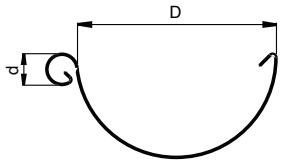
Simplifying the science – size guide

It is important that the sizes of gutters and pipes used in a rainwater system are selected with consideration of the size of the roof and the position of downpipes in order to ensure that typical rainfall does not cause the system to overflow.

All gutter systems in the UK should be designed to BS EN 12056-3:2000 Gravity drainage systems inside buildings. Roof drainage, layout and calculation (AMD 17041), 2000.

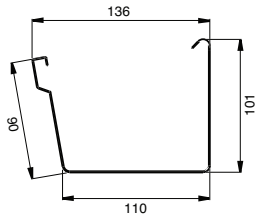
Rainline gutters are available in two shapes and five sizes. Half Round: 100mm, 125mm, 150mm, 190mm and Rectangular 136mm. Downpipes are available in four sizes: 75mm, 87mm, 100mm and 120mm.

Half round gutters (R)

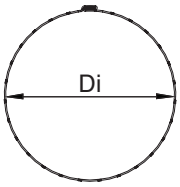


Size (mm)	D (mm)	d (mm)
100	107	17
125	123	17
150	155	17
190	192	22

Rectangular gutters (RER)



Downpipes (SROR)



Size (mm)	Di (mm)
75	75
87	87
100	100
120	120

Roof area

BS EN 12056-3:2000 requires that wind driven rain is taken into account when considering the effective catchment area. The standard assumes that rain falls at an angle of 2 units vertical to 1 unit horizontal which means that half the vertical height of any surface must be taken into account in calculations.

For a typical roof surface this means that the effective area is calculated from:

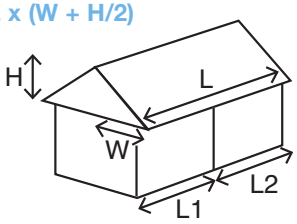
Effective area, AE (m2) = L x (W + H/2)

Where:

L= Roof length (m)

W= Eaves to ridge width (m)

H= Eaves to ridge height (m)



Flow capacities

In order to select the appropriate gutter and pipe size combination it is necessary to understand the flow rate required and the flow capacity of the system. The presence of corners in the gutter reduces the capacity, where this is applicable a 15% reduction should be assumed for calculations.

Flow rate is calculated from:

Flow rate (litres/second)

= Effective area x rainfall intensity

Flow capacities of the Rainline gutter-pipe size combinations are shown in the table below:

Flow capacity (l/s)

Gutter	Downpipe							
	Centre Outlet				End Outlet			
	75mm	87mm	100mm	120mm	75mm	87mm	100mm	120mm
Half Round 100mm	1.3	1.3	–	–	0.7	0.7	–	–
Half Round 125mm	1.6	2.0	2.0	–	0.9	0.9	0.9	–
Half Round 150mm	1.6	2.6	3.4	3.4	1.6	1.7	1.7	1.7
Half Round 190mm	–	–	3.7	6.5	–	–	3.3	3.3
Rectangular 136mm	1.6	2.6	3.3	–	1.6	2.4	2.4	–

Pipe position

The position of the pipe has a significant effect on the flow capacity of a rainwater system, this can be seen by comparing the flow capacities table for a gutter run with a centre outlet to the table for a gutter run with an end outlet.

A gutter ratio can be used in conjunction with the effective roof area to account for the required adjustment in system flow rate.

For a typical gutter run up to a maximum of 10m the ratio of gutter lengths is calculated from:

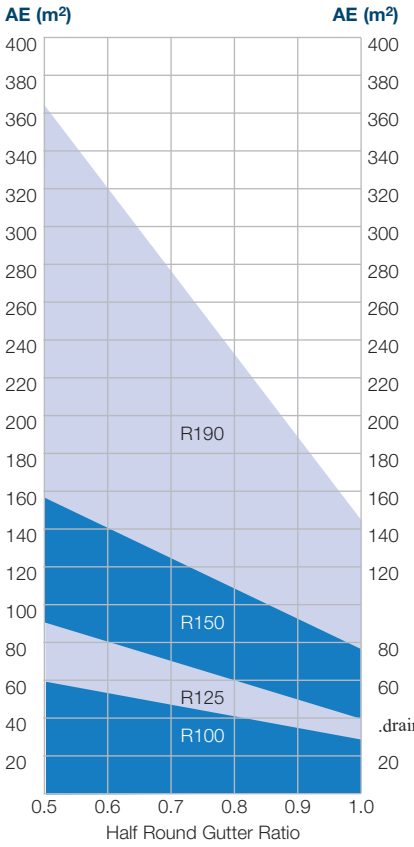
Gutter Ratio = L1 / (L1 +L2)

