



ADDENDA

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

Safety Standard for Refrigeration Systems

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

This addendum was approved 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. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

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ISSN 1041-2336



ASHRAE Standing Standard Project Committee 15

Cognizant TCs: 10.1, Custom Engineered Refrigeration Systems, and 9.1, Large Building Air-Conditioning Systems

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FOREWORD

Addendum 1 modifies portions of ASHRAE Standard 15 to incorporate requirements for commercial refrigeration applications with the use of A2L, A2, and A3 refrigerants. The text is developed in response to CMP0004-001, in conjunction with proposed product safety standard UL/CSA 60335-2-89, as well as research performed in collaboration with AHRI, ASHRAE, the U.S. DOE, and California Energy Commission.

The use of flammable refrigerants for commercial refrigeration applications in many of the new requirements concentrated in Section 7.7 is very similar to that of the existing requirements for A2L refrigerants for human comfort applications found mostly in Section 7.6. A2L requirements for human comfort were published in Addendum d to Standard 15-2016. Notably, several of the Section 7.7 requirements refer back to Section 7.6.

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

Addendum I to Standard 15-2019

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

[...]

7.4 Location in a Machinery Room or Outdoors. All components containing *refrigerant* shall be located either in a *machinery room* or outdoors, where the quantity of *refrigerant* needed exceeds the limits defined by Sections 7.2 and 7.3 or where direct-fired absorption equipment is used.

Exceptions to 7.4:

1. ~~Listed self-contained~~*Self-contained* systems are permitted outside of a *machinery room*, provided that such systems are not located in public hallways or *lobbies* and are limited to the following occupancies and refrigerant quantities:

[...]

7.5 Additional Restrictions

7.5.1 All Occupancies. Sections 7.5.1.1 through ~~7.5.1.8~~7.5.1.9 apply to all occupancies.

[...]

7.5.1.9 Addition of Doors to Open Refrigerated Display Cases Containing Flammable Refrigerants. It is acceptable for doors to be added to open display cases containing flammable *refrigerants* only when in accordance with all of the following:

- a. The owner or the owner's authorized agent shall be notified prior to addition of one or more doors, and the addition of a door shall not be made where the owner objects to the change.
- b. Flammable refrigerant charge sizes shall not exceed the limits for closed refrigerated display cases as defined by UL 60335-2-89/CSA C22.2 No. 60335-2-89. All construction, testing, and marking requirements for a new installation of closed cases, as defined in UL/CSA 60335-2-89, shall also apply.
- c. Validation of safety and suitability of the addition of doors through one of the following:
 1. Written instructions of the original equipment manufacturer and approval of the AHJ
 2. Evaluation of the system by a registered design professional and approval of the AHJ
 3. Evaluation by an approved nationally recognized testing laboratory

[...]

7.5.2 Applications for Human Comfort Restrictions by Refrigerant Safety Group

7.5.2.1 Refrigeration Systems for Human Comfort. Group A2, A3, B1, B2L, B2, and B3 *refrigerants* shall not be used in high-probability systems for human comfort. Use of Group A2L *refrigerants* shall be in accordance with Section 7.6.

Exceptions to 7.5.2.1:

1. These restrictions do not apply to *unit systems* having *refrigerant* quantities less than

- a. 6.6 pounds (3 kg) of *refrigerant* where located in residential *occupancies* or
 - b. 22 pounds (10 kg) of *refrigerant* where located in commercial *occupancies*.
2. These restrictions do not apply to industrial *occupancies*.

7.5.2.2 Refrigeration Systems Other than Human Comfort. *High-probability systems* for other than human comfort applications *shall not* use Class B *refrigerants*. Use of Group A2L *refrigerants shall* be in accordance with Section 7.7. Use of Group A2 *refrigerants shall* be in accordance with Section 7.8. Use of Group A3 *refrigerants shall* be in accordance with Section 7.5.3.

Exception to 7.5.2.2: These restrictions do not apply to industrial *occupancies*.

