

1. Purpose

Establish general guidelines for the usage of refrigerants in new and existing GB industrial systems, according to the commitment defined by GBs Steering Committee regarding Refrigerants Migration and considering regulatory requirements, industrial safety, process continuity, requirements of our clients, sustainability, efficiency, commercial availability, and investment levels.

2. Scope

Applicable to all associates accountable for defining, purchasing and maintaining industrial systems that use refrigerants in the supply chain of any GB Business Unit.

3. Definitions

ASHRAE: For the purposes of this document, ASHRAE Standard 34 will be called, since it defines names and safety classifications based on toxicity and flammability.

Certification of final disposition: Guarantees that the disposition of the refrigerant was sustainable and meets all applicable regulatory requirements.

Chiller: A refrigeration equipment that aims to cool drinking water or water with glycol. Commonly used in the production centers of Grupo Bimbo.

Consumer Goods Forum: Global organization that brings consumer goods retailers and manufacturers together in the pursuit of sustainable practices to create positive changes throughout the industry and environment.

Hydro chlorofluorocarbons (HCFCs): The second generation of refrigerants that contain carbon, hydrogen, chlorine and fluorine. They have a less environmental impact than the first generation of refrigerants - Chlorofluorocarbons (CFC), but still have an Ozone Depletion Potential (ODP). Examples of HCFCs are R22, R123, R401.

Hydro fluorocarbons (HFCs): The third generation of refrigerants that contain carbon, hydrogen, and fluorine. They contain no Chlorine. They were designed to substitute CFC and HCFC since they do not deplete the ozone layer, however, they have adverse environmental effects, specifically having Global Warming Potential (GWP). Examples of HFC's are: R134-A, R410-A, R507-A, R404-A.

Hydro fluoro olefin (HFOs): The fourth generation of refrigerants (or newer generation of refrigerants), that contain hydrogen, fluorine and carbon. They do not deplete the ozone layer and have only a fraction of the Global Warming Potential when compared to HFCs. In this document, the refrigerants resulting of the mixing of HFO and HFC will be called HFO. Examples of HFO's are: R449-A, R513-A, R448-A

Industrial systems that use refrigerants: Refrigeration system for the manufacturing process with more than 23 kg (50 pounds) of refrigerant.

Kigali Amendment: It is an amendment of the Montreal Protocol that seeks the phase-down of production and consumption of HFC's.

Montreal Protocol: It is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of substances that have an Ozone-Depletion Potential (ODP)

Natural refrigerant: Any refrigerant that due to its physio-chemical characteristics do not deplete the ozone layer and has a minimum global warming potential (≤ 1). This document considers CO₂ (R-744), Ammonia (R-717), and Hydrocarbons (HC's) as natural refrigerants.

Reasons for renovation/retrofit of the system: Obsolete system (business continuity); Legal requirements, client requirements, a GB project with a Return of Investment that meets the criteria set forth by the Office of Global Finance.

Retrofit: Process of system update, that consist of substituting the refrigerant fluid in a piece of equipment for another, with less environmental impact.

Zero Net Carbon Emissions Strategy. It is a strategy implemented by Grupo Bimbo that aims to reduce CO₂ emissions that are generated by the manufacturing process and the distribution of the products. The emissions are either direct or indirect.

4. Responsibilities

Global Engineering Department: Establishes recommendations and guidelines for the acquiring and installation of refrigeration systems. They also promote and advise in refrigerant migrations (retrofit) of existing equipment. Consolidate and share good practices in the usage of refrigerants and refrigerant technologies. Updates the GB policy annually, according to the commercial availability of newer designs, newer developments in refrigerant technologies; and learnings of the GB operations and facilities worldwide.

Business Unit Engineering Department: Establishes an initial baseline of assets with refrigerants and updates the changes as they take place. Gather the refrigerant leak report(s) from all the facilities of the various Business Units and shares it with the DGO. Define specifications of the new refrigeration systems (equipment, or facilities), according to the recommendations and guidelines of the Global Operations Office, and to the local legislation and regulations.

GB Facility Managers: Execute the change of refrigerant migration program defined by the Regional Office. Define and comply with a maintenance plan for the equipment and facilities with refrigerants to avoid leaks to the atmosphere. Report leaks of any industrial refrigeration systems to the Business Units Engineering or Sustainability Department, as soon as they are aware of them. Train the facility staff involved in refrigerants the safety and environmental procedures for the facilities with refrigerants. Certificates of final disposition must be on file.

