(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

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

(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:

\[
Q = 1.67 \times A_c \times \frac{I}{100}
\]

Where
\[
A_c = \text{catchment area (m}^2\text{)} (\text{this includes } \frac{1}{2} \text{ the area of any vertical surface or the total area of any other roof that drains on to the catchment area})
\]

\[
I = \text{Expected rainfall intensity for the geographical location (see Table 3.1B) (mm/hr)}
\]

To determine flow capacity of the gutter chosen:

\[
Q_c = .0016 \times A_e^{1.25}
\]

Where
\[
A_e = \text{Effective cross sectional area of the gutter (mm}^2\text{)}
\]

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 $A_c$ (m$^2$) 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

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

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 $A_e$ (mm$^2$)

<table>
<thead>
<tr>
<th>Catchment Area Per Downpipe $A_c$ (m$^2$)</th>
<th>Rainfall Intensity $I$ (mm/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1370 1900 2390 2860 3300 3740 4160 4570 4970</td>
</tr>
<tr>
<td>25</td>
<td>1640 2270 2860 3410 3950 4470 4970 5460 5940</td>
</tr>
<tr>
<td>30</td>
<td>1900 2630 3300 3950 4570 5170 5750 6320 6880</td>
</tr>
<tr>
<td>35</td>
<td>2150 2970 3740 4470 5170 5850 6510 7150 7780</td>
</tr>
<tr>
<td>40</td>
<td>2390 3300 4160 4970 5750 6510 7240 7960 8660</td>
</tr>
<tr>
<td>50</td>
<td>2860 3950 4970 5940 6880 7780 8660 9510 10350</td>
</tr>
<tr>
<td>60</td>
<td>3300 4570 5750 6880 7960 9000 10020 11010 11980</td>
</tr>
<tr>
<td>70</td>
<td>3740 5170 6510 7780 9000 10180 11330 12450 13530</td>
</tr>
<tr>
<td>80</td>
<td>4160 5750 7240 8660 10020 11330 12610 13860 15070</td>
</tr>
<tr>
<td>90</td>
<td>4570 6320 7960 9510 11010 12450 13860 15230 16560</td>
</tr>
<tr>
<td>100</td>
<td>4970 6880 8660 10350 11980 13550 15070 16560 18020</td>
</tr>
<tr>
<td>120</td>
<td>5750 7960 10020 11980 13860 15670 17440 19170 20830</td>
</tr>
<tr>
<td>140</td>
<td>6510 9000 11330 13350 15640 17730 19730 21680 23590</td>
</tr>
<tr>
<td>160</td>
<td>7240 10020 12610 15070 17440 19730 21960 24130 26250</td>
</tr>
<tr>
<td>180</td>
<td>7960 11010 13860 16540 19170 21680 24130 26510 28840</td>
</tr>
<tr>
<td>200</td>
<td>8660 11980 15070 18020 20850 23590 26250 28840 31390</td>
</tr>
<tr>
<td>250</td>
<td>10350 14320 18020 21540 24930 28200 31380 34480 37510</td>
</tr>
<tr>
<td>300</td>
<td>11980 16560 20850 24930 28480 32630 36300 39990 43400</td>
</tr>
<tr>
<td>350</td>
<td>13550 18740 23590 28200 32630 36910 41070 45130 49100</td>
</tr>
<tr>
<td>400</td>
<td>15070 20850 26250 31380 36300 41070 45700 50210 54630</td>
</tr>
<tr>
<td>500</td>
<td>18020 24930 31380 37510 43400 49100 54630 60030</td>
</tr>
<tr>
<td>600</td>
<td>20850 28480 36300 43400 50210 56800 63210</td>
</tr>
<tr>
<td>700</td>
<td>23590 32630 41070 49100 56800 64260</td>
</tr>
</tbody>
</table>

June 2018
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:

\[
A_e = 0.9 \times W \times D
\]

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 3250mm\(^2\), 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.
Effective cross sectional area (with 15mm free board) 7500mm²

Flow capacity 112 litres/min

Minimum recommended fall 1:500 = 2mm in 1m

Minimum downpipe  
Circular 70mm  
Rectangular min. cross sectional area of 4125mm², 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

<table>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe A_c (m²)</td>
<td>168</td>
<td>134</td>
<td>111</td>
<td>96</td>
<td>84</td>
<td>75</td>
<td>67</td>
<td>56</td>
<td>48</td>
<td>42</td>
<td>37</td>
<td>33</td>
</tr>
</tbody>
</table>

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.
**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**

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

**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
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.
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. Use Table 3.1B (Section 3.1.4) to determine the Rainfall Intensity to be used.

