

ANSI/ASHRAE Standard 34

What is ANSI/ASHRAE Standard 34 ?

ANSI/ASHRAE Standard 34 is the most frequently referenced refrigerant safety standard. It is designed to be used in conjunction with ANSI/ASHRAE Standard 15. In fact, the two standards are now bundled together in a single publication. The following paragraph comes directly from the foreword of Standard 34.

" ASHRAE Standard 34 describes a shorthand way of naming refrigerants and assigns safety classifications and refrigerant concentration limits based on toxicity and flammability data."

Standard 34 has 10 sections. Each section will be briefly summarized. Direct quotes will be shown in italics. Standard 34 also contains several appendices and tables. The tables are important for determining the safety classification of any particular refrigerant as well as calculating refrigerant concentration limits.

Section 1- PURPOSE

This standard is intended to establish a simple means of referring to common refrigerants instead of using the chemical name, formula, or trade name. It establishes a uniform system for assigning reference numbers, safety classifications, and refrigerant concentration limits to refrigerants. The standard also identifies requirements to apply for designations and safety classifications for refrigerants and to determine refrigerant concentration limits.

Section 2- SCOPE

This standard provides an unambiguous system for numbering refrigerants and assigning composition designating prefixes for refrigerants. Safety classifications based on toxicity and flammability data are included along with refrigerant concentration limits for the refrigerants.

Section 3- DEFINITIONS

As its name suggests, this section is essentially a glossary of all the technical terms used in the standard. Subsection 3.2 lists all the abbreviations and acronyms used in the standard. This is extremely useful in reading and understanding the standard.

Section 4- NUMBERING OF REFRIGERANTS

This section describes in detail the ASHRAE refrigerant numbering system.

Section 5- PREFIXES

Section 5 describes prefixes used with refrigerant designations. Taken together, sections 4 and 5 describe in detail how different refrigerants are identified.

Section 6- SAFETY GROUP CLASSIFICATIONS

This is the section that describes the refrigerant safety classifications which are referenced in many codes and standards.

6.1.1 Classification.

The safety group classification shall consist of two or three alphanumeric characters (e.g., "B1" or "A2L"). The first letter indicates the toxicity and the Arabic numeral with or without suffix letter denotes the flammability.

6.1.2 Toxicity Classification.

Refrigerants shall be assigned to one of two classes, A or B, based on allowable exposure.

- a. Class A refrigerants have an OEL of 400 ppm or greater.
- b. Class B refrigerants have an OEL of less than 400 ppm.

6.1.3 Flammability Classification.

Refrigerants shall be assigned to one of four classes (1, 2L, 2, or 3) based on lower flammability limit testing, heat of combustion, and the optional burning velocity measurement.

Refrigerant blends shall be assigned a flammability classification based on their WCF and WCFF.

6.1.3.1 Class 1 (No Flame Propagation)

A single-compound refrigerant shall be classified as Class 1 if the refrigerant does not show flame propagation when tested in air at 140°F (60°C) and 14.7 psia (101.3 kPa).

Blends are classified as Class 1 if the WCF or WCFF of the blend meets the same criteria.

6.1.3.2 Class 2L (Lower Flammability)

A single-compound refrigerant shall be classified as Class 2L if the refrigerant meets all four of the following conditions:

1. Exhibits flame propagation when tested at 140°F (60°C) and 14.7 psia (101.3 kPa)
2. Has an LFL >0.0062 lb/ft³ (0.10 kg/m³) (See Section 6.1.3.5 if the refrigerant has no LFL at 73.4°F [23.0°C] and 14.7 psia [101.3 kPa].)
3. Has a heat of combustion <8169 Btu/lb (19,000 kJ/kg)
4. Has a maximum burning velocity of 3.9 in./s (10 cm/s) when tested at 73.4°F (23.0°C) and 14.7 psia (101.3 kPa) in dry air

Blends are classified as Class 2L if the WCF or WCFF of the blend meets the same criteria.

6.1.3.3 Class 2 (Flammable)

a. A single-compound refrigerant shall be classified as Class 2 if the refrigerant meets all three of the following conditions:

1. Exhibits flame propagation when tested at 140°F (60°C) and 14.7 psia (101.3 kPa)
2. Has an LFL >0.0062 lb/ft³ (0.10 kg/m³) (See Section 6.1.3.5 if the refrigerant has no LFL at 73.4°F [23.0°C] and 14.7 psia [101.3 kPa].)
3. Has a heat of combustion < 8169 Btu/lb (19,000 kJ/kg)

Blends are classified as Class 2 if the WCF or WCFF of the blend meets the same criteria.

Note that the three criteria listed for Class 2 are exactly the same as the first three criteria listed for Class 2L.

6.1.3.4 Class 3 (Higher Flammability)

A single-compound refrigerant shall be classified as Class 3 if the refrigerant meets both of the following conditions:

1. Exhibits flame propagation when tested at 140°F (60°C) and 101.3 kPa (14.7 psia)
2. Has an LFL ≤ 0.0062 lb/ft³ (0.10 kg/m³) (See Section 6.1.3.5 if the refrigerant has no LFL at 73.4°F [23.0°C] and 14.7 psia [101.3 kPa]) or it has a heat of combustion that is ≥ 8169 Btu/lb (19,000 kJ/kg.)

Section 7- REFRIGERANT CONCENTRATION LIMIT

This section details how refrigerant concentration limits are determined. Factors that are considered include

Mortality

Cardiac Sensitization

Anesthetic or Central Nervous System Effects

Other Escape Impairing Effects and Permanent Injury

Oxygen Deprivation Limit

Flammable Concentration Limit

Note that Tables 4-1 and 4-2 list a large number of refrigerants and their concentration limits.

Section 8- REFRIGERANT CLASSIFICATIONS

Refrigerants are assigned the safety group classifications indicated in Tables 4-1 and 4-2.

Section 9- APPLICATION INSTRUCTIONS

This section identifies requirements to apply for designations and safety group classifications for refrigerants, including blends, in addenda or revisions to the standard.

Section 10- REFERENCES

This section lists references used in developing this standard.