

## HANDLING AND STORAGE

Correct handling of profiled metal roofing and cladding products is critical to ensure damage does not occur during transportation and storage of the material. The following comments are made as guidelines to be used when inspecting Dimond® Roofing and wall cladding systems during the installation process.

Visual inspection of materials when they are delivered to the site should be carried out to ensure they are dry and free from damage. All components stored on site must be kept dry.

Site storage of sheet material requires dunnage evenly spaced to provide a surface for the materials to be placed on that is in plane.

Covers must be placed over the material to ensure it does not become wet during any storage period, and must remain clear of the material surface so air can circulate freely around the bundle. Product with strippable film applied must not be exposed to direct sunlight during storage.

The need to keep the sheets dry applies to all metal types. If aluminium is stored wet it will suffer black staining that detracts from appearance. If pre-painted Zincolume® products are stored wet, the paint finish will blister due to moisture absorption and eventual under-film corrosion. If unpainted Zincolume® products are stored wet, the surface will stain and can suffer loss of protection that will show up in time as premature corrosion. If the sheets have remained in this wet condition for more than 3 days, they should not be used.

If sheets do become wet and remained wet for less than 3 days, they must first be removed from the stack, immediately dried thoroughly and re-stacked with timber fillets being placed evenly between the sheets to ensure air can circulate freely over the sheet surfaces.

Sheets must always be lifted clear of the stack, never dragged.

Adequate support must be given along the length of sheets when lifting, whether it be single sheets by hand or bundles of sheets by crane or other lifting device. When lifting by mechanical means, spreader bars must be used to ensure the fabric strops do not damage the edge of the sheets as they are lifted.

## LAYOUT AND FASTENING

The following comments are made as guidelines to be used when inspecting Dimond® Roofing and wall cladding systems during and after installation.

### a. Netting

Netting should be run across purlins and be tensioned to remove unnecessary sag. Fastening to timber should be with either galvanised staples or 25mm clouts avoiding contact with the roofing, and to steel with flat head screws.

Fixings should be at 150mm centres on end purlins in such a way that the netting cannot pull past the fixing. Edges of the netting should be tied together or twitched at 300mm centres and fixed to each purlin. Safety mesh should be installed to manufacturers recommendations.

### b. Roofing Underlay

Horizontal Application: underlay is unrolled across the roof parallel with purlins and secured as necessary. Joins should be lapped by a minimum of 75mm and supported on netting if roof pitch is below 8 degrees for self supporting and have the side edges supported on purlins.

Vertical Application: underlay is unrolled vertically down the slope of the roof from ridge to gutter and secured to the purlins as necessary before laying the roof sheet and fixing down. Joins should be lapped by a minimum of 150mm. Support such as netting or safety mesh must be used on pitches below 8 degrees, or when using self supporting underlays on purlin spacings greater than 1200 mm.

When used under roofing, all underlays must be supported on wire netting or strapping at 300mm maximum spacings. Self sufficient underlays can be used on purlins spacing up to 1200mm without support.

Underlay should overlay into the gutter at least 20mm and not more than 50mm, and avoid lapping into the water flow.

Maximum single underlay sheet lengths shall be 10m for bituminous and fire retarded kraft papers. Longer runs are to be end lapped 150mm. Synthetic underlays have no limit on their run length.

In general it is recommended that prolonged exposure of the underlay to the weather is avoided by fixing the roofing over the same day. Always follow underlay manufacturers recommendations.

### c. Roofing and Cladding Sheets

#### Supporting Structure

- Roofing and wall cladding sheets should not be installed until the roofing contractor is satisfied that the support structure is complete, sound, and correctly aligned. This includes support around penetrations and openings.
- Purlin and girt spans both end and internal spacings must be in accordance with Dimond recommendations for profile, metal type and thickness, as well as the expected level of foot traffic. If in doubt, check.
- Curved roofs (whether draped/rolled or crimped) require purlin alignment within  $\pm 5$ mm to minimise the risk of unacceptable finished appearance.
- Spacers must be fixed to steel purlins to allow insulation to fit between and to create a 25mm air gap between underlay and insulation. Do not compress the insulation.

Where the building is under the scope of E2/AS1 there is a requirement to install horizontal wall cladding onto a cavity batten system to achieve a 20mm air space between the back of the cladding and wall framing on all walls in accordance with NZBC E2/AS1. Dimond profiles that come within the scope of E2/AS1 are: Corrugate, Styleline, Veedek®, DD300, DD400 and V-Rib.

Vertical run cladding does require a cavity batten system on all insulated walls and where the cladding is installed over RAB board or sheet panel products to allow ventilation to the back side of the profile.

