GUIDE 64

Guide for the inclusion of environmental aspects in product standards

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

ISO guides are intended essentially for internal use in ISO committees or in some cases for the guidance of member bodies when dealing with matters that would not normally be the subject of an International Standard.

ISO Guide 64 was drawn up by Technical Committee ISO/TC 207, *Environmental management*, and was approved by ISO and IEC national bodies.

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Introduction

Every product has some impact on the environment during its manufacture, distribution, use or disposal. These impacts may range from slight to significant; they may be short-term or long-term; and they may occur at the global, regional or local level. Provisions in product standards may have a significant influence on the extent of these environmental impacts.

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Guide for the inclusion of environmental aspects in product standards

1 Scope

1.1 This Guide covers the consideration of environmental impacts in product standards. It is intended for standard writers; its purpose is

a) to raise awareness that provisions in product standards can affect the environment in both negative and positive ways;

b) to outline the relationship between product standards and the environment;

c) to help avoid provisions in product standards that may lead to adverse environmental impacts;

d) to emphasize that addressing environmental aspects during the development of product standards is a complex process and requires balancing competing priorities;

e) to recommend the use of life-cycle thinking and recognized scientific techniques when addressing environmental aspects of a product being standardized.

1.2 In order to achieve the purposes listed in 1.1, this Guide

a) sets forth some general considerations that should be taken into account when developing product standards that achieve a proper balance between product function and environmental impacts;

b) outlines ways in which provisions in product standards may affect the environment during the stages of a product's life cycle;

c) addresses techniques for identifying and assessing the environmental impacts of provisions in product standards;

d) highlights some ways to reduce adverse environmental impacts resulting from provisions in product standards.

To reflect the diversity of environmental impacts that products can have, this Guide may need to be supplemented by sectoral guides.

2 References

ISO 14001:1996, *Environmental management systems — Specification with guidance for use*

ISO 14040 —,[1] *Environmental management — Life cycle assessment — Principles and framework*

ISO/IEC Guide 2:1996, *Standardization and related activities — General vocabulary*

IEC Guide 109:1995, *Environmental aspects — Inclusion in electrotechnical product standards*

3 Definitions

For the purposes of this Guide, the following definitions apply.

3.1 standard writer

any person taking part in the preparation of standards

3.2 environmental aspect

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

NOTE — A significant environmental aspect is an environmental aspect that has or can have a significant environmental impact.

[ISO 14001]

3.3 environmental impact

any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services

[ISO 14001]

3.4 life cycle

consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal

[ISO 14040]

[1] To be published.

3.5 prevention of pollution

use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of materials and material substitution

NOTE — The potential benefits of prevention of pollution include the reduction of environmental impacts, improved efficiency and reduced costs.

[ISO 14001]

3.6 product standard

standard that specifies requirements to be fulfilled by a product or group of products, to establish its fitness for purpose

NOTES

1 A product standard may include in addition to the fitness for purpose requirements, directly or by reference, aspects such as terminology, sampling, testing, packaging and labelling and, sometimes, processing requirements.

2 A product standard can either be complete or not, according to whether it specifies all or only a part of the necessary requirements. In this respect one may differentiate between standards such as dimensional, material and technical delivery standards.

[ISO/IEC Guide 2]

4 General considerations

4.1 Every product has some impact on the environment. These impacts may occur at any or all stages of the product's life cycle and can be local, regional or global, or a combination of all three.

4.2 Anticipating or identifying a product's environmental impacts is complex and agreement is occasionally lacking on environmental cause-and-effect relationships. Attempts to address a given environmental impact may have consequences at any or all of the stages of a product's life cycle.

4.3 Despite the difficulties involved, a product's environmental impacts should be considered when product standards are developed. Prevention of pollution, resource conservation and other ways to reduce adverse environmental impacts should be considered. The intended use and reasonably foreseeable misuse of a product should also be considered.

4.4 A product's environmental impacts should be balanced against other factors, such as product function, performance, safety and health, cost, marketability and quality; legal and regulatory requirements have to be met.

