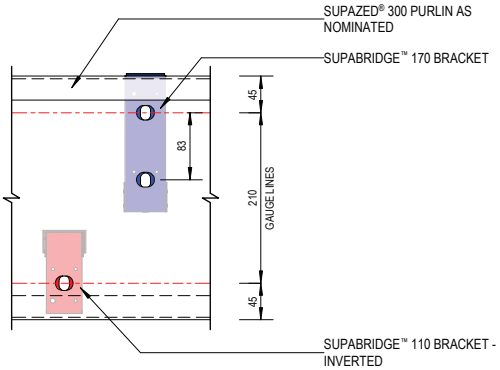
Purlin standard cleat and lap connections



- LAPPED PURLIN CONNECTIONS Two (2) holes in the web located at the gauge lines, and two (2) holes in the flanges (one hole per flange). This is largely for fixing at ends of laps, however this is also the standard hole punching at the ends of all purlins. The minimum edge distance of the holes (add centres) from the ends of purlins is 35mm.

TABLE 4.2.2-2:

SUPAPURLIN® PUNCHING DETAILS

Purlin Size	SUPABRIDGE™ 110 Brackets (SB110)	SUPABRIDGE™ 170 Brackets (SB170)
	SUPABRIDGE™ - 110 brackets utilise standard LYSAGHT SUPAPURLIN® gauge line punching.	SUPABRIDGE™ - 170 brackets utilise standard LYSAGHT SUPAPURLIN® gauge line punching for the top hole and non standard punching for the bottom hole. This punching configuration is facilitated via the dynamic punching ability of LYSAGHT SUPAPURLIN® mills. Some consideration is required however in purlin detailing to accommodate lapping as broad and narrow flanges alternate along the lapped purlin run.
SC/SZ 150	 PUNCHING DETAIL - SUPABRIDGE™ 110 WITH SZ150 PURLIN	N/A
SC/SZ 200	 PUNCHING DETAIL - SUPABRIDGE™ 110 WITH SZ200 PURLIN	 PUNCHING DETAIL - SUPABRIDGE™ 170 WITH SC/SZ 200 PURLIN
SC/SZ 250	 PUNCHING DETAIL - SUPABRIDGE™ 110 WITH SZ250 PURLIN	 PUNCHING DETAIL - SUPABRIDGE™ 170 WITH SC/SZ 250 PURLIN
SC/SZ 300	 PUNCHING DETAIL - SUPABRIDGE™ 110 WITH SZ300 PURLIN	

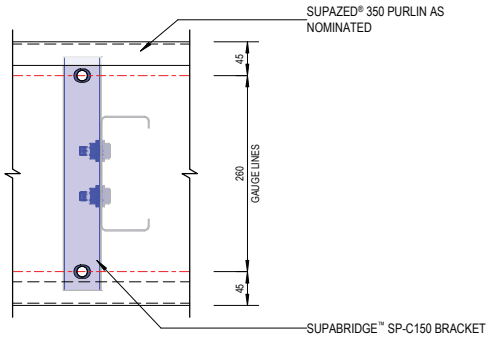
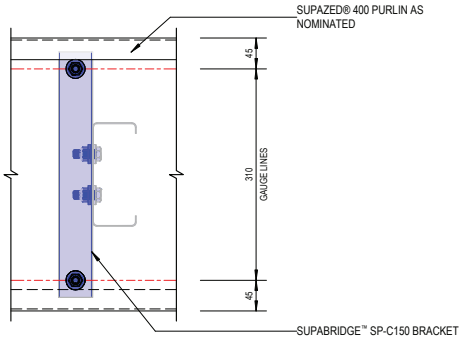
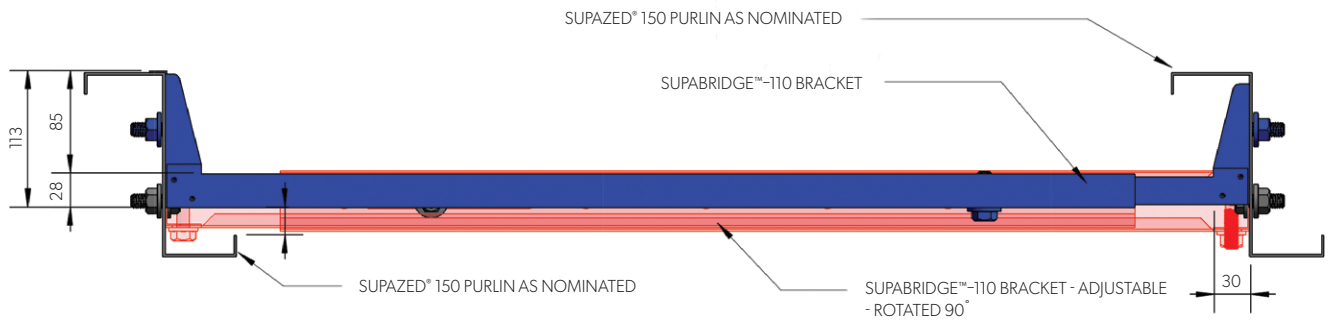
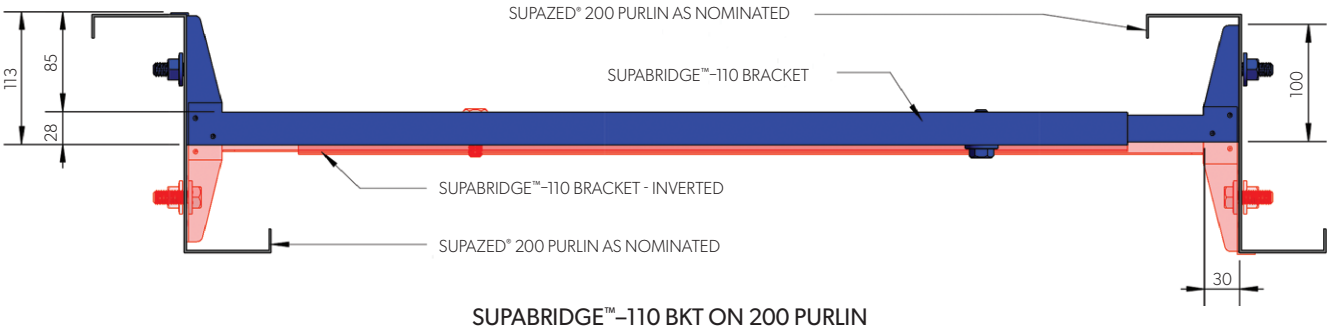
SC/SZ 350	 PUNCHING DETAIL - SUPABRIDGE™ SP-150 WITH SZ350 PURLIN	N/A
SC/SZ 400	 PUNCHING DETAIL - SUPABRIDGE™ 150 WITH SZ400 PURLIN	N/A

TABLE 4.2.2-3:

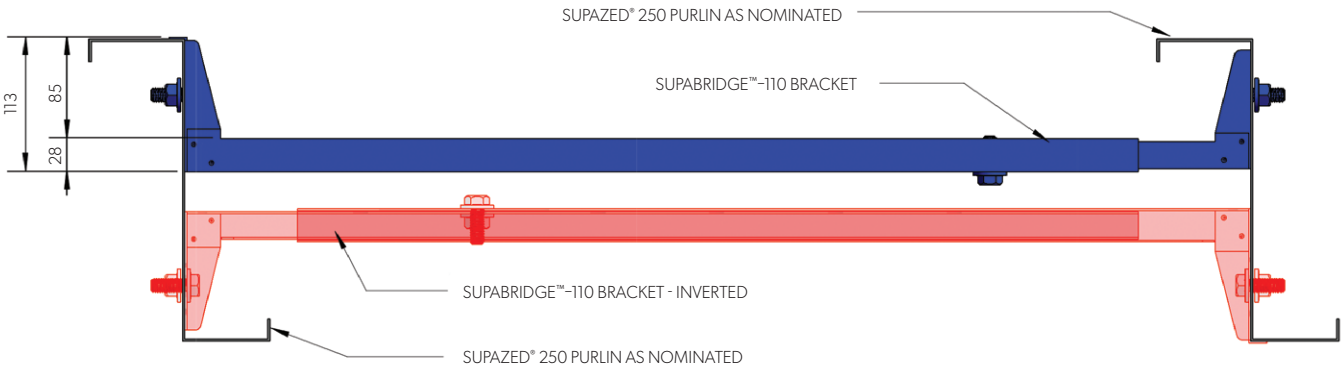
SUPAPURLIN® Bracket / SUPAPURLIN® configurations



