International Standard

ISO 59014

First edition
2024-10

Environmental management and circular economy — Sustainability and traceability of the recovery of secondary materials — Principles, requirements and guidance

Management environnemental et économie circulaire — Durabilité et traçabilité de la valorisation des matières secondaires — Principes, exigences et recommandations

Reference number
ISO 59014:2024(en)

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Published in Switzerland

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Foreword

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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 document 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).

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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 5, *Life cycle assessment*, in collaboration with Technical Committee ISO/TC 323, *Circular economy*.

This first edition cancels and replaces IWA 19:2017, which has been technically revised.

The main changes are as follows:

— extended focus going beyond the recovery of metals from recoverable resources;

— inclusion of operational requirements;

— proper recognition of subsistence activities;

— alignment with most recent developments in the ISO 59000 family of standards;

— consideration of life cycle perspective for achieving the best environmental and social outcome from the recovery of secondary materials;

— comprehensive focus on circular economy with the inclusion of a pathway methodology for the recovery of secondary materials.

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

The global economy is “linear” as it is mainly based on extraction, production, use and disposal. This linear economy leads to resource depletion, biodiversity loss, waste and harmful losses and releases, all of which collectively are causing serious damage to the capacity of the planet to continue to provide for the needs of future generations.[18] Moreover, several planetary boundaries have already been reached or exceeded.

There is an increased understanding that a transition towards an economy that is more circular, based on a circular use of resources, can contribute to meeting current and future human needs (welfare, housing, nutrition, healthcare, mobility, etc.). Transitioning towards a circular economy can also contribute to the creation and sharing of more value within society and interested parties, while natural resources are managed to be replenished and renewed and in a sustainable way, securing the quality and resilience of ecosystems.

Organizations recognize many potential reasons to engage in a circular economy (e.g. delivering more ambitious and sustainable solutions; improved relationships with interested parties; more effective and efficient ways to fulfil voluntary commitments or legal requirements; engaging in climate change mitigation or adaptation; managing resource scarcity risks, increasing resilience in the environmental, social and economic systems), while contributing to satisfying human needs.

The ISO 59000 family of standards (see Figure 1) is designed to harmonize the understanding of the circular economy and to support its implementation and measurement. It also considers organizations, such as government, industry and non-profit, in contributing to the achievement of the United Nations (UN) Agenda 2030 for Sustainable Development.[19]

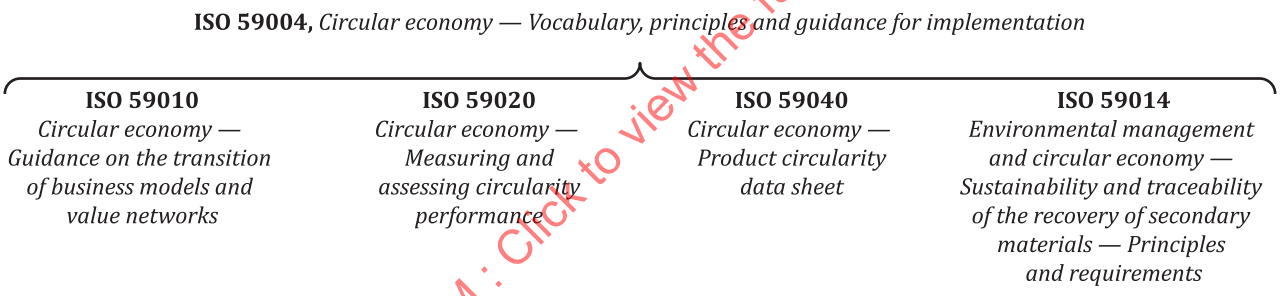


Figure 1 — ISO 59000 family of standards

Responsible, efficient and sustainable management of recoverable resources is a key action for organizations to keep more materials in a circular economy. This action is needed to respond to existing risks and impacts and growing consumer interest about the materials used, and to prevent the shifting of environmental or social impacts between life cycle stages, organizations, communities or countries. This specifically applies to organizations involved in activities and processes leading to the recovery and further use of secondary materials.

The management of waste that is considered a recoverable resource represents an important economic opportunity, while also contributing to reducing the demand for and extraction of virgin resources. The processing and subsequent use of secondary materials prevents the disposal of a resource that can provide value to another interested party(ies) and, thus, supports achieving environmental goals and improving the situation in many regions of the world.

However, inadequate waste management, poor working conditions, and lack of health and safety procedures pose risks and impacts to human health and the environment. These risks often go unidentified or ignored, particularly affecting workers in subsistence activities, communities, and the environment.

Furthermore, consumers are increasingly concerned about the environmental and social risks and impacts associated with the materials and products they purchase. Interested parties want to be informed if a recycled material is sustainably produced.

Traceability plays an important role in the circular flow of resources as it allows for the flow of recoverable and recovered resources, including secondary materials, to be tracked and accounted. The ISO 14000 family of standards supports efforts to identify the risks and opportunities of the preparation and use of secondary materials and to provide harmonized approaches for their environmental management. A key element is the link of environmental and social impacts in the life cycle of materials.

This document aligns with the ISO 14000 family of standards on environmental management (see Figure 2) and can also contribute to enhancing the harmonization system codes (HS code) for secondary materials.

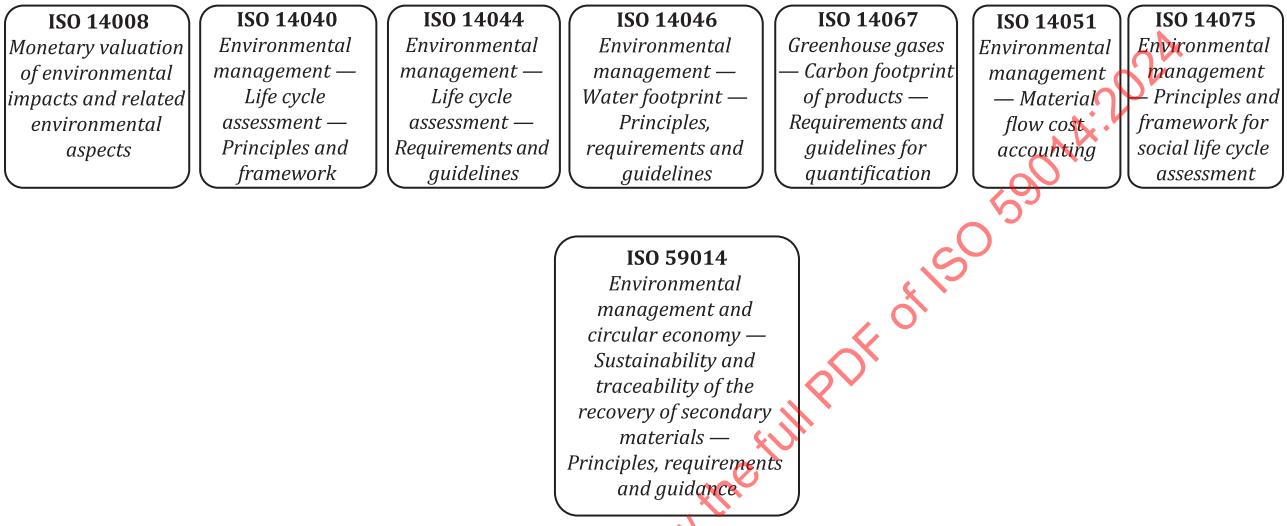


Figure 2 — ISO 14000 family of standards

0.2 Purpose and the outline of this document

This document provides principles, requirements and guidance to any kind of organization seeking to recover secondary materials. It describes the main terms and definitions (see Clause 3), principles (see Clause 4), activities, processes and organizations (see Clause 5), operational requirements (see Clause 6), organizational requirements (see Clause 7) and traceability requirements (see Clause 8).

