

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Environmentally conscious design for electrical and electronic products**

**Eco-conception pour les produits électriques et électroniques**

IEC 62430:2009

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## ENVIRONMENTALLY CONSCIOUS DESIGN FOR ELECTRICAL AND ELECTRONIC PRODUCTS

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It has the status of a horizontal standard in accordance with IEC Guide 108.

The text of this standard is based on the following documents:

CDV	Report on voting
111/104/CDV	111/124/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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## INTRODUCTION

Every product has an effect on the environment, which may occur at any or all stages of its life cycle – raw-material acquisition, manufacture, distribution, use, maintenance, re-use and end of life. These effects may range from slight to significant; they may be short-term or long-term; and they may occur at the local, national, regional or global level (or a combination thereof).

The widespread use of electrical and electronic products has drawn increased awareness to their environmental impacts. As a result, legislation, as well as market-driven requirements for environmentally conscious design, are emerging.

The goal of environmentally conscious design is the reduction of adverse environmental impacts of a product throughout its entire life cycle. This can involve balancing the environmental aspects of the product with other factors, such as its intended use, performance, cost, marketability and quality, and choosing methods to meet legal and regulatory requirements in the most environmentally friendly way. In striving for this goal, multiple benefits can be achieved for the organization, its customers and other stakeholders. Environmentally conscious design is not a separate design activity; rather, it is an integral part of the existing design process. The "design" in this context includes the activities associated with the processes of product planning, development and decision-making as well as the creation of policies within the organization.

The impetus to create an International Standard was triggered by common circumstances impacting many industries in the global marketplace, since the compositional elements of a product (such as materials, components and services) are provided across national borders. The existence of an International Standard provides for a consistent approach to life cycle management.

This International Standard is intended for use by all those involved in the design and development of electrical and electronic products. This includes all parties in the supply chain regardless of organization type, size, location and complexity. It is applicable for all types of products, new as well as modified. Sector-specific documents may be developed to address needs not covered in this standard. The use of this standard as a base reference is encouraged so as to ensure consistency throughout the electrotechnical sector.

This International Standard provides a set of requirements for the process of environmentally conscious design reflecting the contents of IEC Guide 114 and ISO/TR 14062.

# ENVIRONMENTALLY CONSCIOUS DESIGN FOR ELECTRICAL AND ELECTRONIC PRODUCTS

## 1 Scope

This International Standard specifies requirements and procedures to integrate environmental aspects into design and development processes of electrical and electronic products, including combination of products, and the materials and components of which they are composed (hereafter referred to as products).

NOTE The existence of this standard does not preclude particular sectors from generating their own, more specific, standards or guidelines. Where such documents are produced it is recommended that they use this standard as the reference in order to ensure consistency throughout the electrotechnical sector.

## 2 Normative references

No normative references are cited. Informative references are noted in the bibliography.

NOTE This clause is included in order to retain typical clause numbering.

## 3 Terms and definitions

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

### 3.1 design and development

activities that take an idea or requirement and transform these into a product

NOTE The process of design and development usually follows a series of defined steps starting with an initial idea, transforming that into a formal specification, and resulting in the creation of a working prototype and whatever documentation is required to support production of the goods or provision of the service.

### 3.2 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 14001: 2004, definition 3.5]

### 3.3 environmental aspect

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

NOTE A significant environmental aspect has or can have a significant environmental impact.

[ISO 14001:2004, definition 3.6, modified]

### 3.4 environmental impact

any change to the environment, whether adverse or beneficial, wholly or partly resulting from an organization's environmental aspects

[ISO 14001:2004, definition 3.7]



**3.5****environmental parameter**

quantifiable attribute of an environmental aspect

EXAMPLE Environmental parameters include the type and quantity of materials used (weight, volume), power consumption, emissions, rate of recyclability, etc.

**3.6****environmentally conscious design**

ECD

systematic approach which takes into account environmental aspects in the design and development process with the aim to reduce adverse environmental impacts

**3.7****environmentally conscious design tool**

formalized method which facilitates qualitative or quantitative analysis, comparison and/or solution finding during the ECD process

**3.8****life cycle**

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

[ISO 14040:2006, definition 3.1]

**3.9****life cycle assessment**

LCA

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

[ISO 14040:2006, definition 3.2]

**3.10****life cycle stage**

element of a life cycle

NOTE 1 The phrase 'life cycle phase' is sometimes used interchangeably with 'life cycle stage'.

