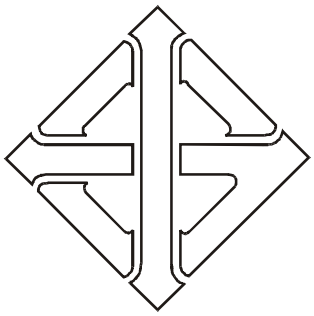

มาตรฐานผลิตภัณฑ์อุตสาหกรรม

THAI INDUSTRIAL STANDARD

มอก. 5064 – 2553

ISO GUIDE 64 : 2008

ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์

GUIDE FOR ADDRESSING ENVIRONMENTAL ISSUES IN PRODUCT STANDARDS

สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

กระทรวงอุตสาหกรรม

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มาตรฐานผลิตภัณฑ์อุตสาหกรรม
ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์

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สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
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ประกาศในราชกิจจานุเบกษา ฉบับประกาศและงานทั่วไป เล่ม 127 ตอนพิเศษ 144 ง
วันที่ 16 ธันวาคม พุทธศักราช 2553

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้กำหนดขึ้นเพื่อเป็นข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์อุตสาหกรรม

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ได้รับ ISO GUIDE 64:2008 Guide for addressing environmental issues in product standards มาใช้ในระดับเหมือนกันทุกประการ (identical) โดยใช้มาตรฐาน ISO ฉบับภาษาอังกฤษเป็นหลัก

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้กำหนดขึ้นเพื่อให้ทันกับความต้องการของผู้ใช้ และจักแปลเป็นภาษาไทยในโอกาสอันสมควร หากมีข้อสงสัยโปรดติดต่อสอบถามที่สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

คณะกรรมการมาตรฐานผลิตภัณฑ์อุตสาหกรรมได้พิจารณามาตรฐานนี้แล้ว เห็นสมควรเสนอรัฐมนตรีประกาศตามมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511

ประกาศกระทรวงอุตสาหกรรม

ฉบับที่ 4256 (พ.ศ. 2553)

ออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม

พ.ศ. 2511

เรื่อง กำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์

อาศัยอำนาจตามความในมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511 รัฐมนตรีว่าการกระทรวงอุตสาหกรรมออกประกาศกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์ มาตรฐานเลขที่ มอก. 5064-2553 ไว้ ดังมีรายละเอียดต่อท้ายประกาศนี้

ทั้งนี้ให้มีผลตั้งแต่วันประกาศในราชกิจจานุเบกษา เป็นต้นไป

ประกาศ ณ วันที่ 20 กันยายน พ.ศ. 2553

ชัยวุฒิ บรรณวัฒน์

รัฐมนตรีว่าการกระทรวงอุตสาหกรรม

มาตรฐานผลิตภัณฑ์อุตสาหกรรม
ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์

บทนำ

ผลิตภัณฑ์ต่าง ๆ ล้วนแล้วแต่ส่งผลกระทบต่อสิ่งแวดล้อมทั้งสิ้นตลอดช่วงวัฏจักรชีวิต ตั้งแต่การจัดหาวัตถุดิบ การผลิต การขนส่ง การใช้งานจวบจนการทำลายซากผลิตภัณฑ์ ซึ่งผลกระทบต่อสิ่งแวดล้อมอาจมีมากบ้างน้อยบ้าง ส่งผลกระทบเป็นระยะเวลาสั้นบ้างนานบ้าง และมีผลกระทบในวงจำกัดหรืออาจมีผลกระทบในวงกว้าง ตามแต่กรณี

มาตรฐานผลิตภัณฑ์จึงมีอิทธิพลต่อแนวโน้มของผลกระทบต่อสิ่งแวดล้อม โดยสามารถลดผลกระทบต่อสิ่งแวดล้อมของผลิตภัณฑ์โดยใช้ข้อกำหนดของมาตรฐานผลิตภัณฑ์เป็นเครื่องมือ

ข้อแนะนำในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์นี้กำหนดขึ้นเพื่อให้ผู้ที่มีหน้าที่เกี่ยวกับการกำหนดมาตรฐานผลิตภัณฑ์นำไปใช้ มีความเข้าใจในการชี้บ่งสิ่งที่ก่อให้เกิดผลกระทบต่อสิ่งแวดล้อมตามลำดับเป็นขั้นตอนโดยใช้แนวคิดตามหลักการวัฏจักรชีวิต และความเป็นไปได้ในการนำมากำหนดไว้ในมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ขอบข่าย

ข้อแนะนำในมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้เป็นแนวทางสำหรับผู้ที่มีหน้าที่ร่างมาตรฐานในการนำข้อกำหนดด้านสิ่งแวดล้อมมากำหนดในมาตรฐานผลิตภัณฑ์ โดยมีจุดมุ่งหมายเพื่อ

- แสดงถึงโครงร่างที่แสดงความสัมพันธ์ระหว่างข้อกำหนดในมาตรฐานและผลกระทบต่อสิ่งแวดล้อมของผลิตภัณฑ์
- ช่วยลดความยุ่งยากให้ผู้ที่มีหน้าที่จัดทำร่างหรือปรับปรุงมาตรฐานผลิตภัณฑ์เกี่ยวกับการพิจารณาผลกระทบต่อสิ่งแวดล้อมของผลิตภัณฑ์ตลอดช่วงวัฏจักรชีวิต

บทนิยาม

ความหมายของคำที่ใช้ในมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 ข้อ 2

แนวคิดและหลักการพื้นฐาน

แนวคิดและหลักการพื้นฐานที่ผู้จัดทำร่างมาตรฐานควรพิจารณา รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 ข้อ 3

ผลกระทบต่อสิ่งแวดล้อมที่สมควรนำมาพิจารณากำหนดไว้ในมาตรฐาน

ตัวอย่างผลกระทบต่อสิ่งแวดล้อมที่สมควรนำมาพิจารณากำหนดไว้ในมาตรฐาน รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 ข้อ 4

การชี้บ่งผลกระทบต่อสิ่งแวดล้อม

การชี้บ่งผลกระทบต่อสิ่งแวดล้อม รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 ข้อ 5

แนวทางในการแทรกข้อกำหนดด้านสิ่งแวดล้อมในมาตรฐานผลิตภัณฑ์

การแทรกข้อกำหนดด้านสิ่งแวดล้อมในมาตรฐานผลิตภัณฑ์ รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 ข้อ 6

ภาคผนวก

ข้อแนะนำในการจัดทำคู่มือด้านสิ่งแวดล้อมตามประเภท รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 Annex A

ตัวอย่างการแทรกข้อกำหนดด้านสิ่งแวดล้อมในมาตรฐานผลิตภัณฑ์ รายละเอียดให้เป็นไปตามมาตรฐาน ISO GUIDE 64:2008 Annex B

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

Draft Guides adopted by the responsible Committee or Group are circulated to the member bodies for voting. Publication as a Guide requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO Guide 64 was prepared by Technical Committee ISO/TC 207, *Environmental management*.

This second edition cancels and replaces the first edition (ISO Guide 64:1997), which has been technically revised.

Introduction

Every product has an impact on the environment during all stages of its life-cycle, e.g. extraction of resources, acquisition of raw materials, production, distribution, use (application), reuse, end-of-life treatment, including final disposal. These impacts range from slight to significant; they can be short-term or long-term; and they occur at global, regional or local level. Provisions in product standards have an influence on environmental impacts of products.

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

This Guide is intended for use by all those involved in the drafting of product standards, to draw attention to environmental issues in support of sustainable international trade, and is not intended to be used to create non-tariff barriers to trade. Standards writers are not expected to become environmental experts but, by using this Guide, they are encouraged to:

— identify and understand basic environmental aspects and impacts related to the product under consideration, and

— determine when it is possible and when it is not possible to deal with an environmental issue through a product standard.

During the life-cycle of a given product, different environmental aspects can be determined. However, the identification of these aspects and the prediction of their impacts is a complex process. When writing a product standard, it is important to ensure that an evaluation as to how products can affect the environment at different stages of their life-cycle is carried out as early as possible in the process of developing the standard. The results of this evaluation are important for specifying provisions in standards. It is anticipated that product standards writers actively consider compliance with any applicable national, regional or local product related regulation.

