Rain gutter

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A **rain gutter** or **surface water collection channel** is a component of water discharge system for a building. [1] An *eaves gutter* is also known as an *eavestrough* (especially in Canada), *eaves channel*, *dripster*, *guttering* or simply as a *gutter*.[2] The word *gutter* derives from from Latin *gutta*(noun), meaning "a drop, spot or mark".[3]

Lead guttering: slate and pitched valley gutter flow into parapet gutter, with downpipe and overflow

Eaves gutter and downpipe

Contents

Description

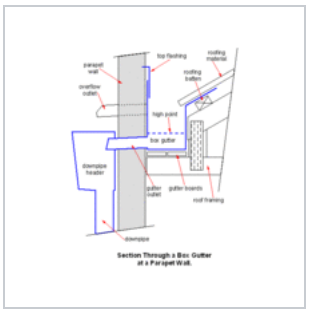
Gutters prevent water ingress into the fabric of the building by channelling the rainwater away from the exterior of the walls and their foundations. Water running down the walls causes dampness in the affected rooms and provides a favourable environment for growth of mould, and wet rot in timber. [4]

A rain gutter may be a:

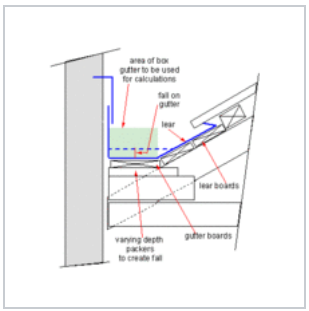
- Roof integral trough along the lower edge of the roof slope which is fashioned from the roof covering and flashing materials.
- Discrete trough of metal, or other material that is suspended beyond the roof edge and below the projected slope of the roof.
- Wall integral structure beneath the roof edge, traditionally constructed of masonry, fashioned as the crowning element of a wall.[5]

A roof must be designed with a suitable fall to allow the rainwater to discharge. The water drains into a gutter that is fed into a downpipe. A flat roof will have a watertight surface with a fall of 1 in 60, or 1 in the case of lead. They can drain internally or to a eaves gutter, which has a minimum 1 in 360 fall towards the downpipe. [6] The pitch of a pitched roof is determined by the construction material of the covering. For slate this will be at 25%, for machine made tiles it will be 35%. Water falls towards a *parapet gutter*, a *valley gutter* or an *eaves gutter*. [7] When two pitched roofs meet at an angle, they also form a *pitched valley gutter*: the join is sealed

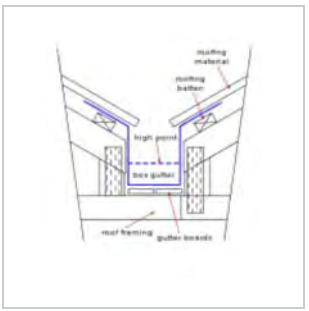
with valley flashing. Parapet gutters and valley gutters discharge into internal rainwater pipes or directly into external down pipes at the end of the run. [7]



A parapet gutter at the base of a sloping roof and a parapet wall, outflowing to a downpipe



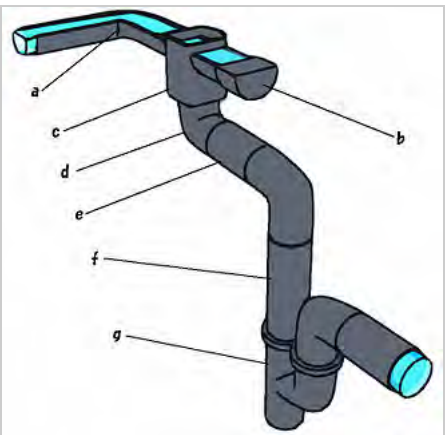
A simpler parapet gutter.



A valley gutter between two parallel roof surfaces.

Eaves gutters can be made from a variety of materials such as cast iron, lead, zinc, galvanised steel, painted steel, copper, painted aluminium, PVC (and other plastics) and occasionally from concrete, stone, and wood.[8]

Water collected by a rain gutter is fed, usually via a downpipe (also called a leader or conductor),[9] from the roof edge to the base of the building where it is either discharged or collected.[10] The down pipe can terminate in a shoe and discharge directly onto the surface, but using modern construction techniques would be connected through an inspection chamber to a drain that led to a surface water drain or soakaway. Altenatively it would connect via a gulley (u-bend) with 50mm water seal to a combined drain.[11] Water from rain gutters may be harvested in a rain barrel or a cistern.[12]



- a: Rainwater gutter
- b: Endcap
- c: Hopper
- d: 112° bend
- f: Downpipe
- g: Manifold

Rain gutters can be equipped with gutter screens, micro mesh screens, louvers or solid hoods to allow water from the roof to flow through, while reducing passage of roof debris into the gutter.[13]

Clogged gutters can also cause water ingress into the building as the water backs up. Clogged gutters can also lead to stagnant water build up which in some climates allows mosquitoes to breed. [14]

