

ASHRAE Standing Standard Project Committee 15
Cognizant TCs: 101, Custom Engineered Refrigeration Systems,
and 9.1, Large Building Air-Conditioning Systems
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CONTENTS
ANSI/ASHRAE Standard 15-2016,
Safety Standard for Refrigeration Systems

SECTION	PAGE
Foreword	2
1 Purpose	3
2 Scope	3
3 Definitions	3
4 Occupancy Classification	6
5 Refrigerating System Classification	7
6 Refrigerant Safety Classification	7
7 Restrictions on Refrigerant Use	7
8 Installation Restrictions	9
9 Design and Construction of Equipment and Systems	11
10 Operation and Testing	23
11 General Requirements	24
12 Precedence with Conflicting Requirements	25
13 Listed Equipment	25
Informative Appendix A: Informative References	26
Normative Appendix B: Normative References	27
Informative Appendix C: Method for Calculating Discharge Capacity of Positive Displacement Compressor Pressure Relief Device	28
Informative Appendix D: Allowable Equivalent Length of Discharge Piping	30
Informative Appendix E: Emergencies in Refrigerating Machinery Rooms	31
Informative Appendix F: Addenda Description Information	33

NOTE

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

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FOREWORD

The 2016 edition of Standard 15 incorporates changes intended to ensure improvement in the safe design, construction, installation, and operation of refrigeration systems. Highlights of the 2016 edition include updated requirements for safety relief systems, including revisions to relief vent pipe discharge locations and design provisions for headered relief vent systems; updated design pressure requirements applicable to systems using carbon dioxide; and modification to overpressure protection for heat exchangers and pressure limiting devices for positive displacement compressors. Additional changes are noted in informative Appendix F.

Standard 15 continues to evolve through the process of continuous maintenance, which allows additions and modifications to be made 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. Interested parties can recommend modifications to the standard by submitting a proposal using the continuous maintenance form located in the back of the standard.

ASHRAE Standard 15 must be used with its sister standard, ANSI/ASHRAE Standard 34¹, Designation and Safety Classification of Refrigerants. Standard 34 prescribes the Refrigerant Classification System, as well as refrigerant concentration limits (RCL), that are vitally important in applying this standard. Although changes to Standard 15 are closely coordinated with those 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 amount of refrigerant in a given space that, when exceeded, requires a machinery room. When a refrigerant is not classified in ASHRAE Standard 34 or its addenda, it is the responsibility of the owner of a refrigerating system to make this judgment.

Users of ASHRAE Standard 15 may also find it useful to refer to the Standard 15-2001 User's Manual. The user's manual was developed as a companion document to ASHRAE Standard 15. Though it does not reflect the addenda and changes incorporated into Standard 15 since its original publication, it still serves to clarify the intent of the standard and provides an explanation of the rationale behind its creation. Its purpose is to assist in use of the standard by including illustrations and examples of accepted industry practice, as well as explanations of and supporting references for formulas in the standard. The user's manual also covers building,

system, and refrigerant classifications, restrictions on refrigerant use, installation restrictions, and equipment and system design and construction for commercial, residential, and industrial applications.

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 147², Reducing the Release of Halogenated Refrigerants from Refrigerating and Air-Conditioning Equipment and Systems.

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

- rupture of a part with risk from flying debris;
- release of refrigerant from a fracture, due to a leaking seal or incorrect operation; or
- fire resulting from or intensified by burning or deflagration of escaping refrigerant or lubricant.

Personal injury resulting from the 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; or
- freezing of tissue by contact with liquid.

Care should be taken to avoid stagnant pockets of refrigerant vapors by properly locating ventilation supply air inlets and exhaust outlets. All commonly used refrigerants, except ammonia (R-717) and water (R-718), are heavier than air. Leaked refrigerant vapor will concentrate near the floor if undisturbed. Floor-level exhaust-air outlets are appropriate for heavier-than-air refrigerants. The user's manual may provide useful guidance for the design of ventilation systems and the location of supply air inlets and exhaust outlets.

The following 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 Refrigerants. Over the next 11 years, representatives from the American Gas Association, American Institute of Electrical Engineers, American Institute of Refrigeration, American Chemical Society, American Society of Heating and Ventilation Engineers, American Society of Mechanical Engineers, National Electrical Refrigerator Manufacturers Association, National Fire Protection Association, and ASRE met to expand the code to address all of the issues raised on the use of refrigeration equipment. The first Safety Code for Mechanical Refrigeration, recognized as American Standard B9 in October