7.5.3 Higher-Flammability Refrigerants. Group A3 and B3 *refrigerants shall not* be used except where approved by the AHJ.

Exceptions to 7.5.3:

1. This restriction does not apply to laboratories with more than 100 ft² (9.3 m²) of space per person.
2. This restriction does not apply to industrial *occupancies*.
3. This restriction does not apply to *listed self-contained systems* containing no more than 0.331 lb (150 g) of Group A3 *refrigerant*, provided that the equipment is installed in accordance with the listing and the *manufacturer's* installation instructions.
4. This restriction does not apply to equipment listed to UL 60335-2-89/CSA C22.2 No. 60335-2-89 containing no more than $0.459 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($13 \times LFL$ [kg], where LFL is in kg/m³) of Group A3 *refrigerant*, provided that the equipment is installed in accordance with the listing and the *manufacturer's* installation instructions. Refrigeration systems containing more than $0.141 \times LFL$ (lb) ($4 \times LFL$ [kg]) in an *independent circuit shall not* be installed within 20 ft (6 m) of an open flame.
5. This restriction does not apply to equipment listed to UL 60335-2-40/CSA C22.2 No. 60335-2-40 containing no more than $0.106 \times LFL$ (lb) ($3 \times LFL$ [kg]) of Group A3 *refrigerant*, provided that the equipment is installed in accordance with the listing and the *manufacturer's* installation instructions.
6. This restriction does not apply to refrigeration systems located in *machinery rooms* or outdoors.

[...]

7.7 Group A2L Refrigerants for Refrigeration Systems Other than Human Comfort. *High-probability systems* using Group A2L *refrigerants* for other than human comfort applications *shall* comply with Sections 7.7.1 through 7.7.5.

7.7.1 Refrigerant Charge Limits. *Refrigerant charge shall* be limited as follows:

- a. Refrigeration systems containing more than $0.141 \times LFL$ (lb) ($4 \times LFL$ [kg]) in an *independent circuit shall not* be installed within 20 ft (6 m) of an open flame.
- b. Refrigeration systems *shall* contain a *releasable refrigerant charge* no more than $9.2 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($260 \times LFL$ [kg], where LFL is in kg/m³) of Group A2L *refrigerant per independent circuit*.

Exceptions to 7.7.1:

1. This restriction does not apply to laboratories with more than 100 ft² (9.3 m²) of space per person.
2. This restriction does not apply to industrial *occupancies*.
3. This restriction does not apply to systems located in *machinery rooms* or outdoors.

7.7.2 Refrigerant Concentration Limits

7.7.2.1 Occupied spaces shall comply with Section 7.2.

7.7.2.2 Unoccupied spaces with *refrigerant*-containing equipment, including but not limited to *pipng* or tubing, shall comply with Section 7.2 except as permitted by Section 7.7.5.

7.7.3 Listing and Installation Requirements. Refrigeration systems *shall* be *listed* to UL 60335-2-89/CSA C22.2 No. 60335-2-89 and *shall* be installed in accordance with listing and the *manufacturer's* instructions.

Exception to 7.7.3: These requirements do not apply to industrial *occupancies*.

7.7.3.1 The nameplate required by Section 9.15 shall include a symbol indicating that a flammable *refrigerant* is used, as *specified* by the product listing.

7.7.3.2 A label indicating a flammable *refrigerant* is used shall be placed adjacent to service ports and other locations where service involving components containing *refrigerant* is performed, as *specified* by the product listing.

7.7.3.3 A refrigerant detector shall be provided in accordance with Section 7.7.6 except where either of the following apply:

- a. When the refrigerant charge of any independent circuit is less than or equal to $0.459 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($13 \times LFL$ [kg], where LFL is in kg/m³)
- or
- b. When the complete discharge of refrigerant from any independent circuit will not exceed 50% of the RCL of the space, and the lowest point from which leak refrigerant will disperse into the space is greater than or equal to 14.5 ft (4.4 m)

7.7.3.4 When a refrigerant detector required by Section 7.7.3.3 senses a rise in refrigerant concentration above the value specified in Section 7.6.5(b), the actions of Section 7.6.2.4 shall be taken.