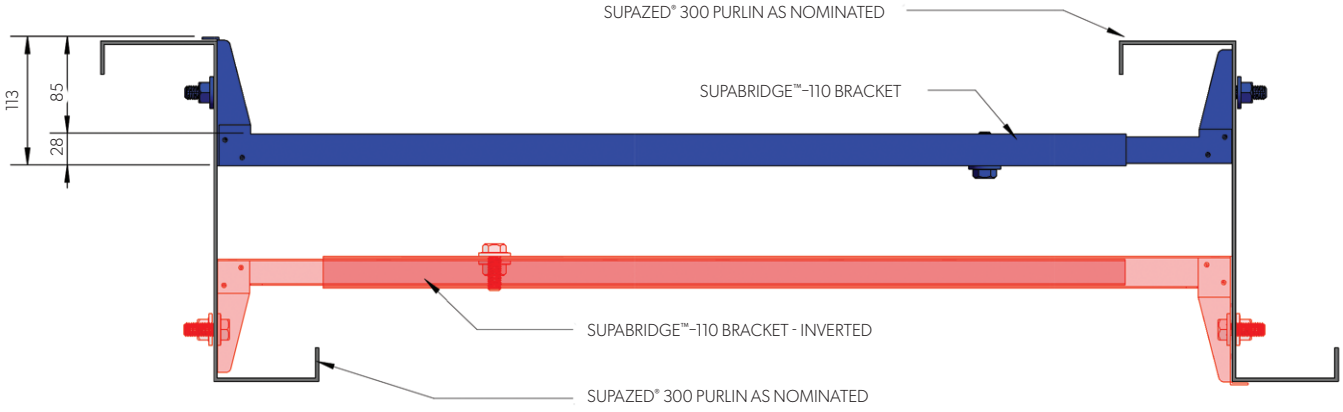
SUPABRIDGE™–110 BKT ON 150 PURLIN



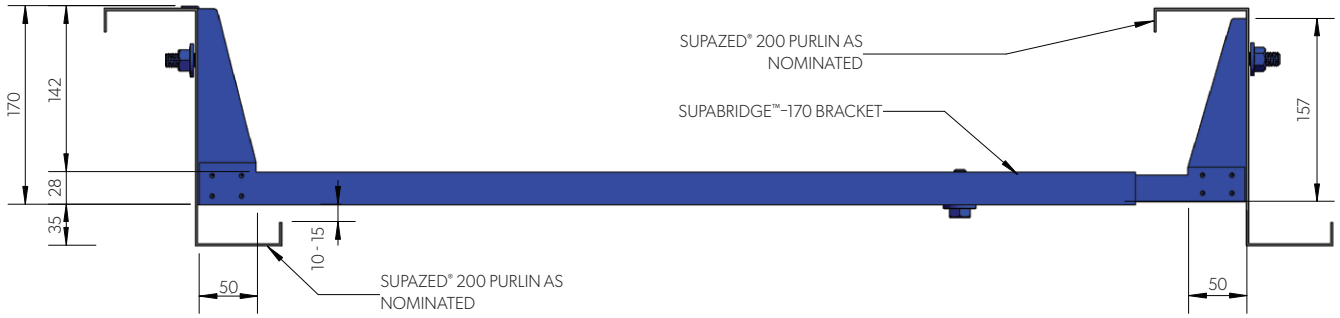
SUPABRIDGE™–110 BKT ON 200 PURLIN



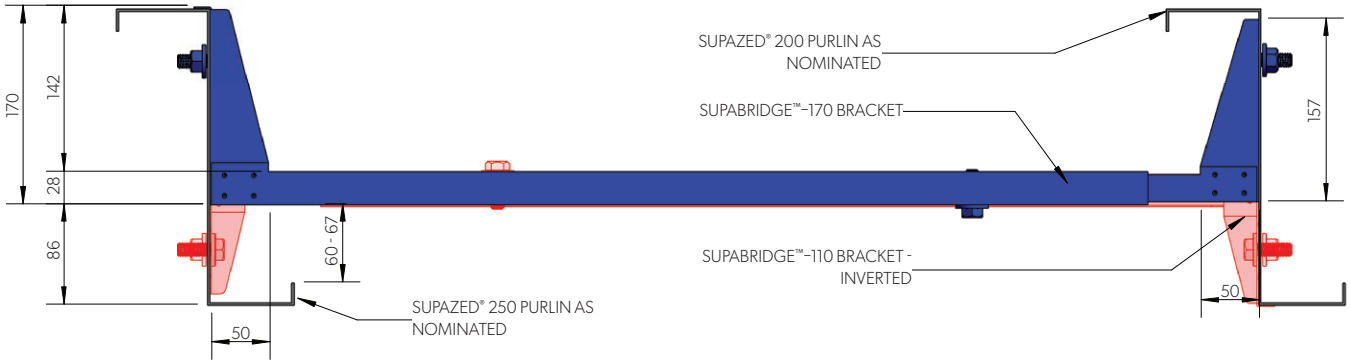
SUPABRIDGE™–110 BKT ON 250 PURLIN



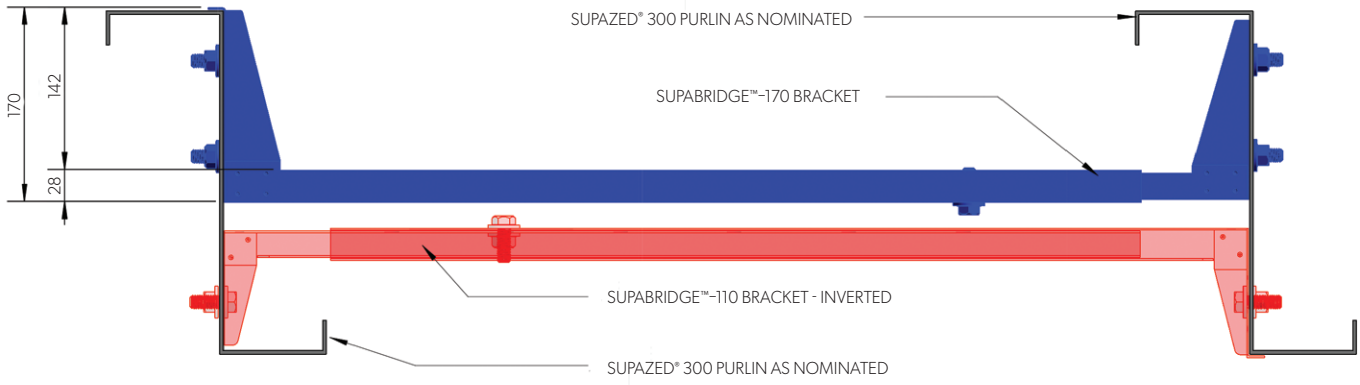
SUPABRIDGE™–110 BKT ON 300 PURLIN



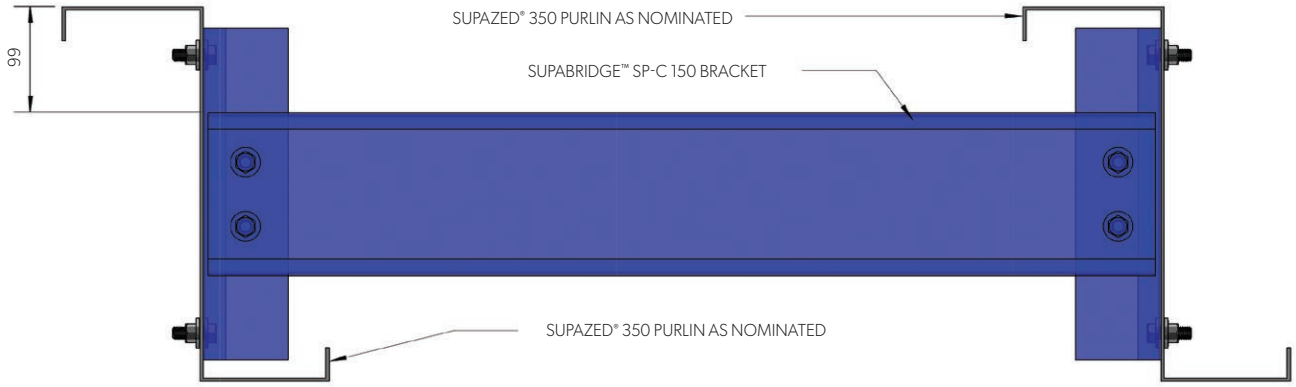
SUPABRIDGE™–170 BKT ON 200 PURLIN



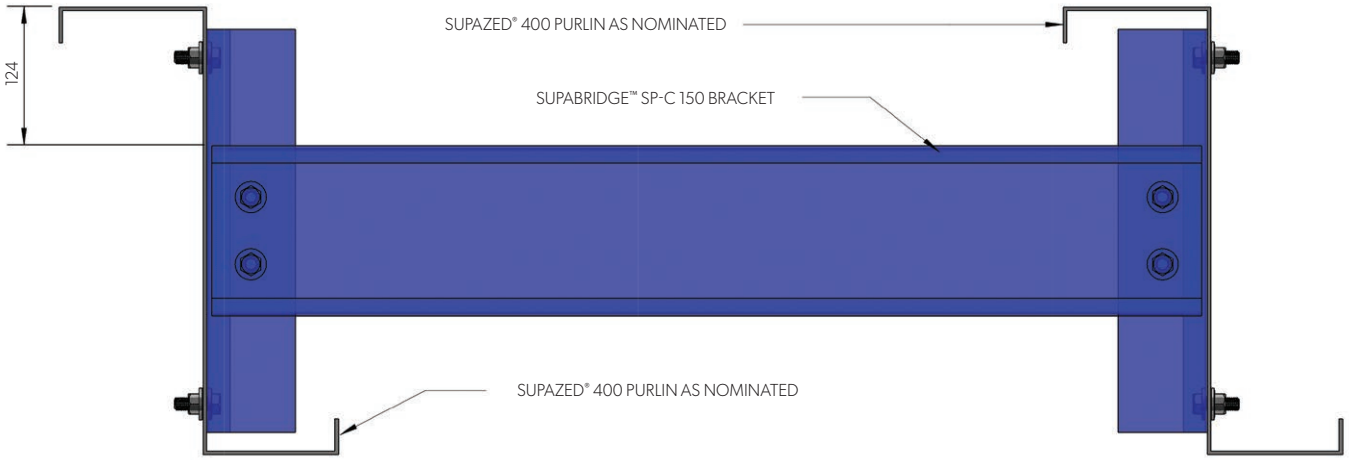
SUPABRIDGE™–170 BKT ON 250 PURLIN



SUPABRIDGE™–170 BKT ON 300 PURLIN



SUPABRIDGE™-SP-150 BKT ON 350 PURLIN



SUPABRIDGE™-SP-150 BKT ON 400 PURLIN

4.3 SUPABRIDGE™ SPACINGS

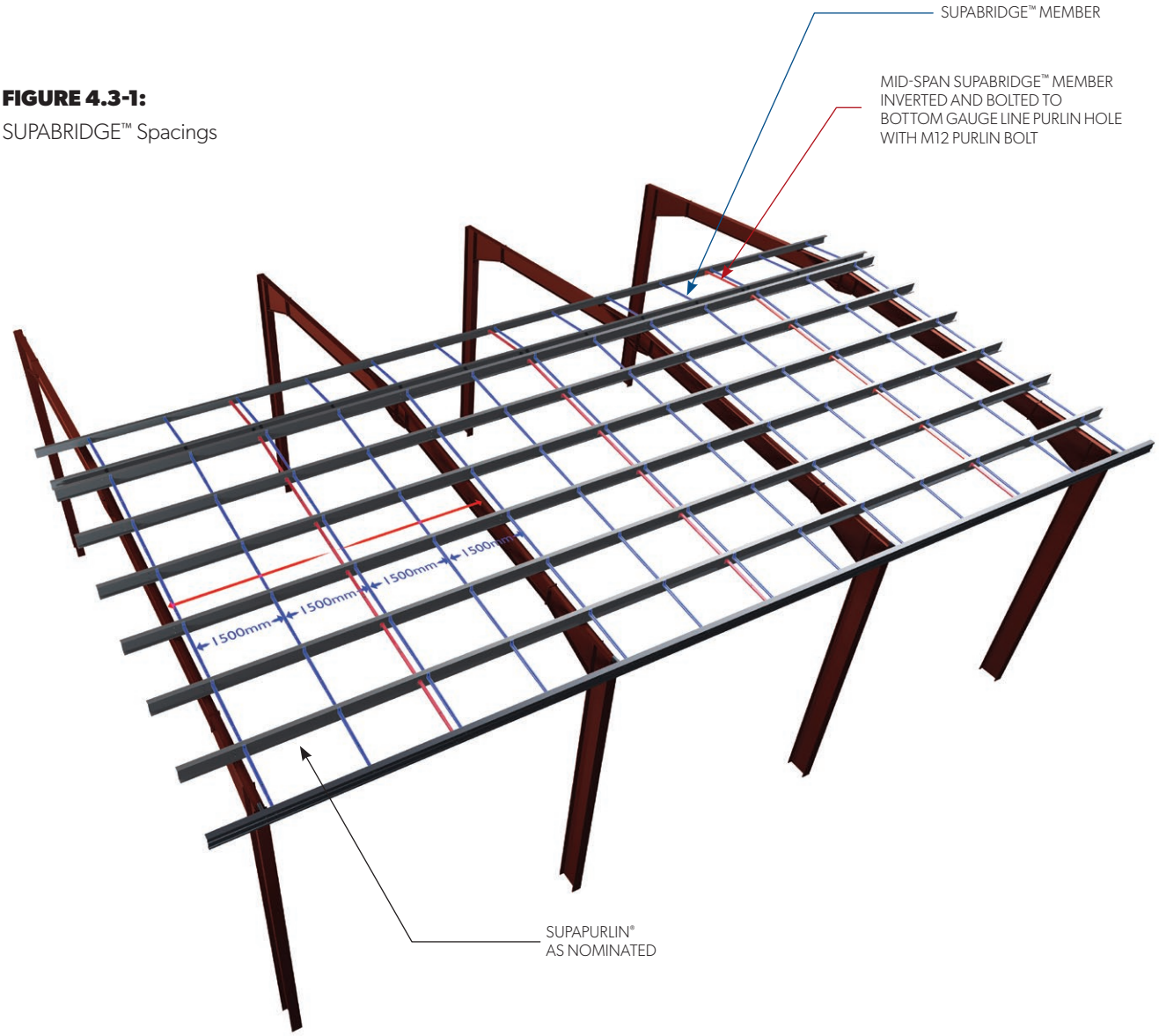
SUPABRIDGE™ sections are spaced at a maximum 1500mm centres along the SUPAPURLIN® length. 1 additional "inverted" SUPABRIDGE™ member is located at purlin midspans, as a bottom chord restraint, to complete the bridging system as noted in table 4.2.2-1.

As noted SUPABRIDGE™ - 110 sections are designed to align with standard gauge line punching.

The punching configuration for open buildings utilising the SUPABRIDGE™ 170mm bracket is set out at Table 4.2.2-1. This bracket configuration utilises 2 x M12 bolts per bracket end for 300mm SUPAPURLIN® sizes only. Only 1 bolt per bracket end is required for 200 and 250 SUPAPURLINS®.

SUPABRIDGE™ - 110 brackets however only use 1x M12 bolt per bracket end.

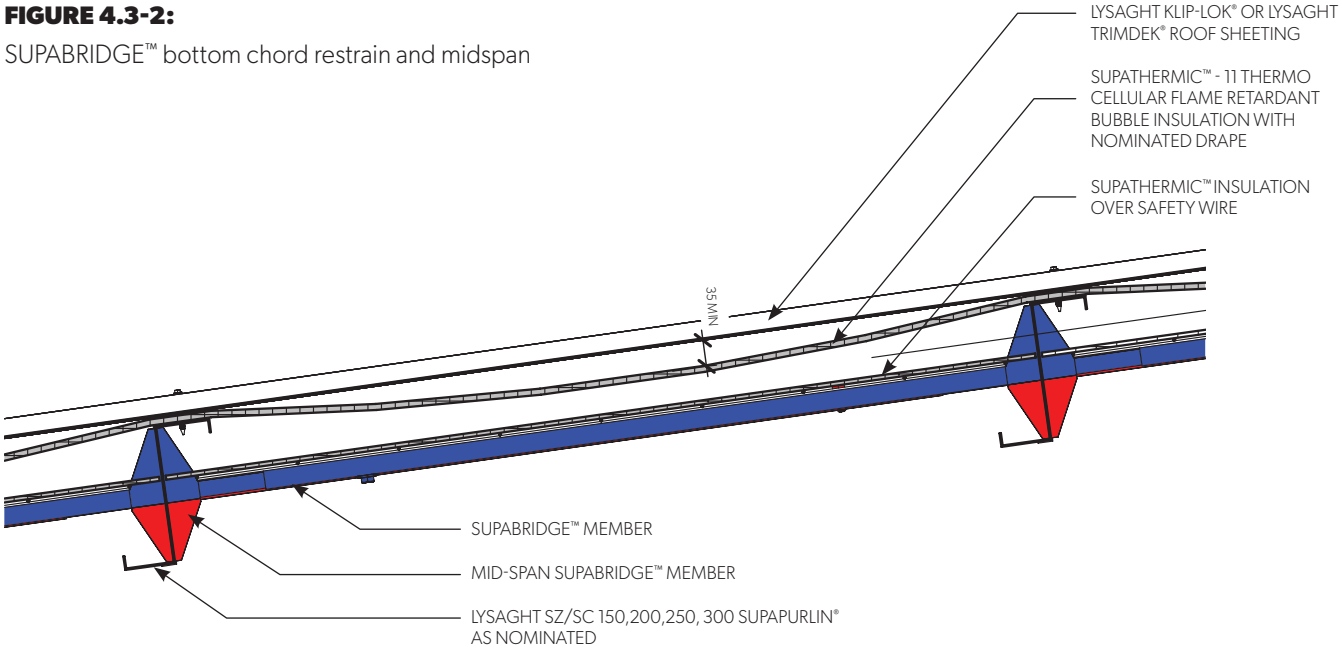
FIGURE 4.3-1:
SUPABRIDGE™ Spacings



Care should be taken when detailing SUPABRIDGE™ bridging punching to avoid clashes with Cleat, mid span bottom chord restraints and fly bracing locations. Additionally consideration should be given to avoid end lap connections. SUPABRIDGE™ brackets may be located within lapped sections but alternate purlin orientations in this region must be considered for punching details . The first SUPABRIDGE™ section is placed 100mm inside the external portal frame and then at 1500mm spacings through to the opposite external portal frame with the last SUPABRIDGE™ section 100mm from that end portal.

