The present disclosure provides a segment for a rehabilitation pipe, the segment comprising: an inner surface plate having an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate; wherein the inner surface plate, the side plates, and the end plates are formed integrally from a plastic material and the segments are linked in a circumferential direction and in a pipe-length direction to install a segmental rehabilitation pipe inside an existing pipe; wherein each of the side plates is provided with at least one hole through which a linking member is inserted for linking the segments in the pipe-length direction, and is provided separately from the hole with an opening at an end in the vicinity of the end plate for a linking operation of the segments in the circumferential direction and for passing therethrough a filler material injected into a space between the existing pipe and the rehabilitation pipe, and wherein each of the end plates has at least one hole through which another linking member is inserted for linking the segments in the circumferential direction, the openings of the side plates being configured so that when the segments are connected in the circumferential direction, the another linking member is inserted through the at least one hole of each of the end plates and positioned and/or tightened through the openings of the side plates.

The present disclosure also provides a pipe unit for a rehabilitation pipe used to rehabilitate an existing pipe, the pipe unit comprising a plurality of segments as described above mutually linked in a circumferential direction of the pipe unit.

The present disclosure further provides a rehabilitation pipe for rehabilitating an existing pipe, the rehabilitating pipe comprising: a plurality of pipe units as described above mutually coupled together in a longitudinal direction of the existing pipe to assemble the rehabilitating pipe.

The present disclosure still further provides a pipe rehabilitation method for installing a rehabilitation pipe inside an existing pipe, the method comprising: providing a plurality of segments each comprised of an inner surface plate having an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate, each of the side plates being provided with at least one hole through which a linking member is inserted for linking the segments in a pipe-length direction, and being provided separately from the hole with an opening at an end in the vicinity of the end plate for a linking operation of the segments in the circumferential direction and for passing therethrough a filler material injected into a

space between the existing pipe and the rehabilitation pipe, the inner surface plate, the side plates, an the end plates being formed integrally from a plastic material; bringing the end plates of the segments into contact with each other; inserting a linking member into through the openings provided to the side plates of each pair of adjacent segments whose end plates have been brought into contact with each other to sequentially link the segments in the circumferential direction, thereby forming a pipe unit; sequentially linking the pipe units in the pipe-length direction by inserting another linking member into the holes provided to the side plates of each pair of the adjacent segments to install a segmental rehabilitation pipe inside the existing pipe; and injecting a filler material into a space between the existing pipe and the rehabilitation pipe so that the filler material passes through the openings provided to the side plates of each pair of the adjacent segments.

The present disclosure also provides, in a pipe unit for a rehabilitation pipe used to rehabilitate an existing pipe, the pipe unit being formed of a plurality of segments mutually coupled together in a circumferential direction of the pipe unit, each of the segments comprising: an inner surface plate having a pair of opposite peripheral edges extending in a pipe-length direction of the rehabilitation pipe and a pair of opposite peripheral edges extending in the circumferential direction of the pipe unit; a pair of end plates provided upright on the respective peripheral edges of the inner surface plate extending in the pipe-length direction, each of the end plates having at least one hole through which a linking member is inserted for linking the segments together in the circumferential direction; and a pair of side plates provided upright on the respective peripheral edges of the inner surface plate extending in the circumferential direction, each of the side plates having an opening that is provided at an end thereof in the vicinity of one of the end plates and that is configured to provide access therethrough to the linking member when positioning and inserting the linking member through the holes of the end plates to sequentially link the segments together in the circumferential direction to form the pipe unit.

The present disclosure provides a rehabilitation pipe for rehabilitating an existing pipe, the rehabilitating pipe comprising: a plurality of pipe units as described above mutually coupled together in a pipe-length direction of the existing pipe to assemble the rehabilitating pipe.

linked in the circumferential direction in a simple manner and that can save the amount of labor involved in the overall rehabilitation operation, and to provide a pipe rehabilitation method using the segments.

The present invention provides a segment for a rehabilitation pipe comprising an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate. The inner surface plate, the side plates, and the end plates are formed integrally from a plastic material and the segments are linked in a circumferential direction and in a pipe-length direction to install a segmental rehabilitation pipe inside an existing pipe. In the present invention, each of the side plates is provided at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction.

The present invention also provides a pipe rehabilitation method for installing a rehabilitation pipe inside an existing pipe using a segment that comprises an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate, the inner surface plate, the side plates, and the end plates being formed integrally from a plastic material. In the method, each of the side plates is provided at an end in the

vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction, and the end plates of the segments are brought into contact with each other. A linking member is inserted into the opening provided to the side plate to sequentially link the segments in the circumferential direction, thereby forming a pipe unit. The thus formed pipe units are sequentially linked in the pipe-length direction to install a segmental rehabilitation pipe inside the existing pipe. The filler material is injected into the space between the existing pipe and the rehabilitation pipe to construct a composite pipe.

