

REVIEW OF STANDARDS FOR RETROFITTING OF LPG REFRIGERANT IN THE EXISTING REFRIGERATORS AND AC SYSTEMS

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Abstract

Chlorofluorocarbons (CFCs) are being phased out and hydro chlorofluorocarbons (HCFCs) and hydro fluorocarbons (HFCs) will be phased out as per the international protocols. HFCs (R 134a) are classified under Kyoto Protocol (KP) as high Global Warming Potential (GWP) Green Housed Gas (GHG). HCFCs (R 22), having high GWP is not covered under KP, as they are scheduled for phase out under Montreal Protocol (MP). If each of us, as nations, that ratify KP and MP wants to adhere to such important phase down, the users of HCFCs and HFCs must start using fluid with much lower GWP and Ozone Depletion Potential (ODP) than current HCFCs and HFCs. This paper examines the promises of Propane (R 290), Isobutane (R 600a), R 436a (mixture of R 290 and R 600a with different mass ratio) and Liquid Petroleum Gas (LPG) mixture as possible substitute to R 22 and R134a. This study reviews the literature, which has various works on the use of LPG, a hydrocarbon fuel operated in many types of equipment, as a substitute refrigerant without any change in refrigerators and air conditioners at various sizes. It was found that hydrocarbon well mixed with existing lubricants, shows improved heat transfer performance and need relatively low amount of system charge compared with HCFCs and HFCs. Many of the low GWP substitute fluid to HCFCs and HFCs are flammable; therefore this makes potential safety issues and may slow down their usage. A series of revisions to the international standards is almost available to provide the additional safety measures required for the design, repair and service of refrigeration and air conditioning equipment using flammable refrigerant. How these revisions and amendments to international standards concerning refrigeration and AC equipment may deliver framework to develop future refrigeration technology engaging hydrocarbons in the local context are discussed. Further, this paper analyses the different existing international and regional standards highlighting the maximum charge and room area limits as well as the specific requirements for air conditioning and refrigeration equipment operating with hydrocarbons. Development/adoption of appropriate local standards is necessary to utilize hydrocarbon refrigerants so that their flammability risks are minimized. Recognizing that servicing (maintenance and repair) activities an A/C equipment represent the high

risk, a comprehensive trainings set for maintenance and repair technicians have to be developed and made available for servicing companies in Sri Lanka.

Key Words: Flammable Refrigerant, Standards Specification, HVAC, LPG