FIGURE 4.3-2:

SUPABRIDGE™ bottom chord restrain and midspan



4.4. PURLIN CAPACITIES

SUPAPURLIN® capacities are outlined in the SUPAPURLIN® DESIGN AND INSTALLATION GUIDE FOR BUILDING PROFESSIONALS. Testing at Lysaght's dedicated testing facility show that the SUPABRIDGE™ system provides lateral restraint to SUPAPURLINS® as detailed below:

For SC/Z 150, 200 and 250 purlins - equivalent to 2 rows of bridging.

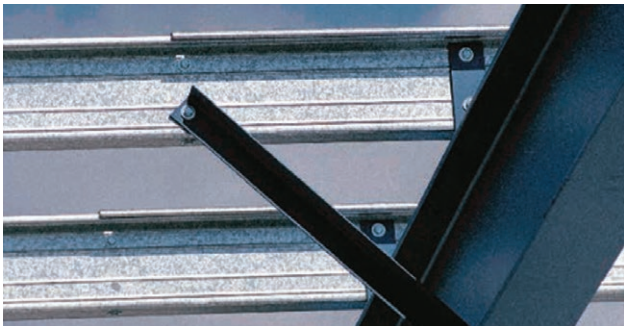
For SZ/SC 300 purlins - equivalent to 1 row of bridging.

For SC/Z 350, and 400 purlins - equivalent to 3 rows of bridging.

As such all published capacity values for SUPAPURLINS® with bridging rows as above are valid for designs using the SUPABRIDGE™ system.

5.0 ASSEMBLIES & INSTALLATION

5.1 CONNECTIONS



All SUPAPURLIN® assemblies and installation details are equally applicable to the SUPABRIDGE™ system

5.1.1 CLEAT CONNECTIONS

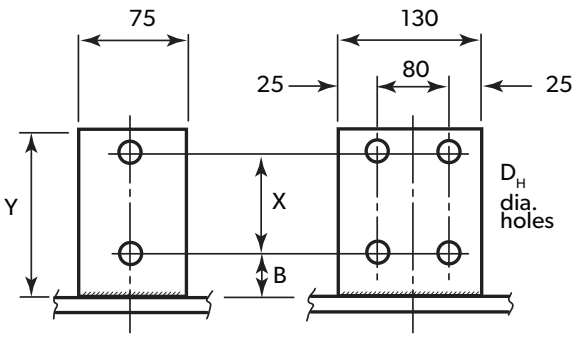
The SUPAPURLIN® purlin capacity tables are based on the sections being fastened through the web to cleats so that the load path is via the web of the sections.

The connections may be single section thickness such as in end connections, or the internal support connection of continuous configurations. Connections with double section thickness occur at the internal support of lapped configurations. Each connection uses two bolts. Cleats must be detailed to provide a nominal gap between the support and the bottom flange of the purlin. In certain situations, a larger gap may be required (e.g. roof cladding expansion joints, downturned lip purlins).

Cleats are to be detailed by the design engineer, however it must not be less than shown in the diagrams.

FIGURE 5.1.1-1:

Details of Cleats



Cleat Nominal Dimensions

TABLE 5.1.1-2:

Nominal Purlin size (mm)	B	Y	BMT (thickness)	Gap	D_H	Gauge
150	55	145	8	10	18	60
200	55	195	8	10	18	110
250	55	245	8	10	18	160
300	65	305	12	20	22	210
350	65	305	12	20	22	260
400	65	305	12	20	22	310

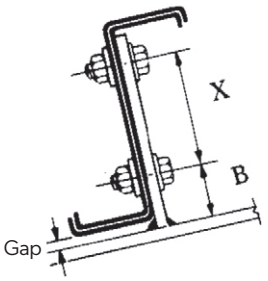
5.1.2 STANDARD PURLIN ORIENTATION

The industry standard orientation of purlin and girt fixing to cleats is detailed below. In certain projects the standard orientations may be varied.

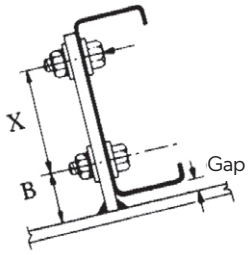
FIGURE 5.1.2-1:

Fastening to Cleats (Standard Modes)

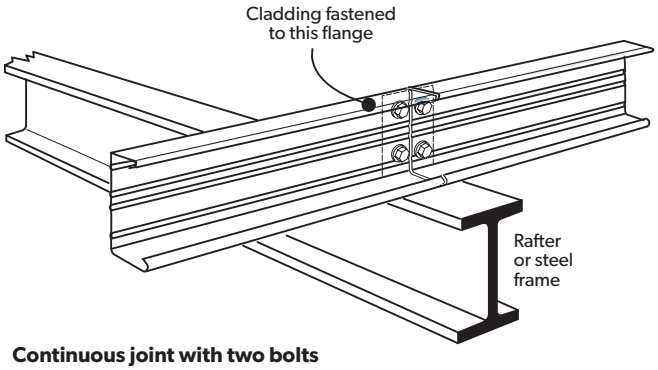
Zed purlins lapped



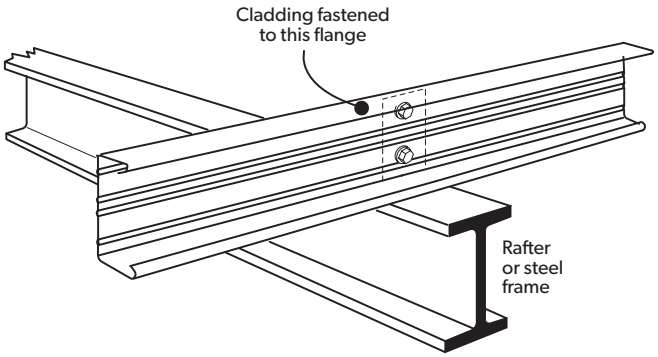
Cee purlin



Butt joint with four bolts



Continuous joint with two bolts



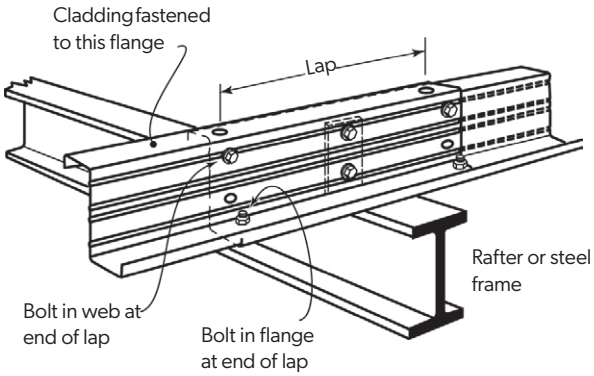
5.2. LAPPING

The structural lap at the internal supports of lapped configurations must be detailed to provide adequate structural continuity. Each end of the lap must have one bolt through the flange furthest from the cladding, and one bolt through the webs near the flanges connected to the cladding.

The nominal lap length is the distance between the bolt centres at the end of the laps. In no situation must the lap be less than 10% of the span.

FIGURE 5.2-1:

Lapped continuous joint with two bolts

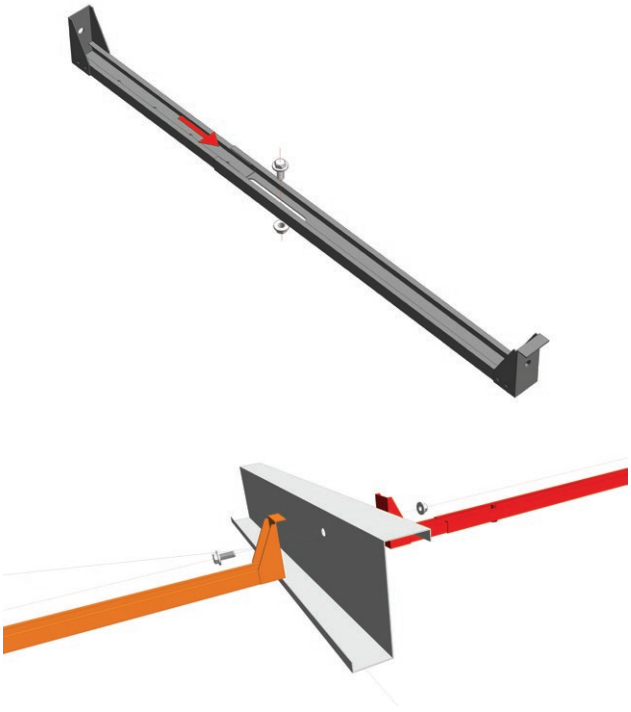


5.3 SUPABRIDGE™ CONNECTIONS

SUPABRIDGE™ sections are telescoping sections that readily allow for onsite adjustment to cater for straightening of purlins or purlin spacing misalignment. All connections are achieved with standard M12 grade 4.6 purlin bolts.

FIGURE 5.3-1:

Purlin bolt connections to purlin and telescoping section



5.3.1 TYPICAL ASSEMBLIES

Assembly details for the SUPABRIDGE™ are closely aligned to the SUPAPURLIN® details with the SUPABRIDGE™ components taking the place of HOOKLOK Bridging.

FIGURE 5.3.1-1:

SUPABRIDGE™ typical assemblies

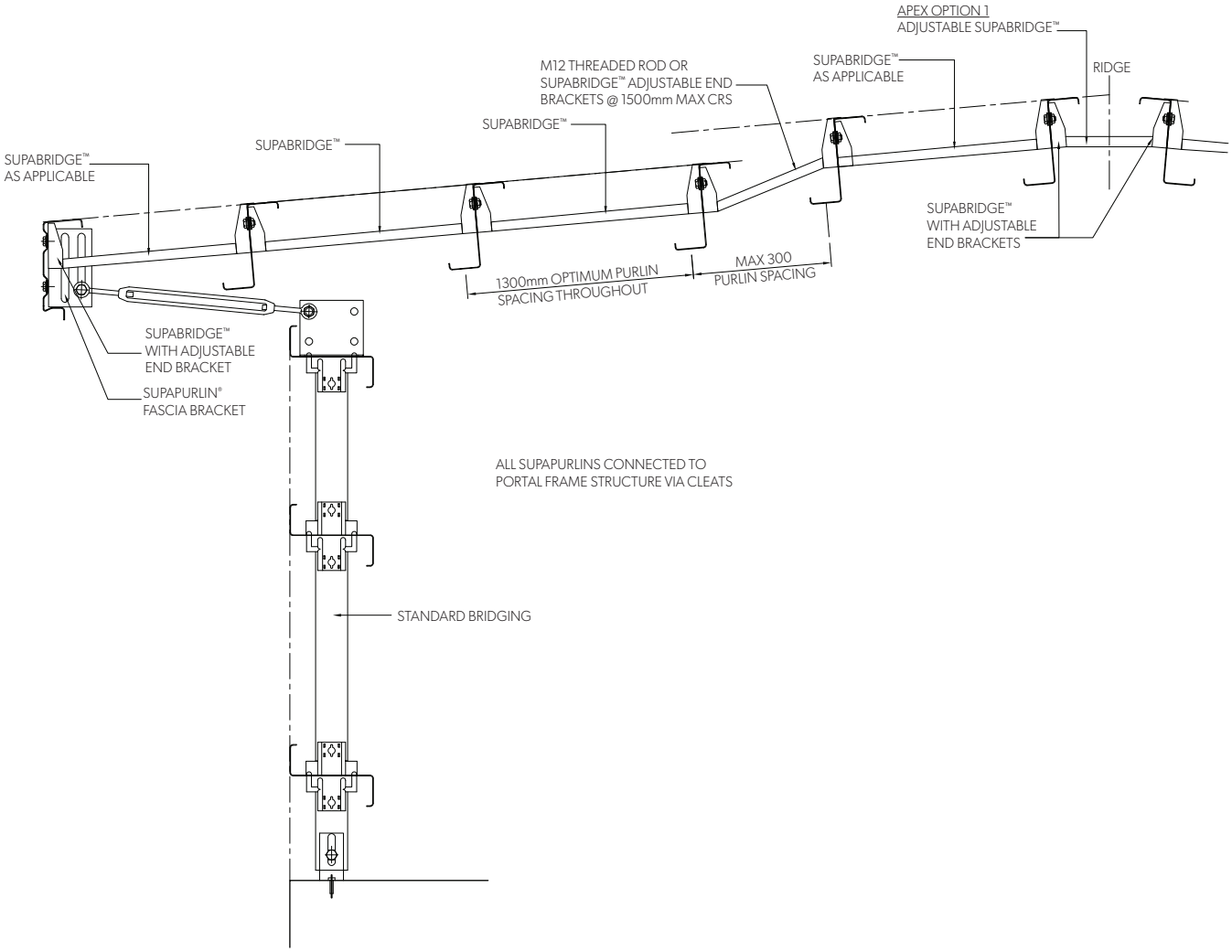


FIGURE 5.3.1-2:
SUPABRIDGE™ wall girt bridging connection option 2

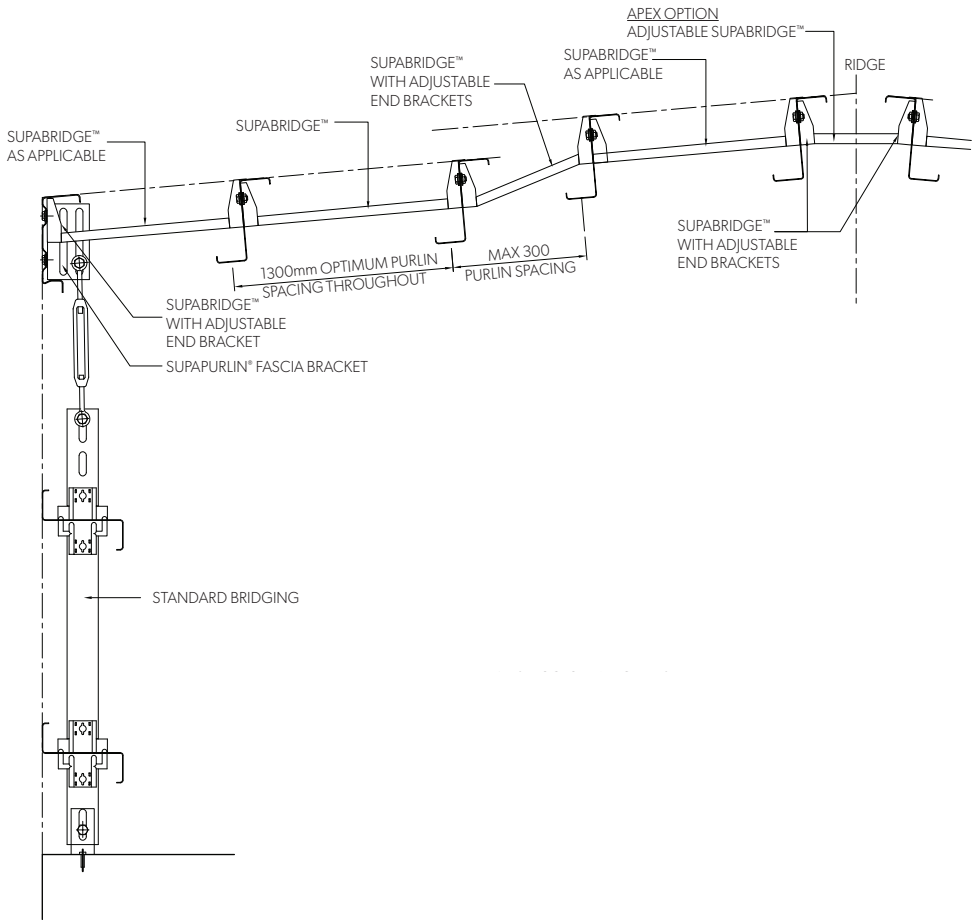
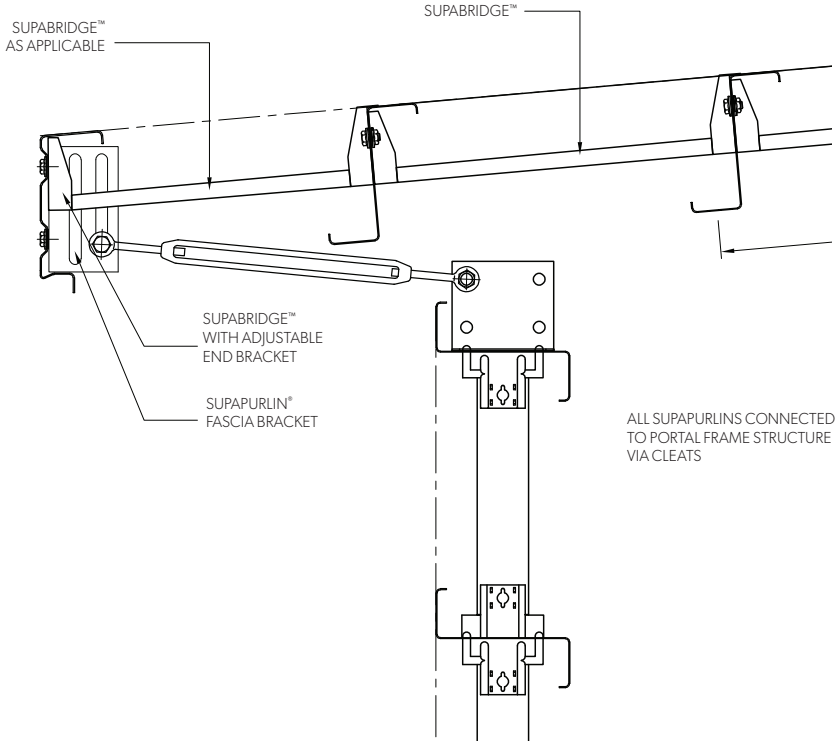


FIGURE 5.3.1-3:
SUPABRIDGE™ wall girt bridging connections – Overhang

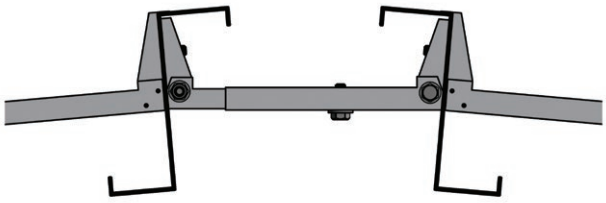


5.3.2 RIDGE ASSEMBLIES

The recommended ridge assembly for the SUPABRIDGE™ system is as shown in Figure5.3.2-1 - Ridge treatment.

FIGURE 5.3.2-1:

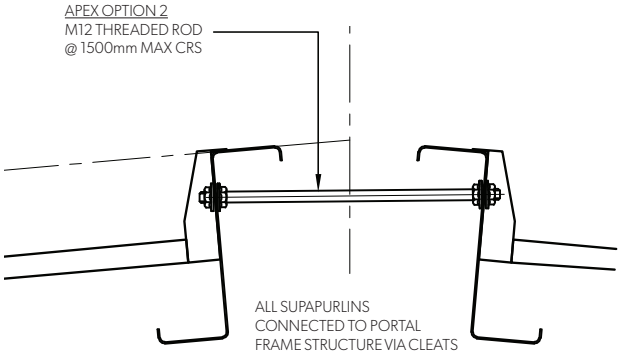
SUPABRIDGE™ ridge assembly Option 1



For ridge assemblies smaller than 300mm M12 threaded rod maybe used.

FIGURE 5.3.2-2:

SUPABRIDGE™ ridge assembly Option 2



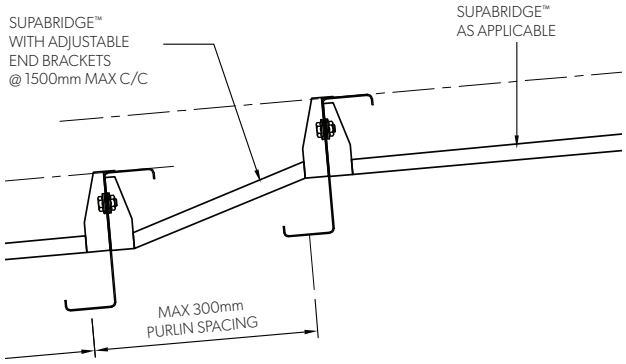
5.3.3 STEP/EXPANSION JOINS

The recommended treatment for expansion joints is to use the LYSAGHT TRIM-KLIP® or LOK-KLIP® systems which provide a cost-effective alternative to step joins in roofing. These systems allow SUPABRIDGE™ to be used without modification.

Where a step joint is unavoidable then the following maybe utilised as shown at Figure 5.3.3-1.

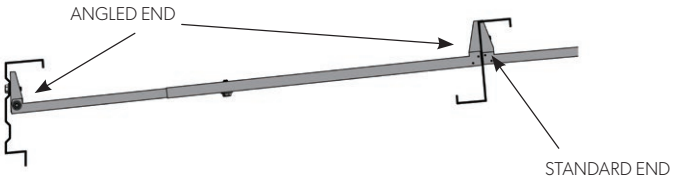
FIGURE 5.3.3-1:

SUPABRIDGE™ step joint treatment



5.3.4 FASCIA PURLIN TREATMENT

The SUPABRIDGE™ readily accepts bolted connections to fascia purlins as detail at 5.3.2-2 via the adjustable end brackets



SUPABRIDGE™ ADJUSTED FASCIA PURLIN CONNECTION

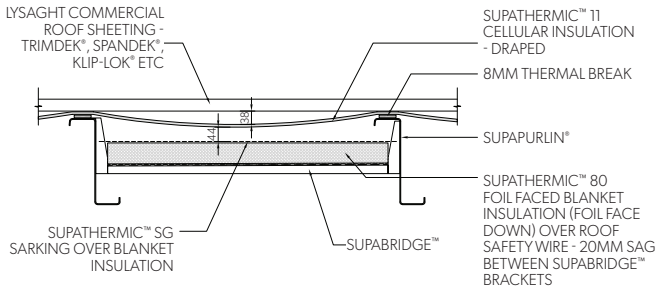
6.0 SUPABRIDGE™ INSTALLATION

6.1 OPEN BUILDING WITHOUT CEILING

6.1.1 BRIDGING MEMBERS

The installation method for SUPABRIDGE™ members utilises industry standard bolted connections with minimal specialist parts.

FIGURE 6.1.1-1:

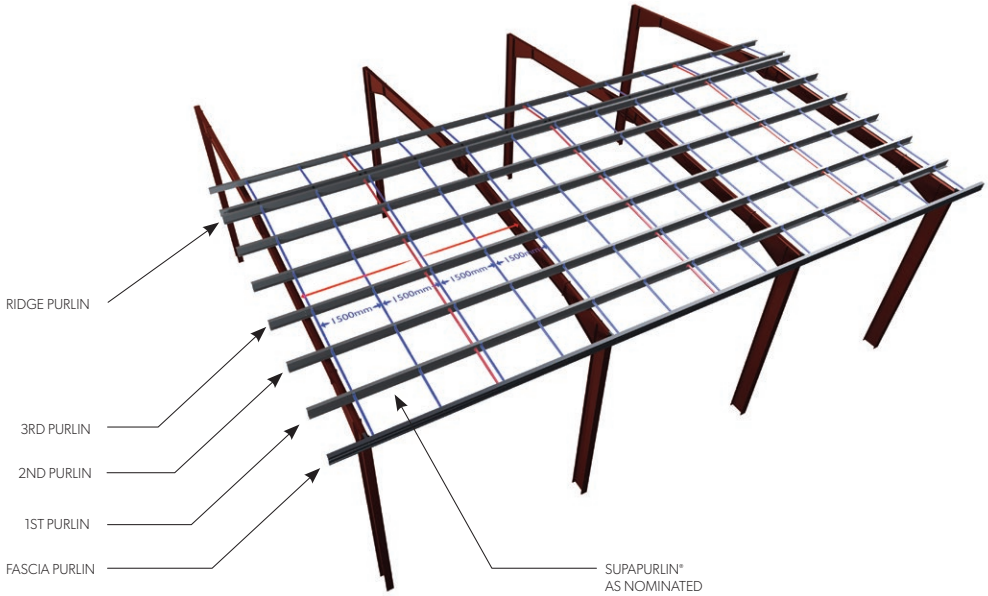


The system layers for Open Buildings without ceilings, in order of installation are

- SUPAPURLIN®
- SUPABRIDGE™ 170 brackets
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ 80 blanket insulation
- SUPATHERMIC™ TB thermal break tape
- SUPATHERMIC™ 11 thermocellular bubble insulation
- LYSAGHT® roofing

The following diagrams and text describe how the installation is completed. Installation of bridging members for roofs (purlins) can be commenced from the eaves or from the ridge (eaves start or ridge start). The following description is for an eaves start.

FIGURE 6.1.1-2:

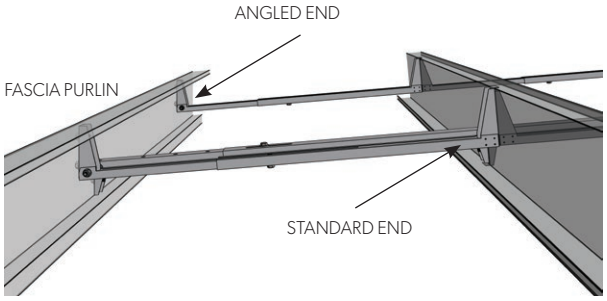


Step 1: Install the SUPABRIDGE™ fascia bridging member by temporarily inserting a M12 purlin bolt through the bracket and first purlin, adjust the opposite bracket to the fascia purlin angle and bolt the opposite end to the fascia purlin. Check purlin alignment and adjust the telescopic SUPABRIDGE™ member as needed. Tighten bolts including the adjusting bolt between the bracket and channel to Snug Fit*. Install 1 x 14 - 10 x 25 Shed Tek screw to each face beside the adjusting bolt to "lock in' the angle.

*Snug Fit as described in AS 4100 Section 15.2.52

FIGURE 6.1.1-3:

SUPABRIDGE™ Fascia Purlin installation



SUPABRIDGE™ ADJUSTED FASCIA PURLIN CONNECTION

Step 2: Moving to the next up-roof purlin bay, install the standard SUPABRIDGE™ bridging member by resting the locator end over the holes of the next purlin, then remove the nut at the 1st purlin and install the standard SUPABRIDGE™ member over the bolt, reinstall the nut. Add an additional M12 bolt to the bottom hole location (SC/SZ 300 only) and move to the 3rd purlin and install the next standard SUPABRIDGE™ member by resting the locater end over the holes of the 3rd purlin. Bolt the standard SUPABRIDGE™ member at the 2nd purlin. Check purlin alignment and adjust the telescopic SUPABRIDGE™ member as needed. NB for SUPABRIDGE™ 170 brackets two bolts are required for each bracket to connect to the SC/SZ 300 SUPAPURLIN® only.