Environmental management and circular economy — Sustainability and traceability of the recovery of secondary materials — Principles, requirements and guidance

1 Scope

This document provides principles, requirements and guidance for organizations in fostering the sustainability and traceability of activities and processes for the recovery of secondary materials.

This document also specifies requirements and provides guidance for organizations that engage with individuals involved in subsistence activities (SAs) as part of the organization's activities and processes for the recovery of secondary materials, with the aim of ensuring safe and healthy working conditions and the continual improvement of the well-being, livelihoods and professional practices of those individuals.

This document is applicable to organizations seeking to recover secondary materials systematically and responsibly using life cycle and circular economy perspectives, regardless of their size, type and location.

This document does not provide quality criteria for specific types of secondary materials recovered. Energy recovery and disposal are outside the scope of this document.

The collection, classification, sorting and non-destructive processes can lead to the recovery of components and products. The preparation and processing of products or components for their reuse or reprocessing (e.g. for repurposing, remanufacturing, refurbishment and repair) are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14040, *Environmental management — Life cycle assessment — Principles and framework*

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO 14050, *Environmental management — Vocabulary*

ISO 14075[1)], *Environmental management — Principles and framework for social life cycle assessment*

ISO 59004, *Circular economy — Vocabulary, principles and guidance for implementation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 59004, ISO 14050 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

1) Under preparation. Stage at the time of publication: ISO/FDIS 14075:2024.

3.1
child labour
work that deprives children of their childhood, their opportunity to attend school, their potential and their dignity, and that is mentally, physically, socially or morally dangerous and harmful to children

Note 1 to entry: Child labour interferes with their schooling by:

— depriving them of the opportunity to attend school;

— obliging them to leave school prematurely; or

— requiring them to attempt to combine school attendance with excessively long hours and heavy duties.

Note 2 to entry: In its most extreme forms, child labour involves children being enslaved, separated from their families, exposed to serious *hazards* (3.8) and illnesses and/or left to fend for themselves on the streets of large cities, often at a very early age.

Note 3 to entry: Children's participation in work that contributes to their development and the welfare of their families can be considered as positive if this provides them with skills and experience, helps to prepare them to be productive members of society during their adult life and does not affect their health and personal development or interfere with their schooling. These activities include helping their parents around the home, assisting in a family business or earning pocket money outside school hours and during school holidays.

Note 4 to entry: Derived from the International Labour Organization "What is child labour?"[16].

3.2
circular economy
economic system that uses a systemic approach to maintain a circular flow of resources, by recovering, retaining or adding to their *value* (3.23), while contributing to sustainable development

Note 1 to entry: Resources can be considered concerning both stocks and flows.

Note 2 to entry: The inflow of virgin resources is kept as low as possible, and the circular flow of resources is kept as closed as possible to minimize *waste* (3.24), losses and releases from the economic system.

[SOURCE: ISO 59004:2024, 3.1.1]

3.3
classification
systematic identification of *recoverable resources* (3.16) with the purpose of making decisions relating to the *recovery pathway* (3.17) and the recovery of resources according to defined attributes

Note 1 to entry: Examples of attributes include *product* (3.15), component and *material* (3.12) type and characteristics, composition, hazardousness, process requirements and repairability.

3.4
continual improvement
recurring activity to enhance performance

[SOURCE: ISO 14050:2020, 3.1.13]

3.5
depollution
selective treatment during which certain substances, mixtures or components that are potentially harmful are safely removed

Note 1 to entry: Examples of removed elements include pollutants and declared *hazardous substances* (3.9).

Note 2 to entry: Depollution does not include the cleaning of food.

3.6
destructive process
process to obtain *secondary materials* (3.19) without any intent of preserving the original *product* (3.15) or component

EXAMPLE Disintegration (crushing, shredding, milling, grinding), concentration (separation, destructive *depollution* (3.5), homogenization), refining and re-melting.

3.7
disposal
process which does not result in the recovery of *products* (3.15), components, *secondary materials* (3.19) or energy

3.8
hazard
potential source of harm

[SOURCE: ISO/IEC Guide 51:2014, 3.2]

3.9
hazardous substance
substance which can adversely affect human health or the environment with immediate or retarded effect, either by itself or through interaction with other factors

Note 1 to entry: Hazardous substances are typically identified by international or national regulations which guide on proper processing and *disposal* (3.7).

3.10
interested party
person or *organization* (3.14) that can affect, be affected by, or perceive itself to be affected by a decision or activity

Note 1 to entry: To "perceive itself to be affected" means the perception has been made known to the organization.

[SOURCE: ISO 14001:2015, 3.1.6, modified — Example deleted.]

3.11
life cycle perspective
life cycle thinking
consideration of the environmental, social and circularity aspects relating to a *product* (3.15), component and *material* (3.12) during their entire life cycle

[SOURCE: ISO 14050:2020, modified — "social and circularity" added after "environmental", "component and material" added after "product".]

3.12
material
substance or a mixture of substances that can be used to make a *product* (3.15)

3.13
non-destructive process
process to obtain resources recoverable as *secondary materials* (3.19) or whole *products* (3.15) and components that preserves the original product or component

EXAMPLE Salvaging, cleaning, emptying, non-destructive *depollution* (3.5), disassembling.

3.14
organization
person or group of people that has its own functions with responsibilities, authorities, and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to sole trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private (e.g. foundation, union, association, agency, municipality, region, country, intergovernmental agencies).

Note 2 to entry: A group of organizations can also be considered as an organization that has, alone or collectively, their own objectives.

[SOURCE: ISO 14001:2015, 3.1.4, modified — Examples in Note 1 to entry added. Note 2 to entry added.]

3.15
product
physical-based object designed for or utilized with a purpose

Note 1 to entry: A product can be, for example:

— goods of any type;

— hardware (e.g. engine mechanical part, spare parts, consumables);

— electrical or electronic hardware devices or components (e.g. computers, communication equipment and sensors);

— processed *materials* (3.12) (e.g. lubricant, plastic, glass).

