



Sterling Chemical Malta Ltd


OPERATIVE INSTRUCTION

OPERATIONAL PLAN FOR CONTROL OF TECHNICAL GASES

REVISION HISTORY

Revision Date	Revision Number	Sections affected	Change description
15.02.2014	Rev.00		First emission

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1. PURPOSE

This document is intended to establish procedures for a proper management and control of containers and the equipment of technical gases within the plant.

2. SCOPE

This procedure must be applied to the receiving, storage, handling and collecting phases of all cylinders containing gases within the plant as well as all equipment containing Ozone Depleting Substances, and fluorinated greenhouse gases.

3. REFERENCE DOCUMENTS

Please use the following reference documents:

- Stock records for goods reception;
- Packing list of raw materials in question.
- F-Gases inspection and check register.
- EC/842/2006 REGULATION - The regulation addresses to the containment, use, recovery and destruction of fluorinated greenhouse gases listed in annex I, labelling and disposal of products and equipment containing these gases as well as communication of information about these gases,
- REGULATION (EC) No. 1516/2007 - According to Regulation (EC) no. 842/2006 of the European Parliament and the Council, the regulation sets standard leakage checking requirements for stable refrigeration equipments, as well as for air-conditioning and heat pumps containing certain fluorinated greenhouse gases;
- Presidential Decree no. 43/2012 "Regulations on implementation (EC) no. 842/2006 on certain fluorinated greenhouse gases.
- Commission Regulation (EC) No 291/2011;

4. BASIC DEFINITIONS


For a correct interpretation of this operative instruction some definitions related to what is established are listed below:

HCFC: Hydrochlorofluorocarbons are gases typically used in industrial applications and not as coolant;

HFC: Hydrofluorocarbon is an organic compound consisting of carbon, hydrogen and fluorine, in which the molecule has not more than six carbon atoms;

F-GASES: Hydrofluorocarbon gases (or HFC gases);

TECHNICAL GASES: It refers to both toxic gases used as a raw material in the production synthesis or in different laboratories and technical gases (such as helium, hydrogen, etc.);

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RECOVERY: collection and storage of fluorinated greenhouse gases from, for example, machinery, equipment and containers;

RECYCLING: the reuse of a recovered fluorinated greenhouse upon execution of a basic purification process;

REGENERATION: the reprocessing of a recovered fluorinated greenhouse gas in order to meet a specific performance standard;

FIXED EQUIPMENT, equipment which is mostly not in transit when in operation;

4. PROCEDURE

The implementation of this operative instruction is divided into the following stages.

4.1 Toxic gases reception

You must refer to operative command **MIO _4.3 B1-loading and unloading of goods**

You must notify RSGS or, secondly to RSGA, the arrival of the cylinder in order to proceed with its timely census.

The census aims to establish an appropriate control plan whereof in paragraph 4.4.

4.2 Toxic gases storage

All cylinders must be stored in suitable areas within the factory by ensuring adequate ventilation and their safe maintenance and access aimed to the preservation of their integrity and functionality also to ensure an environmental protection and safety.


In particular, cylinders must be made stable by means of appropriate safety devices (for example chains);

Unused cylinders must be severely stored with a closed valve and a screwed safety cap: only cylinders in use can be equipped with the appropriate pressure reducer which must be promptly removed when the cylinder is no longer in use.

Please refer to procedure MP_4.4.6_D about constant updating of the toxic gases register so that you can always have control of the stocked quantities, the order and cleanliness of storages. The register to be completed is MRA_4.4.6-D4. Warehousemen must record the inspection date, the substance found in storage, the quantity, and the status of the storages always writing their name and signing up the document. Then the registered amount must be notified, even by mail to:

- Supplies office;
- EH&S office;
- Production

Storages must be checked monthly and whenever the supplies office orders toxic gases. It is responsibility of supplies office to require the supervision of the amount stored before issuing the order.

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4.3 Handling

Handling of industrial gas cylinders will affect only cylinders closed with safety cap.

