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ANSI/ASHRAE Standard 41.4-2015 (RA2025)
Standard Method for Measuring the Proportion of Lubricant in Liquid Refrigerant

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Preview

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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FOREWORD

ASHRAE Standard 41.4 was last revised in 1996 (and reaffirmed in 2006), prior to the global commitment to use refrigerants with lower global warming potential that require the use of synthetic lubricants instead of mineral oils. The methods used in this revision apply to all lubricant-refrigerant combinations. This standard has been revised to comply with ASHRAE's mandatory language requirements and to more clearly specify the test requirements and procedures.

Safety is an important consideration for all procedures involving refrigerant—wear safety glasses and other personal protection equipment.

This is a reaffirmation of Standard 41.4-2015. This standard was prepared under the auspices of ASHRAE. It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform guidelines throughout the industry.

1. PURPOSE

This standard prescribes a method for measuring the proportion of lubricant in liquid refrigerant.

2. SCOPE

2.1 This standard uses the gravimetric method as the primary method, but alternative methods can be used if those methods are calibrated against the primary method.

2.2 This standard does not apply to collected samples that contain less than 0.001 g (0.015 grains) of lubricant.

3. DEFINITIONS AND SYMBOLS

3.1 Definitions

***accuracy*:** the degree of conformity of an indicated value to an accepted standard value, or true value. The degree of inaccuracy is known as *total measurement error* and is the sum of bias error and precision error.

***bias, fixed, or systematic error*:** the difference between the true or actual value to be measured and the indicated value from the measuring system that persists and is a characteristic of the particular instrument or measurement technique.

error: the difference between the true value of the quantity measured and an observed value. Because the true value is not known, it is estimated by the mean. The difference between the mean and an observed value is called its *deviation*.

lubricant circulation rate on the refrigerant basis: the ratio of the mass of lubricant to the mass of refrigerant in the sample.

lubricant circulation rate on the sample basis: the ratio of the mass of lubricant to the mass of refrigerant and lubricant in the sample.

mean: the sum of measurement values divided by the number of measurements. Mean is considered the best approximation of the true value.

packless all-metal diaphragm valves: valve manufacturers use this term to describe diaphragm valves that have polytetrafluoroethylene (PTFE) gaskets but have no elastomeric seals.

precision: the closeness of agreement among repeated measurements of the same characteristic by the same method under the same conditions.

random error (or precision error): a statistical error that is caused by chance and is not recurring. There are two types of random error:

additive errors: errors that are independent of the magnitude of the observations.

multiplicative errors: errors that are dependent on the magnitude of the observations.

resolution: the minimum observable difference between two values of a measured characteristic.

uncertainty: a measure of the potential error in a measurement or experimental result that reflects the lack of confidence in the result to a specified level.

3.2 Symbols, SI (I-P)

M_1 = mass of an empty cylinder assembly, g (grains)

M_2 = mass of a cylinder assembly plus the mass of the refrigerant-lubricant sample, g (grains)

Preview