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Mechanical products — Conditions to set up environmental communication models by recognizing sectorial particularities

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National foreword

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TECHNICAL REPORT

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Mechanical products - Conditions to set up environmental communication models by recognizing sectorial particularities

Produits mécaniques - Lignes directrices pour la sélection de modèles de communication environnementaux par la reconnaissance des particularités sectorielles

Mechanische Produkte - Leitfaden für die Auswahl von Modellen der Umweltkommunikation

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Contents

Page

European foreword

This document (CEN/TR 17004:2016) has been prepared by Technical Committee CEN/TC 406 “Mechanical products - Ecodesign methodology”, the secretariat of which is held by AFNOR.

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Introduction

The European mechanical sector can find opportunities in producing rules for environmental product declaration from such perspectives as business opportunities, financial perspectives, sectorial consistency and public image.

It allows companies in the mechanical field to address current and anticipate future demands coming from clients or markets on the environmental efficiency of their products. In addition, they have sometimes to meet requirements of regulations in force or to come, and to measure products improvements in an eco-innovation project to enhance the attractiveness of the products.

Any communication on environmental criteria will have to be decided for each category of products by the corresponding Technical Committee.

Declaration of environmental performance of products can present several advantages:

— to promote existing eco-innovation efforts to clients and market;

— to create the market for green mechanical products;

— to ensure a fair competition on the market.

This document is aimed at:

— optimizing rules to reduce the cost of environmental communication;

— sharing the efforts needed to develop declaration rules;

— reducing the costs for information exchange within the supply chain.

As most of companies in the mechanical field sell products across Europe and around the world, it is impossible to evaluate and communicate environmental characteristics, taking into account all specific local rules and methodologies. That is why companies expect simple, pragmatic and unified rules.

1 Scope

This Technical Report provides guidance on how to apply existing communication models regarding environmental concerns to mechanical products.

Carrying out communication models for environmental performances of mechanical products can be relevant for several entities, e.g. single companies, enterprises, collective bodies (trade associations, standardization committees, etc.) and others.

On the one hand side, mechanical products represent a large variety of non-uniform items. They can be characterized by several properties distinguishing them from each other. On the other hand side, various generic standards/standard-series are existent addressing on how to communicate environmental issues.

This Technical Report provides a consistent approach on how to match a particular mechanical product with an appropriate generic standard.

In order to do so, this Technical Report contains criteria to cluster the great variety of mechanical products into categories. Based on this categorization, existing standards concerning environmental performance communication are evaluated with regards to their suitability.

2 Normative references

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

EN ISO 14050, *Environmental management - Vocabulary (ISO 14050)*

3 Terms and definitions

For the purposes of this document, the terms and definitions from EN ISO 14050 and the following apply

3.1
mechanical product
product manufactured by enterprises from mechanical engineering and metalworking industry, such as capital goods (machinery, production systems, components), tools, household goods, optical parts, measuring instruments

[SOURCE: CEN/TS 16524:2013, 2.1]

3.2
consumer goods
goods that satisfy personal needs rather than those required for the production of other goods or services

3.3
capital goods
goods that are themselves utilized in the production of other goods rather than being sold to consumers

4 Principal considerations before applying a type of communication

The following should be considered before initiating reflexions on environmental communication (see Figure 1):

— first check whether regulation at European or at national levels applies concerning environmental issues for the concerned product; if this situation applies, the declaration requested by this regulation shall be applied;

— if not, secondly search for standards covering the concerned product, if such standards exist, it is recommended to follow the communication proposed;

— if not, thirdly search for sectorial initiatives covering the concerned product (e.g initiatives from manufacturers associations): if such initiatives exist, it is recommended to follow the communication proposed;

— if this is not the case, it is recommended to use the following guidelines (see Clauses 4 and 5): after having identified the category of the mechanical product, a suitable type of communication is obtained (Clause 4) and Clause 5 provides the proper tools for communication.

