



FreeForm™ Installation Guide

MANOBLE STAND



FreeForm™

1.1 INTRODUCTION

FreeForm™ is engineered for ultimate design flexibility in varying construction applications from single skin roof applications, vertical walls, conical tapered roofing and built up roof system applications. Available in both COLORBOND® steel and aluminium finishes, Fielders has the ability to roll the material onsite to any length or size using the Fielders Mobile Mill® roll former.

FreeForm™ panels accommodate the most complex roof configurations including curved surfaces allowing smooth transitions between roof planes and between the roof and other building elements

The unique tapering can be done from our standard 400mm profile and reduce to 220mm. This allows curved buildings like sports stadia to be accommodated with ease.

Our products are engineered to perform according to our specifications only if they are used in the appropriate conditions and installed to the recommendations in this manual and our other publications. Where we recommend use of third party materials, ensure you check the qualities and capabilities of those products with the relevant manufacturer before use.

The FreeForm™ concealed fix, standing seam system is a roofing system with an innovative architectural appearance. Its flexible design combines with G300 COLORBOND® steel from BlueScope Steel or 5251 H38 marine grade aluminium to provide outstanding watertightness, durability and stunning aesthetics. A variety of end panels and ridge covers cap off the most complex roof designs.

Benefits

The benefits of FreeForm™ cladding include:

- A concealed fixing system that requires no piercing fasteners and helps provide watertightness and superior resistance to wind uplift and harsh corrosive environments.
- It is available in tapered and curved shapes to meet the most challenging design conditions providing unparalleled design freedom.
- The ability to rollform on-site to allow for long continuous roof lines eliminating concerns regarding transportability of sheet lengths.
- Innovative clip system provides superior resistance to wind uplift whilst readily allowing for thermal expansion of long roof runs.
- Wide pans with distinctive ribs not only provide for a dynamic aesthetic but allow for roof pitches as low as 1.5 degrees with excellent water carrying capacity.

Sheeting

Whilst the standard FreeForm™ cover width is 400mm, FreeForm™ is able to be tapered down to 220mm or expanded out to maximum 480mm cover width for special designs. FreeForm™ can be manufactured in a range to meet the most irregular shapes required.

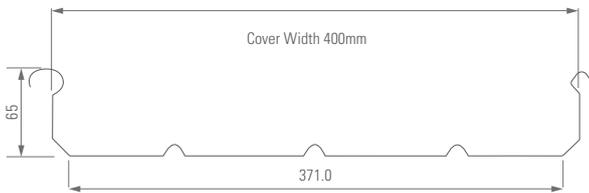
Fixings

FreeForm™ fixing towers are cast from CA401-F1 structural grade aluminium. Clips sit flat on the purlin. If insulation is required we recommend the use of the J-Clip roof-raiser system.

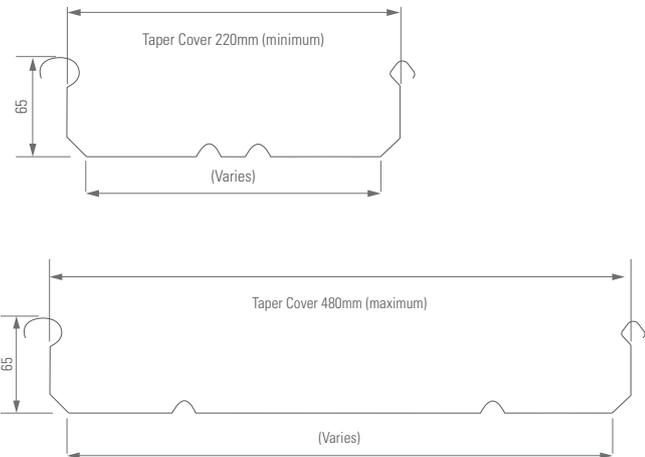
The shape of the fixing tower has been carefully designed to maximise strength, in both outward (wind uplift) and inward load forces. The head of the fixing tower accurately matches the FreeForm™ sheeting, to ensure the sheets slide freely during thermal movement.

Fixing towers are affixed to the structure with Glass 5 (for FreeForm™ steel) or 304SS (for FreeForm™ Aluminium) screws to ensure maximum performance in corrosive environments.

