

**Collection, logistics & Treatment requirements for WEEE -  
Part 1: General treatment requirements**

To be completed

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This draft European Standard is submitted to CENELEC members for Unique Acceptance Procedure.  
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It has been drawn up by CLC/TC 111X.

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**CENELEC**

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Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## Foreword

This document (FprEN 50625-1:2013) has been prepared by CLC/TC 111X "Environmental aspects for electrical and electronic products and systems".

This document is currently submitted to the Unique Acceptance Procedure.

The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

This document has been prepared under mandate M/518 given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of Directive 2012/19/EU (WEEE).

For the relationship with the EU Directive see informative Annex ZZ, which is an integral part of this document.

## Introduction

This European Standard aims to assist organisations in:

- achieving effective and efficient treatment and disposal of Waste Electrical and Electronic Equipment (WEEE) in order to prevent pollution and minimise emissions;
- promoting increased material recycling;
- promoting high quality recovery operations;
- preventing inappropriate disposal of WEEE and fractions thereof;
- assuring protection of human health and safety, and the environment;
- preventing shipments of WEEE to operators whose operations fail to comply with this normative document or a comparable set of requirements.

This European Standard supports the objectives of the Community's environment policy. These aim to preserve, protect and improve the quality of the environment, protect human health and utilise natural resources prudently and rationally. That policy is based on the precautionary principle and the maxims that preventive action to minimise environmental damage should, where possible, be rectified at source and the polluter should pay.

This European Standard contains requirements applicable to the treatment of all types WEEE. In the future it will be supported by other standards covering particular treatment requirements for (gas discharge) lamps, flat panel displays, cathode ray tubes (CRTs), photovoltaic panels and other equipment containing volatile fluorocarbons or volatile hydrocarbons. Additionally this standard will be supported by a technical report which will provide a more detailed comparison between normative treatment requirements derived directly from the legal text of Directive 2012/19/EC, especially Annex VII, and between informative treatment requirements going beyond the strict requirements of Directive 2012/19/EC.

This European Standard has been prepared in order to support European legislation and so uses some of the terms defined in European law. In order to ensure that the definitions used in this standard are identical to those defined by law these terms are identified as 'void', indicating that this standard does not contain a definition, and a 'Note to entry' that identifies which law contains the legal definition and the term as defined in that law.

146

147 **1 Scope**

148 This European Standard is applicable to the treatment of waste electrical and electronic  
149 equipment (WEEE). This standard will be supplemented, for example by standards covering  
150 specific equipment.

151 NOTE This European Standard is intended to cover WEEE arising from electrical and electronic equipment as  
152 listed in Annex I and Annex III of Directive 2012/19/EU.

153 This standard applies to the treatment of WEEE until end-of-waste status is fulfilled, or until  
154 the WEEE is prepared for re-use, recycled, recovered, or disposed of.

155 This standard addresses all operators involved in the treatment including related handling,  
156 sorting, and storage of WEEE.

157 **2 Normative references**

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

162 EN 14899, *Characterization of waste — Sampling of waste materials — Framework for the*  
163 *preparation and application of a sampling plan*

164 EN 50574:2012, *Collection, logistics & treatment requirements for end-of-life household*  
165 *appliances containing volatile fluorocarbons or volatile hydrocarbons*

166 **3 Terms and definitions**

167 For the purposes of this document, the following terms and definitions apply:

168 **3.1 acceptor – related definitions**169 **3.1.1**  
170 **acceptor**

171 organisation that physically and/or contractually takes ownership of WEEE fractions, after  
172 processing has been carried out by a treatment operator

173 **3.1.2**  
174 **first acceptor**

175 acceptor that directly accepts one or more WEEE fractions from the treatment operator

176 **3.1.3**  
177 **downstream acceptor**

178 every acceptor in the treatment chain following after the first acceptor

179 **3.1.4**  
180 **final acceptor**

181 acceptor where the final treatment step takes place

182 Note 1 to entry: Examples of final treatment steps are material recycling, energy recovery and disposal.

183 **3.2**  
184 **backlight**

185 part of the flat panel display, used with certain flat panel display technologies, that illuminates  
186 the flat panel to make the image visible

