

RAINWATER DISPOSAL SYSTEM PERFORMANCE STATEMENT

(a) Description

Dimond rainwater disposal systems are available in a variety of materials together with the appropriate brackets and downpipes. Table 3.1A below summarises the gutter material options available.

Table 3.1A

Material	Grade	Thickness mm	Metal Coating	Prepaint Finish Available	Relevant Standard
Steel	G 250/300	0.55 BMT	Zinc/Aluminium/ Magnesium	Yes	AS 1397
Aluminium (plain)	5052 5251	0.9 BMT	N/A	Yes	AS 1734
Stainless Steel	445M2/304	0.55	N/A	No	AS1449
Copper	122A	0.55	N/A	No	AS2738

(b) Scope of Use

Dimond Rainwater Disposal Systems are intended to collect and channel water that runs off a roof. It is intended that the metal gutters be placed at the perimeter of the building, and not in an internal situation. Use of the products is subject to the limitations listed below.

(c) Requirements

Attention to the following details is required to ensure the expected system performance is achieved.

- The selection of the type and grade of gutter and bracket material and fasteners must be based on the life expectancy required and the severity of the external and internal environments. Refer Sections 2.1.1.2, 2.1.1.3, 2.1.1.4, 2.2.3.
- Site storage that keeps the product dry and protected from damage.
- Product handling that prevents surface damage.
- Correct installation of the brackets and gutter and snow straps.
- Allowance for thermal expansion and contraction.
- Sufficient fall to permit complete surface water drainage, allowing the gutter to completely dry out and not hold water.
- Control of allowable contact with dissimilar materials. Refer Section 2.1.3.3.
- Awareness and implementation of maintenance requirements, particularly for surfaces not washed by natural rainfall. Refer Section 2.1.1.3.

(d) NZBC Compliance

Test information available from Pacific Coilcoaters and BHP NZ Steel, and past history of rainwater products, indicate that provided the product use and maintenance is in line with the guidelines contained in the current literature referenced, Dimond Rainwater Disposal Systems can be expected to meet the performance criteria in Clause E2 of the New Zealand Building Code, for a period of not less than 5 years.

(e) Use Outside the Stated Guidelines

If the need arises to use Dimond Rainwater Disposal Systems outside the limitations and procedures given in this or other referenced literature, or, if any doubt exists on product handling or use, written approval for use must be obtained from Dimond, before the project commences.

DURABILITY, WARRANTY, MAINTENANCE

DURABILITY

Reference should be made to Section 2.1.1.2 Environments, to ensure the correct material for the environment is chosen. Coated brackets should be considered for use in severe and very severe marine environments. In snowfall areas refer to section 3.1.4.7.

WARRANTY

Warranties for commercial applications are issued on a job by job basis. It is imperative that care is taken during the planning process to choose the Dimond rainwater disposal system that will provide the life expectancy in the environment in which it will be installed, as incorrect selection could result in no warranty being available.

To assist you in determining the system that will best meet your warranty expectations Dimond have in place a Warranty Inquiry Service. Your design decisions on product type, paint coating type and colour, along with site details including address, distance from sea and degree of exposure will be required to enable us to provide a meaningful warranty. To access the service, please contact your Dimond Key Account person or phone 0800 DIMOND.

All warranties will carry a required maintenance clause, which must be complied with to ensure the warranty remains valid. Often aspects of design such as roof shape and roof pitch can influence the maintenance requirements. Due consideration of these factors during the design process is wise.

As a general guide, provided the materials are correctly selected from Section 2.1.1.2, Table 2.1B, and provided the building design does not impact on durability, it is reasonable to expect the following warranty terms will be available to your rainwater disposal system.

Steel and aluminium based materials

10 years to perforation of substrate.

5 years resistance to flaking, peeling and excessive fade.

MAINTENANCE

Dimond rainwater disposal systems require at least the following maintenance as a minimum to ensure the guaranteed performance is achieved. Additional regular maintenance can extend the useful life of the products. We define "regular" as often as is needed to avoid dirt build up on the gutter surface.

