

CORRUGATE

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PROFILE TECHNICAL SUMMARY

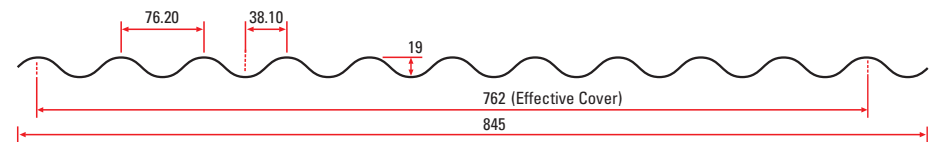
Corrugate lap



(All dimensions are nominal and in mm.)

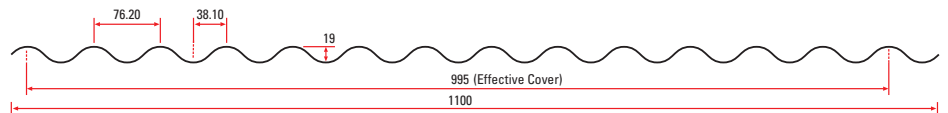
Corrugate 762 (Standard)

Dimensioned Drawing of Corrugate



Corrugate 995

Dimensioned Drawing of Wide Corrugate



Minimum Pitch

The minimum roof pitch for Corrugate is 8 degrees (approx 1:7) and if end lapped 10 degrees (approx 1:6).

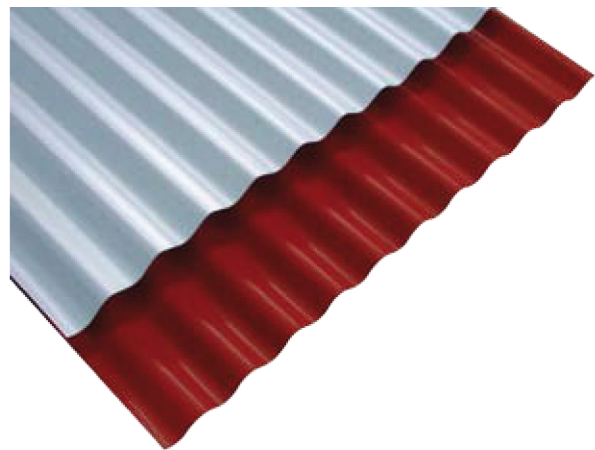
When a combination of sheets provide a run of in excess of 40 metres and up to 60 metres the roof pitch should be increased by 1 degree. Longer lengths require specific design.

When rainfall intensity exceeds 100mm/hour the minimum pitches need to be increased by a further 1 degree for every 10 metres of run over 40 metres

The building design pitch may need to be higher to take into account any cumulative deflections of the frame, purlin and roof sheeting or penetrations.

For curved roofing the roof cladding must **not** terminate at a pitch lower than permitted above.

Side laps of curved sheets must be sealed to any areas below the minimum pitches permitted above.



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- Manufactured custom cut to length subject to transport and site limitations.
- Sheet lengths in excess of 28 metres require specialised transportation.
- Maximum recommended sheet lengths for **Aluminium** is 10-12 metres for dark coloured and 12-15 metres for plain and light coloured. Refer to Roof Expansions Provisions of this summary.
- As sheet lengths increase higher transportation costs may be applicable.
- Sheet lengths for pre-curved material are subject to handling and transport limitations.

Information Table

Substrate Material	Steel		Aluminium	
	.40mm BMT	.55mm BMT	.70mm BMT	.90mm BMT
Aprox weight per lineal metre for substrate material (kg/lm)	3.2	4.27	1.84	2.37
Purlin Spacings -General	Refer to separate section.		Refer to separate section.	
Unsupported Overhang (mm) ¹	150	150	100	150
Drape Curved Roof -Minimum Radius (m)	12	10	12	10
Purlin Spacings for Curved Roofs				
-Intermediate (mm)	900	1200	800	1200
-End (mm)	600	800	550	800
Precurved Roof				
-Minimum Radius (mm)	N/R ²	300	300	300
-Recommended Minimum Radius (mm)	N/R ²	400	400	400

¹ Not suitable for roof access without additional support ² N/R - Not recommended

This technical data sheet is for steel and aluminium based substrates. Corrugate can also be manufactured in other metals such as copper or titanium zinc. Refer to Roofing Industries.

