First edition
2020-12

Environmental management systems — Guidelines for incorporating material circulation in design and development

Systèmes de management environnemental — Lignes directrices pour intégrer la circularité des matériaux dans la conception et le développement

Reference number
ISO 14009:2020(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 1, *Environmental management systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 Background

One of the major challenges that we all face in achieving sustainable development is the efficient use of resources and reuse of these resources repeatedly without diminishing their value, usability, etc. Internationally, the United Nations Environment Programme International Resource Panel (UNEP IRP) warns that, at the current pace of production and consumption, 140 billion tons of natural resources will be consumed in 2050, which is twice the amount consumed in 2005. Such use of natural resources, which does not consider material circulation, has already resulted in unstable resource supplies and serious adverse environmental impacts[34].

The UN adopted 17 sustainable development goals (SDGs) in 2015 and set specific targets for each of them to be achieved over the next 15 years. SDG 9 ("build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation"), SDG 12 ("ensure sustainable consumption and production patterns") and SDG 13 ("take urgent action to combat climate change and its impacts") are directly related to managing natural resources.

Emphasis on the transition from a linear to a circular economy in order to achieve sustainable development has been spearheaded by the European Union (EU)[33]. The concept of a circular economy encompasses a wide range of topics, from the full life cycle of products to business models. The general concept of a circular economy is closing the loop between different life cycles through the application of designs that allow for the enhancement of recycling and reuse for the more efficient use of raw materials and products, limiting (or eliminating) waste. One of the methods to consider for supporting the transition to a circular economy is implementing a design that facilitates the material circulation of products and their constituent parts (see Annex A).

Considering that products are largely composed of raw materials, the material circulation of products plays an important role in the sustainable use of resources. The widely held perception is that strategy/planning for the material circulation of products and their constituent parts should precede their design and development.

Material circulation can be understood as an approach integrated within design and development by which products, parts or materials can be continually reprocessed into the same or similar products in order to achieve material efficiency and (ultimately) the environmental objectives of the organization. In order to be of benefit to the organization and to ensure that the organization achieves its material efficiency objectives, it is intended that the improvement of material circulation be carried out as an integral part of the business operations of the organization. Material circulation can potentially have implications for all functions of an organization.

This document provides guidelines for strategies on material circulation to achieve material efficiency, i.e. minimize the use of materials, by maximizing the lifetime of products through improved design, with increased opportunities for repair, upgrade, reuse, remanufacturing and recycling by an organization.

A material circulation improvement process takes place within an organization's design and development, and it is there where the knowledge required in carrying out and managing material circulation is to be found. However, when it is intended that material circulation be carried out under the umbrella of an environmental management system (EMS), then the person responsible for the EMS is expected to have an understanding of what this process is, and how it is going to be managed and controlled. In this way, the integrity of the EMS is not jeopardized, and the material efficiency and other environmental objectives for the products can be achieved.

Incorporation of material efficiency within an EMS requires knowledge related to the following:

a) assessment of the material circulation of products in the organization;

b) identification of appropriate material circulation strategies to improve the material circulation of products and their constituent parts, and to support the achievement of the material efficiency objectives of the organization;

c) the design and development process, and an understanding of the material circulation improvement processes and how they are managed within an EMS.

0.2 Relationship with other standards

ISO 14001 is a core standard that provides the organization with a framework for establishing an EMS. There are four key elements to support users of ISO 14001. One of them is related to "policy and organizational elements" such as those related to sustainable use of resources, and further exemplified in complementary standards: ISO 14006 on ecodesign and this document (i.e. ISO 14009) on material circulation.

ISO 14006 provides guidelines to assist organizations in establishing a systematic and structured approach to the incorporation and implementation of ecodesign within an EMS such as that described in ISO 14001.

IEC 62430, on the other hand, describes principles, specifies requirements and provides guidance for organizations intending to integrate environmental aspects into design and development in order to minimize the adverse environmental impacts of products. IEC 62430 can be incorporated into an existing management system, as indicated in ISO 14006.

ISO 14051 provides guidance on a methodology [material flow cost accounting (MFCA)] that can be used for quantifying material flows in a production process or an organization. ISO 14052 has extended this concept by providing guidance on using this methodology for quantifying material flows in a supply chain. The MFCA methodology can easily be adapted and used for quantifying material flows in a product life cycle. Although this methodology could be used for quantification of material flows in a product life cycle, it is not addressed in this document.