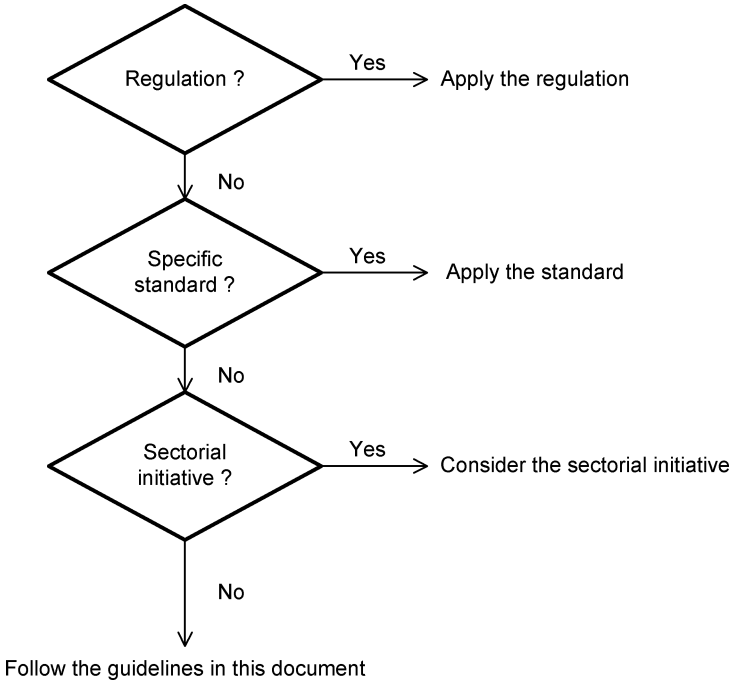


Figure 1 — Principal considerations before applying a type of communication

5 Choice of a type of communication according to categories of mechanical products

5.1 General

The definition of a mechanical product in 3.1 is very generic to cover a wide range of different mechanical products or product groups. A classification can help to provide better insights. Mechanical products can be divided in two principal categories: either consumer goods or capital goods taking into account the answers to the questions provided in 5.2.

NOTE In general, capital goods are often custom-made and tailored to the client's needs, being a long-term investment for the industrial clients and having typically a long lifetime. On the other side, consumer goods are mainly stand-alone, purpose made, mass produced goods in terms of their complexity, application range and intended use, functionality and customer base. It does not mean that a capital good is not produced in series (e.g. catalogue products) for use by industrial clients.

5.2 Characteristics to identify the principal category of a mechanical product

5.2.1 What are the economic issues/acquisition costs?

Acquisition costs of mechanical products can vary from few euros for some consumer goods to several million euros for some capital goods such as production systems.

5.2.2 What is the place of use?

Capital goods are mainly used in factories, plants, businesses or in general by professionals while consumer goods are used by consumers at their private premises.

5.2.3 What are the intended application and the customer maturity?

Capital goods are intended to produce other parts and components (not ready-for-use products) which are further processed in a business value chain or in final products intended for sale to costumers. The use of capital goods requires special knowledge and/or training. Consumer goods are ready-for-use products which are intended to provide an immediate service (Business to Consumer (B2C)). The use of consumer goods does not require special knowledge and/or training.

5.2.4 What is the intended workload?

While capital goods, e.g. production systems are intended to be operated with high load factor, often 24/7, consumer goods are not intended to be used so intensively.

5.2.5 What is the intended lifespan?

In general capital goods are built to be in operation for many years whereas consumer goods are more often designed for a lifespans of few years.

5.2.6 What is the number of units to be produced?

Capital goods are produced in small numbers or are often custom made. Consumer goods are produced in large batch sizes.

5.2.7 What is the level of complexity of the mechanical product?

Consumer goods are often composed of few parts compared to capital goods which may be an assembly of a large variety of different components being themselves complex systems.

5.2.8 Does the operator need special knowledge to use the mechanical product?

Consumer goods are designed to be operated by everyone. Whereas, the operation of capital goods requires special training and know how.

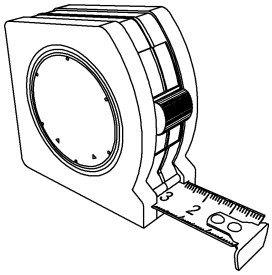
5.3 Classification obtained

Answering the questions listed in 5.2 allows classifying products/product groups as capital good or as consumer good.

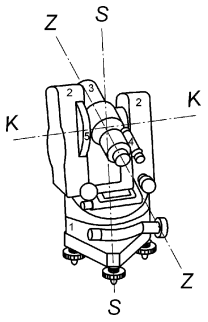
When answering the questions for a certain product group leads to the result that all separate product covered by this group can be assigned to the same category, no further investigation is necessary.

In some cases, a product group covers products that may have characteristics of both consumer and capital goods. In these cases, the questions listed in 5.2 shall be answered for each product and a decision shall be taken case by case.

