AMENDMENT NO. 1 APRIL 2024

TO

IS 16678 (PART 3) : 2018/ISO 5149-3 : 2014 REFRIGERATING SYSTEMS AND HEAT PUMPS — SAFETY AND ENVIRONMENTAL REQUIREMENTS PART 3 INSTALLATION SITE

This Amendment No. 1 is identical to Amendment No. 1 of ISO 5149-3 : 2014 'Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site' issued by International Organization for Standardization.

Price Group 3

Refrigerating systems and heat pumps — Safety and environmental requirements —

Part 3:
Installation site

AMENDMENT 1: Update of the requirements for machinery rooms and emergency mechanical ventilation

Clause 3

Replace the introductory paragraph with the following:

For the purposes of this document, the terms and definitions given in ISO 5149-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4.2, first paragraph

Replace the paragraph with the following:

Refrigerating systems sited in the open air shall be positioned to avoid refrigerant flowing from the system into the building or otherwise endangering people.

NOTE Possible methods to achieve this include one or more of the following:

— location of the refrigerant containing part of the refrigeration system (except piping) at least 6 m away from any opening to the building,

— use of barriers of at least 1 m height between the system location and the inlet ventilation opening to block the flow of leaked or vented refrigerant,

— location of the inlet ventilation opening at least 1 m above the level at which the system is installed.

The discharge opening from safety relief devices shall be positioned 6 m away from and oriented to direct vented refrigerant away from inlet ventilation openings.

4.6, last sentence

In the last sentence, replace the reference to "ISO 5149-1:2014, 5.2.17" with "ISO 5149-1:2014, Annex A".

5.13

Replace 5.13 with the following:

5.13 Ventilation

5.13.1 General

The ventilation of machinery rooms shall be sufficient for background ventilation (if required), temperature control under normal operating conditions, occupancy and emergencies.

NOTE Details of background ventilation are given in 5.14.1.3.

Air from machinery rooms shall be vented outdoors using mechanical ventilation in the event of a release of refrigerant due to leaks or rupture of components. This ventilation system shall be independent of any other ventilation system on the site.

Provision shall be made for a sufficient supply of outside replacement air and a good distribution of that air over the machinery room avoiding dead zones.

Openings for exhaust from the machinery room to the outside shall be positioned to avoid re-circulation into the room.

5.13.2 Ventilation for temperature control under normal operating conditions

Ventilation shall be designed to limit the temperature rise of air to 10 K above outdoor ambient temperature when the equipment is operating at maximum capacity. If the heat emission from the system is not known, it shall be taken to be 10 % of the connected compressor motor power.

NOTE The figure of 10 % allows for heat gain from air-cooled electric motors and heat radiation from hot surfaces. If the motors are water-cooled or cooled by the refrigerant flow, or if the hot surfaces are insulated then it may be appropriate to reduce this allowance.

5.13.3 Ventilation when machinery room is occupied

For ventilation purposes, there shall be a minimum of four air changes per hour when the machinery room is occupied.

5.13.4 Emergency mechanical ventilation

If gas detection is required in the machinery room, then emergency mechanical ventilation shall be provided. The emergency mechanical ventilation system shall be activated by a detector(s) located in the machinery room. The detector(s) shall be as specified in Clause 9.

There shall be at least two independent emergency controls, one or more located outside the machinery room and one or more inside the machinery room.

When the necessary ventilation rate cannot be achieved due to shutdown or failure of the equipment, an audible and/or visual alarm shall be initiated and, where relevant, electrical supplies shall also be terminated.

5.13.5 Required airflow for emergency mechanical ventilation

The emergency mechanical ventilation for the machinery room shall be sufficient to achieve an air change rate of at least 15 air changes per hour in the part of the room in which the refrigeration system is installed. If the room extends more than 5 m in any direction from the refrigeration equipment then the volume used in the air change calculation shall be the product length, width and height of the equipment plus 2 m in each direction, or the volume of the room, whichever is smaller. The emergency mechanical ventilation system shall be installed to ensure that effective air change in the location of the equipment is achieved, for example by positioning the extract duct close to the equipment and on the opposite side to the source of supply air.

5.13.6 Mechanical ventilation openings

Mechanical ventilation openings shall be made in the position and of sizes to permit sufficient airflow considering the characteristics of the refrigerant, the choice of intake or exhaust, and the performance

of the ventilator. The intake and exhaust openings shall be arranged to evacuate the refrigerant under all conditions of leaking refrigerant.

