CONTENTS

Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.
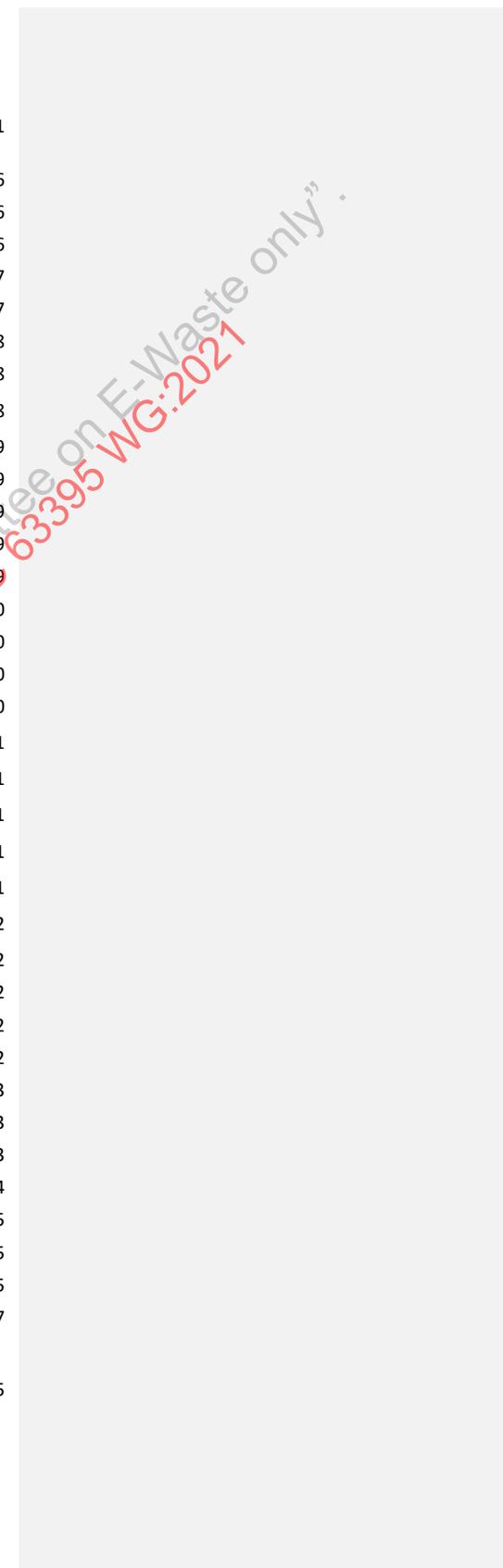
INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

SUSTAINABLE MANAGEMENT OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (E-WASTE)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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

IEC 6XXXX has been prepared by subcommittee XX: TITLE, of IEC technical committee XX: TITLE. It is [...an International Standard, a Technical Specification: specify document type...].

This XXX edition cancels and replaces the XXX edition published in [publication_date], Amendment 1:[publication_date] and Amendment 2:[publication_date]. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) ...;

b)

IEC stage(_WD1_) 63395 © IEC 2021

The text of this [...International Standard, Technical Specification: specify document type...] is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

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

The language used for the development of this [...International Standard, Technical Specification: specify document type...] is English [change language if necessary].

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at https://www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,

- withdrawn,

- replaced by a revised edition, or

- amended.

INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from the patent database available at https://patents.iec.ch/.

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

**SUSTAINABLE MANAGEMENT OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT
(E-WASTE)**

1 Scope

This document specifies the requirements and provides guidance for the sustainable management of waste electrical and electronic equipment (e-waste) from collection to returning reusable products or components or secondary materials to the value chain.

> **Commented [DC(1):** …if we use „should" and "may"

The document is intended for use by an organization involved in e-waste management seeking to manage its responsibilities in a systematic manner.

The requirements set by this international standard will help an organization to achieve sustainability outcomes within the context of e-waste management, including

- enhancement of sustainability performance and achievement of sustainability objectives;

- fulfilment of compliance obligations.

The document is applicable to any organization, regardless of size, type and nature.

The document applies to the environmental and social aspects of e-waste management activities, products and services that the organization determines it can either control or influence, considering a lifecycle perspective.

> **Commented [DC(2):** To be discussed how far we want to go into the social aspects.

> **Commented [W⊐3]:** Social is out of scope of TC 111. Please delete 'social' from the text.

2 Normative references

Standard boilerplate text:

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.

Boilerplate text if no references are listed:

There are no normative references in this document.