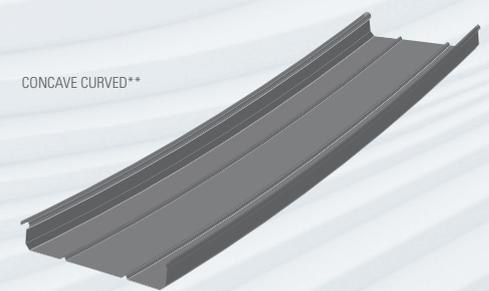
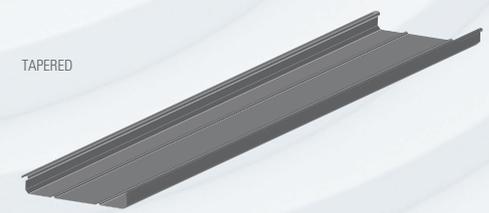
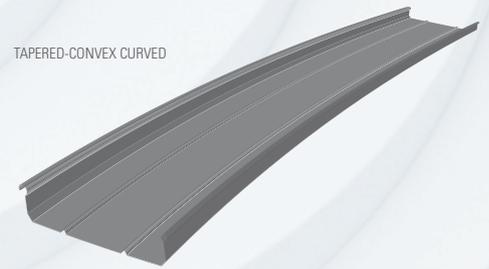
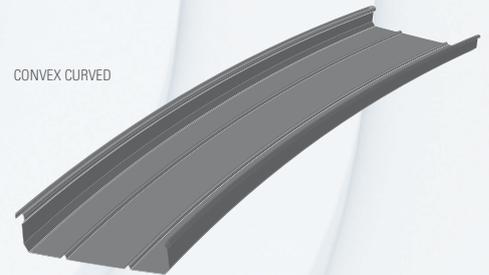
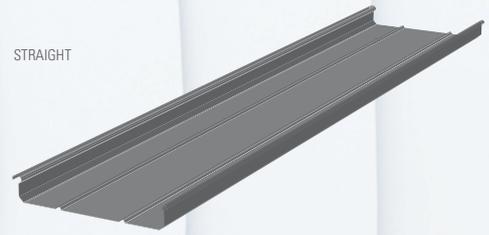
FreeForm™ 400 profile (2 or 3 Swage)



FreeForm™ 220-400Taper profile (2 Swage)



**Please note: Concave can be sprung to a limit of 80m. Crank curving not available with concave applications.



1.2 MATERIAL SPECIFICATION

Table 1.1

| Material | Yield (MPa) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Next generation ZINCALUME® steel aluminium/zinc/magnesium alloy coated steel complies with AS 1397:2011 G300, AM125 (300 MPa minimum yield stress, 125g/m ² minimum coating mass). | 300 |
| COLORBOND® steel is pre-painted steel for exterior roofing and walling. It is the most widely used. The painting complies with AS/NZS 2728:2013 and the steel base is an aluminium / zinc alloy-coated steel complying with AS 1397:2011. Minimum yield strengths for the FreeForm™ range is G300 (300 MPa). Minimum coating mass is AM100 (100g/m ²) plus paint coating mass. | 300 |
| COLORBOND® Metallic steel is pre-painted steel for superior aesthetic qualities displaying a metallic sheen. Minimum coating mass is AM100 (100g/m ²) plus paint coating mass. | 300 |
| COLORBOND® Matt steel is pre-painted steel offering a softer look in neutral tones for a sophisticated design statement. Minimum Coating mass is AM100 (110g/m ²) plus paint coating mass. | 300 |
| COLORBOND® Ultra steel is pre-painted steel for severe coastal or industrial environments (generally within about 100m - 200m of the source). The painting complies with AS/NZS 2728:2013 and the steel base is an aluminium/zinc alloy-coated steel complying with AS 1397:2011. Minimum coating mass is AM150 (150g/m ²) plus paint coating mass. | 300 |
| Aluminium Mill finish Marine Grade Aluminium alloy 5251 / 5052 H38 Temper is suitable for severe coastal or industrial environments (generally within 0m - 500m of the source). | 260/270 |
| Prepainted Marine Grade Aluminium alloy 5251 / 5052 H38 Temper is suitable for severe coastal or industrial environments (generally within 0m - 500m of the source) The painting complies with AS/NZS 2728:2013. | 260/270 |

