(DRAFT – Unofficial translation)

LAO STANDARD

GUIDELINE FOR SAFETY STANDARD FOR THE USE OF FLAMMABLE REFRIGERANTS

LS 644 – 2026

Ministry of Industry and Commerce
Vientiane Capital, 2026

Unofficial English translation, provided for reference only. In case of any discrepancy, the Lao-language version shall prevail.

LAO PEOPLE'S DEMOCRATIC REPUBLIC
PEACE INDEPENDENCE DEMOCRACY UNITY PROSPERITY

Ministry of Industry and Commerce No.: /MOIC
Vientiane Capital, Date:

DECISION

of the Minister of Industry and Commerce on the Adoption and Promulgation of the National Standard on the Guideline for Safety Standard for the Use of Flammable Refrigerants

- Pursuant to the Law on Standards (Amended) No. 49/NA, dated 18 July 2014;
- Pursuant to the Minutes of the Meeting of the National Standards Council Committee No. ....., dated 2026;
- Pursuant to the Proposal of the Chairperson of the National Standards Council No. ....., dated ..... 2026.

The Minister of Industry and Commerce decides:

Article 1. To adopt and officially promulgate the National Standard on the Guideline for Safety Standard for the Use of Flammable Refrigerants, LS 644 – 2026.

Article 2. The offices, departments, institutes and other relevant parties shall take note of and strictly implement this Decision.

Article 3. This Decision shall enter into force from the date of its signature.

Minister

FOREWORD

Flammable refrigerants are products used in electrical appliances that provide cooling. These chemicals belong to the HCFC chemical group and are flammable. To ensure safety in their use and to reduce the risk of fire, this Guideline has been developed with the objective of raising the level of safety in the use of flammable refrigerants in line with national, regional and international standards, and of reducing leakage of such substances, which affects the ozone layer. In addition, this Guideline is of great importance and necessity for the protection of the lives and property of the people.

It is therefore necessary to establish this safety standard for the use of flammable refrigerants to serve as a reference for government agencies, the private sector, business operators and technicians who use these chemicals, so that they are used safely and in an environmentally friendly manner.

This Guideline has been developed on the basis of available data and with reference to regional and international standards, such as:

1. ISO 817:2024. Refrigerants – Designation and safety classification.
2. Guideline for Safe Handling of Low-GWP (Flammable) Refrigerants, 1st edition, Brunei Darussalam.
3. Decree on the Transport of Dangerous Goods by Road and Rail No. 283/GOV, dated 09 September 2026.
4. Based on the Decision on the List of Industrial Chemicals No. 2523/MOIC, dated 04 August 2026.
5. Based on the Decision on Chemical Storage No. 0071/MOIC.DIH, dated 01 February 2021.
6. Based on the Decision on Chemical Labelling No. 0863/MOIC.DIH, dated 15 September 2021.
7. Based on the Standard for LPG (Cooking Gas) Cylinders (LS 639 – 2026).

The Department of Standards and Metrology, Ministry of Industry and Commerce, in collaboration with the Department of Environment, Ministry of Agriculture and Environment, together with the National Technical Committee, the National Standards Council and other relevant parties, has studied this Guideline and reached consensus on its content, technical aspects and practical principles in accordance with the standard development procedure. It is hereby submitted to the Ministry of Industry and Commerce for consideration, approval and official promulgation.

DRAFTING TEAM AND PARTICIPANTS IN THE MEETING TO ENDORSE THE DRAFT GUIDELINE FOR SAFETY STANDARD FOR THE USE OF FLAMMABLE REFRIGERANTS

1. National Standards Council Committee

- Department of Standards and Metrology, Ministry of Industry and Commerce;
- Department of Processing Industry, Ministry of Industry and Commerce;
- Department of Micro, Small and Medium Enterprise Promotion, Ministry of Industry and Commerce;
- Department of Domestic Trade, Ministry of Industry and Commerce;
- Department of Trade Negotiations and International Economic Cooperation, Ministry of Industry and Commerce;
- Department of Business Competition and Trade Inspection, Ministry of Industry and Commerce;
- Department of Foreign Trade, Ministry of Industry and Commerce;
- Department of Housing and Urban Planning, Ministry of Public Works and Transport;
- Food and Drug Department, Ministry of Health;
- Department of Agriculture, Ministry of Agriculture and Environment;
- Department of Energy, Ministry of Industry and Commerce;
- Department of Digital Technology, Ministry of Technology and Communications;
- Department of Standards, Metrology and Quality, Ministry of National Defence;
- Tourism Development Department, Ministry of Culture and Tourism;
- Fire Prevention and Firefighting Police Department, Ministry of Public Security;
- Department of Environment, Ministry of Agriculture and Environment;
- Department of Geology and Mines, Ministry of Industry and Commerce;
- Head of the National Standards Certification and Quality Inspection Centre, Department of Standards and Metrology, Ministry of Industry and Commerce;
- Food and Drug Research Centre, Ministry of Health;
- Faculty of Engineering, National University of Laos;
- Lao National Chamber of Commerce and Industry;
- Lao Tourism Business Association;
- Electricité du Laos (State Enterprise);
- Nam Papa Nakhone Luang (Vientiane Capital Water Supply State Enterprise);
- Lao State Fuel Company (State Enterprise).