3 Terms and definitions

3.1
product

physical-based object designed or utilized with a purpose

Note 1 to entry: A product can be, e.g.:

— goods of any type;

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

— processed materials (e.g., lubricant).

Note 2 to entry: product excludes services (such as software) for the purposes of this standard

Source: ISO/ WD 59004

3.2
non-destructive processing

processing through which recoverable resources are separated into entire items or components without damaging them based on the equipment's structure at the existing detachable connections

Note 1 to entry: processing usually applied for the purpose of further preparation for re-use as well as for further processing and/or depollution

Note 2 to entry: this processing may include semi-destructive processing which accepts damage to or spoilage of low-value parts such as connecting elements, if this helps to achieve the same purpose as non-destructive processing

3.3
secondary material

material that has been used and thereafter processed

Source: JWG14, 2021

3.4   electronic waste

need a definition – consider referencing the UN Basel Convention definitions

3.5   compliance obligations (preferred term) legal requirements and other requirements (admitted term)
legal *requirements* (3.2.8) that an *organization* (3.1.4) has to comply with and other requirements that an organization has to or chooses to comply with

Note 1 to entry: Compliance obligations are related to the *environmental management system* (3.1.2).

Note 2 to entry: Compliance obligations can arise from mandatory requirements, such as applicable laws and regulations, or voluntary commitments, such as organizational and industry standards, contractual relationships, codes of practice and agreements with community groups or non-governmental organizations.

(ISO 14001:2015, 3.2.9)

3.6   document
information and the medium on which it is contained

Examples: Record, specification, procedure document, drawing, report, standard

Note 1 to entry: The medium can be paper, magnetic, electronic or optical computer disc, photograph or master sample, or combination thereof.

Note 2 to entry: A set of documents, for example specifications and records, is frequently called "documentation".

Commented [W⊐4]:
Two terms have already been defined in ISO standards.

secondary material
material (ISO 5659 2:2012, 3.6) recovered from previous use or recovered from **waste** (3.3.11) derived from another *product system* (ISO 14040:2006, 3.28) and used as an *input* (ISO 14040:2006, 3.21)
from ISO 21930:2017(en)
Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

3.6.4
secondary material
material (ISO 5659 2:2012, 3.6) recovered from previous use or recovered from **waste** (3.3.11) derived from another *product system* (ISO 14040:2006, 3.28) and used as an *input* (ISO 14040:2006, 3.21) in another product system
EXAMPLE:
Recycled scrap metal, crushed concrete, glass cullet, recycled wood chips, recycled plastic granulate.
Note 1 to entry: Secondary material is measured at the point [i.e., **system boundary** (3.4.4)] where the secondary material enters the product system from another product system.
[SOURCE:EN 15804:2012 +A1:2013, 3.29, modified — Reference to substituting primary materials has been removed, references to derivation from a previous product system and use as input have been added to replace Note 2 to entry and Note 3 to entry has been changed to examples.

From ISO 21930:2017(en)
Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
]

Note 3 to entry: Some requirements (e.g., the requirement to be readable) relate to all types of documents. However, there can be different requirements for specifications (e.g., the requirement to be revision controlled) and for records (e.g., the requirement to be retrievable).

(ISO 9000:2015, 3.8.5)

3.7   record
document stating results achieved or providing evidence of activities performed

Note 1 to entry: Records can be used, for example, to formalize traceability and to provide evidence of verification, preventive action, and corrective action.

Note 2 to entry: Generally records need not be under revision control.

(ISO 9000:2015, 3.8.10)

3.8   documented information
information required to be controlled and maintained by an *organization* (3.1.4) and the medium on which it is contained

Note 1 to entry: Documented information can be in any format and media, and from any source.

Note 2 to entry: Documented information can refer to:

— the *management system* (3.1.2), including related *processes* (3.3.5);

— information created in order for the organization to operate (can be referred to as documentation);

— evidence of results achieved (can be referred to as records).

(ISO 14001:2015, 3.3.2)

4   Principles for sustainable e-waste management

4.1   Best environmental outcome

Organizations develop and implement measures to deliver the best environmental outcome from a lifecycle perspective, generally prioritising waste prevention and extending product life over material recovery (recycling), energy and other forms of recovery and disposal.

4.2   Pollution prevention

Use of processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) the creation, emission or discharge of any type of pollutant or waste, in order to reduce adverse environmental impacts.

4.3   Systems approach

Organizations take a holistic approach to understand how individual decisions and activities interact within the wider systems they are part of.