1. Keep surfaces clean and free from continuous contact with moisture and debris. The use of a proprietary leaf build-up protection system does not remove the need for regular gutter cleaning to remove any accumulated dirt and debris build-up on the roof or gutter.
2. Ensure that areas that are not washed by rainfall are cleaned regularly with water spray and/or if necessary by scrubbing with a soft nylon brush. This includes the foot of the internal brackets.
3. At the first sign of corrosion, the affected areas should be cleaned down, spot primed and then repainted to an appropriate paint manufacturer's recommendations.
4. Some fading of the surface coating will occur over time, making repainting necessary to retain aesthetic value.

INSTALLER PROGRAMME

Dimond rainwater disposal systems must be correctly selected, specified and installed if they are to meet their designed performance.

Correct system selection and specification will be achieved by following the design guidelines in this manual.

Correct system installation (including components used and workmanship) will be achieved by specifying the use of a Dimond recommended installer.

Correct system performance will be endorsed by requesting a Dimond inspection and written report on completed work that has been carried out by a Dimond recommended installer.

AREAS TO CHECK ON SITE

Gutters

- Materials compatible with environment and roofing material used
- Laps sealed and correctly fastened
- Sufficient fall provided to avoid ponding
- Thermal expansion accommodated where necessary
- Secondary means of water discharge to eliminate water overflow from gutter entering the building

Brackets

- Correct type and size to suit the gutter chosen
- Snow straps installed if in Snowfall Region

Fasteners

- Correct type and size to suit bracket and environment
- Fixings to resist wind uplift of gutter

Droppers and Downpipes

- Droppers to be positioned at lowest point of gutter run
- Correct downpipe size and placement to handle flow load of roof and gutter chosen

RAINWATER DISPOSAL SYSTEMS DESIGN

(a) Thermal Movement

For guidance on expansion rate of the various materials please refer to Section 2.1.3.4.

Where long runs of gutter unbroken by change of direction are planned, it is recommended that steel gutters should not exceed 18 metres and aluminium and copper gutters 12 metres, without the provision of thermal expansion joints to prevent distortion.

The most practical way to accommodate movement is through the use of rainheads which will allow the gutter to move freely at the discharge end. If downpipes are fitted directly to the sole of the gutter, saddle flashings will be required at the high points to accommodate separation of the gutter runs.

(b) Flow Capacity

A quick reference for catchment area per downpipe is available for the standard Dimond gutters – refer Section 3.1.4.1 to 3.1.4.7.

To confirm the suitability of a non-standard gutter to handle the expected rainfall it is necessary to determine the flow load likely from the roof, and the flow capacity of the anticipated gutter shape.

To determine flow load from roof:

$$\text{Design flow load (litres/minute)} \quad Q \quad = 1.67 \times A_C \times \frac{I}{100}$$

Where A_C = catchment area (m²) (this includes 1/2 the area of any vertical surface or the total area of any other roof that drains on to the catchment area)

I = Expected rainfall intensity for the geographical location (see Table 3.1B) (mm/hr)

To determine flow capacity of the gutter chosen:

$$\text{Flow capacity (litres/minute)} \quad Q_C \quad = .0016 \times A_e^{1.25}$$

Where A_e = Effective cross sectional area of the gutter (mm²)

These formulae are incorporated in Table 3.1C for use in the following design process.

The above formulae and Table 3.1C are for design of external gutters based on falls of at least 1:500 or greater. These formulae can be used for internal box gutters provided Q is factored down by

0.4 for no fall

0.5 for 1:500 fall

0.6 for 1:200 fall

This method then aligns itself with AS/NZS 3500 Part 3.

Design Process for Eaves Gutters

Where eaves gutters other than the standard Dimond range shown in Section 3.1.4.1 to 3.1.4.6 are preferred, you will need to confirm the performance of the gutter shape in relation to the location it will be used in, e.g. the area of roof the gutter shape can drain per downpipe. The following is a step by step guide to confirming the suitability of the gutter chosen.