It is strictly forbidden to handle gas cylinders equipped with pressure reducer.

These cylinders can only be handled using an appropriate trolley equipped with a safety cage.

The handling of toxic gases must be carried out only by operators responsible for the use of them and in possession of the provisional permit.

4.4 Cylinders status check

The operator must check the actual functioning of cylinders every time they are taken from the storage.

4.5 Cylinders return

Any damage to the cylinder detected when unloading the goods or during the first use of the same must be noticed in writing to the supplier. Any breakage of the cylinder due to a poor quality material despite a correct use of the same by the operator must be communicated.

5. CONTROL AND MONITORING OF GREENHOUSE GASES


In the plant there are hydrofluorocarbons used in fixed mechanical applications such as: refrigeration, air conditioning, mobile heat pump including their circuits, chiller. For this reason, according to the current European legislation you must follow the following steps:

All fixed installations such as refrigeration, air conditioning, mobile heat pumps including their circuits, as well as fire protection systems which contain fluorinated greenhouse gases listed in annex I, must take all technical measures to:

- a) Prevent leakages of these gases;
- b) Repair any detected leakage as soon as possible.

In particular, the main operations that the Technical Office will carry out are:

Containment: applications containing 3 kilograms or more of fluorinated greenhouse gases must be checked to locate any leakage at least once a year; this provision does not apply to equipment with hermetically sealed systems. These are labelled with their name and contain less than 6 kilograms of fluorinated greenhouse gases. On the other hand applications containing 30 kilograms or more of fluorinated greenhouse gases must be checked to detect any leakage at least once every six months. These maintenances must appear in the annual Maintenance Program. «Applications must be checked to detect any leakage» means that the equipment or systems are examined in order to locate any leakage by using direct or indirect measuring methods that focus on those parts of the equipment or system in which it is more likely to find a leakage. Direct or indirect measuring methods to detect any possible leakage must be specified in the standard inspection requirements described in paragraph 7 of EC Regulation no. 842/2006.

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Repair: Detected leakages must be repaired as soon as possible. If necessary, the repair must be preceded by an emptying or a recovery and followed by a leak testing with oxygen-free nitrogen or other dry gas suitable for pressure, evacuation, recharge and leak tests. After the repair, the equipment register must be updated with the relevant information. The cause which led to the leakage must be identified and described in detail by the company carrying out the repairs. The repair can only be made by a certified company meeting all the requirements of art. 5 of EC Regulation n.842/2006 and adopted by the Italian legislation by the environmental Consolidated Act and its subsequent amendments and additions.

Verification check: In case of ascertained leakage and subsequent maintenance applications must be rechecked within one month from the repair in order to establish the effectiveness of the repair. Process engineer has the responsibility to appoint a certified company (not necessarily the same that carried out the work) to do the control and verification test.

Recovery: Fluorinated greenhouse gases contained in other products and equipment, including mobile equipment, except when used for military operations (if this is technically possible and does not entail excessive costs) must be recovered by appropriately qualified personnel, in order to ensure gas recycling, regeneration or destruction. The feasibility of the expense is a Directorate responsibility who takes charge in front of the appointed Bodies to control that the expense presented with objective evidence is not disproportionate in respect to the environmental benefit.

Gas recoverer: The operator of the relevant application must ensure that the personnel have the necessary certification, which implies an appropriate knowledge of regulations and rules. He must also ensure the staff has the competence to prevent emissions, recover fluorinated greenhouse gases and safely handle the equipment in question. The qualification of the operator in charge of handling is established by art. 5 of the Regulation EC/842/2006, and in accordance with Regulation EC/308/2008.


HFC control register: From the date of issue of this operative instruction the Process Engineer has the responsibility to keep and update a register in which is mandatory to take notes of the amount and type of fluorinated greenhouse gases installed, of the possibly quantities added and recovered during maintenance, repair, and final disposal operations. You must add in the register other relevant information, including the identification of the company or technician who carried out the maintenance or repair service, as well as dates and results of the checks.

