



SLOVENSKI STANDARD SIST EN 16524:2021

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Nadomešča:

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Proizvodi strojne in kovinskopredelovalne industrije - Metodologija za zmanjšanje vplivov na okolje pri načrtovanju in razvoju proizvodov

Mechanical products - Methodology for reduction of environmental impacts in product design and development

Mechanische Produkte - Methodik zur Verminderung der Umweltauswirkungen bei Produktgestaltung und Entwicklung

Produits mécaniques - Méthodologie de réduction des impacts environnementaux à la conception et au développement des produits

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ICS:

13.020.10	Ravnanje z okoljem	Environmental management
21.020	Značilnosti in načrtovanje strojev, aparatov, opreme	Characteristics and design of machines, apparatus, equipment

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EUROPEAN STANDARD

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Mechanical products - Methodology for reduction of environmental impacts in product design and development

Produits mécaniques - Méthodologie de réduction des impacts environnementaux à la conception et au développement des produits

Mechanische Produkte - Methodik zur Verminderung der Umweltauswirkungen bei Produktgestaltung und Entwicklung

This European Standard was approved by CEN on 24 August 2020.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 16524:2020 (E)**European foreword**

This document (EN 16524:2020) has been prepared by Technical Committee CEN/TC 406 “Mechanical products - Ecodesign methodology”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2021, and conflicting national standards shall be withdrawn at the latest by May 2021.

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

This document supersedes CEN/TS 16524:2013.

The main changes compared to CEN/TS 16524:2013 are as follows:

- the document is to be converted into a European standard;
- the link with EN ISO 14001 has been strengthened for users willing to comply with that international standard;
- Clause 5 has been added to detail the preparatory step before implementing the methodology, which consists of an overview of the framework and the methodology;
- the life cycle analysis (LCA) is only referred to as an example of existing data on the product, when available; and
- the purpose of the Annex F on the possible use of life cycle assessment for determining the score of each environmental aspect has been clarified.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Ecodesign methodologies can be divided into three types, depending on whether their purpose is the environmental assessment of products, the environmental improvement of products or to enable the two phases to be carried out during the same ecodesign project.

The environmental assessment phase of products in the ecodesign process can be an impediment for companies (owing to need for expertise, time and resources). Therefore, the methodology discussed in this document has been developed with the aim of helping designers to identify ways of improving the environmental performance of a product without carrying out a complete environmental assessment of the product (in terms of LCA).

Therefore, the approach consists for the company in restricting the scope of analysis to the characteristics defined by the constraints of the product, which takes into account the technical factors of the product, economic constraints, the practices of a company and its development strategies. Secondly, it consists of exploring the potential for environmental improvement within this restricted field.

This document is intended to give companies, in particular small and medium enterprises (SMEs), a pragmatic methodology to consider environmental aspects during their product design. It allows them to:

- Identify the environmental aspects of a product, including but not limited to energy aspects;
- Reduce the environmental impact of a product, taking into account capabilities of the company;
- Inform clients and public authorities about the environmental improvement approach on a mechanical product with this methodology (environmental claim).

The reduction of the environmental impact implies that the intended performance of the product (fitness for use, durability, etc.) is maintained.

To implement this methodology, the company staff will have sufficient knowledge and expertise in environmental issues; if not, external expertise can be addressed. When applying this methodology, management of the company can enter a learning process with the aim of defining and/or confirming its strategy for ecodesign, modifying its design process to enable the environmental issue to be taken into account, and creating new knowledge.

The aim of this document is not to measure the actual environmental performance of a product, nor to conduct a full life cycle assessment according to EN ISO 14040. Nevertheless, suitable data coming from more detailed studies e.g. LCA, carbon footprint, etc. can be used as inputs for this methodology (see an example in Annex F).

Figure 1 shows the relationship between this document and existing documents from ISO.