Note 2 to entry: The term "product" excludes services (such as software).

Note 3 to entry: Intellectual, financial or digital products are considered as services.

[SOURCE: ISO 59004:2024, 3.2.2, modified — "plastic, glass" replaced "cement" in Note 1 to entry. Notes 2 and 3 to entry added.]

3.16
recoverable resource
resource that can be recovered and used again after it has already been processed or used

Note 1 to entry: Recovery can be undertaken to recover, retain or add *value* (3.23).

Note 2 to entry: A recoverable resource can provide no value and be considered *waste* (3.24).

[SOURCE: ISO 59004:2024, 3.3.3]

3.17
recovery pathway
type and sequence of activities and processes applied to recover *products* (3.15), components and *materials* (3.12) from *recoverable resources* (3.16)

3.18
risk
combination of the probability of occurrence of harm and the severity of that harm

Note 1 to entry: The probability of occurrence includes the exposure to a hazardous situation, the occurrence of a hazardous event and the possibility to avoid or limit the harm.

Note 2 to entry: The term "risk" includes potential negative impacts.

Note 3 to entry: The term "harm" is defined in ISO/IEC Guide 51:2014, 3.2.

[SOURCE: ISO/IEC Guide 51:2014, 3.9, modified — Notes 2 and 3 to entry added.]

3.19
secondary material
material (3.12) that has previously been processed or used, has been captured by a recovery system and has completed all recovery process steps, and can be used as an input to produce new materials and *products* (3.15)

Note 1 to entry: Other terminology used, depending on the context, includes ‘‘recovered material.”

3.20
sorting
physical separation or grouping according to defined attributes

Note 1 to entry: Examples of attributes include *product* (3.15), component and material type and characteristics, composition, hazardousness, process requirements and repairability.

3.21
subsistence activity
SA
activity that provides typically self-employed individuals with the minimum to subsist

3.22
traceability
ability to trace and track upstream and downstream data related to a *product* (3.15), component, *material* (3.12) or activity

Note 1 to entry: Data collected can include history, application, location, composition, mass and other relevant information.

3.23
value
gain(s) or benefit(s) from satisfying needs and expectations, in relation to the use and the conservation of resources

EXAMPLE Revenue, savings, productivity, sustainability, satisfaction, empowerment, engagement, experience, public health, trust.

Note 1 to entry: Value is relative to, and determined by the perception of, those *interested party(ies)* (3.10) able to capture it.

Note 2 to entry: Value can be financial or non-financial, e.g. social, environmental, other gains or benefits.

Note 3 to entry: Value is dynamic over time.

[SOURCE: ISO 59004:2024, 3.1.7]

3.24
waste
resource that is no longer considered to be an asset as it, at the time, provides insufficient *value* (3.23) to the holder

Note 1 to entry: The holder can choose to retain, discard or transfer the waste.

Note 2 to entry: Value can be assigned to waste as a result of a need from another *interested party* (3.10), at which point the resource is no longer considered waste.

Note 3 to entry: The assignment of value to waste as a resource is linked, in part, to the available technology.

Note 4 to entry: Some regulations require the holder to dispose of certain types of waste, while others assign value to waste.

Note 5 to entry: Because resources include the energy content or energy potential of *materials* (3.12), such energy, when liberated during a process and not recovered for another use, can be considered a waste.

[SOURCE: ISO 59004:2024, 3.3.6, modified — “(e.g. landfill mining)” deleted in Note 3 to entry.]

4 Principles

4.1 General

Application of the principles in 4.2 to 4.9 is fundamental to ensure that the achievement and demonstration of the sustainability and traceability of the recovery of secondary materials are undertaken in a credible, fair and consistent manner. These principles form the basis for the requirements and guidance in this document.

4.2 Respect for interested parties' interests

Organizations respect, consider and respond to the interests and concerns of its interested parties.

4.3 Value chain responsibility

Organizations consider and take responsibility for environmental and social aspects along the value chain of their products, components and materials, in managing their relationships with the organizations concerned.

4.4 Responsibility towards interested parties engaged in subsistence activities

Organizations engaging with interested parties involved in subsistence activities (SAs), improve their well-being and livelihoods, respect their rights and support their inclusion in the value chain.

4.5 Safe, healthy, and equitable working conditions

Organizations enable safe, healthy and equitable working conditions.

4.6 Protection of the environment

Organizations prevent or mitigate adverse environmental impacts to restore environmental damage that can arise from their activities, processes and products.

4.7 Resource conservation

Organizations conserve resources by minimizing resource use, particularly virgin non-renewable resources, and extending the life cycle of products, components, and materials, where possible. This is achieved by upgrading or at least maintaining their function, service life, and material properties based on the best environmental and social outcomes from a life cycle perspective.

4.8 Life cycle perspective

Organizations consider the entire life cycle of a resource, from raw material extraction and acquisition, through energy and material production and manufacturing, to use and end-of-life treatment. Through such a systematic overview and perspective, organizations identify and assess the consequence of the shifting of the potential environmental and social burdens between life cycle stages or individual processes and aim to avoid any adverse outcome.

4.9 Enabling of circular resource flow using secondary materials

Organizations enable the circular flow of resources through the design of activities, processes and systems that enable the recovery of resources including products, components and materials after end of use and end of life, and maximize their service life and value. Additionally, organizations consider the economic value of resources kept in circular flows.

5 Activities, processes and organizations

5.1 Activities and processes

Activities and processes related to the recovery of secondary materials include the collection of recoverable resources, classification, sorting, and non-destructive and destructive processes as illustrated in Figure 3.

Resources that are non-recoverable as secondary materials are channelled towards energy recovery or proper disposal.

Figure 3 is a simplification of activities and processes for recovering secondary materials. It is acknowledged that sorting, logistics and storage can occur at different stages in the chain of activities and processes.

The sequence of activities and processes can depend on both the intended application of the secondary material to be recovered and the different attributes of the stocks of recoverable resources.

