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The invention relates to a sealing element for insertion in a cable protection tube to be laid underground and to accommodate cables for conducting data and/or electricity.

A generic sealing element is known from DE 42 25 916 C2, in which an insert made of open-cell foam plastic of disc shape and oversize is inserted into a conical housing of pot shape. The known sealing element, as well as that of the present invention, has the purpose of sealing against alluvial sand an inlet or outlet opening into the cable protection tube surrounding the housed cables, while still allowing the mechanical insertion of cables into the buried cable protection tube. The jacket of the housing is slotted in the axial longitudinal direction and has a predetermined breaking point so that the housing can be bent open over cables that have already been drawn in and adapted for different internal pipe diameters. Since there is a large volume demand for cables and cable protection tubes in the field of network technology, there is great interest in low manufacturing costs.

EP 1 187 287 A1 concerns a divisible sealing element for cable ducts. From DE 37 39 714 C1, a device for closing and sealing the free end of a cable conduit is known. DE 44 16 682 C1 describes a cable protection tube and a manufacturing method therefore. US 3,562,847 discloses a slotted round bushing.

It is the task of the invention to overcome the disadvantages of the prior art, in particular to further develop a sealing element for inserting the end of the cable protection tube in such a way that the manufacturing costs can be significantly reduced while maintaining the functional requirements of tightness, in particular of alluvial sand tightness, while ensuring reliable assembly of the sealing element on the cable protection tube, in particular also for inexperienced assembly personnel.

This objective is solved by claim 1.

Accordingly, the sealing element consists in particular exclusively of a foam body in the form of a disc or in the form of a cylinder formed from an open-cell, permanently elastic plastic foam which has a bulk density of less than 110 kg/m^3 and is intended to be pressed into a cable protection tube which is to be laid or has already been laid or into a protective sleeve housing which is to be fitted into the cable protection tube. In particular, the sealing element consists exclusively of the foam body and may require only the sleeve housing to form the sealing element according to the invention and to realize an injury-free mounting of the foam body into the cable protection tube. However, the sealing element can also develop its sealing function and assembly capability without a corresponding sleeve housing. Preferably, the sealing element is constructed in the same way as DE 42 25 916 C2 with regard to the shape, so that its content with regard to the contour details is to be incorporated as a reference.

According to the invention, the bulk density of less than 110 kg/m^3 is significantly lower than that of conventional foam bodies, which are provided with bulk densities of between 150 kg/m^3 and 200 kg/m^3 . Tests conducted by the applicant showed that when the bulk density was significantly reduced below 110 kg/m^3 , the impermeability function, in particular the alluvial sand impermeability, was surprisingly not affected or hardly affected at all, but the material cost could be significantly reduced. Even with a manufacturing tolerance of the foam body with respect to the bulk density of $\pm 15 \%$, at most $\pm 15 \text{ kg/m}^3$, a significant material saving can be achieved according to the invention, while the impermeability standards remain completely fulfilled.

The bulk density is determined according to ISO 845 and is also known in the art as geometric density or density. The bulk density of the foam body according to the invention can also be selected to be less than 100 kg/m^3 or 90 kg/m^3 . In particular, it was found that a minimum bulk density of at least 50 kg/m^3 should not be fallen short of, and preferably a minimum bulk density of at least 60 kg/m^3 is advantageous as a minimum bulk density. The preferred raw density range of the open-cell foam is between 50 kg/m^3

and 110 kg/m^3 , in particular 55 kg/m^3 and 110 kg/m^3 , 60 kg/m^3 and 110 kg/m^3 , 65 kg/m^3 and 110 kg/m^3 or 70 kg/m^3 and 110 kg/m^3 . Sufficient sealing results with significantly reduced density are achieved if a foam body with an open-cell plastic foam of 65 kg/m^3 to 85 kg/m^3 , in particular 70 kg/m^3 to 80 kg/m^3 , in particular $\pm 15 \%$ (or $\pm 3 \text{ kg/m}^3$) is selected. According to the invention, significantly lighter plastic bodies with a density of up to half the density of known foam bodies are sufficient to meet the tightness requirements. Tests showed that an open-cell foam with a bulk density of about 75 kg/m^3 or 77 kg/m^3 achieves very good sealing results, with a significant material saving.

The material for the foam is preferably a permanently elastic, fine-pored, impregnable flexible foam, whereby in particular the impregnation can be formed from a polyurethane without plasticizers. Other materials can also be used for the open-cell foam, which has the desired bulk density.

In a preferred embodiment of the invention, an outer diameter of the cylindrical or possibly slightly frustoconical (the minimum outer diameter) foam body in its unassembled state is at least 15% larger, preferably in a range between 15% and 35%, in particular between 17% and 28% larger, compared to a largest inner diameter of the cable protection tube at its open insertion end where the sealing element is to be inserted or compared to a largest inner diameter of a sleeve housing of the sealing element. Preferably, the sealing element is sized with an outer diameter of 50 mm or more, but it is preferred to be formed smaller than 250 mm or 200 mm. A preferred range of outer diameters may be defined between 80 mm and 160 mm. In the case of a sleeve housing, corresponding inner diameters are relevant. The outer diameter of the foam body in the unassembled state is larger in accordance with the oversize defined according to the invention.

Preferably, the sleeve housing is made of a rigid material, such as plastic or metal, in particular injection molded.

It was found that at these oversizes of the foam body, sufficient tightness of the sealing element is achieved without having to consider larger bulk densities of 150 kg/m^3 or more. In particular, a bulk density of 70 kg/m^3 to 80 kg/m^3 and an oversize of at least 15% are sufficient to meet the sealing requirements. An oversize of more than 35% is, in particular, not necessary to meet the tightness requirements even at low bulk densities.