1. Place downpipes at the preferred locations around the structure. No run of gutter from high point to outlet should exceed 18m. Downpipes should be placed with 2m of valley's discharging into the gutter. It is good practice to position the downpipe within 2m of internal or external corners.
2. Calculate the roof catchment area A_c (m²) for each downpipe. Divide the roof into sections, each section served with a length of gutter sloping from a high point to the outlet. Each section or gutter length is multiplied by the rafter length. If any vertical surface can drain onto the catchment area, add half the vertical surface area to the roof area you are calculating. Also add the total area of any upper roof discharging on to a lower roof.
3. Establish the rainfall intensity for the geographical location of the structure. The New Zealand Building Code Approved Document E1 Surface Water has determined two levels of rainfall intensity. Where an overflowing gutter can result in water entering a building, the rainfall intensity shall be based on a storm with a 2% probability of occurring annually (a 1 in 50 year storm). Otherwise the intensity shall be based on a storm with a 10% probability of occurring annually (a 1 in 10 year storm).

Table 3.1B shows the average intensity for some of the metropolitan centres in New Zealand. For a more precise value contact should be made with the Plumbing and Drainage section of the relevant Territorial Authority.

Table 3.1B

Rainfall Intensity I (mm/hr)		
	10 year period	50 year period
Kaitaia	110	150
Keri Keri	115	155
Whangarei	140	180
Auckland	110	150
Hamilton	105	160
Tauranga	140	200
Rotorua	145	190
New Plymouth	110	175
Napier/ Hastings	75	125
Palmerston North	80	125
Wellington	70	100
Nelson	95	145
Blenheim	55	75
Christchurch	60	90
Timaru	55	90
Tekapo	50	75
Dunedin	70	100
Greymouth	105	145
Gore	65	110
Invercargil	60	100

The intensity is based on a 10 minute duration extrapolated to determine the theoretical amount over 1 hour.

Figures derived from statistical data supplied by NIWA 2018.

4. Enter Table 3.1C on the catchment area line and extend across to the rain intensity column. This will provide the effective cross sectional area your proposed gutter will need to have. Interpolate between columns if necessary.
5. The flow capacity limit for each of the standard Dimond gutters is indicated in Table 3.1C by a stepped line. Select the appropriate Dimond gutter and refer to Sections 3.1.4.1 to 3.1.4.9 from the detailed design information.

Table 3.1C Effective Cross Section of Gutter A_e (mm²)

Catchment Area Per Downpipe A_c (m ²)	Rainfall Intensity I (mm/hr)									
	40	60	80	100	120	140	160	180	200	
20	1370	1900	2390	2860	3300	3740	4160	4570	4970	125 Quad Deep Quad Quad SI
25	1640	2270	2860	3410	3950	4470	4970	5460	5940	
30	1900	2630	3300	3950	4570	5170	5750	6320	6880	Box 125
35	2150	2970	3740	4470	5170	5850	6510	7150	7780	
40	2390	3300	4160	4970	5750	6510	7240	7960	8660	Box 125
50	2860	3950	4970	5940	6880	7780	8660	9510	10350	
60	3300	4570	5750	6880	7960	9000	10020	11010	11980	Box 125
70	3740	5170	6510	7780	9000	10180	11330	12450	13550	
80	4160	5750	7240	8660	10020	11330	12610	13860	15070	200 Half Round
90	4570	6320	7960	9510	11010	12450	13860	15230	16560	
100	4970	6880	8660	10350	11980	13550	15070	16560	18020	Box 175
120	5750	7960	10020	11980	13860	15670	17440	19170	20850	
140	6510	9000	11330	13550	15680	17730	19730	21680	23590	Box 175
160	7240	10020	12610	15070	17440	19730	21960	24130	26250	
180	7960	11010	13860	16560	19170	21680	24130	26510	28840	Box 175
200	8660	11980	15070	18020	20850	23590	26250	28840	31380	
250	10350	14320	18020	21540	24930	28200	31380	34480	37510	Box 300
300	11980	16560	20850	24930	28840	32630	36300	39890	43400	
350	13550	18740	23590	28200	32630	36910	41070	45130	49100	Box 300
400	15070	20850	26250	31380	36300	41070	45700	50210	54630	
500	18020	24930	31380	37510	43400	49100	54630	60030		Box 300
600	20850	28840	36300	43400	50210	56800	63210			
700	23590	32630	41070	49100	56800	64260				Box 300

