What size of Marley spouting and downpipes do I need?

Whether it is a new build or existing property, the safe disposal of rainfall via an effective rainwater system aims to avoid the likelihood of damage or nuisance to both the property and its neighbours.

BRANZ Bulletin 509 Section 2.1.4 states that *"This is normally achieved in urban areas by collecting rainwater from the roof using gutters and downpipes connected to a surface water drain. This is then connected to a disposal system owned and operated by a network utility operator."*

However regions across New Zealand are subjected to varying levels of rainfall intensity which in turn affects the capacity required from spouting and the appropriate no of downpipes. The New Zealand Building Code requires that when designing a rainwater system you allow for a level of rainfall intensity that has a 10% chance of occurring once a year for 10 minutes. Exact rainfall intensities across NZ can be checked using the NIWA High Intensity Rainfall Design System – http://hirds.niwa.co.nz ; however for most areas in New Zealand 100mm/hr is a suitable rule of thumb.

The size and slope of the roof area also affects the required capacity with larger roofs capturing more rainwater and steeper pitches increasing the speed with which the rainwater drains into the gutter and downpipe system.

SELECTING THE RIGHT GUTTER

The gutter's key responsibility is to collect rainwater from the roof and safely transport the water to the outlets without overflowing.

The actual volume of water or 'flow capacity' (litres per min) to be collected for any given roof and location can be calculated by multiplying the roof area by the 'flow load factor' – different flow load factors are shown in the Table 1 for common rainfall intensities (excerpt from BRANZ Bulletin 509).

Once you know the required flow capacity you can work out the minimum gutter capacity or cross sectional area required and use this to select the right gutter.

TABLE 1. FLOW LOAD FACTORS FOR GIVEN RAINFALL INTENSITIES

Rainfall intensity (mm/hour)	Flow load factor l/m
50	0.83
75	1.25
100	1.67
125	2.08
150	2.50
175	2.92
200	3.33

It's important to note that your calculations should always be based on the size of the largest section of roof. This ensures the gutter will have sufficient capacity for all other smaller roof sections on the building.

Example 1: A 50m2 roof area in a location with a rainfall intensity of 100mm/hr.

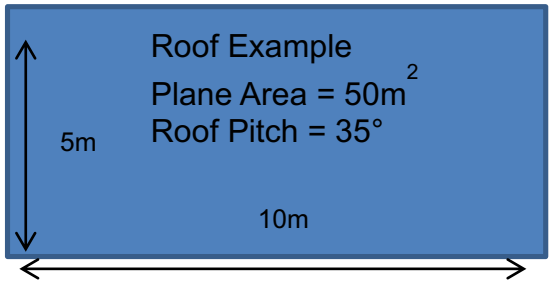
Flow Capacity = Roof Area x Flow Load Factor

Flow Capacity = 50 x 1.67 = 83.5l/min

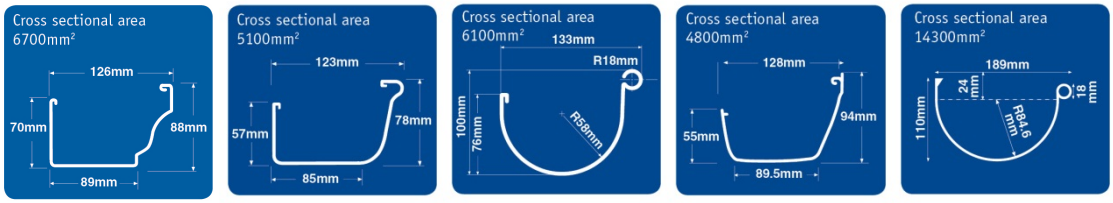
So the gutter and downpipe system has to be able to handle 83.5 litres of water per minute

Minimum Gutter Area in mm^2 = $(FC/0.0016)^{0.8}$

Min Gutter Area = (83.5/0.0016)0.8 = 5943.65mm^2



So which of the following Marley spouting profiles would be suitable?



Classic Stormcloud® Typhoon® FL2® Magnum®

Answer: Classic, Typhoon, Ovation and Magnum

However… the position of outlets affects the minimum gutter capacity. For example, a centrally located outlet halves the serviced roof area (example shown in Figure 3 from BRANZ Bulletin 509)

So based on this we could revise our example as follows:

Total Roof Area = 50m2

Serviced Roof Area = 25m2

Flow Capacity = 25 x 1.67 = 41.75l/min

Min Gutter Area = $(41.75/0.0016)^{0.8}$ = 3413.73mm^2

With a centrally located outlet all Marley spouting profiles could be used.

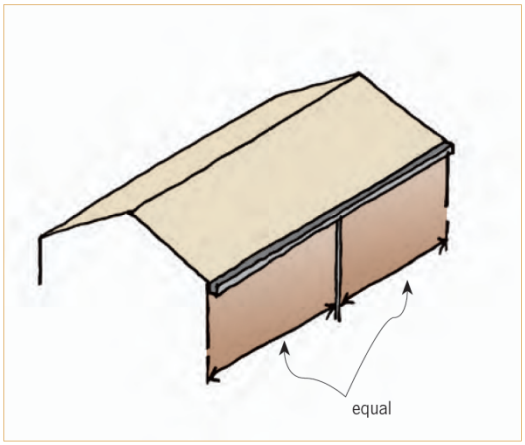


Figure 3. Centrally positioned outlet.

HOW MANY DOWNPIPES AND WHAT SIZE?

The downpipes are sized to suit the roof area as well as the roof pitch so that they are able to handle both the volume of rainwater and the speed.

Again using our original example and Table 2 (BRANZ Bulletin 509)

Roof Area = 50m^2

Roof Pitch = 35°

TABLE 2 – DOWNPIPE SIZES FOR GIVEN ROOF PITCH AND ROOF PLANE AREA
(Table 5 of E1/AS1 modified to incorporate roof plane area)

Downpipe size (mm) (1)	Roof pitch			
Minimum internal size	0 - 25°	25 - 35°	35 - 45°	45 - 55°
	Roof plane area served by the downpipe (m²)			
63 mm diameter	60	50	40	35
74 mm diameter	85	70	60	50
100 mm diameter	155	130	110	90
150 mm diameter	350	290	250	200
65 x 50 rectangular	60	50	40	35
100 x 50 rectangular	100	80	70	60
75 x 75 rectangular	110	90	80	65
100 x 75 rectangular	150	120	105	90

Note (1) This table increases the conservatism of the design by incorporating the slope factor and therefore the run-off rate when roof plane area is used.

Therefore options include:

- 1 x Marley RP80® 80mm Round Downpipe
- 1 x Marley 100x50mm Rectangular Downpipe
- 2 x Marley RP65® 65mm Round Downpipes
- 2 x Marley 65x50mm Rectangular Downpipe