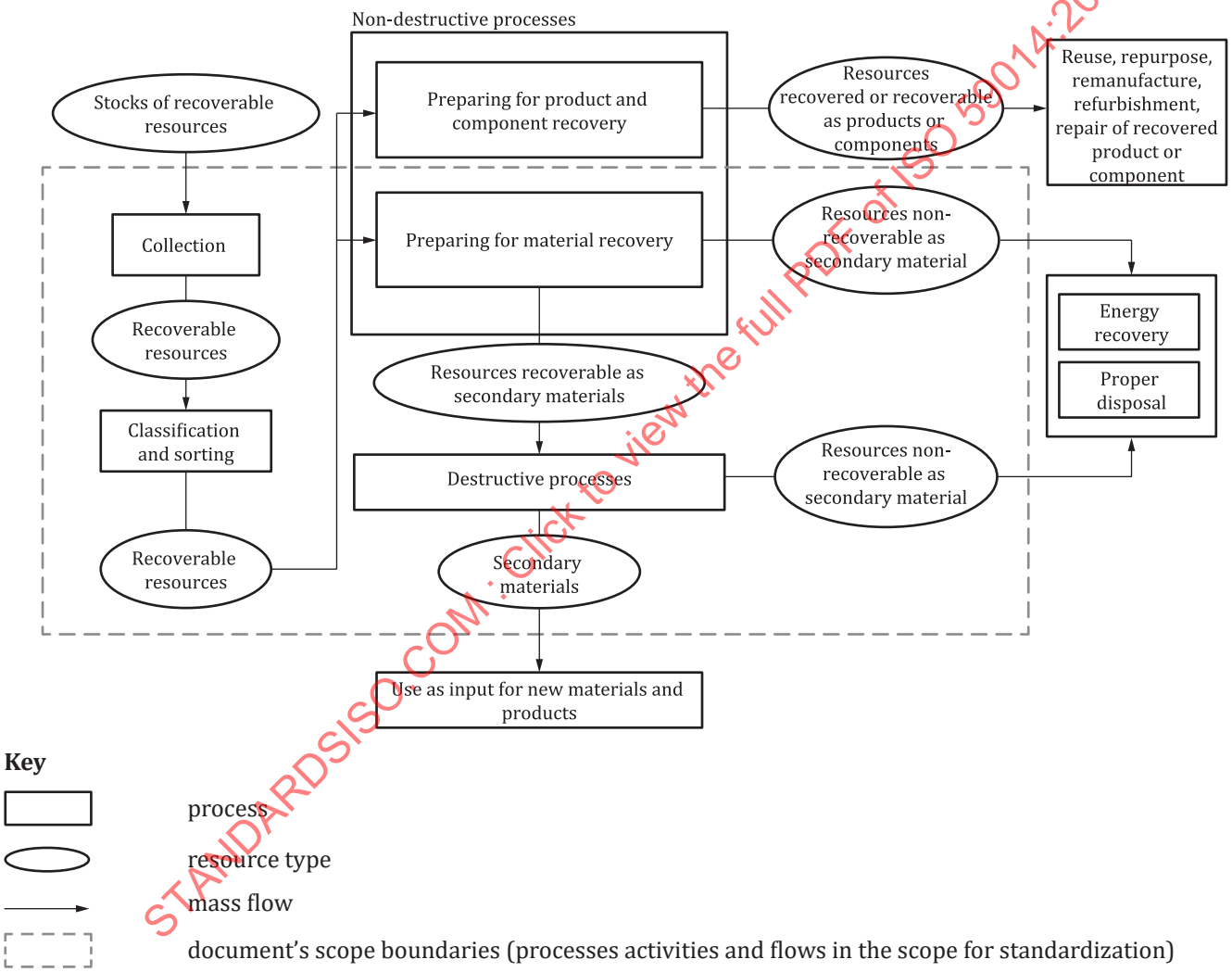


Figure 3 — Simplified representation of activities and processes for recovering secondary materials

NOTE Collection, classification, sorting, non-destructive processes and destructive processes can be combined operations and termed "dismantling" as in the case of the deconstruction of buildings.

5.2 Organizations

Organizations involved in activities and processes leading to the recovery of secondary materials can include, among others, collectors, dismantlers, re-processors, remanufacturers and refiners. Annex A provides examples of organizations involved in recovery processes.

5.3 Recovery pathway

The decision about the recovery pathway is determined by the ways recoverable resources are collected and classified. Annex B provides an example methodology for determining the recovery pathway using decision trees that are applied as part of the classification and sorting process.

5.4 Subsistence activities

Activities conducted by an individual or groups of individuals engaged in SAs can occur throughout the activities and processes shown in Figure 3.

Mechanisms to support any individual or groups of individuals involved in SAs implementing the requirements of this document are described in Annex C.

6 Operational requirements

6.1 General

This clause sets out the operational requirements for activities and processes to recover secondary materials. The order of the operational requirements in this clause is indicative. However, organizations can have a different order of activities and processes or a combination of them.

Requirements shall be applied in accordance with the relevant activities and processes undertaken by the organization.

The organization involved in activities and processes for recovering secondary materials shall identify or define criteria for secondary materials to be recovered that consider their quality and function with the best environmental and social outcome.

The best environmental and social outcome shall be inferred from documented studies which apply a life cycle perspective and include at least consideration of energy consumption and resource scarcity.

If such studies do not provide sufficient information to define the best environmental outcome when identifying or defining the criteria, the organization shall consider conducting studies in accordance with ISO 14040, ISO 14044 and ISO 14075[2]. If these standards are not applied, a rationale for the choice shall be documented.

Based on the properties of the incoming recoverable resources and considering continual improvement, the organization shall identify quantitative and qualitative targets of secondary materials to be recovered.

NOTE Percentage of secondary material recovered can be a target

6.2 Classification and determination of recovery pathways

The organization shall establish, document and maintain a list of attributes relevant to the recoverable resources it handles to facilitate the determination of the recovery pathway and the required recovery processes (see Annex B).

2) Under preparation. Stage at the time of publication: ISO/FDIS 14075:2024.

The organization shall apply a methodology to determine the recovery pathway. A proposed methodology is set out in Annex B. If an alternative methodology to Annex B is chosen, it shall aim for the best environmental outcome based on life cycle perspective and shall be documented together with the rationale for the choice.

NOTE 1 Information sustaining the rationale for the choice includes information available for comparable activities and processes.

Annex B can be supplemented by using publicly available studies based on life cycle perspective or by conducting a life cycle assessment (LCA), in accordance with ISO 14040 and ISO 14044, for comparing the environmental outcomes of the different recovery pathways.

The organization shall identify each delivery of recoverable resources received in accordance with the attributes established in the list of attributes and shall maintain documented information about the results of the identification process for each delivery as part of its traceability system.

If data about attributes are not available, the organization shall apply measures such as testing of the received batch of recoverable resources.

NOTE 2 In this document, a consignment is considered to be the same as delivery.

The organization shall document how decisions regarding the recovery pathway for each delivery were made.

The organization shall keep the list up to date with any relevant changes to the recoverable resources handled and the activities and processes applied.

6.3 Collection

Where the organization has a collection system or is part of the collection systems design, it shall support the separate collection of recoverable resources (e.g. through the provision of separate containers or separate collection points).

NOTE 1 The responsibilities for collection and separation of waste and materials for recovery are sometimes regulated by a national or regional legislative or regulatory framework.

NOTE 2 Collection can occur after dismantling or demolition of, for example, ships and buildings.

Where the organization has a collection system or is part of the collection systems design for recoverable resources, it shall support the development and implementation of measures to facilitate the return or collection of recoverable resources returned or collected (e.g. by supporting collectors with materials lists, communication campaigns and having a take-back scheme in place).

NOTE 3 A selection of different collection system types and collection methods is given in Table B.1.

