

Second edition

2021-mm-dd

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**Electrical and electronic waste —  
Handling, collection, transportation and  
storage — Requirement**

ICS 13.030.30

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Reference number

DRS 276-1: 2021

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In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

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## Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

RS 276-1 was prepared by Technical Committee RSB/TC 013, *Water and Sanitation*.

In the preparation of this standard, reference was made to the following standards:

- 1) RS 181:2018, Solid waste — Handling, collection, transportation and disposal — Code of practice
- 2) RS 180:2018, Solid waste — Safe management for disposal sites — Guidelines
- 3) RS ISO 45001, Occupational health and safety management systems — Requirements with guidance for use

The assistance derived from the above source is hereby acknowledged with thanks.

This second edition cancels and replaces the first edition (RS 276-1: 2016) which has been technically revised.

RS 276 consists of the following parts, under the general title *Electrical and electronic waste*:

- Part 1: Handling, collection, transportation and storage — Code of practice
- Part 2: Treatment and disposal — Code of practice

## Committee membership

The following organizations were represented on the Technical Committee on Water and Sanitation (RSB/TC 013) in the preparation of this standard.

Enviroserve Rwanda

Ministry of Trade and Industry (MINICOM) Paragraph of participants

Ruliba Clays

Rwanda Environmental Management Authority (REMA)

Rwanda Mines, Petroleum and Gas Board (RMB)

Rwanda Polytechnic (RP)

Rwanda Utility Regulatory Authority (RURA)

Shine Engineers Multisectoral Company Ltd (SEMC)

Standards for Sustainability (SFS)

SULFO Rwanda

University of Rwanda- College of Science and Technology (UR-CST)

Water and Sanitation Corporation (WASAC)

Rwanda Standards Board (RSB) – Secretariat

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# Electrical and electronic waste — Handling, collection, transportation and storage — Requirement

## 1 Scope

This Committee Draft prescribes practices of handling, collection, transportation and storage of consumer and industrial Electrical and Electronic waste (e-waste), listed in annex A, to ensure the environment and human health is protected against the potential adverse impacts of e-waste.

This standard does not apply to categories of E-waste provided in annex B.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

RS ISO 45001, *Occupational health and safety management systems — Requirements with guidance for use*

## 3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

### 3.1

#### **consumer**

user of electrical and electronic equipment and potential generator of e-waste

### 3.2

#### **chlorofluorocarbon (CFC)**

compound consisting of chlorine, fluorine, and carbon. CFCs are commonly used as refrigerants, solvents, and foam blowing agents

### 3.3

#### **collector**

person who receives e-waste directly from the generator for recycling or processing for reuse. "Collector" includes, but is not limited to, manufacturers, recyclers, and refurbishers who receive e-waste directly from the public

### 3.4

#### **electrical equipment**

includes any machine powered by electricity. They usually consist of an enclosure, a variety of electrical components, and often a power switch. Examples of these include: major appliance, microcontroller, power tool and small appliances. It also often refers only to the components part of the electrical distribution system such as: electric switchboards, distribution boards, circuit breakers and disconnects, electricity meter and transformers

### 3.5

#### **electronic equipment**

equipment that involves the controlled conduction of electrons (especially in a gas or vacuum or semiconductor) e.g. amplifier, audio and sound system, cassette player, DRS player, Cathode Ray Oscilloscope, detector, equalizer, mixer, modem, telephone among others

### 3.6

#### **Electrical and Electronic Equipment (EEE)**

equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields

### 3.7

#### **environmentally sound management**

taking all steps required to ensure that e-waste is handled, collected, transported and stored in a way which shall protect health and environment against any adverse effects, which may result from hazardous substance contained in such waste

### 3.8

#### **e-waste**

"e-waste" is a term used to cover all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of reuse

### 3.9

#### **regulatory authority**

competent authority with the responsibilities to regulate e-waste management



**3.10**

**cooperative**

corporate body with perpetual succession and legal personality, power to sue and be sued, power to enter into contracts, capacity to hold movable and immovable, properties of every description, ability to do all things necessary for the purpose of and in accordance with its bylaws

