

11.30 Good roofing practice

Introduction to MRC Group

MRC Group is the **ONLY** designer, installer and maintainer of metal roof systems in Africa whose services & works are backed with the 'Guardian' System Warranty. Our unique turn-key offering from "cradle to grave" provides all of our clients with peace of mind, not just during the on-site works, but throughout the life of the guarantee.

Metal roof solutions in 'Pierced Fix' & 'Concealed or Secret Fix' roof sheeting include:

- Single Skin Roof Systems
- Compressed Insulation Roof Systems
- Double Skin Built-Up New Build Roof Systems
- Over-Roofing Roof Systems
- Energy efficient roof systems
- Accoustic roof systems
- High security roof and cladding system
- Metal refurbishment systems

All metal roof systems are designed and supplied in a range of differing metals and finishes to suit the design brief and the location of the site.

Guarantees / Warranties

Generally, traditional guarantees are provided to the client and are split into two areas:

- Long term Product / Material Guarantees on the main roof system items up to 20 years depending on the material, the coating and the site location.
- Short term 1 or 5 Year Workmanship Warranty.

(This generally does not cover design, perimeter details, penetrations, junctions between different roof systems or maintenance.)

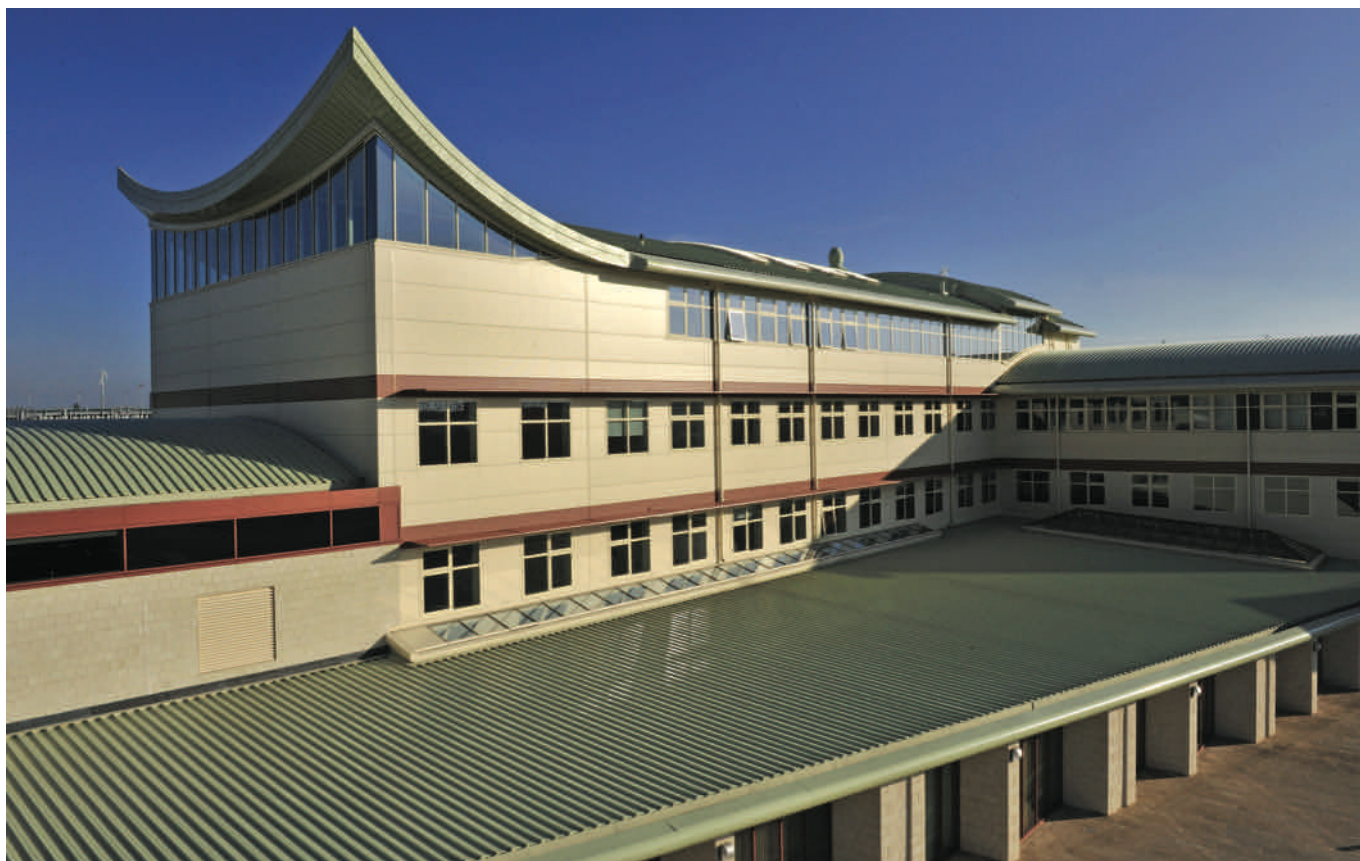
MRC's unrivalled all encompassing, transferrable 'Guardian' System Warranty.