This Guide proposes a step-by-step approach, based on the principle of life-cycle thinking (see also 3.2.1), in order to promote a reduction of potential adverse environmental impacts caused by products, as illustrated in Figure 1.

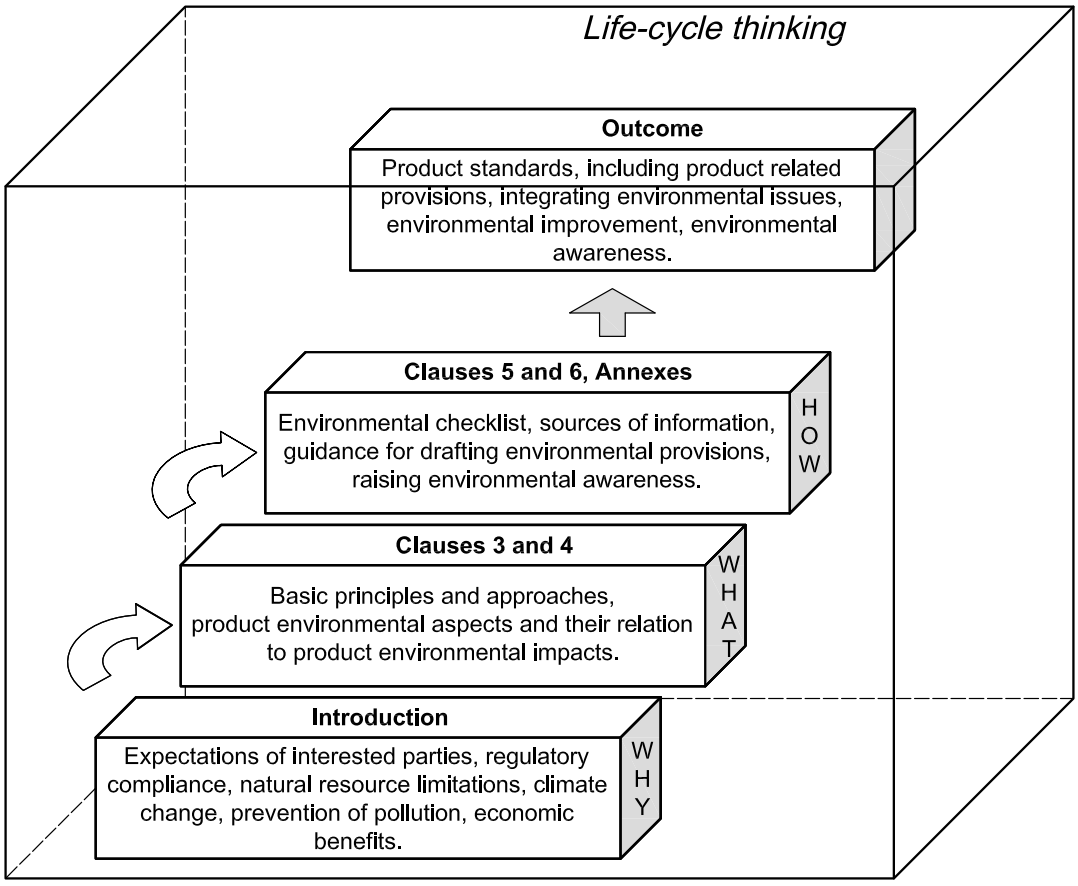


Figure 1 — Step-by-step approach for the inclusion of environmental provisions in product standards based on life-cycle thinking

The approaches outlined in Clause 3 help to make standards writers aware of how it is possible to make an effective contribution to environmental improvement through a product standard, and how to reduce potential adverse environmental impacts of products.

It is necessary to understand how the product interacts with the environment during its life-cycle in order to determine whether it is possible and appropriate to take into account environmental issues in the product standard. These issues are considered in Clause 4, which explains which environmental aspects are relevant for standards writing (“WHAT”).

Through a helpful tool (the environmental checklist), the writer of product standards can assess the relevant product environmental aspects, based on the availability of environmental information, product and environmental knowledge and the application of life-cycle thinking, these are considered in Clauses 5 and 6 which address the techniques of “HOW” to identify environmental aspects and impacts and draft environmental provisions in product standards. Some useful examples taken from existing standards are included in Annex B.

As an outcome, based on this information and additional guidance, environmental provisions can be drafted in product standards.

Guide for addressing environmental issues in product standards

1 Scope

This Guide provides guidance on addressing environmental issues in product standards. It is primarily intended for product standards writers. Its purpose is

— to outline the relationship between the provisions in product standards and the environmental aspects and impacts of the product,

— to assist in drafting or revising provisions in product standards in order to reduce potential adverse environmental impacts at different stages of the entire product life-cycle,

NOTE 1 See Annex B for examples.

— to emphasize that taking into account environmental issues in product standards is a complex process and requires balancing competing priorities,

— to recommend the use of life-cycle thinking when defining environmental provisions for a product for which a standard is being drafted, and

— to promote the future development of relevant sector guides for addressing environmental issues in product standards by standards writers, consistent with the principles and approaches of this Guide.

NOTE 2 See Annex A.

Whenever a new product standard is drafted or an existing product standard is revised or intended to be revised, the project managers and their technical committee chairman/convenors are encouraged to actively promote the application of this Guide. Furthermore, at any stage in the standard development process, experts are encouraged to include environmental issues in their comments.

In order to take account of the diversity of products and their specific environmental impacts, as well as the need for relevant environmental knowledge, it is useful for standards writers to involve environmental experts in the work. The project managers and their technical committee chairman/convenors might wish to take into account other relevant, current sector-specific guidance and environmental provisions identified in related standards.

Unless they are closely related with environmental issues, this Guide does not address issues of occupational health and safety or consumer safety as separate or specific aspects of the product life-cycle. Standards writers can find guidance on these issues in other guides.

NOTE 3 See other guides listed in the Bibliography.

2 Terms and definitions

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

2.1
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

NOTE Surroundings in this context extend from within an organization to the global system.

[ISO 14050:—[1)], definition 3.1]

2.2
environmental issue
any concern for environmental aspects and impacts

2.3
environmental provision
any requirement, recommendation or statement in a standard that addresses environmental issues

2.4
interested party
person or group concerned with or affected by the environmental performance of an organization

[ISO 14001:2004, definition 3.13]

2.5
life-cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to final disposal

[ISO 14050:—[1)], definition 7.1]

NOTE The term “product system” is defined and further explained in ISO 14040.

2.6
life-cycle thinking
LCT
consideration of all relevant environmental aspects (of a product) during the entire (product) life-cycle

[IEC Guide 109:2003, definition 3.10]

2.7
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** (2.10)

NOTE 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.

[ISO 14050:—[1)], definition 3.11]

2.8
product
any goods or service

[ISO 14050:—[1)], definition 6.2]

1) To be published. (Revision of ISO 14050:2002.)

2.9
product environmental aspect
element of a product that, during its life-cycle, can interact with the environment

2.10
product environmental impact
any change to the environment, wholly or partly resulting from a product environmental aspect

2.11
product standard
standard that specifies requirements to be fulfilled by a product or group of products, to establish its fitness for purpose

NOTE 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.

NOTE 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 2:2004, definition 5.4]

2.12
standards writer
any person taking part in the preparation of standards

3 Basic principles and approaches

3.1 General

This clause contains basic principles and approaches that should be considered by standards writers.

3.2 Principles

3.2.1 Life-cycle thinking

3.2.1.1 Principle

Standards writers should consider relevant environmental aspects and impacts at all stages of the product life-cycle (see Figure 2).

3.2.1.2 Explanation

Figure 2 illustrates four major (but not exclusive) stages of the product life-cycle:

— (material) acquisition;

— production;

— use;

— end-of-life.

