



ADDENDA

**ANSI/ASHRAE Addendum s to
ANSI/ASHRAE Standard 15-2019**

Safety Standard for Refrigeration Systems

Approved by ASHRAE and the American National Standards Institute on August 31, 2022.

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FOREWORD

Addendum s to Standard 15-2019 is one of several addenda addressing the use of refrigerants other than Group A1. This addendum addresses the use of refrigerant detection and mitigation requirements when a leak is detected.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum s to Standard 15-2019

Modify Section 3.1 as shown. The remainder of Section 3.1 remains unchanged.

3.1 Defined Terms

[...]

air circulation: mechanically inducing airflow within a space or spaces connected by air ducts.

[...]

conditioned space: an area, room, or space that is enclosed within the building thermal envelope that is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they

- a. connect through openings with conditioned spaces;
- b. are separated from conditioned spaces by uninsulated walls, floors, or ceilings; or
- c. contain uninsulated air ducts, tubing, or other sources of heating or cooling.

[...]

ducted HVAC: an air conditioner, heat pump, whole-house dehumidifier, or whole-house dehumidifying ventilator in which conditioned air is distributed through any amount of air duct.

ductless HVAC: an air conditioner, heat pump, or dehumidifier in which conditioned air is distributed directly into the conditioned space from the refrigerating system without the use of air ducts.

[...]

mitigation actions: actions taken by equipment that are initiated by detection of leaked refrigerant by the refrigerant detector.

[...]

refrigerant detection system: a system that utilizes one or more stationary devices to detect the presence of a specified refrigerant at a specified concentration and initiates one or more mitigation actions required by this standard.

[...]

releasable refrigerant charge (m_{rel}): a portion of the refrigerant in a refrigeration system that can be released into a space as a result of a single-point failure.

[...]

safety shut-off valve: an automatically controlled refrigerant valve for the purpose of limiting the amount of refrigerant released into a space when a refrigerant leak is detected.

[...]

Modify Section 7 as shown. The remainder of Section 7 remains unchanged.

7. RESTRICTIONS ON REFRIGERANT USE

[...]

7.6.2 Listing and Installation Requirements. Refrigeration systems *shall be listed* and *shall be installed* in accordance with Sections 7.6.2.1 through 7.6.2.5, the listing, the *manufacturer's* instructions, and any markings on the equipment restricting the installation.

[...]

~~7.6.2.3 A refrigerant detector shall be provided in accordance with Section 7.6.5 where any of the following apply:~~

- a. ~~For commercial, public assembly, and large mercantile occupancies, when the refrigerant charge of any independent circuit exceeds $0.212 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($6 \times LFL$ [kg], where LFL is in kg/m³), unless the concentration of refrigerant in a complete discharge from any independent circuit will not exceed 50% of the RCL~~
- b. ~~For residential occupancies, when the refrigerant charge of any independent circuit exceeds $0.212 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($6 \times LFL$ [kg], where LFL is in kg/m³)~~
- e. ~~When the occupancy classification is institutional~~
- d. ~~When required by the product listing~~
- e. ~~When using the provisions of Section 7.6.4~~

7.6.2.3* Manufacturer's Refrigerant Detection System Requirements. The following refrigeration systems *shall* have an integral refrigerant detection system:

- a. Ducted HVAC systems with a releasable refrigerant charge (m_{rel}) more than 4.0 lb (1.8 kg) and with any duct openings less than 5.9 ft (1.8 m) above the finished floor
- b. Ducted HVAC systems where spaces connected to the same supply air duct are used as the dispersal floor area to calculate volume per Section 7.3
- c. Refrigeration systems installed where the occupancy classification is institutional occupancy

~~7.6.2.4 When the refrigerant detector senses a rise in refrigerant concentration above the value specified in Section 7.6.5(b), the following actions shall be taken:~~

- a. ~~The minimum airflow rate of the supply air fan shall be in accordance with the following equation:~~

$$Q_{min} = 1000 \times M/LFL \quad (I-P)$$

$$Q_{min} = 60,000 \times M/LFL \quad (SI)$$

where

Q_{min} = minimum airflow rate, ft³/min (m³/h)

M = refrigerant charge of the largest independent refrigerating circuit of the system, lb (kg)

LFL = lower flammability limit, lb per 1000 ft³ (g/m³)

- b. ~~Turn off the compressor and all other electrical devices, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 7.6.5(b).~~
- e. ~~Any device that controls airflow located within the product or in ductwork that supplies air to the occupied space shall be fully open. Any device that controls airflow shall be listed.~~
- d. ~~Turn off any heaters and electrical devices located in the ductwork. The heaters and electrical devices shall remain off for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 7.6.5(b).~~

7.6.2.4* The refrigerant detection system shall comply with the following:

- a. Utilize a set point, nonadjustable in the field, to generate an output signal to initiate mitigation actions.
- b. Field recalibration of the refrigerant detection system shall not be permitted.
- c. Capable of detecting the presence of a specified refrigerant corresponding to the refrigerant designation of the refrigerant contained in the refrigeration system.
- d. Have access for replacement of refrigerant detection system components.
- e. Have self-diagnostics to determine operational status of the sensing element.
- f. Energize air circulation fans of the equipment upon failure of a self-diagnostic check.
- g. Generate an output signal in not more than 30 seconds when exposed to a refrigerant concentration of 25% LFL (+0%, -1%).

