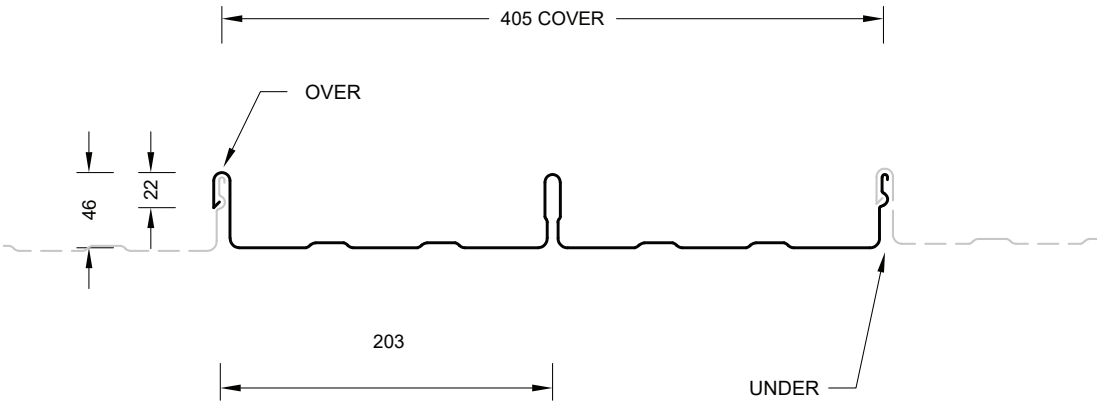
DIMOND DD400® (DIMONDEK)

PRODUCT TECHNICAL STATEMENT



Dimondek® 400 adds architectural interest to your roof, with its broad angular ribs and wide pans it brings modern styling to your roof. The concealed fix system provides a strong clean finish with no visible fixings. Ideally suited for modern contemporary homes, DD400 is the ultimate bold statement in roofs.

SHEET TOLERENCES

Cover: ± 5mm - Sheet length: +10mm, -0mm (steel)

Cover: +10mm, -15mm – Sheet length: +0mm, -15mm (aluminium)

RECOMMENDED PRODUCT/DESIGN USE

- **Minimum Pitch:** 3 degrees
- **Cover (mm):** 405mm
- **Applications:** Residential / Industrial / Commercial Roofing and Wall Cladding
- **Materials:** Specified coating and material based on environmental conditions in accordance with E2/AS1. Available in metallic coated and pre-painted steel in 0.40mm, 0.55mm and 0.75mm - Aluminium 0.90mm BMT (base material thickness). Matching translucent sheeting is available in G.R.P. (fibreglass)
- **Material Thickness:** Steel, 0.40mm, 0.55mm and 0.75mm – Aluminium 0.90mm
- **Colours:** Available in pre-painted ColorCote® ZinaCore™, MagnaFlow™ and MagnaFlow® COLORSTEEL® MAXAM™ and Altimate® Refer to www.colorcote.co.nz and www.colorsteel.co.nz.
- **Durability:** All material selections must be compatible with the prevailing environmental conditions and adjacent materials. Areas not naturally exposed to rain will require scheduled maintenance.

ENVIRONMENTAL PRODUCT DECLARATION

Dimond Roofing® has been implementing green building principles across the industry for several years now and has developed a fully realised environmental sustainability pathway to reach our goal of reducing our carbon emissions by 30% by 2030. Dimond Roofing® has met the criteria for “Level A” certification for the Global GreenTag™ GreenRate™ ecolabel and as part of Dimond’s Toitū carbonreduce® accreditation, essential Scope 1 & 2 emissions, are being measured as well as voluntarily measuring Scope 3 emissions.

Dimond Roofing® profiles are accredited with Eco Choice Aotearoa when manufactured from COLORSTEEL®. All manufacturing sites have been Audited by NZ Steel.

Dimond Roofing® recycle all steel scrap waste and offcuts which can then be remelted down and reused in other steel-based products. At the end of its useful life as a roofing profile can be recycled back by remelted down.

