METHOD FOR TIGHTLY JOINING TWO END SECTIONS OF CORRUGATED PIPES AND DEVICE FOR CARRYING OUT THIS METHOD

Inventor: Vaclav Sasek, Liberec (CZ)

Correspondence Address:
BAKER & DANIELS LLP
111 E. WAYNE STREET
SUITE 800
FORT WAYNE, IN 46802 (US)

Assignee: A.RAYMOND ET CIE, Grenoble (FR)

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ABSTRACT

The invention relates to a method for directly joining two end sections (3, 4) of corrugated pipes (1, 2), comprising the following steps: inserting the end sections (3, 4) of the corrugated pipes (1, 2) into a preferably inventive heat-shrinkable sleeve arrangement (8, 9); subjecting the heat-shrinkable sleeve arrangement (8, 9) to heat in the area of the end sections (3, 4) of the corrugated pipes (1, 2) so that the heat-shrinkable sleeve arrangement (8, 9) rests against the outside wall of the end sections (3, 4) of the corrugated pipes (1, 2), and; stress-free cooling the heat-shrinkable sleeve arrangement (8, 9) and the end sections (3, 4) of the corrugated pipes (1, 2) to a temperature at which the connection can be mechanically stressed. This enables end sections (3, 4) of corrugated pipes (1, 2) to be joined to one another easily and in a cost-effective manner.
METHOD FOR TIGHTLY JOINING TWO END SECTIONS OF CORRUGATED PIPES AND DEVICE FOR CARRYING OUT THIS METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a device for tightly joining two end sections of corrugated pipes.

[0003] 2. Description of the Related Art

[0004] One method for tightly joining two end sections of corrugated pipes is known from U.S. Pat. No. 4,141,576. The prior method for tightly joining two end sections of corrugated pipes comprises the steps of inserting the end sections of the corrugated pipes into a shrink tube assembly comprising a shrink tube coated on the inner side with an adhesive layer, applying heat to the shrink tube assembly, in the region of the end sections of the corrugated pipes, at a temperature such that the shrink tube assembly lies against the outer wall of the end sections of the corrugated pipes, and cooling the shrink tube assembly and the end sections of the corrugated pipes in a stress-free manner to a temperature at which the joint can be mechanically stressed.

[0005] Known from GB 2,269,643 A is a method for tightly joining two end sections of smooth-walled pipes by means of a shrink tube assembly, which in other respects is carried out in similar fashion to the method of the generic kind.

[0006] A method for tightly joining two end sections of corrugated pipes and an associated device are known from U.S. Pat. No. 5,335,945. According to that prior document, two end sections of corrugated pipes are joined to each other by means of a connector made of a flexible, stretchable plastic material, into which the end sections are inserted, with a given stretching of the corresponding sections of the connector. To achieve relatively high pressure-tightness, clamps are placed around a portion of the contact area between an end section and the connector and are tightened.

SUMMARY OF THE INVENTION

[0007] The present invention provides a method for joining the end sections of corrugated pipes by means of which such joining can be done very easily and with a good tightness result.

[0008] By virtue of the fact that a hot-melt adhesive is used in the method according to the invention, the corrugated pipes can be inserted very easily into the shrink tube assembly, since at this point the hot-melt adhesive has not yet been activated by the application of heat. In addition, the abrupt transition of the hot-melt adhesive from the solid phase to the liquid phase when the activation temperature is exceeded results in good sealing, since the then-liquid hot-melt adhesive is evenly distributed, thereby producing a very even coating and adhesive surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The above mentioned and other features and objects of this invention, and the manner of attaining them, will become more apparent and the invention itself will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

[0010] FIG. 1 is a perspective, partially cut-away view of two end sections of corrugated pipes, which are inserted into a shrink tube assembly possessing its original diameter;

[0011] FIG. 2 shows the embodiment of FIG. 1 with a schematic representation of the region in which heat is applied; and

[0012] FIG. 3 shows the arrangement according to FIG. 1, with a joint created after the application of heat.

[0013] Corresponding reference characters indicate corresponding parts throughout the several views. Although the exemplifications set out herein illustrate embodiments of the invention, in several forms, the embodiments disclosed below are not intended to be exhaustive or to be construed as limiting the scope of the invention to the precise forms disclosed.