In Europe, standards on material efficiency assessment methods (the EN 4555X group of standards) [22] to [30] have been developed to support future ecodesign requirements on, among other things, durability, reparability and recyclability of energy-related products. These standards are directly linked to this document.

ISO 14001 requires an organization to identify environmental aspects and the corresponding environmental impacts, taking a life cycle perspective into account. This involves considering aspects and impacts in each stage of the product life cycle, including design and development. ISO 9001 is focused on quality management systems, including design and development, but does not cover environmental impacts. ISO 14006 is focused on a management system to implement environmental conscious design by an organization. IEC 62430 assists with the incorporation processes to implement environmental conscious design by an organization. Lastly, the European EN 4555X group of standards focus on assessment methods related to material efficiency and material circulation, but they do not cover environmental and business management frameworks, as described in this document.

Figure 1 illustrates how ecodesign and material circulation in ISO 14006 and this document can support an EMS as described in ISO 14001.

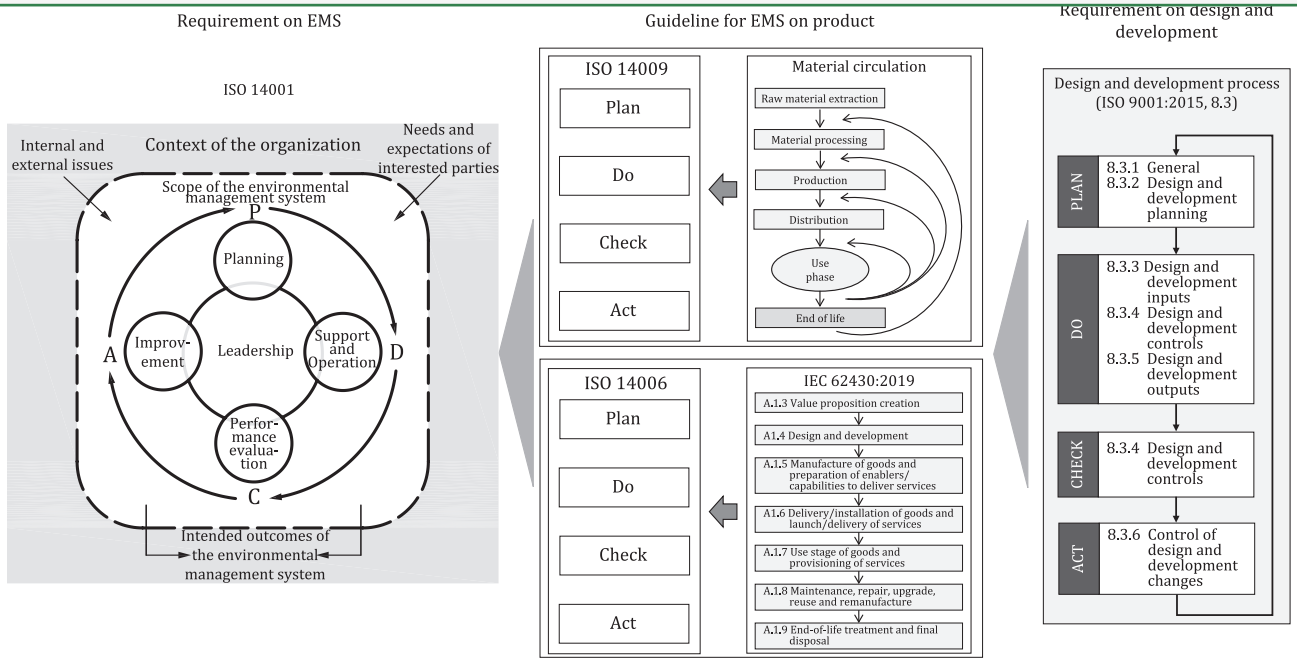

Figure 1 — Relationship between ISO 14001, ISO 14006 and this document

0.3 Overview

This document provides guidelines related to ISO 14001, a management system standard (MSS), and uses an identical structure. It places priority on the clauses of ISO 14001 for planning (Clause 6) and operation (Clause 8):

— Clauses 4, 5, and 7 cover aspects related to an EMS;

— the establishment of material circulation strategies for products is considered in Clause 6;

— creating material circulation solutions, design considerations for material circulation, and ensuring operational planning and control are provided in Clause 8.

Additionally, this document contains the following annexes to assist users in understanding material circulation:

— Annex A shows the relationship between the circular economy and material circulation;

— Annex B provides examples and an explanation of interested parties;

— Annex C illustrates material flow in material circulation and the link with material efficiency;

— Annex D provides a case study on the redesign of existing products.