

DOMESTIC REFRIGERATION USING LPG CYLINDER

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Abstract - In this task we have designed and analyzed a fridge the use of LPG as refrigerant. As the strain of LPG is excessive this saved in cylinder. As this pressurised LPG is exceeded thru the capillary tube of small interior diameter, the strain of LPG is diminished due to enlargement and segment alternate of LPG takes place in an isenthalpic process. Due to segment alternate from liquid to fuel latent warmth of evaporation is won via the liquid refrigerant and the temperature decreased. In this way LPG can produce refrigerating impact in the surrounding. From experimental investigations, we have observed that the COP of a LPG Refrigerator is greater than a home refrigerator.

Key Words: LPG Refrigeration, Capillary tube, Evaporator, COP, Vapour Compression Refrigeration system, Refrigerating Effect.

1. INTRODUCTION

Due to the big demand of electrical energy over the world, we assume of improving the electricity which is already spent however now not being utilized further, to overcome this crisis with much less investment. The climatic alternate and international warming demand on hand and low-priced cooling structures in the shape of fridges and air conditioners. Annually Billions of greenbacks are spent in serving this purpose. Hence forth, we recommend COST FREE Cooling Systems. LPG is saved in liquefied nation in cylinder earlier than its utilization as fuel. According to the power survey, the fridge is one of the heaviest electricity buyers amongst family appliances. The electricity consumption of fridges has accelerated step by step yr over year. It works on the precept that the growth of LPG will be takes area all through the conversion of liquid LPG into gaseous form. As a end result of this, LPG fuel strain drops and the quantity of gasoline will be enlarge this will be end result into dropped in temperature of gasoline and it acts as refrigerant. According to 2d regulation of thermodynamics, this system of cooling can solely be performed with the useful resource of some external work. Hence, the energy grant is typically required to force a refrigerator.

The substance which works In a fridge to extract warmth from a bloodless physique and to supply it to a warm physique i.e.to surrounding is known as refrigerant. Globally 17500 metric lots of traditional refrigerants is ate up through home refrigeration like CFC, HFC which motives

excessive depletion if ozone layer (ODP) and Global Warming Potential (GWP). The use of LPG as an alternative of CFC 22 has made a higher development due to the fact that it has an surroundings pleasant orientation with no ODP. Good product effectivity is resulted by way of the use of LPG due to the fact of its characteristics. Thus we have to look at these two kinds of refrigerants (LPG and CFC 22) in a modified home fridge evaluating their overall performance traits parameters like pressure, temperature etc. in fridge and thinking about security whilst conducting the realistic experiment. It shows LPG can be used as an choice refrigerant to CFC 22 after performing the check on new system.

1.1 OBJECTIVES

- 1) To become aware of the shape of residual waste in normal refrigeration system.
- 2) Compare the essential traits between LPG refrigeration machine and ordinary refrigeration system.
- 3) To distinguish between the cutting-edge current fridge fee and estimated fee of LPG refrigerator.
- 4) The overall performance of present fridge and LPG fridge is to be compared.

2. EXPERIMENTAL SETUP

2.1 Working Principle

The LPG Refrigerator is work on the easy Vapour Compression Refrigeration system. The building and working of easy VCRS is as proven in fig. 1 Process 2-3: When the compressor is started, it attracts the low stress vapor from the evaporator at country two and compresses it is entropically to a sufficiently to a excessive strain up to nation three Since the compression work is achieved on the vapour, its temp additionally increases

Process 1: Hot vapour from compressor below strain is discharged into the condenser the place condenser cooling medium normally water or surrounding air is soak up the warmth from warm vapour. This converts the warm vapour into liquid and the liquid is accumulated in liquid receiver at State 4.

Process 2: The liquid from the liquid receiver at excessive strain is then piped to a refrigerant manipulate valve which regulates the glide of liquid into the evaporator. This manipulate valve, whilst limiting the flow, additionally reduces the strain of the liquid with the end result the liquid exchange into vapour of low dryness fraction represented through state 1.

During this procedure the temperature of the refrigerant reduces corresponding to its pressure.

Process 3: Finally, the low pressure, low temperature refrigerant passes via the evaporator coil the place it soak up its latent warmth from the bloodless chamber or from brine answer at steady stress and converts into vapour at country two It is once more furnished to compressor. Thus, the cycle is completed.

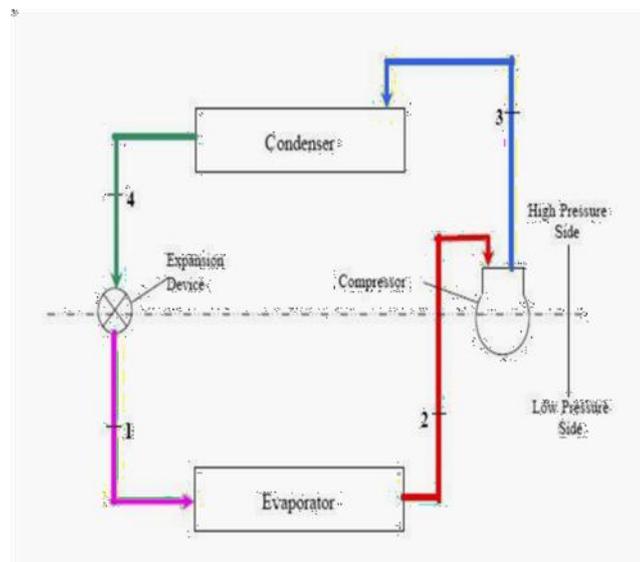


Fig 2.1 Schematic diagram of simple VCRs

3. CONSTRUCTION FEATURES

3.1 LPG Gas Cylinder

LPG is conventional composition of two gases in most cases Propane (C₃H₈) and Butane (C₄H₁₀), both saved one after the other or collectively as a combination in a cylinder. These gases can be liquefied at a ordinary temperature by way of utility of a stress increases. LPG is saved in a cylinder at about 12.5 bars..