- Up to 20 year system warranty including design, materials, workmanship & maintenance.
- Cover is on all installed systems by MRC Group – Metal Roofing & Cladding, Green Roof Systems, Waterproofing, Protective Coatings & Fire Walls.
- Includes all parts of the system, perimeter details, penetrations, junction points between different roof system and maintenance.

The 'Guardian' System Warranty covers the roof system, junction points AND perimeter details for:

- Design
- Materials
- Workmanship
- Maintenance

All the above are for the **SAME** length of term i.e. the workmanship & maintenance match the same length of term as the product guarantee. The length of term is determined by the product guarantee of the roof sheeting and its location. Typically metal roof systems are up to 20 years.





Compressed insulation roof systems

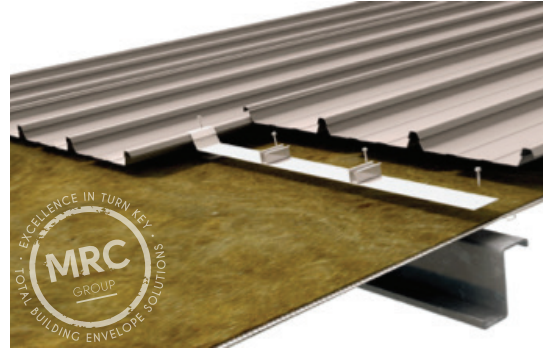
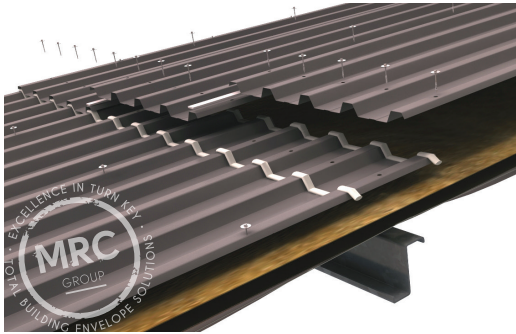
System overview

A compressed insulated roof system is generally constructed using restraining wire laid 90 degrees to the purlin, at centres to suit the flexible bulk density insulation, with the metal roof system installed on top of the insulation thereby compressing the insulation between roof sheet and purlin. The compressed insulation can lose up to 40% of its stated uncompressed thermal performance.

Glass wool bulk density insulation has a Fire Classification of Class 1 (non-combustible) with a melting temperature of over 750 degrees °C. By comparison polystyrene insulation has a dramatically lower melting temperature and needs to be carefully considered if a roof system is installed above, as the polystyrene insulation may shrink over time and then the metal roof system will become loose.

Pierced Fix Compressed insulation considerations:

Concealed Fix Compressed insulation considerations:



- Should only be considered for roof pitches above 7.5 degrees.
- End laps should be sealed with two runs of sealant to ensure no wind driven water ingress from outside or water ingress from internal condensation.
- Side laps should be sealed and stitched to ensure no water ingress.
- Minimum of class 3 exposed fixings complete with washers, depending on the site location.

- Can be used on roof pitches down to 2 degrees. Should openings or penetrations be designed into the roof system then increasing the roof pitch to 7.5 degrees should be considered.
- Please note that the use of compressed insulation thicker than 100mm is NOT advised with a 'Secret Fix' Roof System. Although additional fixings can be used on the clip, there will be additional pressure from the compressed insulation onto the roof sheet surrounding the clip.

Built-Up or double skin metal roof systems

System overview

A 'Built-Up' or 'Double Skin' Metal roof and cladding system using either metal trapezoidal profile liner sheet or wood liner over-purlin with the AshGrid™ bar & bracket support system providing an uncompressed insulation solution. Please note that the insulation is not compressed therefore higher thermal performance can be achieved compared to the compressed insulation systems.

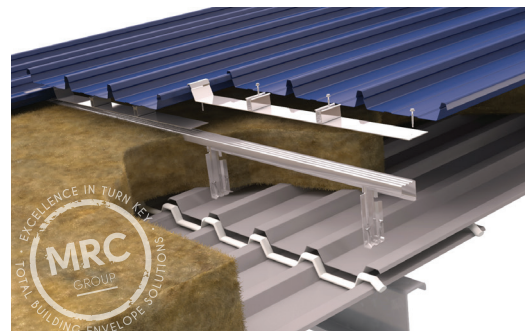
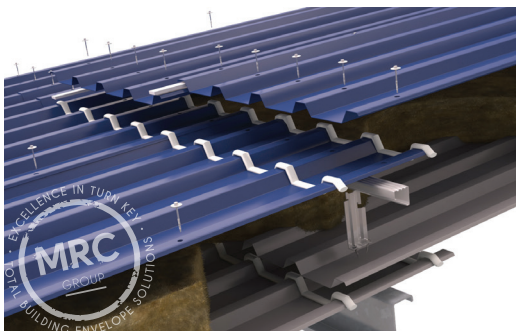
The installation of the metal or timber liner over-purlin provides a safe working platform to install the rest of the roof system and enables the general building works below to continue. The metal liner sheet is normally supplied in white providing a clean soffit within the building.