**3.11**

**licence**

document issued by the competent authority to carry out the activity of collecting and transporting e-waste

**3.12**

**household**

family of one or more persons, residing together in the same house

**3.13**

**collection centre**

centre established individually or a registered association or cooperative, designated agency or a company to undertake collection operations of e-waste

**3.14**

**generator**

any person or institution that produces e-waste

**3.15**

**manufacturer**

entity involved in the making or production of electrical and electronic equipment either locally or internationally

**3.16**

**producer**

any person or entity who introduces or causes to be introduced new and used electrical and electronic equipment into the market by sale, donation, gifts, inheritance or by any such related methods and can either be a manufacturer, importer, distributor or assembler

**3.17**

**take-back**

process of returning or repossessing used products from the market to the producer or their representative

### 3.18

#### transporter

person or entity that is in the conduct of carrying or conveying e-waste from one point to another

### 3.19

#### industrial e-waste

all e-waste generated at the level of the industries.

## 4 Requirements

### 4.1 E-waste handling

**4.1.1** E-waste shall be segregated at source with other types of solid waste and handled separately in accordance with Annex D.

**4.1.2** Different categories of e-waste shall be handled separately depending on the contained hazardous components.

**4.1.3** The handler of e-waste shall wear complete protective garments that shall include boots, water resistant overalls, respirator masks and hand gloves.

**4.1.4** Appropriate containers shall be used in accordance with Annex D and other Best Available Technology (BAT)

**4.1.5** Written procedures shall be readily available for all workers for e-waste handling.

### 4.2 E-waste collection

During e-waste collection the following shall be taken into consideration:

- a) e-waste collection shall be done separately from other types of waste in order to provide adequate treatment, thus preventing pollution and loss of resources;
- b) e-waste containers shall not be overfilled and shall be appropriately covered and labelled; and
- c) the containers shall be immediately replaced once they are worn out.

#### 4.2.1 E-waste collectors/transporters

Collectors/transporters shall:

- a) be trained on e-waste management;

- b) be licensed by the authorised entity;
- c) ensure e-waste is appropriately packed while transporting;
- d) ensure e-waste is appropriately stored; and
- e) ensure the transporting means is appropriately and completely closed.

#### 4.2.2 Establishment of collection and storage systems

Collection infrastructure requires establishment of e-waste collection points and storage areas. The following are requirements for establishing collection points and storage areas:

- a) collection points and storage areas shall provide sorting infrastructure to effectively separate e-waste from other municipal waste in case sorting was not done at the source;
- b) collection facilities shall be available and accessible taking into account the e-waste generation potential of the area;
- c) sites for storage of e-waste prior to their treatment shall have impermeable surface for appropriate areas with the provision of spillage collection facilities and where appropriate, decanters and cleanser-degreasers;
- d) sites for storage of e-waste prior to their treatment shall have weatherproof covering and allow appropriate ventilation;
- e) records of e-waste collected as well as occupational health and safety concerns according to RS ISO 45001 shall be submitted to the competent authority; and
- f) awareness creation on delivery mechanisms of e-waste to the collection centres shall be the responsibility of the producers, competent authorities, retailers and importers.

#### 4.2.3 E-waste collection modalities

The collection modalities are described in terms of the collection channels and infrastructure required to make the channels operational.

##### 4.2.3.1 Consumer take back and storage

Consumer take back and storage shall take the following into consideration:

- a) consumers take back e-waste to retail stores of authorized distributors of similar products;
- b) consumers take back the product at the retail store depending upon purchase of a new product, or without any purchase required;

- c) distributors also shall provide take back schemes to ensure availability and accessibility of designated collection points.

#### **4.2.3.2 Producer/retailer take back and storage**

Producer/retailer take back and storage shall go as follows:

- a) e-waste is taken back by producers/retailer either directly at their facilities or designated collection centres that feed into the e-waste system;
- b) the collected e-waste by the producer is stored on site to be transported for treatment elsewhere or on the site;
- c) the individual producers can have direct contact with dismantlers or recyclers which allows them to take back the re-usable components from their obsolete equipment.