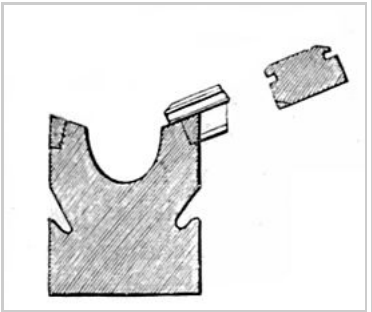
History

The Romans brought rainwater systems to Britain, the technology was subsequenty lost, but was re-introduced by the Normans. The White Tower, at the Tower of London had external gutters.[15] In March 1240 the Keeper of the Works at the Tower of London was ordered by King Henry "to have the Great Tower whitened both inside and out". This was according to the fashion at the time. Later that year the king wrote to the Keeper, commanding that the White Tower's lead guttering should be extended with the effect that "the wall of the tower ... newly whitened, may be in no danger of perishing or falling outwards through the trickling of the

rain".[16]

In Saxon times, the thanes erected buildings with large overhanging roofs to throw the water clear of the walls in the same way that occurs in thatched cottages. The cathedral builder used lead parapet gutters, with elaborate gargoyles for the same purpose. With the dissolution of the monasteries- those buildings were recycled and there was plenty of lead that could be used for secular building. The yeoman would use wooden gutters or lead lined wooden gutters. [15]

When The Crystal Palace was designed in 1851 by Joseph Paxton with its innovative ridge-and-furrow roof, the rafters than spanned the space between the roof girders of the glass roof also served as the gutters. The wooden Paxton gutters had a deep semi-circular channel to remove the rainwater and grooves at the side to handle the condensation. They were under trussed with an iron plate and had preformed notches for the glazing bars: they drained into a wooden box gutter that drained into and through structural cast iron columns.[17]



Cross section of a Paxton gutter with glazing bar

The industrial revolution introduced new methods of casting-iron and the railways brought a method of distributing the heavy cast-iron item to building sites. The relocation into the cities created a demand for housing that needed to be compact. Dryer houses controlled asthma, bronchitis, emphysema as well as pneumonia. In 1849 Joseph Bazalgette proposed a sewerage system for London, that prevented run-off being channelled into the Thames. By the 1870s all houses were constructed with cast iron gutters and down pipes.[15] The Victorian gutter was an ogee, 115mm in width, that was fitted directly to the fascia boards eliminating the need for brackets.[18]

Types

Cast iron

Cast iron gutters were introduced in the late 18th century as an alternative to lead. Cast iron enabled eaves gutters to be mass produced: they were rigid and non-porous while lead could only be used as a liner within timber gutters. Installation was a single process and didn't require heat. [19] They could be attached directly to the fascia board. Cast iron gutters are still specified for restoration work in conservation areas, but are usually replaced with extruded aluminium made to the same profile.[18]

UPVC

In UK domestic architecture, guttering is made from UPVC sections. The first PVC pipes were introduced in the 1930's for use in sanitary drainage systems. Polyethylene was developed in 1933. The first pressurised plastic drinking water pipes were installed in the Netherlands in the 1950s During the 1960's rain water pipes, guttering and down pipes using plastic materials were introduced followed by PVC soil systems which became viable with the introduction of ring seals. A British Standard was launched for soil systems, local authorities started to specify PVC systems. By 1970 plastic rainwater systems accounted for over 60% of new installations.[20] A European Standard EN607 has existed since 2004.[21]

A collector with 112mm gutter, draining into 68mm downpipe

Available gutter fittings

Available pipe and gutter fittings

Fitting a gutter to a 45° connector

Zinc

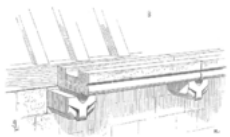
In UK commercial and European commercial and domestic architecture, guttering is made from zinc. Metal gutters with bead stiffened fronts is governed in the UK by BS EN612:2005.[22]

Vernacular buildings

Guttering can be made from any locally available material such as stone or wood. Porous materials may be lined with pitch or bitumen.

Wooden gutter at an open air museum

Wood used on a stone building



Stone gutter in Burgundy

Stone gutters in Slovenia

Finlock gutters

Finlock gutters, also known as concrete gutters, can be employed on a large range of building.[23] There were used on domestic properties in the 1950s and 1960s, as a replacement for cast iron gutters when there was a shortage of steel and surplus of concrete. They were fitted with a aluminium and bitumastic liner.Finlock concrete gutter units are made up of two troughs – one is the visible gutter and the other sits across the cavity wall.The blocks which can range from 8 to 12 inches (200 to 300 mm) can be joined using reinforcing rods and concrete, to form lintels for doors and windows.[24]

See also

- Chantlate
- Copper in architecture
- Cornice
- Gargoyle
- Rain chain

References

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External links

- Rain Gutters (https://guttersmiths.com/)
- An Illustrated glossary of roofs and roofing terms. (https://web.archive.org/web/20121017003751/http:

Wikimedia Commons has media related to ***Rain***

//www.builderbill-diy-help.com/roof-glossary.html)

gutters.

- Tutorial on installing plastic guttering (https://www.youtube.com/watch?v=L_jLdNJxxoM)
- Tutorial on installing metal sheet guttering (https://www.youtube.com/watch?v=Oo_GXULZl8I)

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