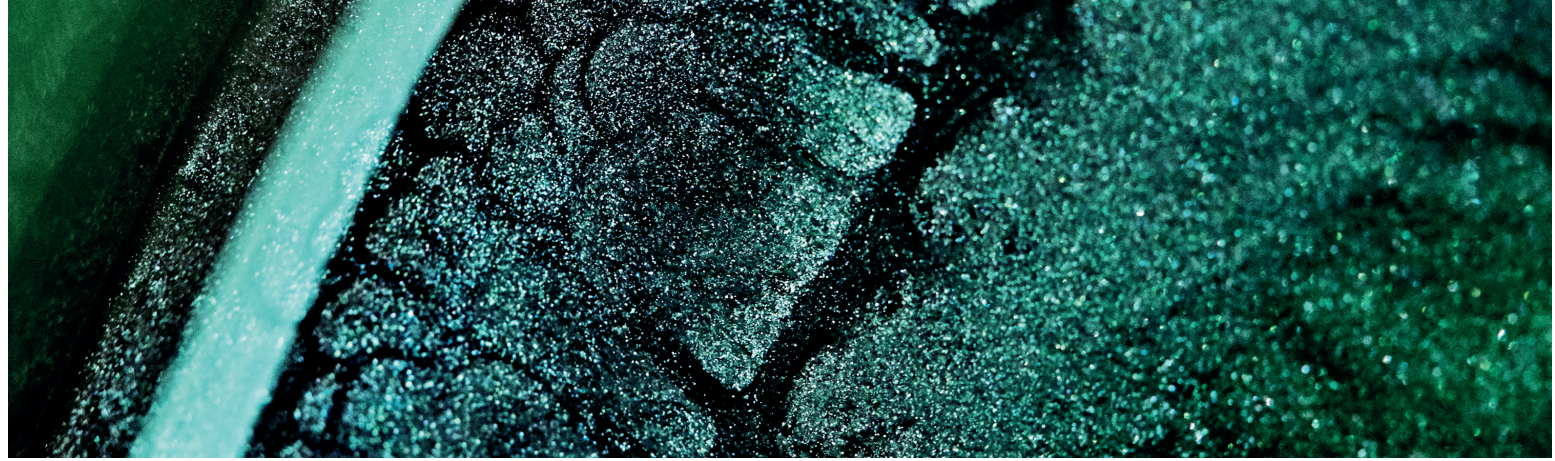




# Design Considerations



## Design with the elements in mind

As New Zealanders, we're more than a little used to climatic extremes, particularly those of us who live in very severe marine zones. Please see the Environmental Categories Brochure for definitions of what constitutes a very severe environment.

In these areas, salt spray can produce highly corrosive conditions that, if not allowed for, can have a detrimental effect on the ongoing appearance and resilience of a building.

Now, with the ever-increasing use of coated, profiled steel in both roofing and cladding, it has never been more important to focus on appropriate design and installation where those atmospheric contaminants most commonly occur.

This is especially relevant where the cladding is not regularly washed by rain, such as underneath eaves.

### STICK TO THE SPECS

It is vital to follow the manufacturers installation specifications as closely as possible.

When the roofing profile is specified, the roofing manufacturer will provide a fastening pattern recommendation. Each profile will have a designated fixing type, either penetrating fasteners, like nails or self-drilling screws, or clip-type fastenings. The most appropriate product should be selected for the local environment.

The use of coated steel fasteners appropriate for the conditions are recommended in severe marine environments. The life of these fasteners, like the coated steel roofing or cladding, is directly related to the level of washing. Fasteners which are subject to a build-up of salt through infrequent washing will have a reduced life. Stainless steel fasteners are not compatible with zinc/aluminium coated steel-based products.