In a further embodiment of the invention, the foam body is provided with separable preformed cutout holes or punchout holes which are held to the foam body via predetermined tear points to form a structural foam body unit. The cutouts are used to provide dimensionally accurate passages in the foam body to allow cables to pass therethrough exiting the cable protection tube. The cut-out holes or punch-out holes form continuous, predetermined inner contact surfaces in the axial direction, which are opposite each other in pairs and realize a seal against alluvial sand when the cut-outs and punch-outs remain. These contact surfaces form sealing surfaces with the one or more cables and open into the predetermined tear point in order to be able to separate one or more cut-outs or punch-outs from the foam body, which are adapted to the dimension of predetermined cables. Preferably, the inner surfaces are circular section-shaped for snug fitting to the cables, in particular cylindrical cables.

In a further development of the invention, the bulk density of the foam body is set below 110 kg/m^3 and, in particular, the oversize of the foam body relative to the inside of the cable protection tube or the sleeve housing is set such that a fine sand tightness test, in particular a standardized one, is successfully carried out.

Such a fine sand tightness test can be carried out, for example, by installing various pipe sizes in a press box with dimensions of, for example, $1 \text{ m} \times 0.5 \text{ m}$. The end of the pipe projecting into the box is then covered with the respective maximum number of cables. The pipe end projecting into the box is covered with the respective maximum number of cables. The box is then filled with sand and compacted. In the course of four weeks, 30 l

of water is poured out on the surface of the filling once a day. At the end of four weeks, it must be checked whether the sealing element has allowed sand to pass through in addition to the water that has seeped through. The fine sand test was successful if sand did not enter the pipe in large quantities. A very small amount of sand cannot be avoided.

In a further development of the invention, a film, in particular of PET, is laminated at least on an outer end face, in particular exclusively on an outer end face of the disc-shaped sealing element, which preferably faces away from the inside of the cable protection tube. Preferably, the complete outer end face is covered with the film, the films also being cut along the edges, in particular in the course of the cut-out edges. Preferably, the film has a thickness of less than 100 μm , preferably between 10 μm and 60 μm , preferably about 30 μm .

In a preferred embodiment of the invention, the foam body is inserted into the particularly rigid sleeve housing, preferably made of plastic, which has a container shape with a bottom or blind hole bottom and an axially opposite insertion opening. To mount the oversized foam body in the sleeve housing, it is inserted into the insertion opening. Preferably, a cylindrical or slightly conical sleeve jacket is provided between the insertion opening and the blind hole bottom, in particular in one piece. The slightly conical sleeve jacket preferably has a conicity in which the jacket increases slightly towards the bottom of the sleeve housing. A slightly conical shape is then formed in particular if the conicity is less than 10° or 5° relative to the axial direction.

The sleeve housing can have a radially outwardly extending abutment collar at the insertion opening, which can define a contact surface for positioning the sealing element. Alternatively and/or additionally, the sleeve housing is slotted in the longitudinal direction in such a way that it can grip around a mounted cable along its circumference after radial expansion of the sleeve housing. In this case, the slot concerning the sleeve

housing is fully continuous in the axial direction and the bottom of the sleeve housing is designed at least as far as a radial center.

In a further embodiment of the invention, the sleeve housing is formed with at least one target separating section by means of which the sleeve housing can be reduced by a target separating section, in particular in the form of a partial container, so that it can adapt to circumferential dimensions of different sizes.

The at least one predetermined separating section is bounded by two slots extending in the axial direction and is coupled to the sleeve body on both sides by means of at least one predetermined breaking point in the region of the abutment collar.

According to the invention, in particular, each predetermined separating section is separably fixed to the rest of the sleeve housing exclusively in the region of the abutment collar, a single weak predetermined breaking point being formed on one end edge side of the predetermined separating section on the abutment collar, while at least two strong predetermined breaking points are designed on the opposite end edge side of the predetermined separating section in the region of the abutment collar, so that the separating force for separation is smaller on one end edge side than on the other side. This is to ensure that a single predetermined breaking point can be broken first without completely detaching the predetermined separating section from the rest of the sleeve housing. In this case, the predetermined break-off section forms a stiffener via which the entire sleeve housing, including the at least one predetermined break-off section connected via the strong predetermined break-off points, can be expanded. To reduce the circumference of the sleeve housing, the reinforced predetermined breaking point can then be broken and thus the one predetermined separating section can be removed. Preferably, two, three or more target breakaway sections can be provided for a sleeve housing, which can preferably be of different sizes to allow different circumferential adjustments to be made. The respective predetermined separating sections are secured

with strong predetermined breaking points to an adjacent predetermined separating section or to the sleeve housing, in particular in the area of the abutment collar.

Concentric indicator elements, such as arrows, may be visually visible on the abutment collar, particularly extending in a circular section along the target separating section and directed toward each other to provide adjustment of the remaining sleeve housing upon separation of the target separating section to a substantially cylindrical or slightly conical slotted sleeve housing of reduced circumference.

In a further embodiment of the invention, the open-cell foam body has an axial length that is greater than the maximum diameter of the foam body, in particular at least 50% greater. Alternatively or additionally, the axial length or axial thickness of the open-cell, preferably cylindrical foam body may be, in particular, between 50 mm and 100 mm, preferably between 55 mm and 80 mm, preferably between 60 mm and 75 mm, in particular about $60 \text{ mm} \pm 5 \text{ mm}$ or $75 \text{ mm} \pm 5 \text{ mm}$, for an outer diameter (in the uncompressed state) of between 50 mm and 100 mm, greater than 50 mm, 60 mm, 80 mm or 100 mm.

In a preferred further development of the invention, the abutment collar of the sleeve housing, which lies in a radial plane, is not formed by a continuously rotating ring section (which may be separate from the predetermined breaking point), but by a plurality of, in particular more than 10 or 15, extending radially outwardly from the sleeve jacket of the sleeve housing, wherein in particular the row of lamellae arranged in the circumferential direction each have two different inward extensions, wherein preferably the radial outward extension of all lamellae is substantially the same. In addition, the different radial extensions are alternated in the circumferential direction.

