



SCDF

The Life Saving Force

... for a safer Singapore

SINGAPORE CIVIL DEFENCE FORCE



Date : 25 January 2021

Our Ref: CD/HAZ/14/03/02/01

Attn: Manufacturers / Suppliers / Distributors

Dear Sir/Madam,

CIRCULAR ON USE OF R32 REFRIGERANT IN AIR CONDITIONING SYSTEMS IN SINGAPORE

Since 2015¹, SCDF supported the use of R32 refrigerant in air conditioning systems for households. Recently, SCDF received proposals from the industry to extend the use of R32 refrigerant usage in air conditioning systems for commercial and industrial premises.

2. In consultation with NEA and with technical support from the industry, SCDF evaluated the proposal and is prepared to support the extension of R32 refrigerant usage in air conditioning systems to commercial and industrial premises. This decision was made after careful consideration and consultation with the relevant stakeholders to ensure that the fire safety risks can be adequately addressed. This in-principle no objection is contingent on all relevant parties, including but not limited to the manufacturer and approved suppliers, complying with the safety guidelines in **Annex A**.

¹ 2015 – single-split air conditioning systems for households, 2016 – multi-split air conditioning systems for households.



SCDF – A member of the Home Team

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3. This circular shall take immediate effect and supersedes the circular issued on 19 September 2016 for domestic split air conditioning system. Please convey the contents of this circular to the parties concerned. For any inquiry or clarification, please contact CPT Mugilan Jaya Ananth (e-mail: Mugilan_Jaya_Ananth@scdf.gov.sg) or LTA Jarren Tuang (e-mail: Jarren_Tuang@scdf.gov.sg).

Yours faithfully,

(transmitted via email)

CPT MUGILAN JAYA ANANTH
HazMat Department
Singapore Civil Defence Force



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1 SCOPE

This document outlines the conditions for the safe usage of R32 refrigerant in air conditioning systems for domestic, commercial and industrial premises up to a capacity of 17.6 kW². R32 is classified as A2L (lower flammability)³ in accordance with International Organization for Standardization (ISO) 817:2014.

2 DEFINITION

- 2.1 'Air conditioning system' – Air conditioning system includes single and multi-split air conditioning system.
- 2.2 'Multi-split air conditioning system' – Multi-split air conditioning system consists of one outdoor unit (condensing unit, CU) and more than one indoor units (fan coil unit, FCU). The outdoor and indoor units are connected by copper pipes and can be located a distance apart.
- 2.3 'Manufacturer' – Refers to any party who owns or runs the manufacturing plant that produces the air conditioning system.
- 2.4 'Supplier' – Refers to any party approved by the manufacturer to make the air conditioning system commercially available to the user in Singapore.
- 2.5 'Service personnel' – Refer to technical personnel who are either employed by the manufacturer or his approved suppliers to provide after sale services, including but not limited to, delivery, installation, maintenance, decommissioning and disposal of the air conditioning system.
- 2.6 'User' – Refers to any party who owns and/or oversees the day-to-day usage of the air conditioning system and carries out a general duty of care for it.
- 2.7 'Equipment placement room' – Refers to a compartmentalized area or room in which the indoor unit is placed by the user for its intended usage.

² Single-phase non-ducted room air-conditioner (split type (inverter/non-inverter)) with a cooling capacity of 17.6kW or lower are regulated goods for the purposes of Part III of the Energy Conservation Act, if they are not second hand goods This Order is the Energy Conservation (Prescribed Regulated Goods) Order 2017 and came into operation on 1 January 2018.

³ This classification is only used in reference to refrigeration, air-conditioning and heat pump system safety. It is not recognised by international transport regulations and in the safety data sheets.

- 2.8 'LFL' –
Refers to the Lower Flammability Limit, which is the lower end of the concentration range over which a flammable mixture of gas or vapour in air can be ignited at a given temperature and pressure.

3 SAFETY REQUIREMENTS

3.1 General Safety Requirements

3.1.1 Manufacturer shall ensure that the air conditioning system (hereinafter referred to as "equipment") complies with the latest applicable International Electrotechnical Commission (IEC) standards (eg. IEC 60335-2-40) and International Organization for Standardization (ISO) standards (eg. ISO 5149-1-4) for air conditioning systems. The equipment shall also be regulated by Enterprise Singapore under the Consumer Protection (Consumer Goods Safety Requirements) Regulations (CGSR).

3.1.2 Manufacturer, either directly or through his approved suppliers, shall ensure that R32 refrigerant is only used in new equipment designed specifically for the refrigerant.

