ADDENDA

ANSI/ASHRAE Addendum m to
ANSI/ASHRAE Standard 15-2022

Safety Standard for Refrigeration Systems

Approved by ASHRAE and by the American National Standards Institute on April 30, 2024.

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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c. offering constructive criticism for improving the Standard, or
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FOREWORD

Addendum m provides consistency on the use of relative molar mass throughout ASHRAE Standard 15. It further harmonizes with ASHRAE Standard 34 on the use of relative molar mass and better defines the connection of several other defined terms within ASHRAE Standard 15 to ASHRAE Standard 34 (i.e., LFL, OEL, RCL).

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

Addendum m to Standard 15-2022

Modify Section 3 as shown. The remainder of Section 3 is unchanged.

3. DEFINITONS

3.1 Defined Terms

[. . .]

****lower flammability limit (LFL):*** see ASHRAE Standard 34 [3].

[. . .]

****occupational exposure limit (OEL):*** see ASHRAE Standard 34 [3].

[. . .]

****refrigerant concentration limit (RCL):*** see ASHRAE Standard 34 [3].

[. . .]

****relative molar mass:*** see ASHRAE Standard 34 [3].

[. . .]

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

7. RESTRICTIONS ON REFRIGERANT USE

[. . .]

7.2.3.2.1 Natural Ventilation Opening for Group A1 *Refrigerants*. The minimum size of the opening for a Group A1 *refrigerant* (A_{vent}) *shall* be calculated by the following formula:

Equations 7-1a [I-P] and 7-1b [SI] are deleted in their entirety and replaced as shown.

$$A_{vent} = \frac{m_{rel} - m_{room}}{\text{RCL} \times 0.833} \times \sqrt{\frac{A}{g \times m_{room}} \times \frac{M_r}{M_r - M_a}} \qquad \text{(7-1a [I-P])}$$

$$A_{vent} = \frac{m_{rel} - m_{room}}{\text{RCL} \times 208} \times \sqrt{\frac{A}{g \times m_{room}} \times \frac{M_r}{M_r - M_a}} \qquad \text{(7-1b [SI])}$$

where

[. . .]

M_r = ~~relative molar mass~~*relative molar mass* of the *refrigerant*, dimensionless

~~29~~M_a = ~~relative molar mass~~*relative molar mass* of air, 29.0, dimensionless

Equations 7-1a and 7-1b are not applicable for *refrigerants* with a *relative molar mass* less than 42.

7.2.3.2.2 Natural Ventilation Opening for Group A2L, A2, or A3 *Refrigerants*. The minimum size of the opening for a Group A2L, A2, or A3 *refrigerant* (A_{vent}) *shall* be calculated using the following formula:

Equations 7-2a [I-P] and 7-2b [SI] are deleted in their entirety and replaced as shown.

$$A_{vent} = \frac{m_{rel} - m_{room}}{\text{RCL} \times 0.417} \times \sqrt{\frac{A}{g \times m_{room}} \times \frac{M_r}{M_r - M_a}} \quad \text{(7-2a [I-P])}$$

$$A_{vent} = \frac{m_{rel} - m_{room}}{\text{RCL} \times 104} \times \sqrt{\frac{A}{g \times m_{room}} \times \frac{M_r}{M_r - M_a}} \quad \text{(7-2b [SI])}$$

where

[. . .]

M_r = ~~relative molar mass~~*relative molar mass* of the refrigerant, dimensionless

~~29~~M_a = ~~relative molar mass~~*relative molar mass* of air, 29.0, dimensionless

Equations 7-2a and 7-2b are not applicable for *refrigerants* with a *relative molar mass* less than 42.

[. . .]

Modify Section 9 as shown. The remainder of Section 9 is unchanged.