The abutment collar of the sleeve housing is preferably provided with one or more radially inwardly projecting projections which protrude radially inwardly beyond the dimension

of the inside of the sleeve jacket to ensure a retaining function of the inserted foam body, which is held axially by the radially inwardly projecting abutment collar sections. In this way, assembly is simplified due to the axially immovable retention of the foam body within the sleeve housing.

Further advantages, features and characteristics of the invention are given in the subclaims.

Further features, advantages and characteristics of the invention are made clear by the following description of a preferred embodiment of the invention with reference to the accompanying drawings, in which show:

- Fig. 1 a perspective view of an embodiment of the sealing element according to the invention;
- Fig. 2 a top view of a sleeve housing according to the sealing element in Fig. 1;
- Fig. 3 a top view of the open-cell foam body of the sealing element according to Fig. 1 without being inserted in the sleeve housing;
- Fig. 4 a perspective view of a sealing element according to the invention in a further embodiment;
- Fig. 5 a top view of the sleeve housing of the sealing element according to Fig. 4;
- Fig. 6 a top view of the open-cell foam body of the sealing element according to Fig. 4;

- Fig. 7 a perspective view of a sealing element in a further embodiment of the invention;
- Fig. 8 a top view of the sleeve housing according to Fig. 7 without the foam body inserted; and
- Fig. 9 a top view of the open-cell foam body according to the sealing element in Fig. 7.

Three different embodiments of the invention are shown in the figures, with Figs. 1, 4 and 7 depicting the sealing element in its entirety, i.e. with sleeve housing 5 and plastic foam body 3, while Figs. 2, 3, 5, 6, 8 and 9 depict the respective exclusive individual components, plastic foam body 3 and sleeve housing 5, respectively. It should be understood that an essential aspect of the sealing element 1 is the plastic foam body 3, which may optionally be combined with a sleeve housing 5.

The sealing element 1 according to the invention is used to seal an end of a cable protection tube, not shown in more detail, which is already equipped with cables or micro tubes. Cables are generally accommodated loosely within the rigid cable protection tube and pass sealingly through the sealing element 1 according to the invention.

Figs. 1, 2 and 3 show the components of a first embodiment of the sealing element according to the invention, which has the disc-shaped or cylindrical plastic foam body 3 and the sleeve housing 5 as its main components.

The sleeve housing 5 according to Fig. 2 has a pot shape with a slightly conically shaped sleeve jacket 7 and an end wall base 11, which is provided with predetermined breaking lines 13, which extend in a curved manner and allow break-out in sections. The predetermined breaking lines 13 extend linearly from one circumferential end edge to the

other circumferential end edge, the circumferential end edge forming a transition region between the end wall base 11 and the sleeve housing 7 of the sleeve housing 5.

The sleeve jacket 7 is substantially conical or frustoconical, with the inner diameter of the sleeve jacket 7 decreasing slightly from the end wall base 11 towards a front insertion opening 17. The conicity angle to the axial direction A is less than 10° . This is to ensure that, at least in the region of the insertion opening, a good seal is created with respect to the inserted plastic foam body 3. Furthermore, the sleeve jacket 7 comprises at least one longitudinal slot 15 which ends in the transition region between the sleeve jacket 7 and the end wall base 11, wherein the longitudinal slot 15 can extend into the end wall base 11. The at least one longitudinal slot 15 opens up the radially circumferential expansion of the sleeve sheath 7 to facilitate the assembly/gripping of the sealing element 1 around at least one cable or micro-tube received by the cable protection tube. At the end of the sleeve sheath 7 opposite the end wall base 11, the insertion opening 17 is defined by the sleeve sheath 7. Also formed at this end is a radially extending, substantially circumferential abutment collar 21 which forms an annular abutment surface 23 which can come into abutment with a wall portion of a building/cellar not shown. The contact surface of the abutment collar 21 opposite the outer contact surface 23 can also be of planar design, in order to ensure that the sleeve housing 5 is also placed there.

As can be seen in Fig. 1, the abutment collar 21 has a radially extending slot extension 25 which continues at the longitudinal slot 15 of the sleeve jacket 7. A substantially triangular abutment 27 is provided on the radial slot extension 25 to define a spacing between the two ends of the abutment collar 21, which define a gap greater than 1 mm of the slot extension 25. In order to form a structural unit, the narrow end of the stop 27 can be firmly coupled, in particular formed integrally, with the opposite edge of the abutment collar 21 in accordance with a predetermined breaking point. This ensures safe transport of the sealing element 1, in particular of the sleeve housing 5, whereby a loosening of this predetermined breaking point is necessary for expanding the sleeve housing 5 in the radial

direction and in the circumferential direction. This predetermined breaking point is also to be understood as a weak predetermined breaking point.

A special feature of the sleeve housing 5 according to Fig. 1 is that a further longitudinal slot (not shown in more detail) is incorporated in the sleeve jacket 7, which opens into a weakening area 31 of the contact flange 21. The weakening area 31 has two recesses which define two strong predetermined breaking bridges 35 which serve to make a predetermined separating section 33 separable from the rest of the main body of the sleeve housing 5. The predetermined breaking bridges 35 first hold the predetermined separating section 33 and the remaining main body of the sleeve housing 5 to form an assembly unit, so that when the sleeve housing 5 is expanded with the predetermined breaking bridges 35 intact, the entire sleeve housing 5 can be expanded. When the breakaway bridges 35 are separated, the breakaway section 33 becomes loose and can be removed from the sleeve housing 5, allowing the circumference of the sleeve housing 5 to be significantly reduced. In the embodiment of the sleeve housing 5 shown in Figs. 1 to 3, the circumferential width of the separating section 33 is about 15° to 30° to provide a desired circumferential reduction.

