ANSI/ASHRAE Addenda f and h to
ANSI/ASHRAE Standard 15-2007

ASHRAE STANDARD

Safety Standard for Refrigeration Systems

Approved by the ASHRAE Standards Committee on June 24, 2009; by the ASHRAE Board of Directors on June 24, 2009; and by the American National Standards Institute on June 25, 2009.

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 US and Canada).

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TC 9.1, Large Building Air-Conditioning Systems
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Addendum f

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Addendum h

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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.

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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.

(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

There has been a trend toward increased use of cascade systems in refrigeration applications. Cascade systems are being used in supermarkets, refrigerated warehouses, and industrial plants. Carbon dioxide (R744) is frequently being used and considered for use in the low-temperature side of cascade systems. Because of the pressure-temperature relationship of R744, it would be cost prohibitive and unnecessary to meet all the design pressure requirements of Section 9.2 for refrigeration systems using R744, since the required standby pressures for R744 are much higher than those experienced during normal operation. For example, the design pressure required to meet an 80ºF temperature (as would be required to meet the provisions of 9.2.1(a) for a lowside portion of a system) would be 970 psia. The standby pressures for R744 are much higher than the traditional design pressure of commercial and industrial refrigerating systems.

The change made in this addendum allows the use of R744 as a secondary coolant or refrigerant in certain situations. It allows limited releases of R744 to the atmosphere during unusual events, such as an extended power failure with coincident heat gains that would otherwise cause system pressures to rise above component design pressures. Refrigerant vented to atmosphere during a power failure is likely to be a "de minimus" quantity compared to losses from other causes such as normal leakage in even the best maintained commercial and industrial systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions).

Addendum f to Standard 15-2007

Modify Section 9.2.1 as shown below.

9.2.1 Design pressures shall not be less than pressure arising under maximum operating, standby, or shipping conditions. When selecting the design pressure, allowance shall be provided for setting pressure-limiting devices and pressure-relief devices to avoid nuisance shutdowns and loss of refrigerant. The *ASME Boiler and Pressure Vessel Code*,[5] Section VIII, Division I, Appendix M, contains information on the appropriate allowances for design pressure.

Refrigerating equipment shall be designed for a vacuum of 29.0 in. Hg (3.12 kPa). Design pressure for lithium bromide absorption systems shall not be less than 5 psig (34.7 kPa gage). Design pressure for mechanical refrigeration systems shall not be less than 15 psig (103.4 kPa gage) and, except as noted in Sections 9.2.2, 9.2.3, 9.2.4, ~~and~~ 9.2.5, and 9.2.6, shall not be less than the saturation pressure (gage) corresponding to the following temperatures:

a. Lowsides of all systems: 80°F (26.7°C)
b. Highsides of all water-cooled or evaporatively cooled systems: 30°F (16.7°C) higher than the summer 1% wet-bulb for the location as applicable or 15°F (8.3°C) higher than the highest design leaving condensing water temperature for which the equipment is designed or 104°F (40°C), whichever is greatest.
c. Highsides of all air-cooled systems: 30°F (16.7°C) higher than the highest summer 1% design dry-bulb for the location but not lower than 122°F (50°C).

Add the following new sections, Sections 9.2.6, 9.2.6.1 and 9.2.6.2, after Section 9.2.5.

9.2.6 When a refrigerating system utilizes carbon dioxide (R744) as a heat transfer fluid, the minimum design pressure for system components shall comply with the following:

9.2.6.1 In a circuit without a compressor, the design pressure shall be at least 20% higher than the saturation pressure corresponding to the warmest location in the circuit.

9.2.6.2 In a cascade refrigerating system, the highside design pressure shall be at least 20% higher than the maximum pressure developed by a pressure-imposing element, and the lowside pressure shall be at least 20% higher than the saturation pressure corresponding to the warmest location in the circuit.

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FOREWORD

This addendum addresses pressure relief discharge piping requirements for low pressure refrigeration systems using R-718 (water) as a refrigerant. These refrigeration systems have safety relief devices that primarily provide relief protection for heat exchanger tube failure. If the relief device should actuate under this scenario, water in a liquid state would be released. Due to the present requirements for vent pipe termination according to Section 9.7.8, the liquid water would be discharged at a high elevation, which is not desirable. The change implemented in this addendum adds an exception to Section 9.7.8 and permits alternate location of the relief vent termination for R-718 systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions).

Addendum h to Standard 15-2007

Add an exception to Section 9.7.8 as shown below.

9.7.8 Pressure-relief devices and fusible plugs on any system containing a Group A3 or B3 refrigerant; on any system containing more than 6.6 lb (3 kg) of a Group A2, B1, or B2 refrigerant; and on any system containing more than 110 lb (50 kg) of a Group A1 refrigerant shall discharge to the atmosphere at a location not less than 15 ft (4.57 m) above the adjoining ground level and not less than 20 ft (6.1 m) from any window, ventilation opening, or exit in any building. The discharge shall be terminated in a manner that will prevent the discharged refrigerant from being sprayed directly on personnel in the vicinity and foreign material or debris from entering the discharge piping. Discharge piping connected to the discharge side of a fusible plug or rupture member shall have provisions to prevent plugging the pipe in the event the fusible plug or rupture member functions.

Exception: When R-718 (water) is the only refrigerant, discharge to a floor drain is also acceptable if all of the following three conditions are met:

1. The pressure relief device set pressure does not exceed 15 psig,
2. The floor drain is sized to handle no less than the flow rate from a single broken tube in any refrigerant-containing heat exchanger, and
3. Either:
   a. The authority having jurisdiction finds it acceptable that the working fluid, corrosion inhibitor, and other additives used in this type of refrigeration system may infrequently be discharged to the sewer system, or
   b. A catch tank, sized to handle the expected discharge, is installed and equipped with a normally closed drain valve and an overflow line to drain.

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.