

Device for draining rainwater from the roof surface of a building

The present invention concerns devices for draining rainwater from the roof surface of a building and relates more particularly to draining devices with a closed or trapped flow.

Such a flow is characterised in that the conduit in which the water flows is solid and has no air entrainment.

FR 2 337 237 discloses a conduit for collecting and draining rainwater at the roof surface of a building having a discharge pipe whose upper end is joined to a collecting receptacle with a larger cross-section than that of the pipe inlet orifice. The upper edge of the receptacle is placed higher than said orifice.

A solid cover whose cross-section is larger than the cross-section of the orifice and smaller than that of the receptacle is fixed over the orifice and joined to a strainer whose wall surrounds the pipe inlet orifice. The strainer is pierced with holes whose area is such that the ratio of the total passage area of the perforated wall of the strainer to the cross-section of the discharge pipe is between 2.5 and 3.5.

In view of the diameter of 75 mm of the pipes generally used for such devices, the diameter of the receptacle or bowl which has to be associated with the pipe is too large, with the result that it becomes necessary to provide the roof with trimmer beams for reinforcing the reception orifices of the draining devices.

This increases the cost of fitting such devices.

The invention aims to overcome the above-mentioned disadvantages of known devices by creating a draining device which, while being of simple construction, permits:

- on a roof which is equipped therewith, a depth of water as low as possible and, in all cases, less than 55 mm, to be obtained for the normal flow,

- the use of a receptacle or bowl with a diameter less than 200 mm in order to avoid having to provide trimmer beams in the holes made in the roof to receive the devices, such trimmer beams being required according to DTU [unified technical documents] standards when the diameter of the holes exceeds 200 mm,

- retention of debris entrained by the rainwater and in particular flakes which are detached from certain composite coverings and could block the small-diameter conduits which have no gradient.

The subject of the invention, therefore, is a device for draining rainwater from the roof surface of a building, including a vertical discharge pipe on top of which is mounted a receptacle with a larger cross-section than that of the pipe and intended to be flush with the roof surface, and an anti-vortex device with a cross-section larger than that of the pipe and smaller than that of the receptacle and disposed inside said receptacle over the inlet end of the discharge pipe, characterised in that the anti-vortex device has a solid cone-shaped wall provided with peripheral axial vanes in contact with the bottom of the receptacle, surrounding the discharge pipe inlet and defining with said bottom radial passages for conducting the water towards said discharge pipe, and in that its conical wall is disposed opposite a frustoconical portion of the receptacle wall so as to form therewith a passage for the water, the ratio of the cross-section of the passage for the water, defined between the conical wall of the anti-vortex device and the frustoconical wall portion of the receptacle, on the one hand to that of the discharge pipe on the other hand, being close to 1.

The invention will be better understood on reading the description which follows, given purely by way of example and with reference to the appended drawings, in which:

- Fig. 1 is an elevational and cross-sectional view of the rainwater-draining device according to the invention in place in a roof slab;

- Fig. 2 is an exploded view of the anti-vortex device and of the cover or gravel guard with their joining rod withdrawn from the receptacle.

Figure 1 shows a rainwater-draining device according to the invention put in place in a roof slab D.

It comprises principally a vertical water discharge pipe 1, also called a conductor, on top of which is mounted a receptacle or pot 2 of generally cylindrical shape with a larger cross-

section than the cross-section of the pipe 1 and connected to the latter by a wall portion 3 of frustoconical shape.

At its end flush with the slab D, the pot 2 has a plate 4 of generally square shape which is laid on the slab D and thus ensures the sealing of the joint between the slab and the draining device.

Inside the pot 2 there is placed an anti-vortex device 5 having a solid conical wall 6 whose conical form is directed towards the end of the pipe 1 connected to the pot 2. The conical wall 6 is disposed opposite the wall portion 3 of frustoconical shape and forms therewith a passage 6a for conducting the water towards the discharge pipe 1. Evenly distributed axial vanes 7 are provided at the periphery of the conical wall 6. The draining device is fitted with a cap or gravel guard 8 surrounded by an anti-flake system 9 placed on the plate 4 and intended to retain the majority of debris or flakes which are detached from certain roof coverings and which could block the horizontal conduits of a rainwater-draining installation.