At the radial level of that predetermined breaking bridge 35 which lies further out on the abutment surface 23 of the abutment collar 21, circular segment shaped position orientation arrows 37, 41 are shown to be aligned with further arrows on the abutment collar 21 of the remainder of the sleeve housing 5, the arrows 37, 41 pointing towards each other and lying on the same concentric circumferential position. In this way, an assembler can detect non-concentric warp deformation of the sleeve housing 5 and take corrective action to form a substantially cylindrical or frustoconical interior of the sleeve housing 5 after the target separating section 33 has been removed, ensuring the sealing function of the sealing element 1.

The plastic foam body 3 has a cylindrical disc shape formed in the unassembled state, wherein the axial length of the plastic foam body 3 is significantly greater than the diameter of the plastic foam body 3. Preferably, an axial excess length of 150% of greater than 130% of the diameter of the plastic body is provided.

As can be seen when comparing the interior 29 of the sleeve housing 5, in particular its maximum diameter dimension, with the diameter dimension of the cylindrical plastic foam body 3, the latter has an oversize of at least 10% or 15%. In the embodiment shown in Figs. 1 to 3, the oversize amounts to about 24% to 26%.

The plastic foam body 3 has annular, concentric punch-outs 45, 47, each of which lies on a circular line concentric with the axis A and is interrupted by predetermined cracking points 51. The predetermined cracking points 51 form a length between the adjacent ends of the punch-outs of about 0.5 cm to 2 cm. In this way, it is possible to form the sealing element 1 with circular-cylindrical openings in which cables or microducts can be passed through to be accommodated in the cable protection tube, which is not shown in greater detail. In the embodiment shown in Figs. 1 to 3, two different sizes of cable are provided. The circular ring-shaped punched holes 45, 47 are arranged concentrically to each other.

Furthermore, for simplified assembly of the cables to be inserted, a radial longitudinal cut-out 53 is provided which extends radially inwards from the outside of the sleeve housing 5, in particular beyond the center of the plastic foam body 3.

When the small sealing element section 55 is cut out, a simple assembly can be realized due to the longitudinal cut-out 53 by expanding the plastic foam body 3 and gripping around the cable to be sealed.

In the case of the punched-out portions 55, 57, sealing surfaces 45, 47, 53 which extend axially are formed in close contact with one another, the flat contact being reinforced by

the oversize of the plastic foam body 3 relative to the sleeve housing when the plastic foam body 3 is inserted into the interior 29 of the sleeve housing 5. After the punched-out portions or foam body portions 55, 57 are released from the composite of the plastic foam body 3, the sealing surfaces 45, 47, 53 form actual sealing surfaces with the cables received by the cable protection tube, which are not shown in detail in the figures.

The plastic foam body 3 has a laminated film, in particular a protective film made of PET, on its end face 61 facing outwards in the inserted state. The protective film has a thickness of about 30 μm , which significantly increases the sealing behavior of the plastic foam body 3 pressed into the interior 29. In this case, it is advantageous if the thin laminated-on protective film does not exceed a thickness of 100 μm .

The plastic foam body 3 is a permanently elastic, open-cell, fine-pored polyurethane flexible foam, which can preferably be impregnated. An impregnation can, for example, be a modified polyacrylic without plasticizers.

According to the invention, the foam body 3 has a reduced bulk density, which is to be determined according to ISO 845. It is 77 kg/m^3 for embodiments shown in Figs. 1 to 8. A tolerance range of $\pm 15\%$ is to be considered, which is to depend on the precision of the manufacture of the plastic foam body 3.

Figs. 4 to 6 show a further embodiment of a sealing element 1 according to the invention, whereby the same reference signs are used for similar or identical components of the sealing element 1 to make the description of the figures easier to read.

The sealing element 1 according to Figs. 4 to 6 differs from the embodiment according to Figs. 1 to 3 in the design of the punched holes, whereby several different punched holes 71, 73, 75, 77 and 79 (five in number) are provided in the plastic foam body 3. This serves

to accommodate different cable cross-sections in a sealing manner in the plastic foam body 3.

The sealing surfaces 45, 47, 53 are also partially prefabricated and formed by cutouts. With unseparated cutouts 71, 73, 75, 77 and 79, the sealing surfaces 45, 47, 53 lie close together so that the sealing element 1 is sealed against the ingress of sand and water.

A further difference to the design according to Figs. 1 to 3 lies in the design according to Figs. 4 to 6 in the number of target separating sections 33, of which two are provided, the second being provided with the reference number 36. In this way, the circumference of the sleeve housing 5 can be reduced in two stages. The two target separating sections 33 and 36 are attached to each other via two corresponding pairs of target break bridges 35, where they can be broken to separate the respective target separating section 33, 36 from the rest of the sleeve housing 5.

Finally, based on the further target separating section 36, an additional position orientation arrow 39 is provided to ensure the correct orientation of the remaining sleeve housing 5 to a substantially circular or cylindrical reduced sleeve housing 5.

In Figs. 7 to 9, a further embodiment of the sealing element 1 according to the invention is indicated, in which the same reference numerals are also provided for similar and identical components of the sealing elements described above.

The sealing element 1 according to Figs. 7 to 9 differs from the aforementioned sealing elements 1 in the design of the punched holes (detachable foam body sections), with two smallest punched holes 81, three medium-sized punched holes 83 and one large punched hole 85 with a non-circular cross-section, for a cable to be accommodated by the cable protection tube, which may have a square cross-section.

Furthermore, the sleeve housing 5 differs in the design of the continuously interrupted abutment collar 21, which is formed from a plurality of plates or wings 91 extending radially from the outside of the sleeve jacket 7, each of which is arranged at equidistant intervals with an intermediate gap 93 between them. Alternating from the respective collar plates 91 are radially inwardly extending retaining internal projections, with a radially internal projection 95 being provided at every other plate 91. These retain the plastic foam body 3 in the axial direction so that it cannot leave the insertion opening 17. In contrast to the embodiments according to Figs. 1 to 3 and 4 to 6, the sealing element 1 according to Figs. 7 to 9 has no predetermined separating sections, but only a longitudinal slot 15 for radial circumferential expansion of the sleeve housing 5.