DETAILED DESCRIPTION

[0014] FIG. 1 is a perspective, partially cut-away view of a first corrugated pipe 1 and a second corrugated pipe 2, whose respective end sections 3, 4 comprise a number of elevations and depressions 5, 6 and are arranged confronting each other. The corrugated pipes 1, 2 have been cut from quasi-endless stock, so-called "yard goods," it being the case here, as often happens, that the corrugated pipes 1, 2 have broken-out defect areas 7 on their faces that are disposed confronting each other in the representation of FIG. 1, as a result of cutting operations that did not yield a clean edge.

[0015] In the representation according to FIG. 1, the end sections 3, 4 of the corrugated pipes 1, 2 can be inserted into a shrink tube 8 of a shrink tube assembly, which in the illustrated exemplary embodiment is coated on its inner side, facing the end sections 3, 4 of the corrugated pipes 1, 2, with an adhesive layer 9 composed of a heat-activatable adhesive material as a further element of the shrink tube assembly. The shrink tube 8 is made of a synthetic material which when exposed to heat causes a reduction in diameter, i.e. shrinkage, of the shrink tube 8, by at least approximately one-third, preferably by approximately two-thirds of its original diameter. Before the application of heat, the shrink tube 8, as is clear from FIG. 1, has a large enough diameter so that the end sections 3, 4 of the corrugated pipes 1, 2 can be inserted into the shrink tube 8 without altering the shape of the shrink tube 8 or the adhesive layer 9.

[0016] FIG. 2 shows the arrangement according to FIG. 1 with a region 10, schematically outlined by a solid line, in which the shrink tube 8 is exposed to heat in the region of the end sections 3, 4, particularly by the delivery of warm air or warm water. The temperature herein is so adapted that during the application of heat, the shrink tube 8 contracts as intended in the radial direction, exerting a radial force on the end sections 3, 4, and the heat-activatable adhesive layer 9 develops its adhesive action.

[0017] FIG. 3 shows the arrangement according to FIG. 1 after the application of heat described with reference to FIG. 2, in the mechanically stressable state, after cooling to a suitable temperature. It can be seen from FIG. 3 that in this exemplary embodiment, the shrink tube 8, together with the adhesive layer 9, henceforth forms a labyrinthine seal at the end sections 3, 4 of corrugated pipes 1, 2, during which process, material of the shrink tube 8 and here particularly also of the adhesive layer 9 is made to conform to the outer contour of each end section 3, 4 of the corrugated pipes 1, 2 over at least three elevations 5 and three depressions 6 and thus lies against their corrugated outer walls.
This ensures that in the event of unfavorable flow behavior of the adhesive layer 9, for example due to its being applied in an inconsistent thickness—which can occur for technical reasons during production—or in the event of defect sites such as defect areas 7, which no longer appear in FIG. 3, a good sealing effect is achieved by the fact of the shrink tube 8 lying directly against the wall regions of the corrugated pipes 1, 2 over a relatively large segment in the longitudinal direction. It will be appreciated in particular that the presence of defect areas 7 is irrelevant to the quality of the seal. It will further be appreciated that the bending behavior of flexible corrugated pipes 1, 2 is not substantially compromised, since both the shrink tube 8 and the adhesive layer 9 have a certain flexibility.

While this invention has been described as having a preferred design, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

1-4. (canceled)
5. A method for tightly joining two end sections of corrugated pipes, comprising the steps of:
inserting the end sections of the corrugated pipes into a shrink tube assembly, the shrink tube assembly including a shrink tube coated on an inner side thereof with an adhesive layer comprising an adhesive that is activatable by heat;
applying heat to the shrink tube assembly at least in the region of the end sections of the corrugated pipes such that the shrink tube assembly lies against the outer wall of the end sections of the corrugated pipes; and
cooling the shrink tube assembly and the end sections of the corrugated pipes in a stress-free manner to a temperature at which the joint can be mechanically stressed.
6. The method of claim 5, wherein each of the end sections includes a plurality of elevations and depressions, and said inserting step further comprises covering at least three elevations and depressions of each of the end sections of the corrugated pipes with the shrink tube assembly.
7. The method of claim 5, wherein said applying step further comprises applying heat by means of warm air.
8. The method of claim 5, wherein said applying step further comprises applying heat by means of warm water.

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