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Objective of the approach	Generic ISO documents	Documents for mechanical products
To assess <i>measure the environmental performance of a product and identify the environmental aspects</i>	EN ISO 14040 EN ISO 14044	
To communicate <i>label, declare an eco-design approach or an environmental performance of a product according to a common reference</i>	EN ISO 14020 EN ISO 14021 EN ISO 14025	
To improve <i>implement actions which contribute to improve the environmental performance of the product</i>	ISO/TR 14062	EN 16524
To manage <i>have a life cycle thinking in relationship with the product design</i>	EN ISO 14001 EN ISO 14006	

NOTE More specific methodologies can exist for specific mechanical products.

Figure 1 — Relationship between this document and existing ISO documents
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This document can assist the company to comply with the requirement of EN ISO 14001 and the recommendations of EN ISO 14006, to establish, implement and maintain a procedure to identify the environmental aspects of its products.

This document is not intended to support or to demonstrate compliance with any specific implementing measures of the Framework Directive 2009/125/EC (Energy-related Products). It can provide methodologies for identifying the more relevant environmental aspects in order to propose alternative design options to improve the environmental performance of the product.

This document is not intended for calculation of environmental footprint.

1 Scope

This document describes a methodology for reducing the overall environmental impact through product design and development that is tailored to mechanical products as defined in 3.1.

This methodology is particularly well suited to the redesign of an existing product; it can also be applied for the design of a new product provided the necessary assumptions regarding a (virtual) reference product are taken.

It addresses companies which have decided to integrate an ecodesign approach to optimize environmental impacts within the product life cycle, in relation to the other product aspects, such as functionality, quality, costs, etc.

It also helps to meet some requirements of EN ISO 14001:2015 on the integration of environmental aspects in the design of products.

NOTE 1 This document targets persons who are directly involved in the design and development of mechanical products, as well as managers responsible for defining corporate policies, and decision-makers. The proposed methodology is intended to kick-start ecodesign initiatives within companies as part of a continuous improvement approach.

This document also includes a template that companies can use as part of the communication on their environmental approach.

This document is neither intended nor suitable to compare products (even similar) of different suppliers.

This document is neither intended nor suitable for product certification purposes.

NOTE 2 An example for the implementation of the methodology is given in Annex D; the background of the algorithm used for this methodology is explained in Annex E.

2 Normative references

[SIST EN 16524:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/bafbac5f-dbec-43e6-bfa7->

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

mechanical product

product manufactured by companies from mechanical engineering and metalworking industry

EXAMPLE Mechanical products such as capital goods (machinery, production systems, components), tools, household goods, optical parts, measuring instruments.

3.2

reference product

existing product of the company to be re-designed, with the same intended use

Note 1 to entry: A similar product existing on the market, or the Technical Specification of a product can also be used as a reference.

EN 16524:2020 (E)**3.3
environmental aspect**

EA
element of an organisation's activities or products or services that interacts or can interact with the environment

Note 1 to entry: For this document, environmental aspects are categorized into Raw Materials acquisition, Manufacturing, Use, Product End-of-life, Hazardous substances, Transport and distribution, Packaging.

[SOURCE: EN ISO 14001:2015, 3.2.2. Changes made to original terminological entry: abbreviation "EA" has been added, note 1 and 2 to entry have been replaced by new note 1 to entry.]

**3.4
design option
environmental design option**

DO
measure intended to improve a specific environmental aspect within the product life cycle, in relation to the other product aspects, such as functionality, quality, costs, etc.

**3.5
scoring of environmental aspects**

SEA
representation of the relative importance of the product's environmental aspects over its life cycle

Note 1 to entry: This SEA does not express the environmental performance of the product.

**3.6
design option indicator**

DO indicator
qualitative or quantitative indicator representative of a given design option, used to track this option during the design phase

**3.7
environmental aspect indicator**

EA indicator
qualitative or quantitative indicator associated with a particular environmental aspect, as representative as possible of this environmental aspect, used to keep a multi-criteria view of the environmental performance of the product during its development

Note 1 to entry: "Multi-criteria view" means the consideration of all environmental aspects to avoid a shift of impact (e.g. change of material can result in lower recyclability coefficient).

**3.8
recoverability**

ability of component parts, materials or both that can be diverted from an end-of-life stream to be recovered

Note 1 to entry: See Figure 2.