2. National Technical Committee on Chemicals:

- Department of Agriculture, Ministry of Agriculture and Environment;
- Department of Science Management, Ministry of Education and Sports;
- Faculty of Natural Sciences, National University of Laos;
- Lao State Fuel Company (State Enterprise);
- Department of Processing Industry, Ministry of Industry and Commerce;
- Food and Drug Department, Ministry of Health;
- Department of Transport, Ministry of Public Works and Transport;
- NNC Pharmaceutical and Medical Equipment Co., Ltd.

3. Representatives of relevant parties:

- Department of Environment, Ministry of Agriculture and Environment;
- Research and Synthesis Division;
- Division for the Management and Resolution of Requests on Standards and Metrology, Department of Standards and Metrology;
- Division for Research and Development of Standards and Metrology, Department of Standards and Metrology;
- National Standards Certification and Quality Inspection Centre, Department of Standards and Metrology;
- National Metrology Centre, Department of Standards and Metrology;
- Standards and Metrology Information Centre;
- National ISO Certification Centre;
- Non-Destructive Testing Centre;
- Lao Refrigeration Association;
- Representative of the Skills Development Institute.

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1. Specification of the Standard

This Guideline for Safety Standard for the Use of Flammable Refrigerants specifies the scope of the standard; terms and definitions; types, toxicity levels and flammability; characteristics; appropriate quantities for the use of refrigerants; good practice procedures; containers or cylinders; import, transport and storage; marking and labelling; testing; and conformity criteria.

2. Scope of Application

This Guideline for Safety Standard for the Use of Flammable Refrigerants serves as a reference document for government agencies, the private sector, business operators and technicians who use these chemicals, so that they are used safely and in an environmentally friendly manner.

3. Terms and Definitions

3.1. **Refrigerant (R)** means any chemical substance used in the heat-exchange (heating or cooling) system of electrical appliances that require cooling, such as air conditioners, refrigerators, freezers and others;

3.2. **Chlorofluorocarbon (CFC)** means a group of chemicals composed of chlorine, fluorine and carbon;

3.3. **Global Warming Potential (GWP)** means a relative value comparing the global warming effect of a gas with that of CO_2, which is assigned a GWP value of 1;

3.4. **Hydrocarbon (HC)** means a group of chemicals composed of hydrogen and carbon;

3.5. **Hydrochlorofluorocarbon (HCFC)** means a group of chemicals composed of hydrogen, chlorine, fluorine and carbon;

3.6. **Hydrofluorocarbon (HFC)**: a group of chemicals composed of hydrogen, fluorine and carbon;

3.7. **Hydrofluoroolefin (HFO)**: a group of chemicals composed of hydrogen, fluorine and carbon, with a double bond in the molecule;

3.8. **Ozone Depletion Potential (ODP)** means a relative value comparing the effect of a gas on the ozone layer with that of CFC-11, which is assigned an ODP value of 1;

3.9. **Ozone-Depleting Substance (ODS)** means a gas or substance that can cause damage to the ozone layer in the upper atmosphere (stratospheric ozone layer);

3.10. **Split system**: a type of refrigeration/air-conditioning system in which the evaporator is located in one place and the compressor/condenser in another. The term is generally used for small air-conditioning systems consisting of an indoor unit and an outdoor unit.

3.11. **Stand-alone system**: a small, factory-assembled cooling unit that only needs to be connected to the electricity supply to operate. A household refrigerator is an example of a stand-alone system. Many types are used in food retail and food service outlets.

4. Types, Toxicity Levels and Flammability

4.1. Types, Designations and Impacts of Refrigerants

Table 01: Types, designations and impacts of refrigerants

Type	Refrigerant	Ozone Depletion Potential (ODP)	Global Warming Potential, GWP (100-year)
ODS	CFC-11	1	4750
	HCFC-22	0.055	1810
HFC	HFC-404A	0	3922
	HFC-410A	0	2088
	HFC-134a	0	1430
	HFC-32	0	675
HFO	HFO-1234yf	0	4
Natural	HC-290 (propane)	0	3
	HC-600 (isobutane)	0	3
	R-744 (CO_2)	0	1

4.2. Toxicity and Flammability Classes

Refrigerants can be divided into 02 classes, namely: toxic (Class A) and non-toxic (Class B), which can be further classified according to flammability into 3 levels: 1) no flame propagation, 2L) lower flammability, 2) flammable, and 3) higher flammability (highly flammable substances). These are shown in Table 2 below:

Table 2: Classification of refrigerants by flammability

Class	Safety group	
	A: Lower toxicity	B: Higher toxicity
Class 3: Higher flammability	A3: e.g. HC-290, HC-600a	B3
Class 2: Flammable	A2: e.g. R-152a	B2
Class 2L: Lower flammability	A2L: e.g. R-32, R-1234yf	B2L: e.g. R-717 (ammonia)
Class 1: No flame propagation	A1: e.g. R-22, R-134a, R-410A, R-404A, R-407C, R-744	B1: e.g. R-123

Explanation of symbols:

1) The letters A and B indicate “lower toxicity” and “higher toxicity”, respectively.
2) The class numbers 1, 2L, 2 and 3 indicate “flammability from low to high”, respectively.