#### **4.2.3.3 Door to door**

The door to door modalities shall:

- a) involve direct pick up of e-waste at the household or institutional level, this process is highly dependent on the stakeholders doing the pick-up especially those who generate significant volumes of e-waste;
- b) involve generators making a request for pick-up of e-waste by the use of online systems or social media to the authorized collectors or recyclers.

#### **4.2.4 Collection centres**

A collection centre shall comply with the following requirements:

- a) enable household e-waste to be collected from streams of household appliances covered by the scope of this Rwanda Standard;
- b) be accessible to the public;
- c) have signs to direct the public to deposit e-waste to the relevant container or area, and prevent mixing of e-waste with other waste;
- d) state the maximum quantity that can be deposited on the site;
- e) have impermeable surface with a sealed drainage and impermeable drains which do not leak to ensure that all liquids are in a sealed sump except where they may be lawfully discharged;
- f) have a weatherproof cover and appropriate ventilation;

- g) have a Collection Point and Storage Facility adequate to serve the geographical area and the volume of separated e-waste tonnage captured;
- h) be located where it complies with environmental regulations;
- i) collection centres shall store the e-waste after sorting it into various categories for easier access by downstream users as well as to facilitate record keeping on the quantities of e-waste;
- j) collection centres shall be located in areas that comply with environmental laws and regulations applicable in Rwanda;
- k) collection centres shall be licensed by the Regulatory Authority in consultation with other relevant key government stakeholders;

### **4.3 Transportation of e-waste**

**4.3.1** Transportation of e-waste from generators collection and treatment facilities shall be done in such a manner that prevents scattering of e-waste on the way.

**4.3.2** Transporters of e-waste shall be responsible for clearing any waste off the road such waste has been accidentally deposited along the road.

**4.3.3** For the safety and health of the e-waste-handlers, they shall be provided with Personal Protective Equipment.

**4.3.4** Transportation of e-waste outside the borders of Rwanda shall be done in accordance with the transboundary movement of hazardous waste.

**4.3.5** E-waste transportation shall entail stringent procedure as they may contain toxic chemicals and other substrates hazardous to human health, the environment and wildlife.

**4.3.6** In the event of the dispersal of e-waste within the haul distance, the generator shall immediately clean-up the area.

**4.3.7** A licence for transportation of e-waste shall be obtained from the regulatory authority.

### **4.4 E-waste storage**

E-waste storage shall respect the following:

- a) the e-waste storage can be within the treatment facility (on site) or outside the facility (off site);
- b) it shall be well covered to store e-waste until it is recycled or treated;
- c) the covering shall be weatherproof to minimise the contamination of clean surface and rain waters. It shall also facilitate the reuse of whole appliances and components intended for recycling and to assist in the containment of hazardous materials and fluids;

- d) the type of weatherproof covering required shall depend on the types and quantities of waste and the storage and treatment activities undertaken;
- e) e-waste items shall be separated and stored in appropriate well marked containers;
- f) the storage area shall have impermeable surfaces and a sealed drainage system. This will ensure that no liquid will run off the pavement and all liquids entering the system are collected in a sealed sump; and
- g) spillage collection facilities shall be provided. They shall include the impermeable pavement and sealed drainage system as the primary means of containment.

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## Annex A (normative)

### Categories of electrical and electronic products covered under the scope of this Rwanda Standard

A.1 List of products which shall be taken into account for the purpose of this standard includes, but are not limited to:

S/N	Categories of Electrical and Electronic Equipment
<b>A</b>	<b>Information Technology and Telecommunication Equipment:</b>
01	Centralized data processing
02	Mainframes, Minicomputers
03	Personal computing
04	Personal computers (Central processing unit with input and output devices)
05	Laptop computers (Central processing unit with input and output devices)
06	Notebook computers
07	Notepad computers
08	Printers including cartridges
09	Copying equipment
10	Electrical and electronic typewriters
11	User terminals and systems
12	Facsimile
13	Telex
14	Telephones
15	Pay telephones
16	Cordless telephones
17	Cellular telephones
18	Answering systems
<b>B</b>	<b>Consumer electrical and electronics</b>
01	Television sets (including sets based on (Liquid Crystal Display and Light
02	Emitting Diode technology), Refrigerator, Washing Machine
03	Air- Conditioners excluding centralized air conditioning plants

