SAFINTRA

world class roofing systems

DESIGN & INSTALLATION MANUAL FOR ROOFING & CLADDING







www.safalgroup.com / www.safintra.com

CONTENTS

INTRODUCTION

This manual is split in two sections. “Design Criteria” (on pages 4 - 12), is intended to be used by all specifiers and professionals involved with specifying and designing with the wide range of our products.
“Installation Procedures” (on pages 24 - 46),is a guide to the installation of steel roofing and side cladding manufactured by Safintra.

We refer only to genuine steel roofing and cladding manufactured by us and marketed under our brand names.

Specific product information can be obtained from our brochures, and you should use them in conjunction with this manual.

Guarantees

Safintra is proud of its products and service and our continuing confidence in our products is shown in the guarantees we offer.

Guarantees covering material, paint and no leak workmanship can be issued on request when an approved erector has followed the guidelines in this manual. Upon completion, Safintra must inspect the project before a guarantee can be issued.

Guarantees require specifiers and installers to exercise care in how the products are applied and installed. Furthermore, owners need to maintain the finished work. A maintenance contract with the installer ensures regular maintenance and inspections after severe storms.

Guarantees are issued in conjunction with the approved erector and the coil supplier. An updated list of approved erectors can be obtained from your local Safintra branch. Safintra must be notified upfront of the need for a project guarantee.

Safintra is part of the Safal Group

Safintra is part of The Safal Group, the largest steel roofing company in Africa. Perhaps more importantly, we are also the longest established group in our field - speaking volumes about the depth of our commitment to our clients, and our pride in what we do.

SAFAL™ GROUP

www.safalgroup.com

GLOSSARY

Bullnose	To curve a sheet.
Capping	Applying a covering over a piece of sheet.
Clips	Devices to hold down a roof sheet without making holes in the sheet.
Concealed fix / Secret fix	A roof sheeting system with no holes in the sheet when fixing to the roof.
Crest / Rib	All roof sheets have an upper and lower section, crest or rib is the higher section.
Pan / Valley	All roof sheets have an upper and lower section, pan or valley is the lower section.
End lap	Two sheets laid end on end.
Side lap	Two sheets laid side by side.
Roof pitch / slope	The angle of the roof relative to the horizontal.
Polycarbonate	Translucent sheets to allow sunlight through.
Purlins	Lip-channels or timber pieces to fix roof sheets onto.
Translucent sheets	Normally polycarbonate or fibre-glass sheets to allow sunlight through.
Pierced fix	A roof sheeting system with holes in the sheet when fixing to the roof.

Care has been taken to ensure that the information provided is accurate. SAFINTRA does not assume responsibility for inaccuracies or misinterpretations of this data. Photographs and illustrations are typical examples of roofing and cladding products and applications. SAFINTRA is continuously engaged in product development, please ensure that you have the most recent issue of information from SAFINTRA.

DESIGN CRITERIA

DESIGN PARAMETERS

The most important part of getting a metal sheet roof to perform to its optimum level is to design it correctly. The success & integrity of the roofing system is dependant on the following 4 (four) factors:

1. Mechanical properties of the input material.
2. Design criteria of the building.
3. Symmetry of the profile and
4. The installation of the approved roofing contractor.

A. TWELVE DESIGN STEPS

The following 12 aspects needs to be considered.

1. Preferred Profile
2. Application
3. Aesthetics
4. Geographical location & Environmental conditions
5. Wind speed region
6. Terrain category
7. Building height
8. Roof shape
9. Roof pitch
10. Overhang
11. Gauge or thickness
12. Purlin material

STEP 1: Preferred Profile

When you incorporate steel sheeting into your building design, you have a wide range of profiles from which to choose. Whilst roofing and cladding obviously have to keep out the weather, they also have significant effects on the looks, cost and durability of a building. Your initial choice might have to change later on due to one of the other 12 steps.

STEP 2: Application

This step is purely to determine whether you are designing a roof or side cladding for a wall. The fixing points differ greatly. Certain profiles work better for side cladding than others and this fact needs to be kept in mind.

Once you have made the aesthetic decision of which profile to use, the main considerations are the support spacings, fixing details and the details of flashing. The span tables for each profile are divided into the roofing and cladding sections and are available on the brochures for each profile.

STEP 3: Aesthetics

A factory or warehouse does not necessarily have to be aesthetically pleasing to be functional, but a residence or upmarket office must be visually attractive. The purlin spacings (as found in the product brochures) for any aesthetically pleasing project needs to be reduced to eliminate any sagging between fixings. Furthermore, we recommend using the thickest available sheet to minimize dents and other marks which might be more visible on thinner gauge sheets. These marks do not influence the performance of the sheets in any way, but could detract from the looks of the roof.

Support structure

It is important to note that neither the roof sheet, nor the roofing erector, can hide the imperfections of the roof structure. In contrast, the roof sheets and side cladding tend to highlight a structure that is misaligned or unstable. The maximum recommended purlin spacings for the purlins are shown and based on testing in accordance with:

SABS / SANS 0237:1991- "Code of Practice – Roof and Side Cladding".

SABS / SANS 0160: 1989 – "The general procedure and loadings to be adopted for the design of buildings".

SABS 6400: 1990 – 'The application of the National Building Regulations'.

The spacings in the tables for roofs are recommended to produce adequate performance of roof cladding under foot traffic loading (incidental for maintenance). The following conditions apply:

- Buildings up to 10 m high in Region B Terrain Category 3 conditions (Vs = 38 m/s and Vu = 60 m/s);
- Cp, e = - 0.65 (forwalls), Cp, i = 0.2 and Kl up to 2.0, in accordance with SABS 1170.2—1989 SABS Loading Code: Wind loads.

In all cases, sheeting is fixed to a support of 3.0 mm minimum base metal thickness (BMT) and minimum yield stress of G550. For support spacings in wind conditions other than those shown, contact your local Safintra branch.

STEP 4: Geographical location & Environmental conditions

Steel products can be affected by some environmental conditions such as industrial, agricultural, marine, intensive animal farming, swimming pools or other aggressive conditions. If any of our products are to be used in these conditions, or unusually corrosive environments, seek advice from your local Safintra branch.

STEP 5: Terrain category

The terrain category would determine the fixing method and the purlin spacing. All materials and fixings have been designed to accommodate terrain category 3. As soon as the project moves into category 2, a factor of 0.8 should be applied to all purlin spacings as found in the product brochures or in section B of this manual. A terrain category 1 would require a spanning reduction factor of 35%.

Terrain Category 1 – Exposed smooth terrain with virtually no obstructions and in which the height of any obstruction is less than 1.5m. This category includes open sea shores, lake shores and flat, treeless plains with little vegetation other than short grass.

Terrain Category 2 – Open terrain with widely spaced obstructions (more than 100m apart) having heights and plan dimensions generally between 1.5m and 10m. This category includes large airfields, open parklands or farmlands and undeveloped outskirts of towns and suburbs, with few trees, hillside or other exposed areas.



Terrain Category 3 – Terrain having numerous closely spaced obstructions generally having the size of domestic houses. This category includes wooded areas and suburbs, towns and industrial areas, fully or substantially developed.



Terrain Category 4 – terrain with numerous large, tall, closely-spaced obstructions. This category includes large city centres or forests.

Our SAFLOK clips (SL 700) have been designed for terrain category 3. For any other conditions please contact Safintra.

STEP 6: Roof height/Site elevation/Site location

The height of a buildings roof will also influence the wind speeds at roof top level. A building 10m or lower would use the purlin spacing as shown in all brochures, however on a building between 10m to 25m, the purlin spacings must be reduced by 20%. A building higher than 25m, the purlin spacings must be reduced by 35%. This is over and above the calculation applicable in step 5.

STEP 7: Roof design

Straight roof or curved? If curved – what is the radius? (refer to curving, bending & bull nosing)
An excellent method of cladding low slope gable roofs is to run continuous lengths of roofing from eave to eave, across the full width of the roof. This gives a particularly neat and attractive roof. It is also possible to spring-curve sheets into a concave shape.

With this design the ridge capping is eliminated, thus avoiding any possibility of leakage along the ridge. SAFLOK 700 can also be used with rib caps at the ridge and a metal cap is fitted over the cut. (See page 8)

Bull nosed sheets

Factory curved roofing sheets are popular for aesthetics such as a bull nosed veranda roof, or for functions such as a gutterless eave design. Pierced fix roofing sheets can be curved to a radius as small as 350 mm.

SAFLOK 700 can be bull nosed to a radius as low as 450 mm.

There is usually a straight portion at the end of the bull nosed sheet beyond the curve of 75 mm. Allow for this in your design. It can be trimmed off after delivery by the erector, if necessary.

If a pre-curved section of cladding is to be joined to a straight section, you should order the curved and straight sheets at the same time, asking for them to be matched in production.

Spring-curved concave roofs

Roofing can be spring-curved into concave shapes.

CURVING & CRANKING TABLE				
Profile	Minimum Spring Inside Radius Convex	Minimum Spring Inside Radius Concave	Minimum Crank Inside Radius Convex	Minimum Crank Inside Radius Concave
SAFLOK concealed fix roofing	36m	60m	450mm	N/A
TUFDEK IBR	28m	60m	350mm	350mm
WIDEDEK	26m	55m	350mm	350mm
classicorr corrugated	23m	23m	350mm	350mm
FLUTELINE	36m	60m	350mm	350mm
SARZIP	36m	60m	450mm	N/A

TABLE 1

Note: If the radius is too big, a large portion of the roof will have a roof slope of 0° which will cause leaking.

Oil canning

Oil canning is a result of the mechanical properties of the material and not a defect of the roof sheet. Sheets being sprung may cause oil canning. The pans of SAFLOK 700 and WIDEDEK tend to oil can (minor waviness in the pan) when spring curved. Apart from not looking good, an oil canned pan may retain water which could lead to discolouration and/or deterioration of the sheet coating and also contributes to thermally induced roof noise. If some oil canning in the pans are aesthetically acceptable, these profiles can be spring-curved with the spacing between the purlins at the ridge being slightly less than the internal span recommended for the profile as specified in table above. Over the supports at the ridge, very slight crease marks may appear in the pans or valleys when subjected to foot traffic. They don't affect strength and will usually not be seen from the ground.

Rib-cap roofs

SAFLOK 700 can be used in continuous lengths from eave to eave by cutting the ribs and bending the pans at the ridgeline. Rib caps are fitted over the cut ribs, which open up when the pans are bent. Fitting the rib caps can be time consuming and care must be taken with sealing to avoid any possibility of leakage.

The ribs must be cut squarely, with a metal cutting blade in a power saw, set to the depth of the rib minus 2 mm. Pressed steel caps to suit SAFLOK 700 ribs are available, though the range of angles is limited.

Tapered roofing

We cannot taper any sheet profile at either end.* In order for a roof, sweep or turn in plan view, the design will have to encompass lots of rake cut sheets and the use of hip or valley flashings.

** SAFZIP manufactured by Safintra India and available on request.*

STEP 8: Roof Pitch

Unless there is adequate positive fall in a roof, there is danger of ponding, which can lead to a reduced service life, particularly in coastal areas. At low roof angles or slopes, approximately 1 in 50 (1°), all roof supports must be in the one plane, as slight variations can result in zero or negative fall. This may occur even after completion of the building as a result of settlement, timber warping or shrinking, extra loadings (like air conditioners) or other foot traffic.

Minimum roof slopes for short roof sheets (under 10m) are listed below:

- 3° or higher, Concealed fixsheets only (SAFLOK 700, SAFZIP)
- 5° or higher, box rib proiles with high ribs (IBR or INDUSTRIAL 7, COMAX1000)
- 7.5° or higher, box rib proiles with lower ribs (WIDEDEK, MAXCOVER, TRIMFLUTE)
- 10° or higher, tile proiles (VERSATILE, ZENTILE, ROMANTILE, LIFESTILE)
- 15° or higher, S-rib proiles (CORRUGATED, VERSADEK)

We do not recommend a roof slope under 2°.

Designing a roof to operate at its minimum roof slope is always risky. The practicality of erecting the roof correctly at these low angles is very difficult, bearing in mind all variables such as unstable or settling ground conditions, steel structure being 100% correct and the level of competency of the labour force. Where possible, allow 2° or 3° extra.

STEP 9: Overhang

All overhangs larger than 500mm need to be positively fixed with a 50mm bonded saddle washer to allow for expansion and contraction. These include canopies, walkways, lean-to roofs, loading bays, gate entrances or aesthetic structures such as wings or buttresses. Overhangs are prone to a build up of wind pressure and are considered as the weak point on any roof. If the design does not allow for positive fixing, a strong, wind resistant soffit must be installed under the overhang area.

Canopies, walkways, lean-to roofs, loading bays and decorative roofs similar to the photo above, must preferably all be positively fixed.

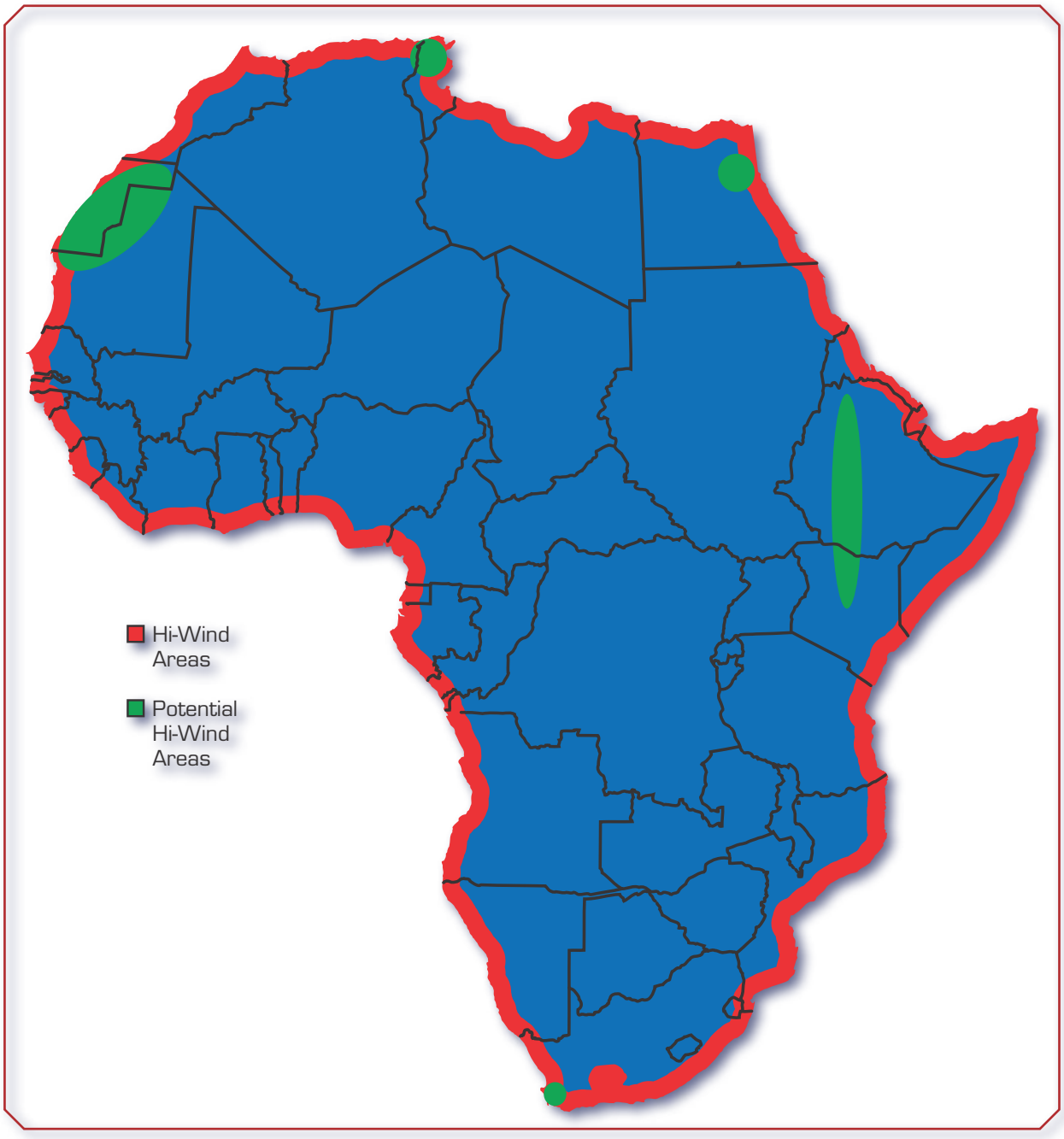
STEP 10: Wind speed

Note: Roofs are susceptible to failure during construction (work in progress), the last sheet for the day must be positively fixed. This sheet should be lifted and re-used at the end of each days work, and discarded at the end of the project. Positive fix the sheet as long as the sheet is secured extremely well!