Due to the multi layered approach of 'Built-Up' or 'Double Skin' Metal roof systems, a large array of solutions can be designed as follows :-

- Air tight energy efficient roof systems
- Specialist acoustic roofs
- Green roof systems
- High security systems
- High humidity systems

Pierced Fix Built-Up considerations:

Concealed Fix Built-Up considerations:



- R-Values of over 10 m².K/W achievable as the bracket heights range from 60mm to over 300mm.
- The over-purlin liner sheet provides top flange restraint of the purlins and increased protection from wind to the roof system above.
- The sealing of the liner sheet across the end laps, side laps and to the walls will provide an air-tight building.
- All Built-Up metal roof system provide a weighted sound reduction of 40dB+ and reduce rain drumming.
- Sound absorption option available with an perforated liner sheet.

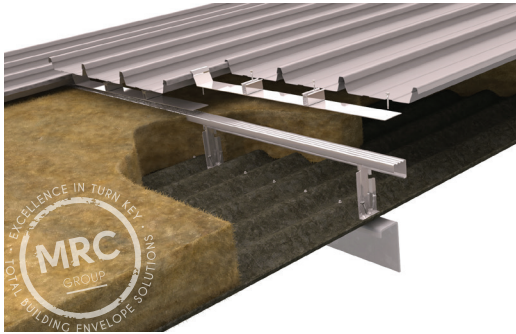
Metal Roof Refurbishment Solutions

System overview

Metal roofing and cladding refurbishment solutions include over-roofing / over-cladding and the opportunity to increase the roof pitch without removing and disposing of the existing roof systems. Generally the building can remain operational during the works.

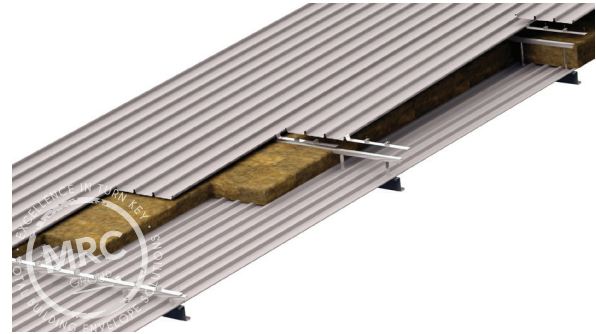
The patented AshGrid™ System is installed in the troughs of the existing roof sheeting with the brackets fixed directly to the underlying steel or timber purlins, thus creating an engineered, structurally defined cavity between the old and new roof coverings.

Over-roofing Roof System considerations:



- Option of upgrading the existing thermal and acoustic performance by insulating the structural void.
- The weight of the new roof system and the AshGrid™ system is between 6 – 12 kg/m² depending on the material and whether the option of the insulation is to be used.

Increasing the Roof Pitch considerations:



- AshGrid's range of brackets from 60mm to over 300mm provide the opportunity to increase the pitch of the roof. Should a steeper pitch be required then structural top-hat sections can be installed below the bar and bracket system to gain the required height.
- Pitched to curved roof solutions can be designed using the same system.



EXCELLENCE IN TOTAL BUILDING ENVELOPE SOLUTIONS



GUARDIAN SYSTEM WARRANTY UP TO 20 YEARS!
Design | Materials | Workmanship | Maintenance

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The Art of Perimeter Detailing

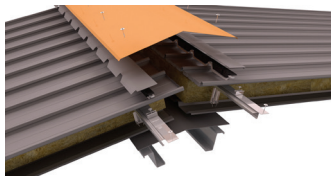
Roof sheeting manufacturers provide a guide to perimeter details such as ridges, barges, side walls, head walls and change in angle details, setting out the principles of how the details should be designed and constructed to ensure no water ingress, but it is the responsibility of the designer to ensure the correct size and gauge of the flashing which may well exceed the standard size.

Commonly, steel coils that are used in the manufacture of flat sheets for flashings are generally 925mm wide and therefore a standard total girth of a barge, ridge or side wall tends to be 462mm i.e. 2 lengths of flashing produced from a flat sheet. However in many circumstances these perimeter flashing details are applied to every project, with little consideration of the roof pitch, site location and roof height which all has an impact on their design such as flashing girth and metal gauge.

However, coils do come in various widths which does therefore allow for wider flashing details. In most cases if there is a failure of the roof perimeter details it is normally due to omission of elements such as polyclosures or undersized flashings.

MRC Group's commitment to excellence in perimeter detailing is backed with the unrivalled single source 'Guardian' System Warranty which covers design, materials, installation & maintenance for the term of the roofing and cladding system.