Processes such as transport, energy supply and other services are located in the centre of the diagram, since they do not belong to a specific stage of the product life-cycle; rather, they are commonly incorporated between the stages. Inputs and outputs can potentially be relevant to all of those stages and processes.

"Life-cycle thinking" means consideration for all environmental aspects of a product at all stages of its life-cycle. Particular improvements targeted at a specific life-cycle stage can adversely affect environmental impacts at other stages of the product life cycle. Standards writers should ensure that considerations for the environmental impact of a single stage should not adversely alter or influence:

— the overall burden of environmental impacts related to a product;

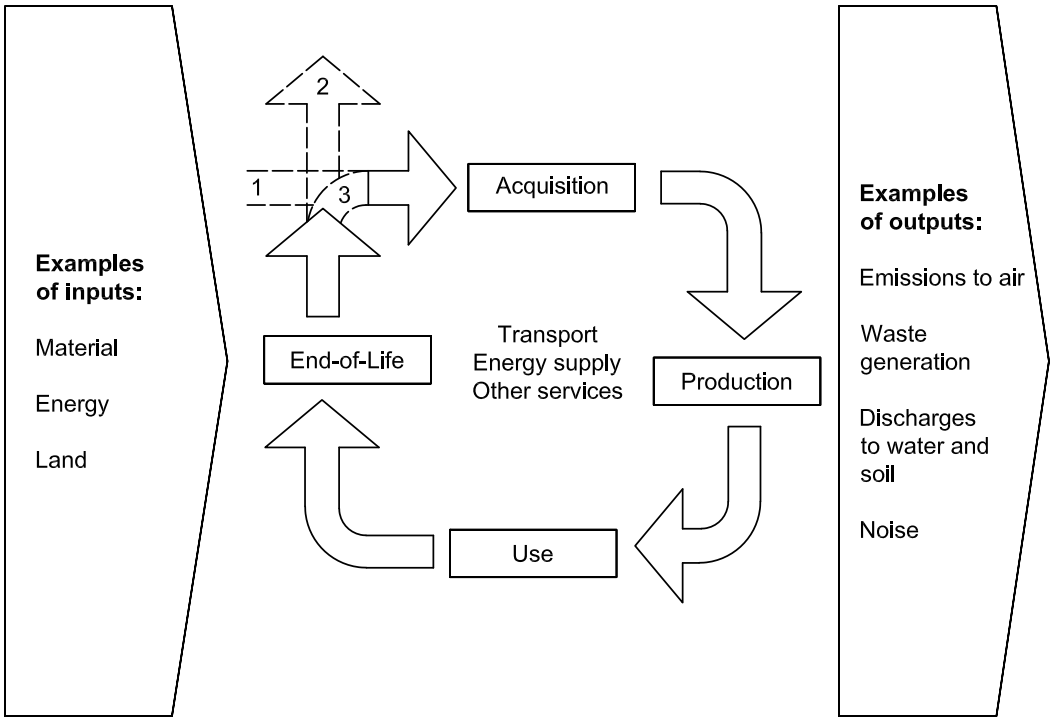
— other aspects of the local, regional or global environment.

EXAMPLE The replacement of solvent cleaning by hot water and air blowing processes has resulted in increased energy use at the stage of production.

This is especially relevant in cases where the scope of the product standard is limited and makes only certain stages applicable.

By applying life-cycle thinking, the significant stages and significant environmental aspects of a product can be identified. These should be covered by environmental provisions in a standard and strongly depend on the nature of the product.

Consideration for including environmental provisions should occur early in the process of developing a product standard.



Key

1 raw material

2 disposal of final residue

3 reuse or recovery

Figure 2 — Life-cycle thinking

3.2.2 Efficient use of natural resources

3.2.2.1 Principle

In drafting provisions in product standards, standards writers should make efforts to reduce the depletion of natural resources, with particular consideration for their scarcity.

3.2.2.2 Explanation

This principle means improving the effective and efficient use of resources during all stages of the product life-cycle. This includes, for example, the selection and use of raw materials, the use of water, energy and land, as well as the utilization of other materials and energy recovered from waste.

Besides the environmental impacts associated with resource acquisition and use, the depletion of non-renewable resources, typically mineral deposits and fossil fuels is unsustainable. Resource depletion also applies to renewable resources depleted at higher rates than they can regenerate.

Human activity can affect biological diversity and the rate of replenishment of biological populations, possibly leading to serious declines in or the ultimate extinction of species.

When environmentally beneficial, preferences should be given by the standards writer to renewable resources, as well as for the different options for end-of-life treatment.

There are also several considerations associated with energy. Among these are the conversion efficiency of a selected source and the efficient use of energy.

3.2.3 Prevention of pollution

3.2.3.1 Principle

Standards writers should take into account the need for preventing pollution at all stages of the life-cycle.

3.2.3.2 Explanation

Provisions in product standards can help to prevent pollution. Prevention of pollution can take many forms and can be incorporated in 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.

It also includes the promotion of the hierarchical approach to the prevention of pollution, which means giving preference to preventing pollution at its source, arriving at a waste and emission-free production by source reduction or elimination (including environmentally sound design and development, material substitution, changes in process, product or technology and efficient use or conservation of energy and material resources).

Additionally, the following options for prevention of pollution should be considered:

— internal reuse or recycling (reuse or recycling of materials within the process or facility);

— external reuse or recycling (transfer of materials offsite for reuse or recycling); or

— recovery and treatment (energy recovery from waste streams on or offsite, treatment of emissions, and releases of wastes on- or offsite to reduce their environmental impacts).

3.2.4 Prevention and minimization of environmental risks

3.2.4.1 Principle

Standards writers should consider the need to reduce risks to the environment taking into account the consequences and the likelihood of incidents and accidents.

3.2.4.2 Explanation

In the context of this Guide, risk is measured in terms of a combination of the likelihood or probability of an event (incident or accident) and its consequences.

The identification of harmful effects to the environment in product manufacturing, use and disposal should be followed by initiatives to prevent incidents and accidents and to minimize consequences for the environment, including human health.

Prevention and minimization of environmental risks relates to identifying potential variations from what is planned or desired, and managing these risks to improve decisions and outcomes. Principles and techniques applied by an organization for prevention and minimization of risks can give valuable inputs on measures to prevent and minimize risks connected to the application of product standards.

When developing product standards, prevention and minimization of environmental risks should be addressed in line with other environmental aspects.

This includes, for example:

— the reduction of risks to human health related to non-occupational incidents and accidents;

— the reduction or avoidance of the use of hazardous substances, either as a component in the product or as a facilitator or catalyst in its production;

— the identification and the proper management of unavoidable process-related risk; or

— the potential for the controlled or uncontrolled release of hazardous material during use or disassembly.

3.2.5 Precautionary principle

3.2.5.1 Principle

Standards writers should take into account the precautionary principle when developing provisions in standards.

3.2.5.2 Explanation

Where there are substantiated threats of serious or irreversible damage to the environment or human health, lack of full scientific certainty should not be used as a reason for postponing the inclusion of an environmental provision in a standard, when it is possible.

In essence, the precautionary principle provides a rationale for taking preventive action against a practice or substance in the absence of scientific certainty, rather than continuing the suspect practice while it is under study, or without study.

Instead of asking what level of harm is acceptable, a precautionary approach asks the following questions:

— How much contamination can be avoided?

— What are the alternatives to this product or activity, and are they safer?

— Is this product or activity even necessary?

The precautionary principle focuses on options and solutions, rather than on risk.

3.3 Approaches

3.3.1 Product design

3.3.1.1 Approach

Standards writers should as much as possible take into account environmental aspects of product design, as product design is the strongest tool for avoiding potential environmental impacts at all stages of the product life-cycle.

3.3.1.2 Explanation

There are several approaches to product design that consider elements of resource conservation and prevention of pollution (see 3.2). These are applied in various product sectors. When developing product standards, standards writers should be aware of these approaches, e.g. Design for Environment (DFE).

NOTE The integration of environmental aspects into product design and development can also be termed Environmentally Conscious Design (ECD), eco-design, the environmental part of product stewardship, etc.