Table 1.2 Minimum Radius for Curving

| | | Min Radii (m) | | |
|---------------------------------------------|------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------|
| | |  |  | |
| Smooth Pre Curve | BMT | Convex | Concave | Max Support C/C (m) |
| "G300 ZINCALUME® steel or COLORBOND® steel" | 0.55 | 6 | 8 | 1.5 |
| | 0.75 | 8 | 10 | 1.8 |
| Pre-painted Marine Grade 5251 H38 Aluminium | 0.9 | 2 | 8 | 1.5 |
| | 1.2 | 4 | 12 | 1.8 |
| Crank Curve | BMT | Convex | Concave | Max Support C/C (m) |
| "G300 ZINCALUME® steel or COLORBOND® steel" | 0.55 | 2 | 1 | 1.5 |
| | 0.75 | 3 | 2 | 1.8 |
| Pre-painted Marine Grade 5251 H38 Aluminium | 0.9 | 2 | 1 | 1.5 |
| | 1.2 | 3 | 2 | 1.8 |
| Spring Curve | BMT | Convex | Concave | Max Support C/C (m) |
| "G300 ZINCALUME® steel or COLORBOND® steel" | 0.55 | 80 | 90 | 1.5 |
| | 0.75 | 90 | 100 | 1.8 |
| Pre-painted Marine Grade 5251 H38 Aluminium | 0.9 | 45 | 50 | 1.6 |
| | 1.2 | 50 | 55 | 1.8 |

Thermal Expansion

Long continuous sheet lengths require careful consideration of thermal behaviour. The FreeForm™ system considers this movement by allowing the FreeForm™ profile to slide freely over the fixing tower system. This eliminates thermal buckling of the cladding profile. Due care should be given to the seaming process during installation, as movement of the system is dependent on accurate seam control. Attention should also be given to transverse flashings/ penetrations to ensure longitudinal movement is not negatively affected. The changes in length depend on the material type, and its corresponding coefficient.

The change in length can be calculated using the following equation:

$$EL(mm) = \text{Length (m)} \times TC \times CO$$

Where:

EL = increase in length (mm)

Length = original length (m)

TC = change in temperature (C°)

CO = For Aluminium the expansion co-efficient is 0.024

For Steel the expansion coefficient is 0.013

Careful detailing is required for long lengths to avoid leaks.

1.3 INSTALLATION PROCESS

Fixing towers are screw fixed to supporting purlins with selfdrilling 12-14 x 25 Screw. For Steel applications this should have a min class 5 protective coating. For aluminum applications these should be 304 grade Stainless Steel. Where possible, the direction of installation should be toward the prevailing weather conditions. This ensures that the overlap locates on the leeward side.

Lateral Spacing of the Fixing Towers

Lateral spacing of the fixing towers depends on the FreeForm™ profile being used. For best results fixing towers should be spaced with a cover width plus 2.0mm. For example for standard straight FreeForm™ 400mm cover, the fixing tower spacing is ideally at 402mm. For curved roofs, increase the spacing an extra 3-5mm depending on the radius of the FreeForm™ sheeting.

Longitudinal Spacing of Fixing Towers

Longitudinal spacing of fixing towers (or cladding span) is determined using the load capacity FreeForm™ tables included in this manual. Careful consideration should be given to areas of the structure which experience high localised loads e.g. edges of the building. It is common to reduce spacing's of fixing towers in this area. To ensure adequate thermal movement of the system is maintained, lateral spacing of fixing towers must be carefully aligned longitudinally during installation.

Flashing Fixing Details

Flashings are screw-fixed to the FreeForm™ sliding bracket assembly with 12x20 stitching screws for steel applications this should have a min class 5 protective coating. For aluminum applications these should be 304 grade Stainless Steel at each rib transversely or at max. 500mm c/c longitudinally as per Figure 1.9.

Timber and Metal Compatibility

Under no circumstances should steel, lead, copper, brass, or copper alloys be placed in contact with Aluminium, ZINCALUME® steel or COLORBOND® steel.

Care must be taken to avoid contact with building materials such as unseasoned or chemically treated timber, lime cement, concrete, mortar or plaster during construction and to provide impermeable barriers against long term contact.

