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ANSI/ASHRAE Standard 172-2024
Method of Test for Insoluble Materials in Lubricant and Refrigerant Systems

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Preview

NOTE

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FOREWORD

Partially soluble substances in the refrigerant/lubricant mixture that are soluble under one set of temperatures and pressures in the refrigeration system but precipitate under other conditions or in select components or locations of the system can adversely impact the operation and reliability of refrigeration and HVAC equipment. Such substances can be transported within the system to select components where they can form permanent deposits. The process of selective precipitation and deposit formation not only may remove a critical component of the refrigerant/lubricant mixture from locations in the system where it is needed but also form undesirable insulating films or constrictions to flow. The impact can be most damaging to fixed-orifice, thermally controlled, or electronically controlled expansion devices where even small deposit formation can dramatically alter the diameter or completely block the orifice. Such changes can dramatically decrease the efficiency of the refrigeration equipment and/or lead to complete failure of the equipment.

1. PURPOSE

The purpose of this standard is to define a test method to determine the formation of insoluble materials in lubricant and refrigerant systems.

2. SCOPE

The test will determine the presence of materials that separate from refrigerant and lubricant mixtures over a range of temperatures and concentrations. The test is based on the precipitation of insoluble material in a lubricant/refrigerant combination. The results can be used to compare lubricants and refrigerants.

3. DEFINITIONS

charging apparatus: a device that allows the accurate vacuum transfer of small volumes of gaseous refrigerants to the sealed tube (or metal test cell) containing precharged lubricant. This apparatus consists of a manifold (metal or glass), vacuum pump, pressure gage, high-vacuum gage, refrigerant cylinder, valves, and filling ports. The function of this apparatus is to evacuate the tube, degas the lubricant, add refrigerant, and seal it. It is calibrated so that the required mass of refrigerant is added very accurately by following the change in pressure on the pressure gage as refrigerant is added to the tube.

lubricant: a stable fluid that is compatible with system components, will form a friction-reducing film between rubbing surfaces and seal critical clearances, and has low-temperature transport properties suitable for the application in which it is used [1].

metal test cell**:** a steel cell containing a charge valve and windows that allow the operator to clearly observe the refrigerant/lubricant mixture for any visual changes. The cell must be rated for the maximum pressure anticipated for the test conditions for the particular refrigerant and possess a pressure relief device.

personal protective equipment (PPE): equipment worn to minimize exposure to a variety of hazards [2]. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs), hard hats, respirators, face shields, safety shields, and full-body suits.

precipitate: a material that separates from the lubricant and refrigerant mixture at a certain temperature (e.g., lubricant additives, contaminants, manufacturing chemicals, extractables).

precipitation temperature: temperatures at which the lubricant and refrigerant mixture forms a precipitate that is visible to the naked eye.

refrigerant: the fluid used for heat transfer in a refrigerating system; the refrigerant absorbs heat and transfers it at a higher temperature and a higher pressure, usually with a phase change. Substances added to provide other functions, such as lubrication, leak detection, absorption, or drying, are not refrigerants [3].

refrigeration equipment: systems containing refrigerant and lubricant for use in HVAC&R applications.

sealed glass tube: a borosilicate glass tube with one end formed into a round bottom. The tube is charged with the refrigerant and materials to be tested and then sealed in a rounded tip at the other end [4]. The glass tube must be rated for greater than the maximum pressure anticipated for the test conditions for the refrigerant.

test apparatus: a system of equipment with specific purpose. Such items include the charging manifold and controlled temperature bath.

Preview