Global and Regional Procurement Area: Establish refrigerant requirements for equipment suppliers not subject to capital expenditure (CAPEX), like local units of air conditioning, according to the guidelines and recommendations of this document.

5. General guidelines

According to GB commitment to the *Consumer Goods Forum*; international treaties, protocols and agreements like the Montreal Protocol or the Kigali Amendment; local regulatory requirements, like F-Gas; GB's Zero Net Carbon Strategy; internal **FGB-EOP-01 Global Environmental Policy**; and depending on the availability of refrigeration technology for the industry, it is GB's policy that in the supply chain, the following refrigeration guidelines are met:

Existing assets

- Identify equipment with HCFC refrigerants (e.g. R22), HFC refrigerants (i.e. R404A, R507, R134a); new generation refrigerants (e.g. R449a, R448a, R513a, etc.); natural refrigerants (e.g. CO₂, Ammonia, HCs) and do the following:
 - Create a survey in GB's BEST system that describes the current situation. Update it and share it with the DGO on April of each year for the global refrigerants report **to be presented to the external auditors of our Zero Carbon Emissions strategy**.
 - Define the renewal and update program, whenever there's a reason for change and include the investment needs on the annual CAPEX list.
 - Adhere to the investment criteria outlined in FGB-FP-02 Global Policy of Investment Projects.**
 - Guarantee that the newer refrigerants that will be used, and it complies with the mentioned characteristics within these guidelines.
 - Report and generate an action plan for any leaking event where more than 30% of the total refrigerant charge is lost and which the root cause of the leak has not been solved in its entirety. the first 30 days since noticing the leak. Keep track of a monthly leak log and report it to the Business Unit Sustainability Manager. (Focus only on Industrial Systems; however, further information may be requested by the DGO. Leaks should be reported in the BEST system, according to the **PGB-EN-01 Procedure for Managing Global Technological Innovation Projects**.
- In the case of non-industrial equipment, or with less than 23 kg (50 lbs.) of refrigerant such, as mini-split-type air conditioning or vending machines, that use HCFC or HFC refrigerants, it is required to wait until the end of each unit's service life and substitute them for equipment with refrigerants that have the less environmental impact possible, according to market availability.

Future assets

- Installation of natural refrigerant systems (e.g. CO₂ (R744), ammonia (R717), **propane (R290)**, etc.) or hybrid systems (e.g. Ammonia/CO₂ or HFO/CO₂) must be considered for new manufacturing sites. A viability analysis and local regulations must be considered. The use of HCFCs', HFC's or New Generation refrigerants are not allowed for new facilities, the only exception is for air conditioning systems in production areas where temperatures exceed 5°C, in **which case only R32 (HFC) refrigerant or refrigerants with lower global warming potential (GWP- Global Warming Potential) will be allowed**.
- Fort the renewal of refrigeration systems in existing manufacturing sites:
 - HCFC or HFCs are not allowed. Natural Refrigerants should be considered as a first option and new generation refrigerants as a second option (e.g. HFO and its blends) **The only exception is for air conditioning systems where temperatures exceed 5°C, where the criteria mentioned above will apply.**
 - HFO refrigerants (pure and blends) cannot be considered for new equipment after December 2025 due to their still significant environmental impact (an HFO R449 has a GWP of 1289, meaning 1289 kg of CO₂ emitted into the environment per kilogram leaked).**
- For systems were a retrofit is viable and it is not necessary to change the asset, new generation refrigerants can be considered. (e.g. HFO's and its blends).
- In the case of the installation of systems with natural refrigerants, special attention and precautions should be paid in the design of the systems, installation and safety systems to avoid any potential hazards, leaks and Associate hazards. The system must be designed to all current and applicable codes and regulations. **If considering a 100% ammonia system, approval from the Global Operations Directorate is required as outlined in PGB-EN-13 Procedure for Investment Projects Management in Supply Chain.**
- For the specific case of non-industrial systems (e.g. El Globo branches refrigerators or similar and/or GB property assets in our clients' facilities), Hydrocarbon (HC) family natural refrigerants [i.e. propane (R290)] should be considered; nevertheless, HFO refrigerants (pure and its blends) could

also be considered as well, as an option that reduces flammability risk and maintains the ecological benefits, in locations where it is commercially available.