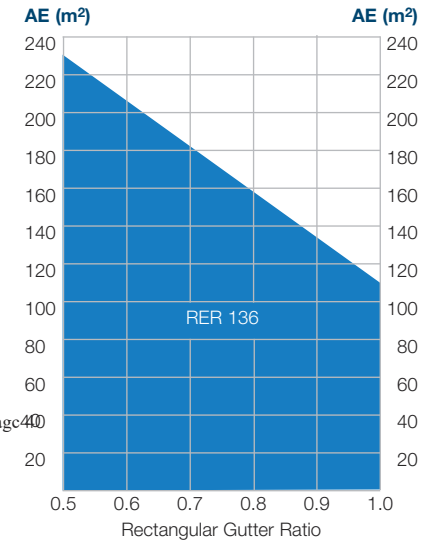
Where: L1 ≥ L2

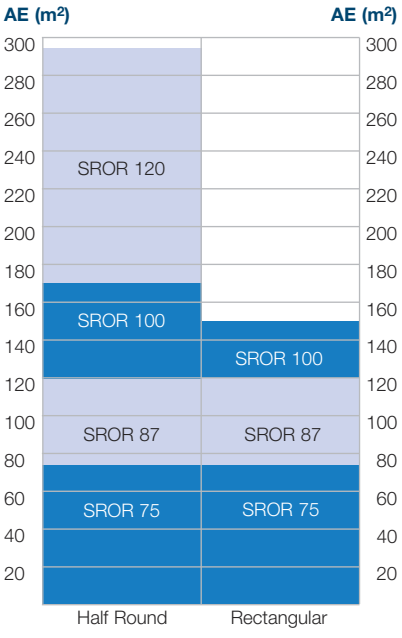
Selecting gutter size

There is no standard rate of rainfall in the UK so for accurate calculations refer to an approved weather authority to get a site-specific rainfall level. A worst case storm of 0.021 litres per second per square metre has been used in our calculations as recommended by British Standards..

The charts below allow effective area and gutter ratio to be used to choose the correct gutter and pipe size.
For gutter runs longer than 10m contact us for further advice.





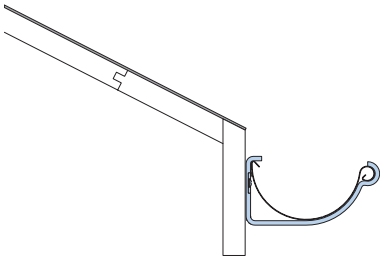


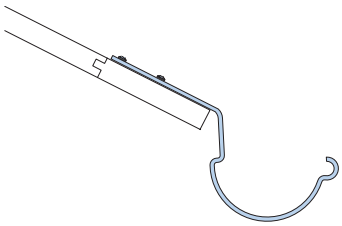
Understanding brackets

Roof construction type, stage of build and preferred method of installation can influence the type of bracket chosen for a project. The main bracket types are fascia brackets and rafter brackets.

Fascia bracket

Fascia brackets fix to a fascia board or directly to the wall of a building. Vertical fascia boards are most common in the UK however adjustable fascia brackets are available for use on angled fascia boards.





Rafter bracket

Rafter brackets are fixed directly to the roof rafters, typically on buildings with overhanging roof structures or with particularly uneven wall surfaces. Rafter bars can be twisted to enable side fixing where access to the top of the rafter is limited.

Rafter bars should be bent to the required angle based on the pitch of the roof, a KBO bracket bender can be used. Rafters can be twisted or bent for a charge of £2 per bracket.

Number of brackets

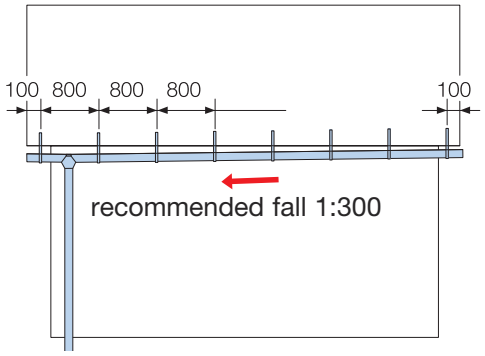
Brackets should be installed at 800mm centres. End brackets should be installed 100mm from roof edge.