Winds can create considerable forces on both the topside and the underside of roof cladding, and one should consider these forces in the design and fixing of any roof. These forces are:

- downward (positive) forces tending to collapse the roof sheeting inwards, caused by wind acting directly on the windward side; and
- upward (negative) forces tending to lift the roof sheeting from its frame, and the entire roof structure from the rest of the building. Upward forces can be caused both by uplift from negative wind pressures, outside the building; and by positive wind pressure inside the building.

Generally the most intense wind loads imposed on roofs are due to the negative uplift forces. The dead weight of roofing materials is relatively small, and therefore, the outward forces must be resisted by the roof fasteners.



Furthermore, the roof of any building is at its most vulnerable during erection. An incomplete roof is more likely to fail than when the building has been completed. Any portion of the building that has not been finished, for example a section of side cladding or the installation of windows or roller shutter doors, can change the wind forces on the roof sheets. Special precautions need to be taken by the design team and the erector to prevent the roof sheets from blowing off during this phase.

WIND SPEED TABLE		
Wind Zone	Flashing Fasteners Per Metre	Purlin spacing for sheeting
Low (32 m/s) 115km/h	1	As per the profile span tables
Medium (37 m/s) 133km/h	2	As per the profile span tables - 5%
High (44 m/s) 158km/h	3	As per the profile span tables - 25%, all side laps to be stitched and all roof perimeters secured, consult your local Safintra branch.
Severe (50 m/s) 179km/h	4	As per the profile span tables - 25%, positive fix all, consult your local Safintra branch

TABLE 2

STEP 11: Gauge or thickness

The following materials and finishes are available:

- Pre-painted or unpainted Aluminium-Zinc (AZ) coated steel.
- Pre-painted or unpainted Aluminium.
- Unpainted stainless steel for very severe coastal or industrial environments (generally within about 100 metres of the source). Check with your local Safintra office for availability of profiles, accessories, as well as suitability of the product.

STEP 12: Purlin type

The type of purlin would determine the type of fasteners to use, i.e. fasteners for wood are longer than fasteners for steel. Also consider contact with, or runoff from, rain water over some materials resulting in chemical solutions that can damage coated steel products.

The materials include certain metals, treated timbers and chemicals.

- prevent any contact of coated steel products with incompatible materials.
- prevent discharge of rain water from incompatible materials onto coated steel products.
- ensure that supporting members are compatible with the coated steel products or alternatively, are appropriately coated.

Minimum purlin sizes:

50mm x 50mm timber or

50mm x 75mm x 20mm lip channel, 2mm thick.

Incompatible materials include:

- lead
- copper
- monel metal
- bare steel
- stainless steel
- carbon (in pencils and some rubber compounds)
- green or some chemically-treated timber
- materials subject to cycles of dryness and wetness or which have excessive moisture content (such as improperly-seasoned timber)
- wet and dry concrete
- soils
- vegetable matter
- any material which will inhibit normal exposure to the atmosphere

ACCEPTABILITY OF DRAINAGE FROM ONE SURFACE TO ANOTHER										
	Upper Surface Materials									
Lower Surface Materials	Galvanised steel	AZ Painted	AZ Painted & stainless steel	Aluminium	Copper	Zinc	Monel	Lead	Glazed tiles, glass & plastic	Unglazed tiles (concrete)
Galvanised steel (GI)	✔	✗	✗	✗	✗	✔	✗	✔*	✗	✔
AZ/Painted	✔	✔	✔*	✔	✗	✔	✗	✗	✔	✔
Stainless steel	✔*	✔*	✔	✔*	✔*	✔*	✔*	✔*	✔	✔
Aluminium	✔	✔	✔*	✔	✗	✔	✗	✔*	✔	✔
Copper	✔*	✔*	✔*	✔*	✔	✔*	✔	✔	✔	✔
Zinc	✔	✗	✗	✗	✗	✔	✗	✔*	✗	✔
Monel	✔*	✔*	✔*	✔*	✔	✔*	✔	✔	✔	✔
Lead	✔*	✔*	✔*	✔*	✔*	✔*	✔*	✔	✔	✔

✔ - Acceptable ✔* = drainage acceptable, direct metal contact not acceptable ✗ = Not acceptable

TABLE 3

B. OTHER ASPECTS TO CONSIDER

Paint finishes

Sheeting with severely damaged paint coatings are best replaced rather than patched up. We recommend that you don't touch up minor scratches with paint. It will fade unevenly and compromise aesthetics.
You may repaint whole roofs and paint accessories to match specific colours, however Safintra does not guarantee post painted results.

Transportation

Our roof sheets and cladding are manufactured by a continuous process, and can be supplied up to the legal limits of transport regulations. Any roof sheets required longer than the transport regulations will have to be SAFLOK 700 and rolled from one of our mobile mills.
Please note heavy sheet bundles slung from cranes, as well as strapping, can cause damage to sheets. When packing or storing, bundles should be restricted to a maximum of 40 sheets per bundle.

Drainage

The pans of roof sheets have to carry water to the gutters.
During heavy rain, the pans can overfill with water and can flow into the roof through the side-laps and flashings.
Factors affecting drainage capability and water tightness of the laps of a profile include:

- the width and depth of the pans;
- the pitch of the roof - rain flows faster on a steeper pitch;
- rain fall intensity for the geographical area;
- the length of the roof from ridge to gutter; and
- penetrations that cause nearby pans to carry extra rain, diverted from valleys obstructed by the penetration.

The design of roof drainage should always be done by a professional or an engineer. Safintra cannot assist in the design of gutter sizes and down pipe intervals.

This manual does not attempt to cover the structural design details of supports or aesthetics, there are many other references and SABS or SANS Standards that cover this issue.

Insulation

The following is taken into consideration when deciding to insulate:

- blocking heat from the sun;
- loss of heat from inside the building;
- preventing condensation on the inside of the roofing and cladding; and
- noise from rain, thermal expansion and contraction.

The table below shows thermal performances of different insulation systems by showing the heat that may be radiated through roofing materials.

HEAT TRANSMITTED INTO A BUILDING			
	Roof only	Roof with reflective foil lamination	Roofing with 50mm insulation blanket & reflective foil lamination
	Heat radiated from underside w/m²	Heat radiated from underside w/m²	Heat radiated from underside w/m²
AZ	25	2	2
Colour			
White	40	2	1
Beige	65	3	2
Green	105	4	3
Grey	130	5	4
Charcoal	145	6	4

TABLE 4

You need to compare the initial cost of installing insulation, with the savings in cost of heating and cooling. There are also gains for the environment when you save energy.

Heat control methods

In roofs, a simple, inexpensive and very effective method is to drape a membrane of reflective foil laminate over the supports before laying the cladding. The foil laminate can also provide a moisture barrier to minimise condensation. If the membrane is allowed to drape 50 to 75 mm between the supports, the air space between the membrane and the roof cladding will further improve heat insulation.
Additional heat insulation is often achieved by using bulk insulation blankets. The same principles apply to walls, though the foil is not draped. Reflective foil laminate is simple, cheap and very effective.

Condensation

When warm air in a building comes into contact with metal cladding, water vapour (moisture) in the air can condense on the inside of the cladding. Water vapour passes fairly freely through most

building linings into the ceiling and wall spaces where it may directly contact the sheeting. Condensation can lead to deterioration of building components and staining of ceiling and walls. If insulation blankets are wet, or even slightly dampened by condensation, its efficiency is significantly reduced.

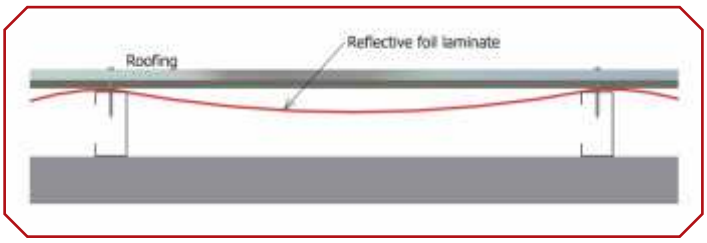
The amount of condensation depends upon the amount of water vapour in the air and this varies with climatic conditions. Activities within a building can add substantially to the amount of water vapour, and typical domestic situations include bathing, showering, cooking, washing and drying of clothes and dishes, and simply breathing. It is recommended to vent water vapour to outside the building.

Noise reduction

Should any noise reduction material be needed, consider the use of a special acoustic insulation material.

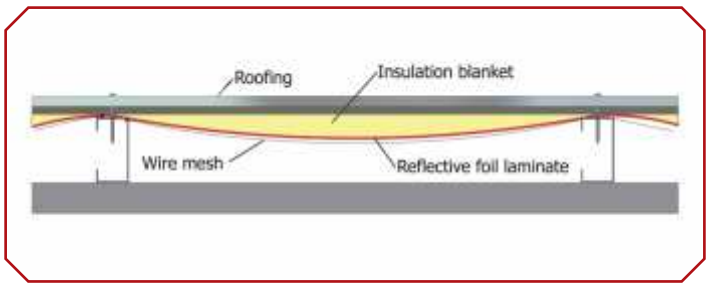
Insulation materials

Typical insulation materials are reflective foil laminates, insulation blankets or batts and boards made from rigid materials.



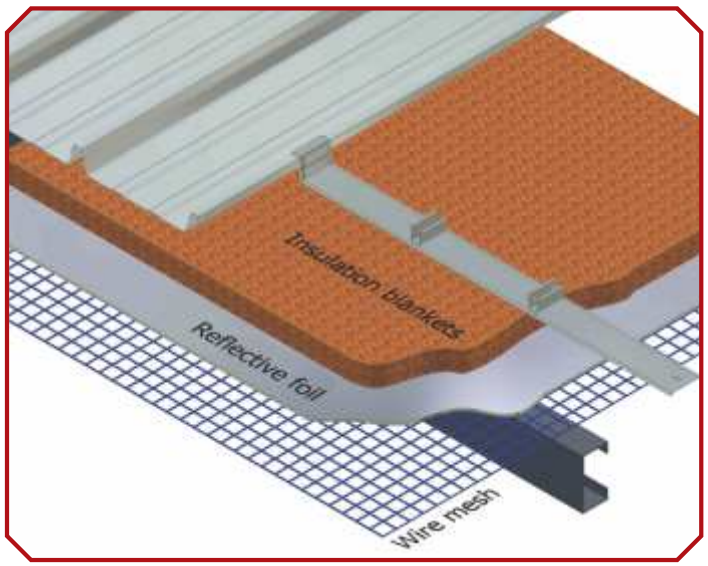
Bubble foil laminates

Foil laminates with a plastic air bubble layer not only reflect heat but double-up as a vapour barrier to control condensation. Where they are used as a vapour barrier, the joints between successive strips are overlapped about 100mm, and sealed with a tape impervious to moisture.
Examples are Alububble® or Alucushion®.



Blankets

Blankets minimise heat convection and are available with the laminate bonded to the fiberglass. They are also effective in reducing noise.



Insulation blankets must be protected from moisture, particularly around the edges of the roof and even more particularly at the bottom end of the cladding where rainwater run-off can be blown back under a low-pitched roof. If the blanket overhangs the bottom support, it may even come into contact with water in the gutter, where the insulation will absorb moisture and remain damp for extended periods, thus leading to deterioration of the coating on the underside of the roofing and substantially reducing the effectiveness of the insulation. Insulation blankets up to a nominal thickness of 75mm for pierced-fixed cladding and 45mm forSAFLOK 700 profiles will compress sufficiently over the roof supports to allow normal procedures to be used for fixing. However, you may need to increase the length of fasteners slightly to allow for the thickness of the compressed blanket between the cladding and support. Examples are Factorylite® or Starlight®.

Polystyrene boards

Expanded and extruded materials are manufactured as boards. The boards demand different fixings to those mentioned above. Seek advice from the manufacturers.

Natural light / Skylights

We recommend the use of new technology multiwall polycarbonate sheeting to allow for natural light. This can be done on side cladding or by adding polycarbonate into the monitors.
We do not recommend the use of polycarbonate sheeting in “run of roof” applications due to the risk of leakage.

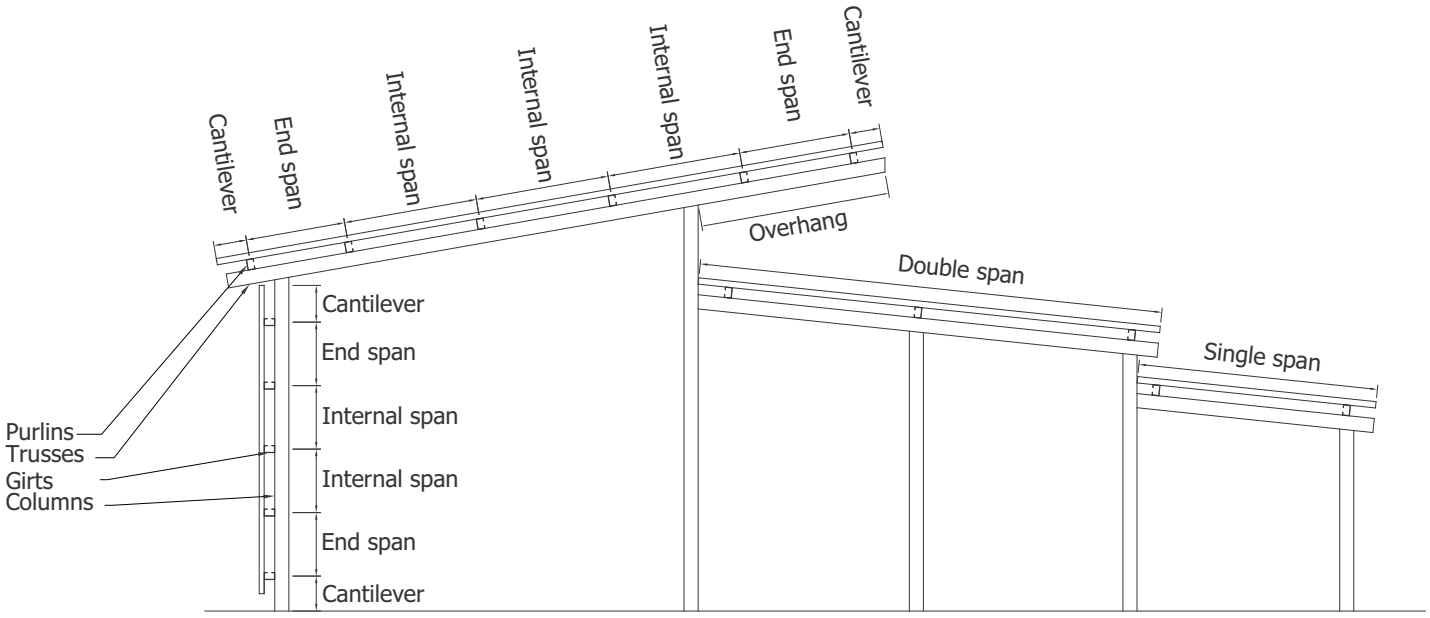
Flashings

A successful low pitch roof system is usually possible if building science principles are understood and applied to design and construction. Difficulties occur however, when the designer fails to appreciate the attention to detail of the complete waterproofing system. Flashing details at interruptions and terminations are of such particular importance that their selection and manner of construction should not be left to the discretion of a material supplier or a tradesman at the job site.
In South Africa, as in most other countries, badly designed flashings are a frequent source of roof leakage. A clear understanding of the function of flashings, the forces to which they are subjected, and the limitations of the materials commonly used, are necessary for successful design.

