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SUMMARY

The broad scope of this research is to provide compatibility information on engineering plastics with alternate refrigerants exposed to a wide variety of suitable lubricants. In part, data will be obtained on the changes in the polymer and mechanical properties of selected plastics after ambient aging under stress and after thermal aging in refrigerant-lubricant mixtures at constant pressures.

Engineering plastics from the polybutylene terephthalate, polyethylene terephthalate, polyamide, polypropylene, polyetherketone, polyetheretherketone, polytetrafluoroethane, liquid crystal polymers, polyetherimide, polyamide-imide, polyimide thermoset, acrylonitrile-butadiene-styrene copolymer, acetal, phenolic, polyaryl sulfone, polycarbonate, polyphenylene ether (modified), polyvinylidene fluoride copolymer and polyphenylene sulfide families will be molded into a modified ASTM Type 5 tensile bars for all immersion and mechanical studies.

Immersion data will be obtained for refrigerants 22, 123, 124, 125, 134a, 152a, 32, 142b, 143a and E134 with a mineral oil, an alkylbenzene, polypropylene glycol butyl monoether, polypropylene glycol diol, a modified polyglycol, penta erythritol polyol ester from mixed acids, and a penta erythritol polyol ester from branched acids. Refrigerant only immersion test temperatures are planned at ambient and at 60°C for fourteen days. A weight value of polymer extractables by refrigerant will also be determined. Oil only immersion test temperatures will be at 60°C and 100°C for fourteen days.

Mechanical property data will be tensile at break from molded ASTM Type 5 specimens taken before aging and after 150°C thermal aging experiments at constant refrigerant pressure (300 psia. max.) studies. Stress cracking and creep rupture studies will be from a special, all stainless steel test instrument wherein identical molded ASTM Type 5 test specimens are dead weight loaded in a refrigerant-lubricant mixture. Refrigerant concentration will be maintained constant throughout the study in a 32 ISO viscosity grade polyol ester composed of mixed linear and branched acids at ambient or at elevated temperature conditions.

Equilibrium refrigerant gas solubility fluid properties of the 32 ISO viscosity grade polyol ester used in the stress crack creep rupture test will be known prior to the test. The data will provide the necessary information for maintaining constant refrigerant concentrations.

Test results from this program will be discussed during the meeting session.

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