4.5 Because the rate of innovation is high, review of product standards should be considered whenever the adverse environmental impacts might be significantly reduced by the application of new knowledge.

4.6 Provisions in product standards that are too restrictive may have the unintended effect of stifling innovation and environmental improvements.

5 Influence of provisions in product standards on the environment

5.1 In developing product standards, it is important to recognize how products can affect the environment at different stages of their life cycle. The specific provisions of the product standard will, to some extent, determine the relevant environmental aspects peculiar to the product covered by the standard. In order to avoid excessive or inefficient material or energy use, provisions should be no more stringent than necessary to achieve the product's purpose throughout its expected life. Conversely, provisions that are unduly lax may force the product to be frequently replaced.

5.2 When specifying requirements, such as descriptive requirements or performance requirements, provisions in product standards affect the choices made during the design and production of a new or improved product. For example, during all stages of the product's life cycle these choices can influence

a) the inputs and outputs associated with production processes;

b) the inputs and outputs associated with packaging, transportation, distribution and use;

c) the options for reuse and recovery, including recycling or energy recovery of the product, as well as its ease of disassembly, repair and restoration;

d) the options for disposal of the product and associated waste.

5.3 The impacts these choices have on the environment will vary from product to product. All products will not necessarily affect the environment equally at all stages of their life cycle.

5.4 Because a product's environmental impacts are usually interrelated, an arbitrary emphasis on a single environmental impact may alter environmental impacts at other stages of the product's life cycle or in other aspects of the local, regional or global environment.

6 Inputs and outputs to be considered in the development of product standards

6.1 A product's environmental impacts are largely determined by the inputs that are used and the outputs that are generated at all stages of the product's life cycle. Changing any single input, either to alter the materials and energy used, or to influence a single output, may affect other inputs and outputs. (See figure 1.)

6.2 Inputs fall into two broad categories: materials and energy.

6.2.1 Material inputs to the raw material acquisition, manufacturing, transportation (including packaging and storage), use/maintenance, reuse/recycling, and disposal of products can produce a variety of environmental impacts. Material inputs used in product development should also be considered. These impacts can include depletion of renewable and non-renewable resources, detrimental land use, and environmental or human exposure to hazardous materials. Material inputs can also contribute to the generation of waste, emissions to air, effluents to water, and other releases.

