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Mechanical Room or Machinery Room: Understanding the Differences In ASHRAE® Standard 15

Within the realm of building design and facility management, the terms "mechanical room" and "machinery room" are often used interchangeably. However, when it comes to ASHRAE® Standard 15, *Safety Standard for Refrigeration Systems*, these two types of spaces are treated very differently and house different types of equipment. This EN delves into those distinctions.

The term machinery room has a special meaning in Standard 15. It is defined as a designated space that contains one or more refrigeration systems and complies with the requirements listed in Sections 8.9, 8.10, and 8.11. Which of these requirements apply depends on the safety group classification of the refrigerant(s) in use.

> "machinery room: a designated space meeting the requirements of Sections 8.9, 8.10, and 8.11 that contains one or more refrigeration systems or portions thereof, such as compressors and pressure vessels." (ASHRAE® Standard 15-2024, Section 3.1)

The term mechanical room is not defined in Standard 15, but the Washington State Energy Code provides a useful definition (see below). While it may house one or more refrigeration systems, it does not conform to Standard 15's specific requirements for a machinery room.

> "mechanical room: a room or space in which mechanical equipment and appliances are located that has sufficient room for access and maintenance of the equipment or appliances with room energy doors closed." (2021 Washington State Energy Code, Section C202)

Standard 15 defines an **occupied space** as "that portion of the premises accessible to or occupied by people, excluding machinery rooms." Since it does not meet all the specific requirements of a machinery room, a mechanical room is considered an occupied space since it is "accessible to…people."

Mechanical Rooms and ASHRAE Standard 15

Mechanical rooms are found in a wide range of occupancies, including residential, commercial, institutional, and industrial. These spaces use "ordinary" construction, comply with general building codes, and may resemble finished or unfinished space in an office or warehouse. In addition to refrigeration components, they may also house water heaters, air-handling units, circuit panels, etc. In addition, it is not uncommon for a mechanical room to have multiple uses, such as a server room or temporary storage. Finally, the local building code might not require mechanical rooms to have restricted access.

As mentioned, a mechanical room is not explicitly called out in Standard 15. Therefore, the engineer-of-record must treat it as an occupied space (see inset), which requires determining the Effective Dispersal Volume Charge (EDVC). For refrigerants other than Group A2L, the EDVC is defined in Section 7.3. For Group A2L refrigerants, it is defined in Section 7.6.

To maximize the EDVC, the designer may use "connected spaces" (per Section 7.2) to increase the effective dispersal volume (V_{eff}):

> "connected spaces: two or more spaces connected by natural ventilation, a ducted air distribution system, or mechanical ventilation." (ASHRAE® Standard 15-2024, Section 3.1)

For detailed examples of how to perform EDVC calculations for various types of HVAC equipment and systems, refer to Trane application manual APP-APM001*-EN.

If the releasable refrigerant charge (m_{rel}) does not exceed the EDVC, no additional safety mitigations are required. However, if the releasable charge exceeds the EDVC, the room will likely need to meet the requirements of a machinery room, or the equipment can be located outdoors.

Machinery Rooms and Standard 15

Like mechanical rooms, machinery rooms are also found in commercial, institutional, and industrial occupancies. But unlike mechanical rooms, Standard 15 does not permit machinery rooms to use "connected spaces."

The standard places additional restrictions on machinery rooms, outlined in Sections 8.9, 8.10, and 8.11. These include access restrictions, signage, tight-fitting doors, tight wall construction, refrigerant leak detection with audible and visual alarms, emergency ventilation, and more. These requirements allow for the safe design of systems where the refrigerant charge exceeds the EDVC limitation.

A common example is a large indoor water chiller. A 500-ton centrifugal chiller might contain 750 lbs of R-514A refrigerant or 1200 lbs of R-1234ze refrigerant. In both cases, this charge is likely to exceed the EDVC, so a machinery room would be required.

For a detailed discussion of the Standard 15 requirements for machinery rooms, refer to Trane application manual APP-APM001*-EN.

Example of a Mechanical Room Housing a Water Chiller

Historically, most indoor water chillers were placed in a machinery room by default. But is this always a requirement? In some cases, maybe not. As Standard 15 has been updated to address A2L refrigerants, newer language in Section 7.6 may allow for more flexibility in the design.

Consider the example of an 80-ton modular water chiller installed inside a building. This chiller consists of two independent refrigeration circuits, each containing 27 lbs of R-454BA refrigerant, which is classified as safety group A2L.

Since the entire refrigeration system is housed indoors, a refrigerant leak from a failed connection, seal, or component of the water chiller would enter this enclosed space. Therefore, this chiller is initially classified by Standard 15 as a "high-probability" system, and its use of an A2L refrigerant means that the requirements of Section 7.6 apply.

