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Safety Standard for Refrigeration Systems

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FOREWORD

This republication of ANSI/ASHRAE Standard 15 comes one year early to better align Standards 15, 15.2, and 34 with the model code revision cycle. By republishing in 2024, ASHRAE's refrigeration standards can be submitted in public comments to the International Code Council (ICC) and International Association of Plumbing and Mechanical Officials (IAPMO) model codes. This one-time exception establishes a new three-year cycle for republication moving forward.

The 2024 edition of Standard 15 incorporates 19 published addenda, the most addenda per year in the standard's history. Most addenda to the 2022 edition address some aspect of flammable refrigerant use—a good sign that the requirements to address next generation refrigerants are being implemented and that users of Standard 15 are closely engaged in the details of its ongoing development.

Standard 15-2024:

- *Revises Section 9.7.5 to clarify intent and requirements related to pressure relief devices*
- *Clarifies that specific requirements have precedence over general requirements (consistent in approach with model codes)*
- *Corrects values of conversion factors in Table 7-3 for use in the calculation of effective dispersal volume charge (EDVC) and adds equations to calculate conversion factors for other refrigerants not included in Table 7-3*
- *Clarifies the intent for determination of EDVC limits*
- *Provides consistency on the use of relative molar mass throughout ASHRAE Standard 15 and better defines the connection between Standards 15 and 34 with respect to use of other defined terms (LFL, OEL, RCL).*
- *Modifies requirements for handling, transportation, and storage of flammable refrigerants based on recommendations of ASHRAE RP-1807*
- *Permits use of Section 8.9.6 ventilation airflow rates where explosion-proof electrical equipment is chosen as a compliance path, allowing ignition-source engineering controls to be the primary means of risk management for Class 2L refrigerants*

For a complete list of changes since the 2022 edition, see Informative Appendix G.

Standard 15 is regularly updated through the continuous maintenance process, which allows additions and modifications based on feedback from users in accordance with ASHRAE's ANSI-approved procedures. In addition to feedback from users, changes in the science originating from ASHRAE and industry research, as well as changes in refrigeration technology, necessitate the continuous maintenance approach. Instructions for how to submit a change can be found on the ASHRAE website at www.ashrae.org/continuous-maintenance.

ASHRAE Standard 15 must be used with its companion standard, ANSI/ASHRAE Standard 34, Designation and Safety Classification of Refrigerants. *Standard 34 prescribes the Refrigerant Classification System, as well as refrigerant concentration limits (RCLs) and lower flammability limits (LFLs), which are vitally important in applying this standard. Although changes to Standard 15 are closely coordinated with changes to Standard 34, users of Standard 15 should also review the most recent version of Standard 34 and its associated addenda for the latest information related to refrigerant designations and safety classifications.*

ASHRAE Standard 15 gives a method for determining the maximum amount of refrigerant that can safely be used in a given space, occupied or unoccupied. That maximum amount may differ depending on the type of refrigeration system and mitigation actions. If the maximum amount is exceeded, a machinery room will be required. When a refrigerant is not classified in ASHRAE Standard 34 or its addenda, this standard has provisions for the authority having jurisdiction to approve a classification for use in establishing the installation requirements.

ASHRAE Standard 15 is directed toward the safety of persons and property on or near the premises where refrigeration facilities are located. It includes specifications for fabrication of refrigerating systems but does not address the effects of refrigerant emissions on the environment. For information on the environmental effects of refrigerant emissions, see ANSI/ASHRAE Standard 147, Reducing the Release of Halogenated Refrigerants from Refrigerating and Air-Conditioning Equipment and Systems.

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FOREWORD

ASHRAE Standard 34 describes a shorthand way of naming refrigerants, and it assigns safety classifications and refrigerant concentration limits based on toxicity and flammability data.

A new edition of the standard was published one year early, in 2024, to better align with timing of building code updates. The 2024 edition of the standard incorporates 38 approved and published addenda to the 2022 edition. Brief descriptions of the addenda and their dates of approval are included in Informative Appendix K.

First published in 1957, Standard 34 is updated on a regular basis using ASHRAE's continuous maintenance procedure. In accordance with this procedure, the standard is revised several times a year via addenda that are publicly reviewed, approved by ASHRAE and ANSI, and published on the ASHRAE website.

Users are encouraged to apply the continuous maintenance procedure to propose changes for further improvements to the standard. Instructions can be found at www.ashrae.org/continuous-maintenance.

Also, because the standard changes as new addenda are published, ASHRAE recommends subscribing to the free Standards Actions listserv, which provides notice of all public reviews and approved and published addenda and errata. At the minimum, users should periodically review the ASHRAE website to ensure they have the latest published addenda.

Application guidance for designation, flammability, and toxicity is available at sspc34.ashraepcs.org.

The following are key changes included in the 2024 edition:

- *Twenty-eight refrigerants were added to Table 4-2.*
- *Burning velocity data were added to Tables 4-1 and 4-2 for flammable refrigerants.*
- *The designation numbering of zeotropic refrigerant blends following the assignment of R-499A was delineated.*
- *The standard was revised to allow further alignment with ISO Standard 817, including updating the definition of occupational exposure limit (OEL), clarifying toxicity data, and revising application requirements.*
- *Toxicity values for R-50, R-1150, and R-1270 were added to or revised.*
- *Refrigerant numbering descriptions of the ethane series were expanded to also incorporate the ethene series.*
- *Ethers and cyclobutene were added to the list of substances which can be explicitly determined from the refrigerant numbers.*
- *Clarification on the allowable pressure range for flammability testing was added.*
- *The composition tolerances for components of refrigerant blends were revised.*

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 establishes a uniform system for assigning reference numbers, safety classifications, and refrigerant concentration limits to refrigerants. The standard also identifies requirements to apply for designations and safety classifications for refrigerants and to determine refrigerant concentration limits.

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 along with refrigerant concentration limits for the refrigerants.

This standard does not imply endorsement or concurrence that individual refrigerant blends are suitable for any particular application.

3. DEFINITIONS

3.1 Defined Terms

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

acute toxicity exposure limit (ATEL): the refrigerant concentration limit determined in accordance with this standard and intended to reduce the risks of acute toxicity hazards in normally occupied, enclosed spaces. ATEL values are similar to the immediately dangerous to life or health (IDLH) concentrations set by the

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