## Sheet Layout

- Firstly, the sheet should show no signs or evidence of transport damage or storage damage including wet storage effects. If the sheets are damaged they must not be fixed down, and the Dimond supplying branch should be informed as soon as possible.
- Care should be taken to ensure sheets are laid parallel to the lines of building ends, and perpendicular to ridges and gutters. If possible, the direction of laying should be such that the sheet side laps face away from the prevailing wind direction, or, in the case of wall cladding, away from the most common line of sight.
- Side laps must be properly engaged such that the overlap rib fits correctly over the underlay without obvious gaps or insufficient cover.
- Roofing sheets should run continuously from ridge to gutter, avoiding end laps. Long lengths separated for thermal expansion or handling reasons should join at a step in the roof. Where end lapping of straight and curved sheets cannot be avoided, a correctly formed 150mm minimum sealed lap is required, with a bead of neutral curing silicone sealant each end of the lapped sheets.
- Sheet ends should form an even line (within a workable tolerance) and roof sheeting should overhang into gutters by at least 50mm and must allow clearance to enable ease of gutter cleaning.

## Sheet Ends

- All roofing and wall cladding sheet ends that terminate under flashings (regardless of pitch) should be formed with a full vertical dog-eared stop end to the full height of the profile rib. Where a full height dog-eared stop end cannot be achieved, a pull up stop end a minimum 28mm high on all profiles excluding Corrugate must be provided in conjunction with foam profile closures.
- For roofs below 8 degrees pitch the drip edge sheet end should be formed with a down turned lip.

## Sheet Fastening

- Sheet must be fastened to every purlin (or girt) to transfer outward loads evenly to every structural member.
- The screw and washer system used should meet specification requirements and have a durability to at least match that of the sheeting, and be in accordance with Dimond literature for that profile.
- Fasteners must be perpendicular to the sheeting and tightened sufficiently to effect a durable seal without over tightening that results in seal washer distortion or profile crest dishing and depressing. Fixings must be to a line.
- Concealed clips used to fasten Dimondek® 300, Dimondek® 400, Dimondek® 630 and Eurotray® profiles must not exhibit screw or nail head protrusion such that damage to the roof sheet and coating may result.
- Whenever oversize holes are required to accommodate expansion, profiled washers and seals must be used.
- Profiled washers and seals should be used whenever specified to provide extra wind uplift capacity.
- Note should be made to ensure there are sufficient fasteners, evenly distributed. In particular the perimeter zones of roofs, where maximum wind uplift occurs, must have sufficient fasteners.
- No areas on the roof should hold water that will cause ponding long term. The structure may require realignment and if the profile is damaged, this should be replaced.

## Wall Cladding Underlay

- Can be laid either horizontally on steel girts or vertically on timber studs.
- When run horizontally lap upper sheet over lower sheet a minimum of 75mm. Adequately secure to framing at 300mm centres. When installed in high wind areas fix through a reinforced tape such as Danband branded polypropylene tape.
- Run lengths to be no greater than 10m.
- End laps to be no less than 150mm over studs of vertical joints.
- The underlay should be pulled taut as possible.
- Best practice is to clad on the same day as installation provided the product is kept dry and undamaged.
- Maximum period that the underlays are exposed to the weather is contained in the underlay manufacturers literature.

## Side Lap Fastening

All metal profiles must have side laps fastened (either by primary fasteners through to the purlins, or by stitching the top sheet to the underlay sheet) to comply with the following maximum spacings.

Material	Thickness (mm)	Maximum Side Lap Fastener Spacing (mm)
Steel	0.40	1500
	0.55	2000
	0.75	2400
Aluminium	0.70	1500
	0.90	2000
Duraclad® (GRP) Rib height 30mm or less	1.7	750
Duraclad® (GRP) Rib height greater than 30mm	1.7	1000

## Wall Cladding Side Lap

Side lap stitching on pan fixed wall cladding is recommended to improve the lap weather tightness, when the distance between fixings is greater than 1.5m. Side lap fixings should not exceed 750mm centre to centre.

