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LPG equipment and accessories — Environmental considerations for CEN/TC 286 standards

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (CEN/TS 16765:2015) has been prepared by Technical Committee CEN/TC 286 “Liquefied petroleum gas equipment and accessories”, the secretariat of which is held by NSAI.

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Introduction

Protection of the environment is a key political issue in Europe and elsewhere. Protection of the environment is taken in a very broad sense.

Provisions need to be restricted to a general guidance. Limit values are specified in national laws.

It is recommended that manufacturers develop an environmental management policy. For guidance see the EN ISO 14000- series.

It has been assumed in the drafting of this Technical Specification that the execution of its provisions is entrusted to appropriately qualified and experienced people.

Some of the environmental aspects also have an implication for occupational health and safety.

1 Scope

Protection of the environment needs to be considered during the total life-cycle of a particular product, e.g. impact on the environment including expenditure of energy during all phases of its life-cycle, from mining of raw materials, production, testing, packaging, distribution, maintenance and use, end-of-life disposal and recycling of materials, etc.

This Technical Specification provides information on the environmental aspects of equipment and accessories produced for the LPG industry. The following are addressed:

a) design;

b) manufacture;

c) packaging;

d) use and operation; and

e) disposal.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14717, *Welding and allied processes — Environmental check list*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
environmental aspect
element of an organization's activities or products or services that can interact with the environment

Note 1 to entry: A significant environmental aspect has or can have a significant environmental impact.

3.2
environmental impact
change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects

3.3
life-cycle assessment
LCA
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life-cycle

3.4
prevention of pollution
use of processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) the creation, emission or discharge of any type of pollutant or waste, in order to reduce adverse environmental impacts

Note 1 to entry: Prevention of pollution can include source reduction or elimination, process, product or service changes, efficient use of resources, material and energy substitution, reuse, recovery, recycling, reclamation and treatment.

3.5
packaging
all items made of any material of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer

Note 1 to entry: In this report the goods are referred to as “packaged product” or just “product”, in order to distinguish it from the packaging.

4 Environmental aspects to be considered for systematically addressing environmental issues

There is a need to reduce the potential adverse impacts on the environment of a product that can occur during all stages of its life. The potential environmental impacts of products can be reduced by taking into account environmental issues.

The impact on the environment from the product life-cycle is caused by:

— depletion of resources; and

— pollution including, air emissions, effluent, waste materials and other releases.

Each of the aspects of the product life-cycle shall be examined in order to reduce these impacts on the environment, referred to as a life-cycle assessment. These include:

— design;

— procurement, raw material acquisition, recycling of materials;

— production and testing;

— packaging and distribution;

— maintenance and use; and

— end-of-life disposal, reuse or recycling.

Prevention of pollution can take many forms and can be incorporated at all stages of the product life-cycle. For example, hazardous, toxic or otherwise harmful substances and materials prescribed in product standards should be substituted by other less harmful substances and materials, whenever possible and feasible, as long as it can be demonstrated that at least an equivalent level of quality and safety can be provided and any applicable regulations do not impair such substitution.

5 Design

Product design is the strongest tool for avoiding potential environmental impacts at all stages of the product life-cycle. There are several approaches to product design that consider elements of resource conservation and prevention of pollution.

Manufacturers should develop an environmental management policy; for guidance see the EN ISO 14000-series.

The design of LPG equipment and accessories should take account of the following:

— procurement;

— minimizing the use of materials;

— efficient transport of the finished product;

— minimizing the environmental impact of in service maintenance; and

— minimizing the environmental impact of end of life disposal.

The LPG equipment and accessories shall be designed so that its use is straightforward with minimal complexity, reducing the risk of accidental misuse that could lead to adverse environmental impacts.

6 Procurement

The manufacturer should endeavour to acquire materials and components from suppliers who have a declared environmental policy, see EN ISO 14021, EN ISO 14024 and EN ISO 14025.

Table 1 provides recommendations related to the selection and acquisition of raw materials, pre-manufactured materials and components.