## A.2 Toys, leisure and sports equipment:

S/N	Equipment
01	Electric trains or car racing sets
02	Hand-held video game consoles
03	Video games
04	Computers for biking, diving, running, rowing, and other similar gadgets
05	Sports equipment with electric or electronic components
06	Coin slot machines

## A.3 Monitoring and control instruments:

S/N	Instrument
01	Smoke detector
02	Heating regulators
03	Thermostats
04	Measuring, weighing or adjusting appliances for household or as laboratory equipment
05	Other monitoring and control instruments used in industrial installations

## A.4 Automatic dispensers:

S/N	Dispenser
01	Automatic dispensers for hot drinks
02	Automatic dispensers for hot or cold bottles or cans
03	Automatic dispensers for solid products
04	Automatic dispensers for money



## Annex B (normative)

### Categories of products excluded from the scope of this standard

The following equipment shall not be taken into account:

S/N	Equipment
<b>A</b>	<b>Medical devices (with the exception of all implanted and infected products)</b>
01	Radiotherapy equipment
02	Cardiology
03	Dialysis
04	Pulmonary ventilators
05	Nuclear medicine
06	Laboratory equipment for in-vitro diagnosis
07	Analysers
08	Freezers
18	Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability
<b>B</b>	<b>Security and military equipment</b>
<b>C</b>	<b>Transformers and capacitors</b>

## Annex C (informative)

### Hazardous substances that can occur in e-wastes

Hazardous Substance	Use	Risk	Regulatory requirements with threshold quantities
Short Chain Chloro Paraffins, Alkanes, C10-13	Amounts less than 1 % by weight of SCCP are present in mid chain chlorinated paraffin's (MCCP). Used as secondary plasticizer and flame retardant for PVC and chlorinated rubber in cable insulation.	Very toxic to aquatic organisms. It may cause long term effects in the aquatic environment.	Halogenated Aliphatic Compounds $\geq 0.5\%$
Antimony trioxide	The major use is as a flame retardant synergist in plastics etc. It increases the flame retardant effectiveness of halogenated flame retardant compounds thereby minimising their level.	Limited evidence of acarcinogenic effect	Antimony and antimony compounds $\geq 0.005\%$
Beryllium metal	Chassis, rotating mirrors in laser printers; windows for X-ray generators and detectors for research and medical purposes.	Very toxic on inhalation and may cause cancer by inhalation	Beryllium and cadmium compounds $\geq 0.005\%$
Beryllium oxide	Used in heat sink electrical insulators for electrical and electronic systems and devices. It has very high thermal conductivity; very high electrical resistivity; low dielectric constant; low loss factor; high breakdown voltage; and chemically inert.	Very toxic by inhalation. It may cause cancer by inhalation	Beryllium and cadmium compounds $\geq 0.005\%$
Cadmium	Part of the negative electrode material in nickel-cadmium (NiDRS) batteries, as an electrodeposited, vacuum deposited or mechanically deposited coating on iron, steel, aluminium-base materials, titanium-base alloys or other nonferrous alloys, and as an alloying element in low-melting brazing, soldering and other specialty alloys.	Very toxic by inhalation. It may cause cancer.	
Cadmium oxide	Part of the negative cadmium electrode in nickel cadmium and some silver-cadmium military Batteries. Also part of silver cadmium oxide (Ag-DRSO) electrical contact alloys.	May cause cancer by inhalation. Toxic by inhalation. Toxic if swallowed. Danger of serious damage to health by prolonged exposure Harmful if swallowed	
Cadmium sulphide	Serves as the basis compound for a series of pigments and semi conducting compounds. Used in red, orange and yellow pigments for plastics, glasses, ceramics, enamels and artists colours, cadmium sulphide. Also used for phosphors in x-ray fluorescent screens, cathode ray tubes and electronic devices.	Limited evidence of acarcinogenic effect. Toxic by inhalation and if swallowed. Danger of serious damage to health by prolonged exposure. It may cause long term effects in the aquatic environment.	$\geq 0.005\%$
Chromium VI	Used as pigments (e.g.lead chromate) and as corrosion inhibitor (sodium dichromate) In circulating water systems e.g. absorption heat pumps and (industrial) heat exchangers in freezers and refrigerators. Electrical shielding material for certain sheet metals	Toxic if swallowed by inhalation. It may cause heritable genetic damage and cancer by inhalation. Very toxic to aquatic organisms and may cause	$\geq 0.005\%$