NOTE For instance, the product group “cranes” fulfils all characteristics of capital goods whether the specific product is a mobile crane, a tower crane or a gentry crane. Obviously a simple measuring tape is a consumer good whereas a theodolite fulfils all the criteria of a capital good, nevertheless both products belong to the product group “measuring instruments” (see Figure 2).



a) Measuring tape



b) Theodolite

Figure 2 — Measuring instruments

5.4 Type of communication

Table 1 presents the different types of communication.

Table 1 — Different types of communication

Type I Communication according to EN ISO 14024	**Type II Communication according to** EN ISO 14021	**Type III Communication according to** EN ISO 14025
Ecolabel	**Self-declared claims**	**Environmental Product Declaration (EPD)**
Based on a certification scheme **Third party verification**	**Based on a voluntary approach (e.g.** CEN/TS 16524**)** **Self declaration**	**Based on Life Cycle Assessment (LCA as described in** EN ISO 14040**)** **Usually, third party verification**
Principles		
To help consumers to identify environmentally improved products by using a very simple labelling system guaranteeing the customer a certain level of environmental performance. To encourage self-improvement with a periodical revision of the Eco-label rules. The Eco-label option is more suitable for mass-market products. However, eco-labels appear for mechanical products.	To develop and highlight an effort in eco-innovation / eco-design. To communicate simply and easily to understand information about the environmental performance of products. To provide clear and accessible information for the client by linking environmental and technical characteristics of the product. To allow an easy application by the designers involved with environmental issues.	To propose very detailed information on the environmental performance of products (multicriteria and whole life cycle) in terms of environmental impacts (biodiversity, resource depletion, climate change, etc.). It is based on environmental indicators and additional information, like for example dangerous substances or environmental management systems in the organization. It is possible that customers are not mature enough to fully interpret the meaning of this information. To provide a precise common way for the evaluation of environmental footprint of products.
Comments		
The establishment of a programme for the creation of ecolabels is a long process because it needs to create a set of rules and criteria and requires collaboration of different interested parties.	It is the easiest way to communicate on environmental issues. To do so, it is obvious to have a framework to make sure communication is serious, valid and transparent enough for its acceptance on the market. The recognition of the rules can be made at standardization level or with the support of trade association representing the companies involved with the product categories in question.	The construction of an EPD programme is time-consuming.

