

# CENTRIFUGAL COMPRESSOR WORKING FLUIDS FOR REFRIGERATION CYCLE

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**ABSTRACT - A centrifugal high-speed compressor is an effective light weight option to power a refrigeration cycle for air conditioning purposes. Perhaps the most important decision in design is the working fluid selection. Modern high-speed technology makes it possible for the refrigeration compressor to be completely oil free, which considerably broadens the scale of possible working fluids. Furthermore, many traditional fluids have become banned and the industry standard R134a might face the same faith in some European countries because of its relatively high global warming potential. In this study eleven different fluids were studied and compared and R22 was used as a reference. It was found that there are many potential fluids for centrifugal compressors that provide better efficiencies than the most common fluids in use today. The purpose of this study is to initially screen a larger set of candidate fluids for more accurate estimation later on. The fluids are evaluated by the efficiency of the cycle, but also mechanical feasibility and dimensions are considered as light weight of the machinery was an important criterion in design process. The comparison was made with constant evaporation and condensation temperature and fixed cooling power for all the fluids. In selection of the working fluid the safety factors often play a dominant role which was also shortly considered. In our study we found out that for a residential HVAC size cooling cycle there are environmentally friendly fluids with high efficiency leading to feasible mechanical designs with centrifugal compressors.**