4.4   Precautionary principle

Organizations take preventive action against a potentially harmful practice or substance in the absence of scientific certainty, rather than continuing the suspect practice while it is under study, or without study.

4.5   Life cycle thinking

Organizations systematically consider the environmental and social impacts of products over their life cycle, in particular with the view to environmental impacts of product or material recovery and disposal to inform decision about the sustainable management of e-waste.

4.6   Creative collaboration

Organisations develop and implement networks and mechanisms for creative collaboration that facilitate innovative technologies and practices for recovery of resources contained in e-waste.

4.7   Continual improvement

Organisations undertake recurring activities to enhance their sustainability performance.

5   E-waste management system and processes

5.1   General Management system requirements

5.2   The collection and/or logistics operator shall ensure that a management system is in place for all activities in the fields of health, safety, environment and quality.

E-waste collection and/or logistics operators are free to develop a management system. The system shall be documented.

The organization shall establish, document, implement, maintain and continually improve a management system that is capable of supporting and demonstrating the consistent achievement of the requirements of this standard and in conformance with one of the following standards:

- ISO 9001
- ISO 14001
- ISO 45001

The management system shall address quality, environmental, health, safety, and social (QEHSS) risks and aspects applicable to its activities, products and services relating to electronic waste.

5.3   Additional management system requirements

5.3.1   Context of the organization (ISO 9001/ISO 14001/ ISO 45001 Clause 4)

5.3.1.1   Understanding the organization and its content

In determining and evaluating external and internal issues relevant to its purpose and strategic direction and that affect its ability to achieve the intended results of its management system, the organization shall address QEHSS issues.

5.3.1.2   Understanding the needs and expectations of interested parties

The organization shall address relevant QEHSS needs and expectations of interested parties.

5.3.1.3   Determining the scope of the management system

The scope of the management system including its boundaries and applicability shall include the QEHSS the organization's activities, products and services address health, safety, environmental and social risks and aspects applicable to electronic waste. The management system shall support and demonstrate the consistent fulfilment of the requirements of this document. The management system shall consider and address risks associated with data security and data destruction.

Commented [K5]: Referencing these avoids the issue regarding having to try to develop our own management system and running into the possibility of needing to set up a joint working group with the TCs responsible for management system standards – see ISO Directives Part 1. And note that any of these standards is easily adaptable for QESH, data security and social responsibility issues, with the clarifications noted below.

Where additional requirements have been added, these have been added to ensure consistency with ISO 9001/ISO 14001/ISO 45001. For example, if ISO 45001 included an additional requirement specific to scope commitments for health and safety, this was added so that an organization implementing ISO 9001 for QMS would also have to address the ISO 45001 OHS requirement for scope commitment for H&S.

Note that I tried to keep to the clause titles here consistent with those in the current versions of ISO 9001/14001/45001 which align with ISO/IEC Directives Annex SL for standard management system clauses.

Note also that there is considerable overlap with the management system requirements here and those in the ABNT NBR 16156 draft, which seems to be based on the 2006 version of ISO 14001.

5.3.1.4   Management system and its processes

The organization's management system, including processes needed and their interactions, shall address QEHSS as it applies to the organization's activities, products and services.

5.3.2   Leadership and commitment (ISO 9001/ISO 14001/ ISO 45001 Clause 5)

5.3.2.1   5.3.2.1 Leadership and commitment

The organization's top management shall address QEHSS as it applies to the leadership and commitment. This shall include demonstration of leadership and commitment by top management for

a) protecting workers from reprisals when reporting incidents, hazards, risks and opportunities;

b) ensuring the organization establishes and implements a process(es) for consultation and

participation of workers for the occupational health and safety portion of the management system.

5.3.2.2   Policy (ISO 9001/ISO 14001/ ISO 45001 Clause 5.2)

Top management shall establish, implement and maintain a policy that addresses QEHSS. The policy shall:

a) include a commitment to protecting the environment, including preventing pollution

b) include a commitment to consultation and participation of workers, and where they exist, workers' representatives in occupational health and safety.

c) include a commitment to eliminate hazards and reducing health and safety risks

5.3.2.3   Organizational roles, responsibilities and authorities (ISO 9001/ISO 14001/ ISO 45001 Clause 5.3)

Top management shall ensure that responsibilities and authorities are assigned for relevant QESSH roles within the management system.

5.3.3   Planning

5.3.3.1   5.3.3.1 Actions to address risks and opportunities (ISO 9001/ISO 14001/ ISO 45001 Clause 6.1)

The organization shall address risks and opportunities related to QEHSS.

