

# Kayflow™



## Rainwater Specification and Installation Guide

[www.kayflow.co.uk](http://www.kayflow.co.uk)



FM 09180



KM 508760

Kayflow rainwater systems are ideal for most domestic and light commercial properties in the UK. This guide sets out the basic methods for working out which gutter system should be installed and how many downpipes would be required for the location and roof size involved.

For further technical help please telephone 01952 292511.

## Rainwater runoff

As well as normal levels of rainfall, a domestic or light commercial eaves gutter system must be able to cope with an intense rainfall event, lasting at least two minutes, that could happen once a year anywhere in the UK. The British Standard BS12056 shows how to work out the amount of rainwater (in litres per second) that could run off a roof.

Rainwater runoff = rainfall intensity (litres per second per m<sup>2</sup>) X the effective roof area (m<sup>2</sup>)

1. For the rainfall intensity value either:

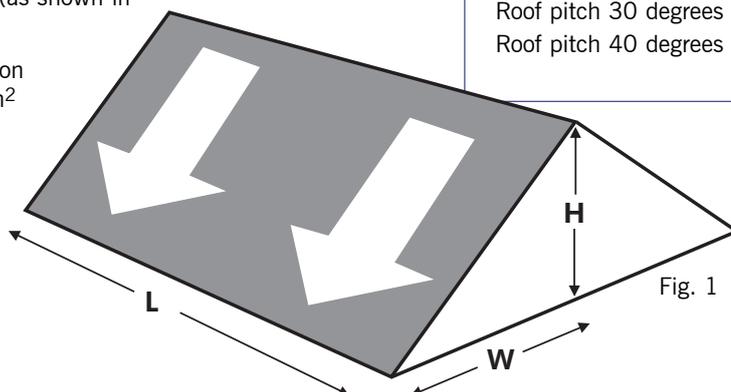
- a. Look up the rainfall intensity for a major annual storm event in the area of the UK where the building is located (as shown in BS EN 12056-3:2000)
- b. Or calculations can be based on 0.021 litres per second per m<sup>2</sup> of roof area. This is nearly the highest intensity shown in the BS Standard and so should cover most areas.

2. For the effective roof area one of two formulas may be used with reference to Fig 1:

- a.  $(W + H/2) \times L$   
 W = width of one pitch of the roof  
 H = vertical height from the eaves to the top of the pitch.  
 L = the length of the roof on one side of the building.
- b.  $L \times W \times \text{Pitch factor}$

### Typical Pitch Factors

Roof pitch 10 degrees = pitch factor 1.088  
 Roof pitch 20 degrees = pitch factor 1.182  
 Roof pitch 30 degrees = pitch factor 1.288  
 Roof pitch 40 degrees = pitch factor 1.419



## Gutter Flow Capacity

The rainwater runoff figure should now be matched to a gutter system with an adequate flow capacity. This is the range of Kayflow gutters. The flow capacity is shown in litres per second.

Gutter Type	Half Round	Square	Deep Flow	Ogee
Downpipe	Round	Square/Round	Round	Square/Round
'Short' length	2.4m	2.7m	3.4m	3.4m
Flow capacity (end outlet)	0.9 l/s	1.6 l/s	1.8 l/s	2.2 l/s
Area drained (end outlet)	43m <sup>2</sup>	76m <sup>2</sup>	86m <sup>2</sup>	105m <sup>2</sup>

The flow capacity and area drained are based on gutter sections that are:

1. Straight - the flow rate of gutter sections with an angle must be reduced by 15%.
2. 'Short' - ie not longer than 50 x the height of water when the gutter is full. If the gutter section is longer than this you may have to reduce the flow rate (see BS12056 for details).
3. Laid level - this can be up to 3mm fall per metre.
4. A centrally placed outlet will drain a much larger area and volume of water.

### Example:

A roof has dimensions L = 2m, H = 3m and W = 4m.

The rainfall intensity is 0.021 l/s/m<sup>2</sup>

The Effective Roof Area is  $(4+1.5) \times 2 = 11 \text{ m}^2$

So the Rainwater runoff is  $0.021 \times 11 = 0.231$  litres per second

At this flow rate the Half Round gutter would easily cope with the volume of water.

The roof area that each gutter with an end outlet can drain at 0.021 l/s is shown opposite. As a quick guide it can be seen that the Half Round Gutter figure of 43m<sup>2</sup> is well above the 11m<sup>2</sup> in this example.

