

ASHRAE Standing Standard Project Committee 15
Cognizant TCs: TC 10.1, Custom Engineered Refrigeration Systems,
and TC 9.1, Large Building Air-Conditioning Systems
SPLS Liaison: Dean S. Borges

Jay A. Kohler, *Chair*
George C. Briley
James M. Calm
Earl M. Clark
Dennis R. Dorman
Stephen W. Duda
Danny M. Halel
Larry Kettwich
Daniel R. Kuespert
Norman Wanner Panabaker
Julian T. Parker

Douglas T. Reindl
William V. Richards
Kenneth M. Schoonover
Rudolph Stegmann
Michael H. Tavares
Martin L. Timm
Eugene F. Troy
John I. Vucci
Thomas E. Watson
Gary W. Westermeyer
Gary J. Zyhowski

ASHRAE STANDARDS COMMITTEE 2003-2004

Van D. Baxter, *Chair*
Davor Novosel, *Vice-Chair*
Donald B. Bivens
Dean S. Borges
Paul W. Cabot
Charles W. Coward, Jr.
Hugh F. Crowther
Brian P. Dougherty
Hakim Elmahdy
Matt R. Hargan
Richard D. Hermans
John F. Hogan
Frank E. Jakob

Stephen D. Kennedy
David E. Knebel
Frederick H. Kohloss
Merle F. McBride
Mark P. Modera
Cyrus H. Nasser
Stephen V. Santoro
Gideon Shavit
David R. Tree
James E. Woods
Ross D. Montgomery, *ExO*
Kent W. Peterson, *CO*

Claire B. Ramspeck, *Manager of Standards*

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 15-2004, Safety Standard for Refrigeration Systems

| SECTION | PAGE |
|--|------|
| Foreword | 3 |
| 1. Purpose | 4 |
| 2. Scope | 4 |
| 3. Definitions | 4 |
| 4. Occupancy Classification | 6 |
| 5. Refrigerating System Classification..... | 7 |
| 6. Refrigerant Safety Classification | 8 |
| 7. Restrictions on Refrigerant Use | 8 |
| 8. Installation Restrictions | 11 |
| 9. Design and Construction of Equipment and Systems | 13 |
| 10. Operation and Testing | 23 |
| 11. General Requirements | 24 |
| 12. Precedence with Conflicting Requirements | 25 |
| 13. Listed Equipment | 25 |
| Appendix A: Calculations of the Maximum Allowable Concentration (C_m) of a Blend..... | 26 |
| Appendix B: Guidelines for Emergency Discharge of Refrigerants When Required by Local Codes..... | 26 |
| Appendix C: Refrigeration Classification Scheme (Normative)..... | 27 |
| Appendix D: Informative References..... | 28 |
| Appendix E: Normative References..... | 28 |
| Appendix F: Method for Calculating Discharge Capacity of Positive Displacement Compressor Pressure-Relief Device | 29 |
| Appendix G: Reserved for Future Use | 29 |
| Appendix H: Allowable Equivalent Length of Discharge Piping (Normative) | 30 |
| Appendix I: Emergencies in Refrigerating Machinery Rooms | 31 |
| Appendix J: Addenda Description Information | 32 |

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 15-2004 is the newest version of one of ASHRAE's oldest standards. This version is a republication of ANSI/ASHRAE 15-2001, including addendum a. The reader is referred to that addendum as well as Appendix J of this standard for changes that have been made since the original publication of ANSI/ASHRAE 15-2001. Among those changes were changes to the treatment of flammable refrigerants, including correction of an omission in the 2001 standard. In addition, changes were made to the requirements for pressure vessel protection and references were updated.

This standard 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 tight systems but does not address the effects of refrigerant emissions on the environment. For information on the environmental effects of refrigerant emissions, see ASHRAE Guideline 3-1996, Reducing Emission of Halogenated Refrigerants in Refrigeration and Air-Conditioning Equipment and Systems.

While the user must be familiar with the entire document, the following major topic grouping allows quicker location of information. The subtopics included in these major groupings are:

GENERAL: Purpose, Scope, Definitions, Occupancy Classification, Refrigerating System Classification, Refrigerant Classification, Precedence with Conflicting Requirements, Listed Equipment.

RESTRICTIONS: Restrictions on Refrigerant Use, Installation Restrictions.

DESIGN AND CONSTRUCTION: Materials, System Design Pressure, Refrigerant-Containing Pressure Vessels, Pressure Relief Protection, Setting of Pressure-Relief Devices, Marking of Pressure-Relief Devices and Fusible Plugs, Pressure Vessel Protection, Positive Displacement Compressor Protection, Pressure-Limiting Devices, Refrigerant Piping, Valves, Fittings and Related Parts, Components Other than Pressure Vessels and Piping, Service Provisions, Fabrication, Factory Tests, and Nameplate.

OPERATION AND TESTING: Field Tests, General Requirements.

In the text of the standard, superscripts indicate the references included in Appendices D and E.

As discussed above, the user is referred to addendum a of ANSI/ASHRAE 15-2001 for changes that have been made since the original publication of ANSI/ASHRAE 15-2001.

Some of those changes are:

- Section 7 – Changes were made to the requirements for flammable refrigerants.
- Section 9 – The requirements for pressure vessel protection were revised.

The hazards of refrigerants are related to their physical and chemical characteristics as well as to the pressures and temperatures occurring in refrigerating and air-conditioning systems. Personal injury and property damage from inadequate precautions may occur from:

- Rupture of a part or an explosion with risk from flying debris or from structural collapse.
- Release of refrigerant from a fracture, due to a leaking seal, or from incorrect operation.
- Fire resulting from or intensified by burning or deflagration of escaping refrigerant or lubricant.

Personal injury from accidental release of refrigerants may also occur from:

- Suffocation from heavier-than-air refrigerants in inadequately ventilated spaces.
- Narcotic and cardiac sensitization effects.
- Toxic effects of vapor or the decomposition products due to vapor contact with flames or hot surfaces.
- Corrosive attack on the eyes, skin, or other tissue.
- Freezing of tissue by contact with liquid.

While ANSI/ASHRAE 15-2004 is written as a self-standing document, it includes references to other standards. One of those standards is ANSI/ASHRAE 34, which prescribes the Refrigerant Classification System and Table 1 quantities that are important to the use of this standard. Changes to ANSI/ASHRAE 15 are closely coordinated with those to ANSI/ASHRAE 34.

Table 1 shows the amount of refrigerant in a given space that, when exceeded, requires a machinery room. When a refrigerant is not classified in ANSI/ASHRAE 34 or its addenda or shown in Table 1, it is the responsibility of the owner of a refrigerating system to make this judgement. For blends, Appendix A is offered to aid in determining allowable concentrations.

Care should be taken to avoid stagnant pockets of refrigerant vapors by proper location of ventilation inlet and exhaust openings (all commonly used refrigerants except ammonia [R-717] and water [R-718] are heavier than air). All machinery rooms are required to have detectors that will activate on alarm and mechanical ventilation at a value not greater than the corresponding TLV-TWV (or toxicity measure consistent therewith). Informative Appendix I provides guidance on integrating the requirements of this standard with occupational health and safety programs.

A short publishing history of this code traces the origins of these safety provisions. In 1919, the American Society of Refrigerating Engineers (ASRE) proposed a Tentative Code for the Regulation of Refrigerating Machines and Refriger-