9. DESIGN AND CONSTRUCTION OF EQUIPMENT AND SYSTEMS

[. . .]

$$r_w = \frac{C_a}{C_r} = \sqrt{\frac{T_r}{T_a}}\sqrt{\frac{M_a}{M_r}} \quad \text{(9-4)}$$

$$C_r = 520\sqrt{k\left(\frac{2}{k+1}\right)^{(k+1)/(k-1)}} \quad \text{(9-5)}$$

where

C_a = 356, a dimensionless constant for air

T_r = the absolute dew-point temperature of refrigerant evaluated at a relieving pressure of 1.1 times the relief device set pressure, °R (K)

T_a = the absolute temperature of standard air, 520°R (289 K)

M_r = ~~the relative molar mass of the refrigerant in accordance with ASHRAE Standard 34~~ [3] *relative molar mass* of the *refrigerant*, dimensionless

M_a = ~~the relative molar mass of air, 28.97~~*relative molar mass* of air, 29.0, dimensionless

k = the ratio of specific heats (c_p/c_v) for saturated refrigerant vapor evaluated at a relieving pressure of 1.1 times the relief device set pressure

[. . .]

Modify Informative Appendix A as shown. The remainder of Informative Appendix A is unchanged.

INFORMATIVE APPENDIX A EXPLANATORY MATERIAL

[. . .]

Section 3.1, "Defined Terms"

lower flammability limit (LFL): the definition of this term and values for individual *refrigerant designations* are taken directly from ASHRAE Standard 34 [3].

[. . .]

occupational exposure limit (OEL): the definition of this term and values for individual *refrigerant designations* are taken directly from ASHRAE Standard 34 [3].

[. . .]

refrigerant concentration limit (RCL): the definition of this term and values for individual *refrigerant designations* are taken directly from ASHRAE Standard 34 [3].

[. . .]

relative molar mass: the definition of this term and values for individual *refrigerant designations* are taken directly from ASHRAE Standard 34 [3].

Modify Informative Appendix B as shown. The remainder of Informative Appendix B is unchanged.

INFORMATIVE APPENDIX B
INFORMATIVE REFERENCES

[. . .]

~~67. IUPAC. 2013. Atomic Weights of the Elements 2013 (IUPAC Technical Report). International Union of Pure and Applied Chemistry, Research Triangle Park, NC.~~

Modify Informative Appendix C as shown. The remainder of Informative Appendix C is unchanged.

INFORMATIVE APPENDIX C
METHOD FOR CALCULATING DISCHARGE CAPACITY OF POSITIVE DISPLACEMENT COMPRESSOR PRESSURE RELIEF DEVICE

[. . .]

$$W_a = W_r \times r_w \tag{C-2}$$

$$r_w = \frac{C_a}{C_r}\sqrt{\frac{T_r}{T_a}}\sqrt{\frac{M_a}{M_r}} \tag{C-3}$$

where

r_w = *refrigerant*-to-standard-air-mass-flow conversion factor (see Table C-1)

M_a = ~~molar mass of air = 28.97~~ *relative molar mass* of air, 29.0, dimensionless

M_r = ~~molar mass of *refrigerant*~~ *relative molar mass* of the *refrigerant*, dimensionless (see Table C-1)

Table C-1 Constants for Calculating Discharge Capacity

Refrigerant	k [a]	Relative Molar Mass~~[b]~~	C_r	r_w
R-11	1.137	137.4	330.7	0.49
R-12	1.205	120.9	337.7	0.51
R-13	2.053	104.5	403.6	0.46
R-22	1.319	86.5	348.8	0.59
R-23	2.742	70.0	439.3	0.52
R-113	1.081	187.4	324.7	0.43
R-114	1.094	170.9	326.1	0.45
R-123	1.104	~~152.9~~153.0	327.1	0.47
R-134a	1.196	102.0	336.8	0.56
R-236fa	1.101	152.0	326.8	0.47
R-245fa	1.107	134.0	327.5	0.50
R-290	1.235	~~44.1~~44.0	340.8	0.84
R-404A	1.279	97.6	345.0	0.56
R-407C	1.270	86.2	344.1	0.59
R-410A	1.434	72.6	359.0	0.62
R-500	1.236	99.3	340.8	0.56
R-502	1.264	~~111.6~~112.0	343.6	0.52
R-507A	1.284	98.9	345.5	0.55
R-600	1.122	58.1	329.2	0.76
R-718	1.328	18.0	349.6	1.28
R-744	2.690	44.0	437.0	0.65

a. Source: NIST REFPROP, Standard Reference Database, v9.1, 2013 [66]

~~b. Source: IUPAC Atomic Weights, 2013 [67]~~

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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.

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