The recommended side-lap fasteners for stitching sheets together are:

Metal Sheeting		
10-16x16mm	Hex head	Tek® screws
10-12x20mm	Hex head	Type 17 screws

### Duraclad®

Bulb - Tite Rivet

or Bolt and compressible rubber sleeve

### d. Duraclad®

The above comments for roofing and cladding sheets generally apply. Additional attention should be given to:

- Stop ends should be correctly formed by attaching a metal (usually aluminium) folded angle to the sheet end, and sealing it in place.
- The supporting structure must be free of abrasive surfaces or irregularities. If used over netting or safety mesh, a barrier strip must be installed to prevent abrasive damage to the sheet surface.
- Fastening of Duraclad® requires pre-drilling of the sheet with a hole size that is at least 2mm greater than the fastener diameter. Additional hole size may be required to accommodate thermal expansion of the sheeting.
- Provision should be made during installation to enable foot traffic movement across the roof without applying point loads to the Duraclad® sheeting. Planks or temporary walkways are recommended.
- Safety Mesh must be installed underneath Duraclad® if the sheet thickness is less than 1.7mm. (If general foot traffic is expected, consult Dimond for the use of products specifically designed for the purpose.)

### e. Natural Lighting Products

Refer to Section 2.4.1.3 for installation of these products.

## FLASHINGS / PENETRATIONS

The following comments are made as guidelines to be used when inspecting Dimond® Roofing and wall cladding systems during and after installation.

### Material

Must be the same material and coating as the roof or wall cladding to give a similar durability and compatibility to the roof/wall system.

### Fabrication

Flashings should be fabricated to achieve sufficient cover width and to maintain falls to avoid water ponding.

They must be without noticeable micro-cracking and be fixed without damage such as dings or crushing, and should be free of scratches and swarf the same as for roofing.

Flashing joints must be sealed at both ends of the lap, and the fasteners must pass through the sealant at the leading edge. Spacing of fasteners should be no greater than 50mm apart. Laps to be 150mm min.

### Fastening

Wherever possible, flashings should be screw fixed through to the supporting structure, with sufficient slope or fall to ensure ponding does not occur. Stitch screws should be the preferred means of attaching flashings to sheeting ribs. If aluminium rivets are used, the minimum size should be 4.8mm diameter.

All fasteners should be of sufficient size and frequency to withstand the loads that may be applied through wind uplift or thermal expansion, throughout the life of the roofing material. As a guide, where flashings cover the roof, use the same fastener that has been used to fasten the roof.

As a guide, the fastener frequency for fixing flashings should be:

Wind Zone*	Fasteners Per Metre
Low (32 m/s)	1
Medium (37 m/s)	2
High (44 m/s)	3
Severe (50 m/s)	4

\*in accordance with NZS 3604

Sensible allowance should be made to allow relative thermal expansion between flashings and sheeting if sheet lengths exceed 12m.

Expansion joints in the flashings should be considered for steel flashings greater than 18m and aluminium flashings greater than 12m in length.

Flashing lapping over roofing should be in accordance with Table 2.1.0 of Section 2.1.3.6 in this manual. Where barges meet the gutter, this must be closed off to ensure wind driven moisture and birds cannot enter the building.

## Profiled Foam

Profiled foam sealing strips should be installed when specified at the top end of the sheet, adjacent to the stop end. To help keep the strips in place it is good practice to position them on a bead of silicone sealant.

## Notching

Best practice to notch flashing downturns around sheet profiles is to mark in-situ and use a rib-shaped template. Clearance gaps around the rib should be just sufficient to prevent cut edge contact with the sheet surface. Gaps between 1mm and 3mm are generally considered satisfactory.

Soft edging can be used on corrugate and low rib profiles with rib heights up to 30mm and should be neatly pushed down and formed in to the profile pans to achieve a neat-tight fit.

## Property boot pipe flashing

Property boot pipe flashings must not be positioned in such a way that a dam is formed across a water channel. It is preferred that Property boot pipe flashings are positioned on the 'bias' rather than square across the sheet. If the pipe and Property boot pipe flashing dam up the pan or restrict more than 50% of the water flow around the pipe and flashing, an additional cover over flashing to the ridge and sealing of the Property boot pipe flashing to this flashing should be considered. Excess silicone sealant should be avoided, as it will add to the risk of water ponding.

## Penetrations

Penetration holes with their major dimension or diameter greater than 150mm must have support framing placed around the perimeter of the penetration holes.

Water diversion around the penetration must not cause an overload of the receiving channel such as the pans that the water has been diverted into, which may cause flooding. Penetration flashing shall not rely solely on the silicone sealant to achieve weather tightness of the flashing.

## GENERAL WORKMANSHIP

The following comments are made as guidelines to be used when inspecting Dimond® Roofing and wall cladding systems during and after installation.

### Roof Access

The means of access must be safe and secure, and should provide protection to the sheeting at the access point. Provision for cleaning or changing footwear to prevent the transfer of dirt onto the roof surface is recommended to minimise the risk of surface scratching damage.