As can be seen in Figs. 3, 6 and 9 of the respective sealing elements 1, the foam body has an oversize compared to the inner diameter dimension (largest dimension) of the sleeve housing 5 of about 25%, the embodiments according to Figs. 1 to 3 about 17% and for the embodiment according to Figs. 4 to 6 and about 27% for the embodiment according to Figs. 7 to 9.

The features disclosed in the foregoing description, figures, and claims may be significant both individually and in any combination for the realization of the invention in the various embodiments.

Reference numbers

1	sealing area
3	plastic foam body
5	sleeve housing
7	sleeve jacket
11	end wall base
13	predetermined break lines
15	longitudinal slot
17	inserting opening
21	abutment collar
23	abutment surface
25	slot extension
27	abument
29	interior
31	weakening area
33, 36	predetermined tear section
35	predetermined breaking bridge
37, 39, 41	position orientation arrow
45, 47	sealing surface
51	predetermined tear position
53	longitudinal cut-out
55, 57	releasable foam body section / punched-outs
71, 73, 75, 77, 79	releasable foam body section / punched-outs
81	releasable foam body section / smallest punched-out
83	releasable foam body section / medium size punched-out
85	releasable foam body section / large punched-out
91	plates/wings
93	intermediate gap
95	radially internal projection
A	axial longitudinal direction

PATENTKRAV

1. Tætningselement (1) til indsætning i et kabelbeskyttelsesrør, hvorigennem kabler lægges under jorden, hvilket tætningselement består af et skumstoflegeme (3) fremstillet af et skumstof med åbne porer, hvor skumstoflegemet (3) er indsat i et hylsterhus (5), der har en beholderform med en grunddel (11) og en aksialt modstående indføringsåbning (17), hvor en cylindrisk, let konisk hylsterkappe (7) er anbragt mellem indføringsåbningen (17) og grunddelen (11), hvor hylsterhuset (5) omfatter mindst én forudbestemt adskillelissektion (33, 36),

kendetegnet ved, at skumstoffet med åbne porer har en tilsyneladende densitet på mindre end 110 kg/m^3 og mindst 50 kg/m^3 , hvor den forudbestemte adskillelissektion (33, 36) er afgrænset i den periferiske retning af to slidser (15), der udstrækker sig i den aksiale retning (A) og er forbundet med hylsterhuset (5) på begge sider ved hjælp af mindst ét forudbestemt brudpunkt.

2. Tætningselement (1) ifølge krav 1, kendetegnet ved, at den tilsyneladende densitet er mindre end 100 kg/m^3 eller 90 kg/m^3 .

3. Tætningselementet (1) ifølge krav 1, kendetegnet ved, at den udvendige diameter af det cylindriske skumstoflegeme (3) i ikke-monteret tilstand er mindst 15% større i forhold til en største indvendige diameter på kabelbeskyttelsesrøret ved dets åbne indføringsende eller i forhold til et hylsterhus (5) til tætningselementet (1).

4. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at skumstoflegemet (3) har gennemgående forud-arrangerede indvendige kontaktflader i den aksiale retning, som, ved dannelsen af tætningsflader med ét eller flere kabler, munder ud i et forudbestemt brudpunkt for kunne at adskille én eller flere udstansning(er) eller udskæring(er) fra skumstoflegemet (3).

5. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at den tilsyneladende densitet af skumstoffet med åbne porer er fastlagt til under 110 kg/m^3 således, at der kan gennemføres en vellykket tæthedstest med fint sand.

6. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at mindst én udvendig endeflade af skumstoflegemet (3) er lamineret med en folie, specielt af PET, hvilken folie har en tykkelse på mindre end $100 \text{ }\mu\text{m}$.

7. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at en anlægsflade (21), der strækker sig radialt udad ved indføringsåbningen (17), er tilvejebragt,

og/eller at hylsterhuset (5) er slidset i den langsgående retning (A) således, at det kan omkranse et monteret kabel langs dets omkreds efter radial udvidelse.

8. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at to eller tre adskillelissektioner af forskellige størrelser med respektive forudbestemte brudpunkter er tilvejebragt til individuel adskillelse af den forudbestemte adskillelissektion.

9. Tætningselementet (1) ifølge krav 8, kendetegnet ved, at den forudbestemte adskillelissektion (33, 36) har en periferisk udstrækning på mindre end 45°, hvor flere forskellige forudbestemte periferiske sektioner kan være tilvejebragt i området 10°, 15°, 20°.

10. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at skumstoffet med åbne porer (3) har en aksial længde, der er større end diameteren af skumstoflegemet (3), og/eller at den aksiale længde af skumstoflegemet (3) er i området mellem 50 mm og 100 mm.

11. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at de forudbestemte brudpunkter er anbragt i området ved en anlægsflade, der strækker sig radialt udad ved indføringsåbningen (17).

