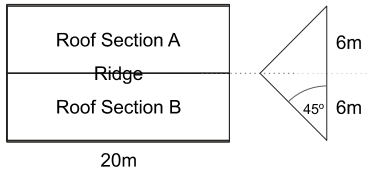
Schematic 1

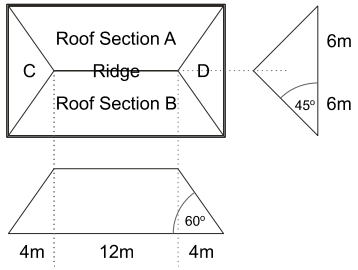


Schematic 1

Plan area of roof section A		= 120m²
Plan area of roof section B		= 120m²
Roof pitch multiplication factor for 45° pitch		= 1.5
Roof section A effective roof area		= 180m² each roof section
Flow rate		= 0.02 x 180 = 3.5 litres per second per roof section

If only one end downpipe is proposed then in this instance we would recommend that only Large Ogee or Large Box Guttering can be used. If one central downpipe or two end downpipes are proposed then any of the gutter profiles can be used except small box.

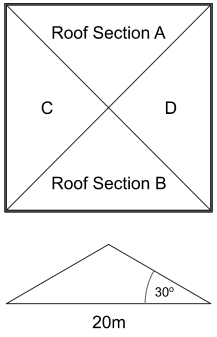
Schematic 2



Schematic 2

Plan area of roof section A	72m² + 24m²	= 96m²
Plan area of roof section B	72m² + 24m²	= 96m²
Roof pitch multiplication factor for 45° pitch		= 1.5
Roof sections A & B effective roof area		= 144m² each roof section
Flow rate		= 0.02 x 144 = 2.88 litres per second per roof section
Plan area of roof section C		= 24m²
Plan area of roof section D		= 24m²
Roof pitch multiplication factor for 60° pitch		= 1.6
Roof sections C & D effective roof area		= 38.4m² each roof section
Maximum rainwater run off		= 0.02 x 38.4 = 0.77 litres per second per roof section
Total flow rate		= 7.3 litres per second

Schematic 3



Schematic 3

Plan area of rood section A	= 100m²
Plan area of rood section B	= 100m²
Plan area of rood section C	= 100m²
Plan area of rood section D	= 100m²
Roof pitch multiplication factor for 30° pitch	= 1.288
Roof sections A, B, C & D effective roof area	= 128.8m² each roof section
Flow rate	= 0.02 x 128.8 = 2.58 litres per second per roof section
Total flow rate	= 10.32 litres per second

Any problems contact: Coppa Gutta Ltd 0845 050 4590

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The first decision has to be whether to purchase copper, plastic, aluminium or cast iron guttering. The following key points should always be borne in mind before making the final decision.

1. Copper is a totally natural product. Aluminium and Cast iron have powder coated and painted finishes which like plastic can degrade over the years. Copper gains in character as it patinates gradually to a blue/green colour and is fully recyclable.
2. Copper gutter profiles are generally up to twice the capacity of the equivalent plastic and cast iron profiles and this should be considered when comparing costs and overall gutter performance. On new build properties it is possible to greatly reduce the costs of the underground drainage, manholes etc.by using copper guttering.
3. Copper guttering is easy to install and is very competitively priced. In many cases when comparing equivalent profiles the copper gutter prices are the best available.
4. Copper guttering is virtually maintenance free. Painted or coloured finishes discolour and crack over the years from exposure to the elements, particularly the sun. Cast iron can also rust and is extremely heavy making it a high maintenance product.
5. Copper guttering lasts virtually indefinitely unlike many of the other gutter materials.
6. Copper guttering adds real “presence” to a property and by featuring some of the copper accessories on offer such as the beautiful copper hopperheads and rain cups the gutter system can become a feature of the building as well as performing its intended function.
7. Copper guttering is a major selling feature when a property is being sold. It adds value to the property whereas plastic guttering generally reduces a property’s resale value.

Once you have chosen the material you want for your gutter system you will want to decide whether you want ogee, half round or box section guttering. Whichever style is chosen it is important that you determine the correct size of gutter and downpipe needed for your particular property. On all the design calculations a rainfall of 75mm (3 inches) per hour has been assumed. This is considered the maximum rainfall likely to be experienced in the UK during a sustained and severe cloud burst and it is unlikely that your gutter system will be tested under such extreme conditions.

There are several variables that need to be considered. These are :-

1. The rate of water flow through the gutter profile chosen. This depends on the size and shape of the gutter section.
2. The area of the roof that is to be fitted with guttering.
3. The number, size and position of the downpipes.