Considerations involve

— material selection,

— material and energy efficiency,

— materials reuse, recycling and recovery,

— production,

— product use and maintenance, and

— end-of-life treatment.

Attention is drawn to ISO/TR 14062, which provides information on the integration of environmental aspects into the product design process; this can be used as guidance for application in standardization.

3.3.2 Use of products

3.3.2.1 Approach

Standards writers should consider the potential requirements for maintenance and for the product's application in use, as well as its unintended use and their influence on the environment.

3.3.2.2 Explanation

Water consumption or energy use during the “use stage” of an appliance may generate the greatest environmental impacts in the product's life. For many appliances using water und energy, the environmental impacts of the use stage predominate. Setting provisions for the efficiency of water or energy use as part of product standardization can reduce the environmental impacts of these products, but often improvements are not without bias.

3.3.3 Environmental product information exchange

3.3.3.1 Approach

Standards writers should contribute to ensuring an exchange of environmental information relevant within the scope of the standard.

3.3.3.2 Explanation

Communication to customers (private or professional) on the intended use of a product increasingly includes information on environmental aspects as well. The International Standards ISO 14020, ISO 14021, ISO 14024 and 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.

In product standards writing, there are various national and international standards to be aware of for communication on environmental product features.

4 Environmental aspects to be considered for systematically addressing environmental issues in product standards

4.1 General considerations

In order to determine how the product environmental aspects should be identified by the writers of products standards, it is necessary to understand how the product interacts with the environment during its life-cycle. Examples of product environmental aspects include

— emissions to air,

— discharges to water and soil,

— use of raw materials,

— energy and water consumption, and

— land use.

For each identified product environmental aspect, there are product environmental impacts. Environmental aspects are connected to impacts through a cause and effect relationship. Examples of environmental impacts that can be positively or negatively influenced by provisions in product standards include

a) climate change (through the emission of greenhouse gases),

b) air pollution (through uncontrolled/untreated or accidental emissions of particulates and toxic gases to air), and

c) depletion of non-renewable resources (consumption of fossil fuels, minerals).

In order to adequately consider environmental issues, writers of product standards should develop an understanding for the relevant environmental aspects of the product under consideration. Guidance on a recommended approach is provided in Clause 5.

A product's environmental impacts are related to the inputs that are used and consumed, the processes employed and the outputs that are generated at all stages of the product life-cycle. These can be influenced beneficially by applying the basic principles and approaches described in Clause 3.

All the product environmental aspects outlined in this clause also apply to services. In some services, life-cycle thinking cannot be applied directly.

4.2 Inputs

4.2.1 General

Inputs include the use of resources that can be natural materials (e.g. minerals, water, gas, oil, coal, wood), those from the industrial environment (e.g. recycled materials, co-products, intermediate products, energy), or from land use.

For practical reasons, these different resources can be broadly categorised into “materials”, “water”, “energy” and “land use”.

4.2.2 Materials

Material inputs play an important role in all stages of the life-cycle, from raw material extraction to final disposal. They can produce a variety of environmental impacts. These impacts can include depletion of resources, detrimental land use, and environmental or human exposure to hazardous materials. Material inputs also contribute to the generation of waste, emissions to air and discharges to soil and water.

4.2.3 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 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.

The preservation of natural habitats and biodiversity is also important in oceans, lakes and rivers. Water pollution, river straightening and conversion of coastal regions can destroy the natural water flora and fauna.

NOTE Nitrate and phosphorus pollution (e.g. because of over-fertilization in landlocked countries) can produce eutrophication in water bodies, which endangers organisms in the affected area.

4.2.4 Energy

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

4.2.5 Land

Taking land into use can lead to a decrease in biodiversity and can affect the soil quality, which takes a long time to rebuild itself. Even if efforts are made to replant the spoiled area, the natural balance and flow of the ecosystem may take a prolonged period, or may never return to a normal level.

4.3 Outputs

4.3.1 General

Outputs generated during a product life-cycle generally comprise intermediates and co-products, emissions to air, discharges to water and soil, waste materials and other releases.

4.3.2 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 1 Uncontrolled releases can be leaks, vaporization or those arising from accidents.

NOTE 2 Climate change is caused by greenhouse gases. The greenhouse gases that contribute most to climate change are carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

4.3.3 Discharges to water

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.

NOTE Uncontrolled releases can be leaks or those arising from accidents.

4.3.4 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.

NOTE Uncontrolled releases can be leaks or those arising from accidents.

4.3.5 Waste

Waste materials and products can be classified in the following broad categories:

— those which are sent to final disposal, e.g. incineration without energy recovery or land filling;

— those which are collected after use and may be suitable for recovery including recycling;

— those which arise within a production process and are not subject to further processing or use before collection.

The existence of regional or national regulations may have a bearing on the subsequent treatment of waste products and materials.

4.3.6 Intermediate and co-products

Other outputs should be considered, e.g. recovered energy from waste (high heat value waste), recycled materials, by-products and recycled water.

4.3.7 Other Releases

Other releases include noise and vibration, radiation and heat.

4.4 Other relevant issues

4.4.1 Risks to the environment from accidents or unintended use

There are many kinds of environmental impacts that may occur during a product life-cycle, which result from explosions, collisions, dropping a container and other incidents.

Environmental impacts also arise from deliberate or accidental misuse when, for example, the product is not used in accordance with instructions or its intended use, e.g.

— exceeding the recommended dose of agrochemicals, which might cause contamination of soil and water;

— risks related to leaking chemicals from accidents involving transportation vehicles;

— energy losses due to misuse of refrigerators, air conditioners, etc.

4.4.2 Customer information

Reliable, understandable, comparable and true information can inform customers about the significant environmental aspects of a product. If relevant, requirements regarding this information should be given in the standard, e.g. which information is necessary (classification and content/release of hazardous substances, energy efficiency, etc.). If relevant, regulatory requirements concerning the format of this information need to be considered.

The information should be easily available before purchase.

NOTE ISO 14021, ISO 14024 and ISO 14025 contain requirements for environmental labels and declarations. These standards could also be referenced in sections on consumer information in standards.

5 Identifying product environmental aspects using a systematic approach

5.1 General

Writers of product standards should, on the basis of life-cycle thinking, establish a procedure for systematically assessing relevant product environmental aspects.

A helpful tool for achieving this task is the environmental checklist, which is based on the availability of environmental information, product and environmental expertise and the application of the life-cycle thinking approach.

The completed checklist permits the identification of the product life-cycle stages at which relevant environmental aspects are found, and where provisions could be included in the product standard.

The checklist can also be used to check whether a published standard should be revised or not, notably if there are environmental reasons to revise a standard.

5.2 Collecting data for the identification of product environmental aspects and impacts

Identification of environmental aspects and impacts related to a product life-cycle and how a product standard can influence them is complex and may need consultation with environmental experts. As far as possible, existing environmental information should be used for identifying and evaluating product environmental aspects and impacts.

Sources of useful information are (in order of preference):

a) relevant sector guides (see Annex A);

b) life-cycle assessment (LCA) studies: LCA conforming to ISO 14040 and ISO 14044 should be applied;

NOTE 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,
- by evaluating the potential environmental impacts associated with those inputs and outputs, and
- by interpreting correctly the results of the inventory and impact assessment phases in relation to the objectives of the study.

c) environmental impact or risk studies, technical data reports, published environmental analyses or studies, or lists of toxic substances related to the product; relevant monitoring data;

d) product specifications, product development data, Material/Chemical Safety Data Sheets (M/CSDS), or energy and material balance data; Environmental Product Declarations;

e) environmental and other related legal requirements;

f) specific environmental codes of practice, national and international policies, guidelines and programmes;

g) reports on emergency situations and accidents.

5.3 Environmental checklist

The environmental checklist (see Table 1) should be completed, updated as appropriate and attached to drafts during all stages of the development of a standard. The matrix provided in Table 1 is particularly suitable to product standards. In some cases, e.g. for services, or to accommodate regional or sector specific issues, other tools or another form of checklist may be more appropriate. For example, the life-cycle stages may be modified to better reflect the typical steps of providing services. In other cases, where one product is described by a whole series of standards covering the whole life-cycle, it can be more appropriate to complete the checklist not for each single standard, but for the whole series.