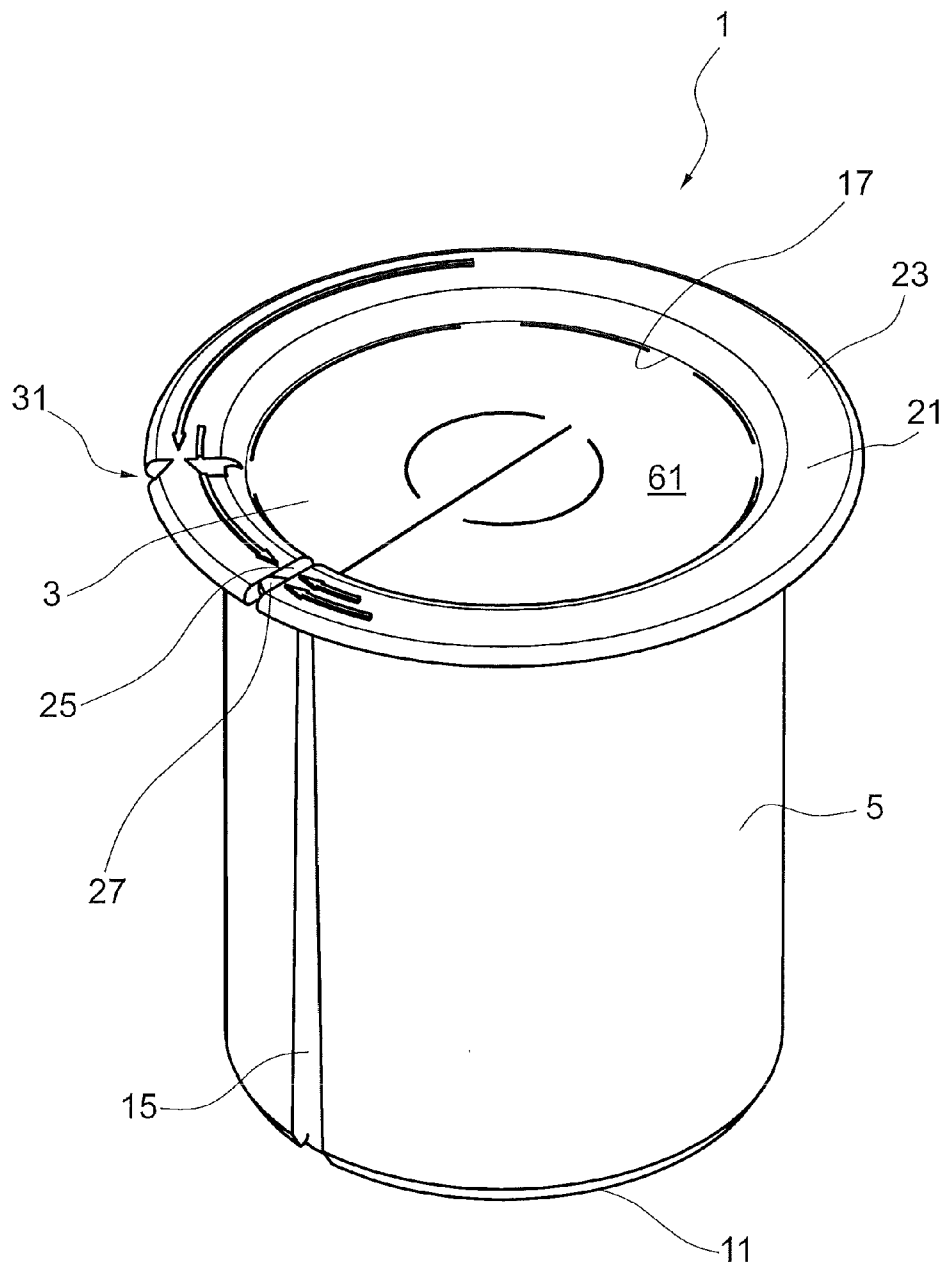
12. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at den mindst ene forudbestemte adskillelissektion (33, 36) er adskilleligt fastgjort til hylsterhuset (5) udelukkende i området ved en anlægsflade, der strækker sig radialt udad ved indføringsåbningen (17), hvor et enkelt svagt forudbestemt brudpunkt er dannet på anlægsflade på én endekantsside af den forudbestemte adskillelissektion (33, 36), mens mindst to stærke forudbestemte brudpunkter er dannet på den modsatte endekantsside af den forudbestemte adskillelissektion (33, 36) i området ved anlægsfladen.

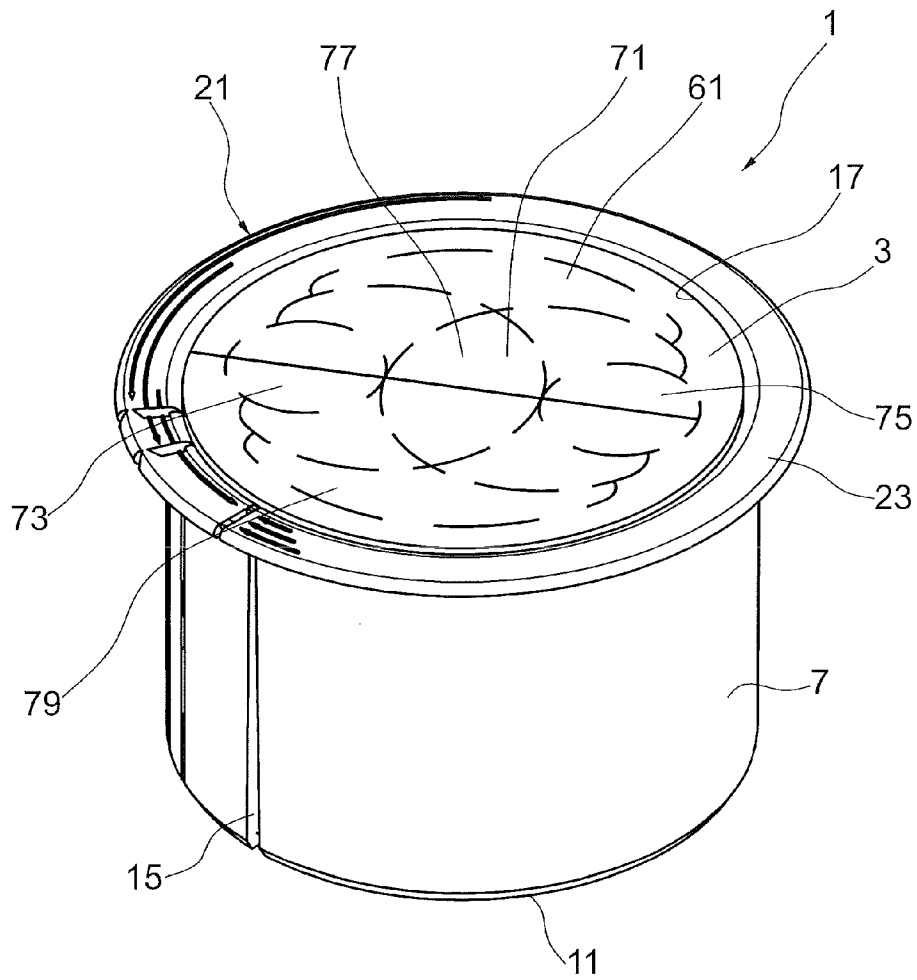
13. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at en anlægsflade (21), der strækker sig radialt udad ved indføringsåbningen (17), er tilvejebragt med en radialt strækkende slidsforlængelse (25), der fortsætter ved én af slidserne (15), hvor et i det væsentlige trekantet anslag (27) er tilvejebragt ved den radiale slidsforlængelse (25), hvilket anslag fikserer en afstand mellem to endeflader på anlægsfladen (21), hvor især afstanden er begrænset til en spalte på mere end 1 mm, og/eller hvor en smal ende af anslaget (27) er forbundet fast, specielt dannet integreret, med den modsatte kant på anlægsfladen (21) i overensstemmelse med et forudbestemt brudpunkt.