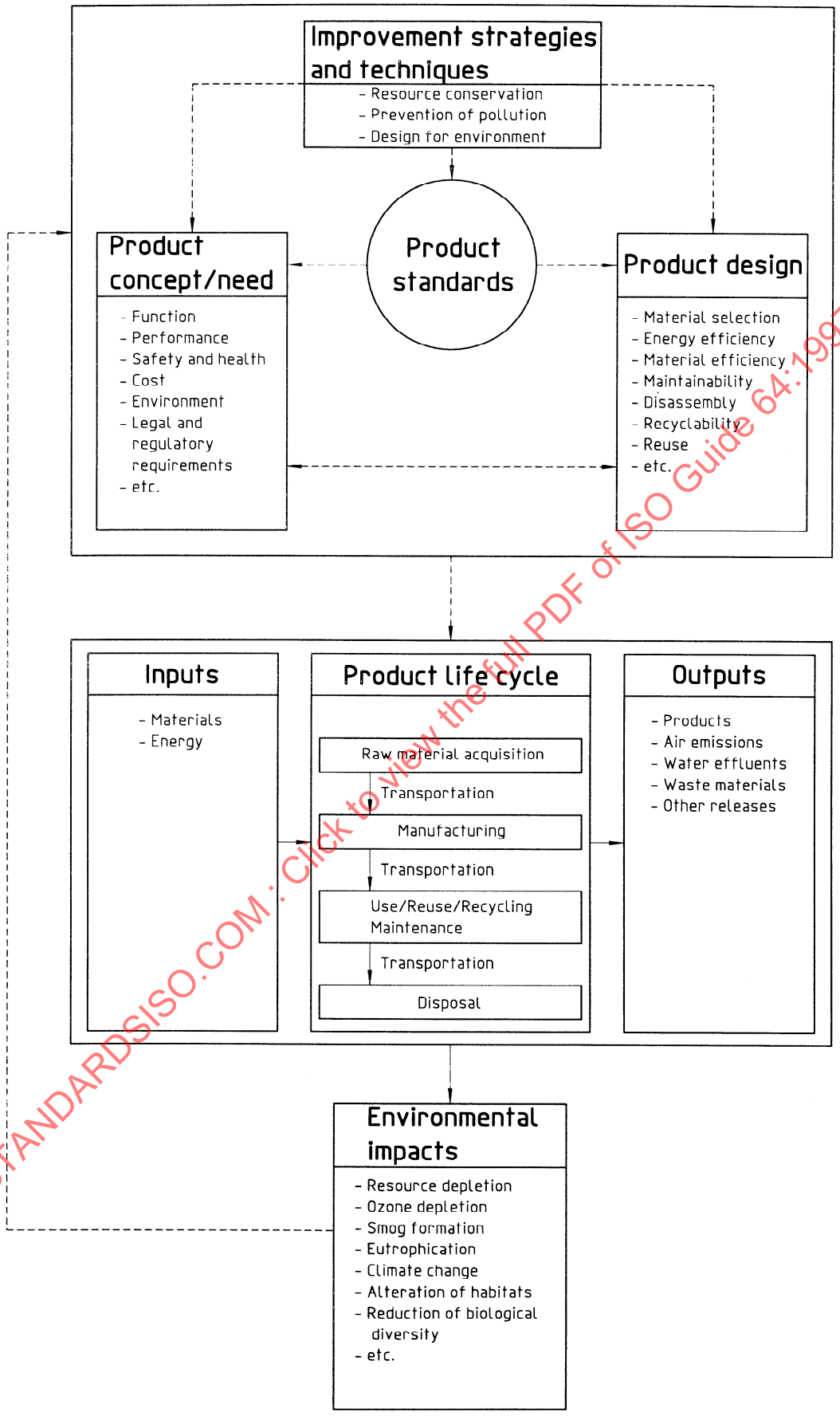

Figure 1 — Conceptual relationship between provisions in product standards and the environmental impacts associated with the product during its life cycle

6.2.2 Energy inputs are required at most stages of a product's life cycle. Energy sources include fossil fuels, nuclear, recovered waste, hydroelectric, geothermal, solar and wind energy, and other sources. Each energy source has its own set of environmental impacts.

6.3 Outputs generated during a product's life cycle generally comprise the product itself, intermediates and by-products, air emissions, water effluents, waste materials and other releases.

6.3.1 Air emissions comprise releases of gases or vapours or particulate matter to the air. Releases of toxic, corrosive, flammable, explosive, acidic or odorous substances may adversely affect flora, fauna, human beings, buildings, etc., or contribute to other environmental impacts such as depletion of stratospheric ozone or formation of smog. Air emissions include releases from point as well as diffuse sources, treated as well as untreated releases, and releases from normal operation as well as accidential releases.

6.3.2 Water effluents comprise the discharge of substances to a watercourse, either surface or ground water. The discharge of nutrients or toxic, corrosive, radioactive, persistent, accumulating or oxygen-depleting substances may give rise to adverse environmental impacts including various pollution effects on aquatic ecosystems and undesirable eutrophication of natural waters. Water effluents include discharges from point as well as diffuse sources, treated as well as untreated discharges, and discharges from normal operation as well as accidential discharges.

6.3.3 Waste materials comprise solid or liquid materials or products, which are disposed of. Waste materials may be produced at all stages of a product's life cycle. Waste materials are subject to recycling, treatment, recovery or disposal techniques associated with further inputs and outputs, which may contribute to adverse environmental impacts.

6.3.4 Other releases may encompass emissions to soil, noise and vibration, radiation and waste heat.

7 Techniques for identifying and assessing environmental impacts

7.1 Accurate identification and assessment of how provisions in product standards influence the product's environmental impacts is complex and needs careful consideration and may need consultation with experts. Certain techniques are evolving to guide the identification and assessment of a product's environmental impacts. Although a complete understanding of these techniques and their limitations requires extensive experience and study of the environmental sciences, awareness of them offers some general understanding of how provisions in product standards may influence a product's environmental impacts.