<table>
<tr><td colspan="3">Examples</td></tr>
<tr>
<td>Typical example</td>
<td>Typical example
Technical characteristics:
- improvement of energy efficiency by X %
- reduction of leakage rate by Y %
- Z% of components are recyclable</td>
<td>Typical example
5. LCA: Results
The Table below shows the LCA results for the declared unit - 1 piece of door closer DC 500 & DC 700.
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)
PRODUCT STAGE | CONSTRUCTION PROCESS STAGE | USE STAGE | END OF LIFE STAGE | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement[2] | Refurbishment[3] | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential
A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D
X | X | X | MND | X | MND | MND | MND | MND | MND | MND | MND | MND | X | MND | X | X
RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: declared unit and product
Parameter | Unit | A1 - A3 | A5 | C2 | C4 | D
Global warming potential | kg CO2-Eq | 1.46E+1 | 2.56E-1 | 7.06E-2 | 3.05E-1 | -3.30+0
Depletion potential of the stratospheric ozone layer | kg CFC-11-Eq | 3.48E-9 | 7.06E-13 | 1.24E-13 | 4.99E-13 | -3.00E-10
Acidification potential of land and water | kg SO2-Eq | 8.43E-2 | 8.66E-4 | 3.21E-4 | 7.21E-5 | -1.19E-2
Eutrophication potential | kg (PO4)3- Eq | 6.58E-3 | 1.09E-4 | 7.41E-5 | 6.46E-6 | -1.1E-3
Formation potential of tropospheric ozone photochemical oxidants | kg Ethen Eq | 6.66E-3 | 8.71E-6 | -1.19E-4 | 5.46E-6 | -1.43E-3
Abiotic depletion potential for non fossil resources | kg Sb Eq | 1.04E-3 | 8.71E-9 | 2.64E-9 | 4.35E-9 | -1.40E-4
Abiotic depletion potential for fossil resources | MJ | 1.67E+2 | 1.66E-1 | 8.79E-1 | 1.53E-1 | -3.46E+1
RESULTS OF THE LCA - RESOURCE USE: declared unit and product
Parameter | Unit | A1 - A3 | A5 | C2 | C4 | D
Renewable primary energy as energy carrier | MJ | 6.77E+1 | - | - | - | -
Renewable primary energy resources as material utilization | MJ | 0.00E+0 | - | - | - | -
Total use of renewable primary energy resources | MJ | 6.77E+1 | 1.05E-2 | 3.85E-3 | 1.44E-3 | -7.45E+0
Non renewable primary energy as energy carrier | MJ | 1.86E+2 | - | - | - | -
Non renewable primary energy as material utilization | MJ | 0.00E+0 | - | - | - | -
Total use of non renewable primary energy resources | MJ | 1.86E+2 | 1.07E-1 | 9.65E-1 | 1.71E-1 | -3.84E+1
Use of secondary material | kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -
Use of renewable secondary fuels | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0
Use of non renewable secondary fuels | MJ | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0
Use of net fresh water | m3 | 1.31E-2 | 7.88E-5 | 4.27E-5 | 7.25E-6 | -1.87E-3
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: declared unit and product
Parameter | Unit | A1 - A3 | A5 | C2 | C4 | D
Hazardous waste disposed | kg | 8.88E-3 | 3.30E-3 | 0.00E+0 | 3.04E-3 | -6.19E-4
Non hazardous waste disposed | kg | 3.70E+0 | 2.80E-3 | 1.27E-4 | 5.65E-1 | -3.14E-1
Radioactive waste disposed | kg | 5.67E-3 | 7.66E-6 | 1.37E-6 | 7.87E-6 | -9.33E-4
Components for re-use | kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -
Materials for recycling | kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -
Materials for energy recovery | kg | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -
Exported electrical energy | MJ | 0.00E+0 | 6.82E-1 | 0.00E+0 | 0.00E+0 | -
Exported thermal energy | MJ | 0.00E+0 | 3.40E+0 | 0.00E+0 | 0.00E+0 | -
6. LCA: Interpretation
This chapter contains an interpretation of the Life Cycle Impact Assessment categories. When expressed as a percentage, the impact refers to its magnitude as a percentage of total impact across all modules, with the exception of module D.
Production phase (module A1-A3) contributes between 96 and 100% to total impact assessment. This stage is dominated by upstream emissions associated with steel- and secondary aluminium making processes. The environmental impacts for the transport (A2) have a negligible impact within this stage.
In module D the benefits (negative values) and loads beyond the system boundary are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution) within A5.
7. Requisite evidence
Not applicable in this EPD.
European Association ECO Platform: http://www.eco-platform.org/the-eco-epd-programs.html</td>
</tr>
</table>

5.5 Choice of communication type

The choice of communication type should be started by considering if Type II is appropriate. This approach (see 6.1) is recommended because of the following main reasons (see Figure 3):

— there are limitations to develop representative and reproducible methods for measurement and/or calculation of environmental performance as a basis for a common environmental declaration of a product (group);

— realistic market expectations (focus often on few key aspects relevant for planed investment, e.g. energy efficiency);

— there is a need to balance the available resources/required investment to establish an (extensive) declaration system for small series or purpose made products against the challenge to remain competitive;

— self-declaration is a common and accepted tool for conformity assessment (e.g. Machinery Directive 2006/42/EC); no added value by third party verification/certification.

If the type II communication does not fit for the considered product, characterization of the product is necessary (see 5.3):

— if the concerned product is a consumer good, the order of priority is to first consider type I communication and then Type III;

— if the concerned product is a capital good, the order of priority is to first consider type III communication and then Type I.