Refrigerant characteristics

- Natural Refrigerants are way more expensive than HCFC and HFC refrigerants; the costs of this systems must be considered in the CAPEX projects budget. In the Annex section a costs chart has been included with estimated CO2 Chillers costs, for low, medium and high temperature.
- The following table shows the characteristics of the most common refrigerants in GB, as well as the suggested alternatives for its change:

	R22	R507A	R404A	R410A	R134a	R407A	R449A	R513A	R32A	R1234yf	Propane (R290)	Ammonia (R717)	CO2 (R744)
Type	HCFC	HFC	HFC	HFC	HFC	HFC	HFO	HFO	HFO	HFO	Natural	Natural	Natural
ODP	0.055	0	0	0	0	0	0	0	0	0	0	0	0
GWP	1810	3985	3922	2088	1430	1774	1282	573	<1	<1	3	0	1
Application (Temperature)	Low, medium, high	Low, medium	Low, medium	Low, medium	Medium, high	Medium (HVAC)	Low, medium	Medium, high	Media, alta	Media, alta	Media, alta	Low, medium	Low, medium, high
Lubricant	MO, AB	POE	POE	POE	PAG Auto, POE	POE	POE	POE	POE	POE	MO, AB, POE	-	-
Safety (ASHRAE)	A1	A1	A1	A1	A1	A1	A1	A1	A2L	A2L	A3	B2L	A1
Flammability	No	No	No	No	No	No	No	No	Medium	Medium	High	Low	No
Toxicity	No	No	No	No	No	No	No	No	No	No	No	Yes	No*

*Dangerous in high concentrations

	Forbidden HCFC
	Forbidden HFC
	Transitory until 2025
	Recommended by the Global Operations Office (retrofit and new equipment). HFO
	Recommended by the Global Operations Office (taking safety systems into account). Natural

Equipment maintenance and refrigerant disposition

- Plants and other facilities must have a maintenance plan for all the equipment that use refrigerants, as well as a leakage record and an action plan for its containment and prevention.
- In case of refrigerants and their disposition. Final disposition certificates, or related document manifests should be retained to confirm the correct transportation, collection and final disposition, according to the local regulatory environmental entity (e.g. SEMARNAT in Mexico, or in the USA the EPA). As a reference, the current methods recognized by some regulatory entities are destruction by incineration in cement kilns, or plasma arc disposition.

6. Annex

-  [**FGB-OP-10 Annex CO2 Chillers Costs Reference**](#)

7. Responsibility / Ownership

The Global Operations Department is the assigned owner of this policy and is primarily responsible for its contents, updating, monitoring of its compliance and submission for approval before the Global Internal Control and Risk Management Department, the Steering Committee, and CEO.

8. Updates

The changes implemented in between versions are described below:

Revision / History of the revision				
Version	Revision date	Updated by	Approved by	Main changes
1	March 2019	Francisco Picazo Luna	Liborio F Villalobos C	Policy is published.
2	December 2019	Francisco Picazo Luna	Liborio F Villalobos C	<ul style="list-style-type: none"> Modification on phase-out date. Scope update to consider only +23 kg (50 lbs.) refrigeration equipment. Target locations update for refrigerants phase out. Global Engineering Department responsibilities update
3	June 2020	Francisco Picazo Luna	Liborio F Villalobos C	<ul style="list-style-type: none"> Phase-out dates are removed. Scope update to focus on process equipment. Reason for change was added as a definition. General editorial changes for clarity.
4	July 2021	Francisco Picazo Luna	Liborio F Villalobos C	<ul style="list-style-type: none"> Definition of Net Zero Carbon strategy added. Use of BEST system for survey included Lead Report Procedure in BEST system added. Editorial changes to stress that Natural Refrigerants are the only ones approved for new manufacturing sites projects. Also, it is clarified where New Generation refrigerants are approved. A cost chart is included as an annex for Natural Refrigerants systems.
5	March 2023	Francisco Picazo Luna	Liborio Villalobos C	<ul style="list-style-type: none"> The definition of chiller is added. The deadline for refrigerant census submission is changed from April to January of each year. A comment is added regarding alignment with the Global Financial Planning Directorate's Investment Criteria, the option to use propane as a refrigerant for industrial

				<p>equipment, and the option to use R32 as a refrigerant for air conditioning systems.</p> <ul style="list-style-type: none">• It is added that the use of HFO refrigerants will be limited starting from December 2025.• A comment is added that validation from the Global Operations Directorate is required for 100% ammonia systems.• The recommended refrigerant table is updated.
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