14. Tætningselementet (1) ifølge ét af de foregående krav, kendetegnet ved, at en kontinuerligt afbrudt anlægsflade (21), der strækker sig radialt udad ved indføringsåbningen

(17), er tilvejebragt med en flerhed af plader eller vinger (91), der strækker sig radiale fra uden for hylsterkappen (7), hvor især plader eller vinger (91) hver er anbragt med ækvivalente afstande til hinanden med en mellemspalte (93).

Drawings

Fig.1

Fig.4

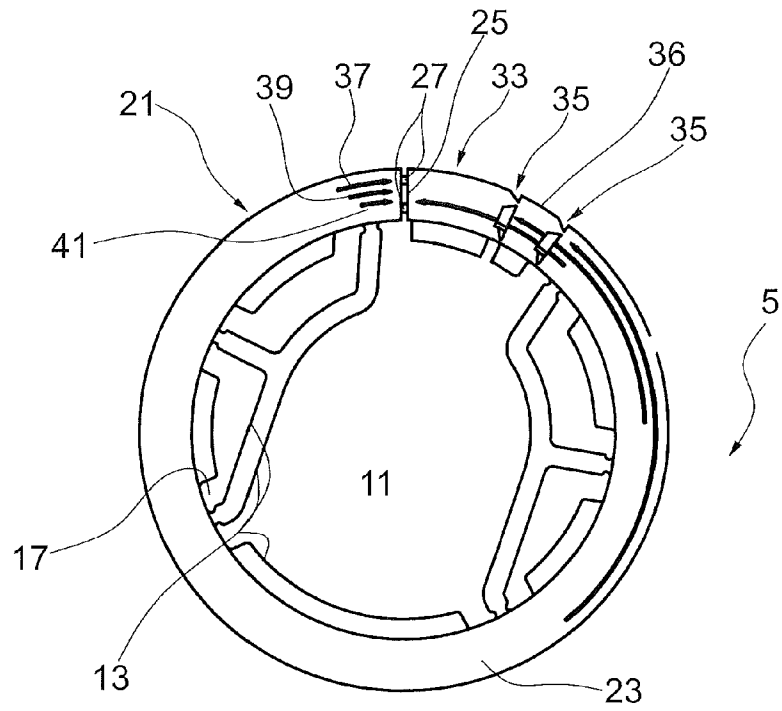


Fig.5

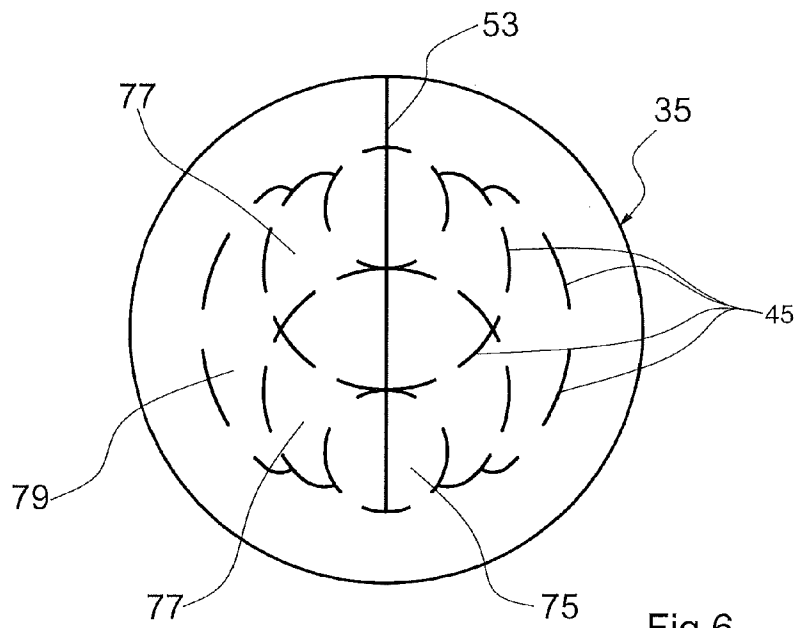
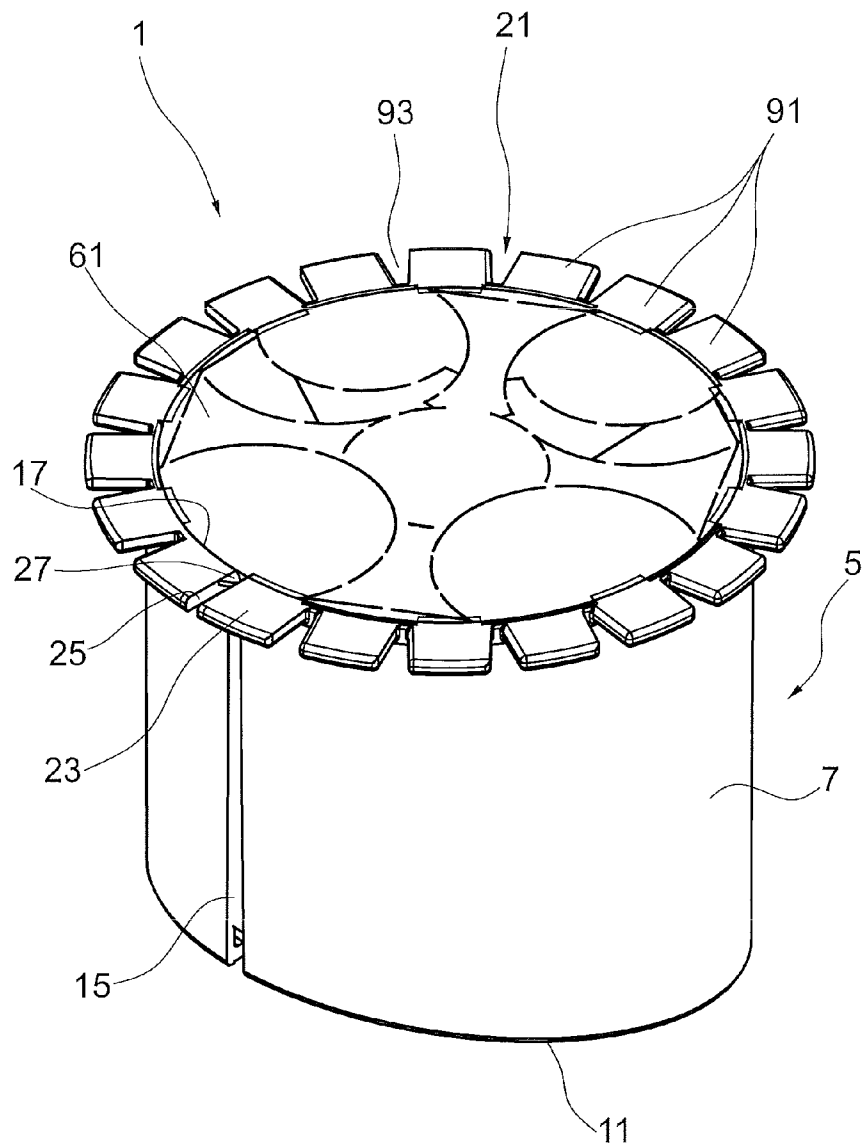