6.4 Sorting

The organization shall consistently sort recoverable resources in accordance with the identified attributes.

When sorting recoverable resources, the organization shall employ appropriate sorting technologies and practices that facilitate achieving the criteria defined for secondary materials to be recovered (see 6.1).

After sorting resources that are non-recoverable as secondary materials, these materials shall be sent to energy recovery or proper disposal at authorized organizations, where available, or to organizations that handle this material in a proper manner.

After sorting resources that are recoverable as products, components or materials, these shall be sent for proper non-destructive processing or to authorized organizations, where available, that handle these resources for reuse, repairing, refurbishing or remanufacturing.

The organization shall sort the recoverable resources it has collected or received and maintain separation between those resources for which it has traceability data, and those for which it does not. If this is not feasible, the entire consignment shall be considered not traceable in accordance with the requirements of this document.

6.5 Material recovery processes

All the requirements in this subclause apply to both non-destructive and destructive processes, or any combination thereof.

Where recoverable resources have been sorted into material types, the organization shall keep them separate to facilitate further processing.

When preparing for recovering material, the organization shall operate and maintain an adequate infrastructure, technologies and practices that facilitate achieving the criteria defined for secondary materials to be recovered.

The selection of non-destructive and destructive processes, or any combination thereof, shall focus on maximizing the quantity and fulfilling the defined quality criteria of the material recovered with the best environmental and social outcome.

The decision regarding the choice of processes shall be supported by using publicly available studies based on life cycle perspective or by conducting a life cycle assessment (LCA), in accordance with ISO 14040 and ISO 14044, for comparing the environmental outcomes of the different processing options.

The organization shall undertake depollution process in such a way that it prevents the release of substances or mixtures to the environment.

Dilution of the concentration of substances or mixtures to be removed shall not be undertaken as part of depollution.

Depollution shall be undertaken by personnel who are competent based on appropriate education, training or experience regarding depollution.

The organization shall route any resulting hazardous substances and components to proper further treatment.

NOTE The treatment of hazardous substances and components can result in substances and components recovered as resources.

6.6 Logistics

The organization shall handle, transport and store recoverable resources in a way that facilitates their subsequent recovery as whole products, components or materials, ensuring the best environmental outcome.

Resources not recovered as materials, components or products shall be handled, transported and stored in a way that facilitates their energy recovery or proper disposal.

The organization shall use adequate transport, storage, packaging methods and packaging materials to prevent environmental and human health risks, and damage to recoverable resources, and shall reduce resource use.

7 Organizational requirements

7.1 Monitoring and evaluation

The organization shall establish, implement and maintain a monitoring and evaluation plan.

The organization shall regularly monitor and review:

— issues and risks that are relevant to the recovery of secondary materials and that affect its ability to fulfil the requirements in this document;

— measures and means required;

— the application of the code of conduct where it has been agreed to between the organization and the suppliers;

— information about interested parties and their relevant requirements;

— evidence of competence of individuals doing work under its control that affects the performance and effectiveness of its activities and processes;

— performance against targets (such as percentage of secondary material recovered);

— traceability data in accordance with Clause 8.

Workers shall be informed of the monitoring results.

The organization shall retain appropriate documented information.

7.2 Interested party engagement

The organization shall take into account the interests and concerns of interested parties that are affected by or can potentially have an effect on its operations.

NOTE 1 Examples of interested parties are local communities, workers, suppliers, individuals engaged in SAs, consumers of secondary materials, components or products produced, local municipalities, among others.

For the purpose of interested party engagement, the organization shall consider establishing:

— clear and accessible channels for two-way communication with the interested parties identified;

— measures to prevent conflicts with the interested parties identified and grievance mechanisms to resolve active ones.

The organization should design and implement a collaborative structure or join an existing one with defined aims, roles and responsibilities, procedures and appropriate means that facilitate:

— the generation and sharing of ideas, information, data and knowledge to attain the defined quality of the secondary materials and targets;

— the participation in an inclusive way of all supplier(s), customer(s) and other organizations involved in the collection, classification, sorting, processing, transport and logistics (including business-to-consumers and business-to-business) and other interested parties;

— the monitoring of the effectiveness of the engagement of and collaboration with supplier(s), customer(s) and other organizations involved in the collection, classification, sorting and processing and logistics of the consignment.

NOTE 2 A collaborative structure includes the formation of a knowledge-sharing committee with representatives of organizations in the value chain, e.g. with the aim to discuss technical challenges limiting the recovery and to draw solutions.

7.3 Responsibility towards the value chain

The organization shall develop, or adhere to, a value chain code of conduct and communicate this code with the organizations concerned along the value chain as an expectation of the organization. The value chain code of conduct shall refer, as a minimum, to ethical behaviour, traceability aspects and responsible practices for achieving the quality and targets expected of the secondary material to be recovered.

The organization shall incorporate the value chain code of conduct aspects into any type of agreement with the organizations concerned along the value chain.

In establishing the code of conduct, the organization should consider the following:

— prioritize reuse before processes and activities for secondary material recovery;

— labour practice and standards e.g. on child labour laws, anti-discrimination practices, health and safety standards, working conditions, working hours, compensation, right to association and freely chosen employment;

— climate change mitigation measures and pollution prevention during product and material use, extraction, production, recovery, disposal and transportation;

— anti-corruption measures such as those addressed in ISO 37001;

— fair business practices (e.g. upstream in the supply chain);

— review and documentation policy.

The organization should establish procurement criteria in accordance with the value chain code of conduct developed.

NOTE 1 Additional guidance on procurement related to the scope of this document is provided in ISO 59004 and ISO 20400.

NOTE 2 See additional guidance in Annex C on supporting the implementation of this subclause in SAs.

Based on the properties of the incoming recoverable resources and considering continual improvement, the organization shall identify capacity development needs in the value chain and provide corresponding training options for properly applying the code of conduct.

7.4 Responsibility towards individuals engaged in subsistence activities

Where applicable, the organization engaging or intending to engage with individuals involved in SAs shall create an enabling environment to work collaboratively with these individuals that addresses their identified needs and interests with regard to their well-being and livelihoods.

NOTE 1 The added value of involving individuals engaged in SAs includes their high level of skill concerning manual processes and adequate knowledge about the recoverable resources collected (where, when, how to collect), among others.

NOTE 2 The concerns of individuals engaged in SAs can include the unequal power dynamics and inequality rooted in gender, race, class, nationality and religion, and exclusion from value chains.

Where applicable, the organization should develop mechanisms for supporting any individuals involved in SAs, who are part of its value chain, in the continual improvement of their well-being, livelihoods and professional practices (see also Annex C).

NOTE 3 Mechanisms include gradual implementation (see Annex C), which complements the provision of training on health and safety aspects and responsible practices, and provision of a safe working space and personal protective equipment (PPE), among others.