5. Characteristics of Flammable Refrigerants

Combustion requires three elements, which together cause fire, namely: 1) heat; 2) fuel or combustible material; and 3) oxygen (O_2). When all three elements are present under suitable conditions, fire will occur.

Most flammable refrigerants are classified in groups A2L, A2 and A3 according to the ASHRAE standard. They are increasingly used because they have a low impact on the greenhouse effect (low GWP) and are environmentally friendly.

- **Low flash point:** can ignite easily in the presence of sparks or high heat in an environment containing air.
- **Flammability limits:** have a lower flammability limit (LFL) and an upper flammability limit (UFL), which define the range of concentrations in air within which combustion can occur.
- **Density:** most are denser than air; therefore, when a leak occurs, the refrigerant sinks and accumulates near the floor or in low corners of the room.

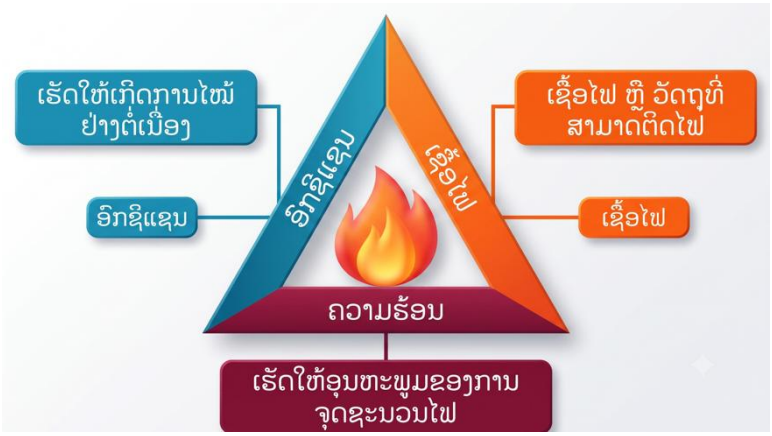


Figure 01: The fire triangle

Labels in the figure: Oxygen – sustains continuous combustion; Fuel – fuel or combustible material; Heat – raises the temperature to the ignition point.

6. Appropriate Quantities for the Use of Refrigerants

6.1. Calculation of the Maximum Refrigerant Charge

Table 3: Formula for calculating the maximum refrigerant charge

Refrigerant class	Formula
Class 2L: R-32	$M_{MAX} = 2.5 \times LFL^{1.25} \times h_0 \times A^{0.5}$ but not exceeding $39 \times LFL$
Class 3: R-290	$M_{MAX} = 2.5 \times LFL^{1.25} \times h_0 \times A^{0.5}$ but not exceeding $26 \times LFL$

Where:

M_{MAX} maximum quantity of refrigerant that may be charged for a room of floor area A (unit: kilogram);

A floor area of the room (unit: square metre, m^2);

LFL lower flammability limit (unit: kilogram per m^3);

h_0 installation height (unit: m), according to how the unit is installed, as follows:

h_0 0.6 m for floor-mounted units;

h_0 1 m for window-mounted units;

h_0 1.8 m for wall-mounted units;

h_0 2.2 m for ceiling-mounted units.

Table 4: Maximum quantity of R-32 that may be charged in air conditioners

Floor area (m^2)	**M_{max} floor-mounted AC (kg)**	**M_{max} window AC (kg)**	**M_{max} wall-mounted AC (kg)**	**M_{max} ceiling-mounted AC (kg)**
9	1.03	1.71	3.09	3.77
12	1.19	1.98	3.56	4.35
15	1.33	2.21	3.98	4.87
18	1.45	2.42	4.36	5.33
21	1.57	2.62	4.71	5.76
24	1.68	2.8	5.04	6.16
27	1.78	2.97	5.34	6.53
30	1.88	3.13	5.63	6.88
33	1.97	3.28	5.91	7.22
36	2.06	3.43	6.17	7.54
39	2.14	3.57	6.42	7.85
42	2.22	3.7	6.66	8.15
45	2.3	3.83	6.9	8.43
48	2.37	3.96	7.12	8.71
51	2.45	4.08	7.34	8.98
54	2.52	4.2	7.56	9.24
57	2.59	4.31	7.76	9.49
60	2.66	4.43	7.97	9.74

Table 5: Maximum quantity of R-290 that may be charged in air conditioners

Floor area (m^2)	**M_{max} floor-mounted AC (kg)**	**M_{max} window AC (kg)**	**M_{max} wall-mounted AC (kg)**	**M_{max} ceiling-mounted AC (kg)**
9	0.08	0.13	0.23	0.28
12	0.09	0.15	0.26	0.32
15	0.1	0.16	0.29	0.36