Specification

Refer to our Full Specification on Masterspec, our website, and our Selection Guide.

Building Design / Performance Criteria / Product Selection

During the design of buildings, it is necessary for the designer to take into account a number of issues to ensure that the most appropriate roofing and cladding product is chosen.

Whilst aesthetics and product availability do play a part, the chosen profile must meet certain performance criteria. These are centred around the profile's ability to shed water from the roof and the ability of the product to span purlin and girt spacings and meet design criteria. The minimum pitch for this profile is outlined elsewhere within this literature.

In terms of purlin spans and girt spacing it is necessary to follow due process.

If a building is being designed and constructed in full accordance with E2/AS1 and roofing and cladding products as covered by that document are chosen, then it is necessary for the design spans and fixing methodology to comply with those of E2/AS1. However E2/AS1 states that the use of the manufacturers information may provide a more optimum spacing of fixings, and this is recommended by Roofing Industries.

Further where a building is outside of the scope of E2/AS1 and the building or parts thereof are of specific design then it is necessary for the roofing and cladding to be suitable for the design and vice versa.

Loadings referred to in Roofing Industries graphs are the result of testing to a serviceability limit state which is more conservative than an ultimate limit state as quoted by some manufacturers.

Our Design Graphs are presented in a form to allow the designer to select suitable products and purlin spacings.

For most roof installations the purlin spacings will be limited by the trafficable limitations of the profile or the structural design. It is then necessary for the designer to calculate the design wind load for the roofing and cladding in accordance with generally acceptable practice, by reference to AS/NZS 1170.2:2011 and/or NZS 3604:2011.

For a fuller explanation of this refer to the NZ Metal Roof and Wall Cladding Code of Practice. This result should be referenced to the Wind Load Span Design Graphs.

The purlin spacings should be limited to the lower of the trafficable limitations and design wind load with the capacity of the structure being greater than the design load for the application. However for roofs that are not able to be walked on and for wall cladding applications, the trafficable limitations may be exceeded providing the design wind loading criteria is met. However this should be done with caution as it may require considerable extra secondary fasteners within the laps.

The designer should always take into account in areas of heavy roof traffic, snow loadings, or where the roofing supports such items as air conditioning units, purlin spacing should be reduced accordingly. Consideration also needs to be given to limitations of purlin spacings for any translucent sheeting.

Reference should be made to the notes in the graphs.

It is our recommendation that for commercial and industrial roofing applications that .55mm BMT steel or .90mm BMT Aluminium is used as it has more resilience to damage particularly by other trades.

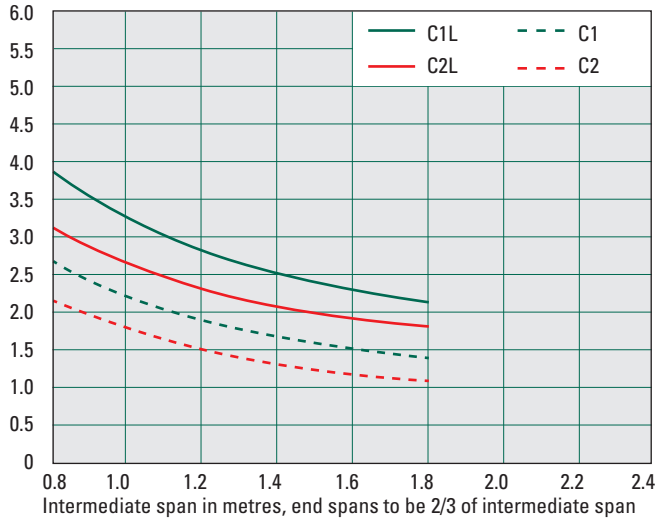
Underlay as per the project specifications should be used.