Function of Flashings

A flashing is a building accessory used to prevent water from penetrating the building roof or sides or to intercept and lead water away. Several types of flashing are used at terminations and interruptions of roofing membranes, some capable of retaining/restricting water and others of shedding water.
Flashings at the side ends of sheets help keep water out of a building, or make a building look good.
Standard flashing girths are more of a guideline than a rule. In most longitudinal flashing cases at the end of the sheeting run, a standard size girth might not work sufficiently. The rule being that one complete dry pan of the sheeting must be covered by the longitudinal flashing to effectively maintain a water tight scenario. Sidewall flashings are the ones most affected.
Flashings to be used for aesthetic purposes should be the thickest possible gauge and longest length possible, with the smallest girth. Thin gauge flashings, end lapped frequently with large flat surfaces will be functional and keep water out, but might warp, bulge or twist, making it aesthetically unacceptable.

Terminology



WHAT IS THERMAL EXPANSION?

All metals expand and contract with changes in temperature. Steel is by far the least affected of all the metals commonly used for roof and wall cladding, however the changes in length experienced in very long runs of roofing are significant.

For example: On a clear hot summer day, with no wind, the steel temperature in roof sheeting can reach approximately 50°C in Painted White, 60°C in plain Unpainted AZ and more than 80°C in Painted Charcoal.

The actual expansion or contraction between the end of a sheet and the last purlin would only be a fraction of the figures shown because the movement in the length of fixed cladding would normally take place from the centre towards each end of the sheet. The movement at each end is thus only half the total expansion or contraction.

Thus:	Steel	= 1mm for 1m @ 40°C if unrestricted.
	Polycarbonate	= 8mm for 1m @ 40°C if unrestricted.
	Aluminium	= 2mm for 1m @ 40°C if unrestricted.

Sideways thermal expansion poses no problems in ribbed cladding because each rib absorbs some transverse movement.

Expansion joints

Thermal expansion effects are mitigated by slight bending of fastener shanks, thermal movement of the building structure, and slight flexing of the purlins (where they are not restrained by cleats or bridging).
Pierced-fix sheeting longer than 24m needs an expansion joint.

GENERAL INFORMATION REGARDING METAL ROOFS

A. SAFETY

It is common sense to work safely, protecting yourself and co-workers from accidents on the site. Safety includes the practices you use; as well as personal protection of eyes and skin from sunburn, and hearing from noise.

Occupational health and safety laws enforce safe working conditions in all locations. Laws in every region require you to have fall protection which includes safety mesh, personal harnesses and perimeter guardrails. We recommend that you acquaint yourself with all local codes of safe practice and you adhere strictly to all laws that apply to your site.

B. CARE AND STORAGE

Rain or condensation is easily drawn between the surfaces of stacked sheets by capillary action, or they can be driven in by wind. This trapped moisture cannot evapourate easily, so it can cause deterioration of the coating which may lead to reduced life-expectancy or poor appearance.

If materials are not required for immediate use, stack them neatly and clear of the ground. If left in the open, protect them with waterproof covers.

If stacked or bundled product becomes wet, separate it without delay, wipe it with a clean cloth and stack it to dry thoroughly.

C. HANDLING

On large building projects you can reduce handling time by lifting bundles with a crane direct from the mobile mill or delivery truck onto the roof structure. Use a spreader bar for long sheets. For small to medium size projects, without mechanical handling facilities, you can unload sheets by hand and pass them up to the roof one at a time.

For personal safety, and to protect the surface finish, wear clean dry gloves. Don't slide sheets over rough surfaces or over each other. Always carry tools, don't drag them.

D. WALKING ON ROOFS

It is important that you walk on roofing carefully, to avoid damage to either the roofing or yourself.
Generally, keep your weight evenly distributed over the soles of both feet to avoid concentrating your weight on either heels or toes. Always wear smooth soft-soled shoes, avoid ribbed soles that pick up and hold small stones, swarf and other objects.

When you walk on roofs, walk parallel to the ribs:

- for ribbed roofing walk on at least two ribs or corrugations (CORRUGATED, and IBR);
- for pan-type roofing walk in the pans (SAFLOK, WIDEDEK, INDUSTRIAL 7). When you walk across the ribs, walk over or close to the roofing purlins.

Be careful when moving between purlins. Do not walk in the pan immediately adjacent to flashings or translucent sheeting. Walk at least one pan away.
Alwaystakeparticularcarewhenwalkingonwetornewlylaidsheets—particularlyonsteeplypitchedroofs.
If there will be heavy foot traffic on a roof, provide a walkway or working platform to minimize damage.

E. MARKING OUT, CUTTING AND DRILLING

Marking out

A pencil of any colour may be used except black or so-called lead pencils as the graphite content can create an electric cell when wet and thus cause deterioration of the coating. You can also use a string line with chalk dust, or a fine, felt-tipped marker.

Cutting

Where possible, you should minimize site-work by using sheets cut to length in the factory.
For cutting thin metal on site, we recommend that you use a power saw with a metal-cutting blade as it produces fewer damaging hot metal particles and leaves less resultant burr than a grinder disc. Cut materials over the ground and not over other materials where hot particles can fall and cause damage to finishes - especially prepainted finishes. It is best to have the exterior colour finish of a prepainted sheet facing down, however you must then protect the paint finish from scratching your work purlins.

If you have to cut materials near sheets already installed, mask them or direct the stream of hot particles away.

Reciprocating nibblers are also widely used in the roofing trade, and they produce an excellent cut. The resulting small, sharp scraps can rust and damage finishes; and they can cause personal injury. Take special care to collect these scraps.

F. CLEAN UP

Swarf (metal scraps or abrasive particles resulting from cutting and drilling) left on the surfaces of materials will cause rust stains which can lead to the reduced life of the material.

- Sweep or hose all metallic swarf and other debris from roof areas and gutters at the end of each day and at the completion of the installation.
- If swarf has become stuck on a finish, it must be removed. Take great care not to remove the paint or metal coating.
- For critical applications inspect the job two weeks after completion, when rain or condensation will have caused any remaining swarf to rust, and thus highlight affected areas.

Warn other contractors

Many stains arising from swarf do so, not from the work of roofing-installers, but from other contractors working on the job. Similarly, problems can arise from contact with incompatible materials, like copper piping or chemically treated timber. Acid cleaning of bricks can also be a problem. Architects and builders need to be aware of this, and advise contractors accordingly.

Strippable coatings

To provide temporary protection during production, handling and transport, some products are coated with a plastic. This coating peels off easily when new, but it has a relatively short life, especially in sunlight. If you do not remove this coating at the time of installation, you may find it very difficult to remove later on.
Please dispose of the plastic in an environmentally responsible manner.

G. SEALANTS

Use recommended sealants. For further information, contact your nearest branch.

Neutral-cure silicone sealants have been successfully used with the range of steel finishes on our roofing and cladding, flashings, cappings and gutters made from the same materials as the cladding.

Neutral-cure silicone sealants:

- have good adhesion to the clean surface of all our roofing and cladding;
- are water resistant and non-corrosive;
- are resistant to extremes of heat and cold while retaining good flexibility;
- provide high resistance to ultra-violet rays (sunlight); and
- have a long service life.

It is important that only neutral-cure silicone be used with steel sheeting. Other silicone sealants, often have a vinegar or ammonia smell, and give off aggressive by-products during curing which are detrimental to steel sheeting.
If in doubt, look for a message on the sealant package similar to: Suitable for use with coated AZ steel products".

Using sealants with:

Polycarbonate sheeting

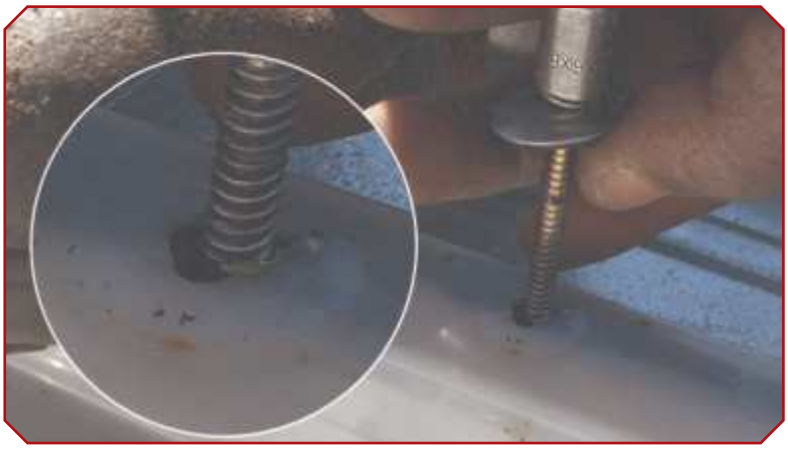
On many factory roofs, a panel of polycarbonate sheeting is installed every second or third spacing. Conventional applications often leak, but with using butyl roofing tape one seldom has any problems. Some silicone absorb moisture, and the moisture in polycarbonate sheeting that gives the sheeting its UV protection is often absorbed by the silicone. After a while, because of this absorption, the sheeting begins to crack and disintegrate, causing leaks. It is well noted that polycarbonate sheeting expands and contracts seven times more than the metal sheeting.

Guttering

There have been some applications where butyl products have been used to seal sections or the backings of gutters. Usually when there is a back flow on a low pitch roof, or when there is a high rainfall, the gutters sometimes overflow and may leak into the structure. This is not common, but may occur. Generally a wider tape is used. From a 25mm x 3mm x 15mm to a 50mm x 3mm x 15mm

Roofing fasteners

As butyl tape is run along the leading edges of an IBR or corrugated profile sheet, it automatically falls in line with where the fasteners are placed. Butyl tape seals the fasteners and prevents them from vibrating out of place. This happens because of wind causing the sheets to vibrate, and the expansion and contraction from temperature changes. Notice how the butyl tape fills in the holes, and seals them optimally.



Cleaning surfaces

For effective bonding, all surfaces must be clean, dry and free from contaminants such as old sealant or oil. Mineral turpentine or white spirits is an alternative and is suitable for cleaning the surfaces but care must be taken to completely remove all residual solvent with a clean dry cloth.
Sealant must be applied on the same day as which the surface is cleaned.

Joint strength

Seams sealed with sealant should be mechanically fixed for strength. Fasteners in joints should generally be no further apart than 50 mm.

The sealant does not require significant adhesive strength in itself, but it must bond positively to all the surfaces it is to seal. To ensure complete sealant cure, the width of sealant in a lap should not exceed 25 mm when compressed.

Applying sealant

Always apply the bead of sealant in a continuous line along the centre line of the fastener holes. This ensures that when compressed, the sealant positively seals the fastener. Be careful not to trap air when applying sealant. Especially, don't place a ring of sealant around fastener holes as entrapped air compresses during tightening of fasteners, and may blow a channel through the sealant, which could prevent the fastener from being sealed.

Fasteners

Use only class 3 or 4 Safintra-approved fasteners.
Warranties will be voided if non-approved fasteners are used.

Procedure for end lapping

The preferred procedure for end lapping is:

1. Assemble, clamp and drill;
2. Separate components and remove drilling debris;
3. Clean joint surfaces as recommended above;
4. Apply bead(s) of sealant;
5. Relocate components and fix;
6. Externally seal each fastener if hollow blind rivets are used.
   To prevent premature curing (which causes poor bonding), finish the joint as soon as practical after applying the beads of sealant. The manufacturer's specified sealant open times should be followed.

Sealant clean up

With practice you will be able to judge the size of beads thus avoiding squeeze-out and the subsequent need to clean up. Uncured sealant can be removed with a clean, dry rag and any excess then removed with a cloth lightly dampened with mineral turpentine or white spirits. Excess cured sealant is best removed with a plastic spatula to avoid damage to the surface finish of the metal.

Avoid any unnecessary smearing of sealant on surfaces intended for painting as silicone can affect adhesion of paint. Smeared sealant may be treated by lightly abrading the area with a non-metallic scouring medium.

H. MAINTENANCE

Factors that most affect the service life or durability of metal cladding are original design, the environment of the installation, and most especially the maintenance of the installation.

Maintenance includes:

- Regular inspection for problems before they become major corrosion sites;
- Regular washing down, especially near coastal or industrial influences, and areas not reached by rain
- Removal of leaves and other debris from gutters;
- Keeping walls free of soil, concrete and debris near the ground;
- Not over spraying pesticides.
- Checking joints with sealant

Maintenance of prepainted steel

The paint system on Safintra sheets is very durable. Simple maintenance of the finish enhances product life and maintains attractiveness for longer periods.

Where the paint finish is naturally washed by rainwater (roofs, for example) there is usually no additional maintenance needed. However areas to be washed include soffits, wall cladding under eaves, garage doors, and the underside of eave gutters.

Washing should be done at least every six months and more frequently in coastal areas where sea spray is prevalent as well as in areas where high levels of industrial fallout occur. Avoid accumulation of salty deposits or industrial dirt.

Establish a regular routine for washing prepainted steel products. Often garage doors can be washed with clean water at the same time as your car is being washed. Guttering and eaves can be hosed down when windows are being cleaned. Walls can be hosed down while watering the garden.

Where regular maintenance doesn't remove all the dirt, wash the surface with a mild solution of pure soap or non-abrasive non-ionic kitchen detergent in warm water. Use a sponge, soft cloth or soft bristle nylon brush; be gentle to prevent shiny spots. Thoroughly rinse off the detergent with clean water.

Never use abrasive or solvent cleaners (like turps, petrol, kerosene and paint thinners) on Painted steel surfaces. For advice on grease, oil or deposits not removed by soap or detergent contact our Information Service Centres.