[SOURCE: ISO 22628:2002, 3.9. Changes made to original terminological entry: Note 1 to entry has been added.]

3.9**recyclability**

ability of component parts, materials or both that can be diverted from an end-of-life stream to be recycled

Note 1 to entry: See Figure 2.

[SOURCE: ISO 22628:2002, 3.7. Changes made to original terminological entry: Note 1 to entry has been added.]

3.10**material recyclability coefficient*****r***

percentage by mass (mass fraction in percent) of a material potentially able to be recycled

3.11**reusability**

ability of component parts that can be diverted from an end-of-life stream to be exploited

Note 1 to entry: See Figure 2.

	Recovery		Undefined residue
(Component parts) Re-use	(Materials) Recycling	(Materials) Energy recovery	(Materials)
Recyclability rate			
Recoverability rate			
Product mass			

Figure 2 — Different kinds of exploitation at the end-of-life stage

3.12**ecodesign**

integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle

[SOURCE: Directive 2009/125/EC]

3.13**project team**

multidisciplinary team with recognized environmental competencies, supported by management, and involving all corporate functions likely to be impacted

EXAMPLE R&D, Design Office, Purchasing, Manufacture, Logistics, Marketing, etc.

EN 16524:2020 (E)**4 Symbols and abbreviations**

The abbreviated terms necessary for the understanding of this document are the following:

BOM	Bill Of Materials or equivalent technical description of the product
DO	Design Option
EA	Environmental Aspect
EoL	End-of-Life
ErP	Energy related Products (European Directive)
ELV	End-of-Life Vehicles (European Directive)
EL-R	End-of-Life Recyclability
M	Manufacturing aspect
Pkg	Packaging aspect
PEL	Product End-of-Life aspect
RM	Raw Material aspect
S	Hazardous Substances aspect
SEA	Scoring of Environmental Aspect
T	Transport and distribution aspect
U	Use aspect
RoHS	Restriction on Hazardous Substances (European Directive)
WEEE	Waste Electrical and Electronic Equipment (European Directive)

5 Overview of the framework for the methodology (Preparatory step 0: strategic analysis)**5.1 General**

The methodology described in this document shall be applied by a multidisciplinary project team with recognized environmental competencies, supported by management, and involving all corporate functions likely to be impacted.

Management of the company shall be involved at the key steps of the methodology, especially when ranking the design options and the development of associated technical solutions that require defining the main actors, the needed time, and the available resources.

NOTE The team concept is used with the purpose of combining different competencies and functions, and does not necessarily require different physical persons.

Figure 3 provides a framework in which context it can be assessed whether the application of the methodology would be appropriate/beneficial for the company. There are two main go/no go points:

- The first after the general strategic and product analysis for the company,
- The second after the conclusion of the case study to extend the use of the methodology for other products of the company.