With an aluminium substrate steel netting should not be used where it may be in contact (either directly or through underlay degradation) with the aluminium roofing or cladding. Alternative material such as polypropylene strapping should be used where support is required, or the cladding separated from the underlay by a high density polystyrene batten or Thermakraft Drainage Matt or similar, and the use of an aluminium gutter flashing. This is also applicable to coated metal and zinc roofing in severe marine applications. As corrugated has a minimum pitch of 8°, self supporting paper (without the use of netting or other support) can generally be used, and in any case self supporting paper is recommended even when support is required, in the above situations.

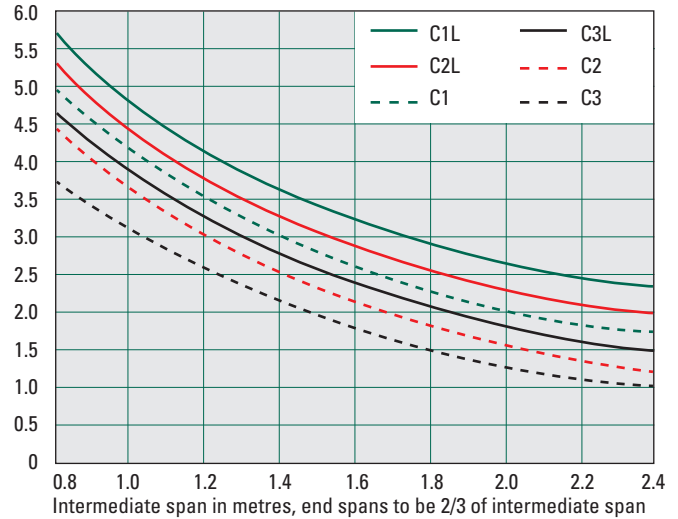
WIND LOAD SPAN DESIGN GRAPH

Roofing - Steel Based Material

kPa **.40 Steel G550 High Strength**



kPa **.55 Steel G550 High Strength.**



C1L, C2L, C1, C3L, C2 and C3 represent alternative primary fixing methods

Testing confirms that .70mm Aluminium has similar results to .40mm Steel and that .90mm Aluminium has similar results to .55mm Steel and is adjusted for practical application. Aluminium requires load spreading washers and EPDM washers at all times.

For compliance with NZ Metal Roof and Wall Cladding Code of Practice.

Primary Fixing Methods*

Roofing Application

- C1L Fix side laps and every 2nd crest with approved screws and load spreading profiled metal washers and EPDM washers.
- C2L Fix side laps and miss 1, hit 1, miss 2, hit 1, miss 1, hit 1, miss 2 etc with approved screws and load spreading profiled metal washers and EPDM washers. End purlins and periphery of roof to be fixed every 2nd crest.
- C1 Fix side laps and every 2nd crest with approved fasteners alone.
- C3L Fix side laps and miss 2, hit 1, miss 3, hit 1, miss 2 etc with approved screws and load spreading profile metal washers and EPDM washers. End purlins and periphery of roof to be fixed every 2nd crest.
- C2 Fix side laps and miss 1, hit 1, miss 2, hit 1, miss 1, hit 1, miss 2 etc with approved fasteners alone. End purlins and periphery of roof to be fixed every 2nd crest.
- C3 Fix side laps and miss 2, hit 1, miss 3, hit 1, miss 2 etc with approved fasteners alone. End purlins and periphery of roof to be fixed every 2nd crest.

* Note - Compliance with E2/AS1 is dependent on purlin spacing and gauge of roofing. See section on Purlin/Girt Spacing Limitations and Recommendations.