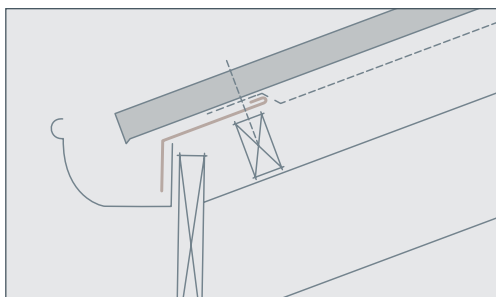


Figure 1 – Apron flashing (shown as dark red line).

Galvanised clips used for clip fastened profiles are also subject to the build-up of salt and atmospheric dust. To lessen the impact of airborne salt, the use of pre-formed, profiled, closed cell foam sealers is essential to prevent the salt from entering

the roof cavity. The galvanised clips, particularly those nearest to the gutter line, should have additional protection through the application of a primer and a marine topcoat. The positioning of the fascia and gutter will also influence the amount of air entering the roof cavity and should be installed using an apron flashing as shown in the NZMRM Code of Practice 5.3.5.4 (see figure 1).

The roof pitch, orientation to the prevailing wind, as well as the type and positioning of the gutters will all impact on the life of the roof.

### KEEP IT CLEAN

Regular and thorough maintenance by simple washing down is an essential requirement where metal roofs and wall claddings are used close to the sea. The option of alternative cladding materials in areas not regularly washed by rain should be seriously considered, particularly where maintenance is infrequent.

Refer to New Zealand Steel's Environmental Categories Guide for recommendations on the correct products and maintenance requirements for use in coastal locations.

## Additional Considerations

### THE BUILDING DESIGN SHOULD TAKE INTO ACCOUNT THESE KEY POINTS:

- Location and orientation of the building in relation to the prevailing wind and the sea
- Steel roofing and cladding material
  - Product specified
  - Profile
  - Fastener specified
  - Positioning of the gutter
  - Flashing designs for windows and doors
- Ease of maintenance
  - Extent of overhang
  - Areas not washed by rain
  - Soffit material and ability to access for cleaning

### EXPANSION ALLOWANCE AND TEMPERATURE

All roofing and cladding is subject to expansion and contraction due to temperature extremes. This is particularly evident with darker colours and long spans where the expansion may be as much as 8mm for a 10 metre sheet. Fixing systems must allow for expansion and accommodate the longitudinal movement which results.

## Typical Roof Temperatures (summer average, calm conditions)

	Insulated	Uninsulated
Light Colours (eg Titania)*	60°C	50°C
Medium Colours (eg Mist Green)	80°C	70°C
Dark Colours (eg Karaka)	90°C	75°C

## Typical Roof Expansions (based on 0.01mm/m/°C)

	8 Metre Run	12 Metre Run	18 Metre Run
Light Colours*	5mm	7mm	11mm
Medium Colours	6mm	10mm	14mm
Dark Colours	7mm	11mm	17mm

\*Light Colours include ZINCALUME® steel material

### FLUES – DOMESTIC/INDUSTRIAL

Natural gas, wood, coal or oil-fired heaters generate high levels of sulphur compounds. When vented over a roof, particularly in damp conditions, sulphuric acid forms which will lead to premature corrosion of the roof, guttering and downpipes.

#### DESIGN GUIDE:

- Design the height of the flue to allow combustion by-products to be dissipated.
- Specify a COLORSTEEL® product designed for very severe environments.
- Ensure that heaters are run as efficiently as possible to allow complete combustion.
- Regularly wash the roof to remove contaminants.

### FOOT TRAFFIC ON ROOFS

Repeated foot traffic and the dragging of maintenance or cleaning equipment, may damage the roof which will reduce its life expectancy.

#### DESIGN GUIDE:

- Design and install catwalks and platforms over the roof where necessary.
- Aluminium or galvanised steel catwalks are recommended.
- Design catwalks and platforms so as not to create an unwashed or ponding area on the roof.
- Timber catwalks and platforms may cause preferential corrosion of underlying roof.