FIGURE 6.1.1-4:

SUPABRIDGE™ SB170 Purlin Connection - SC/SZ 300 SUPAPURLIN®

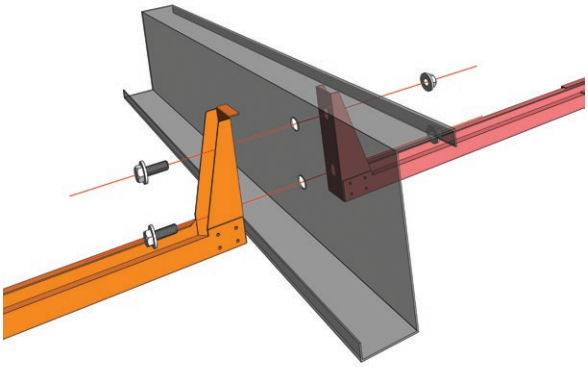
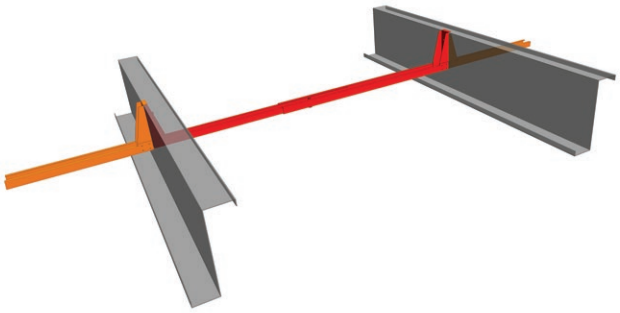


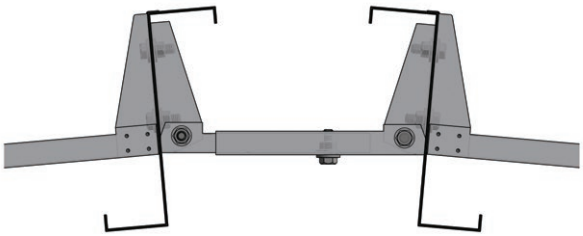
FIGURE 6.1.1-5:



Step 3: Repeat step 2 up the roof line until reaching the Ridge Purlin. Install the SUPABRIDGE™ ridge purlin member, installing the down roof bolt only. Then install the next down roof SUPABRIDGE™ member on the other side of the roof and install the M12 to both the SUPABRIDGE™ ridge purlin member and standard SUPABRIDGE™ member. Tighten bolts including the adjusting bolt between the bracket and channel to Snug Fit*. Install 1 x 14 - 10 x 25 Shed Tek screw to each face beside the adjusting bolt to "lock in' the angle.

FIGURE 6.1.1-6:

SUPABRIDGE™ Ridge member installation



Step 4: Continue down the roof as per steps 1 to 3.
Step 5: Repeat steps 1-4 for the full roof area.

6.1.2 ROOF SAFETY WIRE

Step 6: Install roof safety wire :- Locate wire and wire trolley on roof purlins. Connect wire to first/outermost SUPABRIDGE™ member as per AS/NZS 4389 and roll out along purlin run and connect to the last SUPABRIDGE™ member as per the first member. Repeat and continue for entire roof.

NB: The SUPABRIDGE™ system allows for a nominal 20mm sag in the safety wire between the SUPABRIDGE™ members.

FIGURE 6.1.2-1:

Connect roof safety wire to SUPABRIDGE™ first/outermost channel piece as per AS/NZS 4389

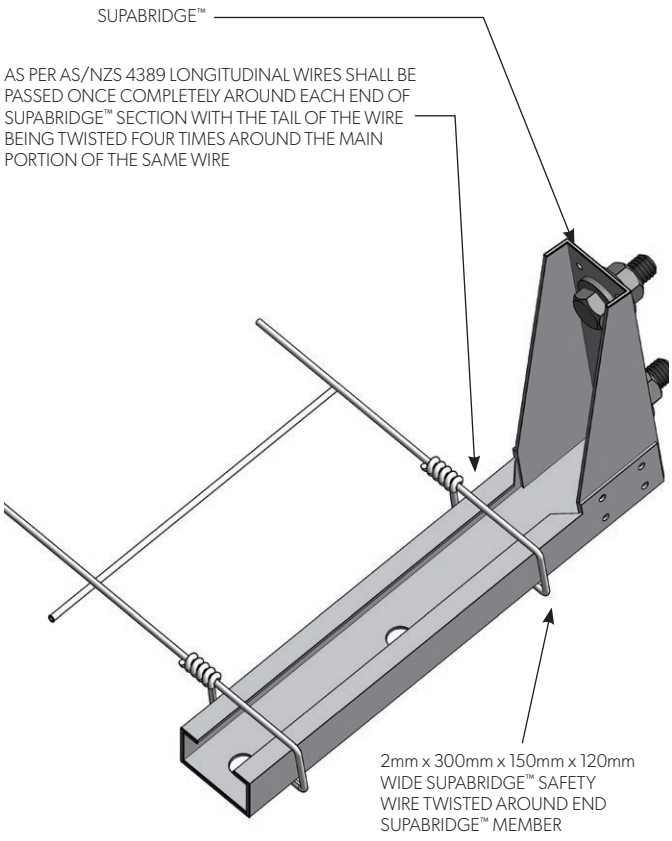


FIGURE 6.1.2-2:

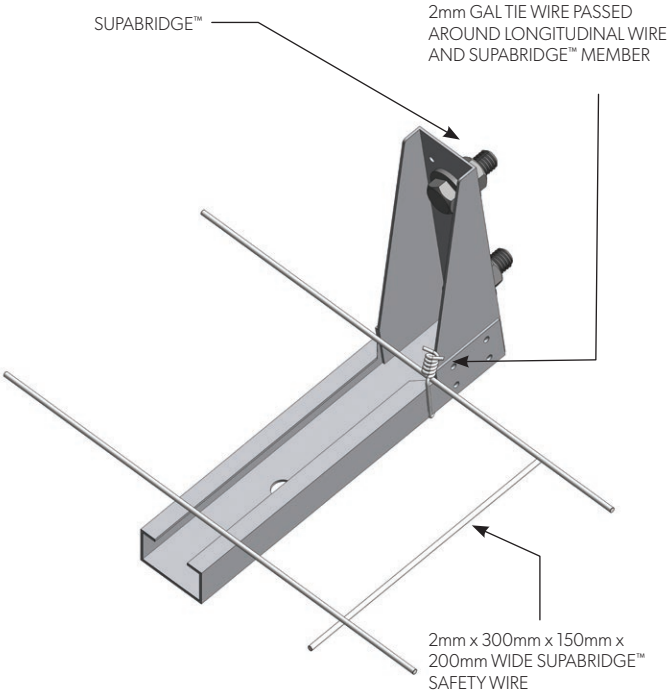
Roof wire trolley

NB: 1300mm purlin centres will allow for unimpeded wire installation. For smaller purlin centres cut roofing wire to size on the ground before placing on the roof.

Safety wire to be connected to each SUPABRIDGE™ member as per Figure 6.1.2-3 with 2mm gal wire.

FIGURE 6.1.2-3:

Roof Safety wire connection at SUPABRIDGE™ supports WIRE INSTALL - CENTRAL SUPABRIDGE™



6.1.3 INSULATION

Step 7: Roll out SUPATHERMIC™ 80 blanket insulation between purlins, over roof safety wire taking care to lay reflective silver side down and blanket face upward.

Install SUPATHERMIC™ - TB-4410 thermal break tape along the purlin top face prior to rolling out selected SUPATHERMIC™ - 11 across SUPAPURLIN® from ridge to fascia ensuring the nominated drape between purlins. Overlap and tape joins as per AS 4200.2.

FIGURE 6.1.3-1:

Roll out SUPATHERMIC™ 80 blanket insulation between purlins

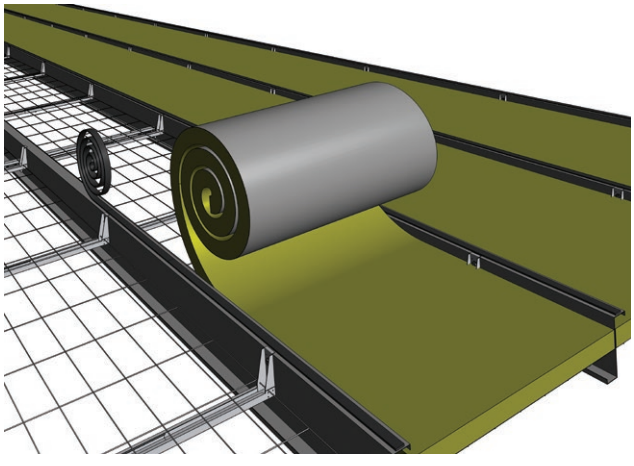


FIGURE 6.1.3-2:

INSULATION INSTALL

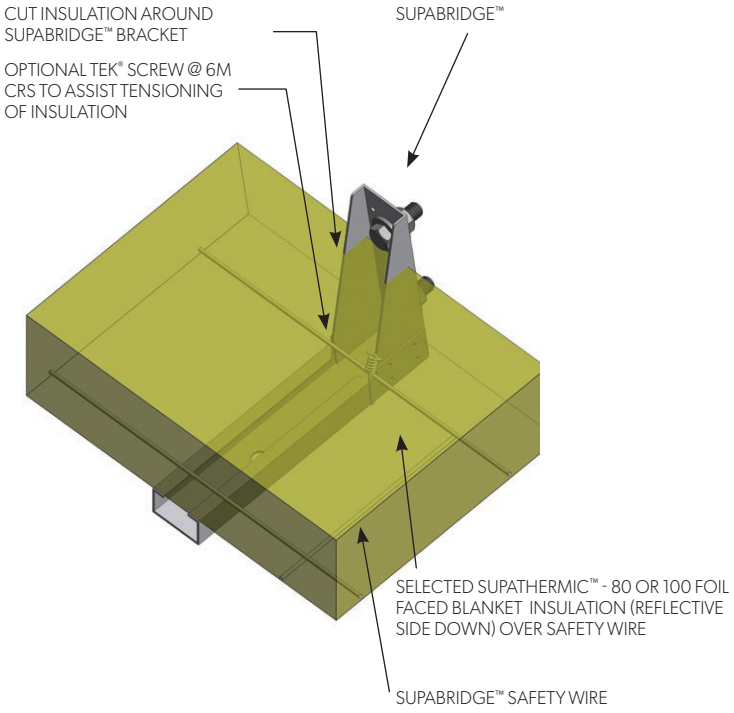
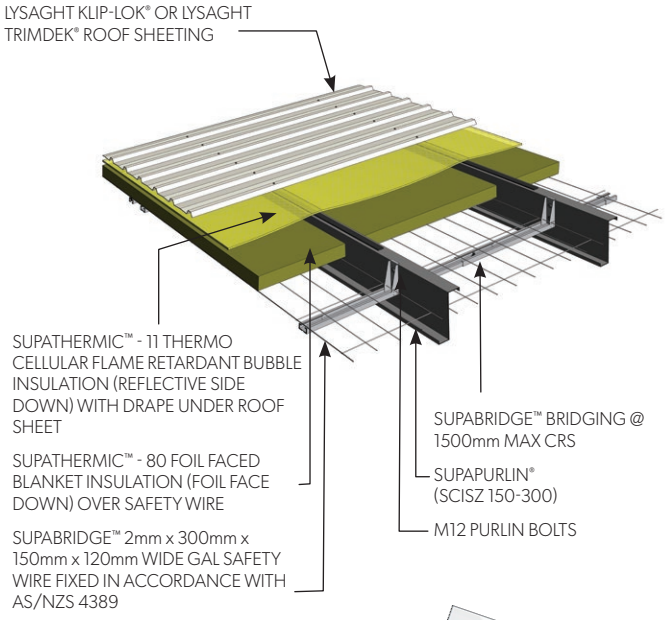


FIGURE 6.1.3-3:

SUPABRIDGE™ component layout



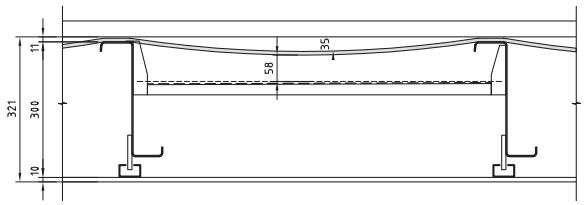
Step 8: Install specified Lysaght roof sheeting as per published recommendations.

6.2 CLOSED BUILDING WITH CEILING

6.2.1 BRIDGING MEMBERS

The installation method for SUPABRIDGE™ - 110 members utilises industry standard bolted connections with minimal specialist parts.