Drape Curved Roofing

The first two purlins at each end of the sheet in drape curving situations should, in all cases, be fixed using profile metal washers and EPDM washers with the balance of the roof fixed as above.

Primary Fixing Methods**

Wall Cladding Application

Fix in the pan adjacent to every side lap over rib and every 2nd pan, and at all external and internal corners.
(No metal washer required)

Wall Cladding Wind Load Span

Pan fixed wall cladding can be assumed to have a wind load design at least equivalent to C1L from the above graphs.

** Note - Compliance with E2/AS1 is dependent on girt spacing and gauge of cladding. See section on Purlin/Girt Spacing Limitations and Recommendations.

To be read in conjunction with Roof Expansion Provisions

PURLIN/GIRT SPACING LIMITATIONS AND RECOMMENDATIONS

Dimensions in metres

Section 1. For compliance with E2/AS1		Fixing Patterns (Refer to section on Primary Fixing Methods)						Aluminium H36	
		Steel Based Material			Aluminium H36			.70mm BMT	.90mm BMT
		.40mm BMT			.55mm BMT				
End Span	Intermediate Span	Windzone			Windzone				
		Low & Med	High & Very High	Extra High	Low & Med	High & Very High	Extra High		
0.4	0.6	C2	C2	C2	C3	C3	C3	Refer to manufacturers recommendation.	
0.6	0.9	C2	C2	C1	C3	C3	C3		
0.8	1.2	C2	C1	C1	C3	C3	C3		
1.15	1.6	N/A	N/A	N/A	C3	C3	C2		

N/A - Not applicable

Section 2.

Manufacturers recommendation in accordance with NZ Metal Roof and Wall Cladding Code of Practice (When compliance with E2/AS1 not required)

		Steel Based Material			Aluminium H36	
		.40mm BMT	.55mm BMT	.70mm BMT	.90mm BMT	
Restricted Access Roof (Type 2B) (Where walking is permitted within 300mm of the purlin line or over 2 crests)	Intermediate	1.200	1.600	0.800	1.200	
	End	0.800	1.100	0.550	0.800	
Unrestricted Access Roof (Type 2A) (Where walking is permitted anywhere on the roof cladding)	Intermediate	N/R*	1.200	N/R*	0.900	
	End	N/R*	0.800	N/R*	0.600	
Non Accessible Roof and Wall Cladding (Type 3)	Intermediate	1.600	2.400	1.500	2.100	
	End	1.100	1.600	1.000	1.400	
Maximum Recommended Purlin Spacing for standard roof (See notes below)	Intermediate	0.900	1.500	0.800	1.200	
	End	0.600	1.000	0.550	0.800	
Wind Design Load using fixing method C2 (minimum) as an example at these purlin spacings from the Wind Load Span Design Graphs	Intermediate	1.9kPa	2.3kPa	1.9kPa	2.3kPa	
	End	2.5kPa	3.6kPa	2.5kPa	3.6kPa	

* Not recommended

Classification Types are from the NZ Metal Roof and Wall Cladding Code of Practice.

For other than compliance with E2/AS1 purlin spacing limitations to be read in conjunction with Wind Load Span Design Graphs.

In areas of heavy traffic purlin spacing should be reduced accordingly.

For curved roofing refer to Information Table.

When self supporting paper is preferred to be used (without any support) purlin spacings must be limited to a maximum of 1.200 mtr centres for vertically run underlay and 1.150 mtr centres for horizontally run underlay. This is particularly relevant with aluminium and /or severe marine environments for the reasons designated under Building Design/Performance/Product Selection part of this document.

Snow Loads

When the possibility of snow exists it is necessary to allow for the extra imposed snow loads by increasing the strength of the structure, and/or minimising the build up of snow, and this is generally achieved by increasing the roof pitch by allowing easier shedding of the snow or otherwise as the designer determines.

The objective is to simplify rather complex loading patterns while remaining adequately cautious. The design loads should take account of drifting snow due to wind, but wind loads are not required to be combined with snow loads.