The purpose of the environmental checklist is to explain whether the proposal covers relevant product environmental aspects and, if so, how they are dealt with in the draft. The standard will be published without the environmental checklist.

The following information should be given on the checklist:

- document number (if available),
- title of standard,
- technical committee (TC)/subcommittee (SC)/ working group (WG) number,
- work item number (if available),
- version of the environmental checklist, and
- date of last modification of the environmental checklist.

The matrix should be completed as indicated below, encouraging the involvement of the TC members and taking into account the data collected (see 5.2).

a) Identify each environmental aspect relevant to the product.

b) Fill in each box with “yes”, if there is a significant product environmental aspect, or “no”, if there is no significant product environmental aspect or if the box is not relevant.

c) For each box with a “yes”, identify whether this product environmental aspect can be addressed in the standard. Mark these boxes with three asterisks (***).

d) Write the numbers of the clauses in the standard where the product environmental aspects are addressed, in the appropriate boxes.

e) Use a separate box (“Comments”) to provide any additional information. A short description of each product environmental aspect (boxes marked with “yes”) and how they are addressed (or why they are not) can be given here. Furthermore, environmentally related comments on the draft standard and the TC reply to these comments may be included here.

f) When assessing various environmental aspects during the life-cycle of a product, it needs to be borne in mind that environmental burden should not be shifted from one life-cycle stage to another, or from one medium to another.

Table 1 — Environmental checklist

Document number (if available)**:**	**Title of standard:**	**TC/SC/WG number:**
Work item number (if available)**:**	**Version of the environmental checklist:**	**Date of last modification of the environmental checklist:**

Environmental issue	Stage of the life-cycle										All stages
	Acquisition		Production		Use			End-of-life			
	Raw materials and energy	Premanu-factured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ material and energy recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials											
Water											
Energy											
Land											
Outputs											
Emissions to air											
Discharges to water											
Discharges to soil											
Waste											
Noise, vibration, radiation, heat											
Other relevant aspects											
Risk to the environment from accidents or unintended use											
Customer information											
Comments:											

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life-cycle, is included in the stage of transportation.

NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as a separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

5.4 Relation between the environmental checklist and the drafting guidance

When significant product environmental aspects have been identified using the environmental checklist, environmental provisions can be drafted for each of these aspects. Clause 6 contains specific guidance that can be correlated to the checklist, using the matrix below (see Table 2).

Table 2 — Drafting guidance for different stages of the life-cycle

	Stage of the life-cycle										All stages
	Acquisition		Production		Use			End-of-life			
	Raw materials and energy	Premanu-factured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ material and energy recovery	Incineration without energy recovery	Deposition	Transportation
Sub-clause	6.2	6.2	6.3	6.3	6.4.2	6.4.3	6.4.4	6.5	6.5	6.5	6.6

6 Guidance for integrating environmental provisions in the product standard

6.1 General

In a standard, environmental provisions should help to minimize potential adverse environmental impacts during the different stages of the life-cycle of a product, as far as is compatible with requirements on fitness for purpose and other criteria, based on life-cycle thinking.

Tables 3 to 10 give examples of possible recommendations for each stage of the life-cycle that should be reflected in environmental provisions, including limitations and examples of possible choices to be made, based on life-cycle thinking. Depending on the nature of the relevant environmental impacts and the scope of the standard, standards writers should decide if such provisions need to be included in standards as requirements, recommendations or statements.

Examples of provisions from existing standards relating to some or all stages of the life-cycle are included in Annex B.

6.2 Acquisition

Table 3 gives recommendations that should be reflected in environmental provisions related to the selection and acquisition of raw materials, including energy, and the acquisition of pre-manufactured materials and components, together with considerations due to limitations and possible decision conflicts.

Table 3 — Acquisition of raw material, pre-manufactured material and components

Recommendations for provisions in standards	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 when, for packaging, 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 (see also 4.1).
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, as well as 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 use 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.

6.3 Production

Tables 4 and 5 give recommendations that should be reflected in environmental provisions in product manufacturing and packaging, together with considerations due to limitations and possible decision conflicts.

Table 4 — Manufacturing

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	Such a provision could prevent the use of waste as ancillary material, e.g. in the steel or cement industry.
Specifying surface treatment with minimum pollution when applied, e.g. prefer water-based coatings to solvent-based ones	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.
Referring to and using product tests which minimize environmental impacts	No known limitations or decision conflicts/No example provided.

Table 5 — Packaging

Recommendations for provisions in standards	Examples of choices and limitations
Minimizing damage, loss and spoilage by use of appropriate types of packaging	This may require packaging material which requires much raw material and energy and/or is difficult to recycle.
Reusing or recycling packaging material	Choices should be made when much effort is required in the collection and taking back of used packaging for reuse or recycling, or when much energy or fossil fuel is used for recycling.

6.4 Use of the product

6.4.1 General

This stage of the life-cycle is sometimes the most energy-intensive one. Although the standards writer cannot control the use of the product, environmental provisions can significantly affect the environmental impacts of the product during its use stage. These provisions include

— provisions which minimize the adverse environmental impacts during the normal use (see 6.4.2);

— provisions which contribute to a higher lifetime of the product and minimize the adverse environmental impacts during maintenance and repair (see 6.4.3); and

— provisions related to the use of additional products (see 6.4.4).

6.4.2 Normal use

Table 6 gives recommendations that should be reflected in environmental provisions in a standard, related to normal use, together with considerations due to limitations and possible decision conflicts.

Table 6 — Normal use

Recommendations for provisions in standards	Examples of choices and limitations
Removal of the stand-by function, option for disconnection from the power supply (by switch) or reduction of the stand-by electricity consumption	Choices should be made based upon functionality and emergency issues.
Informative labels on the product to use in an optimally energy-efficient manner	Choices concern the amount of information disclosed, without overloading the label.
Minimizing the overall use of energy and the emission of greenhouse gases during use	No known limitations or decision conflicts/No example provided.
Minimizing the start-up time of the product	Choices should be made based on functionality, e.g. warm-up functions.
Improving insulation to reduce heat loss	Quantity of insulation material, whose production has environmental impacts, needs to be optimized.
Use light-weight components, e.g. for vehicles and moving machine parts	Decision conflict surrounding energy use for the production of lightweight metals and recycling issue surrounding plastics and composite materials.
Minimizing the use of water during the use stage, which could be achieved by either reducing the overall water consumption or by reusing water; the standardized water consumption class should be indicated in the user guide	Decision conflict may occur when water savings can only be achieved by the additional use of chemicals or energy.
Minimizing the amount of waste generated by the product during use	No known limitations or decision conflicts/No example provided.
Ensuring that hazardous substances are not set free, taking into account all possible release scenarios (emissions into air, indoor air and discharges to soil and water)	Minimization of use of hazardous materials without loss of functionality, and the provision of suitable guidance on the use and disposal of the product.
Minimizing the level of noise from the product during use; the standardized noise class should be indicated on the product or in the user guide	A decision should be made regarding the thickness of insulation layers and the environmental impacts of insulation materials.
Giving guidance on the instructions for use, e.g. the product user guide should provide advice to minimize risks of unintended use and adverse environmental impacts	No known limitations or decision conflicts/No example provided.

6.4.3 Durability, maintenance and repair of the product

Table 7 gives recommendations that should be reflected in environmental provisions in a standard, related to durability of the product, maintenance and repair, together with considerations due to limitations and possible decision conflicts.

Table 7 — 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. Cr (VI).
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.
Including 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.

6.4.4 Use of additional products

Table 8 gives recommendations that should be reflected in environmental provisions in a standard, related to the use of additional products, together with considerations due to limitations and possible decision conflicts.

NOTE Examples of additional products include detergent for washing machines or filter bags for coffee machines.