If there are doubts about the compatibility of other products being used, seek advice from our technical representative. See tables 1.3 and 1.4 for direct contact and rainwater discharge compatibility issues.

General Installation Process

NOTE: This procedure provides an overview of some the main steps involved to install a FreeForm™ roof. Each roof is different and careful consideration should be given to the project specific work method before commencing work on site. This document does not replace a SWMS or risk assessment for the process. It is intended as a guide to assist in the installation of this specialised product.

Step 1

Lay first sheet onto roof and align edge with end of building.

Step 2

Install clips into under lap rib (diamond formed edge) beside each purlin. When clips are in place they can be slid along the sheet to line up accurately with the purlin.

To insert the clip hold it horizontal to the sheet with the top under the lip. Rotate the clip applying pressure to the base until it 'clips' into place and is vertical as shown in the photos.



Step 3

Line clip up with the purlin ready to secure it into position.

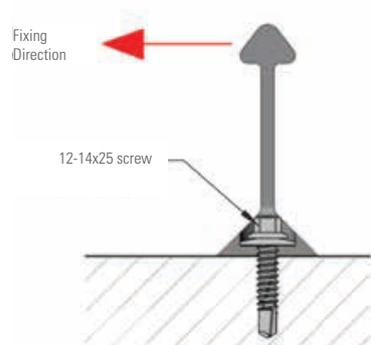


Step 4

Screw clip to purlin with appropriate tek screws. A longer (150mm) hex head driver bit will assist here to clear the top of the sheet.

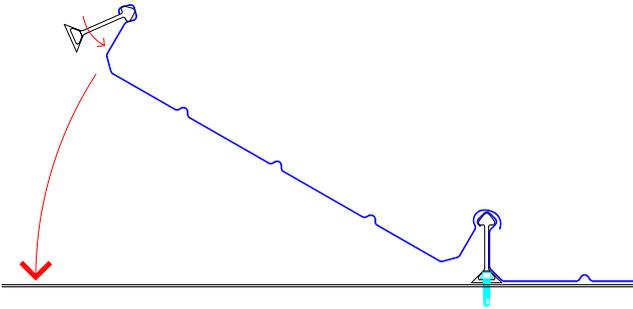


FreeForm™ fixing clips are screwed into the purlins oriented to allow for the desired direction of the ribs.



Step 5

The male and female ribs on the clips are fixed by overlapping the female rib over the male rib of the previous sheet.



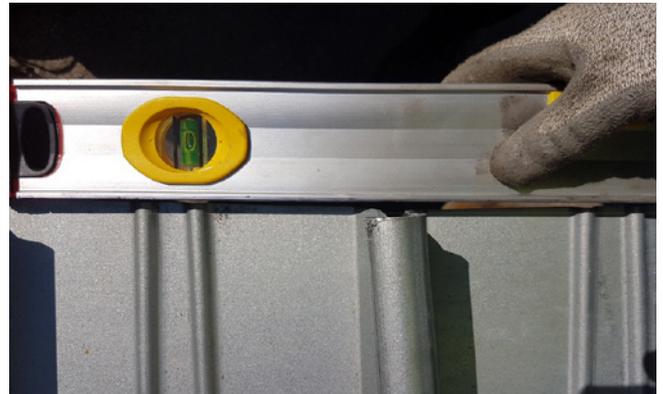
Lift next sheet onto roof and place next to installed sheet. Lift sheet up to 45° to hold 'over' (radius formed edge of sheet) above the top of under. Several people spread along the length of the sheet may be required to help align it.



Figure 1.8: FreeForm™ detail of lap before seaming.

Step 7

Align the end of the sheet.



The sheet shown in the photo above is not properly engaged. The over needs to cover the under completely with the edge of the over touching the vertical face of the previous sheet.

Step 8

Using the manual large hand crimpers, crimp the end 150mm of the seam.

Step 6

Rotate the sheet down to horizontal which will engage the over completely over the under.

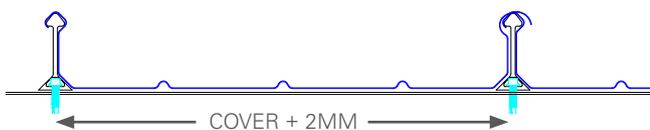


Figure 1.7: Lateral spacing of the fixing towers.