As snow loads are uniformly distributed loads they are similar to wind loads.

Snow loadings are not required to be taken into account for the North Island of New Zealand north of a line drawn from Opotiki to Turangi and New Plymouth.

However for other areas snow loadings may need to be taken into account dependent on the area and altitude of the proposed project. A fuller reference including a map and chart is available from the NZ Metal Roofing Roof and Wall Cladding Code of Practice Section 3.5.

PRIMARY FIXING CHART

Roofing - Crest fixed (To be read in conjunction with Roof Expansion Provisions and Load Span Design Graphs)

	Wood Purlins	Steel Purlins or girts up to 1.5mm	Steel Purlins or girts 1.5-4.5mm	Steel Purlins or girts 4.5-12mm	Washers (When required)
Steel Based Material	12-11x50 Class 4 Type 17 Woodteks or Roofzips with neos or 60mm weatherseal nails	12-14x45 Class 4 Steelteks with neos or 12x50 Roofzips with neos	12-14x45 Class 4 Steelteks with neos	12-24x 50 Class 4 Series 500 Steelteks with neos	Corrugated load spreading profile Metal and 30mm EPDM
Aluminium Based Material	14-11x55 Alutite with bonded washer with Corrugate load spreading profile Ali washer & 30mm EPDM	Stainless steel grade 304, 14-14x70 Steelteks and bonded washers through a 10mm dia. clearance hole with Corrugate load spreading profile Ali washer & 30mm EPDM	Stainless steel grade 304, 14-14x70 Steelteks and bonded washer through a 10mm dia. clearance hole with Corrugate load spreading profile Ali washer & 30mm EPDM	Fabco stainless steel grade 304, 14-14x70 Type B screw and bonded washer through a 10mm dia clearance hole with Corrugate load spreading profile Ali washer and 30mm EPDM	Corrugate load spreading profile Ali and 30mm EPDM

Wall Cladding - Pan fixed

	Wood Purlins	Steel Purlins or girts up to 1.5mm	Steel Purlins or girts 1.5-4.5mm	Steel Purlins or girts 4.5-12mm	Washers (When required)
Steel Based Material Direct fixed	12-11x40 Class 4 Type 17 Woodteks with neos	12-14x20 Class 4 Steelteks with neos	12-14x20 Class 4 Steelteks with neos	12-24x32 Class 4 Steelteks Series 500 with neos	
Steel Based Material 20mm Cavity	12-11x50 Class 4 Type 17 Woodteks or Roofzips with neos	12-14x45 Class 4 Steelteks with neos or 12x50 Roofzips with neos	12-14x45 Class 4 Steelteks with neos	12-24x50 Class 4 Steelteks Series 500 with neos	
Aluminium Based Material Direct Fixed	12-11x35 Alutite with bonded washer	Stainless steel grade 304, 14-14x25 Steelteks and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	Stainless steel grade 304, 14-14x25 Steelteks and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	Fabco stainless steel grade 304, 14-14x20 Type B screw and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	19mm bonded Ali washer
Aluminium Based Material 20mm Cavity	12-14x55 Alutite with bonded washer	Stainless steel grade 304, 14-14x70 Steelteks and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	Stainless steel grade 304, 14-14x70 Steelteks and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	Fabco stainless steel grade 304, 14-14x70 Type B screw and bonded washer through a 10mm diameter clearance hole with 19mm bonded Ali washer	19mm bonded Ali washer

Note: All primary fasteners to have a minimum embedment into structural timber of 30mm. Adjust fastener length for both timber and steel fixings when necessary for battens etc. When using load spreading profile washers for roofing fix ridging, roof flashings etc. using a 25mm Aluminium embossed washer and appropriate screw.

Secondary Fasteners (To be used in accordance with the NZ Metal Roof and Wall Cladding Code of Practice.)

