

Introduction: on how and where to use

From an economic, environmental, and sustainable point of view the best solution will always be use air conditioning only when there is no other solution. If using AC is the only option, the first step will be to ensure the space that will be cooled or heated is properly insulated. It is worthless to invest in an AC and then leave the windows open, the door not closing properly, a non-insulated roof or ceiling, for example. Properly sizing the AC is a critical point for proper performance, size properly the AC according to the volume, materials, external and desired temperature with the AC calculator tool.

Best practices to reduce negative environmental impacts include:

1. Correct installation is critical to reduce inefficiencies and environmental risks linked with leakage of gas.
2. After-sales service and maintenance service should be provided by a qualified technician.
3. Ensure frequent leak test in accordance with local regulations / best practice. (once/year? Twice?)
4. Avoid constant over pressure which can reduce plant life and increase the probability of a leak.
5. End of life disposal.

Refrigerant gas

General info:

Most ACs or heat pumps use R410a refrigerant gas, which comes pre-charged in the unit. Older models may still use R22 and **must be avoided**. Some newer model may be available with improved refrigerants such as R32, which is less environmentally destructive.

Refrigerants are generally not interchangeable. It's important to select a system that runs on a refrigerant that is available locally in case it needs to be refilled.

Selection guidance/types of refrigerant gas:

The following selection guidance for the refrigerant gas was done considering ozone depletion potential and global warming potential. The 5 refrigerant gases were identified as the most used in current AC.

Type of gas	GWP ¹	ODP ²	Selection considerations	Best practices considerations:	Consideration for the bid
HCFC 22 or R-22	1810	0,05	Not allowed	Not allowed	Not allowed
R-410A	2088	0	Should be avoided if better options available	If use, correct installation, and maintenance are crucial to reduce potential environmental impacts (CO ² emissions by energy consumption and gas release). Leakage test to be done at installation and before any gas addition (corrective maintenance).	Lowest score
R-134	1000	0	Valuable option		Medium score
HFC-32 or R-32	675	0	Valuable option		Good score
R-290	< 5	0	Best performant gas	R290 is rated A3 by ASHRAE 34 (2013) ³ meaning it is highly flammable. ATEX accessories should be used when installing this type of equipment.	Best score (?)

¹: Global Warming Potential: tps://www.hrai.ca/uploads/userfiles/files/refrigerant_table_June2019.pdf

²: Ozone Depletion Potential: tps://www.hrai.ca/uploads/userfiles/files/refrigerant_table_June2019.pdf

³: ANSI/ASHRAE 34-2022, Designation and Safety Classification of Refrigerants: [link](#)

Efficiency Rating:

The efficiency of an air conditioner is expressed as the Energy Efficiency Ratio (EER) either expressed as the [W of cooling / W of power input] or in [Btu per hr of cooling / W of power input]. The higher the EER, the better the efficiency is.

Guidance score for Energy efficiency with A being the best option.

CLASS	EER VALUE	Selection considerations	Consideration for the bid
A	EER > 3,2	Best option	Highest score
B	3,20 ≥ EER > 3,00	Good option	Good score
C	3,00 ≥ EER > 2,80	Medium option	Medium score
D	2,80 ≥ EER > 2,60	Bad option	Low score
E	2,60 ≥ EER > 2,40	Worst option	Lowest score

End of life disposal for articles containing gas

This part is crucial to minimize CO2 emissions due to gas release into the atmosphere.

Refrigerant should never be released into the atmosphere. At end of life the refrigerant must be recovered and sent for recycling /treatment. This requires a recovery station, specific gas cylinders and a recycling industry available in the country. If none of these are available, the refrigerant must be pumped down into the compressor and the compressor should be stored until a recycling/treating solution can be found (the rest of the AC can be disposed). For further details, contact your technical department.

Please refer to your wat san referent to understand what disposal facilities are validated in a specific country and for additional guidance.