5. QUICK REFERENCE GUIDE

PROFILE	CONCEALED FIX			TILE-PROFILED SHEETING			
NAME	SAFLOK 700 concealed fix roofing	SAFLOK 410 concealed fix roofing	SARZIP	VERSATILE	ZENTILE	ROMANTILE	Lifestile
MIN ROOF SLOPE	3°	3°	3°	10°	12.5°	12.5°	12.5°
FIXING TYPE	CONCEALED FIX or PIERCED FIX	CONCEALED FIX or PIERCED FIX	CONCEALED FIX or PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX
COVER WIDTH (mm)	700	410	500	740	740	740	740
RIB HEIGHT (mm)	41.5	41.5	65	25	25	25	25
ALUMINIUM	YES	YES	YES	YES	YES	YES	YES
STAINLESS STEEL	NO	NO	NO	NO	NO	NO	NO
POLYCARBONATE	YES	YES	NO	NO	NO	NO	NO
INSTALLATION							
FIXING	SL700 CLIP	SI410 CLIP	Halter	RINGSHANK NAILS & TOPSPEED SCREWS	RINGSHANK NAILS & TOPSPEED SCREWS	RINGSHANK NAILS & TOPSPEED SCREWS	RINGSHANK NAILS & TOPSPEED SCREWS
EVERY RIB FIXED DOWN	YES	YES	YES	4 FIXING POINTS	4 FIXING POINTS	4 FIXING POINTS	4 FIXING POINTS
FLASHING FIXING	CLIP ON SLIDER /S10 CLIP	CLIP ON SLIDER /S10 CLIP	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING
MANUFACTURE							
CONTINUOUS LENGTHS	YES	YES	YES	13.2m	13.2m	13.2m	13.2m
SITE ROLLING (MOBILE MILL)	YES	YES	YES	NO	NO	NO	NO
MINIMUM CRANKING RADIUS (mm)	450	450	450	N/A	N/A	N/A	N/A
SITE CRANKING	YES	YES	YES	N/A	N/A	N/A	N/A
MINIMUM SPRINGING RADIUS (m)	36	36	36 / 60	N/A	N/A	N/A	N/A
REVERSE CRANK	NO	NO	YES	N/A	N/A	N/A	N/A
TECHNICAL SPECS							
THICKNESS (mm)	0.47 - 0.8	0.47 - 0.8	0.47 - 0.8	0.46	0.46	0.46	0.46
INTERNAL SPAN (m)	up to 1.8	up to 2.1	up to 1.8	0.3 / 0.6	0.3 / 0.6	0.3 / 0.6	0.3 / 0.6
END SPAN (m)	1.5	1.9	1.5	0.3	0.3	0.3	0.3
APPROXIMATE MASS Kg/m²	5	5	5	5	5	5	5
CANTILEVER (mm)	300	300	300	150	150	150	150

PIERCED FIX PROFILES						
TUFDEK IBR	WIDEDEK	MAXCOVER	Trimflute	COMAX 1000	FLUTELINE	classicorr corrugated
5°	7.5°	15°	7.5° - 10°	5°	5°	10° - 15°
PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX	PIERCED FIX
686	760	980	760	1000	889	762
36.5	28.5	35	26.5	35	38	19
YES	YES	YES	YES	YES	YES	YES
YES	YES	YES	YES	YES	YES	YES
YES	NO	NO	NO	NO	YES	YES
TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS	TOPSPEED SCREWS & BONDED WASHERS
EVERY 2nd	EVERY 2nd	EVERY 2nd	EVERY 2nd	EVERY 2nd	EVERY 2nd	EVERY 2nd
DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING	DIRECT FIXING
13.2m	13.2m	3m	13.2m	13.2m	13.2m	13.2m
NO	NO	NO	NO	NO	NO	NO
350	350	350	350	350	350	350
YES	YES	YES	YES	YES	YES	YES
28 / 60	26 / 55	28 / 60	26 / 55	28 / 60	36 / 60	23 / 23
YES	YES	YES	YES	YES	NO	YES
0.47 - 0.8	0.47 - 0.8	0.25 - 0.7	0.47 - 0.8	0.4 - 0.8	0.47 - 1.2	0.47 - 0.8
up to 1.8	up to 1.8	up to 2.1	up to 1.8	up to 2.6	up to 2.6	up to 1.8
1.5	1.5	0.7	1.5	1.7	2.4	1.5
5	5	5	5	5	4	5
300	300	150	300	150	400	300

TABLE 5

INSTALLATION PROCEDURES

INSTALLING CONCEALED FIX SHEETING

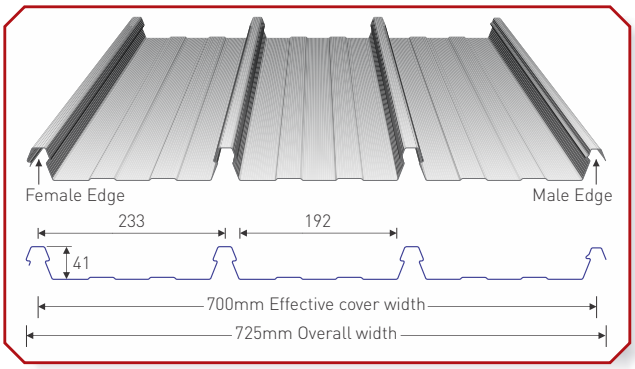
SAFLOK 410 concealed fix roofing | SAFLOK 700 concealed fix roofing | SAFZIP™

A. SAFLOK

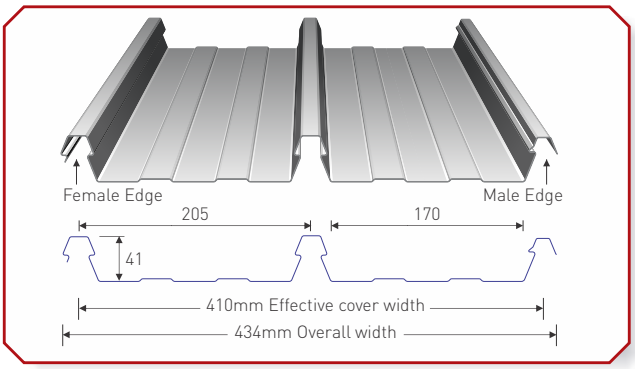
Concealed-fixing, also referred to as secret fix, is a roofing system designed for very low pitched roofs. Clips pre-fixed into the purlins hold the roof sheets in place. The alternative is pierced-fixing, a system not suited for roof pitches lower than 5°, and restricted in sheet length.

Note: *Most "failures" occur during erection. To secure work in progress, the last sheet for the day must be positively fixed. This sheet must be lifted and re-used at the end of each days' work, and finally discarded at the end of the project. Positive fix through the pans or the ribs, as long as the sheet is extremely well secured!*

SAFLOK 700



SAFLOK 410



Material specifications

Concealed fix profiles can be produced from:

- Pre-painted or unpainted steel base with aluminium-zinc alloy-coating.
- Pre-painted or unpainted aluminium base.

Lengths

Mobile roll formed sheets are custom cut on-site. Factory sheets cut to order.
With the aid of the mobile rolling mills, custom lengths in excess of 18m can be rolled on-site. To date the longest continuous sheets in South Africa have been in the region of 130m long.

Tolerances for the material

Length: +0 mm / –15 mm
Width: +4 mm / –4 mm
Make allowance for thermal expansion or contraction for long length roofs at sheeting ends.
The equation $\Delta L = \alpha \times \Delta T \times L$ gives an indication of the sheeting extent or contraction (ΔL).
$\alpha = 12 \times 10^{-6}$ (coefficient of linear expansion for steel)
ΔT = temperature change in °C
L = sheet length in mm

Tolerances for Installation

The clips will only perform if aligned correctly. Viewed from the side, a clip will only engage into the sheet if the purlin is not rotated more than 3° from the roof angle/slope. Similarly seen from above, the clip or the purlin onto which it has been fixed cannot be more than 3° misaligned. Therefore a sturdy sub structure is essential.

If the purlin has deflected or rotated too much under traffic loads, the installed sheets will unclip. It is important to ensure that the roof structure complies with SABS 0237:1991 which states that deviations under self weightconditions do not exceed 5 mm out of parallel per metre of spacing between adjacent purlins/girths and the angle between accepted contract surfaces do not exceed 3°. Purlins or girts must not exceed 3° from the perpendicular to the direction of the sheet.

Minimum roof pitch

SAFLOK was designed for roof pitches from as low as 2° (1 in 50) however 3° is preferred. It can also be used on walls. When applying to very steep roof pitches you should pierce-fix through each sheet under the flashing or capping, along the top of the sheet to prevent the concealed-fixed sheeting from sliding downward in the fixing clips on very steep pitches. Clip-in marks might be visible at high roof angles, this visual effect might not be aesthetically pleasing in a residential application.

Maximum purlin support spacings

The maximum recommended purlin spacings are based on testing in accordance with SABS 0237: 1991 Roof spans consider both resistance to wind pressure and light foot traffic (traffic arising from incidental maintenance).

It is important to note that the design criteria for Industrial and Residential buildings would differ. Aesthetics plays a much bigger role in residential buildings than in industrial type buildings. Hence the purlin spacings on residential buildings need to be reduced for a more pleasing appearance. It is strongly recommended not to design to the limits. Allow for the unexpected, for example installing a very heavy air-conditioning unit long after the building has been commissioned, strong gusts of wind from time to time or an area renowned for snow or hail. Safintra recommends being a little conservative with your purlin spacings, this can prevent potential problems at a later date. Please consult your nearest Safintra branch.

Note: It is important to reduce purlin spacings by 20% when spring curving a roof.

PURLIN SPACINGS	SAFLOK 410 concealed fix roofing			SAFLOK 700 concealed fix roofing		
GAUGE	0.5mm	0.55mm	0.8mm	0.5mm	0.55mm	0.8mm
MATERIAL	ALUMINIUM-ZINC	ALUMINIUM-ZINC	ALUMINIUM	ALUMINIUM-ZINC	ALUMINIUM-ZINC	ALUMINIUM
ROOFS	mm	mm	mm	mm	mm	mm
Single Span	1 400	1 700	1 000	1 400	1 700	1 400
End Span	1 600	1 900	1 200	1 700	2 100	1 500
Internal/Double Span	1 800	2 100	1 700	2 000	2 300	2 000
Cantilever (Unstiffened)	150	150	100	150	260	180
Cantilever (Stiffened)	300	300	200	350	400	380
SIDE CLADDING						
Single Span	1 800	2 100	1 500	2 100	2 300	1 600
End Span	1 900	2 200	2 100	2 400	2 600	2 200
Internal Span	2 100	2 500	2 300	2 600	2 700	2 400
Cantilever	300	400	200	300	400	300
Approximate Mass/m²	5.4kg	6.2kg	2.9kg	5.2kg	6.2kg	2.9kg

Saflok 410 clips are calculated at 140g per clip - require approximately 2 clips per m².
Saflok 700 clips are calculated at 330g per clip - require approximately 1.5 clips per m².

DRAINAGE TABLE	ROOF SLOPE				
RAINFALL INTENSITY MM/HOUR	2°	3°	5°	8°	10°
250	75	90			
300	65	75	95		
400	50	55	70	80	90
500	40	45	55	65	70
Maximum roof run for roof slopes and rainfall intensities shown.					

TABLE 6

Span tables for SAFLOK are calculated for light foot traffic only. Span tables are based on 1.5kPa downward pressure, 1.6kPa upward pressure and 0.75kPa for the side cladding, inward or outward.
Wall spans consider resistance to wind pressure only.
The pressure considered is based on buildings up to 10m high in Region B, Terrain Category 3_1 M_s=0.85, M_l=1.0, M_t=1.0 with the following assumptions made:

Roofs:

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

Walls:

C_{pi}=0.20, C_{pe}=-0.65, K_l=2.0 for single and end spans, K_l=1.5 for internal spans. These spacings may vary by serviceability and strength limit stated for particular projects.

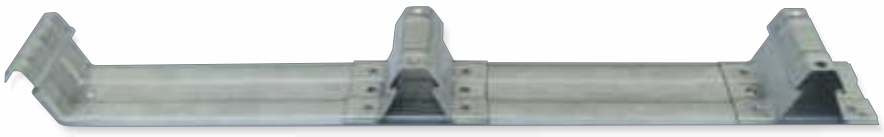
Note: It is important to reduce purlin spacings by 20% when spring curving a roof.

Limit stated wind pressures

SAFLOK has stood the test of time and nature. Our Span table for light foot traffic was tested with the latest methods for modelling wind pressures. The wind pressure capacity table was tested by the SABS, using the direct pressure-testing rig. The pressure capacities for serviceability are based on a deflection limit of (span/120) + (maximum fastener pitch/30). The pressure capacities for strength has been determined by testing the cladding to failure (ultimate capacity). These pressures are applicable when the cladding is fixed to a minimum of 2.0 mm, G550 steel.

SAFLOK CLIPS

SAFLOK 700 CLIP



SAFLOK 410 CIP

Severe corrosive conditions

If this product is to be used in marine, severe industrial, or unusually corrosive environments, ask for advice from your local Safintra branch.

Metal & Timber compatibility

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

Maintenance

Optimum product life will be achieved if all external surfaces are washed regularly. Areas not cleaned by natural rainfall (such as the tops of walls sheltered by eaves) should be washed down every six months. Regular maintenance and inspections, especially after severe storms, are essential.

Storage and handling

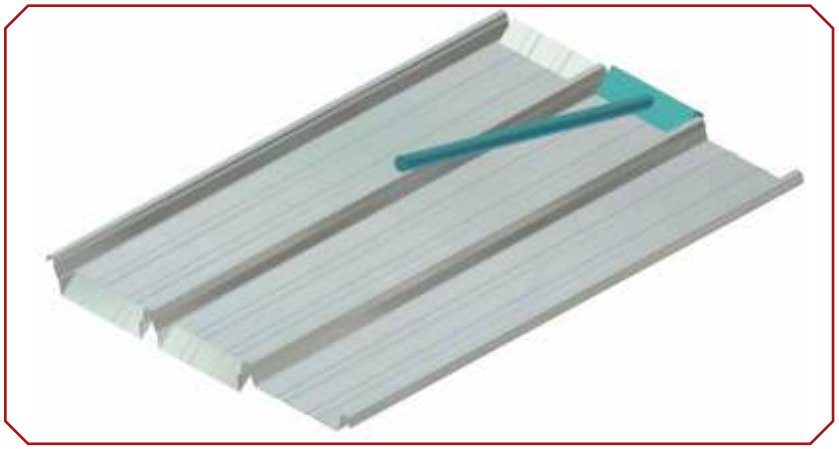
Keep the product dry and clear of the ground. If stacked or bundled product becomes wet, separate it, wipe it with a clean cloth to dry thoroughly. Handle materials carefully to avoid damage, don't drag materials over rough surfaces or each other, don't drag tools over material and protect from swarf.

Turn up-down (Lipping) tools

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

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

Tools are available for both applications.



Notching tool

A tool is available for on-site notching of sideways flashings and cappings (headwall, apex, over-under flashings). Alternatively, make use of serrated metal broad flute closers. There is no tool or serrated metal broad flute closers for hips!

Cutting

For cutting thin metal on site, we recommend a circular saw with a metal-cutting blade. These produce fewer damaging hot metal particles and leaves less resultant burr than a grinder.
The Cutting of sheeting should be done on the ground and not on top of other materials.

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

Fasteners (Only use Safintra approved fasteners!)

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

- into metal: there should be at least three threads protruding past the purlin you are fixing to, but the shankguard must not reach that purlin.
- into timber: the fastener must penetrate the timber by the same amount that the recommended fastener would do if there were no insulation.
- Never re-use a SAFLOK clip.

Curving

SAFLOK can be cranked to a minimum of 450mm inside radius. Limitations on site would be handling and weight. The same applies for cranking in the factory with the additional limitation of transport. Contact your nearest Safintra branch for details.
Natural springing occurs at 36m radius in the convex and 60m radius in the concave.
SAFLOK cannot be cranked in the reverse (concave).

Sealed joints

For sealed joints use fasteners or rivets and neutral-cure silicone sealant branded as suitable for use with GI or AZ steel.

End Laps / Expansion Joints

SAFLOK should never be end lapped. Please contact your nearest Safintra service centre for advice on use of step lap joints. (Or use longer length sheets from mobile rollformer mills.)

INSTALLATION

Before starting work ensure that:

- The purlins for your cladding are truly in the same plane;
- the minimum roof slopes conform to our recommendations;
- the overhangs of sheets from the top and bottom purlins don't exceed our recommendations; and
- the first and last purlins and clips should be at least 75mm from each end of the sheet to keep maximum holding power.

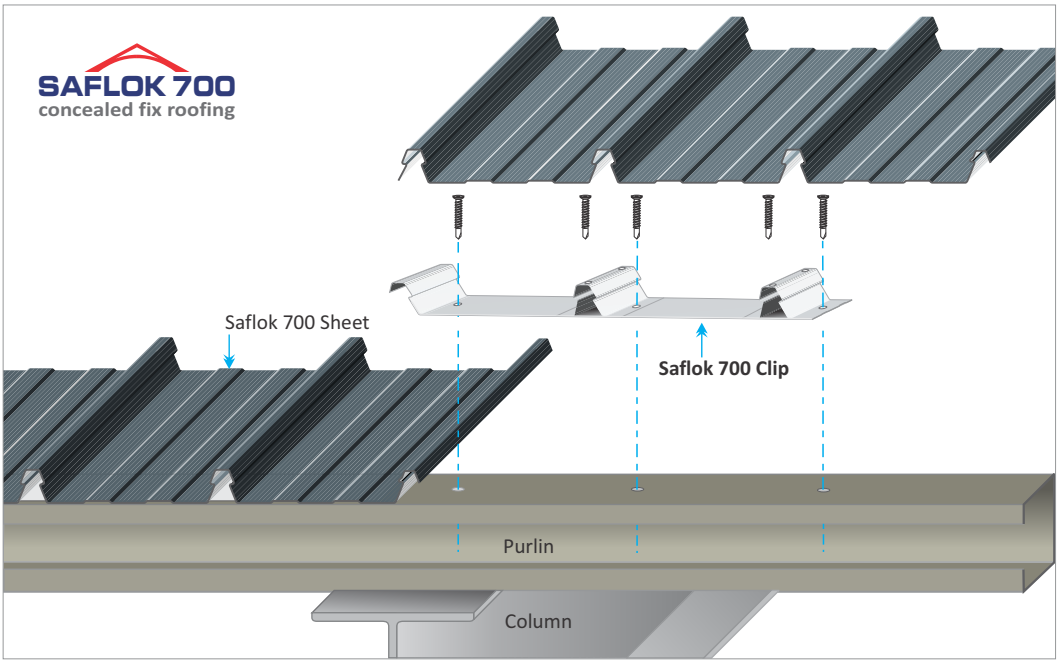
Make any necessary adjustments before you start laying sheets, they will be difficult to rectify later.

