ANSI/ASHRAE Standard 34-2004
(Includes ANSI/ASHRAE addenda listed in Appendix C)

ASHRAE STANDARD

Designation and Safety Classification of Refrigerants

See Appendix C for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, and the American National Standards Institute.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site, http://www.ashrae.org, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in U.S. and Canada).

ISSN 1041-2336

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
1791 Tullie Circle NE, Atlanta, GA 30329
www.ashrae.org

SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard,
d. permission to reprint portions of the Standard.

DISCLAIMER

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

CONTENTS

ANSI/ASHRAE Standard 34-2004
Designation and Safety Classification of Refrigerants

NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at http://www.ashrae.org.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

ANSI/ASHRAE Standard 34-2004 is the latest edition of Standard 34, which describes a shorthand way of naming refrigerants and assigns safety classifications based on toxicity and flammability data. The 2004 edition combines Standard 34-2001 and the twelve approved and published addenda to the 2001 edition, thereby providing an easy-to-use consolidated standard. More specific information on the contents of each addendum and its approval dates are included in an informative appendix at the end of this standard.

First published in 1978, Standard 34 is now updated on a regular basis using ASHRAE's continuous maintenance procedures. According to these procedures, Standard 34 is continuously revised—often several times a year—by addenda that are publicly reviewed, approved by ASHRAE and ANSI, and published on the ASHRAE Web site. Because the standard changes as new addenda are published, users are encouraged to sign up for the free internet list server for the ASHRAE Standards Actions publication, which provides notice of all public reviews and approved and published addenda and errata. At the minimum, users should periodically review the ASHRAE Web site to ensure that they have all of the published addenda. Currently two significant proposed addenda are undergoing the public review and approval process and may be published in the near future: Addendum 34p, which adds flammability and fractionation test methods, and Addendum 34u, which adds the Refrigerant Concentration Level (RCL).

Among the key changes that were incorporated in the 2004 edition are the following:

- *Six refrigerants or refrigerant blends were added to Tables 1 and 2 and an A1 safety classification was added for R-C318.*
- *The term "refrigerant" as it applies to this standard was further defined.*
- *The requirements for blend compositions and tolerances were defined. The minimum amount of any component is now 0.6%, and the tolerance above or below the nominal shall not be less than 0.1% or more than 2.0% m/m.*
- *The reference to ASTM E681 was updated and the conversion factor was deleted from the definition of lower flammability limit (LFL).*
- *Informative Appendix B, which compared previous and current safety classifications, was deleted. Appendix B is now the bibliography.*

Users of the standard are encouraged and invited to use the continuous maintenance procedure to suggest changes for further improvements. A form for submitting proposed changes to the standard is included in the back of this edition. The project committee for Standard 34 will take formal action on all proposals received.

1. PURPOSE

This standard is intended to establish a simple means of referring to common refrigerants instead of using the chemical name, formula, or trade name. It also establishes a uniform system for assigning reference numbers and safety classifications to refrigerants. The standard identifies requirements to apply for designations and safety classifications for refrigerants, including blends, in addenda or revisions to this standard.

2. SCOPE

This standard provides an unambiguous system for numbering refrigerants and assigning composition-designating prefixes for refrigerants. Safety classifications based on toxicity and flammability data are included. This standard does not imply endorsement or concurrence that individual refrigerant blends are suitable for any particular application.

3. DEFINITIONS OF TERMS

acute toxicity: the adverse health effect(s) from a single, short-term exposure, as might occur during an accidental release of refrigerants.

azeotropic: an azeotropic blend is one containing two or more refrigerants whose equilibrium vapor and liquid phase compositions are the same at a given pressure. At this pressure, the slope of the temperature vs. composition curve equals zero, which mathematically is expressed as $(dt/dx)_p = 0$, which, in turn, implies the occurrence of a maximum, minimum, or saddle point temperature. Azeotropic blends exhibit some segregation of components at other conditions. The extent of the segregation depends on the particular azeotrope and the application.

azeotropic temperature: the temperature at which the liquid and vapor phases of a blend have the same mole fraction of each component at equilibrium for a specified pressure.

blends: refrigerants consisting of mixtures of two or more different chemical compounds, often used individually as refrigerants for other applications.

cardiac sensitization: an acute effect in which the heart is rendered more sensitive to the body's own catecholamine compounds or administered drugs, such as epinephrine, possibly resulting in irregular heart beat (cardiac arrhythmia), which could be fatal.

ceiling: an exposure level, permissible exposure level-ceiling (PEL-C) or threshold limit value-ceiling (TLV-C), that should not be exceeded during any part of the day.

chronic toxicity: adverse health effect(s) from long-term, repeated exposures. This information is used, in part, to establish a TLV-TWA, PEL, or consistent indices.

committee: as used in the standard, refers to ASHRAE Standing Standards Project Committee (SSPC) 34.