7.2 One example of such techniques, Life Cycle Assessment (LCA), is the subject of standardization by ISO/TC 207/SC 5.

LCA is a technique for assessing the environmental aspects and potential impacts associated with a product, by

- compiling an inventory of relevant inputs and outputs of a system;
- evaluating the potential environmental impacts associated with those inputs and outputs;
- interpreting the results of the inventory and impact phases in relation to the objectives of the study.

LCA studies the environmental aspects and potential impacts throughout a product's life (i.e. cradle-to-grave) from raw material acquisition through production, use and disposal. The general categories of environmental impacts needing consideration include resource use, human health, and ecological consequences.

LCA can assist in

- identifying opportunities to improve the environmental aspects of products at various points in their life cycle;
- decision-making in industry, governmental or non-governmental organizations (e.g. strategic planning, priority setting, product or process design or redesign);
- selection of relevant indicators of environmental performance, including measurement techniques; and
- marketing (e.g. an environmental claim, ecolabelling scheme or environmental product declaration).

ISO 14040 recognises that LCA is still at an early stage of development. Some phases of the LCA technique such as impact assessment are still in relative infancy. Considerable work remains to be done and practical experience gained in order to develop further the level of LCA practice. Therefore, it is important that the results of LCA be interpreted and applied appropriately.

7.3 Another example of a technique for the evaluation of the environmental impacts of a product is the Environmental Impact Assessment (EIA), described in IEC Guide 109:1995, annex B, "Guidance on Environmental Impact Assessment (EIA) principles for the electrotechnical industry".

According to IEC Guide 109, EIA may be used in studying environmental issues in product standards. It helps to fulfil the requirements for an environmentally desirable product, including environmentally compatible use, reuse, and disposal of such product. Materials and substances that go into a product are particularly critical at the end of life regarding that product's recyclability and proper disposal.

7.4 The respective relevance and value of the technique used to identify and assess a product's environmental impacts will vary depending upon the product and the product sector involved. Incomplete or distorted pictures of the environmental impacts and trade-offs associated with a product may result whenever a technique is applied improperly or in an abbreviated form.

8 Relationship of product standards to strategies and techniques for environmental improvement

8.1 General considerations

Provisions in product standards may both facilitate and hamper environmental improvement. Unless necessary for important reasons (e.g. health, safety or performance of the product), standards should, whenever possible, avoid specifying materials to be used in products. Specifying materials may preclude innovation and the development of new ways of reducing adverse environmental impacts through the use of alternative materials. For instance, provisions in product standards should not preclude the appropriate use of secondary or recycled materials. If materials are to be specified, consideration should be given to how the use of the specified material will affect the environment at all stages of the product's life cycle.

In the context of writing product standards, strategies and techniques for environmental improvement may be represented by resource conservation, prevention of pollution and design for the environment.

8.2 Resource conservation

8.2.1 Beside the environmental impacts associated with resource acquisition and use, resource depletion is of great interest environmentally. Resource depletion refers to the process of diminishing stocks of natural resources. Usually, the less of a particular resource that is depleted, the better.

Renewable resources can be replenished at significant rates. Examples include most biological populations, such as timber resources and soil fertility. Human activity can affect the rate of replenishment of biological populations and lead to serious declines.

In the case of non-renewable resources, the likelihood of replenishment is low in comparison with human lifespan. For example, mineral deposits, fossil fuels and biological diversity can be considered as non-renewable resources.

8.2.2 There are several considerations associated with the conservation of energy. Among these are the environmental impacts of various sources of energy, the conversion efficiency of a selected source, and the efficient use of energy. Substantial environmental trade-offs may exist between energy sources.

8.3 Prevention of pollution

8.3.1 Human and industrial activities result in releases to air, land and/or water. There are several generally accepted means of reducing these releases, including source reduction, material substitution, in-process recycling, reuse, recycling, and treatments to reduce hazards and/or volume.