Floor area (m^2)	M_{max} floor-mounted AC (kg)	M_{max} window AC (kg)	M_{max} wall-mounted AC (kg)	M_{max} ceiling-mounted AC (kg)
18	0.11	0.18	0.32	0.39
21	0.12	0.19	0.35	0.42
24	0.12	0.21	0.37	0.45
27	0.13	0.22	0.39	0.48
30	0.14	0.23	0.41	0.51
33	0.14	0.24	0.43	0.53
36	0.15	0.25	0.45	0.55
39	0.16	0.26	0.47	0.58
42	0.16	0.27	0.49	0.6
45	0.17	0.28	0.51	0.62
48	0.17	0.29	0.52	0.64
51	0.18	0.3	0.54	0.66
54	0.18	0.31	0.55	0.68
57	0.19	0.32	0.57	0.7
60	0.19	0.32	0.58	0.71

Note: The appropriate air-conditioner size for each floor area shall be determined in accordance with Annex A.

6.2. Calculation of the Minimum Floor Area for a Given Refrigerant Charge

The minimum floor area for a given refrigerant charge can be calculated using the following formula:

$$A_{min} = (M / (2.5 \times LFL^{1.25} \times h_0))^2$$

This formula applies to refrigerant charges between 6 × *LFL* and 39 × *LFL* for class 2L refrigerants, and between 4 × *LFL* and 26 × *LFL* for class 2 and 3 refrigerants.

If the refrigerant charge is less than or equal to 6 × *LFL* to 39 × *LFL* for class 2L refrigerants, and less than or equal to 4 × *LFL* to 26 × *LFL* for class 2 and 3 refrigerants, there is no restriction on room size.

Table 6: Minimum floor area requirements

Refrigerant	No room-size restriction	The A_{min} formula must be applied
R-32	Charge ≤ 1.8 kg	Between 1.8 and 12.0 kg
R-290	Charge ≤ 0.15 kg	Between 0.15 and 1.0 kg

Table 7: Minimum floor area requirements for R-32 in air conditioners

Actual charge (kg)	**A_{min} floor-mounted AC (m^2)**	**A_{min} window AC (m^2)**	**A_{min} wall-mounted AC (m^2)**	**A_{min} ceiling-mounted AC (m^2)**
Less than 1.8 kg	No room-size restriction	No room-size restriction	No room-size restriction	No room-size restriction
1.8	27.6	9.9	3.1	2.1
2	34	12.3	3.8	2.5
2.2	41.2	14.8	4.6	3.1
2.4	49	17.6	5.4	3.6
2.6	57.5	20.7	6.4	4.3
2.8	66.7	24	7.4	5
3	76.6	27.6	8.5	5.7
3.2	87.2	31.4	9.7	6.5
3.4	98.4	35.4	10.9	7.3
3.6	110.3	39.7	12.3	8.2
3.8	122.9	44.2	13.7	9.1
4	136.2	49	15.1	10.1
4.2	150.1	54	16.7	11.2
4.4	164.8	59.3	18.3	12.3
4.6	180.1	64.8	20	13.4
4.8	196.1	70.6	21.8	14.6
5	212.8	76.6	23.6	15.8

Table 8: Minimum floor area requirements for R-290 in air conditioners

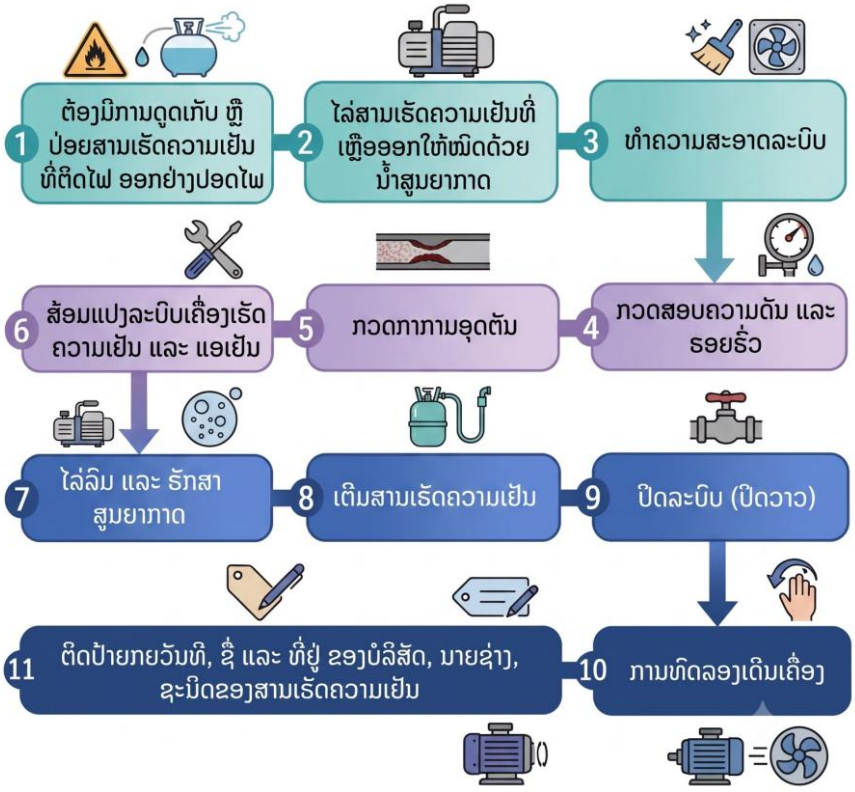
Actual charge (kg)	**A_{min} floor-mounted AC (m^2)**	**A_{min} window AC (m^2)**	**A_{min} wall-mounted AC (m^2)**	**A_{min} ceiling-mounted AC (m^2)**
Less than 1.8 kg	No room-size restriction	No room-size restriction	No room-size restriction	No room-size restriction
0.15	35.5	12.8	3.9	2.6
0.2	63.2	22.7	7	4.7
0.25	98.7	35.5	11	7.3
0.3	142.1	51.2	15.8	10.6
0.35	193.4	69.6	21.5	14.4
0.4	252.6	90.9	28.1	18.8