It is important in the procurement of raw materials that the depletion of resources is considered when choosing the particular materials for the product.

The manufacturer should endeavour to minimize wastage of material by selecting appropriately sized materials related to the finished parts required for manufacture. Unavoidable waste/scrap material should be recycled.

Materials reuse, ease of recycling and recovery are important factors that should influence the choice of materials.

Materials should be chosen to ensure that end-of-life disposal is minimized.

Table 1 — Acquisition of raw material, pre-manufactured material and components

Recommendations	Examples of choices and limitations
Using the smallest possible amounts of materials	A decision should be made when a higher amount of a material A with abundant resources is compared with a smaller amount of a material B with very limited resources.
Using materials which can be easily recovered or recycled	Choices should be made for packaging when, a light-weight flexible packaging disposed of by incineration or land-filling is compared with a heavy rigid container, e.g. a cardboard box or a steel can that is easy to recycle.
Using recycled or reused materials	As a criterion, the end-of-life recycling rate should be preferred to the percentage of recycled material in a product. A lack of knowledge of the quality of the recycled material e.g. the chemical composition (hazardous substances, contaminations) may limit the use of those materials.
Using renewable resources and minimizing the use of non-renewable raw materials	This criterion is only valid if renewable resources are sustainably managed and are not depleted faster than they can re-grow.
Checking the merits of a reusable version of the product	Choices should be made if a reused product consumes more energy than a new product.
Restricting the use of hazardous substances to the unavoidable functional need, with special regard to toxic and very toxic, carcinogenic, mutagenic and reprotoxic substances	Choices should be made if small traces of hazardous materials are dissolved in recycled materials. In such cases, the bioavailability of the dissolved hazardous materials needs to be considered.
Selecting raw materials to optimize durability and lifetime	No known limitations or decision conflicts/No example provided.
Using standardized elements, parts, components for easy maintenance, reuse or recycling	No known limitations or decision conflicts/No example provided.
Minimizing the number of different materials	No known limitations or decision conflicts/No example provided.
Reusing components in or from other products	Choices should be made if a reusable component uses more energy or has other increased environmental impacts compared with a new component.
Minimizing the use of energy and the emission of greenhouse gases during raw material acquisition	A decision conflict may occur, for example, between the use of steel and aluminium in road and rail vehicles, where energy use in the operational stage may be a critical environmental aspect.
Prescribing performance criteria, which includes environmental performance, rather than materials or substances to be used	This usually requires comprehensive specification by the producer and further testing of the product. Technical performance and environmental performance criteria can contradict each other.

7 Production

7.1 General

The scarcity of water, especially of fresh water from surface or underground sources, is critical in many regions of the world. The efficient use of water in the different stages of the product life-cycle needs to be considered, where pertinent. In addition, the availability of water where it is needed requires the use of energy to transport it.

Noise levels from the production process should be evaluated and measures put into place to minimize the impact upon the external environment.

Where heat treatment is performed, the process shall be designed to minimize energy consumption, use of coolants, and ensure the environmentally friendly disposal of insulating material and other waste.

7.2 Measures to reduce environmental impact

Table 2 provides recommendations related to the production and testing of products.

Table 2 — Production

Recommendations for provisions in standards	Examples of choices and limitations
Minimizing the use of energy and the subsequent emission of greenhouse gases during production	Choices should be made between a low-energy process, delivering a lower performance product, and a more energy intensive process, delivering a product with good environmental performance in use.
When considering the choice of production or manufacturing equipment, progressively favouring equipment that minimizes environmental impacts, e.g. low energy pumps or waste heat recovery	In some cases, the new equipment cannot easily replace the existing equipment because of a long lifetime, even if the new equipment has a lower environmental impact.
Specifying ancillary materials which allow minimum pollution in the production stage	When considering ancillary materials and processes used in production selection should be carried out to ensure minimum pollution during the production stage. For example welding materials and processes should be selected in accordance with EN 14717.
Specifying surface treatment with minimum pollution when applied, e.g. prefer water-based coatings to solvent-based ones When selecting the surface treatment system, its environmental impact at the end of life disposal shall be taken into account.	Choices should be made if the performance of a water-based coating is inferior to the performance of a solvent-based coating. A water-based coating may require more energy intensive application. The requirements of EN 14717 shall be applied where appropriate to shot blasting and thermal spraying.
Referring to and using product tests which minimize environmental impacts	Liquids and gases used for testing shall be chosen to ensure that they do not result in environmental pollution during disposal.