A. Rate of water flow through the gutter profile chosen.

The volume of water that can be handled by one of our gutter systems depends on the capacity of the gutter profile per metre and it's related flow rate along the gutter to the downpipe(s). In all our calculations we assume that the guttering is always installed level around the property. It should be noted that the positioning of the outlets/downpipes on a run of guttering can be very important. A downpipe in the middle of a straight run of gutter can normally handle twice the flow *(coming from both sides)* compared to a downpipe positioned at one end of a gutter run. The size of the downpipe we offer is either 80mm or 100mm diameter *or 80 x 80mm square. (100mm downpipe will handle 50% more volume of rainwater than an 80mm diameter downpipe. 80mm square downpipe will handle 28% more than an 80mm diameter downpipe.)*

B. Effective roof area being fitted with guttering.

When working out the roof area from a plan drawing measure the length of the ridge roof in metres together with half the horizontal width of the ridge roof in metres. Multiply together and then multiply by the roof pitch factor to give the effective roof area to be fitted with guttering. For instance if in plan a ridge roof appears to be 50 square metres either side of the ridge and the roof has a pitch of 45 degrees then according to the table below the effective roof area either side of the ridge is 50 x 45 degree roof pitch multiplication factor *(which in this instance is 1.5)* giving a total effective roof area of 50 x 1.5 square metres = 75 square metres.

(*If you do not have a plan of the roof to be fitted with copper gutter then it will be necessary to measure the roof length in metres and multiply it by the distance from the ridge down the pitch of the roof to the gutter in order to give the effective roof area.*)Where a roof has a hipped end the effective roof area will be computed by dividing the roof into a rectangle and two triangles and adjusting each for the roof pitch multiplication factor which may be different for the hips compared to the main pitch of the roof. Similarly on a pyramid roof the area of each of the 4 triangles has to be calculated and if this pyramid roof is shown on plan then the area of the 4 triangles must be adjusted by the roof pitch multiplication factor. *(See the schematic drawings 1, 2 and 3 showing these three scenarios. Back page.)*

The roof pitch multiplication factor RPMF.

Roof pitch	Factor	Roof pitch	Factor
10 degrees	1.088	30 degrees	1.288
15 degrees	1.134	35 degrees	1.350
20 degrees	1.182	40 degrees	1.419
25 degrees	1.233	45 degrees	1.500

For roofs of 50 degrees pitch and above use the factor as 1.600.

To calculate the maximum rainfall off a particular roof calculate its effective area in square metres and multiply this figure by 0.02 to give the number of litres per second coming off it. Compare this volume of rainwater run-off with the capacity of the gutter to handle it and from this it is possible to see the size of gutter that can be used and the number and position of downpipes that would be needed.

The Capacity/metre of the Coppa Gutta Ltd's guttering sections are as follows :-

CoppaGutta profile.	Sectional area of profile.	Capacity (litres/metre)	Min Flow rate
Standard half round	6200 sq mm	5.6 litres/metre.	2.0 litres/second
Large half round	12000 sq mm	12.7 litres/metre.	3.6 litres/second
Standard ogee	9000 sq mm	6.4 litres/metre.	2.7 litres/second
Large ogee	12700 sq mm	12.7 litres/metre.	4.0 litres/second
Standard box	5525 sq mm	5.5 litres/metre.	1.5 litres/second
Large box	10350 sq mm	10.3 litres/metre.	3.2 litres/second

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For example if the rainfall run off on a particular section of roof was calculated to be 2.4 litres/second then it would only be possible to use the small box gutter if the downpipe was in the centre of the run or there were downpipes at each end of the gutter. If only one end downpipe was to be used then the gutter profile would have to have a minimum flow rate of at least 2.4 litres per second ruling out the small half round gutter and the small box gutter.
This minimum flow rate is based on using 80mm downpipe at one end of a gutter run. These flow rates double if the downpipe is positioned in the centre of the gutter run. The maximum water flow through an unrestricted 80mm downpipe is 5.33 litres per second, 8.00 litres per second through an unrestricted 100mm downpipe and 6.8 litres per second through an unrestricted 80mm by 80mm square downpipe.

C. The number, size and position of downpipes.

It is possible to plan where to put the downpipe outlets. For instance if there is 8 litres per second coming off a section of roof fitted with Coppa Gutta's small half round guttering which can handle a flow rate into the downpipe of 2 litres/second when positioned at an end of a gutter run, then this section of guttering would need either 3 downpipes (1 at each end and 1 in the middle of the run) or alternatively 2 downpipes spaced 1/3rd and 2/3rds of the way along the gutter run in order to dispose of the 8 litres per second of rainwater.

D. Other factors.

All the flow rate calculations are based on the assumption that the guttering is completely level and clear of any debris or other obstructions. If the rainwater has to flow around a corner before arriving at a downpipe this can reduce the capacity of the gutter flow by 40% and should be considered in any gutter system design.

Vertical walls/parapets, etc.

When wind drives against a vertical wall/parapet rainfall calculation surface that has a pitched roof attached then add half the vertical roof surface to the effective roof area calculations to work out the maximum amount of rainwater that would flow of the wall and gutter.

Flat roofs.

Use the flat roof plan area for any roof pitch of 10% or less.

Valleys.

Valleys tend to have to handle more rainfall than other roof areas which can be critical especially during heavy rainstorms when the rainwater run off from two or more roofs meet. The rainwater outlet should be sized to cope with this concentration of rainwater and one of our decorative copper hopperheads should be considered as they form excellent surge reservoirs. Because of the head of water that can be accumulated in the hopperhead the flow rate down to the drain from the hopperhead will be at least 5.3 litres/second. This can be useful where a downpipe is located at a gutter end and where it has to handle the rainwater run off from another roof or valley. This additional area of roof can then be drained into the same downpipe by being piped into the top of the hopperhead alongside the main outlet.