7.7.4 Ignition Sources Located in Ductwork. Any ductwork serving the space shall comply with Section 7.6.3.

7.7.5 Compressors and Pressure Vessels Located Indoors. For refrigeration compressors and pressure vessels located in an indoor space that is accessible only during service and maintenance, it shall be permissible to exceed maximum refrigerant charge calculated in accordance with Section 7.2, provided a mechanical ventilation system is used to prevent exceeding the RCL and all of the following provisions are met:

- a. The releasable refrigerant charge of the largest independent refrigerating circuit shall not exceed $9.2 \times LFL$ (lb) ($260 \times LFL$ [kg]). Releasable charges greater than $9.2 \times LFL$ (lb) ($260 \times LFL$ [kg]) shall comply with the machinery room requirements of Section 8.13.
- b. A mechanical ventilation system shall be provided that will mix air with leaked refrigerant and remove it from the space where the equipment is located. The space shall be provided with an exhaust fan. The exhaust fan shall remove air from the space where the equipment is located in accordance with Section 8.13.11.4.
- c. The space and mechanical ventilation system is in compliance with Section 7.6.4(b) and Sections 7.6.4(d) through 7.6.4(f).
- d. Electric motors driving fans shall not be placed inside the exhaust ducts; fan rotating elements shall be nonferrous or nonsparking, or the casing shall consist of or be lined with such material.

7.8 Group A2 Refrigerants for Refrigeration Systems Other than Human Comfort. High-probability systems using Group A2 refrigerants for other than human comfort applications shall comply with this section. Refrigeration systems using Group A2 refrigerants shall be limited to listed self-contained systems containing no more than $0.459 \times LFL$ (lb), where LFL is in pounds per 1000 ft³ ($13 \times LFL$ [kg], where LFL is in kg/m³), provided that the system is installed in accordance with the listing and the manufacturer's installation instructions. Refrigeration systems containing more than $0.141 \times LFL$ (lb), ($4 \times LFL$ [kg]) in an independent circuit shall not be installed within 20 ft (6 m) of an open flame.

Exceptions to 7.8:

1. This restriction does not apply to laboratories with more than 100 ft² (9.3 m²) of space per person.
2. This restriction does not apply industrial occupancies.
3. This restriction does not apply to systems located in machinery rooms or outdoors.

[...]

Modify Section 14 as shown. The remainder of Section 14 remains unchanged. (Note: Normative Appendix B, "Normative References," was redesignated as Section 14 by Addendum f to Standard 15-2019, which can be downloaded at www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda.)

14. NORMATIVE REFERENCES

[...]

18. UL. 2021. ANSI/UL 60335-2-89-2021, Edition 2. Household and Similar Electrical Appliances—Safety—Part 2-89: Particular Requirements for Commercial Refrigerating Appliances and Ice-Makers with an Incorporated or Remote Refrigerant Unit or Motor-compressor. Northbrook, IL: UL LLC.
19. CSA. 2021. CAN/CSA-C22.2-21 No. 60335-2-89, Edition 2. Household and Similar Electrical Appliances—Safety—Part 2-89: Particular Requirements for Commercial Refrigerating Appliances and Ice-Makers with an Incorporated or Remote Refrigerant Unit or Motor-compressor. Toronto, ON: CSA Group.

Modify Informative Appendix B as shown. The remainder of Informative Appendix B remains unchanged. (Note: Informative Appendix A, “Informative References,” was redesignated as Informative Appendix B, “Informative References,” by Addendum f to Standard 15-2019, which can be downloaded at www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda.)

[. . .]

18. See Section 14, “Normative References.”

19. See Section 14, “Normative References.”

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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.

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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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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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