Flashings



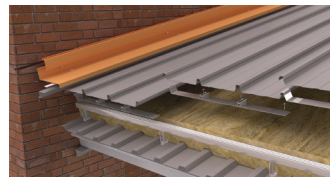
RIDGE

- Flashing Gauge 0.8mm
- Total Girth 840mm
- Serrated Closure
- Polyclosure
- Mastic Seal to Polyclosure
- Turn Up of Roof Sheet



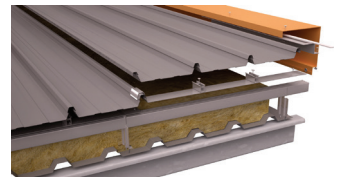
HEADWALL

- Flashing Gauge 0.8mm
- Total Girth 840mm
- Serrated Closure
- Polyclosure
- Mastic Seal to Polyclosure
- Turn Up of Roof Sheet



SIDEWALL

- Flashing Gauge 0.55mm
- Separate Support Zed
- Isolating Sealant Tape
- Metal Counter Flashing
- Angled Return
- Height Overall min. 150mm

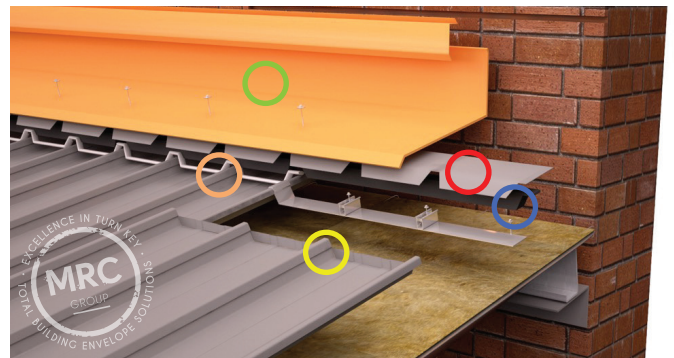
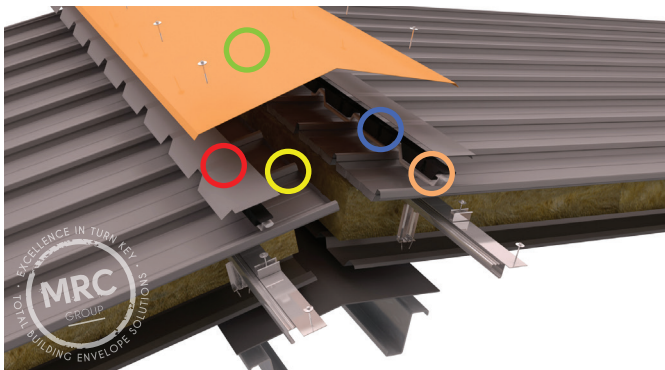


BARGE

- Flashing Gauge 0.55mm
- Separate Support Zed
- Isolating Sealant Tape



Principles of Ridge and Headwall design



Essential key components:

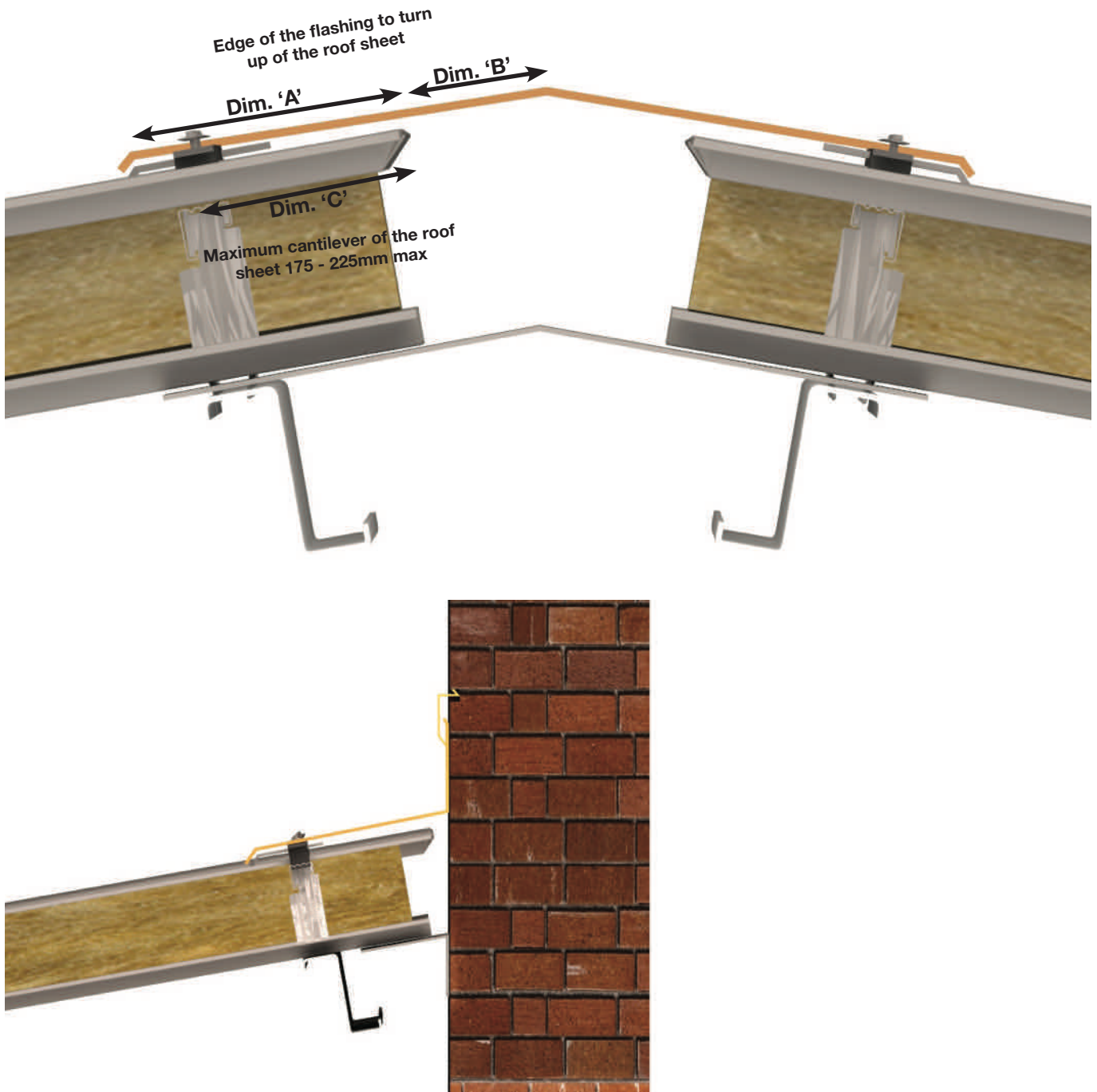
	Metal ridge flashing with Fasteners		Metal serrated closure
	Expanded polyethylene Polyclosure		Mastic sealant to one side of polyclosure
	Roof sheet 'turn up'	Please note it is essential that ALL components are installed correctly to stop water ingress	

