Hermetically sealed compressor assembly pdf

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Hermetically sealed compressor is mounted directly on shaft of motor. The assembly of compressor and motor is hermetically sealed in a welded steel shell. The motor is cooled by the refrigerant itself, either by vapour refrigerant being drawn into the compressor from suction line or by liquid refrigerant being drawn from liquid line, starting from condenser outlet. This eliminates the need of shaft coupling and external shaft seal, which are used in reciprocating compressor. Hermetically sealed compressor is employed in domestic refrigerators, deep freezers and window air conditioners. A compressor is said to be hermetically sealed compressor, when the compressor and motor operate on the same shaft and both are enclosed in a common casing. These types of compressors eliminate the use of crank shaft seal, which is necessary in open type compressors in order to prevent leakage of refrigerant. In case of open type compressor like reciprocating compressor, a shaft seal fitted on the crankcase remains a permanent source of trouble and after some period of service, it tends to leak requiring constant attention. Since a common user is unable to pay the required attention, a hermetical y sealed compressor is used in small refrigeration systems like domestic refrigerator, window air conditioner etc. Construction of Hermetically Sealed Compressor The compressor and motor mounted on the same shaft are enclosed in a casing. Suction and discharge lines are extended inside the casing. A service line is also provided for charging of refrigerant and changing of lubricating oil. The power is supplied to three terminals of the motor winding through a relay. The relay cuts off starting winding after a start-up, leaving running winding in circuit. The relay has an overload protector (OLP) also. Fig. 1: Hermetically sealed compressor Working of Hermetically Sealed Compressor Compressor and motor operate on the same shaft in a common casing (i.e. housing). As the motor shaft rotates, piston starts reciprocating inside the cylinder. The low temperature and low pressure vapour refrigerant from the evaporator is sucked into the compressor shell. The refrigerant sucked in the compressor shell does not get admitted directly into the cylinder, but instead, it is circulated in the shell around the motor, so that, the motor can be cooled. Thus, the suction vapour refrigerant is used to cool the lubricating oil as well as winding of the motor. Then, the sucked vapour refrigerant enters into the cylinder and gets compressed, thereby increasing its pressure and temperature. At the end of discharge stroke of the piston, the high pressure refrigerant is discharged, through the discharge line. As the motor is enclosed, it heats up the oil bath in the casing. Therefore, suction vapour refrigerant is used to cool the motor. In some units, a special oil cooling loop is provided from the condenser. As the unit is sealed, its life is very long. Also, there is reduction in noise during operation. The use of capillary tube as an expansion device was made possible only with the use of sealed unit, because use of very small diameter capillary tube was limited due to tendency of refrigerant leakage. Hermetically sealed units are now available up to 10 TOR capacities and are found in refrigerators, water coolers, deep freezers, window/split air conditioners and even in package air conditioners. The sealed unit has no easy access and needs to be cut and open for repairs. This difficulty is overcomed with the development of a semi-hermetically sealed unit. In hermetically sealed compressor, compressor is in the form of welded steel shell, whereas, in semi-hermetically sealed compressor, top cover is bolted to compressor housing. This top cover is also called as screwed cover. Due to the bolted construction, parts of compressor become accessible after removing the top cover. Therefore, repair or servicing can be done. Semi-hermetically sealed units are now-a-days available in large capacities even up to 100 TOR. Applications of Hermetically Sealed Compressor Domestic refrigerators. Window air conditioners. Water coolers. Home freezers. Split air conditioners. Deep freezers. Small capacity refrigeration and air conditioning units. Advantages of Hermetically Sealed Compressors The leakage of refrigerant is completely prevented. Less noisy. Less vibration. Compact, so requires small space. The lubrication is simple as the motor and compressor operate in a sealed space with the lubricating oil. The power required per tonne of refrigeration is less than that required for open type compressor. As both, the motor and compressor are enclosed a common casing, it eliminates the need of crank shaft seal. Long life. Portable as they can be moved easily from one place to another place. Less maintenance. Easy installation. The suction and discharge connections are available