8 Customer information

Communication to customers on the intended use of a product increasingly includes information on environmental aspects as well. The International Standards EN ISO 14020, EN ISO 14021, EN ISO 14024 and EN ISO 14025 provide principles, examples and requirements for environmental labelling e.g. for environmental product declarations. Recommendations for proper use, including maintenance and repair, and end-of-life handling of products are typically anticipated to be part of such communications.

9 Packaging

Any packaging and protection used during storage/transport of the finished products should be selected to have the minimum environmental impact, i.e. use of recyclable or bio-degradable materials and/or minimum use of energy.

Recycling instructions and/or recycling symbols for each packaging material should be printed on the packaging. See Table A.1 for recycling symbols.

10 Transportation

The product shall be designed to save energy during transport.

Transportation should be minimized during the life-cycle of the product, e.g. for maintenance and repair, for the acquisition of additional products or to end of life treatment/disposal and reuse/recycling/recovery methods.

Losses and damage should be minimized by use of appropriate transport packaging.

Packaging should be carried out with maximum efficiency considering:

— weight;

— volume;

— load/transportation unit;

— reusability; and

— recoverability.

11 Product operation and reuse

11.1 Durability of the product, maintenance and repair

In order to ensure the durability and life expectancy of the product the recommendations in Table 3 should be considered.

11.2 Reconditioning and reuse of equipment

Where LPG pressure vessels or equipment are reconditioned for reuse, the fluids and processes employed for the testing shall be handled in an environmentally friendly manner. All discharges or emissions to the air, water or soil shall comply with 11.3.

Table 3 — Durability of the product, maintenance and repair

Recommendations for provisions in standards	Examples of choices and limitations
Improving the foreseeable life expectancy of the product	This may sometimes only be achieved by a surface treatment which uses hazardous materials e.g. Zn.
Improving resistance to corrosion	This can require additional surface treatment.
Designing the product in such a way that it is easy to clean and/or does not become dirty easily	This can require additional surface treatment.
Using components that are easy to exchange	No known limitations or decision conflicts/No example provided.
Minimizing pollution during cleaning, repair and maintenance operations	Applies to operations which require additional products during cleaning, repair or maintenance.
Providing joining techniques which allow easy connection and disconnection, e.g. for repair	Applies to products where the lifetime can significantly be increased by repair operations.
Ensuring easy access to components for repair and replacement	This can require increasing the size of the product, which means higher environmental impacts in the stages of raw material acquisition and production.
Ensuring that standard tools can be used for maintenance	No known limitations or decision conflicts/No example provided.
Ensuring availability of spare parts	Applies to assembled products with components of low lifetime or frequent damage.
Providing possibilities of upgrading or improvement of the product	No known limitations or decision conflicts/No example provided.
Include guidance on instructions for repair and maintenance; including maintenance and service intervals	Applies to products where the lifetime can significantly be increased by repair operations.
Minimizing the need for maintenance and surface treatment	No known limitations or decision conflicts/No example provided.

11.3 Inspection and testing

11.3.1 Water

The scarcity of water, especially of fresh water from surface or underground sources, is critical in many regions of the world. The efficient use of water in the testing process needs to be considered.

11.3.2 Discharges to water

LPG is not a potential contaminant of water. When LPG equipment is subjected to hydraulic or other pressure tests, the test fluid shall be disposed of in an environmentally friendly manner.