3.1.3 Any party who imports, transports, stores and/or works with R32 refrigerant shall comply with all relevant regulatory requirements from the respective government agencies. This includes obtaining the relevant Petroleum and Flammable Materials license(s)⁴ from the SCDF HazMat Department and complying with relevant fire safety requirements for buildings⁵.

3.2 Safety Awareness

3.2.1 Manufacturer, either directly or through his approved suppliers, shall take all necessary measures as may be deemed reasonable to educate users on the inherent safety risks from the usage of R32 refrigerant in the equipment and to ensure the safe handling and usage of the equipment. These measures shall include, but are not limited to, those outlined under Parts 4 and 5 of this document.

⁴ This does not apply to R32 stored in the air conditioning system.

⁵ SCDF has in-principle no objection to allow individual operators to store a maximum of 2 numbers of 8kg cylinders of R32 within their factory unit without the need for a fire safety plans submission. These 2 gas cylinders shall comply with relevant international safety standards and shall be kept within a metal cabinet with 2.4mm thick metal plate. However, the individual operator shall ensure their existing factory layouts with respective usages have obtained the necessary FSC (Fire Safety Certificate).

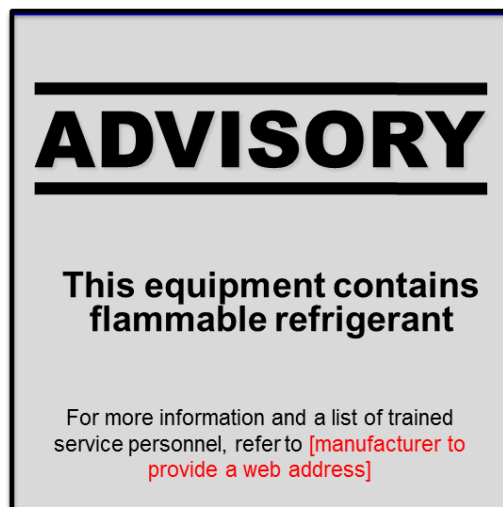
4 ADVISORY LABEL REQUIRMENTS

4.1 Advisory Label for Users

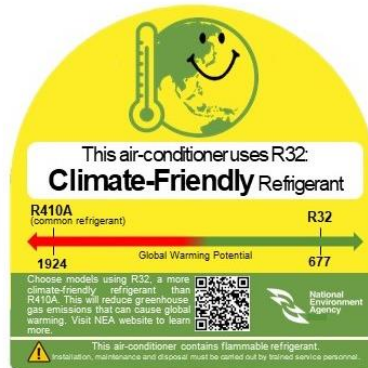
4.1.1 The advisory label shall be printed or affixed as a label/sticker on the front of the FCU on display at retail premises and shall be clearly visible to potential buyers when viewing the equipment.

4.1.2 For units delivered to a buyer's premises or any other location as determined by the buyer, the advisory label shall also be affixed on the front of the FCU. Alternative locations on the FCU may be considered if it remains clearly visible to the user after installation.

4.1.3 The advisory label shall comply with the design specifications outlined in **Appendix A1**. The advisory label shall be 90mm (length) by 90mm (breadth). The printed label shall be in an indelible manner and with a minimum resolution of 300 pixels per inch (ppi). An example is illustrated below.



4.1.4 As an alternative, equipment that carries the NEA approved Climate-Friendly Label (as illustrated below) may be used in place of the advisory label for users as described in Part 4.1.3. Please contact NEA for details of the label requirements.



4.2 **Advisory Label for Service Personnel**

- 4.2.1 The advisory label shall be affixed permanently on or near the condensing unit of the system to indicate the flammability risks. The advisory label shall be clearly visible from the repair access area.
- 4.2.2 The advisory label shall also be affixed permanently on the side of the FCU casing which shall be clearly visible when removing the casing for maintenance.
- 4.2.3 The advisory label shall be accompanied with a triangular warning sign in accordance to latest applicable ISO standards (e.g. ISO 7010) for flammable material warning labels. The perpendicular height of the triangular warning sign shall be at least 15mm. The name of the refrigerant (i.e. R32, Difluoromethane) should also be included together with the triangular warning sign as shown in the sample below.



- 4.2.4 The advisory label shall be accompanied with cautionary statements concerning the flammability risks, safe handling, servicing and disposal of the system. The cautionary statements shall be provided in both English and Chinese languages.
- 4.2.5 The advisory label shall comply with the design specifications outlined in **Appendix A2**. The printed label shall be in an indelible manner and with a minimum resolution of 300 pixels per inch (ppi).
- 4.2.6 For existing labels which may contain other advisory messages from the manufacturer, the advisory label outlined in Part 4.2 may be provided either as a standalone label or may be combined with the existing labels.