		long term effects in the aquatic environment.	
Copper beryllium alloys	Used in electrical connector terminations; switch components; relay springs; electromagnetic radiation seals.	Toxic by inhalation	>=0.005 %
Decabromo-diphenyl-ether (DBDE)	Used as a flame retardant in electrical and electronic plastics.	Potential for forming brominated dibenzodioxins or furans (PBDD/F) in uncontrolled thermal processes, and possibility that higher PBDEs could debrominate to form the tetra and penta BDEs found in	>=0.005 %
		marine environment food chain	
Lead	Used in batteries, solders, alloying element for machining metals, printed circuit boards, components, in incandescent light bulbs, and weighting	Lead compounds, are all classified as dangerous substances.	>=0.5 %
Lead oxide	Occurs in leaded glass in cathode ray tubes, light bulbs and photocopier pastes. Lead oxide is also used in batteries.	May cause harm to the unborn child Harmful by inhalation/harmful if swallowed	>=0.5 %
Liquid Crystals	Commercially available liquid crystals (LC) are mixtures of 10 to 20 substances, which belong to the group of substituted phenylcyclohexanes, alkylbenzenes and cyclohexylbenzenes. Liquid crystal mixtures are used as electroactive layer in liquid crystal display (LDRS).	No indications of carcinogenic potential and acute oral toxicity have been found	
Mercury	It is used in thermostats, sensors, relays and switches, discharge lamps, among others.	Very toxic to aquatic organisms and may cause long term effects in the aquatic environment and the central nervous system (CNS) the kidney in humans Toxic by inhalation	>=0.005 %
Mineral Wool	Man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkali earth oxide (Na <sub>2</sub> O+K <sub>2</sub> O+CaO+MgO+BaO) content greater than 18 % by weight	Limited evidence of carcinogenic effect Irritating to the skin	
Octabromodiphenylether (OBDE)	Flame retardant in plastics used for electrical and electronic equipment	Possible risk of harm to the unborn child	>=0.005 %
Polychlorobiphenyls	Extensively used in capacitors and transformers. Found in refrigerators, cookers, washing machines, air-conditioners, dishwashers.	Very toxic to aquatic organisms and may cause long term effects in the aquatic environment	50mg/kg (0.005%)
Refractory Ceramic Fibers:	Man-made vitreous (silicate) fibers with random orientation with alkaline oxide and alkali earth oxide	May cause cancer by inhalation. Irritating to the skin	


Tetrabromobisphenol-A(TBBPA)	It is used as active (primary use) or additive flame retardant in polymers and printed writing boards.	Potential to form brominated dioxins/furans in thermal processes. Potential for endocrine modulating effects (hormone disrupter) substances"	>=.005 %
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## Annex D (normative)

### BAT- based storage and protective equipment for staff

S/N	Name of tool	Description	Picture example
1	Dismantlers tool kit	Contains tools for assembling and tools for disassembling which are used simply. Operation is reliable and safe	
2	Semiautomatic dismantling tools	Used as equipment that protects the user against health or safety risks at work	
3	High end dust protection masks	Protect workers from toxic dust and fumes  Protect the wearer from inhaling harmful dusts, fumes, vapors, or gases	
4	High end ear muffs	Protect workers from noise, example, CRT cutter, shredder, etc.	
5		Protect workers from cutting themselves while handling CRT tubes	

6	Overcoats, helmets, goggles and safety shoes	Protect workers from injury and offer protection against dust	 
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