NOTE 2 Examples of life cycle stages are: raw material acquisition and production; manufacturing; packaging and distribution; installation and use, maintenance and upgrading and end of life.

**3.11****life cycle thinking**

LCT

consideration of all relevant environmental aspects during the entire life cycle of products

[IEC Guide 109:2003, modified]

**3.12****organization**

group of people and facilities with an arrangement of responsibilities, authorities and relationships

[ISO 9000:2005, definition 3.3.1, modified]

**3.13****process**

set of interrelated or interacting activities which transform inputs into outputs

NOTE 1 Inputs to a process are generally outputs of other processes.

NOTE 2 Processes in an organization are generally planned and carried out under controlled conditions to add value.

[ISO 9000:2005, definition 3.4.1, modified]

### 3.14

#### **product**

any goods or service

NOTE This includes interconnected and/or interrelated goods or services.

[ISO 14040:2006, definition 3.9, modified]

### 3.15

#### **product category**

group of technologically or functionally similar products where the environmental aspects can reasonably be expected to be similar

### 3.16

#### **stakeholder**

individual, group or organization that has an interest in an organization or activity

NOTE Usually a stakeholder can affect or is affected by the organization or the activity.

[ISO 14050, definition 3.5, modified]

## **4 Fundamentals of environmentally conscious design (ECD)**

NOTE More detailed information relating to Clause 4 is provided in Annex A.

### **4.1 General**

Clause 4 describes the fundamental requirements of ECD to be implemented by the organization. Clause 5 describes the ECD process to be implemented on an operational basis.

### **4.2 Life cycle thinking**

Environmentally conscious design shall be based on the concept of life cycle thinking (LCT), which requires consideration during the design and development process of the significant environmental aspects of a product in all life cycle stages.

Key elements of life cycle thinking are as follows:

- a) having an objective to minimize the overall adverse environmental impact of the product;
- b) identifying, qualifying and where feasible, quantifying the significant environmental aspects of the product;
- c) considering the trade-offs between environmental aspects and life cycle stages.

The above shall be initiated as early as possible in the design and development process, when most opportunities exist to make changes and improvements to the product affecting its overall environmental performance throughout its life cycle.

NOTE 1 As a first step in LCT, the intended function of the product should be determined. In subsequent design and development stages the influence of any applied business model should be recognized.

NOTE 2 The life cycle stages of any product under control of the organization usually include the processing of materials, manufacturing, distribution, use, maintenance and end-of-life management (including reuse, recycling, recovery and final disposal).

NOTE 3 When a product is part of a system, the environmental performance of one product during one or more life cycle stages can be altered by other products in that system.

NOTE 4 ECD requires collaboration and contributions of all stakeholders along the supply chain.

### 4.3 Regulatory and stakeholders' requirements

Environmentally conscious design is performed within the boundaries set by regulatory and stakeholders' requirements. Such requirements shall be regularly reviewed so that relevant changes are understood by the organization undertaking the ECD.

Regulatory and stakeholders' requirements may include:

- a) restrictions and obligations resulting from national and international regulations;
- b) technical standards and voluntary agreements;
- c) market or customers' needs, trends and expectations;
- d) societal and investors' expectations, e.g. advances in technology.

### 4.4 Integration into management system

Environmentally conscious design and its objective of minimizing the overall adverse impact of the product shall be reflected in the policies and strategies of the organization. If an organization has a management system which includes the product design and development function, the ECD process shall be an integral part of that documented system.

Environmental considerations could be one element of the overall risk management process of the organization.

NOTE 1 "Risk management" is defined in ISO/IEC Guide 73.

In line with the procedures of the management system of the organization, the ECD process shall be reviewed when required and at planned intervals to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the ECD process and the related policies and strategies of the organization.

NOTE 2 The iterative process of continual improvement in product design and development can also be described by the PDCA (Plan, Do, Check, Act) cycle. This approach also provides means for managing the changing legal, technological, organizational, economic and environmental requirements.

NOTE 3 Communication regarding the ECD process and its objectives is performed within an organization so that the affected departments understand the rationale for the initiative, leading to their cooperation and collaboration.

NOTE 4 Management systems are described, for example, in ISO 9001 and ISO 14001.

## 5 Environmentally conscious design process (ECD process)

NOTE More detailed information relating to Clause 5 is provided in Annex B.