7.5 Equitable working conditions

During activities and processes to recover secondary materials, the organization shall do the following:

a) Establish decent work conditions in their own operations.

b) Prevent child labour, forced labour, harassment and any form of discrimination with a specific focus on vulnerable and disadvantaged workers, women and individuals involved in SAs with whom the organization engages.

NOTE 1 In this context, forced labour refers to work or service that is exacted from any person under the menace of any penalty and for which the said person has not offered themselves voluntarily.[17]

c) Ensure freedom of association and the right to collective bargaining and inform workers of any existing collective bargaining agreement at workplace site(s). If the formation of workers' associations or unions is prohibited in the country of operations, the organization shall provide other mechanism(s) to engage in a dialogue with workers (such as a health and safety committee with representatives from workers and management).

NOTE 2 Workplace is understood as places or facilities where activities and processes for the recovery of secondary materials take place.

d) Provide PPE.

EXAMPLE Masks, goggles, gloves, safety helmets, safety equipment and clothing to protect workers from hazards and hazardous waste, components and substances, first aid equipment.

e) Make toilet and sanitary facilities regularly accessible to workers.

f) Put in place safety and health measures and infrastructure for pregnant workers and workers who have recently given birth or are breastfeeding.

7.6 Risks

7.6.1 Environmental and social risks

The organization shall undertake actions to address identified environmental and social risks that arise from its activities for the recovery of secondary materials, covering, as a minimum, the development of:

— protocols to prevent, reduce or control social or environmental risks and adverse social impacts or environmental impacts from releases (e.g. pollutants);

— protocols, activities, processes and mechanisms that aid and accelerate the recovery of ecosystems that have been degraded or destroyed by its activities (see, for example, land degradation cases in ISO 14055-1) and should ensure financing for preventive and restorative measures.

The organization shall put in place a communication plan to address the interests and concerns of interested parties, covering, as a minimum:

— any risks to the environment or the community related to its processes and activities;

— protocols to be implemented for preserving healthy and safe living conditions;

— emergency protocols (e.g. explosion, fire, contamination, accident).

Where the risks of current practices are not well understood, the organization shall seek to identify information that help it prevent or mitigate the risks.

Where the organization has identified that it is not properly managing harmful substances or is engaging in harmful practices, the organization shall remove the substances from the activities and processes or improve practices to make them safer.

The activities and processes for recovering secondary materials should by themselves not increase the risks of environmental harm arising from releases of hazardous substances.

7.6.2 Health and safety risks of workers and individuals involved in SAs

The organization shall consider the following elements for secondary material recovery at the workplace of their workers and for individuals involved in SAs with whom the organization is engaging:

— health and safety risks;

— protocols to be activated to prevent, reduce or control (separately or in combination) risks and adverse health and safety impacts;

— communication of those risks to those concerned.

7.7 Resource use

The organization shall identify opportunities to minimize resource use and implement corresponding measures.

Consideration should be given to the following measures as relevant to the organization:

— replacing materials made from primary resources with secondary materials, when this represents the best environmental outcome based on life cycle perspective;

— reducing or substituting the use of resources, in particular those that are likely to be scarce for current and future generations (e.g. water in areas with water scarcity, critical raw materials);

NOTE 1 Materials whose availability is threatened can be inferred from relevant national guidance. If not available, equivalent ones from other regions can be used.

— replacing non-renewable resources with renewable resources, when this represents the best environmental outcome based on life cycle perspective;

NOTE 2 Non-renewable and renewable resources can include energy.

— avoiding, reducing or substituting the use of resources which pose a risk to the environment and human health, e.g. very persistent, very bioaccumulative (VPVB) substances;

— minimizing energy or fuel use when collecting, transporting, sorting and processing recoverable resources or secondary materials.

7.8 Competencies and training

7.8.1 Operational and managerial competencies

Operational competency areas cover collection, sorting, classification, treatment processes and logistics. Specific operational competency aspects can include depollution practices, operating safely and standard operating procedures (SOPs).

Managerial competency areas can cover traceability, risk assessment and management, monitoring, data management, reporting and social responsibility aspects, among others.

The organization shall:

a) determine the necessary operational and managerial competencies of individuals doing work under its control that affects the performance and effectiveness of its activities and processes;

b) assess whether the individuals concerned possess the competencies identified;

c) appoint individuals with the required competencies responsible for the operational activities and processes and activities of management processes with a description of the roles of this position;

d) where applicable, take actions to ensure that these individuals are competent on the basis of appropriate education, training, mentoring or experience, and evaluate the effectiveness of the actions taken.

7.8.2 Training needs

The organization shall identify training needs for any organization with whom it engages such as suppliers, sub-contractors and individuals engaged in SAs.

NOTE 1 Engagement with individuals involved in SAs can occur, for example, on the basis of an automatic legal authorization such as the one provided to collectors in certain countries, or a contractual relationship according to the prevailing laws and regulations.

The organization shall plan and conduct training activities in the areas of need. This shall cover, as a minimum, training on the value chain code of conduct of the organization.

NOTE 2 Areas in need for training include operational aspects such as operating safely and SOPs, and management practices (traceability, risk assessment and management, monitoring, reporting and social responsibility aspects, among others).

The organization shall provide guidance, training and awareness raising in an appropriate form, manner and language(s) to workers of the organization in occupational health and safety, emergency response topics, first aid, safe handling, collection, classification, sorting and logistics. Workers shall receive in-depth training in treatment processes.

Where the organization engages with individuals involved in SAs, they shall be provided guidance, training and awareness raising in an appropriate form, manner and language(s) at a minimum on operating safely, emergency response topics and SOPs.

8 Traceability requirements

8.1 General

The organization shall develop and implement a traceability system including procedures and a relevant policy whereby the latter shall be publicly available.

The organization shall collect data about the products, components or materials handled.

A justification shall be provided if traceability data are not available.

8.2 Collection of upstream data

The organization's data shall cover, at a minimum:

a) the name and address of the organizations in its value chain with which it has contractual relationships, including the collection, processing and delivery of the consignment of products, components or materials, and the contact information;

b) confirmation of compliance with the code of conduct (see 7.3) from the organizations in its value chain with which it has contractual relationships;

c) the date of receipt of the recoverable resource and the date of release or shipment;

d) the origin (address) of the consignment;

e) where available, the unique reference number of the recoverable resource (if not available, the organization should assign one);

f) the classification system used for classifying products, components or materials;

EXAMPLE The UNU Key-code for electronic waste.

g) assigned attributes for sorting;

h) indication of recoverable resources that have completed the appropriate stage identified for non-destructive or destructive processes.

8.3 Collection of processing data

The organization's data shall cover, at a minimum:

a) inputs by mass or volume (in SI units) or number of units, preferably categorized by product, component or material types, according to the harmonized system (HS code);

b) percentage of the total amount of inputs routed towards different recovery pathways (see Annex B), energy recovery or proper disposal, identifying main activities and processes applied including depollution;

c) outputs by mass or volume (in SI units) or number of units, preferably categorized by product, component or material types, according to the HS code.