Table 8 — Use of additional products

Recommendations for provisions in standards	Examples of choices and limitations
Specification of those additional products	No known limitations or decision conflicts/No example provided.
Enclosing instructions to use a minimum of additional products	No known limitations or decision conflicts/No example provided.
Encouraging minimization in the use of water and promoting its recycling, where applicable	No known limitations or decision conflicts/No example provided.
Making the additional products reusable or recyclable, refillable and biodegradable	No known limitations or decision conflicts/No example provided.
Minimizing the use of single-use components, unless environmentally beneficial	No known limitations or decision conflicts/No example provided.
Using standard components and products (e.g. power supplies, connectors) as additional products	No known limitations or decision conflicts/No example provided.

6.5 End-of-life

At the end of its life, a product can either be reused/recovered or disposed of (after treatment, whenever necessary), possibly after dismantling and further processes. The best environmental option at this step of the life-cycle depends on many factors, including the available local waste management infrastructure, the nature/importance and biodegradability of the waste stream and, last but not least, the design options initially selected for the product. The focus on this end-of-life stage should never jeopardize the environmental optimization of the product from a whole life-cycle perspective.

Table 9 gives recommendations that should be reflected in environmental provisions in a standard, related to the end-of-life operations of products, together with considerations due to limitations and possible decision conflicts.

Table 9 — End-of-life

Recommendations for provisions in standards	Examples of choices and limitations
Marking of different components to make them easy to sort	Only advisable for large components which usually undergo dismantling.
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.
Ensuring a high rate of collection	Only for small products which are fabricated in large series (cans, batteries, etc.).
Minimizing the number of different materials used	Separation techniques to be considered (magnetic sorting, electromagnetic sorting, etc.).
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.
Ensuring a simple dismantling or sorting of hazardous and of valuable substances or materials	No known limitations or decision conflicts/No example provided.
Avoiding, as far as not functionally indispensable, the use of persistent hazardous substances	No known limitations or decision conflicts/No example provided.
Providing instructions and/or use labels, aimed at end users, for the appropriate end-of-life operations, differentiating hazardous and non-hazardous waste	No known limitations or decision conflicts/No example provided.
Reusing or recycling packaging material	No known limitations or decision conflicts/No example provided.

6.6 Transportation

Product standards can hardly list provisions for the organization of the logistic chain, but the design of products can have a significant influence on the environmental impacts of transportation at any stage of the life-cycle. Design of the product can help to make savings in the use of raw materials and energy, in a way that ensures its efficient distribution, taking into account transport distances between the different sites of the production chain, from manufacturer to distributor/retailer/user and the sites involved in the end-of-life operations.

Various factors that influence the environmental aspects of packaging and distribution are given in Table 10.

Table 10 — Transportation

Recommendations for provisions in standards	Examples of choices and limitations
Designing the product to save energy in transporting it	No known limitations or decision conflicts/No example provided.
Saving needs of transportation, e.g. for maintenance and repair, for the acquisition of additional products or to end-of-life treatment/disposal and reuse/recycling/recovery methods	No known limitations or decision conflicts/No example provided.
Selecting appropriate transportation mode (road/rail/water/air)	No known limitations or decision conflicts/No example provided.
Minimizing losses and damages by use of appropriate transport packaging	No known limitations or decision conflicts/No example provided.
Using packaging with maximum efficiency (weight, volume, load/transportation unit, reusability, recoverability)	No known limitations or decision conflicts/No example provided.
Saving raw materials, pre-manufactured materials and components relating to transportation	No known limitations or decision conflicts/No example provided.
Ensuring appropriate labelling on product, packaging and transportation unit	No known limitations or decision conflicts/No example provided.

Annex A
(informative)

Developing environmental sector guides

A.1 General

For some sectors, it might be useful to develop an environmental sector guide that goes beyond the information given in this Guide. Such a sector guide could focus on sector-specific environmental issues and could give additional and more detailed information to the standards writer, e.g. by using sector-specific examples on how to address environmental issues in standards of the respective sector.

NOTE Sector guides already exist within CEN for aluminium and welding, and within ISO for plastics (see Bibliography). More sector guides have been developed by CEN sectors for gas infrastructure, gas utilization, healthcare and pressure equipment. These are freely accessible via the website of the CEN Environmental Helpdesk (CEN/EHD): http://www.cen.eu/sh/ehd.

Typically, a sector guide is drawn up by a group of experts with environmental and technical expertise in a specific sector, together with representatives of sector-specific consumer organizations, non-governmental organizations (NGOs) or other groups.

It is recommended that sector guides should be applied as stand-alone documents. However, they should be in line with the principles, approaches and recommendations outlined in this Guide. Moreover, it might be useful to keep to the same structure presented in this Guide, and to include relevant contents in addition to the sector-specific guidance.

The following specific recommendations for the development of sector guides are structured in the same way as in the main body of this Guide, in order to ensure compatibility with this Guide, and with the aim of improving the usability of the sector guide.

A.2 Recommendations for introduction, scope, references and definitions

For sector guides, the introductory text below may be appropriate.

“This document is a guide to assess environmental issues of standards within the sector. The aim is to provide a helpful tool for persons involved in standardization who are not necessarily environmental experts. This environmental sector guide can be used by the Technical Committees (TC) and Working Groups (WG) within the sector as a tool to take into account the potential environmental aspects related to their standards.”

Further text should be provided with information on the sector and the sector environmental group, if applicable.

Scope, references and definitions should be in line with this Guide. Additional text, e.g. sector-specific references or definitions, could be added.

A.3 Recommendations regarding basic principles and approaches

The basic principles and approaches also apply for environmental sector guides. Additional guidance on the principles and approaches and on their relevance for the standards writer could be given. Furthermore, consideration could be given to the concretization of the recommendations with regard to the sector, or to the addition of further recommendations.

A.4 Recommendations regarding environmental aspects

A.4.1 General

In order to identify the main environmental issues, it is essential in sector guides to describe more purposively and precisely the major environmental aspects of the sector. In this context, it is advisable to use examples from the specific sector.

In this section, it should be specified which provisions in the product standard will most likely influence the environmental impact of the product. Examples will often be a valuable help.

A.4.2 Inputs

A.4.2.1 Materials

If there is a significant use of materials or if substances of environmental concern are typically used in the sector, this should carefully be described in a sector guide. In addition, if there is a potential for the use of recycled materials, this should be considered.

A.4.2.2 Water

If the products within the sector have significant water consumption during any or all life-cycle stages, the sector guide should address the issue and how it can be dealt with.

A.4.2.3 Energy

Energy is often a significant environmental aspect that can be dealt with in standards. For instance, if the products within the sector have significant electricity consumption during use, the sector guide should address the issue and how it can be dealt with. One example is to establish classes of energy demand to allow easy comparison between products.

A.4.2.4 Land use

If there is an intensive land use in any or all of the stages of the product life-cycle, the sector guide should address the issue and how it can be dealt with, always regarding best practices in land reclamation.

A.4.3 Outputs

A.4.3.1 Emissions to air and discharges to soil and water

Especially if there are any emissions or discharges during the use of the product, the issue should be dealt with in the sector guide. The sector guide can give examples on how to minimize emissions and discharges from the products. Another possibility is to establish classes for different levels of emissions and discharges to allow easy comparison between products.

A.4.3.2 Waste

If there is a significant amount of waste generated during the life-cycle of products in a sector, examples on how to minimize or recycle waste should be given in the sector guide, e.g. the possibilities of recycling/energy recovery of the materials (including the need to specify provisions that allow for easy disassembly of the product after end use) and the potential environmental risks during recycling, energy recovery or end disposal.

A.4.3.3 Other releases

In addition to the above, other releases, e.g. noise, radiation, could be relevant for a certain sector and should be addressed accordingly.

A.5 Recommendations regarding figures

It is recommended to use figures in sector guides to visualize, for example, the life-cycle of the products in the specific sector, its environmental aspects and their interdependence. The environmental checklist (see 5.3) is one example of how to provide an overview of the environmental aspects of a product and/or the product standard.