The purpose of a ridge/headwall flashing is to complete the intersection between two opposing roof planes and to seal the building against water penetration.

N.B. 'Secret' or 'Concealed' Fix roof sheeting can be installed down to a 2 degree roof pitch and therefore a minimum overall ridge flashing should be 840mm using 0.8mm gauge steel.

The complete construction of the ridge/headwall detail must prevent direct and wind driven water from entering the building, close off the insulation void and ensure that debris does not build-up forming moisture traps that will have a negative impact on the roof sheeting.

Indicative Sections



To determine the overall girth of the ridge/headwall flashing the following should be considered:-

- Roof Pitch
- Length of the roof sheet due to thermal expansion
- Wind loads, Site location and Environment

Dim. 'A' – The lower the roof pitch the longer this dimension should be to stop wind driven rain.

Dim. 'B' – This dimension is determined by the purlin distance. (*In the below table we have assumed 100mm)

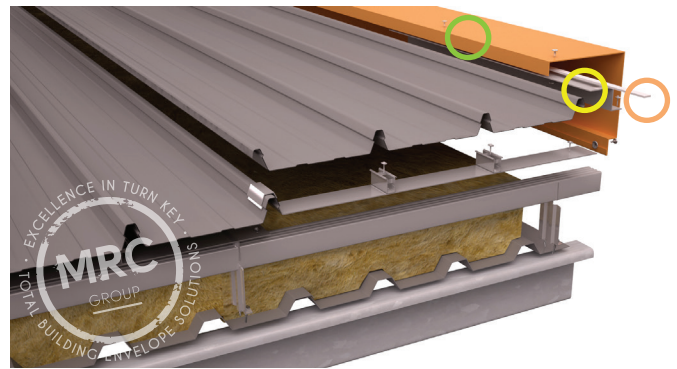
Table of Minimum Dimensions to determine the correct girth of Ridge Flashings.

Flashing Girth Calculator	Ridge Edge Turn Down	Dim 'A'	Dim 'B' (*)	Leg of the Flashing	Total Girth (both sides)	Minimum Gauge of Steel
Roof Pitch up to 7.5 Degrees	20mm	300mm	100mm	420mm	840mm	0.8mm
Roof Pitch over 7.5 Degrees	20mm	225mm	100mm	345mm	690mm	0.8mm

Please note that any flat, unbent surfaces greater than 270mm should be formed from 0.8mm gauge steel



Principles of Sidewall and Barge design



Essential key components:

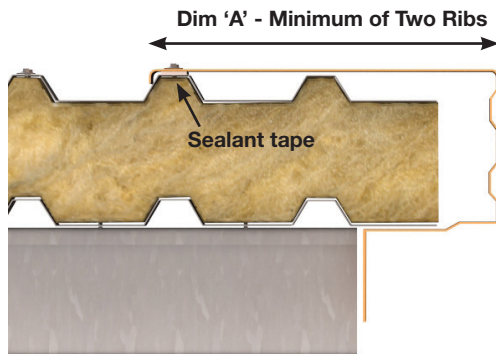
	Metal barge flashing with Fasteners		Sealant tape between the rib and the zed
	Metal counter flashing With angled return		Flashing to be fixed to the Independent zed

Please note it is essential that ALL components are installed correctly to withstand the impact from wind driven rain and to stop water ingress

The purpose of a barge/sidewall flashing is to complete the intersection between the roof and wall planes and to seal the building against water penetration. For a barge/sidewall flashing to be effective, it must be durable, low-maintenance, weather resistant, compatible with adjoining materials, and also able to accommodate thermal movement.