### FUME EXTRACTORS AND VENTS

Corrosive dust and particles can be released through roof vents and discharged onto the roof surface. The immediate area of the roof adjacent to the vent is then at increased risk of corrosion.

#### DESIGN GUIDE:

- Install filter elements to contain hazardous material.
- Specify a COLORSTEEL® product designed for very severe environments to be installed adjacent to the vent.
- Consider applying a suitable protective coating to the affected area of the roof.
- Maintain coal or oil fired boilers or incinerators so that they do not discharge high sulphur levels over the roof surface.
- Regularly wash the roof to remove contaminants.

### UNWASHED AREAS

Every effort must be made during the design of the building to eliminate or minimise sheltered or overhanging areas. Consideration should be given during the design stage to ensure the underside of ZINCALUME® steel and COLORSTEEL® is enclosed and therefore not exposed to the environment. Where unwashed areas cannot be designed out, specify regular washing of these areas as part of an ongoing maintenance programme. Refer to the Maintenance Recommendations Brochure.

- Design consideration for easy access must be given to areas that require regular maintenance.
- Inspect profile bends to ensure that there are no microcracks in the finished product.

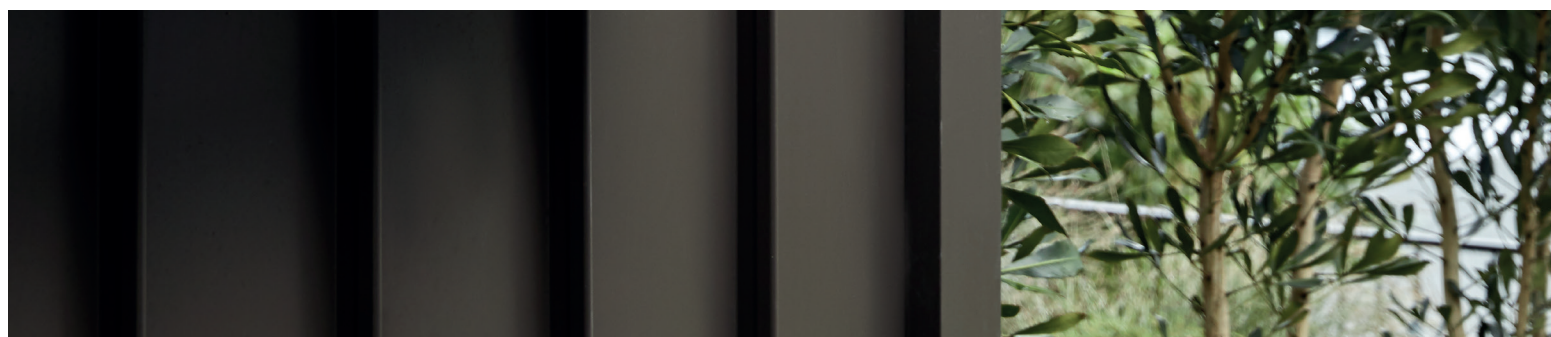
### ADEQUATE PITCH

The New Zealand Building Code provides an Acceptable Solution to the problem of roof pitch. The pitch figures shown in paragraph 8.4.5 of Acceptable Solution E2/AS1 are reproduced, in part, below for your convenience. Refer specific enquiries to the Profile Manufacturer who may have an Alternative Solution.

### ROOF PITCH REQUIREMENTS

Product	Minimum Pitch	
	Sheet Length	
For profiled metal roof cladding (without end laps)	≤18m	> 18m
Corrugated	≥ 8°	Refer manufacturer
Trapezoidal (where the crest height is less than 27mm)	≥ 4°	Refer manufacturer
Trapezoidal (where the crest height is 27mm or higher)	≥ 3°	Refer manufacturer
Trough profile	≥ 3°	Refer manufacturer

Note: Where manufacturers have more stringent requirements, these should be followed to optimise performance and to avoid invalidating guarantees.



For more information about COLORSTEEL® products  
call **0800 697 833** or visit **colorsteel.co.nz**

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