Fig.6

Fig.7

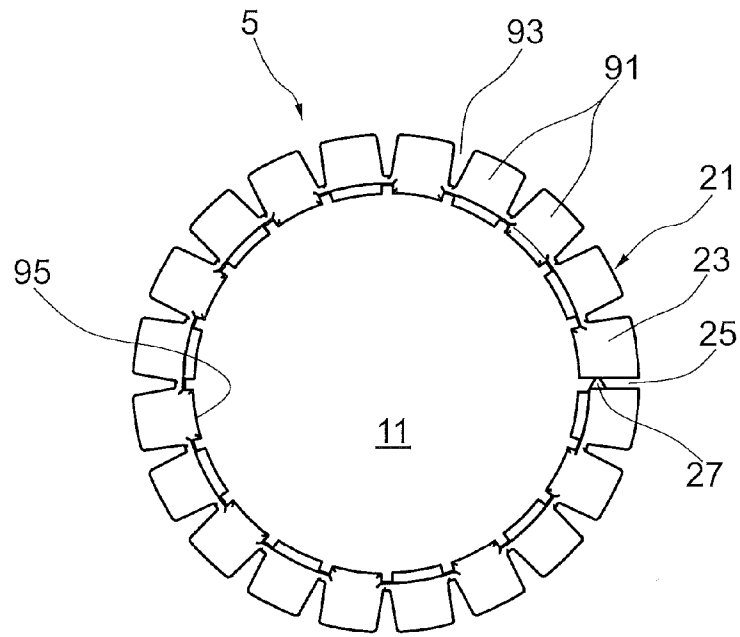


Fig. 8

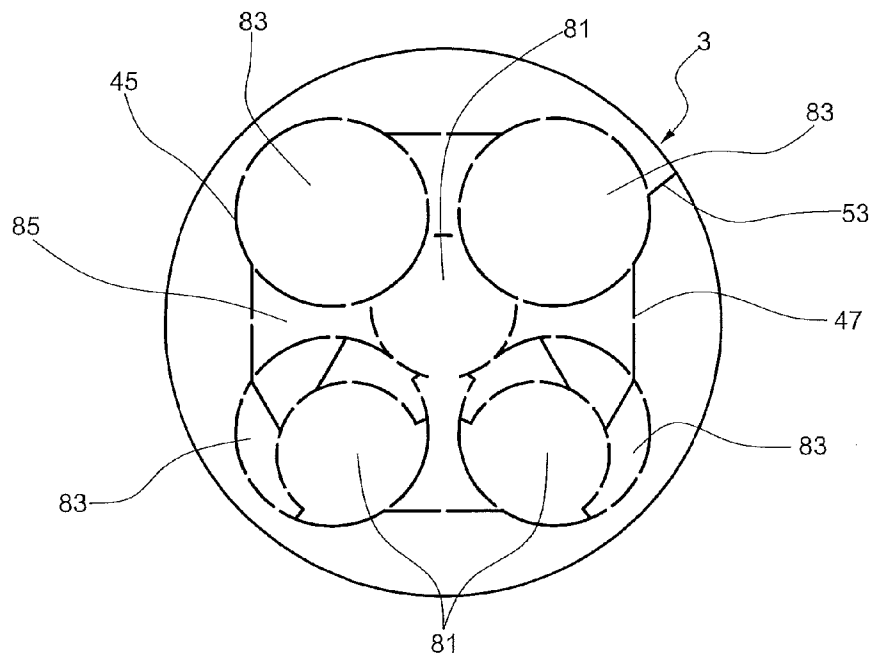


Fig. 9