NEW ZEALAND BUILDING CODE COMPLIANCE

When used in accordance with Dimond Roofing installation and maintenance requirements, facilitate with meeting the following provisions of the NZBC:

- **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (c) (g) (h), B1.3.4 (b) and (d)
- **B2 Durability:** Performance clauses B2.3.1(b) and (c)
- **C3 Fire affecting areas beyond the fire source:** Performance clauses C3.4(a) and C3.9
- **E2 External moisture:** Performance clauses E2.3.1 and E2.3.2
- **F2 Hazardous building materials:** Performance clause F2.3.1
- **G12 Water Supplies:** Performance clauses G12.3.1 and G12.3.2

To comply with the performance clauses of NZBC E2 all cladding to be installed in accordance with:

- Acceptable Solutions NZS E2/AS1 or an Acceptable Alternative Solution
- MZ Metal Roofing Manufacturers Code of Practice
- Dimond Roofing Specification; details available on www.dimond.co.nz

Dimond Roofing is not subject to any warning or ban under section 26 of the Building Act 2004.

MAINTENANCE

In general, NZ metal roofing materials exposed to rain washing can be expected to comply with NZBC B2 without manual washing, or replacement of protective finishes.

Areas not directly exposed to rain, such as soffits, wall cladding under eaves, the undersides of gutters, fascia's, and sheltered areas like garage doors, will require scheduled maintenance.

Refer to ColorCote® Minimum Maintenance Schedule and COLORSTEEL® Maintenance Recommendations Brochure.

MATERIAL CLADDING TESTING AND PREFORMANCE

All cladding testing is carried out in accordance with the NZMRM Code of Practice – Testing and MRM Standards.

Material Options	Steel			Aluminium H36	Copper*	Duraclad® (GRP)
Thickness (BMT) mm	0.40	0.55	0.75	0.90	0.55	1.7
Nominal Weight/lineal metre (kg/m)	N/A	2.77	3.73	1.48	2.99	0.96
Drape curved – min. radius (m)	N/A	70	70	70	70	18
(1) Purlin spacings for drape curving (m)	N/A	1.2	1.5	0.9	1.0	1.0
(2) Machine crimp curved - min. radius (mm)	N/A	N/A	N/A	N/A	N/A	N/A
(3) Unsupported Overhang (mm)	N/A	250	300	200	200	150

*Dimondek 400 is available in copper ex Auckland only, subject to coil availability

(1) Recommended maximum purlin spacings at minimum radius
(2) N/A
(3) Based on 1.1kN point load support, but not intended for roof access
N/R – Not recommended
N/A – Not available.

Roll-forming facility location: Auckland, Hamilton, Wellington and Christchurch
Crimp curving facility location: N/A
Manufacturing location for DuraClad®: Auckland
Sheet lengths: Dimondek® is custom run to order.

Where long sheets are used consideration must be given to:

- Special transportation licences for sheets over 25m
- Site access for special lifting equipment
- Fixing techniques to accommodate thermal expansion.

DIMONDEK® 400 LIMIT STATE LOAD / SPAN CAPACITY CHART

(span in mm, distributed serviceability loads in kPa)

Serviceability Category		Unrestricted-Access Roof		Restricted Access Roof			Non-Access Roof & Wall	
G550 Steel 0.55mm	End Span	600	800		900	1100	1100	1400
	Internal Span	900	1200		1300	1600	1700	2100
	Ultimate[5]	**2.0**	**1.7**		**1.6**	**1.4**	**1.3**	**1.0**
G300 Steel 0.75mm	End Span	800	1000	1100	1300	1500	1500	
	Internal Span	1200	1500	1600	1900	2200	2300	
	Ultimate[5]	**2.0**	**1.8**	**1.7**	**1.5**	**1.3**	**1.2**	
5052 H36 Aluminium 0.90mm	End Span	400	600		700	900	900	1100
	Internal Span	600	900		1000	1300	1400	1700
	Ultimate[5]	**2.7**	**2.1**		**1.9**	**1.6**	**1.5**	**1.0**
1/2 hard Copper 0.55mm	End Span		700		700	900	1000	
	Internal Span		1000		1100	1400	1500	
	Ultimate[5]		**1.9**		**1.8**	**1.5**	**1.4**	