5.14

Replace 5.14 with the following:

5.14 Additional measures for flammable refrigerants (classes 2L, 2 and 3)

5.14.1 General

5.14.1.1 Location

The machinery room location shall depend on the amount of charge in the refrigerating system.

Machinery rooms with flammability class 2L, 2 and 3 refrigerants, where the risk of explosion can occur because it is possible for the concentration of refrigerant to reach the lower flammability limit, shall comply with the requirements of hazardous areas. Some explosion relief (e.g. frangible wall or roof) shall be provided.

5.14.1.2 Emergency exhaust ventilation

The emergency exhaust ventilation shall be either

a) in the airflow with the motor outside the airflow, or

b) rated for hazardous areas as required in ISO 5149-2:2014, 5.2.16.

The fan shall be located to avoid pressurization of the exhaust ductwork in the machinery room.

The fan shall not cause sparks to occur if it contacts the duct material.

The outlet from the exhaust ventilation shall not be restricted but have means of keeping rubbish, leaves, and birds from entering. The bottom of any rising ductwork open to the outside shall have a drain with a trap for rainwater and with access for inspection.

5.14.1.3 Ventilation for background ventilation for flammable refrigerants

Background ventilation shall be provided if required in order to ensure that the release of flammable refrigerant does not result in the creation of a hazardous zone of greater volume than a zone of negligible extent as defined in IEC 60079-10-1. The background ventilation shall operate at all times that flammable refrigerant is contained in the system whether or not the system is running. If the design minimum outdoor ambient temperature is lower than the saturated suction temperature of the refrigerant under running or standstill conditions, then measures shall be taken to prevent refrigerant condensing in the compressor.

NOTE Appropriate measures to prevent refrigerant condensing in the compressor can include general heating of the plantroom, heating of the inlet air to maintain a room temperature not less than the compressor suction saturated temperature or sufficient trace heating of the compressor body to prevent the condensation.

5.14.2 Combustion equipment

Combustion equipment shall not be installed in a machinery room containing an A2L, A2/A3 refrigerating system.

5.14.3 Maximum surface temperature

Hot surfaces shall not exceed a temperature of 100 K less than the auto-ignition temperature of the refrigerant.

5.15

Add the following subclause after 5.14, before Clause 6:

5.15 Additional requirements for R-717

5.15.1 Drainage

To prevent R-717 spill reaching surface waters, a catchment system shall be designed and installed. The machinery room floor shall be designed in order to prevent liquid R-717 from spilling out from the room. The drain from the catchment system shall be normally closed.

5.15.2 Specific equipment for emergency washing

For R-717 or other caustic or skin or eye irritant refrigerant, easily accessible eyewash and body shower facilities shall be provided outside the emergency exit from the machinery room. An automatic drench shower, providing at least 1,5 l/s flow at between 25 °C and 30 °C, shall be provided.

5.15.3 Fire sprinkler systems

Fire sprinkler (water) systems shall not be permitted in machinery rooms with R-717 refrigerating systems of more than 200 kg of R-717 charge.

6.3.3.2

Replace the text with the following:

Exhaust ventilation openings shall be designed and located to prevent flow of the exhaust air into ventilation air intake openings.

NOTE Possible methods to achieve this include one or more of the following:

— use of directional louvres on the exhaust,

— addition of ductwork to the exhaust opening to direct the exhaust air beyond the intake opening,

— use of barriers of at least 1 m height between the exhaust and the inlet to block the flow of exhaust air.

9.4.2

Replace 9.4.2 with the following:

9.4.2 Refrigerant detectors for A2L, A2, B2L (except for R-717), B2, A3, and B3 refrigerants

An appropriate refrigerant detector for a group A2L, A2, B2L (except for R-717), B2, A3, and B3 refrigerant shall activate the alarm signal at a level not exceeding 25 % of the LFL of the refrigerant. The detector shall continue to activate at higher concentrations. The detector shall be set lower for the toxicity, if applicable, and a specific detector for toxicity shall be used. It shall automatically activate an alarm, start mechanical ventilation, and stop the system when it triggers.

Bibliography

Add the following reference:

[3] IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

(MED 03)

Publication, BIS, New Delhi