

**Anti-kink protective device for lines**

The present invention relates to a protective device serving to guide and deflect lines and cables, in particular optical-fiber cables, for example in drainage systems, according to the preamble of claim 1.

DE-U1-298 02 655 discloses a protective device of this type which is provided for use in the transition region between a manhole and a drainage pipe, opening into the latter, of a drainage or sewage system. It has a deflection element which is designed to be semicircular in one plane, in particular as a half drop shape, and has a groove on its radially outer side for accommodating an optical fiber. A one-piece covering, holding and fastening device covers the groove on the one hand and serves to hold and fasten the deflection element to the wall of the manhole on the other hand. The deflection element is arranged so as to run obliquely upward from the orifice of the drainage pipe into the manhole, and the optical-fiber cable laid in the drainage pipe runs in the manhole in the groove of the deflection element and from the end of the deflection element remote from the drainage pipe approximately rectilinearly to hooks which are fastened to the wall of the manhole. The optical-fiber cable is directed by the hooks in the peripheral direction of the manhole to a next deflection element, via which the optical-fiber cable runs into a further drainage pipe.

The known protective device is therefore firmly mounted in a position which enables the optical-fiber cable to be directed further in an intended direction. If it is found that the direction originally intended was not correct, that the protective device was not mounted with sufficient precision or could not be mounted at all in the desired position for lack of a



suitable bearing surface, the hooks in the manhole are to be adapted accordingly, so that no inadmissible bending of the optical-fiber cable occurs. Of course, the bending of the optical-fiber cable in the drainage
5 pipe is to be taken into account and corrected if need be. If the conditions are not optimal, this installation work may therefore turn out to be very expensive.

It is therefore an object of the present invention
10 to provide a protective device which can be mounted in a simple manner and permits kink-free guidance and deflection of lines and cables, in particular optical-fiber cables.

This object is achieved with a protective device
15 which has the features of claim 1.

Preferred configurations of the protective device are specified in further claims.

The protective device according to the invention consists of a deflection element and a holder which has
20 a first angle element which can be connected in a first plane to a sole plate in such a way as to enclose a selectable angle, it being possible for this sole plate to be mounted on a bearing surface, e.g. on a sewer or manhole wall, and which can be connected in a second
25 plane, disposed at least approximately perpendicularly to the first plane, to a second angle element again in such a way as to enclose a selectable angle, to which second angle element the deflection element is fastened.

30 After the sole plate has been mounted, the deflection element can therefore be brought into a suitable position by rotating and tilting the two angle elements and can be fixed in this position. If necessary, e.g. when laying an additional cable, the
35 angle elements can be released and fixed again in a

corrected position. The orientation of the deflection element can therefore easily be effected or corrected after the sole plate has been mounted.

The invention is explained in more detail with
5 reference to an exemplary embodiment shown in the drawing, in which, in a purely schematic manner:

Fig. 1 shows a preferred configuration of the protective device according to the invention with deflection element 1 and holder 2,

10 Fig. 2 shows the holder 2 according to fig. 1 with a sole plate 2, and a first and a second angle element 4 and 5, which are rotated relative to one another into the end positions,

Fig. 3 shows the holder 2 according to fig. 2 in center
15 position.

Fig. 1 shows a protective device, in particular for lines 15 to be laid in sewage systems, having a deflection element 1 which can be mounted by means of a holder 2 and by means of which lines 15 coming from a
20 first direction can be deflected in a second direction.

The holder 2, which is shown without deflection element 1 in fig. 2 and fig. 3, has a sole plate 3, which can be mounted on a bearing surface, e.g. on a sewer or manhole wall, and two angle elements 4, 5
25 which enable the deflection element 1 to be rotated into a suitable position and tilted. The sole plate 3, which is connected to the first angle element 4, is preferably provided with slots 31, 32 which serve to pass mounting screws 33 through and which enable the
30 sole plate 3 and thus the deflection element 1 to be displaced or rotated into a more favorable position before the mounting screws 33 are tightened.