FIGURE 6.2.1-1:

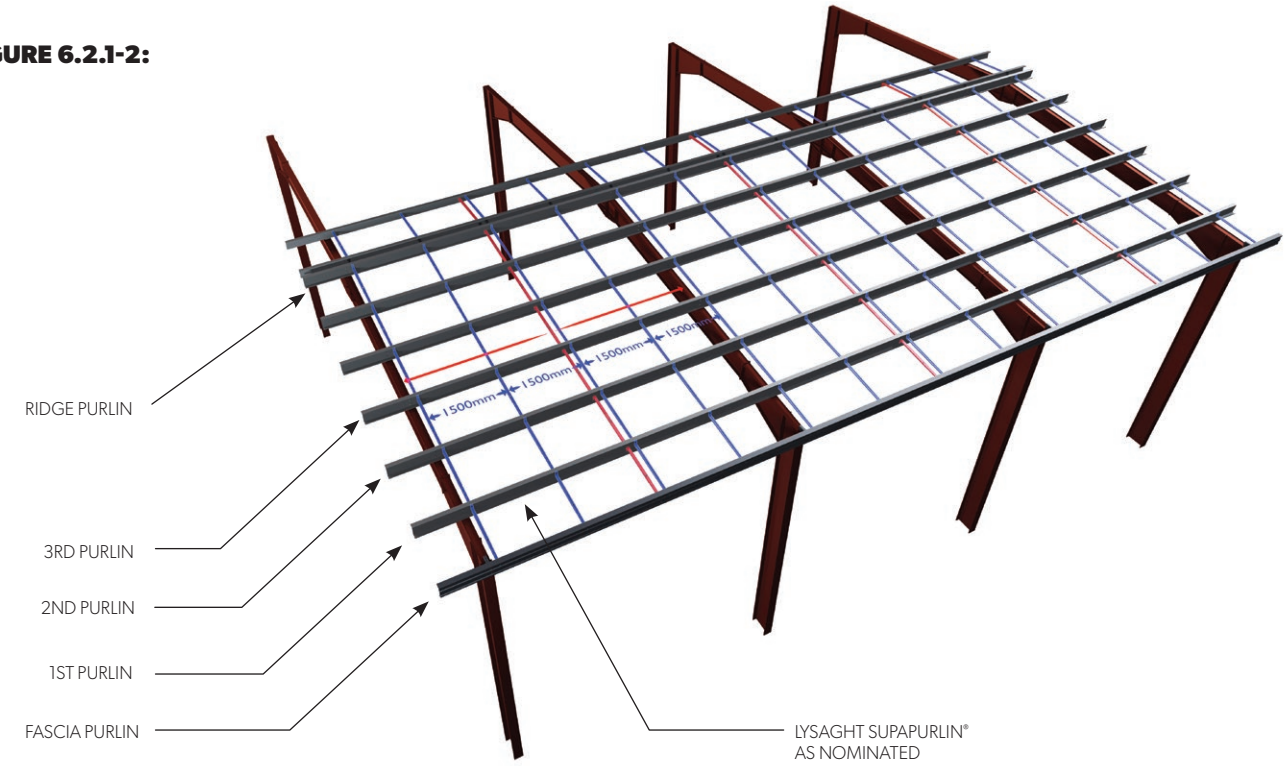


The system layers for CLOSED buildings with ceilings, in order of installation are

- SUPAPURLIN®,
- SUPABRIDGE™ - 110 bracket
- SUPABRIDGE™ safety wire
- SUPATHERMIC™ - MR Sarking
- SUPATHERMIC™ - 80, SUPATHERMIC™ - 11
- SUPATHERMIC™ - MR-PB insulation
- LYSAGHT® roofing

The following diagrams and text describe how the installation is completed. Installation of bridging members for roofs (purlins) can be commenced from the eaves or from the ridge (eaves start or ridge start). The following description is for an eaves start.

FIGURE 6.2.1-2:

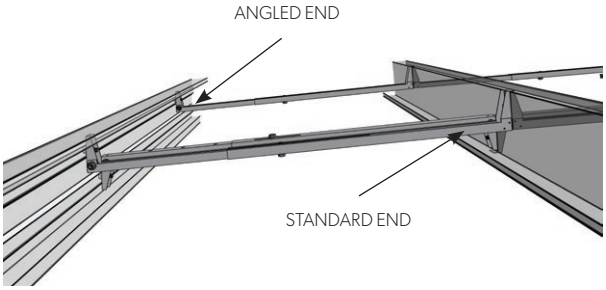


Step 1: Install the SUPABRIDGE™ fascia bridging member temporarily inserting a M12 purlin bolt through the bracket and first purlin, adjust the opposite bracket to the fascia purlin angle and bolt the opposite end to the fascia purlin. Check purlin alignment and adjust the telescopic SUPABRIDGE™ member as needed. Tighten bolts including the adjusting bolt between the bracket and channel to Snug Fit*. Install 1 x 14 - 10 x 25 Shed Tek screw to each face beside the adjusting bolt to "lock in' the angle.

*Snug Fit as described in AS 4100 Section 15.2.52

FIGURE 6.2.1-3:

SUPABRIDGE™ fascia purlin installation



Step 2: Moving to the next up-roof purlin bay, Install the standard SUPABRIDGE™ bridging member by resting the locator end over the holes of the next purlin, then bolt the opposite end to the 1st purlin and SUPABRIDGE™ fascia bridging member. Check purlin alignment and adjust the telescopic SUPABRIDGE™ member as needed.

FIGURE 6.2.1-4:

SUPABRIDGE™ purlin connection

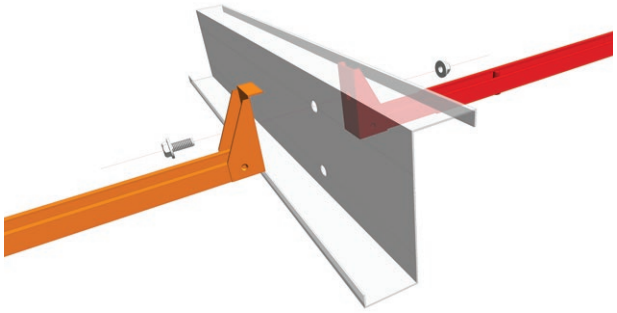
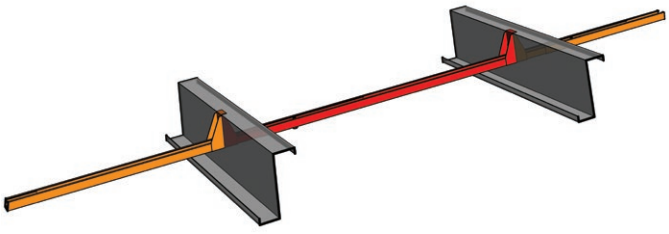


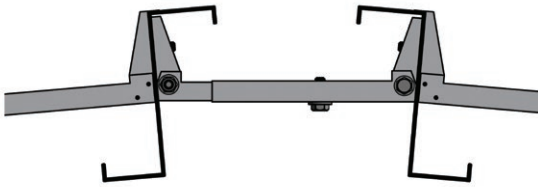
FIGURE 6.2.1-5:



Step 3: Repeat step 2 up the roof line until reaching the Ridge Purlin. Install the SUPABRIDGE™ ridge purlin member, installing the down roof bolt only. Then install the next down roof SUPABRIDGE™ member on the other side of the roof and install the M12 to both the SUPABRIDGE™ ridge purlin member and standard SUPABRIDGE™ member. Tighten bolts including the adjusting bolt between the bracket and channel to Snug Fit*. Install 1 x 14 - 10 x 25 Shed Tek screw to each face beside the adjusting bolt to "lock in' the angle.

FIGURE 6.2.1-6:

SUPABRIDGE™ ridge member installation



Step 4: Continue down the roof as per steps 1 to 3.
Step 5: Repeat steps 1-4 for the full roof area.

6.2.2 ROOF SAFETY WIRE

Step 6: Install roof safety wire :- Locate wire and wire trolley on roof purlins. Connect wire to 1st SUPABRIDGE™ member as per AS/NZS 4389 and roll out along purlin run. Repeat and continue for entire roof.

FIGURE 6.2.2-1:

Connect roof safety wire to SUPABRIDGE™ end piece as per AS/NZS 4389

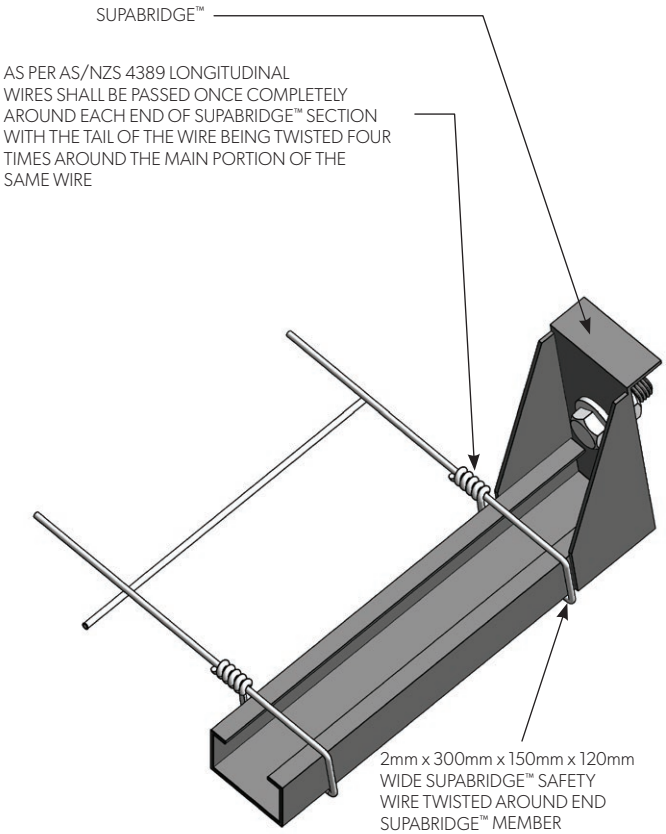


FIGURE 6.2.2-2:

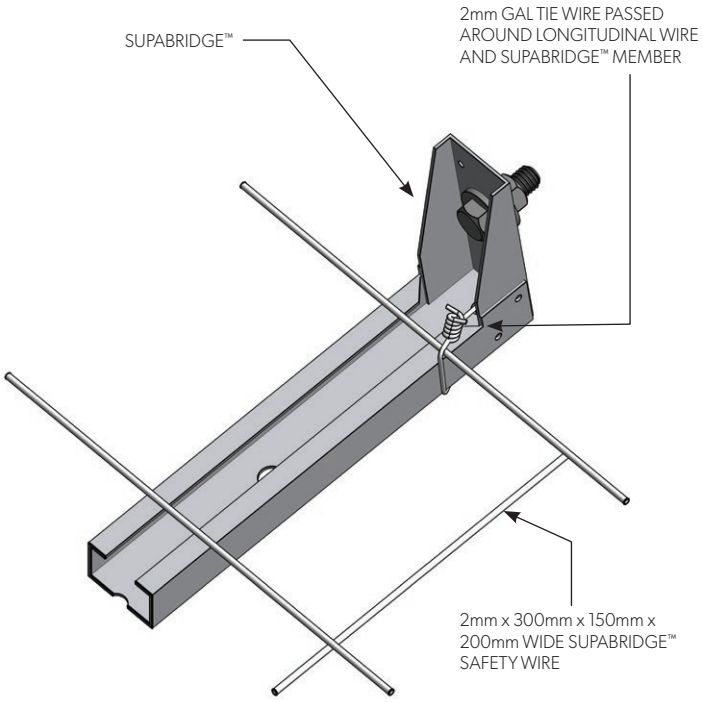
Roof wire trolly

NB: 1300mm purlin centres will allow for unimpeded wire installation. For smaller purlin centres cut roofing wire to size on the ground before placing on the roof.

Safety wire to be connected to each SUPABRIDGE™ member as per Figure 6.2.2-3 with 2mm gal wire.

FIGURE 6.2.2-3:

Roof safety wire connection at intermediate SUPABRIDGE™ supports WIRE INSTALL - CENTRAL SUPABRIDGE™



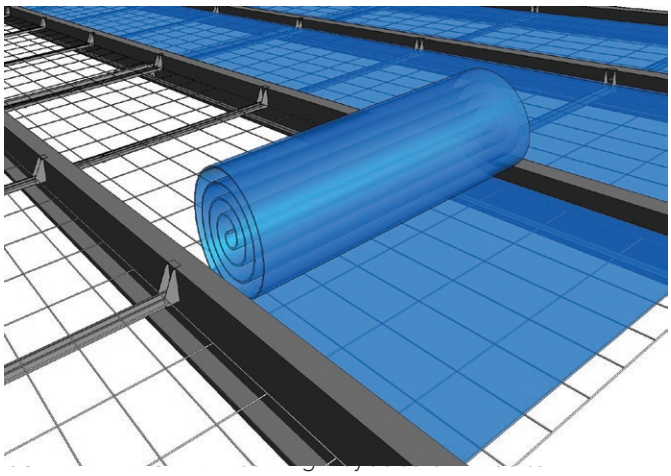
6.2.3 INSULATION

Step 7: Roll out selected SUPATHERMIC™ insulation over roof safety wire taking care to lay reflective silver side down and non-reflective gold face upward. The sarking foil facing can be neatly folded up 25mm on each side to fully cover the 1300mm space.

If required install SUPATHERMIC™ - TBS 4410 thermal break tape to SUPAPURLIN® top flange then roll out SUPATHERMIC™ - 11 insulation over roof across SUPAPURLIN® from ridge to fascia. Overlap and tape joins as per AS 4200.2.