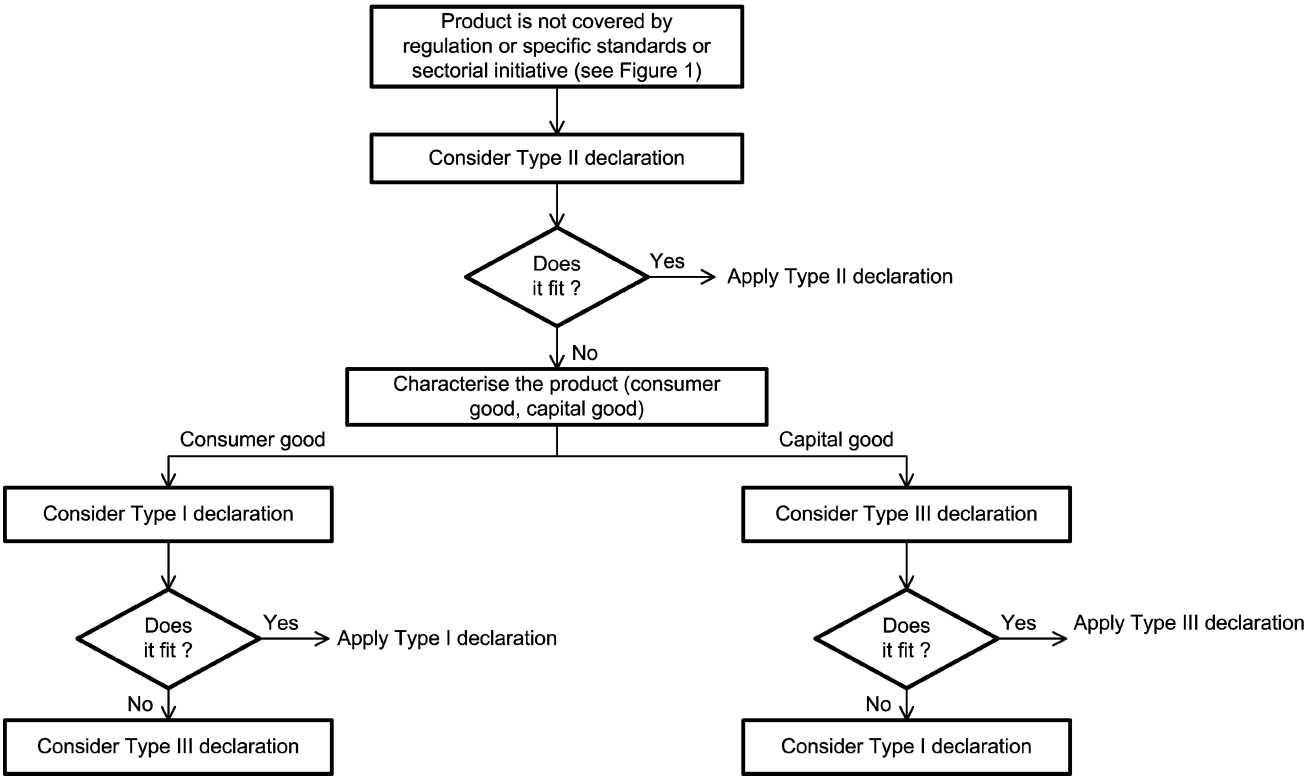


Figure 3 — Classification of mechanical products and choice of communication type

6 Communication

6.1 Type II self-declared claim according to EN ISO 14021

A self-declared claim is suitable to communicate on properties of a product.

EN ISO 14021 proposes a framework for this kind of declaration, by giving, for instance, definition of typical vocabulary and expressions. The aim of this document is also to allow a communication that is serious, valid and transparent enough for its acceptance on the market.

The format is not specified. In this manner, the manufacturer can determine the best way to present his products, taking into account the following general principles:

Abstract of EN ISO 14021:2016, 5.7**:**

The statements given in the claim:

a) shall be accurate and not misleading;

b) shall be substantiated and verified;

c) shall be relevant to that particular product, and used only in an appropriate context or setting;

d) shall be presented in a manner that clearly indicates whether the claim applies to the complete product, or only to a product component or packaging, or to an element of a service;

e) shall be specific as to the environmental aspect or environmental improvement which is claimed;

f) shall not be restated using different terminology to imply multiple benefits for a single environmental change;

g) shall be unlikely to result in misinterpretation;

h) shall be true not only in relation to the final product but also shall take into consideration all relevant aspects of the product life cycle in order to identify the potential for one impact to be increased in the process of decreasing another;

NOTE This does not necessarily mean that a life cycle assessment should be undertaken.