Discharges to water comprise the discharge of substances either to a drain, a sewer or a watercourse. The discharge of nutrients and toxic, pathogenic, corrosive, radioactive, persistent, accumulating or oxygen depleting substances can give rise to adverse environmental impacts, including various pollution effects on aquatic ecosystems and deterioration of water quality. Discharges to water include controlled as well as uncontrolled sources, treated as well as untreated discharges, and discharges from normal operations as well as accidental discharges.

11.3.3 Emissions to air

Emissions to air comprise releases of gases, vapours or particulate matter to the air. Releases (e.g. dust and toxic, corrosive, flammable, explosive, acidic or odorous substances) can adversely affect flora, fauna and human beings. In addition, acidic rain can cause damage to sites of architectural and archaeological value. They can contribute to other environmental impacts, such as climate change, depletion of stratospheric ozone or formation of photochemical smog. Air emissions include releases from controlled as well as uncontrolled sources, treated as well as untreated releases, and releases from normal operations as well as accidental releases.

NOTE Climate change is caused by greenhouse gases. The greenhouse gases that contribute most to climate change are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

11.3.4 Discharges to soil

All discharges and disposals to soil, as well as soil applications, should be considered for their potential environmental impact. As well as hazardous materials, this includes non-hazardous materials, depending on their concentration and use. Their potential impacts need to be considered in relation to soil and groundwater quality.

Discharges to soil include controlled as well as uncontrolled sources, treated as well as untreated discharges, and discharges from normal operation as well as accidental discharges.

12 End of life

In order to ensure the environmental impacts are minimized at the end-of-life of the product the recommendation in Table 4 should be considered.

LPG pressure vessels should be scrapped in accordance with EN 13109.

LPG cylinders should be scrapped in accordance with EN 12816.

Table 4 — End of life

Recommendations for provisions in standards	Examples of choices and limitations
Placing non-recyclable and non-reusable materials in a product in such a way that they can easily be removed	Not necessary if product undergoes shredding and sorting operations, without prior dismantling operations.
Avoiding inseparable composite materials	Composite materials can contribute to the environmental optimization of the whole life-cycle, e.g. by weight savings.
Minimizing time and paths for disassembly	Only for products which usually undergo dismantling.
Minimizing the number of different materials used	Separation techniques to be considered.
Avoiding components, constituents, additional materials and surface treatments that can create impediments to reuse or recycling	Such elements may significantly contribute to the environmental performance of the product.
Using standardized elements, parts and components for easy reuse	Applies mainly for components which are frequently used as spare parts.
Reusing or recycling products	Pressure relief valves (PRV's) may be reconditioned where appropriate

Annex A
(informative)

Recycling symbols

Table A.1 lists the recycling symbols that may be displayed on packaged products and goods.

Table A.1 — Recycling symbols

Symbol	Material	Recycling capabilities
	Polyethylene Terepthalate	Widely recycled
	High Density Polyethylene	Widely recycled
	Polyvinyl chloride	Widely recycled
	Low Density Polyethylene	Not generally recycled
	Polypropylene	Not generally recycled
	Polystyrene	Not generally recycled
	Other plastics	Not generally recycled
	Mobius loop	This recycling symbol indicates that the products packaging can be recycled. It does not automatically mean it is accepted in all recycling collection systems. Sometimes this is used with a x% figure in the middle which is used to denote that the packaging contains x% of recyclable material.

	Aluminium Recycling	This recycling symbol indicates that aluminium packaging can be recycled.
	Paper Recycling	This recycling symbol shows that the product contains wood from sustainably managed forests and is independently certified in accordance with the rules of the Forest Stewardship Council.
	Wood Recycling	This recycling symbol shows that the product contains wood from sustainably managed forests and is independently certified in accordance with the rules of the Forest Stewardship Council.
	Green Dot	This is a European trademark that producers and suppliers include on their packaging advising consumers that they have contributed financially to the recycling of the products packaging. It does not mean that the packaging is recyclable.

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[6] EN ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling) (ISO 14021)*

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