The complete construction of the barge/sidewall detail must prevent direct and wind driven water from entering the building and close off the insulation void. All barge/sidewall flashings used with a concealed or secret fix roof system must be fixed to the independent zed support to allow the roof sheet to thermally move without distorting the barge/sidewall flashing.

Pierced fix Sidewall and Barge design



Dim. 'A' – A barge flashing must cover a minimum of two ribs.

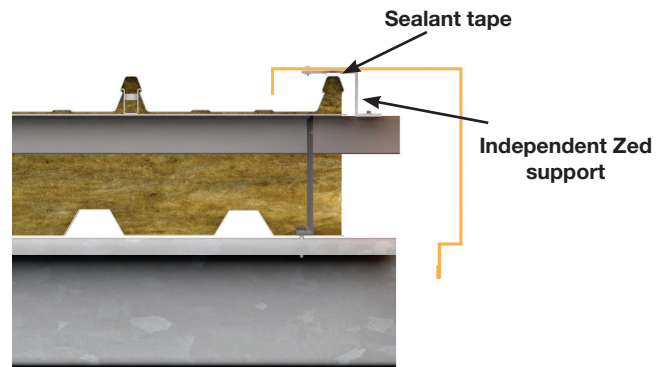
If the position of roof sheet rib finishes flush then Dim 'A' will be 220mm, should the rib of the roof sheet NOT finish flush then Dim 'A' could be in excess of 344mm.

(Please note this calculation is based on a standard IBR Profile.)

Should the gable of the building be angled on plan then you could need barge/sidewall flashings that cover 3 or 4 ribs, to provide the minimum of 2 ribs at the narrowest point.

The sealant tape between the roof sheet rib and the flashing is essential to stop wind driven rain entering the barge/sidewall detail. Should any water get into the detail, past the sealant, then the force from the wind will have been stopped and the water will roll down the pan into the gutter.

Concealed fix Sidewall and Barge design



The barge/sidewall flashing is fixed to the independent zed support to allow the roof sheet to thermally move without putting additional thermal stress on the flashing. Should the fixing between the barge flashing & the zed support leak then the water will drain onto the roof sheet & into the gutter therefore not entering the building.

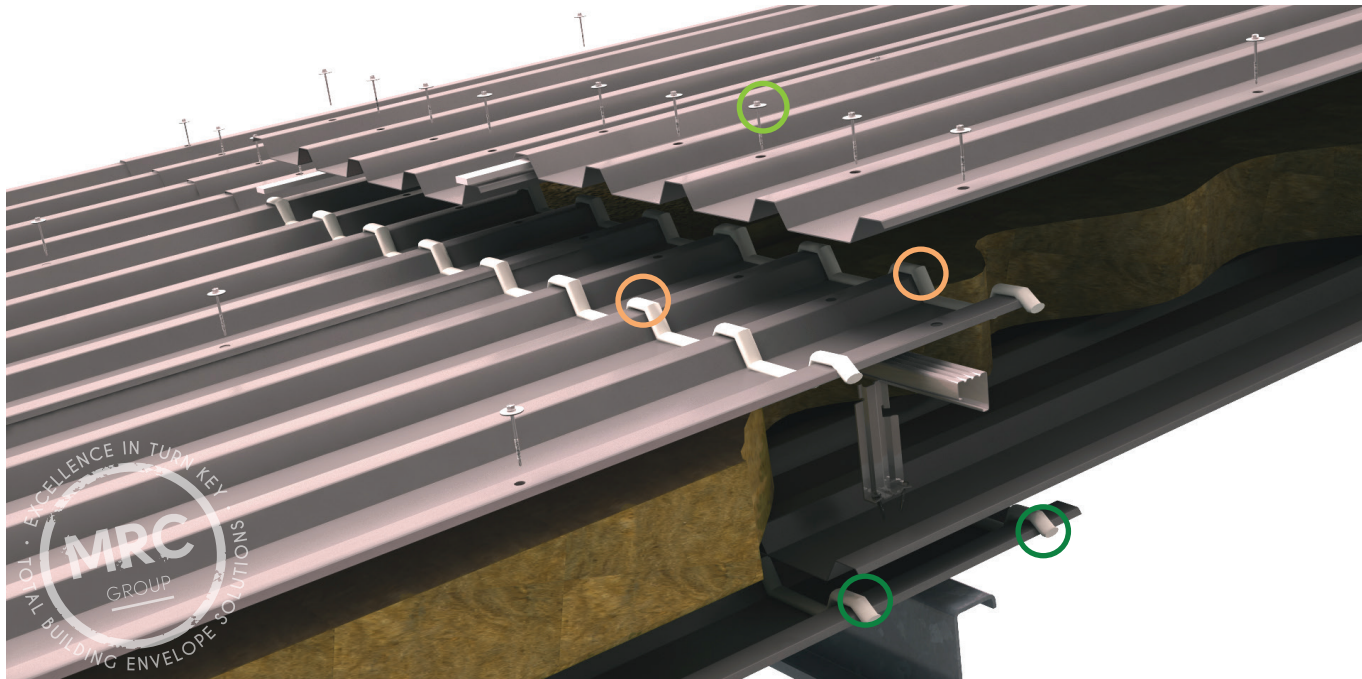
'Secret fix' or 'concealed fix' roof sheets can thermally move 1 – 2mm per linear metre of roof sheet in steel or 5 – 6mm in aluminum i.e. a 30 metre long steel roof sheet can thermally move 30 – 60mm. If the barge flashings are fixed to the rib of the roof sheet or the flashing barge/sidewall clips do NOT allow for this amount of thermal expansion then the pressure on the barge flashing will cause visual distortion, loosening the fixings and could eventually fall off the building.

