which is a portion lower than the inversion leading end line 103, and therefore, the lining material 101 proceeds without rotation. However, in a bending portion which is included in the conduit P and bends toward the right or left, that is, which bends within a horizontal plane, the lining material 101 tries rotating from the state where the inversion leading end line 103 extends in the right-left direction (horizontal direction) as shown in FIG. 17A to the state where the inversion leading end line 103 extends in an up-down direction (vertical direction) to make the inversion easier. Because this behavior functions as a force to rotate the overall lining material 101, the lining material tries rotating in the circumferential direction of the conduit P in the bending portion, with the result that peeling occurs at the overlapping portion 101a.

[0007]

An object of the present invention is to prevent peeling at overlapping both circumferential ends (overlapping portion) of a lining material installed in a conduit.

Solution to Problem

[0007a]

According to a first aspect, there is provided a lining material for a conduit, the lining material being inverted to be inside out to line the conduit, the lining material comprising: an impermeable layer; a lining material main body provided inside the impermeable layer, the lining material main

body made into a tubular form by rolling a base material sheet, and the lining material main body having an overlapping portion thereby with its both circumferential ends overlapping each other; and a tubular member provided inside the lining material main body, the tubular member being a tubular woven fabric which has no seam in its axial direction, and the diameter of the tubular member being larger than the diameter of the lining material main body, wherein the tubular member has a slack portion or a folded portion in a state where the tubular member is squashed to be substantially flat in the lining material main body, and the tubular member having an outer side of the tubular member which contacts the overlapping portion of the lining material main body and an inner side of the tubular member which does not contact the overlapping portion of the lining material main body, wherein the slack portion or the folded portion of the tubular member is disposed on the inner side, so that the slack portion or the folded portion does not contact the overlapping portion of the lining material main body, and wherein the lining material main body and the tubular member are releasably jointed to each other.

[0007b]

In various embodiments, inside the lining material main body, the tubular member is releasably jointed to an inner surface of an overlapping portion where both circumferential ends of the lining material main body overlap each other.

[0007c]

In various embodiments, the impermeable layer includes a tubular woven fabric which is woven from synthetic yarns, an outer surface of the tubular woven fabric being coated with a coating of a thermoplastic resin.

[0007d]

According to a second aspect, there is provided a method for lining a conduit having a bending portion, the method comprising: impregnating the lining material as disclosed herein with a curable resin; and subsequently inverting the lining material to line the conduit.

[0008]

According to a first embodiment, a lining material for a conduit, the lining material being inverted to be inside out to line the conduit, includes: an impermeable layer; a lining material main body provided inside the impermeable layer, the lining material main body made into a

tubular form by rolling a base material sheet, with its both circumferential ends overlapping each other; and a tubular member provided inside the lining material main body.

[0009]

In this embodiment, the tubular member is provided inside the lining material main body, before inversion. Therefore, when the lining material is installed in the conduit while being inverted to be inside out, that is, while the lining material main body and the tubular member are inverted, the tubular member to be positioned outside prevents the overlapping both circumferential ends of the lining material main body from contacting an inner surface of the conduit. This prevents peeling at the overlapping both circumferential ends of the lining material main body, especially in a bending portion of the conduit where the lining material tries to rotate in the circumferential direction.

[0010]

According to a second embodiment, the lining material of the first embodiment is arranged such that a diameter of the tubular member is larger than a diameter of the lining material main body.

[0011]

In this embodiment, the diameter of the tubular member is larger than the diameter of the lining material main body, and therefore, it is possible to invert the lining material to be

inside out, that is, to invert the lining material main body and the tubular member, and the tubular member does not interfere with diameter expansion at the both circumferential ends of the inverted lining material main body.

[0012]

According to a third embodiment, the lining material of the second embodiment is arranged such that: the tubular member has a slack portion; and the slack portion does not contact an overlapping portion where both circumferential ends of the lining material main body overlap each other.

[0013]

In this embodiment, the slack portion of the tubular member does not contact the overlapping portion where the both circumferential ends of the lining material main body overlap each other. Therefore, as shown in FIG. 1, the slack portion (A) is not caught into the overlapping portion (2a) when the slack portion (A) of the tubular member (8) is extended in the process of inversion or diameter expansion, and the tubular member (8) prevents peeling of the overlapping portion (2a) (the overlapping both circumferential ends) of the lining material main body (2).

[0014]

According to a fourth embodiment, the lining material of any one of the first to third embodiments is arranged such that the lining material main body and the tubular member

are releasably jointed to each other.