A.6 Recommendations regarding the identification of product environmental aspects using a systematic approach

The environmental checklist is a helpful tool for addressing environmental issues in a systematic way, and it should therefore also be recommended in environmental sector guides. It may be modified to accommodate sector-specific issues, e.g. further relevant sub-stages or environmental aspects could be added. An example of a completed checklist could be given in the sector guide.

However, for some sectors, services or product groups, the checklist might not be appropriate, and in some cases, different tools or approaches already exist. In these cases, these alternative tools could be introduced and described in detail in a sector guide.

Furthermore, additional and sector-specific sources of information should explicitly be mentioned in the sector guide.

For accurate identification and assessment of environmental aspects and impacts, it could be useful to consult an environmental expert for the development of the sector guide.

A.7 Recommendations regarding guidance for including environmental provisions in the product standard

In sector guides, consideration should be given to the inclusion of sector-specific recommendations, limitations and examples for including environmental provisions in standards.

Annex B
(informative)

Examples for including environmental provisions in standards

B.1 Examples relating to the stage of acquisition

B.1.1 Use of non-virgin materials for plastic pipes

B.1.1.1 Description of the issue

For plastic pipes, the use of non-virgin materials, e.g. recycled plastics, is often restricted. CEN/TS 14541 contains explicit horizontal requirements for non-virgin materials of PE, PP and PVC-U that allow using them under certain conditions, so these materials are not excluded as such, but need to fulfil very clear requirements.

B.1.1.2 Example taken from CEN/TS 14541:2007 on the utilization of non-virgin PVC-U, PP and PE materials for plastics pipes (non-pressure applications)

"***4.2 External reprocessable and recyclable materials with agreed specification***

External reprocessable and recyclable materials with an agreed specification that are available in relevant quantities and time intervals shall be permitted to be added to virgin or own reprocessable material or a mixture of those two materials for the production of pipes, provided all the following conditions are met.

— *Specification for each material shall be agreed between the supplier of external reprocessable or recyclable material and the product manufacturer. It shall at least cover the characteristics given in Table 1, Table 2 and Table 3 for PVC-U, PP and PE. Other characteristics are specified in EN 15346 for PVC, EN 15345 for PP and EN 15344 for PE.*

When determined in accordance with the test methods given in Table 1, Table 2 and Table 3 for PVC-U, PP and PE, the actual values from these characteristics shall conform to the agreed value.

— *Each delivery shall be covered by a certificate according to 3.1 of EN 10204:2004 showing conformity to the agreed specification made by either the material supplier or the product manufacturer as agreed between the parties.*

NOTE The quality plan of the supplier of external reprocessable or recyclable material should conform to ISO 9001:2000.

— *Maximum quantity of external reprocessable and recyclable material that is intended to be added shall be specified by the product manufacturer.*

— *Quantity of external reprocessable and recyclable material that is actually added in each production series shall be recorded by the product manufacturer.*

— *Material characteristics of the end product shall conform to the requirements specified in the relevant product standard.*

— *Type testing shall be carried out on the end product with the maximum specified amount and with each form of external reprocessable or recyclable material with an agreed specification. Approved results shall be taken as also proving conformity for components containing lower levels of external or recyclable material.*"

B.1.2 End-of-life considerations in the acquisition stage

B.1.2.1 Description of the issue

A good example for life-cycle thinking in relation to standards is to consider the end-of-life stage when specifying materials (acquisition stage). In EN 15312 on multi-sports equipment, this issue is solved in a subclause on general requirements for materials, which also contains requirements regarding environmental issues.

B.1.2.2 Example taken from EN 15312:2007 on free access multi-sports equipment

"***4.1 Materials***

(…)

When choosing a material or substance for equipment, consideration should be given to the eventual disposal of the material or substance having regard to any possible environmental toxic hazard. Special attention should be given to potential toxic hazards of surface coatings."

B.2 Examples relating to the stage of production

B.2.1 Reducing environmental impacts of product testing

B.2.1.1 Description of the issue

Many product standards require the products to be tested in a certain manner before being placed on the market. Some of these tests, especially destructive tests, have significant environmental impacts, e.g. the generation of emissions. Standards can help to reduce these impacts.

B.2.1.2 Example taken from EN 14180:2003 on sterilizers for medical purposes

"***Annex A Test methods***

(…)

NOTE 1 By performing tests simultaneously, as described by the following test methods, the total number of tests and test equipment disposals is reduced. As a result the burden on the environment can be reduced (see also Annex F)."

B.2.1.3 Example taken from IRAM 3543:2005 on fire extinguishers and tests regarding their extinction potential

"4 Generalities

(…)

WARNING —These tests convey a certain risk and involve substances than can be harmful to health and the environment. Precautions must be taken to protect employees and the environment, taking into account the final deposition of both the used products and the waste generated.

4.6 Test sites

(…)

NOTE It is advisable to have a gas capture and wash system during the test, in order to prevent pollution of the environment."

B.2.2 Environmental impacts of packaging material

B.2.2.1 Description of the issue

Many product standards contain the requirement to use a certain type of (primary) packaging for the product. However, standards should also cover environmental aspects of primary packaging, e.g. the disposal.

B.2.2.2 Example taken from ISO 16201:2006 on certain technical aids for disabled persons

"4 General requirements

4.2 Information supplied by the manufacturer

4.2.3 Labelling

On the product/packaging/instructions as appropriate, based on the safe use of environmental control systems and/or individual device in the system the labelling shall contain at least the following information:

(…)

g) guidance on how to dispose of packaging materials in an environmentally sound manner;

(…)"

B.2.3 Hazardous substances in recycled materials

B.2.3.1 Description of the issue

The use of recycled materials is relatively widespread in the domestic construction sector, but environmental impacts caused by hazardous substances in recycled materials should be considered.

B.2.3.2 Example taken from JIS A 5731:2002 on inspection chambers and covers for rainwater made from recycled plastics

"***7.1 Recycled plastics***

In case of use of recycled plastics, they, by judging from their past records, shall be free of components and contaminants (e.g. adhering matters) containing hazardous amounts of matter that would adversely affect the human body or the environment. If the records are not available, a test shall confirm that they are not hazardous to the human body or the environment at the time they are used. The items to be tested and methods of the test shall be subject to mutual agreement between the parties concerned with the delivery.

7.2 Auxiliary material

(…)

The auxiliary material such as extenders, reinforcing agents, additives and so on shall not contain hazardous amounts of matter that would adversely affect the quality of the products or the environment."

B.2.4 Enhancing recyclability

B.2.4.1 Description of the issue

In order to enhance the recyclability of equipment, it is essential to properly incorporate recyclability considerations into product design or the early production phase. This leads to a harmonized way of estimating recyclability of a product, which generally reflects a real situation of end-of-life chains in a society, yet providing designers with a good estimate available at an early stage of production.

B.2.4.2 Example taken from JIS C 9911:2007 on calculating and displaying recycling/ reuse indicators for electrical or electronic equipment

"***1 Scope***

This standard specifies the calculation and display method of an index to be utilized at the design and development phase of electrical and electronic equipment and parts regarding the rate of recycled resources, in order to evaluate the result of the measures for the effective use of the resources in the design/development stages of the equipment."

B.3 Examples relating to the stage of use

B.3.1 Environmental precautions within chemical laboratories

B.3.1.1 Description of the issue

European standards relating to chemicals that are used for treatment of water intended for human consumption also include requirements for analytical methods for these substances. Some of those standards also contain an informative annex which provides information on environmental, health and safety precautions within chemical laboratories. Similar recommendations should also be included in other product standards that include testing methods involving chemicals with environmental impacts.