8.4 Collection of downstream data

The organization's data shall cover, at a minimum:

a) the name and address of the receiving organizations;

b) the shipment address;

c) the percentage of the total amount of outputs routed towards different clients and recovery pathways (see Annex B) or energy recovery or proper disposal, identifying types of products, components or materials;

d) the unique reference number (e.g. products or components identification or batch number) generated with commonly accepted code systems (if not available, the organization should assign one);

e) the classification system used for classifying products, components or materials;

f) assigned attributes for sorting;

g) indication of recoverable resources that have completed the appropriate stage identified for non-destructive or destructive processes.

8.5 Collection of depollution data

Where depollution is carried out, the recoverable resources that have been depolluted shall be accompanied by the following related information when receiving them from upstream or delivering them downstream:

— the component, materials, substances or mixtures fully or partially removed;

— the presence of declared hazardous substances and their concentration;

NOTE 1 Concentrations can be provided in a range indicating the method used for estimation.

— documentation that demonstrates that the removed components, materials, substances or mixtures have been routed to proper treatment for recovery, energy recovery or proper disposal.

NOTE 2 Information collected through this document can also be used to support the creation of a product circularity data sheet, which is documented in ISO 59040[3)], and the measurement of circularity as established in ISO 59020.

If data upstream or data downstream cannot be collected, a justification shall be provided.

8.6 Communication

Where the organization intends to communicate about the traceability of the materials, the claims of the organization shall adhere to a recognized model (such as the one outlined in ISO 22095) or equivalent.

The organization shall ensure that the relevant requirements for implementation of the traceability system applied are made available effectively across all relevant interested parties, including workers and suppliers with whom the organization has contractual relationships.

Traceability data shall be made available to the organization's immediate downstream and upstream organizations who can require it.

The organization shall take measures to engage and collaborate with all direct supplier(s) and other organizations involved in the collection, processing and delivery of the materials, components or products, and to support them with their data gathering.

3) Under preparation. Stage at the time of publication: ISO/DIS 59040:2024.

8.7 Continual improvement

The organization shall undertake regular reviews of the effectiveness of the traceability system, revise any aspect found to be ineffective, and implement enhancements to ensure continual improvement.

Annex A
(informative)

Examples of organizations engaged in the recovery of secondary materials

This annex introduces examples of organizations conducting activities and processes in line with Figure 3 towards the recovery of secondary materials from recoverable resources (see Table A.1).

Organizations can be for profit or not for profit. They can be governmental organizations, non-governmental organizations (NGOs), public-private partnerships or from the private sector.

Table A.1 — Examples of organizations engaged in the recovery of secondary materials

Activities and processes	Examples of organizations involved in the activities and processes
Collection	— Municipalities — Commercial waste and recycling companies — Reuse organizations such as non-profit reuse operators, charitable and aid organizations, community organizations and commercial resellers — Waste collection associations or cooperatives — Groups and individuals engaged in SAs — Retailers — Dealers and traders — Producer responsibility organizations (PROs)
Classification and sorting	These processes occur along the whole value chain and so are conducted by all types of organizations.
Non-destructive processes for preparing for product, component or material recovery	— Municipalities — Commercial resellers — Repair organizations — Reuse organizations — Refurbishing workshops — Remanufacturers — Original equipment manufacturers (OEMs) — Commercial waste and recycling companies — Charitable and aid organizations — Community organizations — Dismantling workshops — Groups and individuals engaged in SAs — Work integration programmes
Destructive processes for recovering material	— Commercial waste and recycling companies conducting mechanical or chemical processes — Refining or re-melting companies

Annex B
(informative)

Methodology for selecting the recovery pathway

B.1 Background

The use of a methodology for selecting the recovery pathway provides a systematic approach to implementing in a practical way the principles underlying this document, in particular, the “resource conservation” principle.

The methodology provides a simplified standardized approach for deciding the recovery pathway of recoverable resources.

While the design of products, components and materials is out of the scope of this document, it is acknowledged that their proper design plays an important role for enhancing the potential for circularity of materials.

Collection systems and methods have an impact on the recovery potential. The design of the collection system and method plays a critical role in the recovery potential of products, components and materials, both in terms of quantity and quality.

In some cases, the collection method pre-determines the recovery route.

Table B.1 provides a selection of collection system types and methods and recoverable resources targeted.

Table B.1 — Examples of collection system types and methods and recoverable resources targeted

Collection system types	Collection methods	Recoverable resources targeted
Collection specifically for the recovery or reuse, repurpose, remanufacture, refurbishment and repair of products	Deposit refund or return schemes	Glass and plastic bottles or containers
	Refill schemes	Glass and plastic bottles or containers, ink cartridges
	Pick-up from households or business premises	Furniture, electrical and electronic equipment, clothes
	Drop-off at designated facilities	Clothing and shoes, electrical and electronic equipment, furniture, home furnishing and bedding, toys, books, housewares, jewellery
	Reverse logistics schemes	Automotive parts, truck parts, electronics appliances, office printer/copier cartridges, aircraft parts, rail parts, medical equipment, medical devices, electrical devices
[a] This can require prior disassembly or dismantling.		

Table B.1 *(continued)*

Collection system types	Collection methods	Recoverable resources targeted
Collection with separation into product types for potential recovery of product, component or material	Pick-up from households or business premises	Bulky waste[a] (large items)
	Drop-off at designated facilities	Textiles, electrical and electronic equipment, lighting, furniture, building and demolition waste[a] (including timber, window frames, doors, cables and wires, metallic structural parts, wood, gravel, window glass, bricks, concrete, stone and ceramic tiles, but excluding asbestos), paints and varnishes, car batteries, household batteries, household oils and chemicals, lubricant oils, metal cans
	In-store return schemes	Electrical and electronic equipment, lighting, household batteries, clothes, plastic bottles
	Reverse logistic schemes	Lubricant oils, herbicide containers
Collection as mixed product types for potential recovery of product, component or material	Pick-up from households or business premises	Textiles, electrical and electronic equipment, lighting, furniture, building products[a] (including window frames, window glass, doors, cables and wires, metallic structural parts, wood, gravel, bricks, concrete, stone and ceramic tiles, but excluding asbestos), construction and demolition waste, paints and varnishes, car batteries, household batteries, household oils and chemicals, lubricant oils, packaging (including primary, secondary and tertiary), glass bottles or containers
	Drop-off at designated facilities	
Collection as separate material types for recovering material	Pick-up from households or business premises with kerbside sort	Glass bottles and jars, newspaper, paper packaging, cardboard, aluminium and steel cans, aluminium foil, plastic bottles or containers, tubs and trays, and other compound materials, other plastic packaging, packaging (including primary, secondary and tertiary), glass bottles or containers Sorted materials from house building, construction demolition and material scrap from manufacturing industries
	Drop-off at designated facilities or points	
Collection as mixed material types for recovering material	Pick-up multi-material recycling collections	Packaging materials including glass bottles or containers, newspaper, paper packaging, cardboard, aluminium and steel cans, plastic bottles, tubs and trays, liquid packaging board and other compound materials, packaging (including primary, secondary and tertiary), glass bottles or containers
	Drop off at designated facilities	

[a] This can require prior disassembly or dismantling.