Orientate sheets before lifting

Consider which end of the building is best to start from. For maximum weather-tightness, start laying sheets from the end of the building that will be downwind of the worst-anticipated or prevailing weather.

It is much easier and safer to turn sheets on the ground than up on the roof. Before lifting sheets on to the roof, check that they are the correct way up and the overlapping side is towards the edge of the roof from which installation will begin.
Place bundles of sheets over or near firm purlins, not at mid span of roof members.

Steps for installing Saflok 700

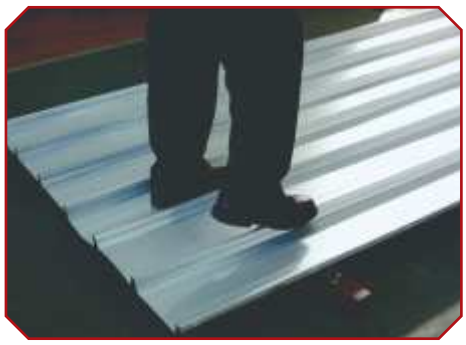


Installation example

1 Fix the first SAFLOK clips perpendicular to the gutter in a straight line on the edge of the first sheet to ensure straightness. Care should be taken to ensure that the overlap is facing away from the prevailing weather. Drive wafer-head fasteners through the top of the clip, into the purlin.

2 Place/Insert the first sheet above the clips ensuring that the overhang into the gutter is correct, positioning the sheet so that it overhangs the desired amount (usually 50mm) to the gutter. It is important to ensure this first sheet is placed square to adjacent edges. Push downwards on the SAFLOK sheet until the decking is secured at every clip. Do not use excessive force.

3 Lap the next SAFLOK clip over the top of the male rib. The holes on the existing and new clip will align and hook into place on the self locating tabs. It is very important to lift the side of the sheet just laid down and roll the new clip onto the male rib. This rolling action will ensure that the spur on the inside of the clip is engaged properly. Fasten this section first and fix the remaining two holes as per previous. Fasten all clips in this manner.



4 Lay the next SAFLOK sheet as previously done. Inspections should be made periodically to ensure the decking is installed squarely. This can be done by comparing the coverage on the ridge and gutter line. At the end of the purlins, cut the sheet and clip to suit.

5 Work along the edge of the gutter, ensuring it aligns correctly at its ends, in relation to the gutter and ridge (or parapet or transverse wall).

6 Place the glass wool insulation between the purlins and clips. (maximum glass wool thickness of 45mm). Alternatively lay the bubble foil insulation between the purlin and clips. (see insulation section for details)

7 Measure the distance from the gutter end of the sheet to the purlin.

8 Engage the sheet with clips using vertical foot pressure on all the ribs over each clip. Start from one end working your way to the other end. (usually top to bottom).

9 Be sure the clip is 90° to the edge of the sheet.

10 As before, place the next sheet over its clips ensuring you also engage the edge of the preceding sheet.

11 Accurately position the sheet so that it overhangs the desired amount into the gutter. It is important that you keep the gutter-end of all sheets in a straight line.

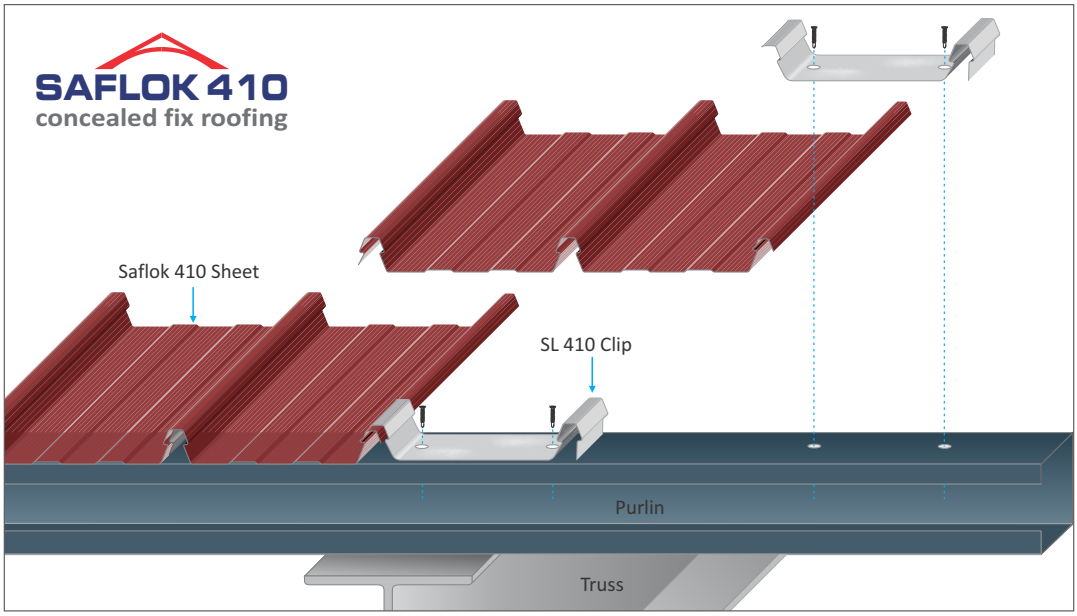
12 Fully engage the two sheets along the overlapping rib. You can do this by walking along the full length of the sheet with one foot in the centre pan of the previous sheet and the other foot applying vertical pressure to the top of the interlocking ribs at regular intervals. It is important that you don't walk in the unsupported pan beside the overlap.

13 Similarly, engage all the clips by applying vertical foot pressure to the top of the other two ribs over each clip. It is essential that the sheets interlock completely. It is important that your weight is fully on the sheet you are installing.

14 Turn up the SAFLOK pans at the ridge line. On lower pitches the pans should be turned down at the gutter line.

15 Clean the roof daily by removing all swarf, pop rivets and fasteners.

Steps for installing Saflok 410



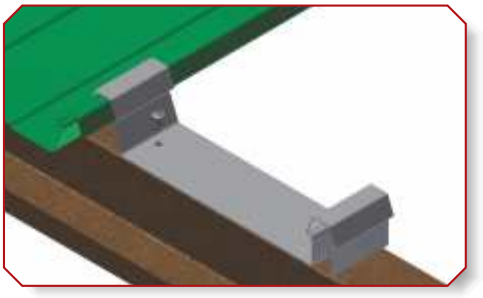
Installation example



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

2 Position the first sheet perpendicular to the purlins and locate it over the fastened run of clips, positioning the centre rib first, and engage the centre and overlapping ribs onto all clips by foot pressure.

3 Position and fasten the next run of clips, one to each purlin, with the "goose neck" of the clip over the male rib of the installed sheet. Take care to roll the clip in by engaging the inside spur first and then roll to engage top section. (for a video demonstration go to http://www.safintra.co.za/concealed-fix-roofing.html) If the clip fouls one of the spurs spaced along the outer free edge of the under lapping rib, the spur can be flattened with a blow from a rubber mallet to allow the clip to seat down over the rib.


4 Place the second sheet over the second run of clips, again positioning the centre rib first. A builders line stretched across the bottom alignment of the sheets can be used to check that the ends of the sheets are in line. Fully engage the interlocking ribs and the centre rib over each clip. This can be achieved by walking along the full length of the sheet being installed with one foot in the tray next to the overlapping rib and the other foot applying pressure to the top of the interlocking ribs at regular intervals. Also apply foot pressure to the top of the centre rib over each clip. For complete interlocking, which is essential, the spurs of SAFINTRA SAFLOK 410 along the under-lapping rib must be fully engaged in the shoulder of the overlapping rib. See illustration above. A distinct and loud "click" will be heard as the interlocking ribs fully engage. When engaging SAFINTRA SAFLOK 410 interlocking ribs, stand only on the sheet being installed, that is the overlapping sheet, and not on the preceding sheet. Install subsequent sheets by following Steps 3 and 4 and make periodic checks that the installed sheets are aligned with the roof perimeter. On side cladding or walling applications a rubber hammer must be used to fully engage the interlocking ribs and engage the centre ribs over the clips.

Base flashing example

5 If the space left between the last full sheet and the fascia or parapet is more than a half sheet width, a sheet can be cut longitudinally, leaving the centre rib complete. This partial sheet can be fully clipped onto a row of clips as for a full sheet, before installing the capping or flashing. If the space left between the last full sheet and the fascia or parapet is less than a half sheet width, it can be covered by the capping or flashing. In this case, the last sheet should be secured by cutting the sheet in half and fastening the under-lapping rib at each purlin with a half sheet. Similarly, a half clip may also be used if required. in this case, where a partial sheet of less than two ribs is used, it is necessary to turn up the lip along the edge of the cut sheet. This can then be covered by the capping or flashing. (Last rib fastened with half sheet and covered by capping or flashing).

6 Turn up the SAFLOK pans at the ridge line. On lower pitches the pans should be turned down at the gutter line.

7 Clean the roof daily by removing all swarf, pop rivets and fasteners.

Check alignment occasionally

Occasionally check that the sheets are still parallel with the first sheet, by taking two measurements across the width of the fixed sheeting.

At about half way through the job, perform a similar check but take the measurements from the finishing line to aim that the final sheet be parallel with the end of the roof. If the measurements are not close enough, lay subsequent sheets very slightly out of parallel to gradually correct the error. To allow this to happen, flatten the tabs on the base of subsequent clips—the slot in the clip will allow the clips to be fixed out of standard pitch.

Fix the last sheet

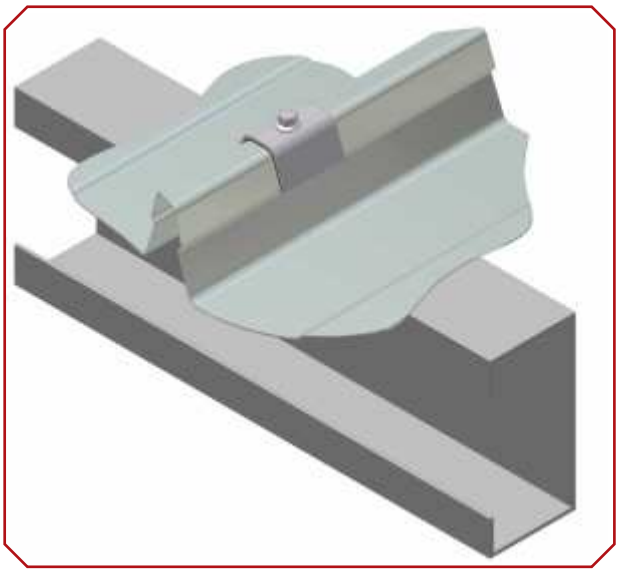
If the final space is less than the full width of a sheet, you can cut a sheet along its length and shorten the clips appropriately. It is desirable to fix the sheet at one end.

Installing SAFLOK side cladding

It is important to note that SAFLOK was never designed for side cladding. When used as side cladding it does not appear aesthetically pleasing. However, the installation procedure for walls is similar to that described for roofs. To prevent SAFLOK from sliding downward in the fixing clips, one should pierce-fix through each sheet under the flashing or capping, along the top of the sheets. The concealed fix clip engaging a sheet often leaves a small mark or indentation. This is normal and unavoidable. A wooden mallet or rubber hammer should be used to engage the clip and preferably do not kick the sheet into place, as the latter (although easiest) will potentially run a greater risk of leaving marks on the sheets. Although the marks do not influence the performance of the sheets, aesthetically it is not pleasing in certain light conditions.

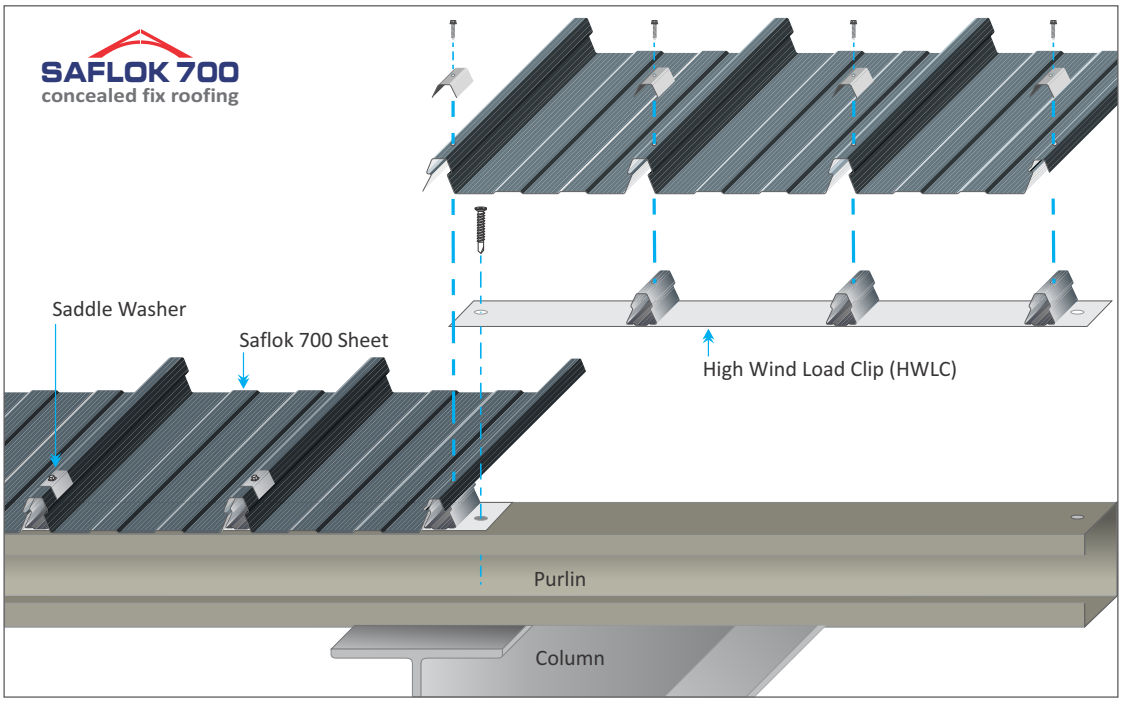
Installing SAFLOK 700 with the High Wind Load System

The installation processes for using the High Wind Load System (HWLS) is a pierced fix method. The High Wind Load System is recommended for terrain categories 1 & 2, or areas with wind speeds exceeding 120km/h. Note that the HWLS is not a concealed fix system, and is therefore recommended to be used around the perimeter and/or overhang areas of the building. Buildings taller then 10m would also require special design attention and the use of the HWLS. When using the HWLS the roof slope should not be less than 4°.



1. Starting with the female rib first, align first sheet, and hold down.
2. Place a saddle washer over the first 3 ribs above the purlins (from the female rib side). Align, and fasten the saddle washers through the rib using 10x65mm Hex Flange metal self tapper class 3 fastener.
3. Now place the next sheet, engaging the female rib firmly over the male rib of the previous sheet. Repeat step 2.

Note, the bonded washer can only be fixed from the top.