Step 9

Split the electric seamer by lowering the side locking bar and pulling both sides of the tool apart. Place the seamer over the roof seam joint with the front set of rollers over the section of the seam that was manually crimped.



Step 10

Close up the electric seamer with the side locking bar. It may need to be rolled back or forth on the roof to engage the gears connected to the rollers.

Step 11

Ensure the trigger on the seamer is not locked in. Connect the extension cable supplied with the machine to a 240V power outlet. Connect the seamer to the extension cord and secure in place with the locking plug.

Step 12

Turn the power on and the extension lead switch on. Using the trigger on the seamer 'jog' it along 500mm of the seam to ensure it is engaged and seaming. Release the trigger.



Step 13

Turn the power off at the extension lead switch and lock in the trigger switch on the tool.

The seamer can now be controlled with the extension lead switch. Watch to ensure the lead doesn't get caught on anything or run over by the seamer.

Step 14

When seaming is completed correctly the edge of the material on the over should be pushed right in and touching the vertical section of the previous sheet.



Table 1.3: Compatibility of direct contact between metals or alloys

| Roof Drainage System Components and Any Cladding Material | Accessories or Fastener or (Upper Surface) | | | | | | | | |
|-----------------------------------------------------------|--------------------------------------------|------------------|------|-----------------------------------------------------|----------------------|--------------------------------|------------------|---------------------------------------|------|
| | ZINCALUME® steel | Galvanised steel | Zinc | COLORBOND® steel Including Ultra, Metallic and Matt | COLORBOND® Stainless | Stainless Steel ⁽³⁾ | Aluminium Alloys | Copper & Copper Alloys ⁽¹⁾ | Lead |
| Aluminium Alloys | No ⁽⁴⁾ | No | Yes | No | No | Yes | Yes | No | No |
| ZINCALUME® steel ⁽⁴⁾ | Yes | Yes | Yes | Yes | No | No | No | No | No |
| Galvanised steel ⁽⁴⁾ | Yes | Yes | Yes | Yes | No | No | No | No | No |
| Zinc | Yes | Yes | Yes | Yes | No | No | Yes | No | No |
| COLORBOND® steel (Plus Ultra, Metallic & Matt) | Yes | Yes | Yes | No | No | No | No | No | No |
| COLORBOND® Stainless steel | No | No | No | No | Yes | Yes | No | No | No |
| Stainless steel | No | No | No | No | Yes | Yes | No | No | No |
| Copper and Copper Alloys ⁽¹⁾ | No | No | No | No | No | No | No | Yes | No |
| Lead | No | No | No | No | No | No | No | Yes | Yes |

(1) Monel - copper/nickel alloy. (2) For further guidance refer to AS/NZS 3500.3:2003. (3) Fixings only. (4) Our experience is that these materials are not compatible in extremely corrosive environments, so our advice differs from AS/NZS 3500.3:2003

Table 1.4: Acceptability of drainage from an upper surface to a lower metal surface

| Lower Roof Drainage System Material | Upper Cladding or Roof Drainage System Material | | | | | | | | | |
|------------------------------------------------|-------------------------------------------------|------------------|--------------------|-----------------------------------------------------|----------------------------|-----------------|------------------|---------------------------------------|------|---------------------------------|
| | ZINCALUME® steel | Galvanised steel | Zinc | COLORBOND® steel Including Ultra, Metallic and Matt | COLORBOND® Stainless steel | Stainless Steel | Aluminium Alloys | Copper & Copper Alloys ⁽¹⁾ | Lead | Glazed Tiles, Glass and Plastic |
| Aluminium Alloys | No | No | Yes ⁽³⁾ | Yes | Yes | Yes | Yes | No | No | Yes |
| ZINCALUME® steel | Yes | Yes | Yes | Yes | Yes | Yes | Yes(3) | No | No | Yes |
| Galvanised steel ⁽⁴⁾ | No | Yes | Yes | No | No | No | No | No | Yes | No |
| Zinc | No | Yes | Yes | No | No | No | No | No | Yes | No |
| COLORBOND® steel (Plus Ultra, Metallic & Matt) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | Yes |
| COLORBOND® Stainless steel | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Stainless steel | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Copper and Copper Alloys ⁽¹⁾ | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Lead | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