externally. Disadvantages of Hermetically Sealed Compressors Not easy for maintenance, because the moving parts are not accessible. The welded joints need to be broken and open for repairs. Separate vacuum pump is required for evacuation and charging of refrigerant. The lubricating oil may mix with the refrigerant and can deteriorate the quality of refrigerant. Presence of moisture in the refrigerant may harm the winding of motor. Due to difficult maintenance activity, existing hermetically sealed compressor under maintenance is replaced by new one, instead of repair. Therefore, when service period (life) is considered as parameter for selecting suitable compressor, the refrigeration system using this compressor is said to be costlier, United States Patent 1 Rinehart Oct. 23, 1973 [54] HERMETICALLY SEALED COMPRESSOR 3,568,712 3/1971 Rinehart 137/5253 ASSEMBLY [75] Inventor: Dean C. Rinehart, Louisville, Ky. Primary Examiner c Husar Assistant Examiner-Leonard Smith Assigneei General Electric l y, Att0rneyWalter E. Rule et al. ' Louisville, Ky. [22] Filed: July 28, 1972 [57] ABSTRACT [21] Appl. No.: 275,945 A hermetic compressor unit comprising a hermetic casing containing a compressor including a cylindrical block having an arcuate surface engaging the inner [52] US. Cl 418/248, 417/902 surface of the casing and a Suction tube assembly for [51] Int. Cl F04b 17/00 connecting the compressor to a refrigeration system [58] Field of Search 417/902; 285/158; Th t b bl t b 1 1 418/248 e suc ion u e assem y comprises a u u ar a um num connector havmg a reduced end portion extendin into a flan ed hole in the casin and communicat- [56] References Clted in: with a sucfion passage in the hick. A tubular fit- UNITED STATES PATENTS ting includes an end portion press fit into the passage 2,447,529 8/1948 Lucke 285/158 and a shoulder portion press fit into the reduced end Andrus X pdrtion of the connector 2,988,405 6/1961 Scheldorf 417/415 3,209,991 10/1965 Sauber 417/902 X 3 Claims, 4 Drawing Figures BACKGROUND OF THE INVENTION In the manufacture of hermetic compressors for refrigeration systems, it is necessary to provide a fluid tight connector means for connecting the hermetic compressor unit to the refrigeration system. Until recent years most of the conduits for connecting a hermetic compressor to a refrigeration system have been composed of copper or steel. When using such materials, the usual brazing techniques have been available for assuring a fluid tight joint between the copper or steen conduit and the steel compressor casing during final connection of the compressor to the system. Improved aluminum tubing has now become available for use in refrigeration systems and improved adhesives have made it possible to provide low cost tubular aluminum joints employing such adhesives. However, when an adhesive is used for these purposes, no brazing is available to seal the aluminum conduit component of the refrigeration system to the compressor casing in order to assure a fluid tight connector assembly. SUMMARY OF THE INVENTION The present invention is particularly directed to an improved hermetically sealed compressor unit assembly adapted to assure a fluid tight connection between an aluminum connector tube and the compressor casing whereby the aluminum connector can be adhesively joined to an aluminum conduit. In accordance with the illustrated embodiment of the invention, there is provided a hermetic compressor unit comprising a steel casing including a cylindrical side wall and a compressor including a cylinder or compressor block having arcuate surfaces press fit or heat shrunk into contact with the casing side wall. The block includes a passage opening into an arcuate surface and the casing is provided with a flanged hole aligned with and larger than the passage. A tubular aluminum connector having a reduced end portion extends into the FIG. 4 is a view similar to FIG. 3 illustrating the manner in which the connector tube is used for sealing the compressor for hermetic testing. DESCRIPTION OF THE PREFERRED EMBODIMENT With reference to FIG. 1 of the drawing, there is illustrated a hermetic rotary compressor unit comprising a flanged hole, to a point adjacent the arcuate surface of the block and zinc-aluminum soldered to the casing. A tubular steel fitting is driven into the connector and has an end portion press fit into the passage and a shoulder portion press fit into the reduced end portion of the connector thereby providing a direct connection to the passage and also a mechanical seal with the aluminum end portion of the tubing. The aluminum connector can thereafter be joined to an aluminum conduit forming part of a refrigeration system by an epoxy resin sealed joint. BRIEF DESCRIPTION OF THE DRAWING In the accompanying drawing: FIG. 1 is a horizontal sectional view of a hermetic refrigerant compressor unit incorporating the present invention; FIG. 2 is an enlarged sectional view taken along line 2-2 of FIG. 1 