## Installation

### Preparation

- Make sure all fascias are in good order and ready to accept the new rainwater system.
- **Gutter** - Measure around the building at ground level to work out the amount of gutter required. Gutter is available in 4m lengths. A union bracket must be used to join two lengths of gutter together.
- **Fascia Brackets** - Calculate the number of fascia brackets required:

Fascia Bracket Spacing				
Type	Half Round	Square	Deep Flow	Ogee
Maximum spacing for any run of gutter	1m	1m	800mm	800mm (500mm on conservatories)
Max distance from any fitting	*150mm	*150mm	*150mm	150mm

\*Fascia Brackets must be fitted to both sides of running outlets, angles and union brackets on these systems.

- **Stopend Outlet Setup** - Various options are possible.

Stopend Outlet options				
Type	Half Round	Square	Deep Flow	Ogee
One-piece Stopend Outlet		Y		Y*
Running Outlet with Internal Stopend	Y	Y		
Running outlet, short piece of gutter & External Stopend	Y	Y	Y	Y*

\* Ogee Stopend Outlets and External Stopends are handed

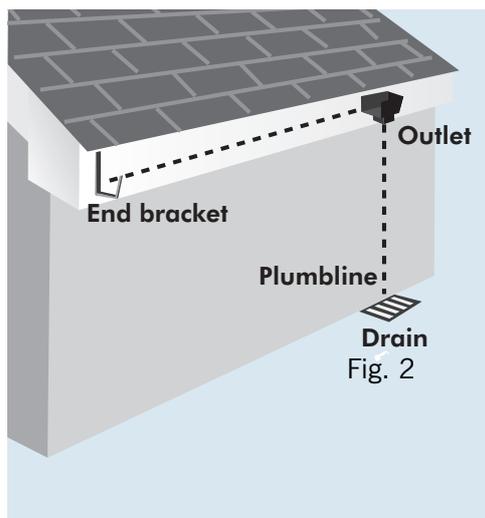
- **Downpipe** - Measure the length of downpipe required at each drain point, from the ground to the eaves or count the number of brick courses and divide by 13 to get the length of downpipe in metres. Downpipe is available in 2.5m, 4m and 5.5m lengths.
- **Downpipe Fixings** - Downpipe lengths are connected by pipe sockets. The downpipe is fixed to the wall with pipe clips at 1m max. intervals. Offset Bends are used to angle the downpipe around eaves and other obstructions or to angle the downpipe towards a drain. Use a Branch or Hopper to link two outlets into one downpipe.





## Fixing the rainwater system

- Please note that where fixing holes are provided on fittings these must all be used during installation.
- Fit an outlet directly above each drain (see Fig 2); Use a running outlet for the middle of a run and a stop end outlet set-up (see table over leaf) for the end. Use a plumbline to check that the outlet lines up with the drain. Fix the outlet to the fascia with 25mm No 10 rustproof screws.
- Fit the fascia bracket furthest away from the outlet. The far end of the gutter will need to be higher than the outlet end.
- Tie the end of a string line to the bracket and feed the other end through the outlet. Pull the string tight. Using the line as a guide, attach fascia brackets at the appropriate intervals (see table) sloping down to the outlet. Repeat this process from the other side if it is a running outlet.
- Cut the gutter to the required length using a hack saw and remove all swarf to ensure the seals are not affected. Lubricate all seals with silicone spray. Clip the gutter into the outlet level with the "Fit gutter to here" marking inside the outlet. Now clip the gutter into the fascia brackets by tilting it to fit under the back clip then pushing the front clip over.
- At the end of the gutter fit an external stopend. Use gutter guard to prevent leaves and other debris from blocking the gutter.
- If the guttering needs to connect to a neighbour's system use a union bracket or an appropriate adaptor.



## Downpipes to finish

- The gutter will stand out from the wall by the depth of the soffit. Usually 2 x 112° Offset Bends are used to bridge the distance back to the wall with a piece of pipe in between. If the first offset bend goes straight on to the outlet spigot a small piece of pipe will still be needed to form a joint between the spigot and the offset bend itself.
- Fix the remaining length(s) of pipe to the wall at 1m intervals using pipe clips. Use Pipe Sockets to join lengths together.
- A Hopper may be used to collect water from more than one pipe. A branch may also be used to bring two pipes together.
- At the end of the downpipe fit a shoe to direct the water into the drain. This must be supported by a pipe clip.

## Snow Loading Guidance

Where snow lays on roofs the front edge of the gutter should not be higher than the projected line of the roof, unless snow guards or other precautions are used. On smooth surfaces such as conservatories and on steeply pitched roofs, that are likely to experience heavy snow loads, additional gutter support brackets with maximum centres of 600mm should be fitted.

Kayflow rainwater systems carry Kitemark KM508760, BS EN 607:2004 (Eaves Gutters & Fittings), BS EN 12200-1:2000 (Plastic Piping Systems) and BS EN 1462:2004 (Brackets for Eaves Gutters) Manufactured under ISO 9001 Quality Management System.



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