Pierced fix end laps and sealants




If 'Pierced Fix' roof sheeting is installed and the roof slope length is longer than the manufactured roof sheeting supplied, then end laps need to be formed over the supporting purlin.

For an end lap detail to be effective, the detail must prevent direct and wind driven water from entering the building, close off the insulation void and also be able to accommodate thermal movement

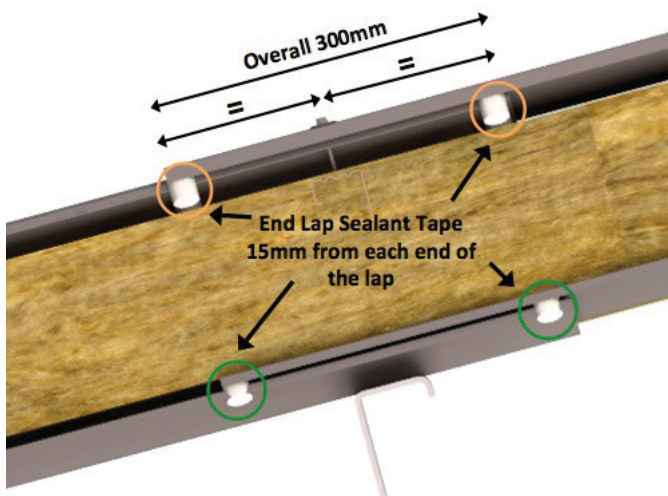
All end laps must have 2 runs of end lap sealant and the roof sheeting secured at every rib position with fasteners.



Essential key components:

	Fasteners at every rib		End lap sealant tapes between roof sheets
	Optional end lap sealant tapes for air tight seal		

Please note it is essential that ALL components are installed correctly to withstand the impact from wind driven rain and to stop water ingress



Please note that end lap details are used with 'Pierced Fix' metal roof systems and should ONLY be used down to a minimum roof pitch of 7.5 degrees. Roof pitches below 7.5 degrees should always use a single roof sheet with no end laps i.e. a 'Secret Fix' metal roof system.

ASYMMETRIC OR SYMMETRICAL END LAP

Some designers recommend an asymmetric design where the fixing is typically positioned towards the top third of the lap, however this has been shown to apply most of its compression to the sealant positioned towards the top of the end lap and less compression to sealant positioned towards the bottom of the lap.

MRC Group prefers the symmetrical design of a centrally fixed end lap detail that allows the fixing to apply equal pressure to the sealants positioned at the upper and lower ends of the lap, which has been shown to provide a more effective continuous seal.

SECURING THE END LAP

Class 3 or 4 (depending on the location of the site) main fixings complete with washers to suit the roof sheet material and the structure, are to be used through EVERY rib into the structure below.