The first and the second angle element 4, 5 have a base plate 41; 51 and two wing pieces 42a, 42b and 52a,
35 52b, respectively, which together with the associated

base plate 41; 51 form an L-profile or a U-profile. The wing pieces 42a, 42b and 52a, 52b are screwed to one another, so that the angle elements 4 and 5 displaced one inside the other are firmly connected to one another in such a way as to enclose an intended angle.

The sole plate 3 and the base plate 41 of the first angle element 4 are connected to one another by a first screw 43, which forms an axis about which the two plates 3, 41 can be rotated relative to one another, and can be mutually fixed by at least one further screw 45. Provided in the base plate 41 is an aperture, e.g. a hole, for passing the first screw 43 through, and a slot 47a which runs concentrically thereto and inside which the further screw 45 serving for the fixing is guided during the mutual rotation of the two plates 3, 41. A further slot 47b is shown, through which an additional fastening screw can be guided and, like the first and second screws 43 and 45, respectively, can be screwed into a tapped hole provided in the sole plate 3. The sole plate 3 and the base plate 41 can therefore be rotated relative to one another in a first plane by an angle determined by the length of the concentrically running slots 47a, 47b and can be fixed in a desired position.

In a similar manner, the two angle elements 4 and 5 can be displaced relative to one another and fixed in a second plane preferably perpendicular to the first plane. The deflection element 1 can therefore be displaced and rotated in the first plane and tilted or inclined relative to this first plane (rotation in the second plane). To this end, the wing pieces 42a; 42b and 52a; 52b are each connected to one another with a screw 44a; 44b, these screws forming an axis about which the two angle elements 4, 5 can be rotated

relative to one another, and can be mutually fixed by at least one further screw 46a; 46b.

5 Provided in each of the wing pieces 42a; 42b of the first angle element 4 is a hole for passing a first screw 44a; 44b through and a slot 48a; 48b which runs concentrically thereto and inside which the further screw 46a; 46b serving for the fixing is guided during a mutual rotation of the two angle elements 4, 5. The screws 44a; 44b and 46a; 46b, which are guided by holes and slots 48a; 48b in the wing pieces 42a; 42b of the first angle element 4, are screwed into tapped holes, 10 corresponding thereto, in the wing pieces 52a; 52b of the second angle element 5. The two angle elements 4 and 5 can therefore be rotated relative one another in the second plane by an angle determined by the length of the concentrically running slots 48a, 48b and can be fixed in a desired position. It is shown in fig. 1 and fig. 2 that the wing pieces 42a, 42b of the first angle element 4 enclose the wing pieces 52a, 52b of the second angle element 5 from outside. Of course, the measures described for connecting the two angle elements 4, 5 may also be transposed (wing pieces 42a, 15 42b on the inside).

The deflection element 1 may now be connected to 25 the second angle element 5 directly or, as shown in figs 1 and 2, via a supporting yoke 6. The second angle element 5 may also be formed in an extension in accordance with the form of the supporting yoke 6. The supporting yoke 6 preferably has a certain elasticity, 30 which prevents sudden tensile forces, in particular in the region of the bending zones, from being able to cause deformations at the lines 15.

The second angle element 5, as shown in fig. 3, is preferably connected to a mounting block 7, to which 35 the lines 15 or guide tubes 8 provided for the lines 15

can be fastened. In this case, the mounting block 7 provides protected access to the deflection element 1. The lines 15 can also be held by the mounting block 7, so that pulling movements are absorbed by the holder 2 and not by the deflected line 15.

The deflection element 1 has an inner guide element 11 in which a line 15 coming from a first direction is deflected in a second direction. The deflection element 1 preferably also has a cover 12, which together with the inner guide element 11 forms a cable duct, inside which the deflected lines 15 run in a protected manner.

The inner guide element 11 and the outer guide element 12 corresponding thereto preferably have a drop-shaped profile. According to respective requirements, other profiles may also be selected. The protective device according to the invention may of course be used for any desired electrical or optical lines 15, but also for liquid lines.

Since potential differences may occur which are disturbing over longer distances, adjacent holders 2 are preferably connected to an electrical cable 9, by means of which equipotential bonding is effected. As a result, data transmission errors which are caused by potential differences, and the cause of which can normally hardly be determined, can be avoided.