Actual charge (kg)	A_{min} floor-mounted AC (m²)	A_{min} window AC (m²)	A_{min} wall-mounted AC (m²)	A_{min} ceiling-mounted AC (m²)
0.45	319.7	115.1	35.5	23.8
0.5	394.7	142.1	43.9	29.4
0.55	477.6	171.9	53.1	35.5
0.6	568.4	204.6	63.2	42.3
0.65	667.1	240.2	74.1	49.6
0.7	773.7	278.5	86	57.5
0.75	888.1	319.7	98.7	66.1
0.8	1,010.50	363.8	112.3	75.2
0.85	1,140.80	410.7	126.8	84.9
0.9	1,278.90	460.4	142.1	95.1
0.95	1,425.00	513	158.3	106

7. Good Practice Procedures for Installation and Maintenance

7.1. Good Practice Procedures for Installation and Maintenance

The good practice procedures for servicing refrigeration and air-conditioning equipment that uses the flammable refrigerants R-32 and R-290 shall follow the steps below:



Steps shown in the diagram above:

1. Recover or vent the flammable refrigerant safely
2. Remove the remaining refrigerant completely using a vacuum pump
3. Clean the system
4. Check pressure and leaks
5. Check for blockages
6. Repair the refrigeration and air-conditioning system
7. Evacuate air and hold the vacuum
8. Charge the refrigerant
9. Seal the system (close the valves)
10. Test-run the unit
11. Affix a label showing the date, the name and address of the company, the technician and the type of refrigerant

7.1.1. Safe Recovery or Venting of Flammable Refrigerants

Since some refrigerants contribute to global warming, they should not be released into the atmosphere; a refrigerant recovery machine must be used to recover the refrigerant from the refrigeration system.



Figure 02: Refrigerant recovery machine

7.1.2. Complete Removal of Refrigerant from the System Using a Vacuum Pump

1) Ensure that all refrigerant has been removed before opening the system;
2) Remove the refrigerant completely using a vacuum pump;
3) The pressure in the system must be reduced to below 2 psig (0.14 bar).

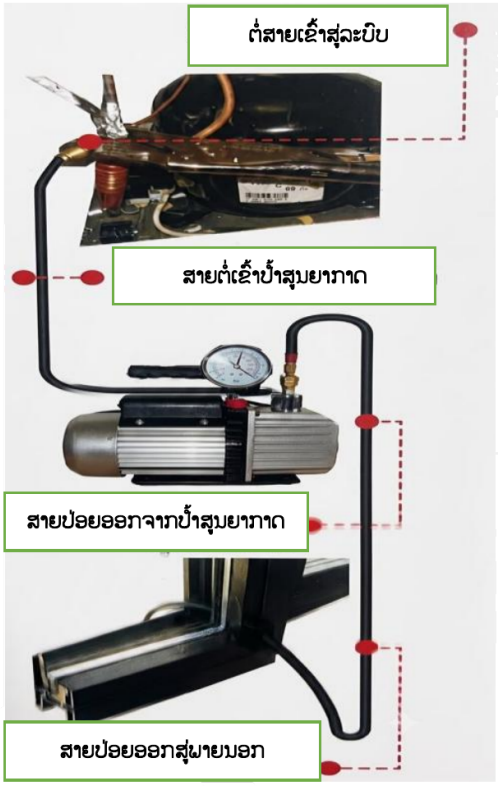


Figure 03: Releasing refrigerant from the system

Labels in the figure (top to bottom): hose connected to the system; hose connected to the vacuum pump; discharge hose from the vacuum pump; discharge hose to the outside.

7.1.3. Cleaning the System

After the old filter has been removed from the refrigeration or air-conditioning equipment, proceed as follows:

1) Use dry nitrogen with a two-stage regulator at a pressure of approximately 5 bar;

2) Use hexane/methylene dichloride (MDC) or other environmentally friendly cleaning chemicals;

3) Do not use carbon tetrachloride (CTC), R-141b, air or oil for flushing.



Figure 04: Cleaning with nitrogen

Label in the figure: Flushing with nitrogen.