The organization shall establish, implement and maintain a procedure(s)

a) to identify the QESSH aspects of its activities, products and services within the defined scope of the management system that it can control and those that it can influence taking into account planned or new developments, or new or modified activities, products and services, and

b) to determine those aspects that have or can have significant impact(s) on the QEHSS.

The organization shall ensure that the significant QEHSS aspects are taken into account in establishing, implementing and maintaining its QEHSS management system.

The organization shall:

a) determine and have access to the compliance obligations related to its activities, products and services and its QEHSS risks and aspects;

b) determine how these compliance obligations apply to the organization;

c) take these compliance obligations into account when establishing, implementing, maintaining and continually improving its QEHSS management system.

The organization shall identify potential emergency situations that can have an environmental, health and safety impact.

> **Commented [K6]:** From ABNT NBR 16156 draft, 4.3.1

5.3.3.2   5.3.3.2 QEHSS Objectives and planning to achieve them (ISO 9001/ISO 14001/ ISO 45001 Clause 6.2)

In establishing and planning actions to achieve objectives, the organization shall establish QEHSS objectives and develop and implement plans to achieve these.

5.3.4   Support (ISO 9001/ISO 14001/ ISO 45001 Clause 7)

Support actions shall address QEHSS. The following additional requirements also apply:

5.3.4.1   Monitoring and measuring resources

The organization shall determine and provide the resources needed to ensure valid and reliable

results when monitoring or measuring is used to verify the conformity of products and services to

requirements.

The organization shall ensure that the resources provided:

a) are suitable for the specific type of monitoring and measurement activities being undertaken;

b) are maintained to ensure their continuing fitness for their purpose.

The organization shall retain appropriate documented information as evidence of fitness for purpose of the monitoring and measurement resources.

When measurement traceability is a requirement, or is considered by the organization to be an essential part of providing confidence in the validity of measurement results, measuring equipment shall be:

a) calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; when no such standards exist, the basis used for calibration or verification shall be retained as documented information;

b) identified in order to determine their status;

c) safeguarded from adjustments, damage or deterioration that would invalidate the calibration

status and subsequent measurement results.

The organization shall determine if the validity of previous measurement results has been adversely affected when measuring equipment is found to be unfit for its intended purpose, and shall take appropriate action as necessary.

5.3.5   Operational planning and control (ISO 9001/ISO 14001/ ISO 45001 Clause 8)

Operational planning and control actions shall address QEHSS. The following additional requirements apply:

5.3.5.1   Identification and traceability

The organization shall establish, implement and maintain a documented procedure and records that allow to retrieve information about electric and electronic waste received and processed, which shall include:

a) conducting incoming inspection of received material in order to identify actual and potential risks;

b) measures to prove traceability to the next step of electrical and electronic waste management, or according to specific requirement;

c) objective evidence establishing contractual and legal compliance regarding final disposal; d) verification of the intermediate transport of waste in relation to the intended destination;

