

Roof drainage design

Design basis

To assess the suitability of a gutter system to drain the roof to a building the following factors need to be taken into consideration:

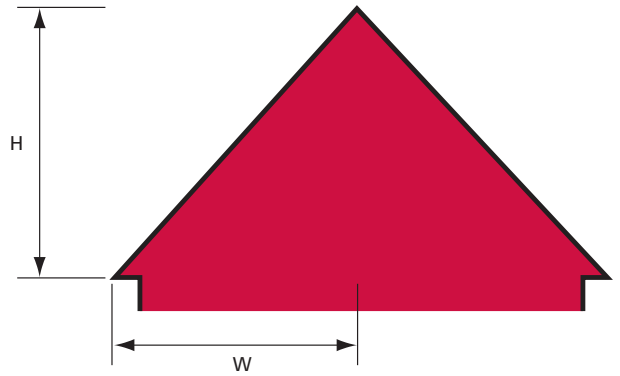
1. The effective roof area to be drained.
2. Rainfall intensity.
3. The flow characteristics of the gutter system.
4. The number and position of downpipes.

Effective roof area

The effective roof area can be determined by calculation in accordance with the following:

1. BS EN 12056-3:2000, Gravity drainage inside buildings.
2. The Building Regulations 2002 Approved Document H, Part H3.

The formula and example shown opposite reflects the method used in the above standard to calculate effective roof area.



$$\left(\frac{H}{2}\right) + W \times L = m^2$$

For example a roof 4m high x 4m wide x 10m long

$$2 + 4 \times 10 = 60m^2$$

Multiplication factors

An alternative approach to that described above is the use of multiplication factors to establish effective roof area. From plan area the appropriate factor for the roof slope can be applied to determine the effective area. This method is similar to that shown in Approved Document H of the Building Regulations. The table below provides a wider range of factors to enable accurate assessment of effective roof area to be determined.

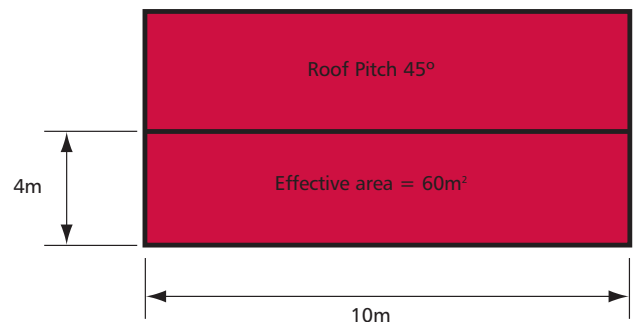
Roof pitch	Factor	Roof pitch	Factor
10°	1.088	30°	1.288
12.5°	1.111	32.5°	1.319
15°	1.134	35°	1.350
17.5°	1.158	37.5°	1.384
20°	1.182	40°	1.419
22.5°	1.207	42.5°	1.459
25°	1.233	45°	1.500
27°	1.260	47.5°	1.547

For roofs of 50° and above a factor of 1.600 may be used.

Multiplication factor method

Using the same roof dimensions as the example above with a 45° roof pitch.

$$4m \text{ wide} \times 10m \text{ long} \times 1.5 = 60m^2$$



Vertical surfaces

Where pitched roofs abut vertical walls the catchment area is likely to be increased as a result of wind driven rain. To allow for this half the vertical surface area of the wall should be added to the effective area of the sloping roof.

Flat roofs

For roofs with a pitch of less than 10° the effective area is taken as the plan area.

Rainfall intensity

The Building Regulations 2002 Approved Document H recommends a flat rate rainfall intensity of 0.021 litres/second per square metre of roof area be used for design calculations. This intensity is virtually the same as 75mm/hour that has been used for the design of eaves gutter systems since the publication of BS 6367 in 1983 which has now been withdrawn.

Where a flat rate rainfall intensity is not adopted for the purpose of design, reference should be made to BS EN 12056-3: 2000 which provides detailed information on rainfall throughout the UK by geographical location and frequency of occurrence. The flow rates shown on page 11 for Marley PVCu gutter systems have been determined from tests carried out in accordance with the test procedure in BS EN 12056-3: 2000.

Roof with 30° Pitch