(1) Monel - copper/nickel alloy. (2) For further guidance refer to AS/NZS 3500.3:2003. (3) Our experience is that these materials are not compatible in extremely corrosive environments, so our advice differs from AS/NZS 3500.3:2003

1.4 FLASHINGS

Purpose of Flashing

Flashings are not only required to provide weather-resistance to the many junctions on a roof or wall structure, but are also a very visible part of the roof and wall cladding design, and perform an important role in the aesthetic appearance of the building. The following sections should be considered as a guide only. For a comprehensive account of flashing guidelines, refer to HB39-1997.

Similar methods of flashing are used for different cladding profiles. You can adapt the principles to suit your application. In all cases it is important to have ample cover provided by the flashing and proper turn-up of the cladding underneath. Be careful when moving between supports. Do not walk on the ridge immediately adjacent to flashings or translucent sheeting. Walk at least one pan away.

All flashings must be designed to prevent ponding of water or build-up of debris. Flashings must be designed to provide weather-resistance for the roof or wall cladding without reliance on sealant as the prime means of providing weather-resistance.

Flashing Materials

It is very important that flashings be made from materials that are compatible with the cladding (see Dissimilar Metals Tables 1.3 and 1.4). Flashings should conform to AS/NZS 2179.1:1994. Materials for flashings are available in the full range of material specification

Roof Flashing

The correct installation of flashings to seal the roof perimeters or penetrations is essential to the security and weather tightness of the roof. Consideration should be given to movement between the roof and building walls and to length expansion of flashings.

Allowance needs to be made for expansion and contraction of long runs of roof sheets to ensure that flashings do not constrain this movement or are strained by movement. To this end FreeForm™ flashing sliding brackets should be used as per Figure 1.11 to 1.14.

Fielders is able to supply a range of flashings which are provided to the same metal specification as the roofing sheet.

Figure 1.11: Barge flashing

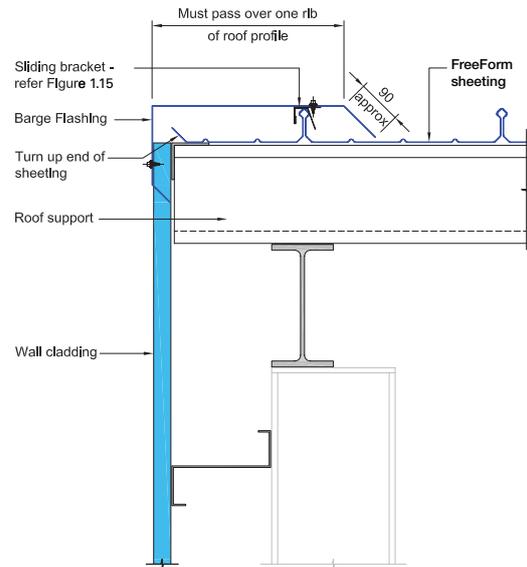
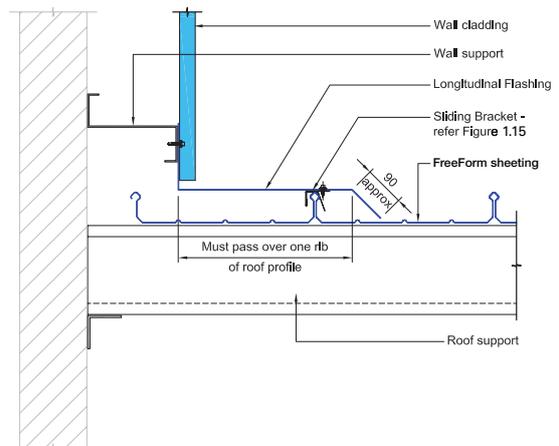


Figure 1.12: Longitudinal flashing



Barge and Longitudinal Flashings

The installation of these flashing types must make allowance for movement between the roof sheeting and the wall parallel to the edge of the sheeting. To accommodate this thermal movement, Fielders recommend the use of a sliding bracket.

Barge and longitudinal flashings are made to suit the cladding profile. They should have an edge turned down to dip into the pan or valley. The minimum recommended cover of longitudinal flashings over cladding should be taken from AS/NZS 3500.3:2015.

