



ENVIRONMENTAL IMPACTS CYLINDER FILLING PLANTS

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1 Introduction

This publication details the environmental impacts of the management of cylinder filling operations and gives guidelines on how to reduce the impacts.

2 Scope and purpose

2.1 Scope

This publication does not give specific advice on health and safety issues, which must be taken into account before undertaking any activity. On these issues the relevant EIGA documents and / or national legislation should be consulted.

2.2 Purpose

This publication is intended to serve as a guide for the managers & personnel of Industrial Gases cylinder filling operations, to assist in putting in place a formal environmental management system that can be certified by an accredited 3rd party verifier. It also aims to provide a guide for operating managers to identify and reduce the environmental impacts of these operations.

3 Definitions

For the purpose of this publication, the following definitions apply:

3.1 Publications terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May and need not

Indicate that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Environmental aspect

These are elements of an organisation's activities, products or services that can interact with the environment. For example, use of energy or road transportation of products.

3.2.2 Environmental Impact

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects. See ISO 14001, *Environmental Management System* [1]¹. For example, the contamination of water with hazardous substances or the reduction of air emissions.

4 Cylinder filling operations—environmental impacts

4.1 General environmental aspects and impacts and links to other EIGA documents

This publication covers the environmental impact of cylinder filling operations, which are summarised in Appendix A.

There are several linked EIGA publications that provide more details on general environmental issues, legislation for the gas industry and operational good environmental practices. A list of these linked documents and their links to the ISO 14001 [1] is provided in Appendix B. Appendix B also shows which of these documents are relevant to cylinder filling plant operations.

4.2 Planning and control

The basic philosophy is the minimisation of waste, emissions and nuisances of any kind and their safe and clean disposal. Also considered is the minimisation of raw materials, energy, unused equipment and cylinders and water use. By considering the potential waste which a new process could generate, or when engineering a plant, future problems can be avoided. This analysis is a crucial element of Environmental Impact Assessment that is strongly recommended before any decision of industrial investment. Waste streams should not be mixed but collected separately to aid further recycling, reuse or recovery.

Safety data sheets (SDS) for all chemical substances should be held on site and used to determine the best way to handle them. In particular, handling of hazardous chemicals such as Polychlorinated Biphenyls (PCB), chemicals containing asbestos or lead or chromates have to be carried out by an authorised contractor. Specific detailed handling conditions and disposal methods have to be written for such hazardous chemicals. These substances will need to be disposed of as hazardous waste by a certified waste disposal company in line with local or national regulations.

The key point in planning and control of environmental impact at cylinder filling operations is to make sure that the responsibilities are clearly defined at the site for management and operators. The key areas are:

- waste management (solid and liquid waste);
- energy management;
- air emissions;
- water use and disposal.

Specifically, in the following areas:

Cylinder preparation:

- purging;
- testing and maintenance;
- cleaning;
- drying;
- painting and labelling;
- valving.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section

Cylinder filling:

- filling;
- sampling and analysis.

Storage:

- product storage;
- underground storage.

General:

- packaging;
- vehicle washing;
- oil;
- polychlorinated biphenyl's (PCB);
- insulation material;
- silica gel;
- electrical and electronic equipment;
- ozone depleting substances and fluorinated gases – air conditioning equipment;
- abatement systems.

Employees and contractors should have site-specific briefing information covering these areas.

4.3 Waste and emissions from a cylinder filling plant

Different types of waste streams, which are to be recycled, recovered, reused or treated, should be separated according to their type and the treatment they will receive and stored safely and securely for transportation. The suppliers of the product or materials should be contacted so that they can take back any residuals. The containers should be suitable for transportation and clearly labelled in accordance with the national regulation. Any liquid should be provided with some means of secondary containment to the capacity of 110% of the largest container (or 25% of the total volume of all containers, whichever is greater).

4.4 Cylinder preparation

4.4.1 Residual gases and liquids

Cylinders that are returned to the filling plant will typically have small quantities of residual gas in them. This should be reused or recycled if technically and economically feasible and if it is not contaminated with other products. If it is not possible to reuse or recycle the residual gases, they should be disposed of correctly and in line with applicable national and international regulations. In any event, the EIGA Doc 30, *Disposal of Gases* [2] can be consulted for advice on disposal methods. Wherever possible, product should be recovered and reused.

4.4.2 Purge gases

The amount of purge gas should be kept to a minimum to avoid wastage; although these purge gases themselves are not harmful to the environment this is to avoid a waste of energy. Nevertheless, purging gases might bring a noise nuisance if no silencer is used, see Section 4.5.2. The re-use of purge gas should be considered, e.g. high purity helium re-used as balloon gas.

4.4.3 Testing and maintenance of cylinders

Gas cylinders are reusable high integrity pressure vessels that are subject to periodic re-qualification.