FIGURE 6.2.3-1:

Roll out between purlins



SUPABRIDGE™ members during installation to aid placement as shown at Figure 6.2.3-2

FIGURE 6.2.3-2:

Optional SUPATHERMIC™ - MR Sarking fixings
INSULATION INSTALL

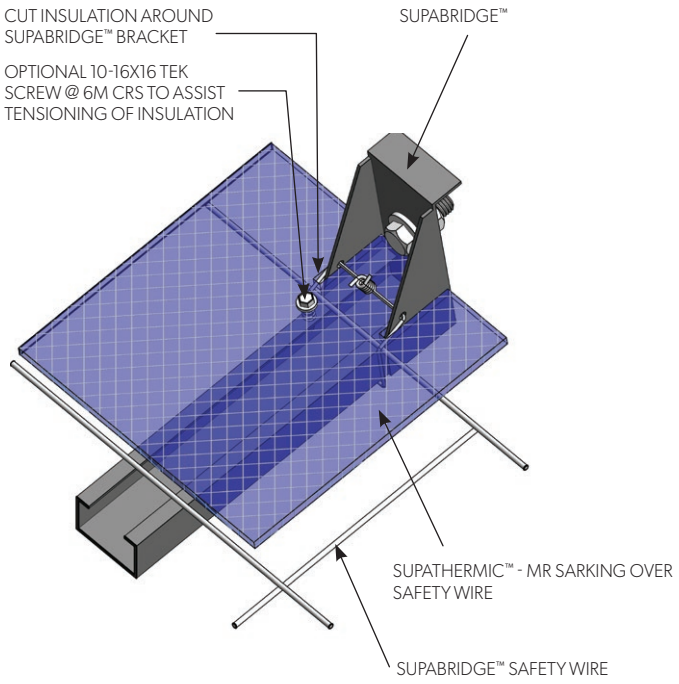
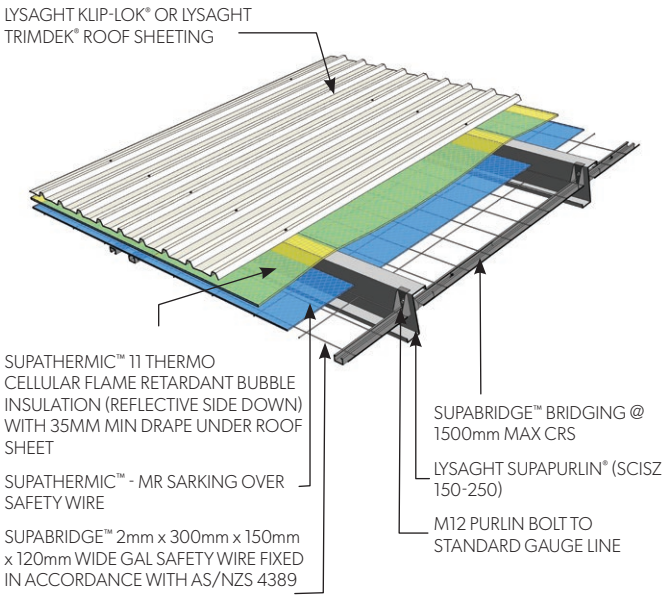


FIGURE 6.2.3-3:

SUPABRIDGE™ component layout



Step 8: Install specified Lysaght Roof sheeting as per published recommendations.

7.0 SUPABRIDGE™ SAMPLE SPECIFICATION DETAIL

7.1 SCOPE

This specification applies to the supply, delivery, erection and fixing of the SUPABRIDGE™ system incorporating LYSAGHT® roof sheeting, LYSAGHT SUPAPURLIN® structural members, SUPATHERMIC™ insulation, safety wire and associated accessories shown on the drawings and/or as necessary for completion of the works.

7.2 GENERAL REQUIREMENTS

7.2.1 STANDARDS

Unless noted otherwise, all Works shall be performed in accordance with the relevant Australian Standard or International Standard in the absence of an Australian Standard, including those listed in Table 8.2.1-1.

TABLE 7.2.1-1:

Standard	Title
AS 1562.1	Design and Installation of Sheet Roof and Wall Cladding
AS/NZS 1170.2	Structural Design, Wind Actions
AS 4040.0, AS 4040.1, AS 4040.2, AS 4040.3	Methods of Testing Sheet Roof and Wall Cladding
AS/NZS 1170.0, AS/NZS 1170.1, AS/NZS 1170.2	Structural design actions
AS 1397	Continuous hot-dip metallic coated steel sheet and strip
AS 4100	Steel Structures
AS/NZS 4600	Cold-formed steel structures
AS/NZS 4859	Materials used in the Thermal Insulation of Buildings
AS 4200.2	Installation Requirements for Pliable Building Membranes
AS/NZS 4389	Roof Safety Mesh

7.2.2 MATERIAL REQUIREMENTS

7.2.2.1 ROOF CLADDING

Sheeting materials and fasteners to be installed under this Contract shall be from the Lysaght roofing range and must be certified or type tested as having capacity for concentrated, static and fatigue loads in accordance with AS 1562.1 based on the following conditions:

- A concentrated load of 1.1kn; and wind pressures derived in accordance with AS/NZS 1170.2.
- Testing is required from a NATA registered facility to demonstrate that each type and thickness of material together with the fasteners is capable of withstanding the applicable loads from the most extreme combination of wind pressure and purlin/girt spacing shown on the drawings.
- For cyclonic regions roof sheeting to have tested capabilities using the Low-High-Low cyclonic testing methodology in accordance with the Building Code of Australia.

Sheeting materials shall be COLORBOND® steel or ZINCALUME® steel complying with AS 1397 and having a Solar Absorptance of ≤ 0.40.

7.2.2.2 STRUCTURAL PURLIN MEMBERS

Structural purlin members to be installed under this Contract shall be LYSAGHT SUPAPURLIN® members and must be designed in accordance with AS/NZS 4600 and be manufactured from GALVASPAN® steel material complying with AS 1397. Purlin members must have documented compatibility with the specified bridging system.

7.2.2.3 BRIDGING SYSTEM

The SUPABRIDGE™ bridging system shall be utilised for this contract as documented in the drawings. SUPABRIDGE™ members shall be designed and installed in accordance with the project structural details and manufacturers published documentation. Bridging shall be manufactured from GALVASPAN® steel material complying with AS 1397.

7.2.2.4 INSULATION MATERIALS

Roofing Insulation materials to be installed under this Contract shall be from the SUPATHERMIC™ range and must comply with AS/NZS 4859 and be installed in accordance with both AS 4200.2 and manufacturers published installation documentation.

7.2.2.5 FLASHINGS AND ACCESSORIES

Flashings shall be neatly scribed fully down into the profile of the sheeting and secured in accordance with the requirements of the design criteria but of a standard not less than that shown on the Drawings.

Notwithstanding the details of various flashings shown on the Drawings, the CONTRACTOR shall check these details and satisfy itself of their suitability to provide waterproof joints or provide alternative flashing details, subject to acceptance by the OWNER, necessary to satisfy this requirement. Where laps occur in flashings, appropriate Neutral Cure Silicone sealant shall be used to seal the joint effectively.

Unless shown otherwise on the Drawings, flashing and other accessories shall be factory fabricated from COLORBOND® steel or ZINCALUME® steel with a minimum 0.55mm base metal thickness, and of the same finish as the external surface of the adjacent sheeting.

7.2.2.6 GUTTERS AND DOWNPIPES

Gutters, downpipes and other rainwater goods shall be in accordance with AS 2179 and AS 2180.

Gutters, downpipes and accessories shall be factory designed and fabricated from the same material grade as the sheeting, and of the same finish to the external surface of the adjacent wall or eaves cladding.

Box gutters shall be designed and installed in accordance with AS/NZS 3500.3, AS/NZS 2179.1:1, HB114:1998 and be fully supported as per manufactures recommendations.

Gutters and downpipes shall be supplied to site as single units. Joints are not permitted in spans less than stock lengths.

Gutters shall be supported at a maximum of 1200 mm centres and shall be suitably sloped to ensure that ponding of water does not occur under any circumstances minimum fall 1:200.

The downpipes shall be supported at ground level and securely fixed to the walls.

7.3 WEATHERPROOFING

The whole of the cladding system shall be made weatherproof. Flashings, mouldings, sealants and other accessories necessary to achieve this shall be supplied and installed in accordance with the cladding Manufacturer's recommendations.

7.4 HANDLING AND STORAGE

Materials shall be kept dry in transit and on site to prevent water and/or condensation being trapped between adjacent surfaces. No stained or damaged materials shall be built into the finished work. Packs of sheets, Purlins and insulation standing on site shall be stored clear of ground. Sheets shall be handled using clean dry gloves.

- Wear clean, dry, cut-resistant gloves that are suitable for the task;
- Take suitable precautions against personal sun damage; and
- Prevent contact of the painted surface with sunscreen that contain titanium dioxide (TiO_2) and zinc oxide (ZnO).

7.5 INSTALLATION

Consideration shall be given to the timing of installation of cladding relative to that of the supporting structure to avoid distortion of the sheeting and/or fixings or otherwise compromising the integrity of the cladding system.

Where required, due allowance shall be made for scaffolding and staging to carry out the work in a safe and workmanlike manner.

Work shall be erected plumb, level and square and in proper alignment and relationship to work of other trades. Sheet profiles shall not to be distorted or spread during fixing, and centre lines of sheet laps must be maintained at the nominated cover width. Scalloped accessories are to be fixed at the time and as part of the operation of fixing the sheet. The whole of the Works shall be erected and fixed in accordance with the manufacturer's recommendations so that there will be no objectionable distortion or stressing of the fastening from thermal movement or other causes. Sheeting, flashings, mouldings and accessories shall be securely fixed in position and the whole of the work shall be weatherproof and bird proof on completion.

The ends of sheeting troughs shall be turned up approximately eighty degrees level with the top of the ribs at the high end of the roof and turned down approximately 15° at the low edge of the roof, using a suitable forming tool, to provide an effective weather-stop.

Fastening holes must be drilled square to the work to ensure correct sealing and weather tightness. Side lap stitching is to be carried out at each side lap before tightening of the main fasteners. During drilling and fixing of side lap fasteners, no weight or downward pressure should be exerted on ribs adjacent to lapped ribs which would result in denting or deformation.

Holes are to be drilled and not punched through the sheet. Pre-drilling or stack drilling of holes in sheets will not be permitted and top-side burrs resulting from drilling shall be removed from the sheets prior to fastening.

Any cutting required shall be done in such a manner so as to avoid distortion of the sheeting. To ensure accurate fitting of fascias, scalloped flashings and eaves filler strips, each are to be fixed at the same time and as part of the operation of fixing sheeting.

Corner moulds, barge moulds and the like shall be fastened to each sheeting support member through crests of the sheeting, and at a maximum spacing of every rib between supporting members.

7.6 CLEANING UP

The roof shall be swept clean of debris (nuts, screws, cuttings, fillings / swarf etc.) using a soft broom on completion of fixings. Rubbish and debris including off-cuts, loose fastenings, broken drills and the like shall be removed from the site prior to completion of the Works.

All drill filings / swarf shall be removed, including those on purlins, in gutters and any other part of the roofing structure.

8.0 BCA - INSULATION PERFORMANCE SOLUTION - FINAL REPORT

BUILDING CODE OF AUSTRALIA
PERFORMANCE SOLUTION – FINAL REPORT

In accordance with
Clause A2.2(4) of the National Construction Code 2019 Amendment 1 /
Clause A2G2 of the National Construction Code 2022

7 July, 2023

Application Ref.: Lysaght SUPABRIDGE® Rv performance

1. Introduction

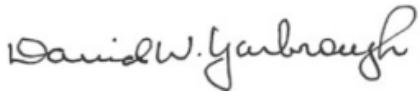
This report has been prepared to outline the following factors of the performance solution:

a) The Building Code of Australia 2022 Deemed-to-satisfy deviation to be addressed
b) The assessment methodology of the proposed solution to satisfy the relevant performance requirements, the acceptance criteria and justification.

2. Building Details

Building Characteristic	Description
Type of Building	Multi-residential, Commercial, Industrial, and Public assembly buildings using steel purlin and steel roofing / walling assemblies.
General Description	
Building Classification	Class 2 – 9 buildings
Rise in stories	Any
Portion of building affected	Roof and or walling utilising SUPABRIDGE insulation system

3. Stakeholders

Relevant Stakeholders		Signed
Lysaght	Metal cladding and purlin manufacturer. Seller of the Lysaght SUPABRIDGE® system	
James Fricker	F.AIRAH (Fellow, Australian Institute of Refrigeration Air Conditioning and Heating) M.IEAust (Member of the institution of Engineers Australia) CPEng (Chartered Professional Engineer) NER APEC Engineer (National Engineering Register APEC Engineer) IntPE (Aus) (International Profesional Engineer)	
Dr David W Yarbrough	BCHE MSChE PhD	

4. Proposed Performance Solution

Performance requirement	
NCC. 2019 - JP1 / NCC. 2022 – J1P1 Energy Use	
BCA DTS Clause	
NCC 2019 J1.29(e)(i) / NCC – 2022 - J4D3(5) Thermal Construction - general	
Proposed Performance Solution(s)	
1	Thermal values for SUPABRIDGE system calculated in accordance with the following • AS/NZS 4859.2:2018 – Thermal insulation materials for buildings Part2: Design - excluding Section 7 – prescriptive Rv values for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces • ISO 6946:2017 - Building components and building elements – Thermal transmittance – Calculation methods • ISO 13789:2017 Thermal performance of buildings- Transmission and ventilation heat transfer coefficients – Calculation Methods • Journal of Building Physics Paper *"Reflective insulation assemblies for above – ceiling applications"* • RIMA International Paper "REVIEW OF REFLECTIVE INSULATION ESITIMATION METHODS"

5. Assessment Methodology

The proposed Performance solution will demonstrate compliance with the relevant performance requirement under NCC 2019 - A2.2(1)(b) / NCC 2022 - A2G2(1)(b)
i.e. that the solution is at least equivalent to the Deemed-to-Satisfy Provisions via NCC 2019 A2.2 (2)(c) / NCC 2022 - A2G2(2)(c) expert Judgment

6. Acceptance Criteria

The proposed Performance Solution will be considered to achieve compliance with insulation requirements of **NCC. 2019 - JP1 / NCC. 2022 – J1P1 Energy Use** via demonstrated equivalency of the insulation requirement of DTS clauses **NCC 2019 J1.29(e)(i) / NCC – 2022 - J4D3(5) Thermal construction – general**, via calculation other than the prescribed values outlined in AS/NZS 4859.2:2018 - Section 7.