Installation example

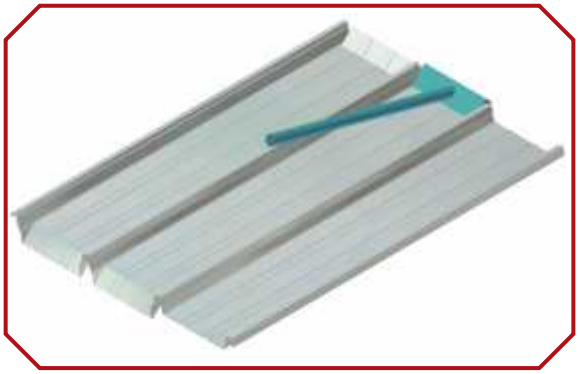
Turning-up (Lipping) SAFLOK

You get the best results by first cutting off the corner of the down-pointing leg of each female rib. Do this before you place the sheets on the roof.

- With the hinged turn-up tool open, position the tool on the sheet with the locating pins harda gainst the end of the sheet.
- Hold the handles together to clamp the tool onto the tray, and pull them to turn-up the tray 90°

Flush turning-up (Lipping) SAFLOK

In normal turning-up of SAFLOK, the tops of the ribs protrude past the turned up tray. Consequently the turn-ups cannot be positioned hard against a fascia or wall, or the ends of the sheets on either side of the ridge cannot be butted together. This is usually of no consequence because the turn-up is completely covered by a flashing or capping. However, if you want the ribs not to protrude past the turn-up, you can make a flush turn-up. You need an extra 40 mm in sheet length for flush turn-ups.



1. Cut the top of each rib before turning-up the pans, and turn-up the pans as described previously.
2. Position the backing tool in the tray and hold it hard against the turn-up with your foot.
3. With a rubber mallet, fold the protruding 'ears' flush against the backing tool.

SAFLOK should not be end lapped. Instead, a step lap joint must be used. Long length sheets from a mobile roll former should be used where possible as this eliminates the need for joining.

Notching

Using notching tools

After the cladding is fixed and the turn-ups finished, proceed as follows.

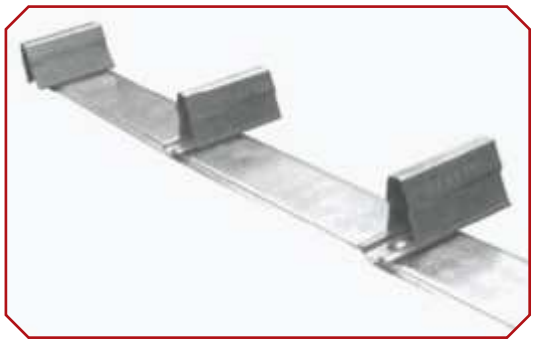
- Place a flashing with the notch-edge resting on the ribs.
- Place or position your notching tool over a rib with the notching head against the flashing. VERTICAL TOOL: Locates the body along the rib. HORIZONTAL TOOL: uses the lugs on the underside to locate on top of the rib.
- Raise the handle to open the tools. With the VERTICALTOOL: lift the flashing into the mouth of the tool, with the HORIZONTAL TOOL: slide the mouth of the tool over the edge of the flashing as far as it will go.
- Push down on the handle to perform the notching.
- Repeat for all ribs, checking in each case that the flashing is correctly positioned.
- If you are using a horizontal tool, bend down the tongues between the notches over a suitable straight edge (such as a piece of timber).

Using tinsnips.

If notching tools are not available, flashings can be notched to the rib profile with tinsnips. After the sheeting is fixed and the turn-ups finished, proceed as follows:

- Place the flashing with the turned-down edge resting on the ribs.
- Mark out the notching using a template positioned over each rib.
- Cut the notches with tinsnips. This procedure is also used for hip cappings.

Polycarbonate sheets



Polycarbonate sheets do not have the mechanical grip required to keep the sheet fixed or adhered to the clip. A pierced fix method is the only way and we do not recommend using polycarbonate sheets on a SAFLOK 700 roof. Due to its greater thermal expansion, Polycarbonate sheeting should be fixed using oversized holes and sealing washers recommended by the cladding manufacturer.

Note: Do not exceed the maximum purlin spacing specified by the Polycarbonate sheeting manufacturer. Use of Polycarbonate sheeting may result in lower limit state capacities.

1. Fix the base plate of the POLY-SLIDER BRACKET down with 10x16mm Wafer Head Teks, Class 3 fastener. Align as per the steps for installation.
2. Place the sheet on top of the POLY-SLIDER BRACKET.
3. Place a saddle washer over every rib above the slider section of the POLY-SLIDER BRACKET. Align and fasten the first 3 ribs using 10 x 16mm Hex Flange metal Teks with seal class 3 fastener. (it is possible to leave out the saddle washer, but this would weaken the system)
4. Now place the next sheet, engaging the female rib firmly over the male rib of the previous sheet. Repeat step 3.
5. Note, the bonded washer can be fixed from the top or from the side. A very low roof pitch would require side fixing.

The Combo clip is also used for changing from metal sheets to polycarbonate or visa versa.

GUIDE TO MAXIMUM SUPPORT CENTRES OF POLYCARBONATE

Single Skin (GRP 1.8 kg/m^2 ; PC 1.25 mm) Roofing

Profile	Chequerboard	Continuous Run
SAFLOK 700	1 800 mm	1 500 mm

TABLE 7

Be careful when moving between purlins. Do not walk in the pan immediately adjacent to flashings or polycarbonate sheeting. **NEVER WALK ON POLYCARBONATE SHEETS!**

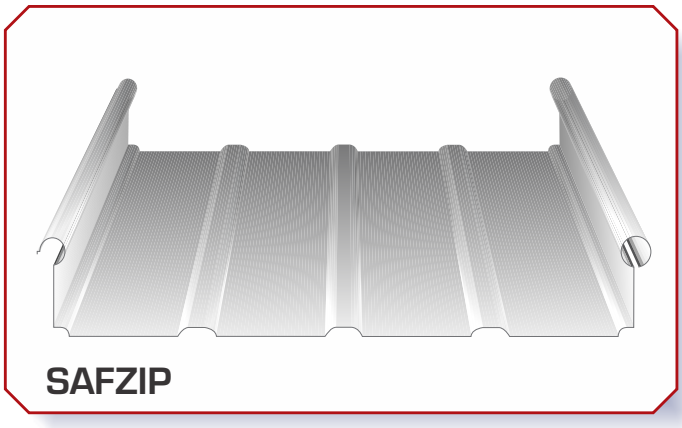
B. SAFZIP

Safzip Self Supported conceal halter standing seam roofing system.

- Safzip offers a perfect system solution with limitless design potential, state of the art production technology, ultimate product quality, innovative material combination and harmonious integration of shape, colors and surfaces.
- Safzip is an advanced “zip-up” standing seam system that creates a continuous weather tight roof. The side laps are “zipped-up” in conjunction with a unique halter system that is fixed directly to the supporting structure without penetrating the external weather sheet. This method of secret fixing creates a structurally sound roof construction that provides excellent resistance to wind uplift.
- Renowned for its outstanding aesthetic properties and performance characteristics, standing seam roofing systems offer the specifier contractor a cost-effective construction solution with numerous benefits.
- Safzip can be manufactured on-site which allows roofs to be constructed using very long sheet lengths. This eliminates the need for any end laps and considerably increases the speed of construction.
- Offering the ultimate in design flexibility, Safzip is available in Aluminium, Galvanized, Galvalume and can be smooth, crimped or concave curved; tapered or wave formed. With potential changes to the Building Regulations / Technical Standards, Safzip standing seam systems easily comply with the stringent performance standards proposed over the next few years.

Safzip features a secretly fixed true standing seam side lap detail which provides a continuous weather tight roof and excellent protection in all weather conditions.
Safzip is available in very long lengths and can be rolled on-site where sheet lengths exceed that which can be delivered by road. This eliminates the need for end laps and consequently the potential for water ingress.
The unique design of Safzip addresses the problem of leakage without an over reliance on sealants or a myriad of components.

Structural performance is another major factor that can result in roof failure. Again Safzip provides an ideal solution to the most commonly experienced problems.
Safzip standing seam roofing systems provide excellent resistance to wind uplift due to their unique fixing method. The thermally broken halter firmly secures the roof system to the steelwork below. The strength of this joining and fixing detail is completed by “zipping” the side laps together to create a secretly fixed roofing envelope with outstanding structural performance.

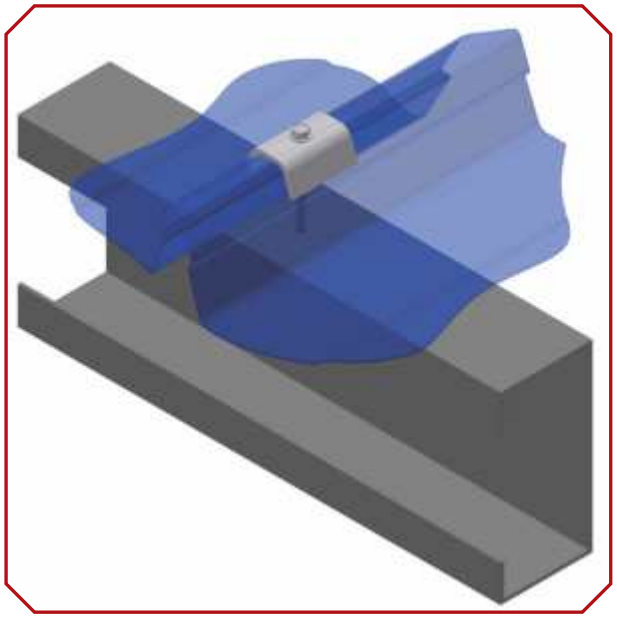


INSTALLING BOX RIB PROFILE SHEETING

TUFDEK iBR | WIDEDEK | MAXCOVER

Trimflute | COMAX1000 | FLUTELINE

Pierce-fixing is where a hole is made through the sheet at every point where a fastener or fixing point needs to be placed. All the Safintra profiles can be pierced-fixed, even SAFLOK 700, however concealed fix allows your roof slope to be lower than 5°, which a pierced-fix sheet is unable to achieve.



You can place fasteners through the crests or in the valleys however, to maximise water tightness, always place roof fasteners through the crests. For Cladding, you may fix through either the crest or valley.

Always drive the fasteners perpendicular to the cladding, and in the centre of the corrugation or rib. The following procedures are described for roofs, but the same general principles apply to walls.

General installation procedure

Check flatness, slope and overhang.

Before starting work ensure that:

- the supports for your cladding are truly in the same plane;
- the minimum roof slopes conform to Section 1 (Low roof pitches); and
- the overhangs of sheets from the top and bottom purlins don't exceed those in Table on page 29 and 30, whilst also overhanging at least 50 mm into gutters. Make any necessary adjustments before you start laying sheets, because they will be difficult or impossible to rectify later.

Orientate sheets before lifting

For maximum weather-tightness, start laying sheets from the end of the building that will be in the lee of the worst-anticipated or prevailing weather. Lay sheets towards prevailing weather. It is much easier and safer to turn sheets on the ground than up on the roof. Before lifting sheets on to the roof, check that they are the correct way up and the overlapping side is towards the edge of the roof from which installation will start. Place bundles of sheets over or near firm purlins, not at mid span of roof members.

Position first sheet

With particular care, position the first sheet before fixing to ensure that it is correctly located in relation to other parts of the building. Check that the sheet is aligned with the end-wall (or its barge or fascia), bearing in mind the type of flashing or capping treatment to be used; and

- align correctly at its ends in relation to the gutter and ridge (or parapet or transverse wall). Roof sheets should overhang at least 50 mm into gutters.
  Fix the sheet as described later in this chapter.

Position other sheets

After fixing the first sheet in position, align the following sheets using:

- the long edge of the previous sheet; and
- a measurement from the end of the sheet to the fascia or purlin at the gutter. It is important that you keep the gutter-end of all sheets in a straight line.
- Fix the sheet by either fixing each sheet completely, before laying the next; or
- fix the sheet sufficiently to ensure it can't move, complete laying all sheets, then return to place all the intermediate fasteners later. Check alignment regularly.

Occasionally check that the sheets are still parallel with the first sheet, by taking two measurements across the width of the fixed cladding.

About half way through the job, perform a similar check but take the measurements from the finishing line to aim for the final sheet to be parallel with the end of the roof. If the measurements are not close enough, lay subsequent sheets very slightly out of parallel to gradually correct the error by:

- properly aligning and fixing a lap, then
- fix the other edge of the sheet, placing the fasteners slightly closer or further from where they would normally be if there was no error.

Side-lapping & positioning pierce-fixed sheets

To prevent moisture being drawn into laps by capillary action, the edges of sheets are slightly modified. IBR, WIDEDEK, MAXCOVER, Trimflute, COMAX1000 and INDUSTRIAL 7 all have flutes formed into the under lapping rib. It is important that sheets be lapped correctly.


IBR to timber support

After fixing the first sheet, place the next (and subsequent) sheet with its side lap nesting over the previous sheet. Secure the sheet firmly in place until each end of the sheet has been fixed. You can do this easily by:

- aligning the bottom edge accurately by a measurement from the end of the sheet to the fascia or purlin at the gutter;
- clamp the lap with a pair of vice grips;

- at the top of the sheet, nestle the side lap snugly, check alignment, and fix the sheet with a fastener.
- If the roof pitch is low (when using corrugated) it is possible to use a double side lap or single side lap with lap sealant

Pierce-fixing on crests

Clamp one end of the sheet whilst fixing the other end. Crest fixing is recommended for roofs made from:

- TUFDEK IBR
- FLUTELINE
- WIDEDEK
- COVERMAX
- TRIMFLUTE
- COMAX1000

Crest fixing may also be used for these products when they are used as Cladding. Alternative valley fixing with crest fixing at side laps (for walls only)

Pierce-fixing on valleys (for Side Cladding only)

Side cladding fasteners may be placed on the crests, but they are usually placed in the valley of side cladding because:

- they are less conspicuous and don't break the aesthetic lines of the steel cladding;
- there is no risk of the proile being deformed, because the fastener is placed through the cladding where it rests flat against its purlin;
- water penetration is not a problem. However, when valley-fixed, the cladding needs a side-lap fastener in all laps, at each purlin. You will find it more economical in labour, time and cost of fasteners to use a crest fastener at each side lap in place of the lap fastener and adjacent valley fastener.

Pierce-fixing on side-laps

Where roofing and cladding are installed according to the purlin spacings table shown in the brochures, side-lap stitching fasteners are generally not required.

You may need to use stitching fasteners where the cladding is laid marginally out of alignment and the weather resistance of a joint is questionable. Decide on the number of stitching fasteners by what looks effective in each individual case.

Where valley fasteners are used, you need side-lap fasteners along each lap at each purlin. Alternatively a crest fastener may be used at each side-lap, in place of the stitching fastener and adjacent valley fastener .
Side-lap fasteners are located in the centre of the crest of the overlapping corrugation.

Turning-up (Lipping)

Completed turn-ups, at the high end of roofing, wind can drive water uphill, under the flashing or capping, into a building. To minimize this problem, you turn up the valleys (or pans) at the high end of roofing. The process is called turning-up (or stop-ending or lipping).

All roofing on slopes below 25° should be turned-up.

You can turn-up sheets before or after they are fixed on the roof. If you do the latter, you must have sufficient clearance for the turn-up tool at the top end of the sheets (about 50 mm).

Slide the turn-up tool onto the end of the sheet as far as it will go. Holding the tool against the end of the sheet, pull the handle to turn up the tray about 80°.
Order of laying
For profiles, lay each run of sheets in turn from bottom to top before moving on to the next run.

Spacing of purlins at end-laps

For the maximum spacing between purlins either side of an end lap in a roof, use the spacing given for end spans.

- one run of sealant at the low end of the lap (to prevent moisture being drawn in by capillary action);

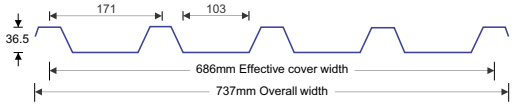
- the other run at the high end (to prevent condensation from running down the underside of the top sheet and entering the lap). When the sheets are lapped together and fixed, the compressed sealant should just appear at the end of the lap.