Fig 3.1: LPG Gas Cylinder

LPG is used as a gasoline for home industrial, horticultural, cooking, agricultural, heating and drying processes. LPG can be used as a gas for automobiles. LPG is a combination of butane and iso-butene. It is commonly saved at 12.7 bar for family reason cylinder. By the usage of a appropriate regulator LPG is despatched in to capillary tube.

3.2 Capillary Tube

The capillary tube is the oftentimes used throttling gadget in the home refrigeration. As you know, the fluid stress drops when it flows thru a conduit. Same precept is used in the capillary tube.



Fig 3.2: Copper Capillary Tube

A capillary tube is of copper having a small bore diameter. It reduces the stress of liquid refrigerant from condenser strain to evaporator strain when related to a liquid line. The size of capillary tube is higher when the evaporator stress is lower. The capillary tube is a easy machine with no shifting part.

However its small bore makes it critical that a filter and drier is geared up earlier than the capillary tube to forestall choking. The capillary tube is many times used throttling gadget in a home refrigeration. The capillary tube is a copper tube of very small inner diameter. It is of very lengthy size and it is coiled to numerous turns so that it would occupied much less space. The inner diameter of capillary tube used for the refrigeration purposes varies from 0.5 to 2.28 mm (0.020 to 0.09 inch).

3.3 Evaporator

The evaporator is additionally an essential factor of the refrigeration system. The cooling impact is produced through passing the refrigerant thru evaporator coil.



Fig 3.3: Evaporator

The real cooling impact takes vicinity interior the evaporator in the refrigeration systems. The warmth is eliminated from the substance by way of transferring the warmth from the substance to be cooled to the refrigerant with the assist of evaporator.

Thus the evaporator acts as warmth exchanger surface. The software of evaporator in refrigeration device is variant, as a consequence evaporator is reachable in a range of design, dimensions and shapes. Depending on the approach of enter of refrigerant they are additionally labeled in exceptional ways, the air circulation route round the evaporator. The freezers are the evaporators as the water freezes into ice in this compartment. The refrigerant is handed via the capillary tube at very low temperature and strain to the evaporators. The warmth is absorbed through this refrigerant from the substance that is to be cooled and accordingly the refrigerant receives heated whilst the substance is cooled. In spite of cooling the substance the refrigerant temperature leaving the evaporator is decrease than that of the substance. In giant refrigeration machine the software of evaporators is primarily for chilling water, for that reason shell and tube kind warmth exchangers are used as evaporator.

3.4 Pressure Gauge

There are many strategies for the size of strain and vacuums. Pressure gauges and vacuum gauges are the contraptions used to measure pressure.



Fig 3.4: Pressure Gauge

The most normally used mechanical gauge is Bourdon kind strain gauge. It is a stiff, flattened metallic tube bent into

a round shape. The fluid whose strain is to be measured is inner the tube. One quit of the tube is constant and different give up is free to cross inward or outward. The inward and outward motion of free give up strikes a pointer, via a linkage and equipment arrangement, a dial graduated in stress unit i.e. bar. Pressure gauge documents the gauge information the gauge stress which is the distinction between fluid strain and outdoor atmospheric pressure. These gauges are reachable in the specific stages of pressure.

3.5 High Pressure Pipes

When there is a want of transferring gasoline at excessive pressure, the vary of excessive strain pipes are used. It consists of a metal pipe with metal spheres constant at each the terminals. These spheres are pressed towards the seating of connecting gap with the assist of two swiveling nipple and as a result the fuel leakage is prevented.



Fig 3.5 High Pressure Pipe

The vary of excessive stress pipes covers most allocation the place there is a requirement to switch gasoline at excessive pressure. They consist of a metal pipe with metal ball heated to each ends. To swelling connections nipples press these ball in opposition to of the connecting poles and hence sealing towards gasoline leakage. All pipes are strain examined to a hundred M Pa (14500 psi). Over advocated working pressure.

4. FUTURE SCOPE

An introduction of new product in the discipline of refrigeration is predicted and to provide out nice end result with this ordinary product. The most important intention is to center of attention on restaurant and neighborhood application hall, mid-day meal of college so to keep meals merchandise like vegetables, milk etc. Also at small snack shops by means of growing the chance of fridge with the aid of lowering its weight, doing away with compressor definitely as properly as most value discount due to no value of refrigeration.

(1) The mine, desolate tract and lookup areas and nations the place lack of electrical energy this product would possibly be beneficial.

(2) This product can additionally keep precise utility in an LPG auto air conditioning.

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