i) shall be presented in a manner which does not imply that the product is endorsed or certified by an independent third-party organization when it is not;

j) shall not, either directly or by implication, suggest an environmental improvement which does not exist, nor shall it exaggerate the environmental aspect of the product to which the claim relates;

k) shall not be made if, despite the claim being literally true, it is likely to be misinterpreted by purchasers or is misleading through the omission of relevant facts;

l) shall only relate to an environmental aspect that either exists or is likely to be realized, during the life of the product;

m) shall be presented in a manner that clearly indicates that the environmental claim and explanatory statement should be read together. The explanatory statement shall be of reasonable size and in reasonable proximity to the environmental claim it accompanies;

n) shall, if a comparative assertion of environmental superiority or improvement is made, be specific and make clear the basis for the comparison. In particular, the environmental claim shall be relevant in terms of how recently any improvement was made;

o) shall, if based on a pre-existing but previously undisclosed aspect, be presented in a manner that does not lead purchasers, potential purchasers and users of the product to believe that the claim is based on a recent product or process modification;

p) shall not be made where they are based on the absence of ingredients or features which have never been associated with the product category;

q) shall be reassessed and updated as necessary to reflect changes in technology, competitive products or other circumstances that could alter the accuracy of the claim; and

r) shall be relevant to the area where the corresponding environmental impact occurs.

A sector (e.g trade association) or standardization technical committee may develop specific parameters to be declared. It allows a wider recognition of the rules defined for assessment and communication of environmental performance products and it allows a better relationship with customers on environmental issues.

NOTE CEN/TS 16524 includes a template that enterprises can use as part of the communication on their environmental approach.

6.2 Type I declaration according to EN ISO 14024

The establishment of a program for the creation of ecolabels is a long process because it needs to develop a set of rules and criteria and will involve different interested parties.

The eco-label option is more suitable for consumer goods. However, eco-labels exist for some mechanical products. In addition, some manufacturers of mechanical products have to face B2B (Business to Business) and B2C (Business to Consumer) markets for a same type of products. So, if an ecolabel is required in B2C market, it would be suitable to use the same basis to serve B2B market.

6.3 Type III declaration according to EN ISO 14025

To implement this declaration, the manufacturer needs to use LCA tools that may be time consuming and require detailed data.

A Type III declaration may be required by customers for particular products. In this case, for mechanical products, those rules apply:

— to identify non-relevant aspects for which no calculation are needed,

— to use generic data (instead of specific data collection),

— to use collective declaration (for several manufacturers),

— to apply results obtained on a reference product to a range of product.

The first step to develop EPDs is to refer to a Product Category Rules (PCR) if it exists or to develop one with a Programme Operator.

Annex A
(informative)

Already existing initiatives in the mechanical sector

Communication type	**Type II communication (Self-declared claims)**
Tool name	**Ecodesign methodology according to** CEN/TS 16524 **and** ISO/TR 14062
Summary	Simplified methodology for the integration of environment in the design of mechanical products At the end of product development, the company can generate an environmental claim to inform their clients on which aspects, the product has been improved.
Status	Voluntary approach
Requirements / Indicators	Qualitative and Quantitative approach Technical and environmental indicators chosen by manufacturers taking into account: • the environmental characteristics of the product • the company strategy • the overall context (regulations, competitors, …) They help the designer to measure the improvements but also to communicate on the final gains.
Life Cycle Stages	Life Cycle approach is considered
Data Quality	Data required: only those linked to the products (BOM, energy consumption, etc.)
Verification	No verification is required This approach can be used in the EN ISO 14001 certification or in the framework of specific third party verification scheme proposed by some organisms such as AFNOR (“AFAQ-Ecoconception” label).
Product Range	Individual product. Results can be used as guidelines for other ranges of products
Other information	Approach related to management system (EN ISO 14001, EN ISO 14006)

Communication type	**Type II communication (Self-declared claims)**
Tool name	**Design methodology for energy-efficient machine tools according to** ISO 14955-1

Summary	Addresses the eco-design of machine tools and especially their energy efficiency during all relevant life cycle stages showing that the largest impact is at the use stage. Defines methods for setting up a process for integrating energy-efficiency aspects into machine tool design. Provides guidance to achieve data to report results in an environmental claim.
Status	Voluntary approach
Requirements / Indicators	Evaluation of energy efficiency quantified by: — observation; — comparison; — measurement
Life Cycle Stages	All relevant life cycle stages showing that the largest impact is at the use stage
Data Quality	Required data: — functions (machining process, tool handling, die change, …); — components composing machine-tools; — energy supplied for the different machine tool functions or subfunctions; — …
Verification	No third party verification
Product Range	Machine tools
Other information	The standard does not support the comparison of machine tools of different machine tool manufacturers. Allows: • comparison with state of the art (e.g. qualitative comparison based on certain measures listed in annexes); • comparison with previous generation of machine tool of similar functionality (performance, productivity, accuracy); • monitoring of results, including parameters covering higher productivity, higher accuracy and higher functionality of new generation machine tools.

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