7.1.4. Repair of Refrigeration and Air-Conditioning Systems

Repairs to refrigeration and air-conditioning systems that use flammable refrigerants shall be carried out as follows:

1) Equipment or tools designed specifically for flammable refrigerants must be used;

2) For refrigerants of high flammability (highly flammable), such as R-290, technicians should not use brazing; a flame-free joining method should be used instead, as it is a safe method;

3) For refrigerants of medium flammability, such as R-32, technicians may braze pipes, but must ensure that no refrigerant remains in the system.



Figure 05: Pipe brazing

7.1.5. Checking for Blockages

The blockage check ensures that no blockage occurs during brazing. Use dry nitrogen to check the pipework through a two-stage regulator.



Figure 06: Two-stage regulator

7.1.6. Pressure and Leak Testing

Pressure and leak testing is carried out using a 4-valve manifold gauge set connected to the system (Figure 07).

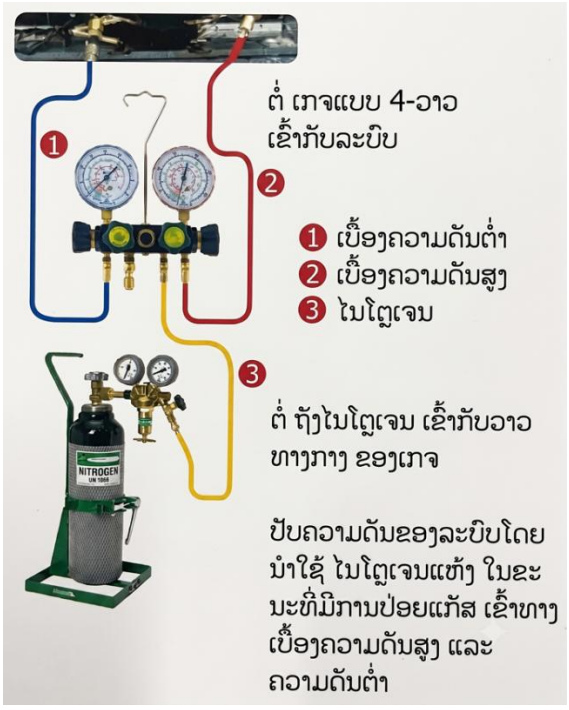


Figure 07: 4-valve manifold gauge set

Labels in the figure: Connect the 4-valve manifold gauge to the system. (1) Low-pressure side; (2) High-pressure side; (3) Nitrogen. Connect the nitrogen cylinder to the centre port of the manifold. Pressurise the system with dry nitrogen, admitting the gas through the high-pressure and low-pressure sides.

After connecting the gauges, use dry nitrogen to test for leaks. **Do not use compressed air or refrigerant for this test.**

Pressurise the system to 20 bar and close the cylinder valve once 20 bar is reached. Apply or spray soap solution on all joints and observe for any bubbles (Figure 08).



Figure 08: Observing soap bubbles

7.1.7. Evacuation and Vacuum Holding

Evacuation and vacuum holding shall be carried out as follows:

1) Connect the hoses to the valves;
2) Switch on the pump, then open the valves;
3) Evacuate to 500 microns or lower;
4) Close the valves;
5) If no vacuum gauge is available, the vacuum pump must run for at least half an hour, until the pressure gauge reads −30 inHg / −760 mmHg / 0 millibar;
6) Leave the system to stand for approximately 5 minutes;
7) The vacuum pressure must be as low as possible and must not rise above 1,500 microns during a standing period of 5 to 10 minutes.

