**Title:** AN IMPROVEMENT IN THE MULTI-LAYERED COMPOSITE PIPE

**Abstract:** The invention is a multi-layered composite pipe resistant to pressure and corrosion, which is used in the sanitary systems, comprising at least one inner pipe (1) with low permeability for oxygen and at least one aluminum foil (3) coated on the said inner pipe (1) and having an expansion coefficient with respect to pressure or temperature variation that is lower as compared to the said inner pipe (1), wherein, in order to secure the aluminum coating (3) along with the inner pipe (1) inside the extension piece without peeling off the said coating, at least one filling duct (3.1) is inserted in the form of a canal that makes it possible to shave the surface of the said aluminum coating (3) visible at the end part of the composite pipe and to leave it inside the plastic and to embed therein and to cover the shaved volume by filling with plastic material.
AN IMPROVEMENT IN MULTI-LAYERED COMPOSITE PIPE

Technical Field

The invention relates to the product used in the sanitary systems and known as the composite pipe.

The invention relates particularly to the combination of the multi-layered composite pipes.

Background of the Invention

The multi-layered composite pipes are the products designed for use in conveying the hot fluids. As already known, the plastic pipes tend to expand longitudinally with the increase in temperature. In order to prevent this expansion, a material derived from metal having an expansion coefficient lower than that of the plastic material is combined with the plastic and a composite pipe is obtained. Besides expansion, another reason for the preference of the composite pipes for the kombi systems used in the buildings is the necessity to prevent the entrance of oxygen to the system.

The interior structure of the currently used composite pipes comprises a PPR pipe in which the fluid passes, a material having adhesive properties coated on the PPR pipe, aluminum folio coated on the said adhesive material, a material having adhesive properties coated on the said aluminum folio and a protective outer coating applied on the said adhesive material. Aluminum folio is adhered onto the PPR pipe produced with a wall thickness compliant with the standards and finally, the product is finished by applying a thin coating and it is presented to the marketplace.

In practice, the composite pipes and the extension pieces may be combined by means of socket weld. During the practice, the PPR outer coating and the aluminum folio must be peeled and removed, to enable the combining process to be performed. In this way, the total wall thickness is brought to the standard pipe wall thickness
without folio. Otherwise, the compatibility problem with the extension pieces is encountered.

In the existing systems, the aluminum folio, following its combination with the extension pieces, is produced closer to the outer layer within the total pipe wall thickness, due to the risk of the pipe being burst by the pressurized water entering between the folio and plastic material. This means the inner layer must be produced with a size capable of bearing the pressure, in accordance with the standards.

In the said composite pipe practices, it is a must to peel off the end section of the pipe by means of a peeling tool, in order to ensure compatible operation with the joining elements, hence material and time losses happen. There is also the possibility for the labor faults. Another disadvantage of the said practice is that it takes long to lay the system, as the welding preparation is a time consuming process.

It is unavoidable for the said PPR pipe to have greater total wall thickness, in order for it to bear the pressure caused by the possible penetration of the pressurized fluid between the pipe and the aluminum folio, following the joining process. This leads to an excessive use of the plastic raw material and aluminum folio.

**Object of the Invention**

Based on the known status of the art, the object of the invention is to eliminate the existing drawbacks by means of the improvements provided in the products used in the sanitary systems and known as the multi-layered composite pipe.

It is another object of the invention to provide a pipe having a standard diameter of use, without the need to peel off the said outer coating and aluminum folio layers during the joining of the said composite pipes. In this way, since there has left no need for the peeling process, it is made possible to include the aluminum folio and the outer coating in the total wall thickness. Accordingly, a major portion of the joining piece permeating the oxygen is provided to be coated with the aluminum folio.
In order to attain the said objects, the improvements have been provided in the multi-layered composite pipes resistant to pressure and corrosion, which are used in the sanitary systems, comprising at least one inner pipe with low permeability for oxygen and at least one aluminum folio coated on the said inner pipe and having an expansion coefficient with respect to temperature variation that is lower as compared to the said inner pipe.

According to a preferred embodiment of the invention, in order to secure the aluminum coating along with the inner pipe inside the extension piece without peeling off the said coating during the joining of the said composite pipe by means of the extension pieces, at least one filling duct is provided in the form of a canal that makes it possible to shave the surface of the said aluminum coating visible at the end part of the composite pipe and to leave it inside the plastic and to embed therein and to cover the shaved volume by filling with plastic material. In this way, it is made possible to join the composite pipes to one another, without having to peel off the aluminum folio. Thus the material and time consumption have been minimized. Also, the labor faults have also been reduced during the pipe jointing process. Moreover, the time needed for the weld preparation has been reduced and the pipe layout process has been made faster.