According to the present invention, the side plate is provided at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction. Therefore, it is possible to insert a bolt, a nut, or another linking member through the opening and readily link the segments in the circumferential direction.

The opening is formed in the side plate, instead of the inner surface plate as according to conventional techniques. Therefore, the filler material injected between the rehabilitation pipe and the existing pipe after the rehabilitation pipe is assembled in the existing pipe will not flow through the opening into the rehabilitation pipe. Therefore, the need for closing the opening formed in the

linked in the circumferential direction in a simple manner and that can save the amount of labor involved in the overall rehabilitation operation, and to provide a pipe rehabilitation method using the segments.

Disclosed herein is a segment for a rehabilitation pipe comprising an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate. The inner surface plate, the side plates, and the end plates are formed integrally from a plastic material and the segments are linked in a circumferential direction and in a pipe-length direction to install a segmental rehabilitation pipe inside an existing pipe. In the present invention, each of the side plates is provided at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction.

Disclosed herein is a pipe rehabilitation method for installing a rehabilitation pipe inside an existing pipe using a segment that comprises an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate, the inner surface plate, the side plates, and the end plates being formed integrally from a plastic material. In the method, each of the side plates is provided at an end in the

vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction, and the end plates of the segments are brought into contact with each other. A linking member is inserted into the opening provided to the side plate to sequentially link the segments in the circumferential direction, thereby forming a pipe unit. The thus formed pipe units are sequentially linked in the pipe-length direction to install a segmental rehabilitation pipe inside the existing pipe. The filler material is injected into the space between the existing pipe and the rehabilitation pipe to construct a composite pipe.

The side plate is provided at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction. Therefore, it is possible to insert a bolt, a nut, or another linking member through the opening and readily link the segments in the circumferential direction.

The opening is formed in the side plate, instead of the inner surface plate as according to conventional techniques. Therefore, the filler material injected between the rehabilitation pipe and the existing pipe after the rehabilitation pipe is assembled in the existing pipe will not flow through the opening into the rehabilitation pipe. Therefore, the need for closing the opening formed in the

What Is Claimed Is:

1. A segment for a rehabilitation pipe comprising an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate, wherein the inner surface plate, the side plates, and the end plates are formed integrally from a plastic material and the segments are linked in a circumferential direction and in a pipe-length direction to install a segmental rehabilitation pipe inside an existing pipe;

wherein each of the side plates is provided at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction.

2. A segment for a rehabilitation pipe according to claim 1, wherein the opening is provided to each of both ends of the side plate.

3. A segment for a rehabilitation pipe according to claim 1, wherein the opening is formed so that a filler material injected into a space between the existing pipe and the rehabilitation pipe flows in or out through the opening.

4. A pipe rehabilitation method for installing a rehabilitation pipe inside an existing pipe using a segment that comprises an inner surface plate constituting an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface

plate, the inner surface plate, the side plates, and the end plates being formed integrally from a plastic material, comprising:

providing each of the side plates at an end in the vicinity of the end plate with an opening used for a linking operation of the segments in the circumferential direction;

bringing the end plates of the segments into contact with each other;

inserting a linking member into the opening provided to the side plate to sequentially link the segments in the circumferential direction, thereby forming a pipe unit;

sequentially linking the pipe units in the pipe-length direction to install a segmental rehabilitation pipe inside the existing pipe; and

injecting the filler material into a space between the existing pipe and the rehabilitation pipe.

5. A pipe rehabilitation method according to claim 4, wherein the opening is provided to each of both ends of the side plate.

6. A pipe rehabilitation method according to claim 4, wherein the opening is formed so that the filler material injected into the space between the existing pipe and the rehabilitation pipe flows in or out through the opening.

Claims :

1. A segment for a rehabilitation pipe, the segment comprising: an inner surface plate having an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate; wherein the inner surface plate, the side plates, and the end plates are formed integrally from a plastic material and the segments are linked in a circumferential direction and in a pipe-length direction to install a segmental rehabilitation pipe inside an existing pipe; wherein each of the side plates is provided with at least one hole through which a linking member is inserted for linking the segments in the pipe-length direction, and is provided separately from the hole with an opening at an end in the vicinity of the end plate for a linking operation of the segments in the circumferential direction and for passing therethrough a filler material injected into a space between the existing pipe and the rehabilitation pipe, and wherein each of the end plates has at least one hole through which another linking member is inserted for linking the segments in the circumferential direction, the openings of the side plates being configured so that when the segments are connected in the circumferential direction, the another linking member is inserted through the at least one hole of each of the end plates and positioned and/or tightened through the openings of the side plates.

2. The segment for a rehabilitation pipe according to claim 1, wherein for each of the side plates, the opening is provided to each of both ends of the side plate.