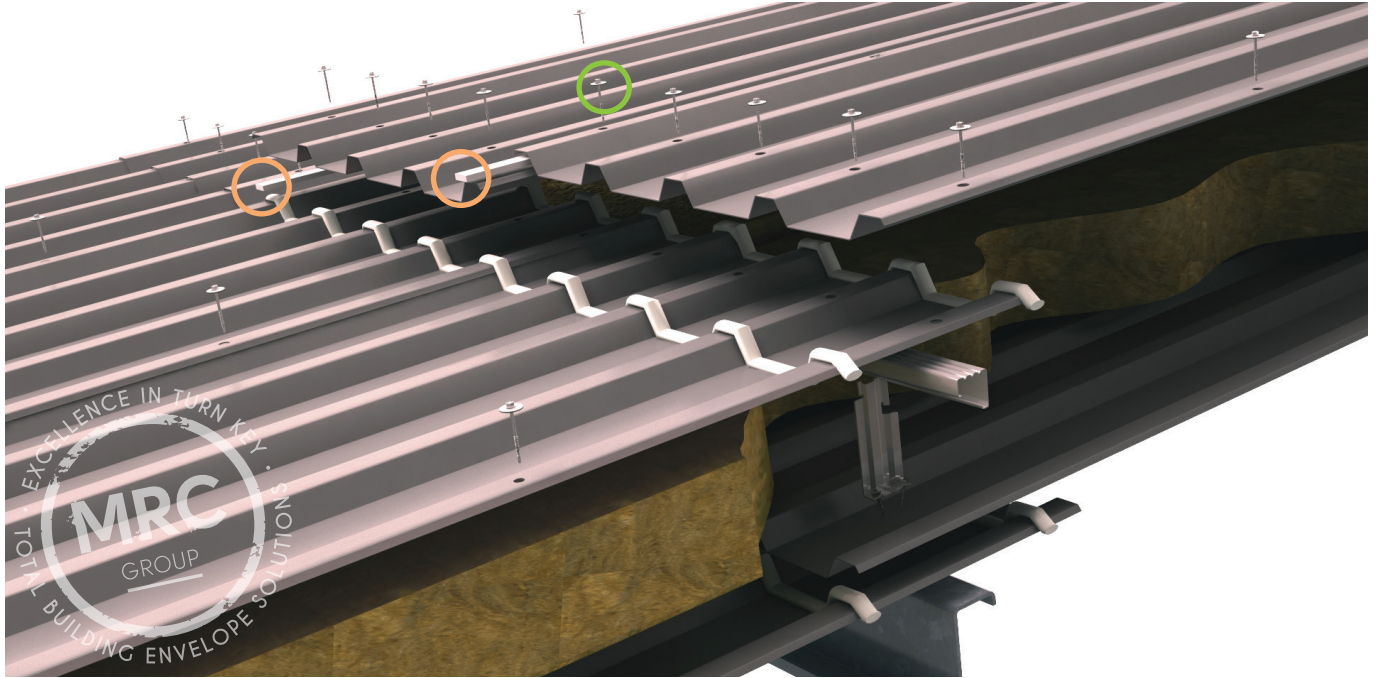


Pierced fix side laps and sealants

All 'Pierced Fix' roof sheeting should be installed with fasteners at 500mm centres maximum on every side lap.

If the roof pitch is less than 7.5 degrees then side lap sealant tape should be installed between the roof sheets to ensure no water ingress.

For a side lap detail to be effective, the detail must prevent direct and wind driven water from entering the building, close off the insulation void and also be able to accommodate thermal movement.



Essential key components:

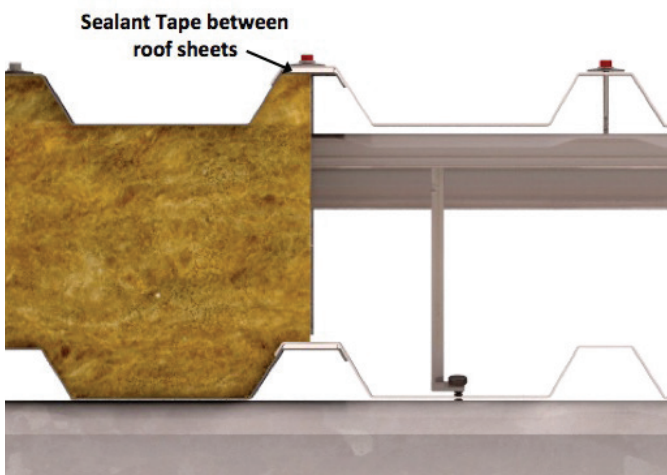


Fasteners at 500mm centres maximum along the side lap



Side lap sealant tapes between roof sheets

Please note it is essential that ALL components are installed correctly to withstand the impact from wind driven rain and to stop water ingress



TECHNICAL DATA FOR CORRECT CONSTRUCTION: SECURING THE SIDE LAP

Class 3 or 4 (depending on the location of the site) tapered stitching screw fixings complete with washers to suit the roof sheet material, are to be installed at EVERY 500mm centres maximum.

SIDE LAP SEALANT TAPE BETWEEN THE ROOF SHEETS ON ALL ROOFS BELOW 7.5 DEGREES.

It is essential to install 1 continuous compressed 8mm diameter continuous self-adhesive butyl tape or impregnated polyurethane foam sealing strip between each adjacent 'pierced fix' roof sheet to ensure a clean, dry and high performing detail on all roof below 7.5 degrees.

It can be argued that the addition of sealant tape across the side laps and end laps helps strengthen the roof sheeting performance.

For our growing library of technical details, system data sheets, technical drawings and 'how to' guides please visit www.mrc-group.co.za/technical-bulletins

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Based in South Africa, we provide a unique 'cradle to grave' service for Building Envelope Solutions providing Excellence in Metal Roofing and Cladding | Green Roofing and Living Walls | Waterproofing Systems | Thermal and Protective Coatings | Firewall Partitions | Solar Panels and Rainwater Harvesting Systems.

MRC Group is the only specialist contractor whose works are backed with the industry leading, all encompassing, transferable up to 20 Year 'Guardian' System Warranty covering Design, Materials, Workmanship and Maintenance for the Building Envelope System and its associated Perimeter Details.

www.mrc-group.co.za
info@mrc-group.co.za