### Walking on Roofs

Soft, clean (free from dirt and clay) light coloured soled footwear must be worn. Foot placement should be close to purlin lines, and point loads should not be applied to profile ribs through careless weight distribution while walking. Avoid foot placement on the underlay edge of roof sheets.

Translucent or Natural Lighting sheet must not be walked on.

### Subsequent Trades

The work habits of trades accessing the roof must be controlled to avoid unnecessary damage from foot traffic, swarf, and storage of materials. Installed roofing that will be subject to further use (or abuse) during building construction should be protected by covers or temporary walkways. Care must be taken to protect and avoid scratching of the paint finish. The placement of scaffolding legs onto a roof should be avoided unless there is adequate support and protection to the roof finish to avoid damage. Penetration flashing should be placed as close to the ridge as possible to avoid large catchment areas upstream of the penetration. All penetration flashings should be done in accordance with the MRM Code of Practice.

### Dissimilar Materials

Care should be taken to ensure that incompatible materials have not been used, particularly through the installation of walkways and air conditioning equipment. Copper pipe must not discharge or allow water run-off onto the metal roof. Where necessary, water run-off from dissimilar metals should be contained and discharged separately from the roofing material.

Wall cladding lapping onto concrete tilt slab or block walls must not contact the concrete. A small gap, such as 5mm, between or isolation strip is recommended.

### Drilling and Cutting

When metal sheets require cutting, only shears, powered nibblers or hand snips should be used to leave a cleanly cut sheared edge. Any form of disc cut will nullify the material warranty.

Cutting of Duraclad® sheets can be with an abrasive disc or a fine tooth saw. Breathing protection should be worn to prevent inhalation of dust.

Cutting and drilling should be carried out clear of other sheeting material, and the drilling swarf immediately removed from the surrounding sheet surface.

Coil on cut edge protection lacquer may be required to be painted on all cut edges in severe marine areas to meet warranty requirements. Check with Dimond.

### Swarf

The particles of metal that result from cutting, drilling or self-drilling screw placement can adhere to the sheet surface and rapidly corrode, causing staining problems. The sheet durability is not affected provided the swarf particles have not penetrated the coating. Loose swarf must be removed without damage to the metal surface at least at the end of each day's work including swarf driven by wind up under barge or apron flashings.

Remaining adhered swarf may be best left alone, provided no particles have broken the coating surface and the visual effect is acceptable. Roofs with heavy deposits of swarf or where the coating has been broken may require the affected sheets to be replaced.

It is best trade practice to clean up after each day's work to avoid swarf damage.

## General Appearance

Screw fasteners should be installed to a straight line (staggered for lapped purlins). Extra care on wall cladding is required to achieve this. Flashings should run parallel with profile ribs or the building line.

Sheet side laps should not exhibit excessive gaps, which can be controlled by careful sheet layout and side lap stitching if necessary.

## Water Ponding

The installed roof and flashings must not exhibit water ponding. Buckling of profile pans caused by poorly formed lip downturns at gutter lines is a particular area of potential ponding that should be checked.

## Sealants

Only neutral cure silicone sealants should be used. All sealed joints must be mechanically fastened, and excess sealant removed to prevent unnecessary dirt build-up.

Joints in flashings or roof plane intersections should not be constructed in a way that relies entirely on sealant to remain weather secure. Sealant should only be used to seal between two metal surfaces, not fill holes or gaps.

## Cleaning on Completion

All forms of debris must be removed daily from the roof surface to prevent scratching damage and moisture or dirt retention. On completion the roof should be thoroughly washed down and then inspected for any damage and any necessary remedial work carried out.

## Strippable Film

Protective films must be removed within 1 day of product installation. Prolonged UV exposure will make removal difficult. The film must be removed from laps and under flashings during installation.

## Scratches and Touch-up

Scratches that have not penetrated to the base metal (on coated materials) and minor surface abrasions should be left alone, as touch up painting will become obvious in time.

Sheets with heavy scratch damage (e.g. scratches readily visible from a 3 metre distance that expose the base metal) should be replaced.

## Buckled Ribs

Minor buckles that have occurred in profile ribs and will not retain water can be left alone. More severe buckles that will retain water or weaken the sheet should be pushed out from underneath, or be capped over with a rib section extending a minimum 50mm beyond the damaged section, fully sealed with silicone sealant and held onto the roofing rib with 4mm diameter blind aluminium rivets each side.

Major buckles that affect more than 1/4 of the ribs in line across any sheet will cause a severe loss of strength, and in such cases the sheet must be replaced, e.g. if more than 2 adjacent ribs are buckled on the same purlin line, the sheet's ability to hold load is reduced and it must be replaced.