INTERPRETATION IC 15-2022-1 OF
ANSI/ASHRAE STANDARD 15-2022
SAFETY STANDARD FOR REFRIGERATION SYSTEMS

Date Approved: July 28, 2023

Request from: John Murphy, Trane Technologies, 2213 20th Street South, La Crosse, WI 54601.

Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE Standard 15-2022, Section 7.6.4, regarding Equation 7-11.

Background: When a Group A2L refrigerant is used in a high-probability system for human comfort, Equation 7-11 (or Table 7-4) is used to determine the required mechanical ventilation airflow rate. This equation and table were implemented as part of Addendum m to Standard 15-2019. The approved version of Addendum m, as posted on the ASHRAE web site, displays this equation as shown below. It uses the variable name M_{vol}, which is calculated using an equation (also shown below) that is identical to Equation 7-3 in Section 7.3.1 (which is used to calculate *EDVC*).

When the *refrigerant* charge necessary to be removed by ventilation is known, in order to be compliant with Section 7.2, an alternative method to determine Q_{req} uses the following equations. This alternative method *shall* be used for all A2L *refrigerants* not *listed* in Table 7-2.

$$Q_{req} = \frac{M - M_{vol}}{4 \times LFL} \times \mathrm{SF}_{vent} \qquad \text{(I-P)}$$

$$Q_{req} = \frac{M - M_{vol}}{4 \times LFL} \times \mathrm{SF}_{vent} \times 60 \qquad \text{(SI)}$$

$$M_{vol} = RCL \times V \times F_{occ}$$

where

Q_{req}	=	required minimum mechanical ventilation airflow rate, ft^3/min (m^3/h)
M	=	*refrigerant* charge of the largest *independent circuit* of the system, lb (kg)
M_{vol}	=	refrigerant charge permitted in the space
RCL	=	*refrigerant concentration limit*, lb/ft^3 (kg/m^3)
V	=	volume of space established in accordance with Section 7.3, ft^3 (m^3)
F_{occ}	=	occupancy adjustment factor. (For all occupancies other than institutional, F_{occ} has a value of 1. For institutional occupancies, F_{occ} has a value of 0.5.
LFL	=	*lower flammability limit*, lb/ft^3 (kg/m^3)
4	=	assumed leak time (4 minutes)
SF_{vent}	=	safety factor, value of 2
60	=	conversion of minutes to hours

However, in the published 2022 version of Standard 15, the variable "M_{vol}" in Equation 7-11 was changed to read "*EDVC*" as shown below.

When the *refrigerant* charge necessary to be removed by ventilation is known, in order to be compliant with Section 7.3, an alternative method to determine Q_{req} uses Equation 7-11a or 7-11b. This alternative method *shall* be used for all A2L *refrigerants* not *listed* in Table 7-5.

$$Q_{req} = \frac{m_s - EDVC}{4 \times LFL} \times \mathrm{SF}_{vent} \qquad \text{(7-11a [I-P])}$$

$$Q_{req} = \frac{m_s - EDVC}{4 \times LFL} \times \mathrm{SF}_{vent} \times 60 \qquad \text{(7-11b [SI])}$$

where

Q_{req}	=	required minimum mechanical ventilation airflow rate, ft^3/min (m^3/h)
m_s	=	largest *system refrigerant charge* from *independent circuit*, lb (kg)
EDVC	=	*effective dispersal volume charge*, lb (kg)
LFL	=	*lower flammability limit*, lb/ft^3 (kg/m^3)
4	=	assumed leak time (4 minutes)
SF_{vent}	=	safety factor, value of 2
60	=	conversion of minutes to hours

Apparently this was an editorial decision meant to improve clarity. However, another editorial change to a variable in Equation 7-8 has now resulted in confusion, rather than clarity.

Equation 7-8 is used to calculate the maximum charge when a Group A2L refrigerant is used in a high-probability system (that has air circulation) for human comfort. This equation was implemented as part of Addendum p to Standard 15-2019. The approved version of Addendum p, as posted on the ASHRAE web site, displays this equation as shown below. It uses the variable name M for the "maximum refrigerant charge of the largest independent circuit of the refrigeration system."

7.6.1.1* Refrigeration Systems with *Air Circulation*. Where a *high-probability system* for human comfort using Group A2L *refrigerants* has either

a. *air circulation* initiated by a *refrigerant detector* in compliance with Section 7.6.2.4 or
b. continuous *air circulation*,

the *refrigerant* charge quantity *shall* be limited per the following equation. Control of continuous *air circulation shall* be performed by the *listed* equipment, and *shall* operate continuously, other than short periods for maintenance and service:

$$M = V \times \text{LFL} \times \text{CF} \times F_{occ}$$

where

M	=	maximum *refrigerant* charge of the largest *independent circuit* of the refrigeration system, lb (kg)
V	=	volume of space established in accordance with Section 7.3, ft^3 (m^3)
LFL	=	*lower flammability limit*, lb/ft^3 (kg/m^3)
CF	=	concentration factor, value of 0.5
F_{occ}	=	*occupancy* adjustment factor. For all *occupancies* other than *institutional occupancies*, F_{occ} has a value of 1. For *institutional occupancies*, F_{occ} has a value of 0.5.

However, in the published 2022 version of Standard 15, the variable "M" in Equation 7-8 was changed to read "*EDVC*" as shown below.

7.6.1.1* Refrigeration Systems with Air Circulation. Where a *high-probability system* for human comfort using Group A2L *refrigerants* has either

a. *air circulation* initiated by a *refrigerant detector* in compliance with Section 7.6.2.4 or
b. continuous *air circulation*,

the *refrigerant* charge quantity *shall* be limited per Equation 7-8. Control of continuous *air circulation shall* be performed by the *listed* equipment and *shall* operate continuously other than short periods for maintenance and service:

$$EDVC = V_{eff} \times LFL \times \text{CF} \times F_{occ} \qquad (7\text{-}8)$$

where

$EDVC$	=	*effective dispersal volume charge*, lb (kg)
V_{eff}	=	*effective dispersal volume*, ft^3 (m^3)
LFL	=	*lower flammability limit*, lb/ft^3 (kg/m^3)
CF	=	concentration factor, value of 0.5
F_{occ}	=	*occupancy* adjustment factor; (For all *occupancies* other than *institutional occupancies*, F_{occ} has a value of 1. For *institutional occupancies*, F_{occ} has a value of 0.5.)

The problem created by this second editorial change is that the standard now includes two different equations for *EDVC* (Equation 7-3 and Equation 7-8).

The calculation for mechanical ventilation airflow rate (in Section 7.6.4) needs to clarify that the *EDVC* used in Equation 7-11 (and in Table 7-4) is supposed to be the value of *EDVC* calculated using Equation 7-3 (the equation that matches the M_{vol} equation included in approved Addendum m), not Equation 7-8.

Interpretation: The value of EDVC used in Equation 7-11 and Table 7-4 should be the value of *EDVC* calculated using Equation 7-3.

Question: Is this Interpretation correct?

Answer: No

Comments: The intention of the committee is for the value of EDVC in Equation 7-11 and Table 7-4 to be the value of EDVC calculated using Equations 7-8 or 7-9, as applicable.