"CONNECTOR FOR HERMETIC COMPRESSORS".

Field of the Invention

The present invention relates to a hermetic connector, preferably made in the form of a tube, which was mainly developed for reducing manufacturing costs through the use of several materials in its constitution.

Background of the Invention

Hermetic compressors, widely used in the refrigeration field, especially in coolants and freezers, are devices that need to ensure that the loss of working gas is minimal, in order to confer more life span to the equipment as well as reduce maintenance periods and increase the thermal efficiency thereof.

A critical point for maintaining the tightness of the compressor is the connections that join it to the evaporation and condensation system, which are commonly carried out by means of connecting tubes, which are fastened by welding, soldering or by mechanical fastening. The same happens to the connections of the process valve tube which is usable to inject oil and coolant, during assembly of the compressor to the system or in case of any need for system maintenance.

The connecting tubes of the state of the art are usually manufactured from a single material in order to facilitate the joint with the system of coolants and freezers, such material being usually steel or copper - the latter being the most frequently employed because of the ease of brazing with the system tube, and for sealing the process valve tube.

Copper, however, is a noble material and has higher costs comparing to other mechanical equivalent materials (steel, for example), so that the use of cooper in applications not requiring specific characteristics (physical or chemical) causes the cost of the final product to get higher than necessary. Another negative point concerning the exclusive use of copper is the fact that it is a metal more rare in nature when compared with other materials such as, for example, iron. Therefore, whenever possible, its use should be moderate.

Some documents of the state of the art show compressors in which the connecting tubes are equipped with components made of material other than copper which, however, do not cover the issue of cost added to the material - not even do it to reduce the use of this metal. Furthermore, these components are integrally formed by a single material, besides presenting embodiments and purposes completely distinct from those targeted by the object of the present invention.

A first example can be found in document PI0613759, which mentions the use of a tube for the connection between the compression chamber and the evaporation and condensation system of the equipment, entirely manufactured in a flexible material in order to reduce the chamber heating between the piston jacket and the compressor housing. Said

tube is made solid in a high thermal resistivity polymer. At this point, it is noted that a material other than copper was used for the connection between the compressor housing and the tube of the condensing and refrigeration system; however the tube employed in this document does not consider the cost of the product, besides having its manufacturing completely limited to a single constituting material.

A second example can be found in document CA1153997, which discloses a connecting tube comprised of a copper tube (which can be alternatively made of steel) with one end mounted on a flange associated with the compressor housing and the other end directed to the joint with the tube of the refrigeration and condensation system. Within the copper (or steel) tube is housed a tubular body capable of maintaining a third tubular body made of ductile material, by pressing the inner surface of the tube. This interference fit is responsible for ensuring the sealing of the system. It is noticed, therefore, that this document discloses an extremely complex construct that, in addition, also predicts that the connecting tube is entirely made of a single constituting material.

In turn, document EP0386320 discloses a connector of an unspecified material (which internally has a conical filter) for coupling the compressor housing, the opposite end thereof being, however, it is coupled to a cooper adapter which effectively accomplishes the connection to the pipe system - that is, two separate elements are coupled (and subsequently fastened) to each other by means of fitting, each being made in a single material. In addition, the cooper adapter also serves to attach the conical filter to the compressor valve, thus disclosing a process for complex manufacturing and assembling and, therefore, costly.

Document WO 2006/090979 describes a connector for hermetic compressor of the type comprising a connection tube having two or more elements in a single piece, wherein those elements are composed of different materials. However, in this document nothing is said about a connector tube wherein portions have the same diameter and are made of different materials, as revealed on present patent application.

Note, therefore, that the current state of the art lacks a connecting tube made of different materials joined together into a single part, thereby allowing more economical manufacturing and ease of installation that does not require the use of several individual components for their assembling to the compressor or to ~~eh~~the system tubes.

~~Objects of the Invention~~

~~Thus, it is one of the objects of the present invention to provide~~ It is desired to provide a connector for lower cost and equally efficient compressors, ensuring that the joint between the involved parts is properly hermetic.

~~It is also an object of the present invention to disclose~~ It is also desired to provide a connector for hermetic compressors produced with a minimum amount of copper – which is a metal that is not very

abundant in nature.

~~Another of the objects of the present invention is to describe~~ It is also desired to provide a single piece part made of two different materials which, however, keep the characteristics suitable for assembling, functioning and tightness of the hermetic compressors used in refrigeration systems in general.

Summary of the Invention

According to an aspect of the present invention, there is provided a hermetic compressor comprising connector tube for interconnection between a housing of a compressor and a system tube, wherein such connector tube comprises:at least two hollow portions, both comprising inner and outer diameters, wherein the first portion is able to join the connecting tube and the housing of the compressor and is made of material pertaining to the group comprising steel or aluminum; and wherein the second portion is able to join the connecting tube to the system tube and is made of cooper; wherein, in a region, the inner diameter of the first portion is equivalent to inner diameter of the second portion and the outer diameter of the first portion is equivalent to the outer diameter of the second portion; and means for fastening to allow association between the first portion and the second portion, those means being chosen from the group comprising brazing, welding and/or mechanical fastening.

~~The objects of the present invention are achieved by~~There is disclosed a connector for hermetic compressors, of the type comprising a connection tube between a compressor housing and any tube- such as, for example, evaporation, condensation systems or process valve tube - and such connector comprises a tube in a single piece having at least two portions composed of different materials, the portions being joined by means of a suitable joining process.