Refer Figures 1.11 and 1.12 for further details on these flashing types and the sliding bracket.

Transverse 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 weatherproofing, the bent lip is fashioned to fit the profile. The turn-down for transverse flashings can be fashioned to fit the profile by scribing to match the FreeForm™ profile.

Flashing Cover

Fielders can produce a range of flashings to suit your needs and design (hip, barge, apron). To increase weather-resistance, Fielders recommends you maximise the overlap between flashings and cladding.

Fixing of Flashings

Longitudinal flashings shall be fastened at maximum 500mm centres. Transverse flashings shall be fastened in accordance with AS/NZS 3500.3:2015.

Flashing Laps

A lap is that part of a flashing that overlaps or covers any portion of the same shaped component, and is variously described as an end lap, overlap or underlap.

Laps should comply with the following criteria:

- an overlap must run in the same direction as the water i.e. downhill;
- an overlap must run over not under;
- an overlap must be across the fall or at a shallow angle;
- water must flow over a lap not into it;
- a lap must be self-draining and not rely solely on sealant;
- a lap must be mechanically fixed;
- a lap must have a minimum of width of 150mm;

* a lap should be sealed with a recommended sealant and fastened.

Figure 1.13: Ridge Capping

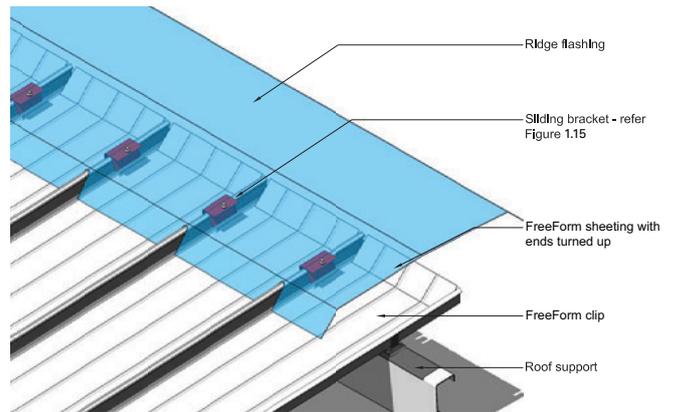


Figure 1.14: Transverse Flashing

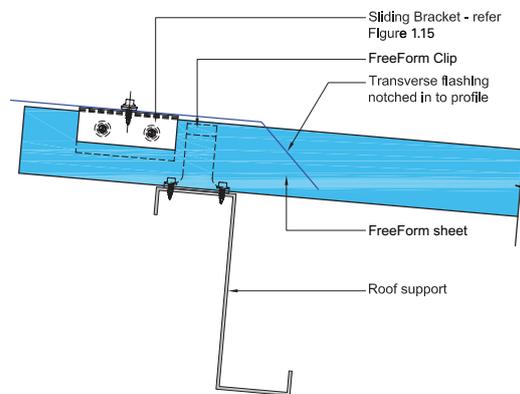


Figure 1.15: Sliding Bracket Detail

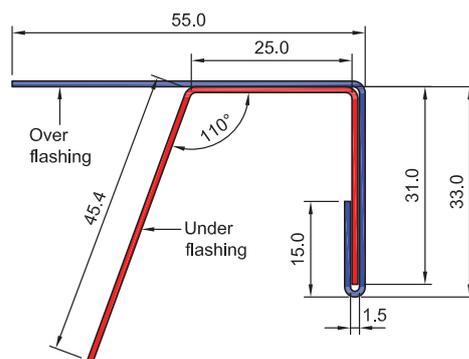
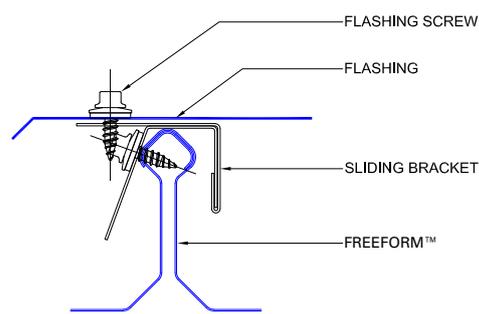


Figure 1.16: Sliding Clip Fixing Detail



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