6. If a custom made shape is required, choose your shape and set the dimensions to achieve the effective cross sectional area (A_e) of the gutter required by Table 3.1C using the following formula:

$$\text{Effective cross sectional area } (A_e) = 0.9 \times W \times D$$

Where

W = the average width measured at half the depth (mm)

D = depth (mm)

Once D is established to achieve A_e , it is recommended a free board allowance of at least 10mm is added. Be sure to determine that it is possible to manufacture the gutter shape that you choose. Phone 0800 DIMOND (0800 346 663).

7. Determine downpipe size. As a general rule for eaves gutters the downpipe sizes can be calculated as follows.

For circular downpipes:

The cross-sectional area should be one half the cross-sectional area of the gutter.

For rectangular downpipes:

The cross-sectional area should be one half the cross-sectional area of the gutter plus 10%.

Note: No downpipe shall be smaller than:

Circular downpipe 63mm (nominal available size is 80mm dia)

Rectangular downpipe have a cross-sectional area of not less than 3250mm², and where the smallest dimension is at least 50mm.

Ensure that the downpipe size can be accommodated within the sole of the gutter.

Where rainheads and sumps are used both internal or external more accurate sizing of downpipes are achieved using AS/NZS 3500 Part 3.2.

(c) Overflow

Gutter and downpipe systems must be designed to accommodate any overflows that may result in water entering the structure, regardless of where the blockage occurs.

One option for eaves gutters is to ensure the top of the fascia board or cladding finishes above the top edge of the back of the gutter, including at the high point. A gap should be created between the fascia/cladding and the back of the gutter. This provides a continuous emergency overflow regardless of where the blockage occurs.

For rainheads and sumps care must be taken to ensure the capacity of the overflow is equal to or greater than the designed flow capacity of the downpipe. In many situations the head of water above the downpipe effectively increases its performance, whereas an overflow of equal dimension to the downpipe has a slower flow capacity.

(d) Design Guidelines for Box Gutters

Below is a simple outline of the main points to consider when designing an internal box gutter.

Box gutters should be of sufficient structural strength to accommodate foot traffic and have a width that provides safe passageway (300mm plus allowance for overhang of roofing material).

The recommended minimum slope for any box gutter is 1:200.

Where steel is being considered to form the lining of box gutters, care must be taken to ensure easy inspection, maintenance and replacement is available. In most instances it is prudent to consider other materials such as rubberised membrane, copper or zinc as the relatively maintenance-free long term performance of these materials provide a more cost effective option over the life of the structure.

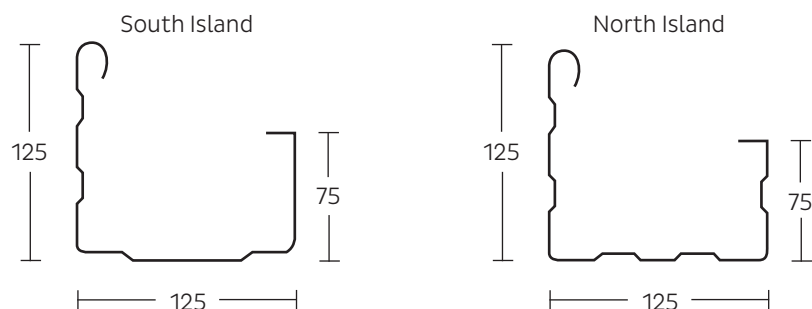
It is recommended that all box gutters discharge into a rainhead or sump, the depth of which can be chosen so as to permit the use of a downpipe of convenient size (the deeper the head of water above the outlet, the smaller the downpipe will need to be). The width of the rainhead or sump must be equal to or larger than the sole of the gutter.