### 5.1 General

Organizations performing environmentally conscious design (ECD) shall establish, document, implement and maintain an ECD process as an integral part of the product design and development process. This ECD process includes the following steps, which are further described in 5.2 to 5.5:

- a) analysis of the regulatory and stakeholders' environmental requirements;
- b) identification and evaluation of environmental aspects and corresponding impacts;
- c) design and development;
- d) review and continual improvement.

The organization shall, while following the above steps, document the relevant results and the subsequent conclusions and responsibilities assigned.

NOTE The above process a) to d) corresponds to the PDCA cycle as follows:

- steps a) and b) correspond to Plan,
- step c) corresponds to Do, and
- step d) corresponds to Check and Act.

## 5.2 Analysis of regulatory and stakeholders' environmental requirements

As an initial step of ECD, to be carried out in conjunction with the identification of environmental aspects (see 5.3), the organization shall understand the relevant regulatory and stakeholders' requirements, both at horizontal and sector specific level. These requirements set the basic framework within which a product is developed.

The organization shall ensure, as appropriate, that:

- a) relevant environmental requirements from applicable regulatory authorities and stakeholders are identified, covering
  - relevant product functions,
  - relevant life cycle stages,
  - relevant environmental aspects of the product,
  - geographical scope of the intended market, and
  - related activities of the organization;
- b) both current and new requirements are regularly reviewed and identified;
- c) a systematic analysis of these requirements is performed and documented, identifying the affected product function(s) and life cycle stage(s), related activities of and responsibilities in the organization, and resulting action(s) to be taken;
- d) new or changed requirements, which appear during the design phase are evaluated as to their effect on the product and necessary modifications are made.

NOTE 1 Horizontal requirements are generally applicable to electrotechnical and electronic products.

NOTE 2 Sector specific requirements address a certain product group.

## 5.3 Identification and evaluation of environmental aspects and corresponding impacts

The organization shall establish a procedure to identify environmental aspects and corresponding impacts. It shall comprise the following steps:

- a) Identification of relevant environmental aspects and corresponding impacts.

For each relevant life cycle stage, identify inputs such as materials, energy and other resources used, as well as outputs (examples are provided in Figure B.3), all of which cause environmental impacts. Examples of outputs include the product itself, semi-finished products, rejects, production wastes, and emissions.

It is permitted to use qualitative or quantitative environmental information associated with the identified processes, materials, parts or components. Where feasible, the quantitative approach is encouraged.

NOTE Identification of environmental aspects can also be made for a product category.

- b) Evaluation of environmental impacts related to the identified relevant environmental aspects.
- c) Determination of significant environmental aspects.

After all relevant environmental aspects have been identified, significant environmental aspects are determined by evaluation and prioritization, based on their contribution to overall environmental impact. The organization should then address, in the subsequent ECD process steps, these significant environmental aspects identified for a product or product category. An arbitrary emphasis on a single environmental aspect or a single life cycle stage should be avoided.

It is permitted to use qualitative or quantitative evaluation and prioritization of the environmental aspects. Where feasible, the quantitative approach is encouraged.

#### 5.4 Design and development

The choice of a design solution should achieve a balance between the various environmental aspects and other relevant considerations, such as function, technical requirements, quality, performance, business risks and economic aspects. Where certain attributes are required for compliance with regulations (e.g. health and safety, electromagnetic compatibility) these shall be met in a manner that is least damaging to the environment. These considerations also apply to research and development of new technologies.

The following steps shall be carried out during design and development:

- a) specify the functions of the product;
- b) define significant environmental parameters from the analysis of regulatory and stakeholder requirements and evaluation of the environmental aspects;
- c) identify relevant environmental improvement strategies for these parameters;
- d) develop environmental targets based on the improvement strategies;
- e) develop a product specification addressing the environmental targets (environmental product specification); and
- f) develop technical solutions to meet the environmental targets while taking into account other design considerations.

NOTE The use of ECD tools (described in Annex C) and other standards may be helpful.

#### 5.5 Review and continual improvement

A procedure for review and continual improvement of the significant environmental aspects of products throughout the entire life cycle shall be established, implemented and maintained.

The organization shall conduct design reviews to evaluate that the product design has met the targets defined in the environmental product specification whenever significant environmental aspects are affected or a major design phase is completed. When the product environmental targets are not met, improvement actions shall be assigned and implemented for the current or future design.