5.3.5.2   Outsourced processes

- The facility shall only outsource items containing hazardous materials for further processing, recycling, or disposal to facilities adhering to the relevant requirements of this standard.
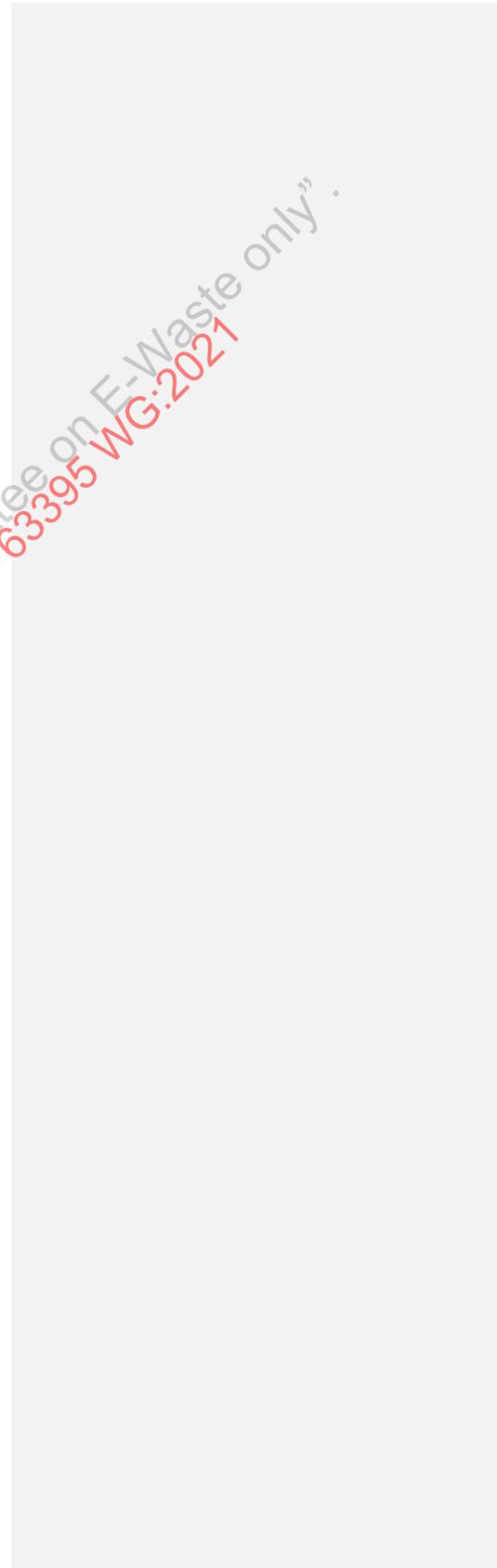
- The organization shall ensure that any hazardous material trans-boundary shipment requirements are met when transferring electronic waste to downstream vendors for further handling/processing.
- The organization shall maintain documented evidence to demonstrate that the outsourced organizations were evaluated and continue to meet the applicable requirements of this standard for the activities that are being outsourced.
- The facility shall maintain traceability of items and subassemblies containing hazardous materials to final re-use or destruction.

5.3.5.3   Emergency preparedness and response

The organization shall establish, implement and maintain the process(es) needed to identify and respond to potential emergency situations.

The organization shall:

a) prepare to respond by planning actions to prevent or mitigate adverse EHS impacts from emergency situations;

b) respond to actual emergency situations;

c) take action to prevent or mitigate the consequences of emergency situations, appropriate to the

magnitude of the emergency and the potential EHS impacts;

d) periodically test the planned response actions, where practicable;

e) periodically review and revise the process(es) and planned response actions, in particular after the occurrence of emergency situations or tests;

f) provide relevant information and training related to emergency preparedness and response, as appropriate, to relevant interested parties, including persons working under its control.

The organization shall maintain documented information to the extent necessary to have confidence that the process(es) is (are) carried out as planned.

5.3.5.4   Site closure plan

The organization shall establish, document and maintain a closure plan that provides for the closure of the facility. The closure plan shall include assurance of adequate funding (e.g., a financial instrument) to ensure proper closure and possible site environmental remediation if necessary.

> **Commented [K7]:** From ABNT NBR 16156 draft, 4.4.6.6 and the US R2 standard

5.3.6   Performance evaluation (ISO 9001/ISO 14001/ ISO 45001 Clause 9)

Monitoring, measurement, analysis and evaluation shall address QEHSS. The following additional requirements apply:

5.3.6.1   Evaluation of compliance

The organization shall establish, implement and maintain the process(es) needed to evaluate fulfilment of its compliance obligations.

The organization shall:

a) determine the frequency that compliance will be evaluated;

b) evaluate compliance and take action if needed;

c) maintain knowledge and understanding of its compliance status.

The organization shall retain documented information as evidence of the compliance evaluation result(s).

5.3.7 Improvement (ISO 9001/ISO 14001/ ISO 45001 Clause 10)

Improvement actions shall address QEHSS.

5.4 Competencies

All employees and contractors of collection and logistic facilities, dealing with E-WASTE, shall be made familiar with the environmental, health and safety policy of the collection and logistics operator. Employees and contractors involved in E-WASTE operations shall be instructed and trained to perform the tasks assigned to them.

Standard operating procedure:
Training shall include emergency response planning, occupational health and safety measures, and training for the relevant operations performed. The effectiveness and suitability of training shall be checked regularly. Training programmes shall be delivered at a level suitable to the trainee in form, manner and language.

Handbook: Employee training materials and information shall be available at the work place and be easily accessible at all times. These should at least cover basic knowledge about E-WASTE, its hazardous nature, its handling, how E-WASTE should be handled and stored in such a way that preserves re-use potential, and treatment.

Where the risk assessment has identified the need for personal protective equipment (PPE) training in the proper use of that PPE shall be provided.