The holder 2 and the deflection element 1 are preferably made of corrosion-resistant materials. Suitable materials are, for example, plastics which have the requisite strength, stainless steel or galvanized metals.

As described above, screws 45, 46a and 46b are provided for the mutual fixing of the sole plate 3 and of the angle elements 4, 5 and thus of the deflection element 1. However, it is also possible to fix the

deflection element 1 directly with a screw which is preferably screwed into the bearing surface, e.g. a sewer wall, at that end of the deflection element 1 which is remote from the holder 2, e.g. by a flange.

Patent claims

1. A protective device, in particular for lines (15) to be laid in sewage systems, having a deflection element (1) which can be mounted by means of a holder (2) and by means of which lines (15) coming from a first direction can be deflected in a second direction, characterized in that the holder (2) has a first angle element (4) which, in a rotatable manner about a first axis, is connected to a sole plate (3), it being possible for said sole plate (3) to be mounted on a bearing surface, and which, in a rotatable manner about a second axis, is connected to a second angle element (5), to which the deflection element (1) is fastened, and can be fixed.

2. The protective device as claimed in claim 1, characterized in that the first and/or the second angle element (4; 5) have a base plate (41; 51) and one or two wing pieces (42a; 42b and 52a; 52b resp.), which together with the base plate (41; 51) form an L-profile or a U-profile, in which case the wing pieces (42a; 42b and 52a; 52b resp.) of the first and of the second angle element (4; 5) can be connected to one another in such a way as to enclose a selectable angle.

3. The protective device as claimed in claim 1 or 2, characterized in that the sole plate (3) and the base plate (41) of the first angle element (4) are mutually rotatable about a screw (43) forming the first axis, and the wing pieces (42a; 42b and 52a; 52b resp.) of the first and of the second angle element (4; 5) are mutually rotatable about at least one screw (44a; 44b) forming the second axis, the first and the second axis preferably running at right angles to one another.

4. The protective device as claimed in one of claims 1, 2 or 3, characterized in that the second angle

element (5) is connected to the deflection element (1) directly or via an elastic or firm supporting yoke (6).

5 The protective device as claimed in one of claims 1 to 4, characterized in that the second angle element (5) is connected to a mounting block (7), to which the lines (15) or guide tubes (8) provided for the lines (15) can be fastened.

6 The protective device as claimed in one of claims 1 to 5, characterized in that the deflection element
10 (1) comprises a guide element (11) serving to accommodate the lines (15) and preferably having a drop-shaped profile.

7 The protective device as claimed in claim 6, characterized in that the guide element (11), which is
15 open outward, can be closed by a cover (12) in such a way that a cable duct for the lines (15) is formed by the deflection element (1).

8 The protective device as claimed in one of claims 1 to 7, characterized in that the first and the second
20 angle element (4; 5) and the base plate (41; 51) and/or the deflection element (1) can be fixed by at least one further screw (45 and 46a; 46b resp.).

9 The protective device as claimed in one of claims 1 to 8, characterized in that the first angle element
25 (4), in the base plate (41) and in the wing piece (42 or 42a, 42b), has an aperture for passing the first and the second screw (43 and 44a; 44b resp.) through and, concentrically thereto, at least one slot (47a; 47b or 48a; 48b) each, through which the further screws (45
30 and 46a; 46b resp.) serving to fix the device pass.

10 The protective device as claimed in one of claims 1 to 9, characterized in that the sole plate (3) is provided with slots (31; 32) which preferably run in the longitudinal direction and transversely thereto and
35 serve to pass mounting screws (33) through.

11. The protective device as claimed in one of claims
1 to 10, characterized in that a cable (9) can be
connected or is connected to the holder (2), by means
of which cable (9) at least two protective devices can
5 be connected to one another for the purpose of
equipotential bonding.

12. The protective device as claimed in one of claims
1 to 11, characterized in that the holder (2) and/or
the deflection element (1) are at least partly produced
10 from a corrosion-resistant material, such as plastic or
stainless steel.