(Exception: The advisory label design specifications outlined in Appendix A2 may be exempted for systems with existing advisory labels containing similar warning sign and cautionary statements as outlined in Part 4.2.3 and 4.2.4.)

5 SAFETY CONTROL MEASURES

5.1 Manufacturer/Supplier

5.1.1 Manufacturer shall take all necessary measures as may be deemed reasonable to ensure that service personnel, either employed by him or his approved suppliers, who handles the equipment, are equipped with all the relevant technical skills to work safely with the equipment. Manufacturer shall fulfil this by ensuring that the service personnel have completed the following 2 courses conducted by the Institute of Technical Education:

- a. R32 Refrigerant - Safety Awareness
- b. CoC in Residential Air-Conditioning System (Refrigerant)⁶

5.1.2 The list of trained service personnel and their employers shall be made easily accessible on the respective manufacturer's website and the web address shall be printed on the advisory label as shown in **Appendix A1**.

5.1.3 Both the manufacturer and supplier of the equipment shall ensure that before installing the equipment, the service personnel conduct the necessary risk assessment and evaluation of the size of the equipment placement room and the maximum refrigerant charge in accordance to IEC 60335-2-40.

5.1.4 Manufacturer, either directly or through his approved suppliers, shall provide the equipment safety instruction manual to the user to ensure that the user is fully aware of the inherent fire safety risks posed by the R32 refrigerant and the essential safety precautions and procedures to adopt. The instruction manual should include a recommended maintenance regime for the equipment in accordance to relevant safety standards and industry best practices.

5.1.5 Manufacturer, either directly or through his approved suppliers, shall offer assistance/services to the user in carrying out installation, maintenance and decommissioning of the system in accordance to the relevant safety standards and industry best practices.

⁶ While the CoC in Residential Air-Conditioning System (Refrigerant) course rolled out by NEA in collaboration with ITE applies to R32 split unit air-conditioners (<17.6kW) which are largely used in residential, they may also be used in commercial/industrial setting. The course is hence applicable for installing R32 air-conditioning system in residential, commercial and industrial premises.

5.2 Service Personnel

- 5.2.1 Employer of service personnel shall ensure that they are adequately trained by the recognised training providers (refer to Part 5.1.1) before they work with R32 refrigerant and its related equipment.
- 5.2.2 Employer of the service personnel shall ensure that they are adequately trained to conduct the necessary risk assessment and evaluation of the size of the equipment placement room and the maximum refrigerant charge in accordance to IEC 60335-2-40.
- 5.2.3 Employer of service personnel shall comply with the relevant requirements under the Workplace Safety and Health Act administered by the Ministry of Manpower.

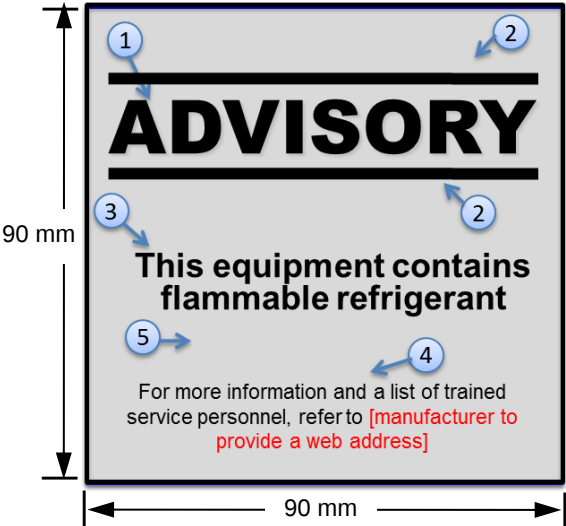
5.3 User

- 5.3.1 User shall be advised by the manufacturer, either directly or through his approved suppliers, to ensure strict ignition control regime (e.g. No smoking near equipment) and where practical, eliminate all potential ignition sources (eg. spark/naked flame) from the equipment placement room.
- 5.3.2 User shall be advised by the manufacturer, either directly or through his approved suppliers, to engage service personnel trained by the recognised training providers (refer to Part 5.1.1) to carry out any delivery, installation, maintenance, decommissioning or disposal of the system.