Collection facilities or collection points addressed by the methods include the following:

— reuse and repair centres, remanufacturing facilities;

— household and commercial waste recycling centres;

— non-public drop-off sites (e.g. in residential areas and housing complexes, at business complexes);

— public drop-off banks or sites (e.g. on residential streets, at public transport hubs, in shopping centres);

— in-store collection points;

— reverse vending machines.

B.2 Description of the methodology

The methodology sets out the following steps, and during each of them decisions regarding the recovery pathway are made. These are represented in the form of decision trees.

— Step 1: Determining the collection system and method (see Figure B.1). The first step of the methodology consists of determining which type of collection system is most applicable for the situation at hand. In some cases, more than one collection method can be applicable and, therefore, the steps need to be undertaken for each applicable scenario.

> EXAMPLE 1 The intended outcome of the collection can also be an important consideration. For example, furniture, white goods and clothing can be collected specifically for recovery as a product (commonly termed "re-use"). Where packaging is collected, for instance, this can be collected as separate product types (e.g. glass bottles, newspaper, aluminium cans) and the collection system's intended outcome is material recovery.

— Step 2: Assessing the recovery potential of products and components (see Figure B.2). As a second step, the recovery potential of products is assessed. Where the recovery of products is deemed not viable, the methodology addresses the component recovery potential of recoverable resources. The list of attributes established for the recoverable resources (such as product, component and material type and characteristics, hazard potential, process requirements and repairability) supports the determination of the recovery potential.

— Step 3: Assessing the recovery potential of materials (see Figure B.3). After any products and components have been recovered or where products and component recovery was deemed not viable in step 2, as a final step, the methodology addresses the recovery of material with the aim of maximizing the quantity and optimizing the quality of the material recovered.

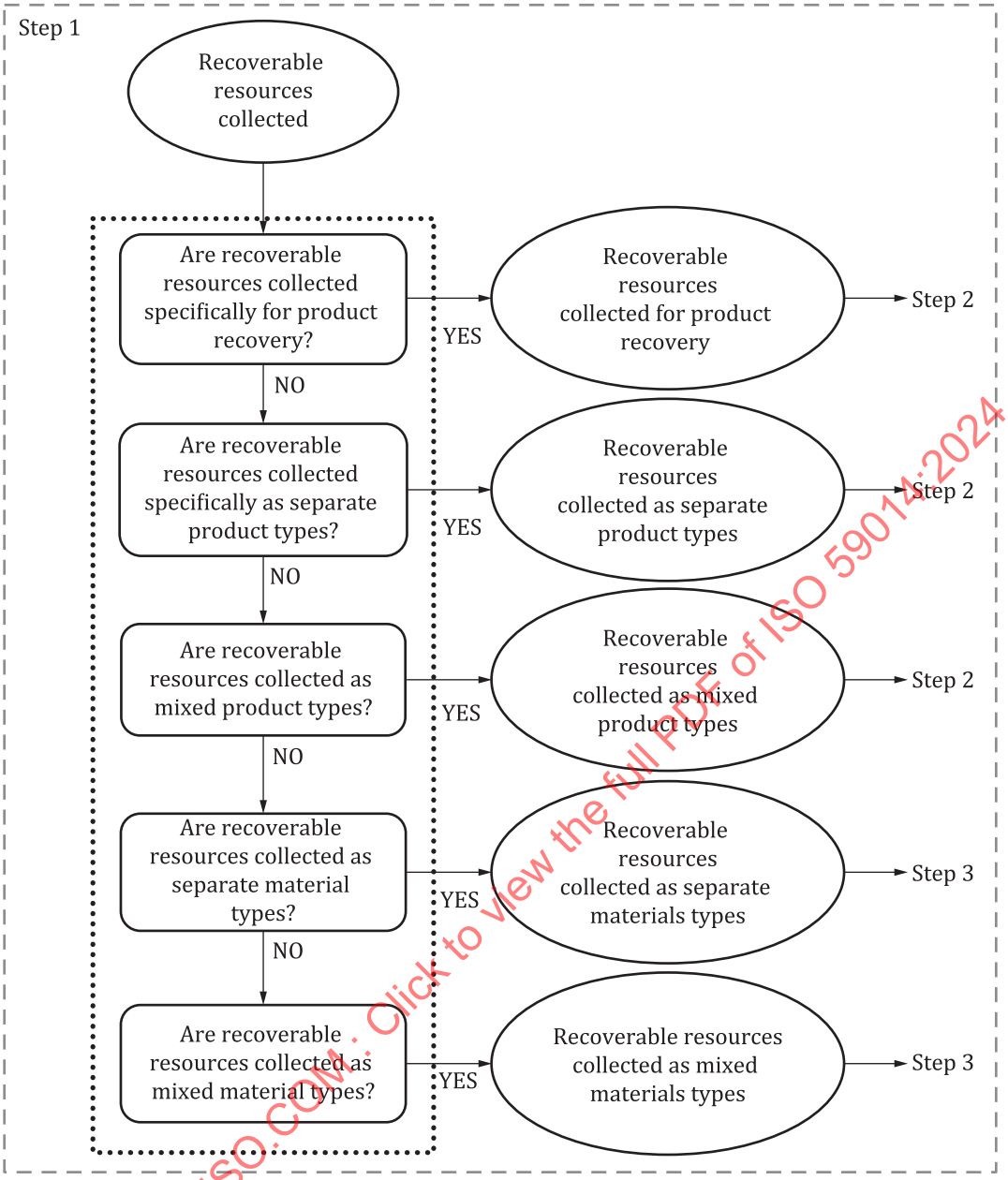
> EXAMPLE 2 Recoverable resources arising from the dismantling and demolition of a building can include products and components such as window frames, steel and aluminium beams, steel roofs and timber flooring that can potentially be reused, and materials such as concrete rubble and facade materials that can be made into aggregate for road building.

Examples of material quality criteria are presented that can be adjusted according to a material-specific situation. Quality levels are not always achievable for all material types where required technologies are not available or where the production costs exceed the market value of secondary materials.

Examples of quality criteria include the following:

— What is not desirable: Additives containing VPVB substances.

— What is desirable: Properties closest to the properties of the original material.



Key

document's scope boundaries (processes, activities and flows in the scope for standardization)

decision-making process

recoverable resources

decision-making question

mass flow

Figure B.1 — Step 1: Determining the collection system and method