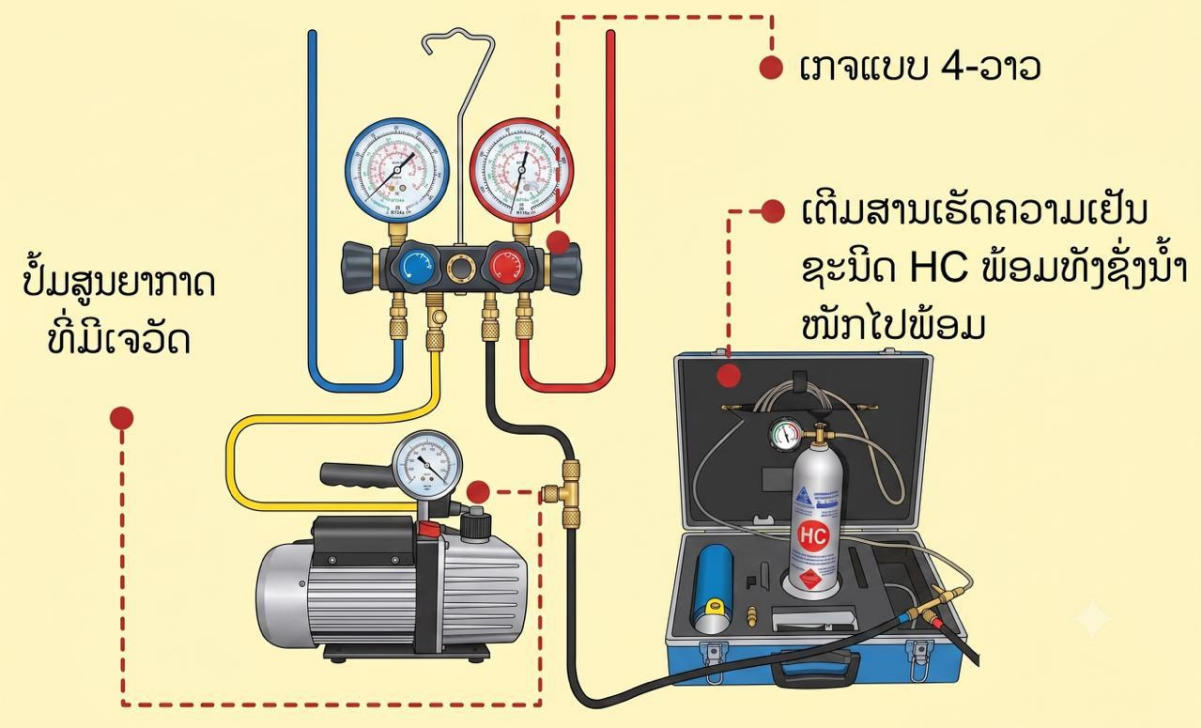


Figure 09: Evacuation and refrigerant charging

Labels in the figure: 4-valve manifold gauge; charging HC refrigerant while weighing it at the same time; vacuum pump with gauge.

7.1.8. Refrigerant Charging

Refrigerant charging shall be carried out as follows:

1) Refrigerant may be charged only into a system that has been properly prepared;
2) Charging must be done slowly and carefully;
3) Use a weighing scale to check the weight or quantity of refrigerant charged.

Accurate control and execution are essential for hydrocarbon refrigerant (R-290), as it is charged in small quantities. The actual charge depends on the recommendations of the manufacturer of each brand of refrigeration and air-conditioning equipment. In any case, the maximum charge must be limited as recommended in Table 5 of this Guideline.

7.1.9. Sealing

When sealing hydrocarbon pipework, technicians are prohibited from using a flame to braze pipes; flame-free joining (lock-ring fittings) shall be used instead, as it is safe.

For split air conditioners using R-32 or R-290, three steps must be performed: closing the valves, capping the valves and checking for leaks.

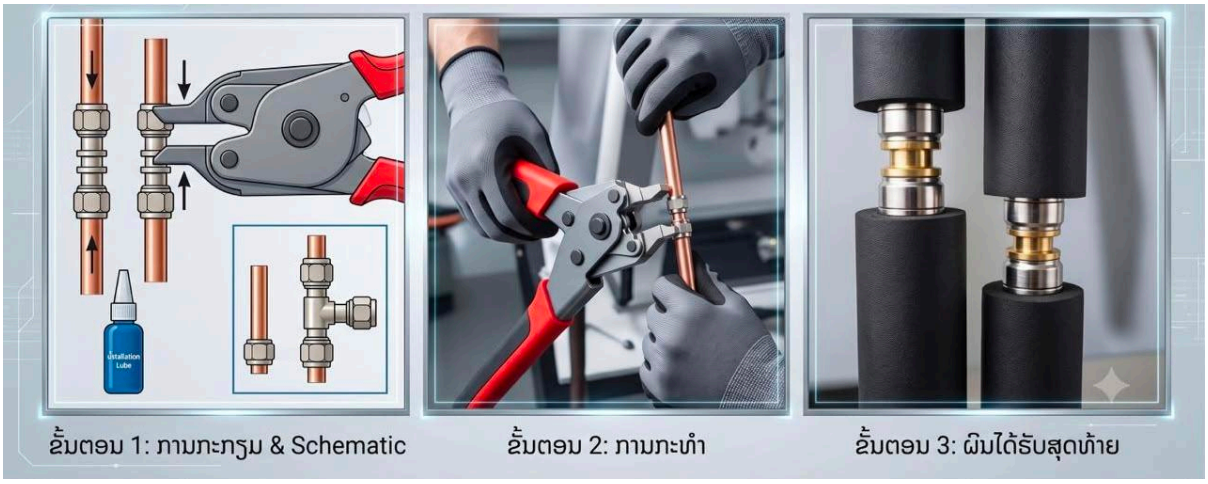


Figure 10: Steps of flame-free (lock-ring) joining

Labels in the figure: Step 1: Preparation and schematic; Step 2: Execution; Step 3: Final result.

7.1.10. Test Run

The test run shall include the following checks and records:

1) Record of the most recent service;
2) Check the temperature;
3) Check the cut-out time;
4) Check the compressor current;
5) Check for vibration.

7.1.11. Installation and Repair Service Label

Companies providing installation and repair services for refrigeration and air-conditioning equipment must affix a label after servicing, and the label must specify the following:

WARNING: Use only environmentally friendly refrigerants		
Date of installation/service	:	
Refrigerant type	:	
Flammability	:	
Refrigerant charge	:	g
Ambient temperature	:	°C
System temperature	:	°C
High pressure	:	psi
Low pressure	:	psi
Running current	:	A
Service provider	:	
Licence No.	:	
Next service date	:	

7.2. Temporary Flammable Zone

A temporary flammable zone is an area at risk of fire during installation and repair work, which must be kept free of ignition sources. For small equipment, the temporary flammable zone has a radius of 2 metres from the installation point. For large equipment, the radius is larger.