~~According to a preferred embodiment of the present invention, s~~Said single piece tube comprises a first portion comprising a first material and a second portion comprising a second material, the first portion of the connecting tube being capable of joining the connecting tube and the compressor housing and the second portion of the connecting tube being able to join the connector tube to the system tube.

~~Still according to the preferred embodiment of the present invention, t~~The first portion of the connecting tube is preferably made of a material belonging to the group comprised of steel, aluminum and metals of related characteristics, and the second portion of the connecting tube is ~~preferably~~ made of copper.

~~Alternatively, t~~The first portion of the connecting tube can be coated with copper or other suitable coating.

~~In the preferred embodiment of the present invention~~Moreover, the first portion of the connecting tube is associated with the second portion of the connecting tube by means of a fastening process pertaining to the group comprised of brazing, welding or mechanical fastening.

Briefly, the ~~present invention comprises~~ disclosure provides means for allowing the connecting tube to be constituted by at least two portions consisting of different materials joined together by means of a suitable joining process, thereby providing a more economical production process besides being of easy installation and providing the same tightness characteristics that are necessary for the proper system functioning.

Brief Description of the Drawings

Figure 1 - shows a schematic view in longitudinal section of an embodiment of a connecting pipe for hermetic compressors of the current state of the art.

Figure 2 - shows a schematic view in longitudinal section of the connector for hermetic compressors made in accordance with a preferred embodiment of the present

invention.

Figure 3 - shows a schematic view of a compressor provided with connecting tubes.

Detailed Description of the Invention

The present invention will be hereinafter further described based on the attached figures.

Figure 1 illustrates a connecting tube 2 conventionally used in the current state of the art which is responsible for joining a housing 1 of the compressor to any tube 3, which may be a process valve or a tube of the evaporation and/or condensation system of the refrigerator or freezer in which the hermetic compressor is installed. This is a single part that is typically manufactured from a single material - generally cooper - and has one end associated with the compressor housing 1 and the other end associated with the system tube 3.

Generally, joining the connecting tube 2 to the system tube 3 is carried out by brazing 4 as it can also be noticed in Figure 1.

The preferred embodiment proposed by the present invention is seen in details from Figure 2, in which the connector 2 consists of two tubular portions 5 and 6, being a first portion 5 of the connecting tube 2 made of one material, and a second portion 6 of the connecting tube 2 being made of a material different from the previous portion 5.

It is worth clarifying that the materials used may be similar or completely different from each other, provided that the specific application and interconnection with the adjacent components are respected.

In an alternative embodiment of the present invention, it is possible to use three or more portions composing the connecting tube 2, each of these portions comprising a different material or even a combination of materials similar, or not, to each other

In the preferred embodiment of the present invention, it is used as aluminum or steel material of the first portion 5 of the connecting tube 2, since: they are relatively abundant and cheap materials, have good mechanical properties, and the manufacturing processes are well established.

In turn, the manufacturing material of the second portion 6 of the connecting tube 2 is preferably copper, in order to maintain the characteristics necessary for the correct operation and assembling of the system as a whole.

Alternatively, the first portion 5 of the connecting tube 2 may also be manufactured in aluminum, steel or other metallic material coated with copper or other coating suitable for the application.

The portions 5 and 6 of connecting tube 2 are joined together in a region 7, through an appropriate fixed joining process, that is, any fixed joining method may be employed,

provided it meets the requirements of mechanical strength, tightness and any other feature defined in the project. Among the possible processes of fixed joining, it is stressed brazing, welding and mechanical fastening.

Thus, it is obtained as a final product a single connecting tube 2 produced with a significantly lower cost than the conventional ones and whose installation process of the other system components - namely: the compressor housing 1 and the system tube 3 - is simple and practical.

By using the first portion 5 of the connecting tube 2 made of steel or aluminum, the manufacturing cost is shown more advantageous over the cost using a connecting tube 2 fully made of copper.

CLAIMS

1. Hermetic compressor comprising connector tube ~~(2)~~ for interconnection between a housing ~~(1)~~ of a compressor and a~~n any~~ system tube, ~~(3) CHARACTERIZED in that~~ wherein such connector tube ~~(2)~~ comprises:

~~2.~~ ~~(i)~~at least two hollow portions ~~(5 and 6)~~, both ~~having the same~~ comprising inner and outer diameters, wherein the first portion ~~(5)~~ is able to join the connecting tube ~~(2)~~ and the housing ~~(1)~~ of the compressor and is made of material pertaining to the group comprising steel or ~~,~~ aluminum; and wherein the ~~and metals;~~ second portion ~~(6)~~ is able to join the connecting tube ~~(2)~~ to the system tube ~~(3)~~ and is made of cooper;

wherein, in a region, the inner diameter of the first portion is equivalent to inner diameter of the second portion and the outer diameter of the first portion is equivalent to the outer diameter of the second portion; and

~~(ii)~~ means for fastening to allow association between the first portion ~~(5)~~ and the second portion ~~(6)~~, those means being chosen from the group comprising brazing, welding and/or mechanical fastening.

CONNECTOR FOR HERMETIC COMPRESSORS

ABSTRACT

The present invention relates to a connecting tube (2) for hermetic compressors, which is responsible for connecting the housing (1) of a hermetic compressor to the tube (3) - which may be the process valve tube or evaporation, condensation system - which comprises at least two portions composed of materials that are different from each other, which are associated by means of a suitable joining process - welding, soldering or mechanical fastening. According to the present invention, the connecting tube (2) comprises a first portion (5) comprising a first material and a second portion (6) composed of a second material, wherein the second portion (6) of the connecting tube (2) can join the first portion of the connecting tube (5) and the system tube (3).