Another preferred embodiment of the invention is characterized in that the external diameter of the said composite pipe is equivalent to the external diameter of a standard flat pipe. Accordingly, the socket welding is preferably employed with the joint parts, without a direct peeling process off any surface. Since the aluminum folio is not peeled off, a part equal to the length of the welding enters the joint piece. In this way, a major part of the extension piece permeating oxygen is covered with aluminum folio. As a result, the oxygen diffusion in the extension piece is greatly reduced. Because there is no shaving (peeling) off the surface, the waste of plastic and aluminum folio encountered during the peeling process is prevented. Consequently, the total wall thickness is made equal to the wall thickness of the standard pipe without a folio. As the circumference where the aluminum folio is wrapped decreases, the amount of consumption also decreases. This has made it
possible to avoid wasting excessive amounts of plastic raw material. Since the aluminum folio is brought close to the center of the composite pipe, both the outer and the inner layer show equivalent resistance to the expansion. Accordingly, the adhesive on the aluminum folio transfers the expansion forces coming from both the inner and the outer layer to the folio in an equal manner. Thus the force is divided into two. However, in the existing system, only the adhesive on the inner layer is subject to force. As a result, the front pipe surface is provided to be perpendicular to the axis and the zone housing the aluminum folio to be carved along the whole circumference.

Another preferred embodiment of the invention is characterized in that the said inner pipe diameter is reduced, in order to place the aluminum folio found inside the said composite pipe at more interior locations inside the wall thickness of the composite pipe.

Another preferred embodiment of the invention is characterized in that a coating is obtained by filling the said fill duct with plastic material using preferably a perforated plate, in order to avoid the risk for the composite pipe being burst by the pressurized fluid entering between the inner pipe and the aluminum folio following the joining process inside the said composite pipe by means of preferably the pipe welding applied on said composite pipe. Thus there has left no need for the technique to produce the aluminum folio closer to the outer layer inside the total pipe wall thickness as a solution for the risk of the composite pipe of being burst by the pressurized water entering between the extension pieces and the plastic material.

Description of the Drawings

Figure-1a is a perspective view of the disassembled composite pipe according to a representative application of the invention.

Figure-1b is a perspective view of the composite pipe according to a representative application of the invention.
Figure-1c is a front sectional view of the composite pipe according to a representative application of the invention.
Figure-2 is the side sectional view of an example of a plate according to a representative application of the invention.

Reference Numbers

1  Inner pipe  4  Outer coating
2  Adhesive layer  5  Plate body
3  Aluminum folio
3.1 Filling duct  5.1 Ventilation hole
3.2 Pipe bearing projection

Detailed Description of the Invention

The embodiment of the invention provided in the figures show the sectional views of the composite pipe used in the sanitary installations working under different temperatures and pressures. In Figure-1a, owing to a filling duct (3.1) in the form of a canal, it is possible to shave the surface of the aluminum coating (3) visible at the end part of the composite pipe and to leave it inside the plastic and to embed therein and to cover the shaved volume by filling with plastic material, in order to secure the aluminum coating (3) along with the inner pipe (1) inside the extension piece without peeling off the said coating during the joining of the said composite pipe by means of the extension pieces and preferably the welding process. In this way, it is made possible to join the composite pipes to one another, without having to peel off the outer coating (4) and the aluminum folio (3). Thus the material and time consumption are minimized. Also, the labor faults are also reduced during the pipe jointing
process. Moreover, the time needed for the weld preparation is reduced and the pipe layout process is made faster.

The said composite pipe is characterized in that its external diameter is equivalent to the external diameter of a standard flat pipe. Accordingly, the socket welding is preferably employed with the joint parts, without a direct peeling process off any surface. Since the aluminum folio (3) is not peeled off, a part equal to the length of the welding enters the joint piece. In this way, a major part of the extension piece permeating oxygen is covered with aluminum folio (3). As a result, the oxygen diffusion in the extension piece is greatly reduced. Because there is no shaving (peeling) off the surface, the waste of plastic and aluminum folio (3) encountered during the peeling process is prevented. Consequently, the total wall thickness is made equal to the wall thickness of the standard pipe without a folio. As the circumference where the aluminum folio (3) is wrapped decreases, the amount of consumption also decreases. This makes it possible to avoid wasting excessive amounts of plastic raw material. Since the aluminum folio (3) is brought close to the center of the composite pipe, both the outer and the inner layer show equivalent mechanical resistance to the expansion. Accordingly, the adhesive (2) on the aluminum folio (3) transfers the expansion forces coming from both the inner and the outer layer to the folio in an equal manner. Thus the force is divided into two. However, in the existing system, only the adhesive on the inner layer is subject to force.