6 REFERENCES

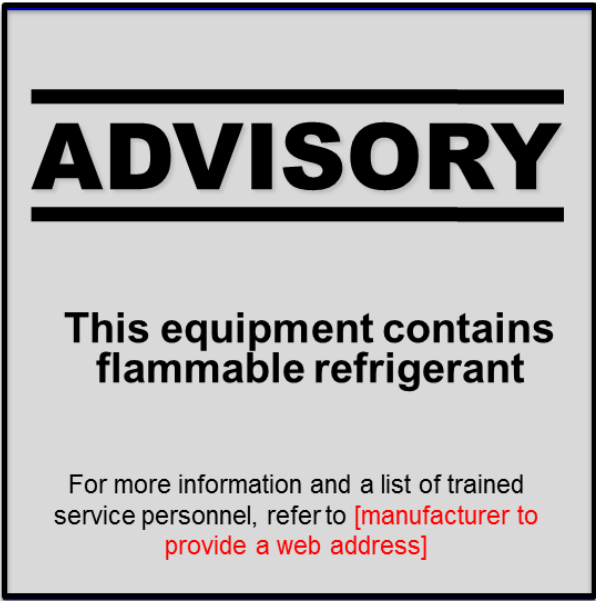
- 6.1 International Electrotechnical Commission (IEC) 60335-2-40 standard
- 6.2 International Organization for Standardization (ISO) 817 standard
- 6.3 International Organization for Standardization (ISO) 5149-1-4 standard
- 6.4 Consumer Protection (Consumer Goods Safety Requirements) Regulations 2011 (CGSR) Information Booklet (Edition 4) by Enterprise Singapore

Full Design Specifications for Advisory Label on the Front of Indoor Unit

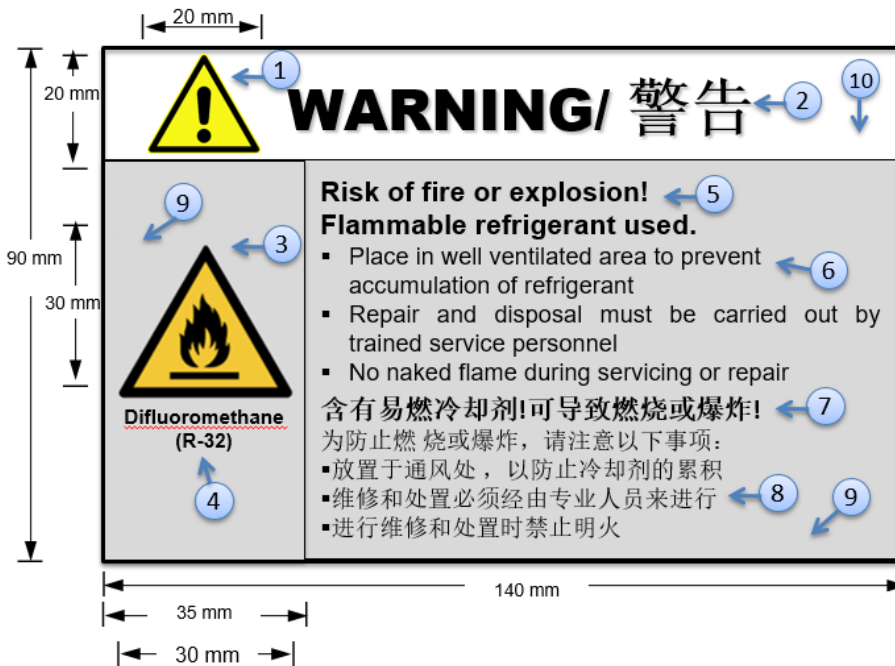


Tag	Description
1	Main Cautionary Sign. (Arial Black, Bold, Black; Size 40)
2	Two black bars (6 pt thickness) to border the cautionary sign.
3	A general information statement to indicate the presence of flammable refrigerant in the equipment. (Arial, Bold, Black; Size 18)
4	More information available. (Arial, Black; Size 10)
5	The background color to be light grey. (color code #CCCCCC)

Sample



Full Design Specifications for Advisory Label for Service Personnel



Tag	Description
1	Hazard warning symbol in accordance to applicable ISO standard. (eg. ISO 7010)
2	Main cautionary sign in English and Chinese languages. (Arial Black, Bold, Black; Size 28)
3	Flammable material warning symbol in accordance to applicable ISO standard. (eg. ISO 7010)
4	The type of refrigerant is specified here. (Arial, Bold, Black; Size 14)
5	Cautionary statement on the use of flammable refrigerant is specified here. (Arial, Bold, Black; Size 14)
6	The safety precaution and advice are specified here. (Arial, Black; Size 12)
7	Cautionary statement translated in Chinese. (Bold, Black; Size 14)
8	Safety precaution and advice translated in Chinese. (Black; Size 12)
9	The background color to be light grey (color code #CCCCCC).
10	The background to be in white (color code #FFFFFF).

Sample