1. With the top sheet upside down, extrude a 3 mm bead of sealant across the underside of this sheet about 25 mm from the end.
2. Position the bottom sheet, then extrude a 3 mm bead of sealant across the top of the sheet to encompass the cut end of the under lapping sheet.
3. Turn the top sheet over and fit it in place.

A. TUFDEK IBR

SPAN TABLE

TUFDEK iBR



GAUGE	0.47mm	0.5mm	0.53mm	0.58mm	0.8mm	0.8mm
TYPE	AZ	PREPAINTED	AZ	PREPAINTED	PREPAINTED	ALUMINIUM
ROOFS	mm	mm	mm	mm	mm	mm
Single Span	1 650	1 650	1 750	1 750	2 200	1 200
End Span	1 700	1 700	1 900	1 900	2 250	1 300
Internal Span	1 900	1 900	2 100	2 100	2 600	1 500
Cantilever (Unstiffened)	150	150	180	180	200	180
Cantilever (Stiffened)	300	300	350	350	400	250
SIDE CLADDING						
Single Span	2 100	2 100	2 300	2 300	2 500	1 600
End Span	2 400	2 400	2 600	2 600	2 650	2 100
Internal Span	2 600	2 600	2 700	2 700	2 900	2 100
Cantilever	300	300	400	400	450	300
Approximate Mass / m^2	4.9kg	5.4kg	5.8kg	6.3kg	8.6kg	2.9kg

TABLE 8

B. WIDEDEK

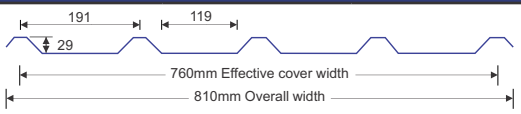
SPAN TABLE						
WIDEDEK						
GAUGE	**0.47mm**	**0.5mm**	**0.53mm**	**0.58mm**	**0.8mm**	**0.8mm**
TYPE	**AZ**	**PREPAINTED**	**AZ**	**PREPAINTED**	**PREPAINTED**	**ALUMINIUM**
ROOFS	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
Single Span	1 350	1 350	1 500	1 500	1 800	800
End Span	1 400	1 400	1 550	1 550	1 850	850
Internal Span	1 600	1 600	1 700	1 700	2 150	1 000
Cantilever (Unstiffened)	200	200	260	260	360	200
Cantilever (Stiffened)	300	300	360	360	460	250
SIDE CLADDING						
Single Span	2 000	2 000	2 300	2 300	2 350	1 200
End Span	2 100	2 100	2 400	2 400	2 450	1 300
Internal Span	2 400	2 400	2 600	2 600	2 700	1 500
Cantilever	200	200	300	300	400	300
Approximate Mass / m ^{2}	3.3kg	3.7kg	3.7kg	4.3kg	5.9kg	2.9kg

TABLE 9

C. MAXCOVER

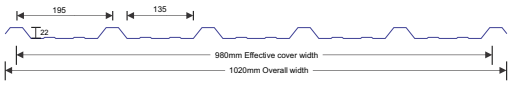
SPAN TABLE						
MAXCOVER						
GAUGE	**0.25mm**	**0.30mm**	**0.40mm**	**0.50mm**	**0.60mm**	**0.70mm**
TYPE	**PREPAINTED**	**PREPAINTED**	**PREPAINTED**	**PREPAINTED**	**PREPAINTED**	**PREPAINTED**
ROOFS	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
Single Span	900	1000	1200	1400	1600	1700
End Span	700	800	900	1000	1100	1200
Internal Span	1000	1200	1 400	1 600	1 900	2 100
Cantilever (Unstiffened)	200	200	260	260	360	200
Cantilever (Stiffened)	300	300	360	360	460	250
SIDE CLADDING						
Single Span	900	1000	1200	1400	1600	1700
End Span	700	800	900	1000	1100	1200
Internal Span	1000	1200	1 400	1 600	1 900	2 100
Cantilever	150	150	150	150	150	150

TABLE 10

D. TRIMFLUTE

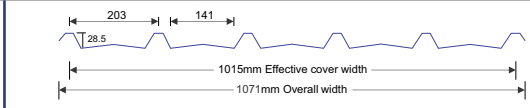
SPAN TABLE			
Trimflute®			
GAUGE	**0.40mm**	**0.45mm**	**0.50mm**
TYPE	**PREPAINTED**	**PREPAINTED**	**PREPAINTED**
ROOFS	**mm**	**mm**	**mm**
Single Span	800	950	1 300
End Span	1 100	1 200	1 400
Internal Span	1 550	1 750	2050
Cantilever (Unstiffened)	-	-	-
Cantilever (Stiffened)	-	-	-
SIDE CLADDING			
Single Span	1 200	1 700	1 900
End Span	1 800	2 450	2 600
Internal Span	2 400	2 850	3 000
Cantilever	-	-	-
Approximate Mass / m ^{2}	3.3kg	3.7kg	3.7kg

TABLE 11

E. COMAX1000

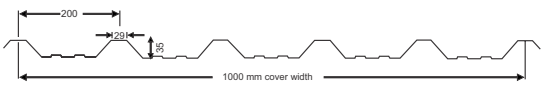
SPAN TABLE						
COMAX1000						
GAUGE	**0.47mm**	**0.5mm**	**0.53mm**	**0.58mm**	**0.8mm**	**0.8mm**
TYPE	**AZ**	**PREPAINTED**	**AZ**	**PREPAINTED**	**PREPAINTED**	**ALUMINIUM**
ROOFS	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
Single Span	1 650	1 650	1 750	1 750	2 200	1 200
End Span	1 700	1 700	1 900	1 900	2 250	1 300
Internal Span	1 900	1 900	2 100	2 100	2 600	1 500
Cantilever (Unstiffened)	150	150	180	180	200	180
Cantilever (Stiffened)	300	300	350	350	400	250
SIDE CLADDING						
Single Span	2 100	2 100	2 300	2 300	2 500	1 600
End Span	2 400	2 400	2 600	2 600	2 650	2 100
Internal Span	2 600	2 600	2 700	2 700	2 900	2 100
Cantilever	300	300	400	400	450	300
Approximate Mass / m ^{2}	4.9kg	5.4kg	5.8kg	6.3kg	8.6kg	2.9kg

TABLE 12

F. FLUTELINE (INDUSTRIAL 5/7)

SPAN TABLE							
FLUTELINE							
GAUGE	**0.47mm**	**0.53mm**	**0.7mm**	**0.8mm**	**0.9mm**	**1.0mm**	**1.2mm**
TYPE	**AZ**	**AZ**	**ALUMINIUM**	**ALUMINIUM**	**ALUMINIUM**	**ALUMINIUM**	**ALUMINIUM**
ROOFS	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
Single Span	1 900	1 950	1 250	1 500	2 000	2 250	2 400
End Span	2 000	2 100	1 300	1 550	2 050	2 300	2 450
Internal Span	2 450	2 650	1 700	2 000	2 250	2 500	2 600
Cantilever (Unstiffened)	400	600	400	450	500	550	650
Cantilever (Stiffened)	500	700	450	550	600	650	750
SIDE CLADDING							
Single Span	3 300	3 350	1 400	2 400	2 700	2 900	3 000
End Span	3 400	3 450	1 500	2 500	2 800	3 000	3 100
Internal Span	3 750	3 900	2 000	3 000	3 150	3 450	3 640
Cantilever	200	300	350	450	500	550	650
Approximate Mass / m ^{2}	4.6kg	5.2kg	2.3kg	2.6kg	2.9kg	3.3kg	3.9kg

TABLE 13

G. POLYCARBONATE PROFILED SHEETING (SINGLE-SKIN MATERIAL ONLY)

GUIDE TO MAXIMUM SUPPORT CENTRES OF POLYCARBONATE

Single Skin (GRP 1.8 kg/m2 ; PC 1.25 mm) Roofing

Profile	Chequerboard	Continuous Run
TUFDEK IBR	1 200 mm	900 mm
WIDEDEK	1 500 mm	1 000 mm
MAXCOVER	1 800 mm	1 500 mm
TRIMFLUTE	1 800 mm	1 500 mm
COMAX1000	1 800 mm	1 500 mm
FLUTELINE	1 800 mm	1 500 mm

TABLE 14

classicorr corrugated

A. CLASSICORR CORRUGATED

Pierce-fixing is where a hole is made through the sheet at every point where a fastener or fixing point needs to be placed. All the Safintra profiles can be pierced-fixed, even SAFLOK 700, however concealed fix allows your roof slope to be lower than 5°, which a pierced-fix sheet is unable to achieve.

You can place fasteners through the crests or in the valleys however, to maximise water tightness, always place roof fasteners through the crests. For Cladding, you may fix through either the crest or valley.

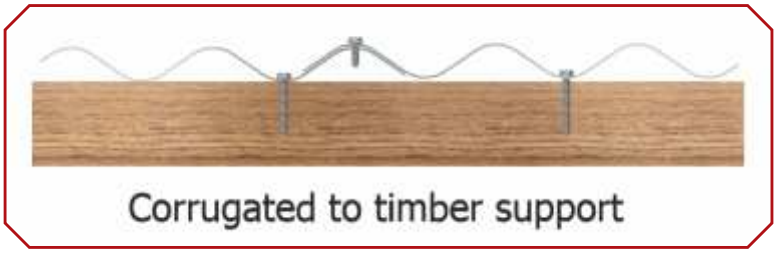
Always drive the fasteners perpendicular to the cladding, and in the centre of the corrugation or rib. The following procedures are described for roofs, but the same general principles apply to walls.

General installation procedure

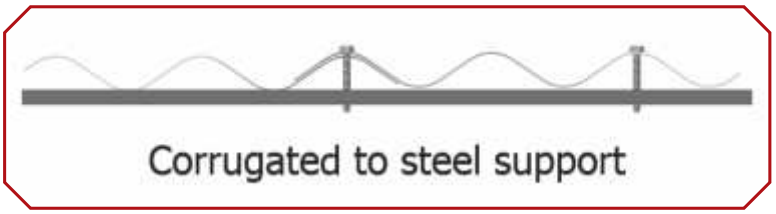
Check flatness, slope and overhang.

Before starting work ensure that:

- the supports for your cladding are truly in the same plane;
- the minimumroofslopesconformtoSection 1 (Low roof pitches); and
- the overhangs of sheets from the top and bottom purlins don't exceed those in Table on page 29 and 30, whilst also overhanging at least 50 mm into gutters. Make any necessary adjustments before you start laying sheets, because they will be difficult or impossible to rectify later.



Corrugated to timber support



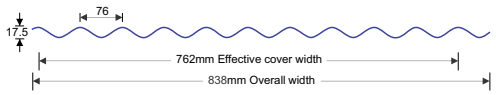
Corrugated to steel support

Turning-up CORRUGATED

With pliers, multi-grips or a shifting spanner closed down to approximately 2 mm, grip the valley corrugations 20 mm in from the end of the sheet and turn up as far as possible (Figure 10.1.2). Be careful not to tear the sheet.

SPAN TABLE

classicorr corrugated



GAUGE	0.47mm	0.5mm	0.53mm	0.58mm	0.8mm	0.7mm	0.8mm	0.9mm
TYPE	AZ	PREPAINTED	AZ	PREPAINTED	PREAINTED	ALUMINIUM	ALUMINIUM	ALUMINIUM
ROOFS	mm	mm	mm	mm	mm	mm	mm	mm
Single Span	600	600	700	700	900	700	800	900
End Span	900	900	1 200	1 200	1 600	750	850	1 000
Internal Span	1 200	1 200	1 700	1 700	2 200	900	1000	1 200
Cantilever (Unstiffened)	200	200	250	250	300	150	200	250
Cantilever (Stiffened)	300	300	350	350	400	200	250	300
SIDE CLADDING								
Single Span	1 200	1 200	1 500	1 500	2 000	1 100	1 200	1 300
End Span	1 350	1 350	1 800	1 800	2 400	1 200	1 300	1 400
Internal Span	1 800	1 800	2 400	2 400	3 200	1 400	1 500	1 600
Cantilever	200	200	250	250	300	250	300	350
Approximate Mass / m ^{2}	3.3kg	3.7kg	3.7kg	4.3kg	5.9kg	2.6kg	2.9kg	3.3kg

TABLE 15

GUIDE TO MAXIMUM SUPPORT CENTRES OF POLYCARBONATE

Single Skin (GRP 1.8 kg/m2 ; PC 1.25 mm) Roofing

Profile	Chequerboard	Continuous Run
Corrugated	1 200 mm	900 mm

TABLE 17

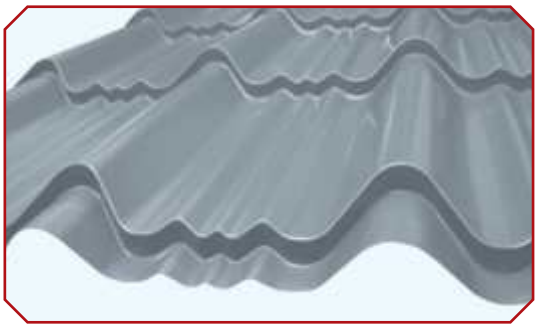
INSTALLING TILE-PROFILED SHEETING

VERSATILE | ZENTILE | ROMANTILE

Lifestile | Orientile | ELEGANTILE

With the benefits of both worlds lightweight, watertight, impact resistant, maintenance free and tamper resistant. With a purlin centre spacing of maximum 600mm and a maximum overhang of 150mm, this profile can be used for any application from up-market residential, to low-cost houses and any thing in-between. It works well for re-roofing. It can be fixed directly to an existing roof without reinforcing the structure.
It is the simplicity of construction and savings on timber and transport add further to the advantage.

This tile is fixed in the conventional manner to the timber structure, primarily for new roof applications. It is also used for re-roofing over existing sheet metal roofs by first fixing timber purlins to the existing roof in preparation to accommodate the tile. As with all the roof sheets, start laying from the prevailing weather side, using the male rib first. Check flatness, slope and overhang.



Before starting work ensure that:

- the purlins for your cladding are true ie. in the same plane (level and flat);
- the minimum roof slopes not less than 7.5°;
- the overhangs of sheets from the top and bottom purlins don't exceed 150mm, whilst also overhanging at least 50 mm into gutters. Make any necessary adjustments before you start laying sheets, because they will be difficult or impossible to rectify later; and
- make sure you start with the male rib facing towards the direction you want to sheet towards. This might take some consideration.

After fixing the first sheet in position, align the subsequent sheets using:

- the long edge of the previous sheet; and
- a measurement from the end of the sheet to the fascia or purlin at the gutter. It is important that you keep the gutter-end of all sheets in a straight line.

Fix the sheet by either:

- fixing each sheet completely, before laying the next; or
- fix the sheet sufficiently to ensure it can't move, complete laying all sheets, then return to place all the intermediate fasteners later. Check alignment occasionally.

Occasionally check that the sheets are still parallel with the first sheet, by taking two measurements across the width of the fixed cladding.

FIXTITE® Fasteners are coated with our unique coating that provides our carbon steel fasteners with exceptional corrosion resistance capabilities. These specially coated fasteners are specifically developed for outdoor environments where they are exposed to the contamination of natural and industrial atmospheres. FIXTITE Fasteners are coated with a proprietary FIXTITE (Class 3) & (Class 4) coating for superior outdoor application, especially in highly corrosive coastal and industrial regions. This proprietary coating formula consists mainly of Zinc and Aluminium to combat deterioration of steel surfaces. It provides far more advantages than conventional electroplating, dip spin coating and even mechanical plating.

Corrosion resistance performance of fasteners used in building and construction is crucial because they provide integrity and security to the other system components. Corrosion of ferrous fasteners can lead to failure of building systems as a result of their premature deterioration.