New purchases: With regard to machinery, for fixed application containing HFC it is necessary to fill in the form "notice of change" MM_4.3.1-A so that to allow RSGA, RSGS and EHS office operators to assess the consequences or the feasibility for an implementation of a new machine containing HFCs.

5.1 Types of equipment subject to the regulation

Types of equipment using fluorinated gases as refrigerants that are regulated by this regulation are:

- Refrigerating machines - devices intended for the cooling of products to be stored in a space to keep below the room-temperature, such as household refrigerators or industrial

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refrigeration systems, such as refrigerating rooms and refrigerator aisle used in retail markets etc;

- Air Conditioners - devices intended to achieve a comfortable room-temperature in buildings, ranging from small units used for cooling small spaces such as a room, to large refrigerator units used to maintain comfortable working conditions in large industrial complexes;
- Heat pumps - devices intended for the heating that use a refrigeration machine to extract energy from a heat source and provide useful heat.

5.2 Duties for F_GASES control and management

Maintenance staff has the responsibility to perform the following duties:

Periodic monitoring in order to detect leakages. : Machinery containing more than 3 kilograms of refrigerant liquid must be checked periodically, both using direct and indirect methods, by certified staff respecting the frequency described in the table below


Check frequency	Normal machinery	Hermetically sealed machinery
Never	< 3 kg	< 6 kg
Yearly	From 3 kg to 30 kg	From 6 kg to 30 kg
Biannual	From 30 kg to 300 kg	From 30 kg to 300 kg
Quarterly	> 300 kg	> 300 kg

Table 1 Periodic check of the status of machinery containing HFCs.

Register keeping. For equipment containing 3 kilograms or more fluorinated greenhouse gases you must keep a register in order to take notes about the amount and type of fluorinated greenhouse gases loaded, about quantities added and those recovered during maintenance, repair and final disposal operations.

Register must include:

- The amount and type of fluorinated gases installed in each system;
- Any amount of refrigerant added;
- The amount of refrigerant recovered during maintenance and final disposal operations;
- Other relevant information, including the identification of the company and the technician who carried out the maintenance service, as well as dates and results of leakage checks made with detection system;
- Relevant information to identify fixed equipment containing 30 kg or more refrigerant;
- On request, these registers can be made available for the competent authorities and the Commission.

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Employing of properly trained and certified personnel Companies involved in the activities of leakage check, gas recovery or other refrigerant handling activities must have appropriate personnel with proper certification to handle the refrigerant (license).

Labelling. Any new machinery sold on the European market, must be equipped with a clear label declaring the type and quantity of HFC refrigerant used. The form of the label to be used is established by European regulations. Monitoring operations will be carried out by the environment office. Maintenance manager must submit a notice of change to the environment office by attaching to it all the technical features of the machinery to buy.

Control and surveillance: Make sure the refrigerant recovery is running during the machinery maintenance. After recovery, the refrigerant must not be released into the atmosphere. It can be treated in one of these four ways:

1. It can be reused in the same system. This choice is made during the maintenance stage when a bit of refrigerant is recovered in order to allow the access to a part of the refrigerating circuit.
2. It can be recycled and used in another application. Recycling must be a cleaning operation that removes pollutant such as lubricating oils and impurities. This provides a sufficiently clean refrigerant to be reused in another machinery but does not guarantee a precise composition of the mixture. Recycling operation can be carried out with small equipment that is normally associated with the recovery machines.
3. It can be regenerated so that the refrigerant will have all the technical specifications of a virgin refrigerant. Regeneration can be done only in specialized plants.
4. It can be destroyed. This entails the incineration of refrigerant at such a high temperature to break it down into basic chemical components that are not greenhouse gases. Refrigerants destruction is possible in a specialized plant.

6. TYPES OF REFRIGERANT USED


F-Gas operative instruction can be applied to any refrigeration system that uses fluorinated gases including mixtures.