All rainheads or sumps must have overflow systems designed to accommodate the water flow that is likely from the catchment area in the most intense rainfall for the geographical location.

An effective way to create an overflow in a rainhead is to set the front 25mm below the sole of the gutter. This will allow the water to weir over the front should the downpipe become blocked.

Where the gutter discharges into a sump positioned within a building, sufficient attention must be paid to the design of the overflow to ensure that the water flow from the catchment area is accommodated at all times. The depth of the rainhead or sump will determine the size of the downpipe required. This is due to the pressure that can be formed by the head of water above the outlet. However, the overflow system will most likely not have the head of water above it therefore it may need to be bigger than the main downpipe. The overflow drainage system must be capable of carrying all the water to the outside of the building as the overflow system will be activated only when the normal outlet is blocked.

BOX 125



All dimensions given are nominal.

Effective cross sectional area (with 15mm free board)	7500mm ²
Flow capacity	112 litres/min
Minimum recommended fall	1:500 = 2mm in 1m
Minimum downpipe	Circular 70mm Rectangular min. cross sectional area of 4125mm ² , smallest dimension at least 50mm.

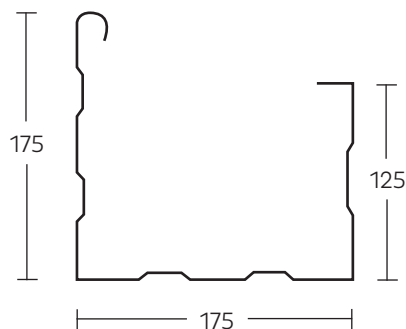
Catchment area per downpipe based on the above flow capacity is given in Table 3.1G. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1G

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	168	134	111	96	84	75	67	56	48	42	37	33

Material options including thickness and grade	Steel 0.55mm G300 Aluminium 0.90mm H34 Copper 0.55mm 1/2 hard Stainless steel refer Dimond
Roll-forming facility	Auckland, Christchurch (Note: all Dimond branches can fold gutter shapes with swages patterns to be confirmed at time of order) (1)
Gutter bracket material and thickness	Internal Galvanised 1.15mm External Hot dipped galvanised 3mm x 32mm Aluminium 5mm x 30mm Brass 3mm x 30mm Stainless steel 3mm x 30mm
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible).
Bracket Centres	Aluminium 450mm Internal - 600mm External
Recommended fixings	Screw fastenings to suit substrate.

(1) Internal brackets are not recommended with folded gutter without a 4mm diameter aluminium rivet fixing through the gutter and bracket.

BOX 175

All dimensions given are nominal.

Effective cross sectional area (with 15mm free board)	19,250mm ²	
Flow capacity	363 litres/min	
Minimum recommended fall	1:500	= 2mm in 1m
Minimum downpipe	Circular	115mm
	Rectangular	min. cross sectional area of 10,600mm ²

Catchment area per downpipe based on the above flow capacity is given in Table 3.1H. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1H

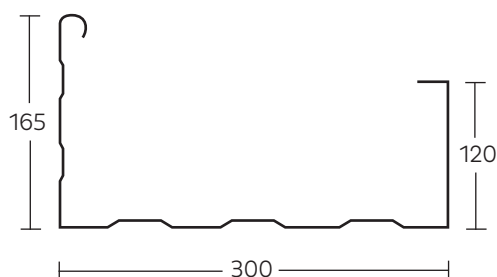
Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	545	435	360	310	270	240	220	180	155	135	120	110

Material options including thickness and grade	Steel	0.55mm G300	
	Aluminium	0.90mm H34 offered in folded shape only	
	Stainless steel	refer Dimond	
Roll-forming facility	Hamilton (Note: all Dimond branches can fold gutter shapes with swages patterns to be confirmed at time of order) (2)		
Gutter bracket material and thickness	Internal (1)	Galvsteel	1.55mm
	External	Hot dipped galvanised	5mm x 30mm
		Aluminium	7mm x 30mm
		Stainless steel	5mm x 30mm
Recommended maximum spacings	900mm (refer section 3.1.4.7 for recommended spacings where snow fall is possible). Aluminium: 600mm		
Recommended fixings	Bolts or screw fastenings to be compatible with substrate and bracket material		