[0015]

In this embodiment, the lining material main body and the tubular member are releasably jointed together into one member, and therefore, no shift occurs between the lining material main body and the tubular member when inverted. In other words, the lining material main body is not moved by a force applied to the tubular member, and this ensures prevention of peeling at the overlapping both circumferential ends of the lining material main body due to the tubular member when the tubular member is inverted.

[0016]

According to a fifth embodiment, the lining material of the fourth embodiment is arranged such that inside the lining material main body, the tubular member is releasably jointed to an inner surface of an overlapping portion where both circumferential ends of the lining material main body overlap each other.

[0017]

In this embodiment, inside the lining material main body, the tubular member is releasably jointed to the inner surface of the overlapping portion where the both circumferential ends of the lining material main body overlap each other. Therefore, in the process of lining, it is possible to prevent peeling by the tubular member at the overlapping portion of the lining

material main body, where the both circumferential ends thereof overlap each other, even in the case where the conduit has a complicated structure with a larger number of bending portions.

[0018]

According to a sixth embodiment, the lining material of any one of the first to fifth embodiments is arranged such that the tubular member is a tubular woven fabric.

[0019]

In this embodiment, the tubular member is a tubular woven fabric, which has high permeability of the liquid thermosetting resin to be impregnated into the lining material main body, and which reduces the possibility that the tubular member is deformed. Therefore, the lining process is performed stably.

[0020]

According to a seventh embodiment, the lining material of the sixth embodiment is arranged such that the tubular woven fabric has no seam in an axial direction of the tubular woven fabric.

[0021]

In this embodiment, since the tubular member has no seam in its axial direction, that is, which has no joint in the axial direction, its elongation in the circumferential direction is uniform. This facilitates smooth inside-out inversion of the lining material.

[0022]

According to an eighth embodiment, the lining material of any one of the first to seventh embodiments is arranged such that the impermeable layer includes a tubular woven fabric which is woven from synthetic yarns, an outer surface of the tubular woven fabric being coated with a coating of a thermoplastic resin.

[0023]

In this embodiment, the impermeable layer is formed of: the tubular woven fabric; and the thermoplastic resin coating on the outer surface of the tubular woven fabric. That is, the tubular woven fabric is reinforced by the coating. This enables inversion of the lining material to be performed stably.

[0024]

According to a ninth embodiment, a method for lining a conduit having a bending portion including: impregnating the lining material described in any one of the first to eighth embodiments with a curable resin; and subsequently inverting the lining material to line the conduit.

[0025]

In this embodiment, the lining material main body and the tubular member provided inside the lining material main body are inverted together to line the conduit. Therefore, the tubular member to be positioned outside prevents the overlapping portion of the lining material main body from contacting the inner surface of the conduit, when inverted.

CLAIMS

[Claim 1]

A lining material for a conduit, the lining material being inverted to be inside out to line the conduit, the lining material comprising:

an impermeable layer;

a lining material main body provided inside the impermeable layer, the lining material main body made into a tubular form by rolling a base material sheet, and the lining material main body having an overlapping portion thereby with its both circumferential ends overlapping each other; and

a tubular member provided inside the lining material main body, the tubular member being a tubular woven fabric which has no seam in its axial direction, and the diameter of the tubular member being larger than the diameter of the lining material main body,

wherein the tubular member has a slack portion or a folded portion in a state where the tubular member is squashed to be substantially flat in the lining material main body, and the tubular member having an outer side of the tubular member which contacts the overlapping portion of the lining material main body and an inner side of the tubular member which does not contact the overlapping portion of the lining material main body,

wherein the slack portion or the folded portion of the tubular member is disposed on the inner side, so that the slack

portion or the folded portion does not contact the overlapping portion of the lining material main body, and

wherein the lining material main body and the tubular member are releasably jointed to each other.

[Claim 2]

The lining material according to claim 1, wherein

inside the lining material main body, the tubular member is releasably jointed to an inner surface of an overlapping portion where both circumferential ends of the lining material main body overlap each other.

[Claim 3]

The lining material according to any one of claims 1 to 2, wherein

the impermeable layer includes a tubular woven fabric which is woven from synthetic yarns, an outer surface of the tubular woven fabric being coated with a coating of a thermoplastic resin.

[Claim 4]

A method for lining a conduit having a bending portion, the method comprising:

impregnating the lining material recited in any one of claims 1 to 3 with a curable resin; and subsequently inverting the lining material to line the conduit.