8. Pre-Service Safety Measures and Emergency Response Standards

8.1. Before servicing, maintaining or repairing refrigeration and air-conditioning equipment, the following safety measures must be taken:

1) Check the repair history;
2) Identify the safety class of the refrigerant used in the system, such as its type, the quantity present and the appropriate quantity to be charged;
3) Ensure that there are no ignition sources or flammable materials within the temporary flammable zone;
4) Ensure that a suitable fire extinguisher (CO_2 or dry chemical) is ready for use;
5) Put up warning signs indicating that work is in progress in the area;
6) The work area must be well ventilated;
7) Ensure that any leaked refrigerant can be vented to the outside;
8) Have a leak detector ready for use;
9) Wear personal protective equipment (PPE) or other safety equipment.

8.2. Emergency Response Measures

In the event of a fire, the following emergency response measures shall be taken:

1) Evacuate people from the area; do not enter any building that has not yet been inspected.
2) Shut off the electricity, gas, fuel or chemical supply.
3) Report the incident and coordinate with firefighters, police, rescue services or local authorities.
4) Check on and assist the injured.
5) Give first aid to the injured and take them to hospital if necessary.
6) Coordinate with the person responsible for the building/organisation and the insurance company.

9. Standards for Technicians

9.1. Technicians or service providers who install air conditioners using refrigerants must have completed training on the use of refrigerants provided by the relevant sector;

9.2. Technicians or service providers who install air conditioners using refrigerants must pass a skills test conducted by the relevant sector;

10. Containers or Cylinders, Transport and Storage

10.1. Containers and Transport

10.1.1. Refrigerant containers or cylinders shall comply with all articles of Chapter 4 of the Decision on Chemical Storage No. 0072/MOIC.DIH, dated 01 February 2021;

10.1.2. The transport of flammable refrigerants shall comply with the Decree on the Transport of Dangerous Goods by Road and Rail No. 283/GOV, dated 03 September 2026, or with guidance issued by the relevant sectors from time to time.

10.2. Storage and Precautions

10.2.1. Storage

The storage of flammable refrigerants shall comply with the Decision on Chemical Storage No. 0072/MOIC.DIH, dated 01 February 2021.

10.2.2. Precautions for Use

1) Smoking or any work that produces sparks, such as welding or cutting metal, is strictly prohibited in the storage area;
2) Warning signs or barriers must be in place to keep unauthorised persons away from areas where refrigerants are used or stored;
3) Do not store refrigerants near oxygen cylinders or other oxidising substances;
4) Do not carry out modifications or gas transfers in storage areas that lack supporting safety systems, such as fire extinguishers.

11. Marking and Labelling

Chemical marks and labels must contain information in the Lao language and a foreign language, either on a single label or on separate labels, including the following:

1. Name or type of refrigerant;
2. Refrigerant capacity of the cylinder (grams);
3. Internal pressure of the cylinder;
4. Ignition temperature;
5. Marks/symbols;
6. Warnings;
7. Manufacturing standard;
8. Information on the manufacturer or distributor;
9. Production batch.

12. Conformity Criteria

Flammable refrigerants must comply with all provisions of this Guideline in order to be deemed to comply with the safety standard for the use of flammable refrigerants in conformity with the Lao National Standard.

ANNEX A

Appropriate air-conditioner capacity for each floor area

AC capacity (BTU/h)	Bedroom (normal)	Bedroom (sun-exposed)	Office (normal)	Office (sun-exposed)	Restaurant (normal)	Restaurant (sun-exposed)
5,000 BTU	5–9 m²	4–8 m²	4–8 m²	4–8 m²	3–7 m²	3–7 m²
9,000 BTU	10–14 m²	9–13 m²	9–13 m²	8–12 m²	7–11 m²	7–11 m²
12,000 BTU	14–18 m²	13–17 m²	12–16 m²	11–15 m²	11–15 m²	10–14 m²
15,000 BTU	18–22 m²	17–21 m²	16–20 m²	15–19 m²	14–18 m²	13–17 m²
18,000 BTU	22–26 m²	20–24 m²	19–23 m²	18–22 m²	17–21 m²	16–20 m²
20,000 BTU	25–29 m²	23–27 m²	22–26 m²	20–24 m²	19–23 m²	18–22 m²
22,000 BTU	27–31 m²	25–29 m²	24–28 m²	22–26 m²	21–25 m²	20–24 m²
24,000 BTU	30–34 m²	28–32 m²	26–30 m²	25–29 m²	23–27 m²	21–26 m²
30,000 BTU	38–42 m²	35–39 m²	33–37 m²	31–35 m²	30–34 m²	28–32 m²
36,000 BTU	46–50 m²	44–47 m²	40–44 m²	38–42 m²	36–40 m²	34–38 m²
40,000 BTU	51–55 m²	48–52 m²	45–49 m²	41–46 m²	40–44 m²	38–42 m²