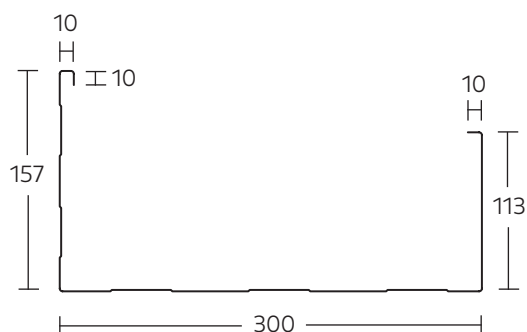
(1) Internal brackets are not recommended for use in areas that are subject to snow fall and/or wind above medium velocity (as determined by NZS 3604).

(2) Internal brackets are not recommended with folded gutter without a 4mm diameter aluminium rivet fixing through the gutter and bracket, it is better to use external brackets.

BOX 300



Roll formed shape



Folded shape (based on strip girth (g) of 600mm)

All dimensions given are nominal.

Effective cross sectional area (with 15mm free board)	33,550mm ² or 29,400mm ² (g = 600mm)	
Flow capacity	727 litres/min or 616 litres/min	
Minimum recommended fall	1:500	= 2mm in 1m
Minimum downpipe	Circular	150mm
	Rectangular	min. cross sectional area of 18,500mm ²

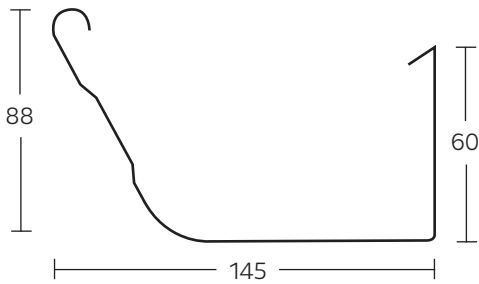
Catchment area per downpipe based on the above flow capacity is given in Table 3.1 I. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1 I

Roll formed shape												
Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	1090	870	725	620	545	485	435	360	310	270	240	215
Folded shape (based on strip girth of 600mm)												
Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	922	738	615	527	461	410	369	307	264	231	205	184

Material options including thickness and grade	Steel	0.55mm G300	
	Aluminium	0.90mm H34	
	Copper	0.55mm 1/2 hard	
	Stainless steel	refer Dimond	
Roll-forming facility	Hamilton (Note: all Dimond branches can fold gutter shapes) Dimensions may vary slightly from above. Check with your local Dimond branch.		
Gutter bracket material and thickness	External	Hot dipped galvanised	5mm x 50mm
		Aluminium	6mm x 38mm
		Stainless steel	5mm x 40mm
Recommended maximum spacings	600mm (refer section 3.1.4.7 for recommended spacings where snow fall is possible).		
Recommended fixings	Bolts or screw fastenings to be compatible with substrate and bracket material.		

DEEP QUAD



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	5435mm ²	
Flow capacity	75 litres/min	
Minimum recommended fall	1:500	= 2mm in 1m
Minimum downpipe	Circular	60mm
	Rectangular	min. cross sectional area of 2717mm ² , smallest dimension at least 50mm.

Catchment area per downpipe based on the above flow capacity is given in Table 3.1J. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

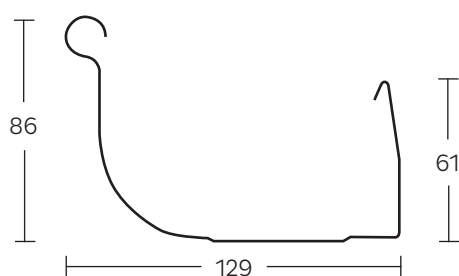
Table 3.1J

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	112	90	75	64	56	50	45	37	32	28	25	22

Material options including thickness and grade	Steel	0.55mm G300	
Roll-forming facility	Rotorua		
Gutter bracket material and thickness	Internal	Aluminium	2.0mm
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible).		
Recommended fixings	Screw fastenings to be compatible substrate and bracket material.		
Stop ends	Zinc cast stop ends are available powder coated to match fascia colour.		