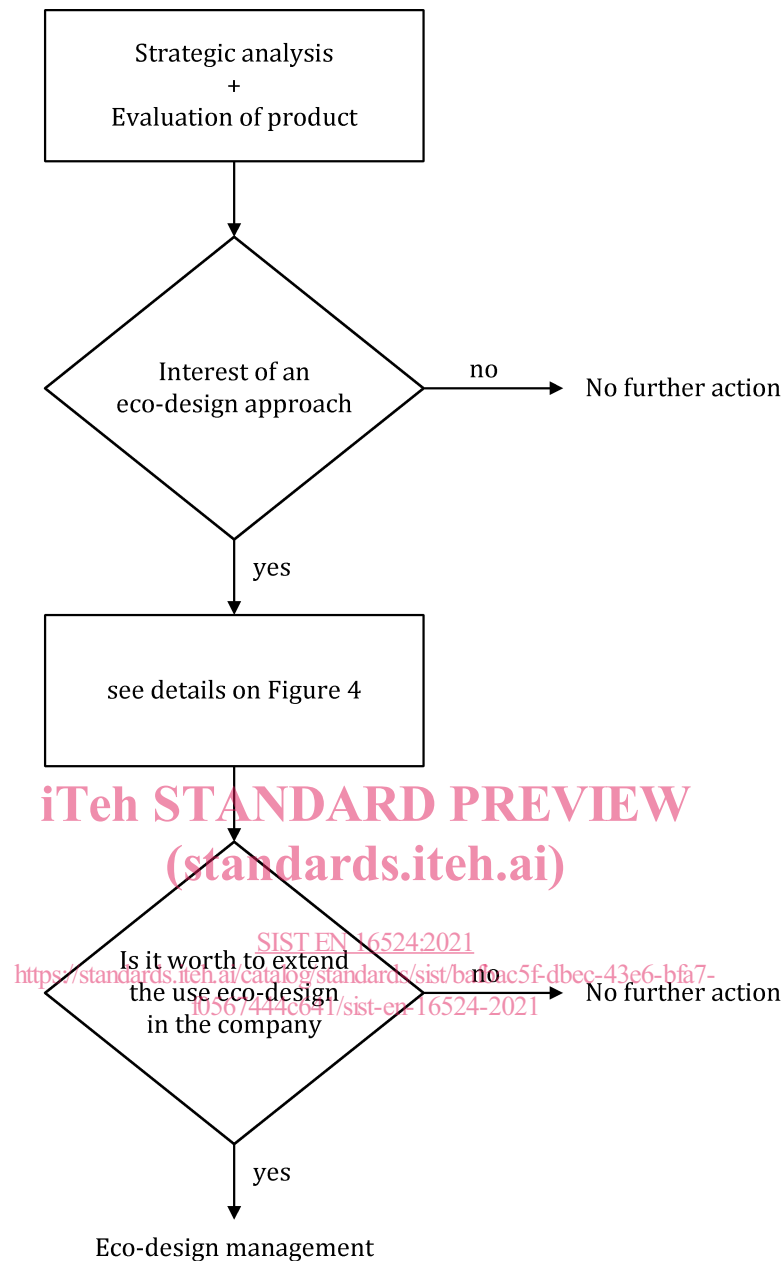


Figure 3 — Framework to assess the opportunity to apply the methodology

5.2 Preparatory step 0: strategic analysis at company level

5.2.1 Objective

Before starting an ecodesign approach, it is worthwhile to better understand the context of the company and the project, in terms of:

- Legal applicable requirements, market needs or requirements (specifications),
- Customers' unexpressed needs (their own legal requirements or constraints),
- Feedbacks in the company (case studies, green procurement, existing practices for environment, etc.),

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- Available standards, ecolabels, practices in the sector,
- Competitors' behaviours or practices (their communication on environmental issues, certification, etc.),
- Possible Suppliers' contributions.

5.2.2 Procedure

A benchmark on the various points enumerated above shall be done.

Based on the results of the strategic analysis combined with an economic analysis (which costs, which gains, etc.), top management will have sufficient data to determine if ecodesign can serve the company's strategy and if it is relevant to launch an ecodesign project. The SWOT (Strength/Weaknesses/Opportunities/Threats analysis) tool can be interesting to have a final decision.

5.2.3 Documentation of the preparatory step 0

- Report on strategic analysis, including all information mentioned above,
- Formal decision of the top management whether or not an ecodesign project (according to this document) should be started.

6 Description of the methodology**6.1 General**

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After the preparatory step 0 (strategic analysis, see Clause 5), the methodology described in this document, which is based on five steps set out below that are linked with the design and development process for a product (see Figures 4 and 5), shall be applied:

- Step 1: determination of the scoring of the environmental aspects of the reference product,
- Step 2: selection/ranking of design options,
- Step 3: choice of suitable DO and EA indicators related to the reference product,
- Step 4: evaluation of the redesign using DO and EA indicators,
- Step 5: final assessment and consideration for future activities.

The objective and the procedure to be followed for each step are described in 6.2 to 6.6. The procedures are specified in the form of instructions.

The output documents of each step are inputs for the next step and shall be validated by the project team before going to this next step.