3. The segment for a rehabilitation pipe according to claim 1, wherein for each of the side plates, a lower edge of the opening is proximate to a lower edge of the side plate, and an upper edge of the opening is lower than an upper edge of the side plate.

4. A pipe unit for a rehabilitation pipe used to rehabilitate an existing pipe, the pipe unit comprising a plurality of segments according to claim 1 mutually linked in a circumferential direction of the pipe unit.

5. A rehabilitation pipe for rehabilitating an existing pipe, the rehabilitating pipe comprising: a plurality of pipe units according to claim 4 mutually coupled together in a longitudinal direction of the existing pipe to assemble the rehabilitating pipe.

6. A pipe rehabilitation method for installing a rehabilitation pipe inside an existing pipe, the method comprising: providing a plurality of segments each comprised of an inner

surface plate having an inner circumferential surface, and side plates and end plates provided upright on a peripheral edge of the inner surface plate, each of the side plates being provided with at least one hole through which a linking member is inserted for linking the segments in a pipe-length direction, and being provided separately from the hole with an opening at an end in the vicinity of the end plate for a linking operation of the segments in the circumferential direction and for passing therethrough a filler material injected into a space between the existing pipe and the rehabilitation pipe, the inner surface plate, the side plates, an the end plates being formed integrally from a plastic material; bringing the end plates of the segments into contact with each other; inserting a linking member into through the openings provided to the side plates of each pair of adjacent segments whose end plates have been brought into contact with each other to sequentially link the segments in the circumferential direction, thereby forming a pipe unit; sequentially linking the pipe units in the pipe-length direction by inserting another linking member into the holes provided to the side plates of each pair of the adjacent segments to install a segmental rehabilitation pipe inside the existing pipe; and injecting a filler material into a space between the existing pipe and the rehabilitation pipe so that the filler material passes through the openings provided to the side plates of each pair of the adjacent segments.

7. The pipe rehabilitation method according to claim 6, wherein for each of the side plates of each segment, the opening is provided to each of both ends of the side plate.

8. The pipe rehabilitation method according to claim 6, wherein each of the end plates of each of the provided plurality of segments has at least one hole; wherein the end plates of the segments are brought into contact with each other so that the holes of the end plates are aligned with one another; and wherein the linking member is inserted through the openings provided to the side plates and positioned relative to the aligned holes of the end plates to link the segments in the circumferential direction.

9. The pipe rehabilitation method according to claim 6, wherein for each of the side plates of each of the provided plurality of segments, a lower edge of the opening substantially coincides with a lower edge of the side plate, and an upper edge of the opening is lower than an upper edge of the side plate.

10. In a pipe unit for a rehabilitation pipe used to rehabilitate an existing pipe, the pipe unit being formed of a plurality of segments mutually coupled together in a circumferential direction of the pipe unit, each of the segments comprising: an inner surface plate having a pair of opposite peripheral edges extending in a pipe-length direction of the rehabilitation pipe and a pair of opposite peripheral edges extending in the circumferential direction of the pipe unit; a pair of end plates provided upright on the respective peripheral edges of the inner surface plate extending in the pipe-length direction, each of the end plates having at least one hole through which a linking member is inserted for linking the segments together in the circumferential direction; and a pair of side plates provided upright on the respective peripheral edges of the inner surface plate extending in the circumferential direction, each of the side plates having an opening that is provided at an end thereof in the vicinity of one of the end plates and that is configured to provide access therethrough to the linking member when positioning and inserting the linking member through the holes of the end plates to sequentially link the segments together in the circumferential direction to form the pipe unit.

11. The pipe unit according to claim 10, wherein each of the side plates is provided with at least one hole different from the opening and through which another linking member is inserted for linking the segments in the pipe-length direction.

12. The pipe unit according to claim 11, wherein for each of the side plates, the opening is provided to each of both ends of the side plate and the at least one hole comprises a plurality of holes extending between the openings at both ends of the side plate.

13. The pipe unit according to claim 10, wherein for each of the side plates, the opening is provided to each of both ends of the side.

14. The pipe unit according to claim 10, wherein for each of the segments, the inner surface plate, the side plates and the end plates are formed integrally from a plastic material.

15. The pipe unit according to claim 10, wherein for each of the side plates of each of the segments, a lower edge of the opening substantially coincides with a lower edge of the side plate, and an upper edge of the opening is lower than an upper edge of the side plate.

16. The pipe unit according to claim 10, wherein for each of the side plates of each of the segments, the opening is configured for passing therethrough a filler material that is injected into a space betwe en the existing pipe and the rehabilitation pipe.

17. A rehabilitation pipe for rehabilitating an existing pipe, the rehabilitating pipe comprising: a plurality of pipe units according to claim 10 mutually coupled together in a pipe-length direction of the existing pipe to assemble the rehabilitating pipe.