Notes:

1. In Restricted Access Roof and Non-Access Roof & Wall applications, spans exceeding the maximum values shown should not be used. The maximum spans for Restricted Access Roofs are based on static point load testing as a guide and are further limited by practical experience of roof performance under dynamic foot traffic loads. For Non-Access Roof & Wall applications, the maximum spans are limited to ensure satisfactory appearance for wall cladding.
2. Loads given are based on clip fastening every rib at every purlin.
3. If design requirements exceed the loads given above, the push on Dimond wind clamps can be installed to double the wind uplift load.
4. N/R = not recommended.
5. For the purposes of serviceability design, the serviceability limit, limited by permanent rib deformation, occurs essentially at the same load as ultimate failure which is the point of disengagement of the roof with the clip.
6. End span capacities given in this table are based on the end span being 2:3 ratio of the internal span.
7. Design Criteria for Limit State Capacities

   a) Serviceability Limit State (SLS Design)
   No deflection or permanent distortion that would cause unacceptable appearance, side lap leakage or water ponding, due to foot traffic point loads, inward or outward wind loads or snow loads.

   b) Ultimate Limit State (ULS Design)
   No pull through of fixings or fastener withdrawal resulting in sheet detachment due to wind up-lift (outward) loads.
8. System Design
   The span capacity of the roofing or cladding profile is determined from the Load Span Table, using the section of the chart appropriate to the grade and type of material, and the category of serviceability selected from the two categories above. Ultimate limit state loads have been derived by testing according to NZMRM procedures.

   Note: The capacities given do not apply for cyclone wind conditions.

   Serviceability Requirements
   While these categories are provided for design guidance to meet the serviceability limit state criteria, foot traffic point load damage may still occur if point loads are placed carelessly.

   Service Category
   Refer to MRMCOP 3.7.4 Roof Traffic. The designer must consider the degree and type of foot traffic expected on a roof. The following requirements are subjective standards and must be considered in line with customer expectations, building use, and type. More robust design than specified below (such as reducing purlin spacing or adding protection from mechanical action) is required for roofs that are regularly accessed, used as staging by subsequent trades, or areas adjacent to access points, particularly step-down access.
9. Wind Pressure Guide
   As a guide for non-specific design the following S.L.S. design loads in accordance with the MRM Roofing Code of Practice can be used for buildings less than 10m high, otherwise AS/NZS 1170.2 should be used Low wind zone = 0.68kPa, Medium wind zone = 0.93kPa, High wind zone = 1.32kPa, Very high wind zone = 1.72kPa and Extra high wind zone = 2.09kPa.

DIMONDEK® 400 CLIP

Used to secure by pushing the profile down onto it until it clicks into place. The Dimondek® 400 is designed to fix over the previously laid male under rib and centre rib of the sheet to be laid.

Clip Material

Usually manufactured from either

1. As standard unpainted 1.15mm thick coil with galvanised coating to 275 g/m2
2. Coated for increased durability. Nylon coated over galvanised. Colour may vary between Bright blue or light grey depending on supply. During a salt fog test after 2000 hours this coat showed no sign of degradation. Must be used with Aluminum roofing
3. Other material, such as brass clips to suit a copper roof, can be manufactured to customer order. The brass is 1.2mm thick and is 1/2 hard brass.

FASTENERS

The durability of the fasteners should equal or exceed that of the material being fastened, and the fastener metal or coating must be compatible with the cladding material if in contact. Refer to NZS E2/AS1 table 20 for compatibility requirements.

The minimum embedment of 30mm is the requirement for screws fixing into timber and minimum of three threads to pass through steel. When fastening through cavity battens, thermal break materials etc ensure the length of the screw is increased to accommodate the extra material.