NOTE In this document, "methodology" is used for the overall approach of reducing environmental impacts; "method" is used for specific tasks, such as an indicator calculation.

Step 0 – Strategic analysis (5.2)

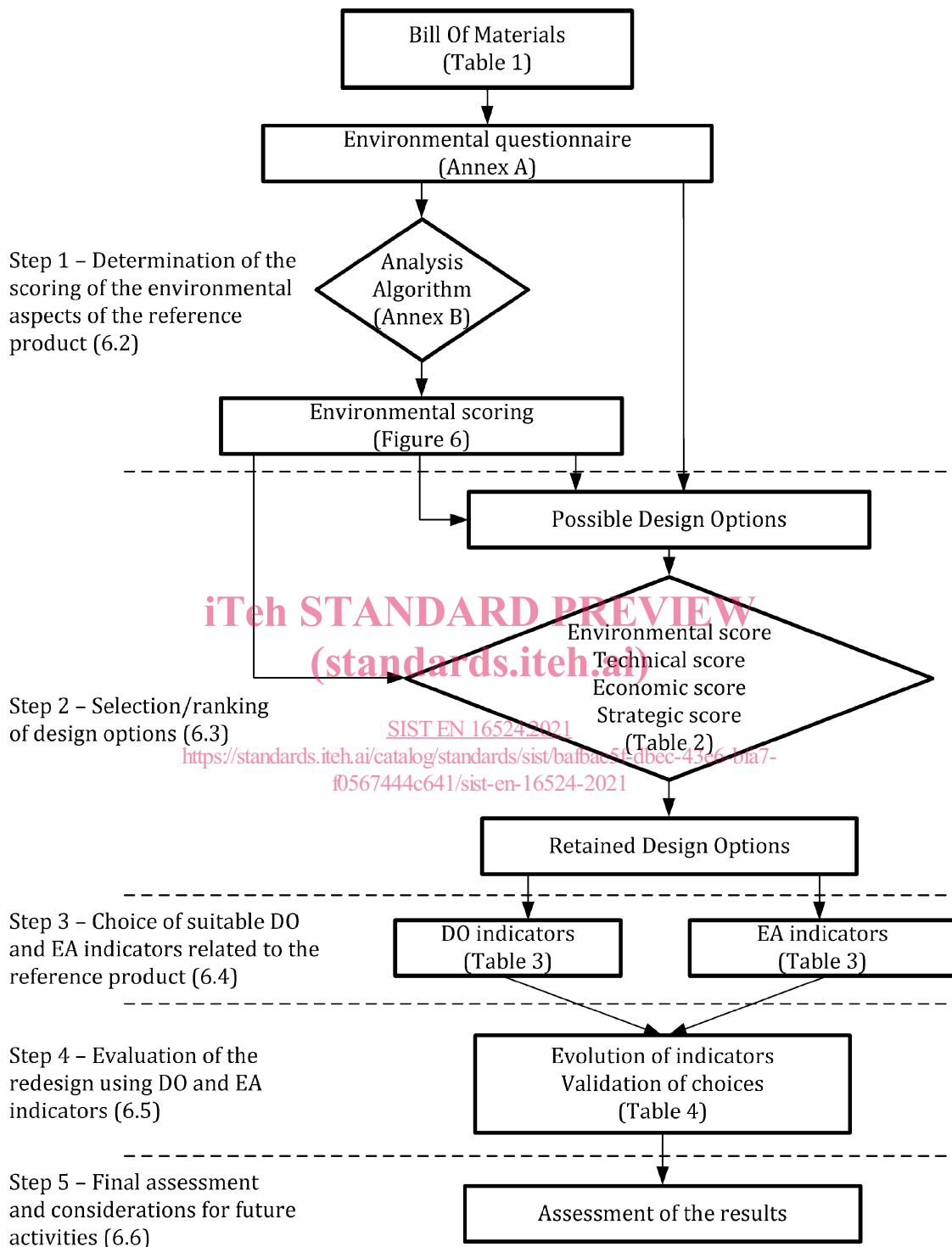


Figure 4 — Schematic illustration of the methodology