NOTE The organization could conduct further product reviews after market launch to consider feedback from users and other stakeholders as well as additional environment-related knowledge. The results could then be incorporated into the ECD process supporting continual product improvement and the revision of policies and procedures of the organization setting the basis for product specifications for future product development.

Records of the design reviews, including the assigned actions arising from the review, shall be maintained and serve as a reference for future product development and continual improvement activities.

#### 5.6 Information sharing for ECD

As part of the ECD process, organizations in the supply chain shall disclose information of their product or product category to organizations involved in design and development to enable them to achieve ECD objectives.

Examples of information to be exchanged include:

- a) relevant resources used in the product, in the manufacturing processes and for the operation of the product;

EXAMPLE Resource usage includes water, energy and materials.

- b) relevant emissions generated by the product;

- c) guidance to improve environmental performance;
- d) end-of-life treatment;
- e) self-declaration indicating conformance with regulatory and customer requirements.



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## Annex A (informative)

### Fundamentals of environmentally conscious design

NOTE Annex A provides information relating to Clause 4 of this standard.

#### A.1 General (4.1)

ECD is based on life cycle thinking (LCT) and should be part of the organization's design and development processes (see 4.2). Figure A.1 illustrates how ECD could be incorporated into the (existing) management system of the organization (see 4.4).

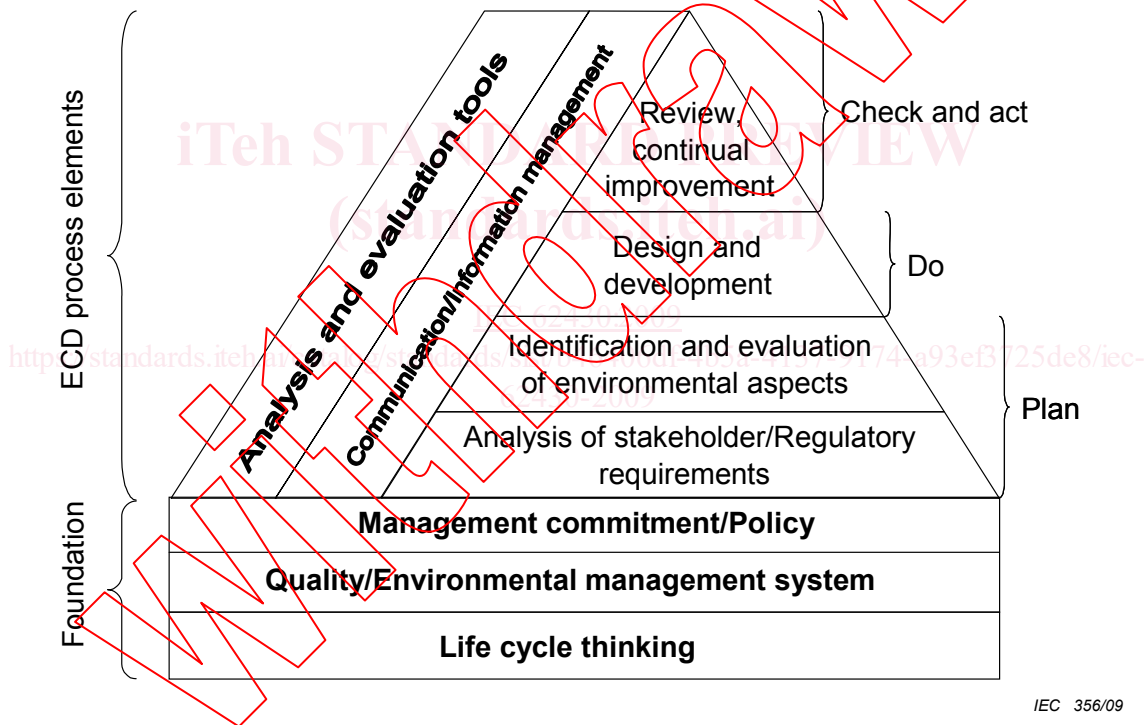


Figure A.1 – Overview of ECD process

As indicated in Figure A.1, the ECD process is consistent with the approach of Plan, Do, Check and Act.

#### A.2 Life cycle thinking (4.2)

Life cycle thinking is essential for performing ECD. The elements listed below can be included in life cycle thinking.

- Comprehensive view: rather than arbitrarily focusing on one life cycle stage or aspect of the product, all such stages are considered during the design and development process from the environmental as well as from other business perspectives, maintaining the goal of overall improvement of the environmental performance.