Provisions of the operative plan must not be applied to mixtures or preparations, where the gas GWP is less than 150.

All air conditioning systems must be labelled writing the type of refrigerant used. Label must be put onto a visible part of the system, or alternatively it can be added within the documentation that came with the equipment purchase.

Some types of refrigerants, which are subject to the regulation or not, are listed in the following tables.

5.1 Types of refrigerants subject to the regulation		
Type	Commonly used refrigerants	Less frequently used refrigerants
HFC:	R134a	R23, R32, R125, R143a

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<ul style="list-style-type: none"> Pure refrigerants 		
HFC: <ul style="list-style-type: none"> Mixtures 	R403A, R403B, R404A, R407C, R408A, R410A, R413A, R417A, R507	R401 (A,B,C) R402 (A, B) R407 (A, B, D), R411B, R 416A, R422A, R423A, R508
Refrigerants trade name	Refrigerants name are commonly composed of a number followed by a letter and preceded by an expression (e.g. Harp Suva 134a or Suva MP39) or a letter (e.g. R-401a). The following refrigerant trade names contain F-Gases: AZ-20, AZ-50, Forane (FX56, FX80, FX100), Greencool 411B, Harp, Isceon (MO29, 39TC, MO49, 59, MO79, MO89), Klea, RS-24, RS-44 Suva (MP39, MP66, HP80, HP81)	

Table 2 Refrigerants subject to EC Regulation no. 842/2006

5.1 Types of refrigerants not subject to the regulation		
Type	Commonly used refrigerants	Less frequently used refrigerants
HFC: <ul style="list-style-type: none"> Pure refrigerants 	R22	R123; R124
HFC: <ul style="list-style-type: none"> Mixtures 		R406A, R409(A, B)
CFC	R11, R12, R502	R13, R500
Other refrigerants	R717 (ammonia), R290 (propane), R600a (isobutane), R1270 (propylene) Care (10, 30, 40, 45, 50 – HC mixture)	R744 (CO ₂). Absorption refrigerants: Ammonia/lithium water Bromide/water

Table 3 Refrigerants subject to EC Regulation no. 842/2006


7. NITROGEN DISTRIBUTION SYSTEMS CHECK

There are two separate nitrogen distribution systems in the plant; each one has its own exclusive supplier.

Each supplier is directly connected to the system and it constantly monitors the level of nitrogen in the tanks.

The system that supplies the production department is connected to a reservoir of a maximum capacity of 30000 litres, which is replenished whenever the filling level falls below 5000 litres.

Every two days internal Sterling staff (the head office or warehouseman) makes a check of the level of the tank and, if it is close to the threshold, he must notify is to the Safety Office. Level check is

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recorded in the **MRS_4.4.6-D5 nitrogen distribution systems check register** by reporting date, time, the operator responsible for monitoring and filling level of the tank. At the end of each month the register is delivered to RSGS that notices the check in the **MRS_4.5.1 Monitoring and Measurement Safety Registry**.

8. OTHER OBLIGATIONS OR BANS

According to European regulations you must respect the following restrictions:

- ✓ Ban on production, sale and use of controlled substances in accordance with EC Regulation 1005/2009;
- ✓ Prohibition on the use of CFCs for maintenance and recharge of refrigeration / air conditioning systems;
- ✓ HBFC production is allowed until 2019 as well as the export outside EC;
- ✓ You must be subscribed to the ODS website of the European Community in order to have license to import HBFC.

10. RESPONSIBILITY

Proper management of loading and unloading of technical gases packaged in cylinders is duty of warehousemen who commit to adequately train the new internal personnel who can participate in such operations, with respect to the potential danger of the same. Furthermore it is a warehousemen's responsibility to inform carriers about the correct method of good unloading. It is responsibility of the Maintenance manager to provide for a regular maintenance of applications containing HFCs by constantly updating the maintenance handbook of each application as well as the inspection and check register.