To calculate how many brackets are required use the following formula:

No. of brackets = (L ÷ 0.8) +1 Where: L = length of run in metres

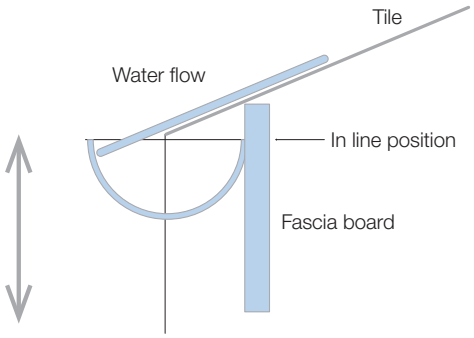
Bracket installation

Gutters should be installed so that the gutter falls towards the outlet dropping by 10mm over every 3m length, (a fall of 1:300). A single run should not exceed 10m.



In order to achieve the required slope install the lowest bracket first (next to the outlet) and then the highest bracket (at the opposite end of the gutter run). Pull a string between the two brackets, the string indicates the level that the other brackets should be fixed.

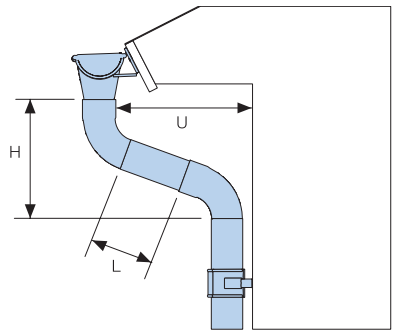
Where multiple downpipes are positioned along one gutter run the gutter should be installed with a high point between the pipes and sloping towards each outlet.



The front lip of the highest bracket should not be installed higher than the position horizontally in line with the roof edge. In areas with heavy snowfall the highest bracket should be installed lower.

Creating offsets

The roofline of a building, where the gutter is fitted, is commonly positioned away from the walls of the building. An offset arrangement is used to connect the outlet to a downpipe stack.



The measurement U is the projection of the offset. An SOKN one-piece offset is available with a fixed projection of 100mm.

For larger projections an offset can be created using pipe bends and a length of SROR pipe or an MST intermediate pipe cut down to the required length.

The table can be used to indicate the length of the pipe required to make the offset.

Bends at an angle of 70° are typically used to create offsets, 85°/90° bends may be preferred for very long projections however flow capacity will be reduced.

A BK conical bend should be used at the top of the offset. If the pipe used has a spigot bottom a BK conical bend should also be used at the bottom of the offset. If the pipe used does not have a spigot bottom a BM pipe bend with socket should be used at the bottom.

Intermediate pipe length at 70° bends

U mm	H mm	L mm
220	275	0
270	290	100
300	300	135
350	320	185
400	340	240
450	355	290
500	375	345
550	395	400
600	410	455
650	430	505
700	450	580
750	465	610
800	485	665
850	505	720
900	520	770
950	540	825
1000	555	880
1050	575	930
1100	595	985
1150	610	1040
1200	630	1090

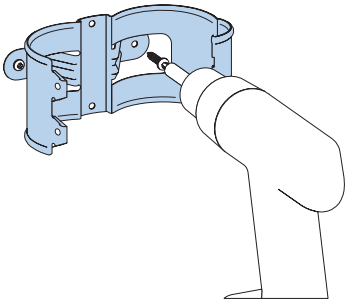
Pipe bracket installation

Pipe brackets should be installed at 1.5m centres. The highest pipe bracket should be installed 150mm from the offset or hopper head at the top of the pipe stack. A spirit level or plummet line can be used to align the other brackets.

Pipe brackets are typically installed using screw-to-wall fixing or drive-in fixing. Choice can be influenced by the construction type of the building, installer preferences or regional conventions.

Rainline SSVU universal pipe brackets can be installed using either fixing method and have a neat click lock mechanism. Unpainted Rainline systems use SVHA brackets for screw-to-wall fixing and SV brackets for drive-in fixing and have an easy to use wedge lock mechanism. Drive in spikes should be ordered separately.

Screw-to-wall fixing



Drive-in fixing