Thus, in Figure 2, it can be seen that the vanes 7 are connected to the conical wall 6 in an intermediate zone of their length and are advantageously diametrically opposed in pairs and directed widthwise towards the centre of the conical wall 6. The ends of the vanes 7 situated on the side of the hollow of the conical wall 6 and thereby facing the end of the bowl 2 carrying the plate 4 are connected to one another by a banding ring 10, while the ends of the vanes 7 opposite said ring end in points 11 by which the anti-vortex device 5 rests on the bottom 12 of the bowl 2 which surrounds the orifice of the discharge pipe 1.

Thus, above the frustoconical wall 6, the anti-vortex device 5 has an annular grate 14 formed by the conical wall 6, the banding ring 10 and the portions of the vanes 7 joining them and, below the frustoconical wall, it has a grating for the passage of the water between the portions of the vanes 7 which are situated below the frustoconical wall 6 and are in contact with the bottom 12 of the bowl 2.

The upper grate 14 prevents the formation of vortices in the dish formed by the conical wall 6, while the grating formed by

the ends provided with points 11 of the vanes 7 also prevents the formation of vortices in the currents of water which enter the pipe 1.

It can also be seen in Figure 2 that the anti-vortex device 5 has centring studs 16 disposed at 120° relative to one another and each projecting relative to an axial vane 7.

The studs 16 are inscribed in a circle with a diameter equal to that of the pot or receptacle 2 and thus ensuring that the anti-vortex device is centred in the pot.

The presence of the vanes 7 causes a radial flow of the water from the periphery towards the centre of the bowl 2 and consequently prevents any formation of vortices which are liable to entrain air towards the discharge pipe or conductor 1.

The cap or gravel guard 8 of the device has a domed shape and contains approximately radial slots 20. It has a diameter adapted to that of the bowl 2 and exhibits axial vanes 22 for bearing on the rim of the bowl 2 which are evenly distributed at its periphery, one in two, for example, of these vanes having a centring finger 24 intended to come into contact with the inner wall of the bowl or receptacle 2. It is possible to choose a different number of axial vanes 22 which are provided with centring fingers.

The vanes 22 define with the plate 2 [sic] of the bowl passages 25 for admitting the rainwater into the bowl 2.

The frustoconical wall 6 of the anti-vortex device 5 and the cap or gravel guard 8 each contain a central orifice in which there is engaged a sliding securing rod 26 having a head 27 and carrying, at its end opposite the head, a washer 28 for locking, after compression, the corresponding end of the rod 26.

This rod permits a slight axial displacement of the gravel guard 8 relative to the anti-vortex device 5 and promotes:

- the correct positioning of the anti-vortex device 5 in the bowl 2,
- the holding of the gravel guard 8 in place during high winds,
- the fixing, without nuts and bolts, of the anti-vortex device 5, which is held in place, when in operation, by the

negative pressure created and, when not in operation, by the central rod 26.

The ratio of the cross-section S1 of the passage 6a defined between the conical wall 6 of the anti-vortex device 5 and the frustoconical wall 3 for joining the discharge pipe 1 to the bowl 2 on the one hand, to the cross-section S2 of said pipe (Fig. 1) on the other hand, is chosen to be close to 1 according to the invention.

In view of the cross-section of the discharge pipe, it is thus possible to use an anti-vortex device with a relatively small cross-section and thereby an outlet of reasonable dimensions with good flow characteristics.

The anti-flake system 9 is in fact a filtering system.

It consists of a ring 30 made of perforated sheet metal provided with a rim 31 for arresting debris. It may also be formed by a ring made of a mesh of metal or textile or else of foam.