These should be:

- Aluminium Blind Rivets AS5-3 x 4mm minimum (Residential)
- Aluminium Blind Rivets AS 6-3 x 4.8mm minimum (Commercial)
- Aluminium Bulb-tite Rivets
- 12-11x35 Alutites
- 12-11x25 Class 4 Type 17 Woodteks (Steel based material only)

ROOF EXPANSION PROVISIONS

Fix with recommended fasteners and systems from the Primary Fixing Chart and additionally allow for the following where applicable.

Steel Based Material				
E2/AS1 Compliance				
Sheet Lengths	Up to 8 metres	>8-12 metres	>12-18 metres	>18 metres
	No special provision	Lower 50 % of the roof should be fixed using oversize holes at fastening points with approved load spreading profile washer, and 30mm EPDM washers		Not Applicable
NZ Metal Roof and Wall Cladding Code of Practice Compliance				
Sheet Lengths	Up to 15 metres	>15-18 metres	>18-24 metres	>24-30 metres
Zincalume and light colours in Favourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	No special provision	No special provision except screws are recommended	No special provision except screws are recommended	Solid fix using screws from the ridge down 24 metres and oversize holes should be used for the remainder of the sheet with approved load spreading profile washers, and 30mm EPDM washers
Dark Colours in Favourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	No special provision	No special provision except screws are recommended	Solid fix using screws from the ridge down 18 metres and oversize holes should be used for the remainder of the sheet with approved load spreading profile washers, and 30mm EPDM washers	Not recommended*
Zincalume and light colours in Unfavourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	No special provision	No special provision except screws are recommended	Solid fix using screws from the ridge down 18 metres and oversize holes should be used for the remainder of the sheet with approved load spreading profile washers, and 30mm EPDM washers. *Maximum recommended sheet length is 25 metres	
Dark Colours in Unfavourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	No special provision	Solid fix using screws from the ridge down 15 metres and oversize holes should be used for the remainder of the sheet with approved load spreading profile washers, and 30mm EPDM washers.		* Not recommended over 25 metres

For sheet lengths in excess of the above a step joint or other special provision for expansion is required. Refer to Roofing Industries.

When using load spreading profile washers for roofing fix ridding, roof flashings etc. using a 25mm Aluminium embossed washer and appropriate screw.

Oversize holes should be 3mm greater diameter than the screw or as per the Primary Fixing Chart for stainless steel screws.

For further information on the fixing of Corrugated refer to E2/AS1 of the NZ Building Code and NZ Metal Roof and Wall Cladding Code of Practice, www.metalroofing.org.nz

These publications along with the foregoing technical data should form the basis of the design and installation of metal roofing and cladding

Also refer to our suite of detail drawings, and to NZ Steel Ltd and Pacific Coilcoaters literature.

ROOF EXPANSION PROVISIONS

Fix with recommended fasteners and systems from the Primary Fixing Chart and additionally allow for the following where applicable.

Aluminium				
Sheet Lengths	Up to 10 metres	10-12 metres	12-15 metres	>15 metres
Plain Aluminium & lighter colours in Favourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	Fix using oversize holes with screws and approved load spreading profile Ali washers, and 30mm EPDM washers			Not recommended
Dark Coloured Aluminium in Favourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	Fix using oversize holes with screws and approved load spreading profile Ali washers, and 30mm EPDM washers		Not recommended	
Plain Aluminium & lighter colours in Unfavourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	Fix using oversize holes with screws and approved load spreading profile Ali washers, and 30mm EPDM washers		Not recommended	
Dark Coloured Aluminium in Unfavourable Installations (Refer NZMRM C.O.P. Section 4.1.6)	Fix using oversize holes with screws and approved load spreading profile Ali washers, and 30mm EPDM washers.	Not recommended		

For sheet lengths in excess of the above a step joint or other special provision for expansion is required. Refer to Roofing Industries.

When using load spreading profile washers for roofing fix ridding, roof flashings etc. using a 25mm Aluminium embossed washer and appropriate screw.

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