Since the modular chiller in this example does not use "air circulation" to disperse any leaked refrigerant, Section 7.6.1.2 is used to calculate the EDVC. The floor area of this space is 200 ft^2 and the lowest point of any opening in the equipment from which refrigerant could leak (which is the definition of "Height" used in Table 7-1) is less than 2 ft. Using these values, and interpolating from Table 7-1 in the standard, the refrigerant charge limit (M_{def}) is 4.0 lbs. Applying the correction factor for R-454B (F_{LFL} = 0.96) from Table 7-3 and an occupancy adjustment factor (F_{occ}) of 1.0, the EDVC for this example space is calculated to be 3.8 lbs:

$$EDVC = M_{def} \times F_{LFL} \times F_{occ}$$
$$= 4.0 \text{ lbs} \times 0.96 \times 1.0$$
$$= 3.8 \text{ lbs}$$

This is lower than the releasable refrigerant charge (m_{rel}) of 27 lbs, as defined in Section 7.3.4. In the past, this would have necessitated the design and construction of a machinery room, and that approach could still be used here. However, as mentioned, language in Section 7.6 may create an alternate path.

Since an A2L refrigerant is being used, Section 7.6.4 allows the use of connected space via a mechanical ventilation (exhaust) system to remove the excess leaked refrigerant from this mechanical room. The first step is to calculate how much excess refrigerant must be removed, which equates to 23.2 lbs for this example:

$$m_s - EDVC = 27 \text{ lbs} - 3.8 \text{ lbs} = 23.2 \text{ lbs}$$

Note: For this calculation, an official interpretation (IC 15-2022-11) by the ASHRAE committee clarified that the term m_s is the same as m_{rel}.

Interpolating from Table 7-4 in the standard, and applying the correction factor for R-454B (C_{LFL} = 0.96), the minimum mechanical ventilation (exhaust) air flow rate (Q_{min}) is calculated to be 627 cfm:

$$Q_{min} = 608 \text{ cfm} / 0.97 = 627 \text{ cfm}$$

Per Standard 15, this rate of mechanical ventilation can be used to remove the excess refrigerant, allowing the mechanical room to comply with the EDVC. Then it would not be necessary for this space to comply with the additional requirements of a machinery room.

In the context of Standard 15, **mechanical ventilation** refers to removing air (and leaked refrigerant) from a space, and either exhausting it outdoors or transferring it to another space. This is different than introducing outdoor air to a space for the purpose of achieving acceptable indoor air quality.

Of course, as equipment capacity increases, so does the refrigerant charge. At some point, the refrigerant charge will reach a threshold where it is more economical to design this space as a machinery room.

Note that Standard 15 allows this mechanical ventilation system to either operate continuously or be activated by a refrigerant leak detector installed in the mechanical room. Operating this fan continuously seems inefficient, so why would an engineer choose that option?

In this application of a high-probability system using an A2L refrigerant, if the refrigerant detector is triggered, Section 7.6.2.5 requires de-energizing potential ignition sources. This might include electrical switch gear. Disabling switch gear could have the unintended consequence of interfering with any mitigation actions, making the situation less safe.

Standard 15 recognizes that if this mechanical ventilation (exhaust) fan operates continuously, any excess refrigerant would be continuously expelled and not accumulate in the room. This would bring the system into continuous compliance with the EDVC, with no additional mitigations required. While energy inefficient, for some applications, continuous fan operation may be a safer option.

Conclusion

While the terms “mechanical room” and “machinery room” are often used interchangeably, they are not the same. The specific requirements in Standard 15 that govern their design and operation are very different.

Mechanical rooms are general-purpose spaces that use “ordinary” construction and are governed by general building codes. They may be used to house refrigeration equipment so long as the releasable refrigerant charge does not exceed the EDVC. To avoid exceeding the EDVC, a mechanical room may use “connected spaces” via natural ventilation, a ducted air distribution system, or mechanical ventilation.

Machinery rooms use code-specific construction that enables a refrigeration system to exceed the calculated EDVC. This is accomplished by isolating these systems with more stringent requirements outlined in Standard 15 and adopted by model codes. These rooms, while more expensive to construct, may safely contain equipment that contains hundreds or thousands of pounds of refrigerant.

Understanding this distinction is crucial for ensuring compliance with relevant safety standards and codes, and for designing safe and efficient refrigeration systems.

By Chris Williams, Trane. You can find this and previous issues of the Engineers Newsletter at www.trane.com/EN. To comment, send e-mail to ENL@trane.com..

References

ASHRAE. 2024. Safety Standard for Refrigeration Systems, ANSI/ASHRAE Standard 15–2024. Atlanta, GA: ASHRAE.

ASHRAE. 2024. Designation and Safety Classification of Refrigerants, ANSI/ASHRAE Standard 34–2024. Atlanta, GA: ASHRAE.

Murphy, J, Williams, C., and C. Hsieh. 2023. “A2L Refrigerants and ASHRAE® Standard 15.” Trane Engineers Newsletter, 52-3.

Washington State Energy Code, Commercial Provisions. 2021. Olympia, WA: Washington State Building Code Council.

Williams, C., and J. Murphy. Refrigeration Systems and Machinery Rooms: Application Considerations for Compliance with ASHRAE Standard 15-2022. Trane application manual APP-APM001F-EN.

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