Common Fastener Lengths* – Roof Cladding			
Cladding Material	Timber Purlins (mm)	Steel Purlins/Girts up to 2.5mm (minimum 3 threads) (mm)	(1,2) Load Spreading Washers (LSW) (When required)
Steel	TT 10g x 45 Wafer head	ST 10g x 16 Wafer head	N/A
Aluminium (1,2)	TT 10g x 45 Wafer head	ST 10g x 30 Wafer head	N/A
Copper (3)	Refer to note.	N/A	N/A

*Class 5 fasteners are recommended with steel-based material
(1) – When using aluminium DD400 the steel clip requires to be nylon coated to avoid potential dissimilar metal contact
(2) – When using aluminium DD400 all screw heads must be coated with PA10 paint or similar before tray is installed
(3) – When using copper, brass clips to be used with silicone bronze nails or stainless steel
(4) – It is important to use a long shank driver for the screws

Common Fastener Lengths* – Wall Cladding		
Cladding Material	Timber Dwangs/Nogs (mm)	Steel Girts up to 2.5mm (mm)
Steel Direct fix	TT 10g x 45 Wafer head	ST 10g x 16 Wafer head
Steel On 20mm (nom.) Cavity Batten	TT 10g x 65 Wafer head	ST 12g x 45 Wafer head
Aluminium Direct fix	TT 10g x 45 Wafer head	ST 10g x 16 Wafer Head
Aluminium On 20mm (nom.) Cavity Batten	TT 10g x 65 Wafer head	ST 14g x 45 Wafer head

*Class 5 fasteners are recommended with steel-based material

Note: Use a minimum 75mm long driver to set the screw.

The Limit State Load / Span Capacity Chart is based on every rib being clip fastened to every purlin or girt.

DESIGN EXAMPLE

Restricted access roof, 0.55mm G300 steel Dimondek® 400 has a maximum end span of 1100mm and a maximum internal span of 1600mm. The following distributed load capacities apply.

End Span	1100mm
Internal Span	1600mm
Ultimate	1.4 kPa

DESIGN DETAILS

Design details covering residential & commercial roof & wall claddings are available at www.dimond.co.nz in PDF, DWG & RVT files under each product section.

PUBLICATIONS

To achieve the product's full potential, it must be designed, installed, and maintained in accordance with Good Trade Practice. For more information, please refer to:

NZS E2/AS1: www.building.govt.nz

NZMRM: New Zealand Metal Roofing and Wall Cladding Code of Practice – www.metalroofing.org.nz

NZMRM: Installation Guide – Metal Longrun Roofing and Cladding - www.metalroofing.org.nz

RANZ: How to Guides - www.ranz.co.nz

Pacific Coil Coaters: Choose the Right Roof www.colorcote.co.nz

Pacific Coil Coaters: Maintenance Schedule www.colorcote.co.nz

Pacific Coil Coaters: Environmental Product Declaration www.colorcote.co.nz

New Zealand Steel: Environmental Categories, Warranty & Product Maintenance Recommendations Brochure www.colorsteel.co.nz

New Zealand Steel: Maintenance Recommendations Bulletin - www.colorsteel.co.nz

New Zealand Steel: Installers Guide www.colorsteel.co.nz

BRANZ: Good Profiled Metal Roofing and Wall Cladding - www.branz.co.nz

MBIE: Guide to tolerances, materials and workmanship in new residential construction 2015 - www.mbie.govt.nz

THERMAL NOISE

All profiled metal roofs and wall cladding can produce thermal noise from time to time. This occurs as the roof expands and contracts due to temperature changes, with darker colours potentially increasing the noise. The NZMRM Code of Practice addresses this issue.

According to the MBIE's 2015 "Guide to Tolerances, Materials, and Workmanship in New Residential Construction," noise from metal roofing's thermal expansion is considered normal and should be expected.

OIL CANNING

Differential thermal movement between wide, flat surfaces and ribs or corners within a metal sheet can create a visual effect known as oil canning. This refers to the visible waviness or undulations in the flat sections of metal cladding, roofing, or walling. Oil canning is an inherent architectural characteristic of flat metal surfaces and is not indicative of any performance issues with the product.

It may occur during the forming and installation processes, as well as throughout the roof's lifecycle due to thermal expansion. The visibility of oil canning can vary depending on lighting conditions, sun angles, and the gloss level of the coating.

For more details, please refer to Section 12.4 of the New Zealand Metal Roof and Wall Cladding Code of Practice.

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