Management options of e-waste: according to the best environmental outcomes (include

Decision trees for determining most sustainable route of treatment of e-waste

Pre-conditions for each treatment route

Identification of relevant actors across the lifecycle/for each treatment route

5.5 Traceability (Lucia, Ricardo & Claudia)

The organization is responsible for traceability of electric and electronic waste received in accordance with this Standard, until its destination or its final final disposal. The organization shall establish, implement and maintain a documented procedure and records that allow to retrieve information about electric and electronic waste received and processed, which should include: a) conducting incoming inspection of received material in order to identify actual and potential risks; b) relevant documents required by clients to prove traceability to the next step of electrical and electronic waste management, or according to specific requirement; c) objective evidence establishing contractual and legal compliance regarding final disposal; d) verification of the intermediate transport of waste in relation to the intended destination; e) provide information to customers when requested; f) written notice, as agreed, the organization responsible for the previous step management of electrical and electronic waste, additions or replacements occur if the organizations that are responsible for the next steps in the management of electrical and electronic waste; g) written notice of any violation of the contract requirements; h) written notice of environmental or OHS penalties that are imposed on the organization or organizations responsible for the subsequent stages of the management of electric and electronic waste to final final disposal.

5.6   General documented Information / records

The organization shall establish and maintain records as necessary to demonstrate conformity to the requirements of its electrical and electronic management system and of this Standard, and the results achieved. The organization shall establish, implement and maintain a procedure(s) for the identification, storage, protection, retrieval, retention and final disposal of records. Records shall be and remain legible, identifiable and traceable.

- All documents shall be stored securely for a minimum period of X years.

Records concerning health, safety, and environmental monitoring include first aid measures, emergency plans, risk assessments documents and records describing incidents, accidents, work related illness, leakages, fires, and related damages.

- records demonstrating compliance with the requirements of this document;

- records concerning health, safety, and environmental monitoring;

- records concerning training of employees and instructions/guidance regarding processes;
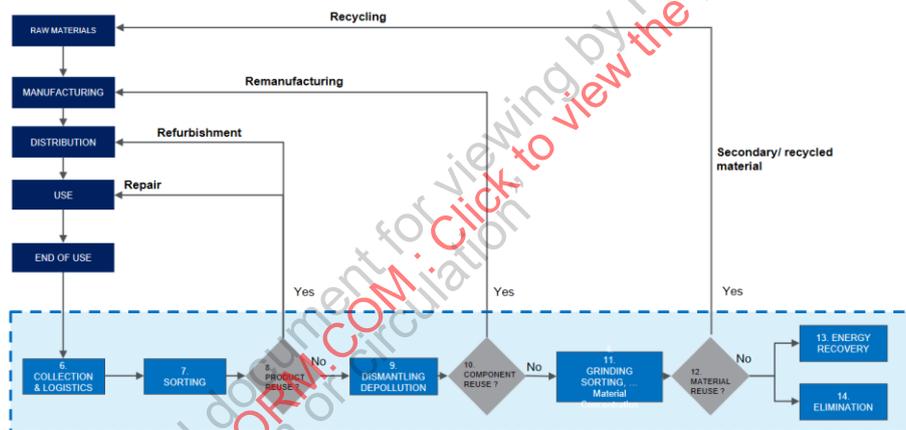

Figure 1 E-Waste Management Process Flow Chart

6   Collection & Logistics

6.1   Risk management requirements

The collection and/or logistics operator shall possess infrastructure, in terms of size, technologies installed, equipment and characteristics of the operations, that is suitable for the activities performed. A risk management process shall assess all tasks performed and include the identification of hazards, the assessment of risk to human health and the environment and, where appropriate, the elimination or reduction of the risk, and documentation of the process.

This risk assessment shall include the identification of those locations and activities that require the use of personal protective equipment and procedures to be followed.

Collection and logistics facilities including storage areas shall be designed, organised, and maintained to provide safe access to, and egress from, the site. Collection and logistics facilities including storage areas shall be secured to prevent access by unauthorised persons to prevent damage to and theft of e-waste.

~~6.2   Transport Licences~~ (to be deleted as this will be legal requirements)

~~Collection and logistics facilities shall ensure that logistics operators have appropriate waste transport licenses before transferring the E-WASTE.~~

~~Collection and logistics facilities shall ensure that information is provided to the carrier so they are aware of the handling and hazardous properties of E-WASTE.~~

6.3   Documented Information / Records

The collection and logistics operator shall maintain the following documentation:

- documents recording the quantity of E-WASTE collected and forwarded (sorted or non sorted) by means of weight notes

- A yearly overview of masses of E-WASTE forwarded shall be kept, based on the e.g. weight notes.