B.3.1.2 Example taken from EN 15039:2006 on certain chemicals used for treatment of water intended for human consumption

"***Annex C Environmental, health and safety precautions within chemical laboratory***

(…)

The following list is not exhaustive but users of analytical methods referred to in this document may use it as a guide to the safe and proper techniques. They should:

— *investigate if European Directives, transposed European Legislation and national laws, regulations and administrative provisions apply;*

— *consult manufacturers/suppliers for specific details such as material safety data sheets and other recommendations;*

(…)

— *be careful about flammable materials and substances that are toxic and/or human carcinogens and generally take care during transportation, decanting, diluting, and dealing with spillages;*

— *store, handle and dispose of chemicals in a safe and environmentally satisfactory manner: including chemicals for laboratory test, test specimens, unused solvents and reagents that have been disposed of.*"

B.3.2 Maintenance and repair

B.3.2.1 Description of the issue

Generally speaking, the useful life of a product can be extended by regularly maintaining the product. Especially for products that are not subject to fast cycles of innovation, an extension of the useful life of a product is mostly connected with reduced environmental impacts. Easy reparability and maintainability can therefore reduce the environmental impacts of a product.

In addition, processes associated with or products used for maintenance and repair can have a significant environmental impact. Standards can address this by also including provisions for this particular stage of the life cycle.

B.3.2.2 Example taken from ISO 16201:2006 on certain technical aids for disabled persons

"***4 General requirements***

4.2 Information supplied by the manufacturer

4.2.1 General

At least the following information shall be given in an unambiguous and understandable way and in the official languages of countries in which the environmental control system or devices comprising such a system are marketed:

(…)

j) detailed information on the replaceability of components.

(…)

4.2.2 Instructions for use

The instructions shall contain at least the following information:

(…)

d) details of the nature and frequency of the maintenance and calibration needed."

B.3.2.3 Example taken from IRAM 2400:2003 on the maintenance of mineral electrical insulating oils in service

"13 Hygiene and Environmental Protection Measures

(…)

NOTE In the case of change or treatment of the oil, it is recommended to users and proprietors of transformers or equipment that contains insulating mineral oil, to determine the content of PCB (polychlorinated biphenyls) preventively, in order to respect the effective legal dispositions."

B.3.3 Reducing the environmental impacts related to additional products

B.3.3.1 Description of the issue

In many cases, the use of a certain product also requires the use of additional products, e.g. water. Apart from the inherent environmental aspects of those additional products, a major aspect is always the amount of additional products used. In particular, this aspect could be reduced by including in the standard recommendations for the user. On the other hand, the use of additional products might be needed to reduce other environmental aspects of the product itself.

B.3.3.2 Example taken from EN 14180:2003 on sterilizers for medical purposes

"***4.2 Design and construction***

4.2.3 Evacuation systems

4.2.3.1 *Sterilizers shall be provided with a vacuum system to remove air, water and sterilant.(…)*

NOTE Vacuum systems mostly operate by means of water. Attention should be paid to optimize the use of water in such systems as there could be a balance between the use of resources and diluting of formaldehyde into concentrations harmless to environment (see also Annex F)."

B.4 Examples relating to the stage of end-of-life

B.4.1 Choosing the appropriate end-of-life option

B.4.1.1 Description of the issue

A series of European Standards on recycled plastics (EN 15342, EN 15343, EN 15344, EN 15345, EN 15346 and EN 15347) from different materials contains an introduction that points out the importance of life-cycle thinking when deciding which end-of-life option to choose.

B.4.1.2 Example taken from a series of standards on recycled plastics (EN 15342:2007, EN 15343:2007, EN 15344:2007, EN 15345:2007, EN 15346:2007 and EN 15347:2007)

"***Introduction***

Recycling of plastics waste is a material recovery process intended to save resources (virgin raw materials, water, energy), while minimizing harmful emissions into air, water and soil as well as their impacts on human health. The environmental impact of recycling has to be assessed over the whole life-cycle of the recycling system (from the waste generation point to the disposal of final residues). To ensure that recycling constitutes the best environmental option for treating the available waste, some prerequisites should preferably be met:

— *the recycling scheme being contemplated should generate lower environmental impacts than alternative recovery options*

— *existing or potential market outlets should be identified that will secure a sustainable industrial recycling operation*

— *the collection and sorting schemes should be properly designed to deliver recyclable plastics waste fractions fitting reasonably well with the available recycling technologies and with the (changing) needs of the identified market outlets, preferably at minimum costs for society.*"

B.4.2 Requirements regarding disposal

B.4.2.1 Description of the issue

To cover the full life-cycle of a product, product standards should also contain recommendations regarding the disposal. These recommendations should typically include how the product is to be disposed of, and by whom.

B.4.2.2 Example taken from IEC 60836:2005 on specifications for unused silicone insulating liquids for electrotechnical purposes

"***4.2 Requirements regarding health, safety, environment (HSE)***

4.2.2 Disposal

Local regulations shall be complied with. The preferred means of disposal is recycling by a qualified contractor. Waste liquid may be incinerated. Spillages should be cleaned using adsorbent media. (…)"

B.4.3 Asking users for their cooperation in promoting recycling

B.4.3.1 Description of the issue

The most crucial factor in promoting recycling of battery cells is the participation of users through appropriate handling in the use stage. This leads to a requirement for the manufacturers to include a clear description of this issue in user's manuals or labels.

B.4.3.2 Example taken from JIS C 8705:2006 on sealed nickel-cadmium rechargeable batteries

"***11 The caution for handling***

(…)

i) The cooperation request shall be indicated (in manuals, labels or other appropriate manners) for promoting effective utilization of the battery cell after use as renewable resource."

B.5 Examples relating to all stage of the life-cycle

B.5.1 Collecting environmental issues in one horizontal clause

B.5.1.1 Description of the issue

In some standards, all environmentally related provisions or recommendations are combined in one horizontal clause or annex. EN 12975-1 on solar collectors for thermal solar systems contains an informative Annex B on environmental protection. It includes provisions on the heat transfer fluid, insulation materials and the recycling of collector materials relating to different stages of the product life-cycle.

B.5.1.2 Example taken from EN 12975-1:2006 on thermal solar systems

"***Annex B Environmental protection***

B.1 Heat transfer fluid

The heat transfer fluid used should not be toxic, seriously irritant to the human skin or eyes, or water polluting and it should be fully biodegradable.

B.2 Insulation materials

For the collector insulation no materials should be used, which have been manufactured using or containing CFCs. Furthermore, the insulation materials should not contain components, which outgas at the stagnation temperature, specified in Clause 6, which are toxic and seriously irritant to the human skin or eyes.

B.3 Recycling of the collector materials

Solar collectors are mainly used to save energy and reduce pollution. Therefore the design of the collectors should take into consideration the possibility to recycle the materials used. Materials which are not to be recycled should be avoided or used to the lowest possible extent.

NOTE Information on the classification and identification of toxic substances can be found, e.g. in the Directives 67/548/EEC (classification, packaging, labelling of dangerous substances) and 76/769/EEC (restriction on the use of dangerous substances) and amendments."

B.5.2 Applying the checklist for systematically assessing the environmental aspects of a standard

B.5.2.1 Description of the issue

A similar horizontal clause as in EN 12975-1 is included in ISO 23747 on peak expiratory flow meters. Following a general description of the environmental aspects of the product, an environmental checklist is included in the final standard, indicating the relevant environmental aspects for each stage of the life-cycle and where in the standard they are dealt with.

B.5.2.2 Example taken from ISO 23747:2007 on anaesthetic and respiratory equipment

"1 Scope

(…)

Planning and design of products applying to this International Standard should consider the environmental impact from the product during its life-cycle. Environmental aspects are addressed in Annex E.

(…)

Annex E Environmental aspects

The environmental impact generated by peak expiratory flow meters (...) is mainly isolated to the following occurrences:

- *Impact at local environment during operation, including routine inspection and adjustments by the user, according to the instructions for use and routine procedures;*
- *Use, cleaning and disposal of consumables during operation, including routine inspection and adjustments by the user, according to the instructions for use and routine procedures;*
- *Scrapping at the end of the life-cycle.*

To highlight the importance of reducing the environmental burden, this International Standard addresses requirements or recommendations intended to decrease environmental impact caused during different stages of the life span of the peak expiratory flow meters.

Table E.1 shows a mapping of the life-cycle of peak expiratory flow meters in terms of the environment.

[Table E.1: Environmental Checklist]"

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