7. Performance Solution Assessment / Analysis

NCC 2019 J1.29(e)(i) / NCC – 2022 - J4D3(5) outlines insulation values to be calculated in accordance with AS/NZS 4859.2:2018 – Thermal insulation materials for buildings Part2: Design. AS/NZS 4859.2:2018 sets out prescriptive R values to be attributed to Airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.

AS/NZS 4859.2:2018 closely aligns with equivalent international standards such as ISO 6946:2017 and ISO 13789:2017, with the exception of AS/NZS 4859.2:2018 - Section 7. ISO 6946:2017 provides both simple default values for "*Airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces*" as well as a calculation methodology as per ISO 13789:2017.

Whilst providing simplicity, AS/NZS 4859.2:2018 Section 7 restricts application of internationally acknowledged calculation methodology for airspaces greater than 300mm and airspaces that have non-parallel bounding surfaces.

8. Performance Solution Justification

The objectives of the performance requirement is met on the following basis:

1. Expert judgement –
    a. Rv calculations for the Lysaght SUPABRIDGE® have been undertaken and certified using calculation methodologies outlined in ISO 13789:2017 by James Fricker F.AIRAH M.IEAust CPEng NER APEC Engineer IntPE(Aus).
    b. Rv calculations for the Lysaght SUPABRIDGE® have been peer reviewed by Dr David W Yarbrough
    c. Published Lysaght SUPABRIDGE® Rv values are certified by James Fricker F.AIRAH M.IEAust CPEng NER APEC Engineer IntPE(Aus).

9. Roof and ceiling construction

1. A roof or ceiling must achieve a *Total R-Value* greater than or equal to –
    a. in *climate zones* 1, 2, 3, 4 and 5, R3.7 for a downward direction of heat flow; and

Energy efficiency

    b. in *climate zone* 6, R3.2 for a downward direction of heat flow; and
    c. in *climate zone* 7, R3.7 for an upward direction of heat flow; and
    d. in *climate zone* 8, R4.8 for an upward direction of heat flow.

2. In *climate zones* 1, 2, 3, 4, 5, 6 and 7, the solar absorptance of the upper surface of a roof must be not more than 0.45.

10. Conclusions

This Performance Solution has been developed in accordance with the assessment methods and requirements of NCC 2019 - A2.2(1)(b) / NCC 2022 - A2G2(1)(b) and it is considered that equivalency is met for insulation values to met DTS clauses NCC 2019 J1.29(e)(i) / NCC – 2022 - J4D3(5) for development of project solutions to satisfy NCC. 2019 - JP1 / NCC. 2022 – J1P1 Energy Use.

9.0 J4D4 ROOF AND CEILING CONSTRUCTION

[2019: J1.3]

1. A roof or ceiling must achieve a *Total R-Value* greater than or equal to –

(a) in *climate zones* 1, 2, 3, 4 and 5, R3.7 for a downward direction of heat flow; and

Energy efficiency

(b) in *climate zone* 6, R3.2 for a downward direction of heat flow; and

(c) in *climate zone* 7, R3.7 for an upward direction of heat flow; and

(d) in *climate zone* 8, R4.8 for an upward direction of heat flow.

2. In *climate zones* 1, 2, 3, 4, 5, 6 and 7, the solar absorptance of the upper surface of a roof must be not more than 0.45.

SUPABRIDGE™ ORDER FORM

Customer: Order Number:

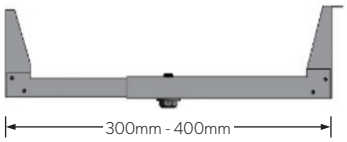
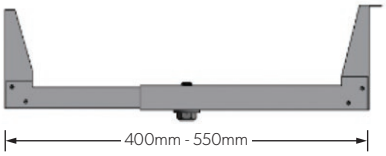
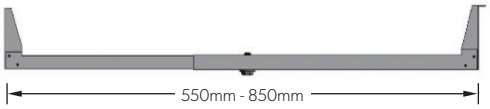
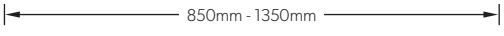
Delivery Address (Store/Pickup/To Site):

Site Contact: Mobile:

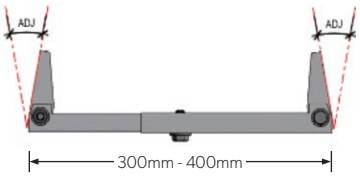
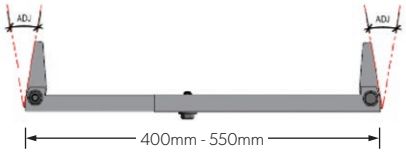
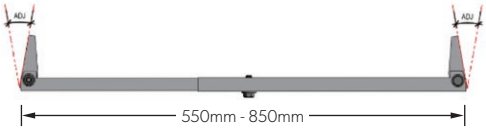
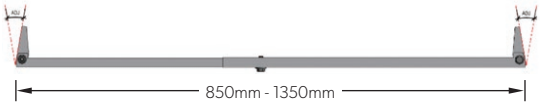
Date Required:

Date: Order Placed By:

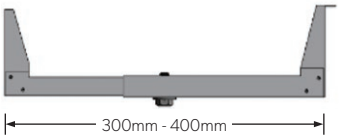
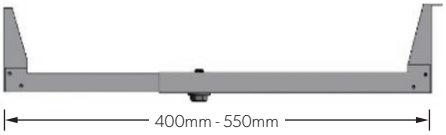
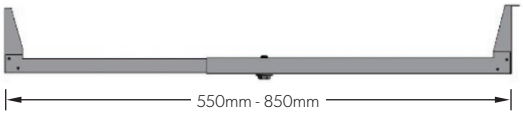
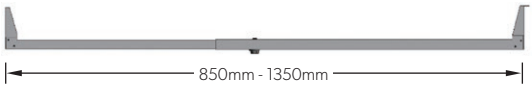
LYSAGHT SUPABRIDGE® - 110 BRACKETS - STANDARD FIXED ANGLE BRACKETS

Product Code	Description	Image	UOM	Qty
SB110400	SUPABRIDGE™ 110mm TELESCOPING BRIDGING 300mm - 400mm		each	
SB110550	SUPABRIDGE™ 110mm TELESCOPING BRIDGING 400mm - 550mm		each	
SB110850	SUPABRIDGE™ 110mm TELESCOPING BRIDGING 550mm - 850mm		each	
SB1101300	SUPABRIDGE™ 110mm TELESCOPING BRIDGING 850mm - 1350mm		each	

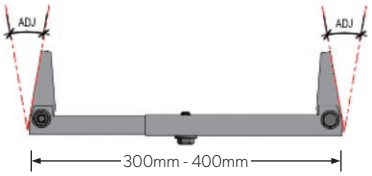
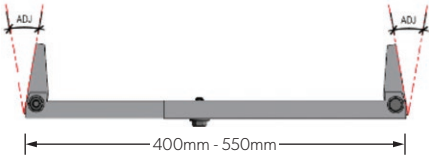
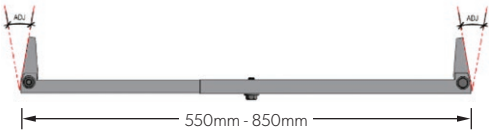
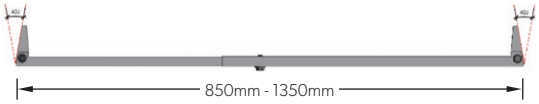
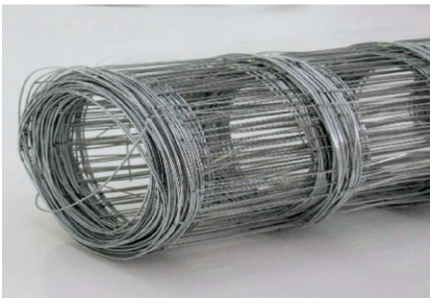
LYSAGHT SUPABRIDGE® - 110 BRACKETS - ADJUSTABLE ANGLE BRACKETS FOR CONNECTION TO FASCIA PURLINS AND RIDGE TO RIDGE PURLINS

Product Code	Description	Image	UOM	Qty
SB110ADJ400	SUPABRIDGE™ 110mm ADJ TELESCOPING BRIDGING Angle adj 300mm - 400mm		each	
SB110ADJ550	SUPABRIDGE™ 110mm ADJ TELESCOPING BRIDGING Angle adj 400mm - 550mm		each	
SB110ADJ850	SUPABRIDGE™ 110mm ADJ TELESCOPING BRIDGING Angle adj 550mm - 850mm		each	
SB110ADJ1300	SUPABRIDGE™ 110mm ADJ TELESCOPING BRIDGING Angle adj 850mm - 1350mm		each	
PB1230	M12 x 30mm Grade 4.6 Purling bolt and Nut		each	

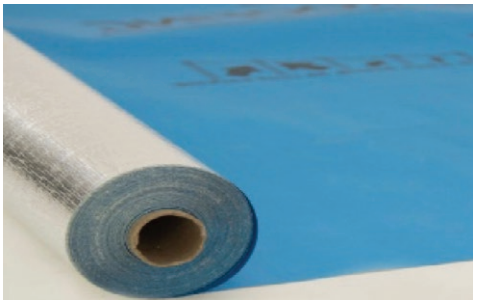
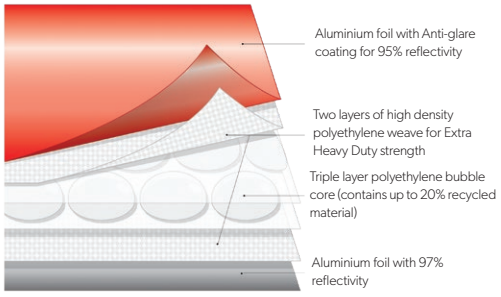
LYSAGHT SUPABRIDGE® - 170 BRACKETS - STANDARD FIXED ANGLE BRACKETS

Product Code	Description	Image	UOM	Qty
SB170400	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 300mm - 400mm		each	
SB170550	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 400mm - 550mm		each	
SB170850	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 550mm - 850mm		each	
SB1701300	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 850mm - 1350mm		each	

LYSAGHT SUPABRIDGE® - 170 BRACKETS - ADJUSTABLE ANGLE BRACKETS FOR CONNECTION TO FASCIA PURLINS AND RIDGE TO RIDGE PURLINS

Product Code	Description	Image	UOM	Qty
SB170ADJ400	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 300mm - 400mm		each	
SB170ADJ400	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 400mm - 550mm		each	
SB170ADJ400	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 550mm - 850mm		each	
SB170ADJ400	SUPABRIDGE™ 170mm TELESCOPING BRIDGING Angle adj 850mm - 1350mm		each	
RW203001501200	Gal Roof Wire 2mm x 300mm x 150mm -1200mm wide x 50m Roll to suit 1300mm roof purlin spacing		each	
RW20300150900	Gal Roof Wire 2mm x 300mm x 150mm -900mm wide x 50m Roll to suit 900mm purlin spacing		each	

LYSAGHT SUPATHERMIC® INSULATION COMPONENTS

Product Code	Description	Image	UOM	Qty
SBSARK301350MR	SUPATHERMIC™ - MR SARK P'Weave Sark 1350mm x 30 lm - 39m²		roll	
SBSARK30 1000 / 1100 / 1200 / 1250 / 1300MR	SUPATHERMIC™ - MR P'Weave Sark 1000 1000 / 1100 / 1200 / 1250 / 1300mm x 30 lm		roll	
SBSARK30900MR	SUPATHERMIC™ - MR SARK P'Weave Sark 900mm x 30 lm - 27m²		roll	
INSB80181200SF	SUPATHERMIC™ - 80 x 1200mm blkt faced w/-1350mm Silver foil 15m/18m²		roll	
INSB8018900SF	SUPATHERMIC™ - 80 X 900mm blkt faced w/-950mm Silver foil 18lm		roll	
INSSB100101200	SUPATHERMIC™ - 100 x 1200mm blkt faced w/- 1350mm silver foil 10lm-12m²		roll	
INSBTB104810B70	SUPATHERMIC™ - TBS 4410 Thermal Break Tape 10mm x 48mm - 10m roll - box of 7 (70lm)		roll	
INSB11135030NF	SUPATHERMIC™ - 11 x 1350mm wide x 22.22lm / 26m² bubble insulation		roll	

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LYT0176 - 10/2024

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WWW.LYSAGHT.COM

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