illustrating the construction of the connector portion of the unit; FIG. 3 is a view similiar to FIG. 2 illustrating one step in the manufactureof the compressor connector portion; and cylindrical casing 1 in which there is disposed a rotary compressor 2. The compressor includes a cylinder block 3 having an inner cylindrical surface 4 which in combination with an end plate 5 and a second end plate (not shown) defines a compression cylinder 6 containing a rotor 7. The cylinder block 2 includes diametrically opposed legs or extensions 8 having arcuate surfaces 9 engaging the inner surface of the cylindrical casing wall 1. In the manufacture of such a compressor, the cylinder block is either pressed into the casing or the casing is heat shrunk onto the cylinder block. A suction passage 10 extends through the cylinder block from one of the arcuate surfaces 9 and into the compression cylinder 6. The outer end of this passage, as illustrated in FIG. 2 of the drawing, is in axial alignment with a flanged hole 11 in the casing side wall 1. A compressor of this general construction is shown in U.S. Pat. No. 3,568,71 2-Rinehart to which reference is made for a more detailed description of its construction and operation. In accordance with the present invention, the hole 11 has a somewhat larger diameter than the passage 10 and the means for connecting the suction line of a refrigeration system to the passage 10 comprises a tubular aluminum connector 12 having a reduced end portion 14 extending into or through the hole 1 1 to a point adjacent the arcuate surface 9 of the compressor block. The reduced end portion 14 preferably has an outer diameter slightly smaller than the hole 11 to provide clearance for the brazing or soldering of the end portion 14 to the casing. This operation is preferably carried out using a zinc-aluminum alloy, the brazed joint being indicated at 19. A tubular fitting 15 is then employed to mechanically connect the connector 12 to the passage 10. This tubular fitting 15 inserted into connector 12 includes a reduced end portion 16 press fit into the passage 10 and a shoulder portion 17 press fit into the reduced end portion 14 of the connector and designed to firmly engage this end portion 14 of the aluminum connector in the area of the brazed joint 19 to form a fluid tight seal with the portion 14. For assembly to the aluminum suction line 20 of a refrigeration system, the end of the line 20 is slip fit onto the connector 12 and adhesively bonded thereto by use of a suitable adhesive such as an epoxy cement. In the manufacture of the compressor, the connector 12 is also employed for sealing the compressor during evacuation thereof prior to assembly into the refrigeration system. To this end, the connector, as shown in FIG. 3 of the drawing, is made longer than required for the system connection and is notched as indicated by numeral 22 for removal of the additional length. The fitting 15 is inserted through the open end of the connector 12 as shown in FIG. 3 and pressed into passage 10, the shoulder 17 expanding the connector portion 14 into mechanical engagement with the case opening 11. The connector is then brazed to the casing. For evacuation of the compressor, the end of the connector 12 is pinched and sealed as shown in FIG. 4. After the testing, the sealed end portion is removed at the break-off notch 22 to provide a connector of the length shown in FIG. 2 which is then available for joining to the aluminum conduit 20. The press fit between the fitting 15, the reduced end portion 14 of the aluminum connector and the passage in the cylinder block provides a hermetic seal so that no additional sealing is required to form a fluid tight connection between the compressor and the system. While there has been shown and described a specific embodiment of the present invention, it is to be understood that it is not limited thereto and it is intended by the appended claims to cover all such modifications as fall within the true spirit and scope of the invention. I Claim 1. A hermetic compressor unit comprising: a casing including a cylindrical side wall; a compressor including a cylinder block positioned in said casing and having an arcuate surface engaging the inner surface of said casing side wall; a passage in said block opening into said arcuate surface; said casing having a flanged hole aligned with and larger than said passage; a tubular aluminum connector having a reduced end portion extending into said flanged hole to a point adjacent said arcuate surface; and a tubular fitting having an end portion press fit in said passage and a shoulder portion press fit in said reduced end portion of said connector. 2. A compressor unit according to claim 1 in which said aluminum tubular connector is zinc-aluminum soldered to said flange prior to insertion of said fitting. 3. A compressor unit according to claim 1 in which said tubular fitting is steel.

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