Tests conducted on FIXTITE Fasteners by internationally accredited laboratories confirm that they comply with corrosion resistance requirements of Australian Standards AS3566 (2002), Class 3 and Class 4. Further corrosion test methods in accordance to ASTM D6294 (2003) were also applied to assure further compliance of our fasteners performance under various environmental categories (SS-EN-ISO 12944-2).

Specifying the correct corrosion class

For optimal performance, the service life warranty of the fasteners must exceed the service life warranty of the roof sheeting.
Only Class 3 or Class 4 fasteners are suitable for use with Aluminium Zinc coated steel. (Painted or unpainted).
In accordance with SANS 1273:2011 only Class 3 or Class 4 fasteners can be used for external applications.
Class 4 fasteners must be used with AZ200 material or if installation is within 1km of coastal environments.

FIXTITE SERIES (CLASS 3)
Designed for atmospheres containing some salt or average levels of airborne pollution. Urban and light industrial areas. Areas exceeding 1km from coastal conditions.
1250 Hour Salt Spray Test. 15 Cycle Kesternich Test. 20 YEAR INTERNATIONAL MANUFACTURERS WARRANTY.

FIXTITE SERIES (CLASS 4)
Designed for atmospheres with average salt contents or discernible levels of airborne pollution. Industrial and areas less than 1km from coastal conditions.
2000 Hour Salt Spray Test. 15 Cycle Kesternich Test. 30 YEAR INTERNATIONAL MANUFACTURERS WARRANTY.

Setting of fasteners

Fasteners with sealing washers should be tightened only until the washer is gripped firmly enough to provide a weather tight seal. The fasteners should not be over-tightened because this may split the sealing washer or deform the sheet, either of which could lead to water penetration. Take particular care when valley fixing because there is no flexibility with the sheet hard against its purlin. It is important that you set fasteners correctly.

Recommended fasteners and locations

Fastener length with insulation
Where insulation is installed under cladding, you may need to increase the length of fasteners, depending on the density and thickness of the insulation.

When the fastener is properly tightened

- INTO METAL: there should be at least three threads protruding past the purlin you are fixing to—but the shank protection must not reach that purlin;
- INTO TIMBER: the fastener must penetrate the timber by the same amount that the recommended fastener would do if there were no insulation.
  Fixing to steel thicker than 3 mm,
- Use Hex head self drilling, self tapping fasteners with seal with an extended drill point; or
- in a pre-drilled hole, use Hex head self drilling, self tapping fasteners with seal, of 12 gauge–14 pitch, with the length as specified in Table 3.8.1.

Side-lap and accessory fastenings

- Stitching fasteners with seal: 8mm – 15mm x 15mm; or
- Hex head self drilling, self tapping fasteners with seal:
  10mm - 16mm x 16mm; or
- Sealed blind rivets: 4.8mm diameter aluminium.

Number of clips per job = (Number of purlins) x (Number of sheets + 1)

Number of fasteners per job (for pierced fixing) = n x (Number of sheets) x (Number of purlins)

Number of side-lap fasteners per sheet = Purlin spacing (in mm) x Number of purlins

For every sheet profile there is a specific flashing for the relevant application. Flashings are available in GI, AZ, Painted Steel and Aluminium. In all cases, it is important to have ample cover provided by the flashing and proper turn-up of the cladding underneath. Adapt the principles to suit your application.

Safintra has a range of standard flashings. We can also supply custom made flashings to meet your requirements – ask your local Safintra branch for details.

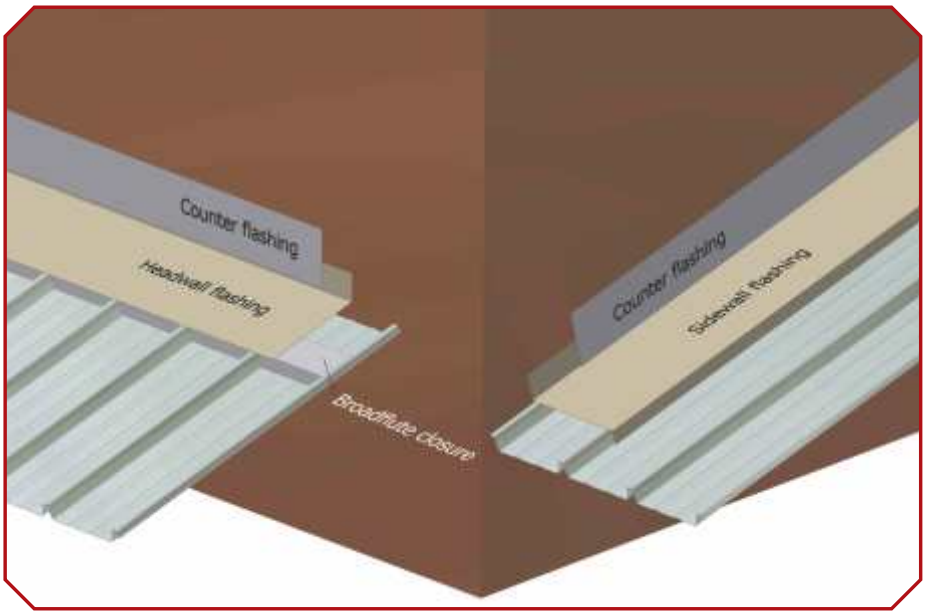
Materials

It is very important that flashings are made from materials that are compatible with the cladding. Materials for flashings are available in the same finishes as the sheeting.

Flashings running with the sheeting

(Sidewall, and/or Barge flashing) Flashings running parallel to the pans or valleys are made to suit the cladding profile. They should have an edge turned-down to dip into the pan or valley. All flashings running next to a wall will need a flashing cover or Counter Flashing. This counter flashing is inserted into a groove recessed into the brick work at the same angle or roof pitch as the sheets. 10mm-20mm cut into the wall is sufficient.

A Sidewall or Barge flashing should always cover at least one (1) complete pan of the profile. Flashings must be fastened at maximum 500mm centres.



SAFLOK flashings should be fixed using Clip-On-Brackets or F10 brackets to ensure that no holes are made directly through the top of the sheet. Never use more than 3 Clip-On-Brackets in a row without the fourth being a F10.

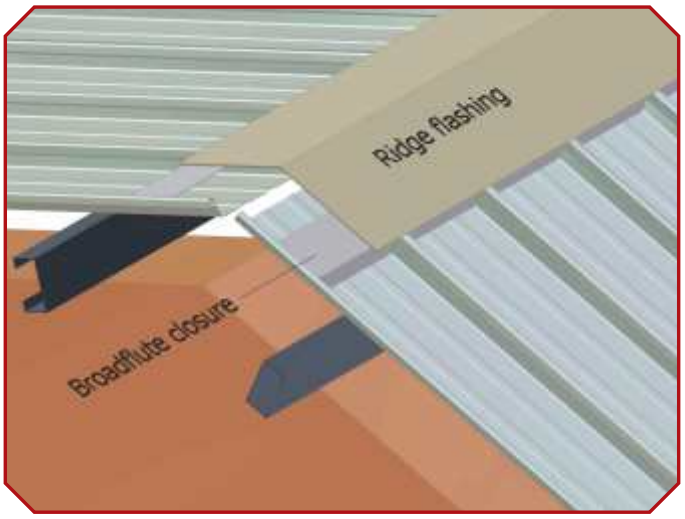
Flashings running across the sheets

(Headwall and/or Apex flashings)
Transverse flashings run across the pans or valleys. They usually have a stiffening lip, along the lower edge, which is turned-down to dip into the pan or valley. To maximise weather proofing, the bent lip is fashioned to fit the profile.

Fixing of Flashings

Transverse flashings shall be fastened in accordance with HB39-1997, as detailed below.

Profile	Recommended Fixing Spacing
CORRUGATED	Every 5th rib
FLUTELINE	Every 2nd rib
SAFLOK 700	Every rib depending on wind
TUFDEK IBR	Every 3rd rib
WIDEDEK	Every 2nd rib
TRIMFLUTE	Every 2nd rib
MAXCOVER	Every 2nd rib
COMAX1000	Every 2nd rib



On typical transverse flashings, the above fastener spacing relates to the stitching of flashings to sheeting. It does not constitute the minimum number of fasteners required to fix the sheeting to purlins.

Fasteners for flashings running across the sheets

You must correctly fix both the flashings and the ends of all sheets.
Where the sheeting is pierce-fixed through crests, and the position of the purlin allows it, the fasteners used to fix the sheets, should also fix the flashings.
On all other installations, pierce-fix your flashing to the ribs or crests of the sheets.

Joining flashings

The overlaps of transverse flashings should be sealed with a recommended sealant and fastened. Before finally positioning and fixing the lap, turn over the top piece and apply a 3 mm bead of sealant across the flashing, about 12 mm from the end. Use a template to mark out for notching with tinsnips.

Flashing at change of pitch

Change of roof pitch can be done in 2 ways. Reverse crank for pierced fix sheets (SAFLOK 700 cannot be reverse cranked) or with the use of an under-over flashing. Please call your local branch for design assistance.

Flashing small roof penetrations

Contact Safintra for assistance.

Flashing walls

Cladding is usually installed with the profile running vertically or horizontally, though sheets can be laid diagonally the choice is aesthetic. Wind can drive rain hard against wall flashings, so it is important that you pay attention to the detailing of flashings around windows, doors, re-entrant and external corners to ensure you not only get a watertight building but also a neat appearance. Safintra make wall flashings for some wall cladding which are sometimes called trims. Where these are not suitable, custom-made flashings can be easily produced following the general principles described in this section.

Cladding profile running horizontally

- It is normal to lay the first sheet at the bottom of a wall and work up wards towards the eaves. You want the window and door flashings to fit properly into the valleys, so you should locate the first sheet relative to the heads and sills of doors and windows.
- Where possible, select the vertical size of windows so that the lashings at both heads and sills will coincide neatly with the pitch of your profile.
- Be sure that the crests of the profile align with each other on adjacent walls, either side of a corner, this ensures that horizontal flashings fit properly into all valleys.
- Where valleys create a void at flashings, use closed-cell foam plastic to fill.
- Where wind-driven rain can be expected, turn back the edges of flashing to restrict water movement past the flashing.

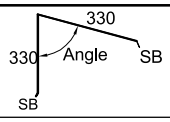
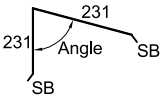
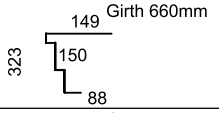
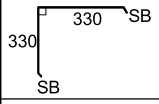
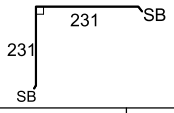
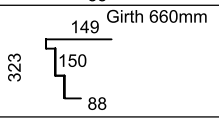
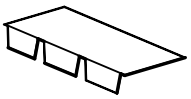
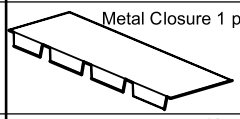
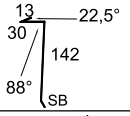
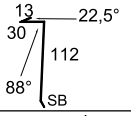
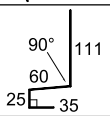
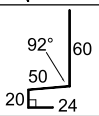
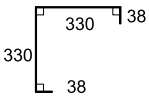
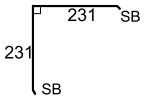
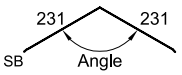
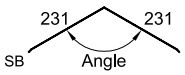
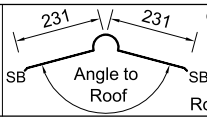
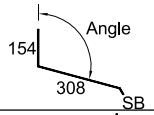
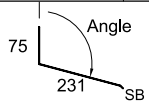
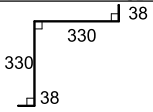
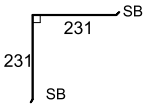
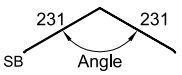
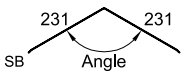
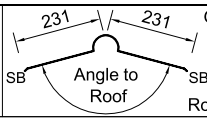
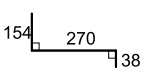
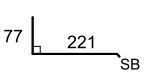
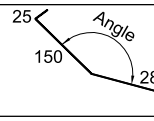
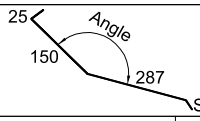
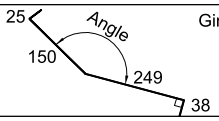
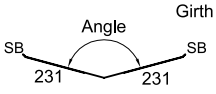
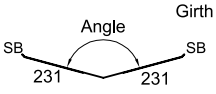
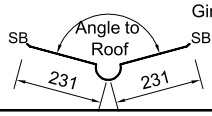
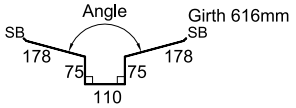
FLASHINGS				
	Concealed Fix	Box Rib	S-Rib	Special Flashings
Apex Flash	 Girth 660mm	 Girth 462mm		 Girth 660mm
Barge Flash	 Girth 660mm	 Girth 462mm		 Girth 660mm
Closure			No closures for Corrugated	
Counter Flash	 Girth 185mm	 Girth 154mm		
Drip Flash	 Girth 231mm	 Girth 154mm		
External Corner	 Girth 740mm	 Girth 462mm		
Ridge/Hip Flash	With Broad flute closures Girth 462mm 	With Broad flute closures Girth 462mm 		
Headwall Flash	 Girth 462mm	 Girth 308mm		
Internal Corner	 Girth 740mm	 Girth 462mm		
Ridge/Hip Flash	With Broad flute closures Girth 462mm 	With Broad flute closures Girth 462mm 		
Sidewall Flash	 Girth 462mm	 Girth 308mm		
Under Over	 Girth 462mm	 Girth 462mm		 Girth 462mm
Valley	 Girth 462mm	 Girth 462mm	 Girth 462mm	 Girth 616mm

TABLE 18

INSPECTION SHEET

Client: _____ Date of inspection: ____/____/_____

Contact person: _____

Project: _____

Address: _____

_____

Profile: _____

Terrain category: _____

Building height: _____ Roof pitch: ____°

Purlin steel with spacing: _____mm

Observation:		**Yes**	**No**	**Comment**
Structure	Structure aligned & work surface flat	☐	☐	
	Purlins & Girth Spacing: Correct	☐	☐	
Sheeting	Side laps interlocking correctly	☐	☐	
	Clip interlocking with centre ribs	☐	☐	
	Clip-inside-spur interlocking with leading edge of sheet	☐	☐	
	Stop ends done	☐	☐	
	Lipping done	☐	☐	
	Fasteners used correctly	☐	☐	
	Fasteners of sheet at Eaves & Gable sides	☐	☐	
	Overhangs secure	☐	☐	
	Sheeting alignment: Satisfactory	☐	☐	
	Material as specified	☐	☐	
	Roof sheet damage	☐	☐	
	Vertical sheeting plumb	☐	☐	
	Bullnose lapped correctly	☐	☐	
Flashings	Flashings - correct size	☐	☐	
	Flashing lap size correct	☐	☐	
	Sealant on laps	☐	☐	
	Spacing of S10s	☐	☐	
	Correct size screws or pop-rivets	☐	☐	
	Cleaning of roof: done all Swarf (filings) removed	☐	☐	
	Correct spacing of fixing screws	☐	☐	
	Roof insulation: Erected satisfactory	☐	☐	
	Side lap stitching done correctly	☐	☐	

Comments: _____

_____

_____

_____

_____

SAFAL™
GROUP



- Africa's largest manufacturer of steel roofing
- The continent's first producer of Aluminium-Zinc coated steel
- Over *3,200* people employed in *36* operations in *11* countries
- Africa's most tried and trusted roofing brands

In all its processes and practises, through its products and its people, in its business performance and its ethics,
The SAFAL Group continually strives to
Make a World of Difference.

www.safalgroup.com



Angola | Burundi | Ethiopia | Kenya | Malawi | Mozambique | Rwanda | South Africa | Tanzania | Uganda | Zambia

MRM MABATI ROLLING MILLS
www.mabati.com

SAFAL STEEL
www.safalsteel.co.za

ALAF
www.aluminiumafrica.com

UGANDA BAATI
www.ugandabaati.com

SAFINTRA world class roofing systems
www.safintra.com