- documents recording the downstream chain of collected E-WASTE until E-WASTE is handed over to a reuse operator or a E-WASTE treatment operator

6.4   Technical requirements

6.4.1   Separate collection of E-Waste

E-WASTE shall be separately collected. E-WASTE shall not be mixed with other types of waste within the same container or receptacles. Exceptions are only acceptable, when the collection and logistics operator can assure complete re-separation at a later stage before assessment for possible re-use or before treatment.

Collection facilities and/or logistics facilities shall set aside sufficient space for the separation of E-WASTE from other waste.

E-WASTE shall be handled and stored with due care in order to avoid release of hazardous substances into air, water, or soil, as a result of damage and/or leakage.

6.4.2   Collection of E-Waste for re-use

Preferably collection facilities and/or logistics facilities should set aside sufficient space for storage of E-WASTE that is suitable for preparation for re-use.

The collection and logistics operator of a municipal or other public collection facility shall provide access to members of the public to hand over household E-WASTE free of charge and provide clear, visible and appropriate signage to direct them to the relevant area or container. This also includes directions for E-WASTE that may be fit for re-use.

Collection and logistics operators are encouraged to set-up support systems to identify whole items of E-WASTE that are potentially suitable for preparation for re-use.

Depending on the collection system of the country, a first selection can also be carried out at the logistics facility.

The collection and logistics operator shall:

- grant access to contracted re-use operator(s)

- ensure that they work with authorised re-use operators

- prevent abuse of the re-use system and ensure no treatment operations take place (such as by the stripping of cables, motors and valuable components), and

- secure the return of E-WASTE deemed unfit for re-use or residual material as E-WASTE to the collection and logistics operator or secure it is handed over to a E-WASTE treatment operator.

6.4.3   Handling

All handling of E-WASTE, including the loading, unloading, storage and transport, shall be carried out using appropriate tools, containers and fixings to avoid damage or hazardous substances being emitted.

E-WASTE shall not be handled in a way that subsequent preparation for re-use, de-pollution or recovery is adversely affected.

E-WASTE shall be placed in containers or stacked in a stable manner to avoid damage or breakage to avoid spillages of oil and other emissions.

Crushing or compacting of E-WASTE prior to treatment is not permitted.

Uncontrolled tipping of containers with E-WASTE shall not be permitted.

Special attention shall be drawn to batteries whether contained in E-Waste or separated from E-Waste.

6.4.4   Storage

Appropriate storage of E-WASTE and attentive site management should be employed at all times to address all health and safety concerns.

All E-WASTE shall be stored on impermeable surfaces with spillage collection facilities (e.g. drains, interceptors, etc.).

Where appropriate to the E-WASTE type being stored (e.g. containing oil), absorbent materials, decanters and cleanser-degreasers shall be available.

Lamps shall be stored separately from other E-WASTE in robust receptacles to avoid damage or breakage of the lamps before they reach the treatment facilities. Any broken lamps or lamp fractions not located in the container should be cleared up without undue delay and stored in closable containers.

E-WASTE at collection and logistics facilities need not to be covered, provided the amount of E-WASTE (broken and unbroken) at the site is processed within a small period of time. Storing broken appliances for a longer period of time requires weatherproof covering.

CRT equipment, flat panel display equipment, temperature exchange equipment, and lamps shall be stored in receptacles or stacked in a stable manner to prevent damage or breakage.

The collection and logistics operator shall have a separate storage area with weatherproof covering available for E-WASTE intended for re-use

6.4.5   Transport

E-WASTE shall be placed in receptacles and transported in an appropriate manner, to minimize movement and risk of breakage during transportation.

Flat panel display equipment shall be transported in small containers, pallet boxes or cages and not in bulk containers in order to avoid breakage of the mercury containing tubes.

Lamps shall be transported in robust receptacles to avoid damage or breakage of the lamps.

All other E-WASTE can be transported either in small containers, pallet boxes and cages, or in open bulk containers covered by at least a net. They do not need to be weatherproof covered as the amount of E-WASTE in the containers is relatively small, the time of residence is short and the risk of dispersal of hazardous materials into the water or air is minimal. E-WASTE that can generate leachate needs to be transported on impermeable surfaces, so to be able to clean up unwanted spillage (eg oil) during transportation. Any unwanted spillage needs to be cleaned up.