7.6.2.5* Mitigation Action Requirements. The following mitigation actions *shall* be completed in not more than 15 seconds after the initiation of the output signal of Section 7.6.2.4(g), and *shall* be maintained for at least 5 minutes after the output signal has reset:

- a. Energize the *air circulation* fan(s) of the equipment per the *manufacturer's* instructions.
- b. Open zoning dampers, or set zone dampers to full airflow set point, that are installed in the *air ducts* connected to the *refrigeration system*.
- c. Activate mechanical ventilation if required by Section 7.6.4.
- d. De-energize electric resistance heat installed in the *air duct* that is connected to the *refrigeration system*.
- e. Activate *safety shut-off valves* utilized to reduce *releasable refrigerant charge*.
- f. De-energize potential ignition sources, including open flames and unclassified electrical sources of ignition with apparent power rating greater than 1 kVA, where the apparent power is the product of the circuit voltage and current rating.

[...]

7.6.4 Compressors and Pressure Vessels Located Indoors.

[...]

- b. The space where the equipment is located *shall* be provided with a mechanical ventilation system in accordance with Section 7.6.4(c) and a ~~refrigerant detector~~ refrigerant detection system in accordance with Section ~~7.6.2.4~~ 7.6.5. The mechanical ventilation system *shall* be started when the ~~refrigerant detector~~ refrigerant detection system senses refrigerant in accordance with Section ~~7.6.2.4~~ 7.6.5. The mechanical ventilation system *shall* continue to operate for at least five minutes after the ~~refrigerant detector~~ refrigerant detection system has sensed a drop in the refrigerant concentration below the value specified in Section ~~7.6.2.4(g)~~ 7.6.5(b).

[...]

7.6.5 Refrigerant Detectors. ~~Refrigerant detectors required by Section 7.6.2 shall meet the following requirements:~~

- a. ~~Refrigerant detectors that are part of the listing shall be evaluated by the testing laboratory as part of the equipment listing.~~
- b. ~~Refrigerant detectors, as installed, shall activate the functions required by Section 7.6.2.4 within a time not to exceed 15 seconds when the refrigerant concentration reaches 25% of the LFL.~~
- e. ~~Refrigerant detectors shall be located such that refrigerant will be detected if the refrigerating system is operating or not operating. Use of more than one refrigerant detector shall be permitted.~~
 - 1. ~~For refrigerating systems that are connected to the occupied space through ductwork, refrigerant detectors shall be located within the listed equipment.~~
 - 2. ~~For refrigerating systems that are directly connected to the occupied space without ductwork, the refrigerant detector shall be located in the equipment, or shall be located in the occupied space at a height of not more than 12 in. (30 cm) above the floor and within a horizontal distance of not more than 3.3 ft (1.0 m) with a direct line of sight of the unit.~~
- d. ~~Refrigerant detectors shall provide a means for an automatic operational self test as provided in the product listing. Use of a refrigerant test gas is not required. If a failure is detected, a trouble alarm shall be activated, and the actions required by Section 7.6.2.4 shall be initiated.~~
- e. ~~Refrigerant detectors shall be tested during installation to verify the set point and response time as required by Section 7.6.5(b). After installation, the refrigerant detector shall be tested to verify the set point and response time annually or at an interval not exceeding the manufacturer's installation instructions, whichever is less.~~

[...]

Modify Informative Appendix A as shown. The remainder of Informative Appendix A remains unchanged. (Note: This addendum reflects changes previously made by Addendum k to Standard 15-2019, which can be downloaded from the ASHRAE website at <https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda>.)

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INFORMATIVE APPENDIX A EXPLANATORY MATERIAL

Sections of the standard with associated explanatory information in this appendix are marked with an asterisk "*" after the section number, and the associated appendix information is located in a corresponding section number preceded by "A".

[...]

Section 7.6.2.3

The requirements of Section 7.6.2.3 are intended to harmonize Standard 15 with the requirements of ANSI/ASHRAE Standard 15.2, *Safety Standard for Refrigeration Systems in Residential Applications* and UL 60335-2-40²⁰/CSA C22.2 No. 60335-2-40²¹. A refrigerant detection system of equipment listed to UL 60335-2-40/CSA C22.2 No. 60335-2-40 meets the requirements of this section.

Section 7.6.2.4

Validation of meeting requirements (a) to (c) and (e) to (g) can be accomplished by verifying that the refrigerant detector meets the Annex LL requirements of UL 60335-2-40²⁰, 4th edition or CSA C22.2 No. 60335-2-40²¹, 4th edition.

Section 7.6.2.5

The manufacturer's instructions can be reviewed to determine which of these requirements are performed by the equipment.

Section 7.6.2.5(c)

The ventilation requirements in Standard 15 are different from those in ANSI/ASHRAE Standard 62.1, *Ventilation and Acceptable Indoor Air Quality*, in that they are not intended to control indoor air quality. Rather, ventilation in Standard 15 serves as a safety mitigation method for reducing the refrigerant concentration within a space.

Section 7.6.2.5(e)

Safety shut-off valves located on the lowside of the refrigeration system may remain open during pumpdown to reduce releasable refrigerant charge. The pumpdown cycle should not reduce the lowside pressure below atmospheric pressure, and the safety shut-off valves must close at the end of the pumpdown cycle to be considered to meet this requirement.

Section 7.6.2.5(f)

Potential ignition sources include those items that are defined in ANSI/UL 60335-2-40 and CAN/CSA C22.2 No. 60335-2-40, including arcs and sparks from electrical components in Clause 22.115 and hot surfaces and flames in Clause 22.117.

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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.

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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.

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