Table 3.1 I

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

Material options including thickness and grade
- Steel 0.55mm G300
- Aluminium 0.90mm H34
- Copper 0.55mm ½ 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.

Dimond Roofing
Effective cross sectional area (with 10mm free board) 5435mm²
Flow capacity 75 litres/min
Minimum recommended fall 1:500 = 2mm in 1m
Minimum downpipe Circular 60mm
Rectangular min. cross sectional area of 2717mm², 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>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe A (m²)</td>
<td>112</td>
<td>90</td>
<td>75</td>
<td>64</td>
<td>56</td>
<td>50</td>
<td>45</td>
<td>37</td>
<td>32</td>
<td>28</td>
<td>25</td>
<td>22</td>
</tr>
</tbody>
</table>

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

Effective cross sectional area (with 10mm free board) 5485mm²
Flow capacity 75 litres/min
Minimum recommended fall 1:500 = 2mm in 1m
Minimum downpipe Circular 60mm
Rectangular min. cross sectional area of 2742mm², 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>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe A [m²]</td>
<td>112</td>
<td>90</td>
<td>75</td>
<td>64</td>
<td>56</td>
<td>50</td>
<td>45</td>
<td>37</td>
<td>32</td>
<td>28</td>
<td>25</td>
<td>22</td>
</tr>
</tbody>
</table>

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

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>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe $A_c$ (m$^2$)</td>
<td>142</td>
<td>114</td>
<td>95</td>
<td>81</td>
<td>71</td>
<td>63</td>
<td>57</td>
<td>47</td>
<td>40</td>
<td>36</td>
<td>32</td>
<td>28</td>
</tr>
</tbody>
</table>

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 3.1.7 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

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

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

<table>
<thead>
<tr>
<th>Dimond Gutter shape Type</th>
<th>Gutter Bracket</th>
<th>Maximum gutter bracket and snow strap spacing (mm) by Snow Region</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N1</td>
</tr>
<tr>
<td>125 Quad</td>
<td>Internal</td>
<td>600</td>
</tr>
<tr>
<td>Deep Quad</td>
<td>Internal</td>
<td>600</td>
</tr>
<tr>
<td>Quad SI</td>
<td>Internal</td>
<td>600</td>
</tr>
<tr>
<td>Box 125</td>
<td>Internal</td>
<td>600</td>
</tr>
<tr>
<td>Box 125</td>
<td>External</td>
<td>900</td>
</tr>
<tr>
<td>Box 175</td>
<td>External</td>
<td>900</td>
</tr>
<tr>
<td>Box 300</td>
<td>External</td>
<td>600</td>
</tr>
<tr>
<td>150 Half Round</td>
<td>External</td>
<td>900</td>
</tr>
<tr>
<td>200 Half Round</td>
<td>External</td>
<td>900</td>
</tr>
</tbody>
</table>

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 14,200mm²
(with 10mm free board)

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

<table>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe A (m²)</td>
<td>371</td>
<td>297</td>
<td>247</td>
<td>212</td>
<td>185</td>
<td>165</td>
<td>148</td>
<td>124</td>
<td>106</td>
<td>93</td>
<td>83</td>
<td>74</td>
</tr>
</tbody>
</table>

Material options including thickness and grade

Steel 0.55mm G300
Copper 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 *Stainless steel 3mm x 30mm
Powder coated in matching colour.
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.
Effective cross sectional area (with 10mm free board) 5670mm²
Flow capacity 79 litres/min
Minimum recommended fall 1:500 = 2mm in 1m
Minimum downpipe Circular 80mm
Rectangular min. cross sectional area of 2835mm², 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

<table>
<thead>
<tr>
<th>Rainfall Intensity, I (mm/hr)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Area per downpipe A_c (m²)</td>
<td>118</td>
<td>95</td>
<td>79</td>
<td>68</td>
<td>59</td>
<td>53</td>
<td>47</td>
<td>39</td>
<td>34</td>
<td>30</td>
<td>26</td>
<td>24</td>
</tr>
</tbody>
</table>

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.