For light rain producing a depth of water on the roof less than the height of the filter, the mesh retains the flakes but not the water.

The upper plane or rim 31 of the filter has the purpose of containing the flakes which may float when the water starts to revolve around the outlet.

For heavier rain, the water and the flakes submerge the filter. The anti-flake filter 9 therefore has a height which corresponds to the depth of water for which the outlet (and therefore the system of piping) starts to function as a trap and therefore cannot be clogged by the flakes (hydrocleansing).

**CLAIMS**

1. Device for draining rainwater from the roof surface of a building, including a vertical discharge pipe (1) on top of which is mounted a receptacle (2) with a larger cross-section than that of the pipe and intended to be flush with the roof surface, and an anti-vortex device (5) with a cross-section larger than that of the pipe (1) and smaller than that of the receptacle (2) and disposed inside said receptacle over the inlet end of the discharge pipe (1), characterised in that the anti-vortex device has a solid cone-shaped wall (6) provided with peripheral axial vanes (7) in contact with the bottom of the receptacle, surrounding the discharge pipe inlet and defining with said bottom radial passages for conducting the water towards said discharge pipe, and in that its conical wall (6) is disposed opposite a frustoconical portion (3) of the receptacle wall so as to form therewith a passage (6a) for the water, the ratio of the cross-section of the passage (6a) for the water, defined between the conical wall of the anti-vortex device and the frustoconical wall portion (3) of the receptacle, on the one hand to that of the discharge pipe (1) on the other hand, being close to 1.

2. Draining device according to the preceding claim, characterised in that the conical wall (6) is connected to the axial vanes (7) in an intermediate zone of the length of the vanes, the ends of the vanes situated on the side of the hollow of the conical wall (6) being connected by a banding ring (10) so as to form with the conical wall a grate (14) preventing the formation of vortices in the dish formed by the conical wall, while the ends of the vanes situated on the side of the point of the conical wall (6) delimit with the conical wall (6) and the bottom (12) of the receptacle with which they are in contact a grating preventing the formation of vortices in the currents of water which enter the pipe (1).

3. Draining device according to Claim 2, characterised in that the vanes (7) of the anti-vortex device (5) are directed widthwise towards the centre of the conical wall (6).

4. Draining device according to one of Claims 2 and 3,



characterised in that the anti-vortex device has centring studs (16) each projecting relative to an axial vane (7) and being inscribed in a circle with a diameter equal to that of the receptacle (2).

5. Draining device according to one of Claims 1 to 4, characterised in that the receptacle (2) has, at its end intended to be flush with the roof surface, a plate (4) for sealing the joint between the roof and the draining device.

6. Draining device according to one of Claims 1 to 5, characterised in that it additionally has a cap or gravel guard (8) of domed shape, having a diameter adapted to that of the receptacle (2) and exhibiting axial vanes (22) for bearing on the rim of the receptacle (2) which are evenly distributed at its periphery, at least some of said vanes having a centring finger (24) intended to come into contact with the inner wall of the receptacle (2), said bearing vanes defining passages for admitting the water into the receptacle (2).

7. Draining device according to Claim 6, characterised in that the anti-vortex device (5) and the cap or gravel guard (8) each contain a central orifice, a sliding rod for securing the anti-vortex device (5) to the cap (8) being engaged in said orifices, said rod (26) having a head (27) and carrying, at its end opposite the head, a washer (28) for locking, after compression, the corresponding end of the rod (26).

8. Draining device according to one of Claims 6 and 7, characterised in that it additionally has a filtering system (9) surrounding said cap or gravel guard (8), said filtering system being intended to arrest the debris such as flakes which are detached from certain roof coverings.

9. Draining device according to Claim 8, characterised in that the filtering system is a ring (30) made of perforated sheet metal provided with a debris-arresting rim (31) placed on the plate (4) of the receptacle (2).

10. Draining device according to Claim 8, characterised in that the filtering system is a ring made of a mesh of metal or textile or of foam.