*When using aluminium internal brackets the roofing may need to be 10mm longer into the gutter to accommodate correct roof overhang into gutter.

QUAD SI



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	5485mm ²
Flow capacity	75 litres/min
Minimum recommended fall	1:500 = 2mm in 1m
Minimum downpipe	Circular 60mm Rectangular min. cross sectional area of 2742mm ² , smallest dimension at least 50mm.

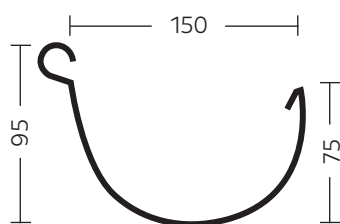
Catchment area per downpipe based on the above flow capacity is given in Table 3.1L. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1L

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	112	90	75	64	56	50	45	37	32	28	25	22

Material options including thickness and grade	Steel	0.55mm G300
Roll-forming facility	Christchurch	
Gutter bracket material and thickness	Internal	Galvanised 1.15mm
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible).	
Recommended fixings	Screw fastenings to be compatible with substrate and bracket material.	
Stop ends	Zinc cast stop ends are available powder coated to match fascia colour.	

150 HALF ROUND



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	6600mm ²
Flow capacity	95 litres/min
Minimum recommended fall	1:500 = 2mm in 1m
Minimum downpipe	Circular 80mm

Catchment area per downpipe based on the above flow capacity is given in Table 3.1M. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1M

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	142	114	95	81	71	63	57	47	40	36	32	28

Material options including thickness and grade	Steel	0.55mm G300
Roll-forming facility	Christchurch & Invercargill	Note: only available in the South Island
Gutter bracket material and thickness	External	Aluminium 4mm x 30mm
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible). Snow straps available.	
Recommended fixings	Screw fastenings to be compatible with substrate and bracket material avoiding dissimilar metal contact.	

GUTTER BRACKETS IN SNOWFALL AREAS

When installing gutters in areas subjected to snow fall in New Zealand, the gutter bracket spacings must be reduced and snow straps installed to take the increased snow weight that may be experienced during periods of snow fall to avoid damage to the gutter system.

This is a guide to the snow fall regions. Please refer to the standard AS/NZS 1170.3 for full details, available for purchase from www.standards.co.nz

	Sub Alpine Snow Region	Height above sea level (m)	Region description
North Island	N1	400 to 1200	South of a line from Opotiki to Turangi and across to New Plymouth
	N2	200 to 900	West of Southern Alps from Nelson to Milford Sound
South Island	N3	150 to 900	Nelson East to Cheviot
	N4	0 to 900	East of Southern Alps Cheviot to Moeraki into Omarama
	N5	0 to 900	South of Moeraki around to Milford Sound

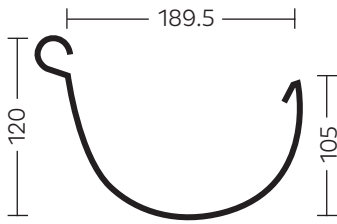
Note: Regions with a height above sea level great than shown above require specific design and are outside Dimond recommendations.