Loads shall be inspected and sufficiently secured prior to leaving the site to reduce movement of the load during transport thus ensuring safety of employees when unloading and preventing the likelihood of the load being rejected as unsafe on arrival at the receiving facility.

7   Sorting

E-WASTE fit for preparation for re-use shall be sorted out if there is a requirement at the site.

Prior to treatment, E-WASTE shall be sorted into equipment types according to treatment stream, with a minimum of:

- CRT equipment

- Flat panel display equipment

- Temperature exchange equipment

- Lamps

- Photovoltaic panels

- All other E-WASTE

8   Product Reuse (whole appliances)

Sustainable e-waste management is based on the Best environmental outcome principle (see Section X), whereby the recovery of products and components is generally prioritised over material and other forms of recovery (e.g. energy recovery) and disposal.

This section intends to assist organizations in putting the Best Environmental Outcome principle into practice by providing a methodology to determine the

When determining whether to route an e-waste item towards product, component or material recovery, the following criteria/methodology should be used:

8.1 Collection (?)

8.2 Product recovery

When considering whether an e-waste item is suitable for non-destructive product recovery, the following shall be considered:

8.2.1 Functionality

- Does it function?

- Does it comply with current electrical safety requirements?

- Where an item is not functional, how easily are faults identifiable and how easy is repair deemed to be?

- Where an e-waste item is functional, does it require refurbishment, e.g. cleaning, repair of faults that don't impair functionality, cosmetic improvements?

- What lifecycle aspects have been/need to be considered when determining the item's environmental performance (e.g. energy use rating, potential release of hazardous substances)?

If it is deemed suitable as a secondary or refurbished product, the e-waste item should be routed towards reuse and refurbishment.

8.2.2 Suitability for repair and remanufacturing

- Are required spare parts available?

- Is remanufacturing a technically and economically viable option?

- What lifecycle aspects have been/need to be considered when determining the item's environmental performance (e.g. energy use rating, potential release of hazardous substances)?

- What information is required/available to facilitate repair (e.g. repair manuals)?

If it is deemed suitable for repair or remanufacturing, the e-waste item should be routed towards (non-destructive) repair or remanufacturing processes (see Annex 1 Product Reuse Process)

8.3 Non-destructive component recovery

Where an e-waste item is deemed unsuitable for non-destructive product recovery, as a next step, the recovery of components shall be considered.

- What types of components suitable for recovery does the e-waste item contain?

- Is the non-destructive recovery of components technically and economically viable?

Commented [CK8]: Should the criteria specifically cover decisions made during the collection stage?

Commented [CK9]: Here we could link to EN45553 Assessment for remanufacturability of energy related products

Commented [CK10]: Maybe an example list of components would be helpful?

Commented [CK11]: Here we could link to EN 45555 General methods for assessing the recyclability and recoverability of energy-related products and similar standards if they exist

- What information is required to identify components?

8.4 Component recovery for subsequent material recovery

Where components or assemblies are deemed unsuitable for reuse, they should be recovered for the subsequent recovery of materials contained in this component or assembly (e.g. circuit boards), in particular where these are materials whose availability is threatened now and in the future.

National or regional indices should be used to determine critical raw materials (e.g. EU critical raw materials list).

8.5 Material recovery

Where an e-waste item is deemed unsuitable for product or component recovery, it should be routed towards material recovery.

The following shall be considered:

- How can the recovery of materials be maximised, both in terms of types of materials and the quantity/percentage of material?

- How can the recovery of materials whose availability is threatened now and in the future be maximised? (National or regional indices should be used to identify critical raw materials (e.g. EU critical raw materials list).

- What information is required/available to identify material types and their location within the e-waste item?

> **Commented [CK12]:** This is about recycling effectiveness and ensuring materials with lower economic value are also recovered

8.6 Non-recoverable products, components and materials

All products, components and materials deemed non-recoverable shall be passed to authorised operators for final treatment (e.g. energy recovery).

9 Dismantling, Depollution

Technical and infrastructural pre-conditions

Training

Receiving of e-waste at treatment facility

Handling of e-waste

Clustered storage prior to treatment

Clustered treatment

De-pollution and monitoring of de-pollution

Treatment of non-de-polluted e-waste and fractions

Storage of fractions and components

Clustered storage

Recycling of separated fractions and energy recovery targets

Plastic fractions size

Recovery and disposal of end-of-life/waste fractions

Testing and documentation

...

10 Component Reuse

...

11 Grinding & Sorting

...

12 Material Reuse

...

13 Energy Recovery

...

14 Elimination

...