The said inner pipe (1) diameter is reduced, in order to place the aluminum folio (3) found inside the said composite pipe at more interior locations inside the wall thickness of the composite pipe.

The isolation coating is obtained by filling the said fill duct (3.1) with plastic material using preferably a perforated plate, in order to avoid the risk for the composite pipe being burst by the pressurized fluid entering between the inner pipe (1) and the aluminum folio (3) following the joining process inside the said composite pipe by means of preferably the pipe welding applied on said composite pipe. Thus there has
left no need for the technique to produce the aluminum folio (3) closer to the outer layer inside the total pipe wall thickness as a solution for the risk of the composite pipe of being burst by the pressurized water entering between the extension pieces and the plastic material.

Plastic material fills in the said carved zone, during the application of the socket welding. Thus, the aluminum folio visible in the front section remains inside the plastic and the possibility of water leak through the aluminum folio is eliminated. It is possible to minimize the user faults, in case preferably the plate illustrated in Figure-2 is used to join the composite pipes obtained with the said method, owing to the possibility to use existing plates in said process. Consequently, the front section of the composite pipe is also smoothened during the formation of the duct (3.1) prepared by way of shaving to some extent.

The aluminum folio (3) is shaved off from the composite pipe front section in a way to remove some portion. Although it is possible to use the existing plates during the socket welding preferably applied to join the composite pipes, the heater plate bearing a ventilation hole (5.1) and having a projection (5.2) at its interior may also be used to minimize the possible user faults. When the plate (5) is preferably used in the said hot pipe welding, there is a hole (5.1) to provide the air entrapped inside to be released. Owing to the said hole (5.1), the user ensures that he/she presses the composite pipe to the bottom of the plate (5). There is a projection (5.2) bearing the pipe from the inside. Thanks to the presence of the projection (5.2), the molten material is directed towards the inside of the duct (3.1) and prevents the formation of lip in case of the user pressing excessively.

During the joining of the pipes, the composite pipe is shaved off at its front face. Meanwhile, a very low amount of filings is removed to form a duct (3.1) to house the aluminum folio (3). During the preferably applied socket welding process, the molten plastic material fills in the said duct (3.1) and covers the aluminum folio (3).
The invention may not be limited to the representative applications provided in this section. Based on the scope of the claims, the alternative embodiments may be produced by the persons skilled in the technical field.
CLAIMS

1. The invention relates to the multi-layered composite pipes resistant to pressure and corrosion, which are used in the sanitary systems, comprising at least one inner pipe (1) with low permeability for oxygen and at least one aluminum folio (3) coated on the said inner pipe (1) and having an expansion coefficient with respect to temperature variation that is lower as compared to the said inner pipe (1), wherein; comprises,
   - in order to secure the aluminum coating (3) along with the inner pipe (1) inside the extension piece without peeling off the said coating during the joining of the said composite pipe by means of the extension pieces and preferably welding process, at least one filling duct (3.1) is provided in the form of a canal that makes it possible to shave the surface of the said aluminum coating (3) visible at the end part of the composite pipe and to leave it inside the plastic and to embed therein and to cover the shaved volume by filling with plastic material.

2. A multi-layered composite pipe according to claim 1 characterized in that the external diameter of the said composite pipe is equivalent to the external diameter of a standard flat pipe.

3. A multi-layered composite pipe according to any one of the preceding claims characterized in that the said inner pipe (1) diameter is reduced, in order to place the aluminum folio (3) found inside the said composite pipe at more interior locations inside the wall thickness of the composite pipe.

4. A multi-layered composite pipe according to any one of the preceding claims characterized in that a coating is obtained by filling the said fill duct (3.1) with plastic material using preferably a perforated plate, in order to avoid the risk for the composite pipe being burst by the pressurized fluid entering between the inner pipe (1) and the aluminum folio (3) following the joining process
inside the said composite pipe by means of preferably the pipe welding applied on said composite pipe.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. F16L58/18 F16L13/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**EPO-Internal**

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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**Date of the actual completion of the international search**

24 August 2006

**Date of mailing of the international search report**

04/09/2006

**Name and mailing address of the ISA/EU European Patent Office, P. B. 5518 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 940-2040, Tx. 31 651 epo nl, Fax (+31-70) 940-9016**

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