Dimond Gutter shape Type	Gutter Bracket	Maximum gutter bracket and snow strap spacing (mm) by Snow Region									
		N1		N2		N3		N4		N5	
		Gutter brackets	Snow straps	Gutter brackets	Snow straps	Gutter brackets	Snow straps	Gutter brackets	Snow straps	Gutter brackets	Snow straps
125 Quad	Internal	600	900	600	600	600	600	600	500	600	600
Deep Quad	Internal	600	900	600	600	600	600	600	500	600	600
Quad SI	Internal	600	900	600	600	600	600	600	500	600	600
Box 125	Internal	600	900	600	600	600	600	450	500	450	600
Box 125	External	900	900	600	600	600	600	450	500	600	600
Box 175	External	900	900	600	600	600	600	450	500	600	600
Box 300	External	600	900	600	600	600	600	450	500	600	600
150 Half Round	External	900	900	600	600	600	600	450	500	600	600
200 Half Round	External	900	900	600	600	600	600	450	500	600	600

Notes:

1. Based on an 8m maximum single roof run.
2. Situations where upper roofs allow snow to fall onto lower roofs are excluded and require specific design
3. Each Snow strap is fixed to roof and into purlins using 2x 12 gauge self drilling screws or M6 Roofzips
4. Each Snow strap is fixed to the gutter using 2x 4.8mm dia alum rivets minimum
5. Snow strap min sizing to be 0.55mm x 25mm
6. Formed snow straps are available for 125 Quad, 150 Half Round & 200 Half Round

200 HALF ROUND



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	14,200mm ²
Flow capacity	248 litres/min
Minimum recommended fall	1:500 = 2mm in 1m
Minimum downpipe	Circular 150mm

Catchment area per downpipe based on the above flow capacity is given in Table 3.1M. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

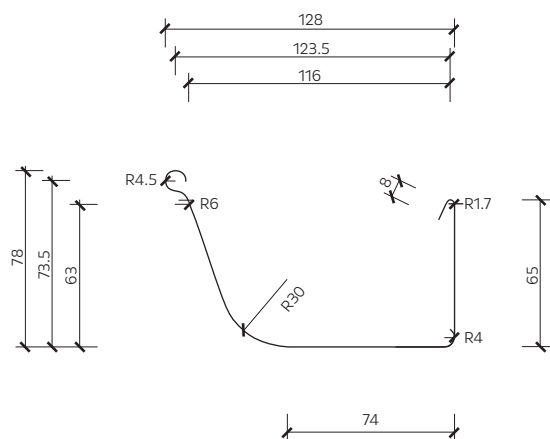
Table 3.1M

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	371	297	247	212	185	165	148	124	106	93	83	74

Material options including thickness and grade	Steel Copper	0.55mm G300 0.6mm Half hard
Manufacturing facility	Christchurch & Invercargill Note: only available in the South Island	
Maximum length	4.2m	
Gutter bracket material and thickness	External Powder coated in matching colour.	*Stainless steel 3mm x 30mm
	External	Brass 2.5mm or 3.0mm x 50mm wide (for use with copper gutter)
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible). Snow straps available.	
Recommended fixings	Screw fastenings to be compatible with substrate and bracket material avoiding dissimilar metal contact.	

***Note:** A PVC barrier tape must be placed between the inside of the bracket and the spouting.

125 QUAD



All dimensions given are nominal.

Effective cross sectional area (with 10mm free board)	5670mm ²	
Flow capacity	79 litres/min	
Minimum recommended fall	1:500	= 2mm in 1m
Minimum downpipe	Circular	80mm
	Rectangular	min. cross sectional area of 2835mm ² , smallest dimension at least 50mm.

Catchment area per downpipe based on the above flow capacity is given in Table 3.1J. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1J

Rainfall Intensity, I (mm/hr)	40	50	60	70	80	90	100	120	140	160	180	200
Catchment Area per downpipe A _c (m ²)	118	95	79	68	59	53	47	39	34	30	26	24

Material options including thickness and grade	Steel	0.55mm G300		
	Aluminium	0.70mm H34		
Manufacturing facility	Invercargill			
Gutter bracket material and thickness	Internal	ZINCALUME™	1.95mm	Q2
	External	Galvanised steel	2.0mm	Q4
Recommended maximum spacings	900mm spacing (refer section 3.1.4.7 for recommended spacings where snow fall is possible). Snow strap available.			
Recommended fixings	Screw fastenings to be compatible substrate and bracket material.			