187 **3.3**

188 **batch**

189 definite and well-defined amount of WEEE or fractions thereof

190 **3.4**

191 **batch process**

192 procedure where a batch is processed to determine the composition of the resulting output  
193 fractions and de-pollution performance

194 **3.5**

195 **category**

196 Void

197  
198 Note 1 to entry: Category is a term used by Directive 2012/19/EU to describe types of electrical and electronic  
199 equipment within its scope. When used in this standard the word 'category' should be construed as applying in a  
200 comparable manner.

201 **3.6**

202 **component**

203 constituent part of a device which cannot be physically divided into smaller parts without  
204 losing its particular function

205 **3.7**

206 **CRT (Cathode Ray Tube)**

207 component used to display images comprising a vacuum tube and integral fluorescent screen

208 **3.8**

209 **CRT equipment**

210 equipment containing at least one Cathode Ray Tube

211 **3.9**

212 **collection**

213 gathering of WEEE, including the preliminary sorting and preliminary storage of WEEE for the  
214 purposes of transport to a logistics facility or a treatment facility.

215 Note 1 to entry: The term "collection" is defined in Directive 2008/98/EC.

216 **3.10**

217 **collection facility**

218 location designated for the gathering of WEEE to facilitate separate collection

219 Note 1 to entry: Collection facilities are typically registered, listed, or otherwise approved or designated in  
220 accordance with the national legislation implementing Directive 2012/19/EU and Directive 2008/98/EU.

221 **3.11**

222 **de-pollution**

223 selective treatment during which certain substances, mixtures and components are removed  
224 from the WEEE stream

225 Note 1 to entry: Annex F identifies the substances mixtures and components that shall be removed and  
226 treated from separately collected WEEE, the process being de-pollution.

227 **3.12**

228 **disposal**

229 void

230 Note 1 to entry: Directive 2008/98/EC defines disposal: "'disposal' means any operation which is not recovery  
231 even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets  
232 out a non-exhaustive list of disposal operations".

233 **3.13**234 **end-of-waste**

235 result of treatment whereby the resulting fractions are no longer classified as waste

236 Note 1 to entry: Fractions that cease to become waste, following a recovery or recycling operation in  
237 compliance with specific criteria according to Article 6 of Directive 2008/98/EC, are regarded as secondary  
238 materials and so have achieved end-of-waste status.

239 **3.14**240 **energy recovery**

241 production of useful energy through direct and controlled combustion or other processing of  
242 waste

243 Note 1 to entry: Energy recovery is a recovery operation where the material is used principally as a fuel or  
244 other means to generate energy, see R1 of Annex II of Directive 2008/98/EC.

245 **3.15**246 **flat panel**

247 that part of the flat panel display where the image is produced

248 **3.16**249 **flat panel display**

250 assembly of components that use technologies that produce and display an image without the  
251 use of cathode ray tubes

252 Note 1 to entry: The term "flat panel module" is also used as an alternative to the term flat panel display.

253 **3.17**254 **flat panel display equipment**

255 equipment using a flat panel display having a display screen larger than 100 cm<sup>2</sup>

256 Note 1 to entry: Examples of flat panel display equipment include LCD TV, Plasma TV, LCD screens and  
257 monitors, and notebooks.

258 **3.18**259 **fraction**

260 separate output stream generated by the treatment of WEEE

261 **3.19**262 **hazardous waste**

263 waste which exhibits one or more hazardous properties

264 Note 1 to entry: The term "hazardous waste" is defined in Directive 2008/98/EC; the properties of hazardous  
265 waste are described in Annex III of Directive 2008/98/EC.

266 **3.20**267 **lamp**

268 electric light source, for general or special lighting purposes, but excluding filament bulbs

269 Note 1 to entry: General lighting can include straight and compact fluorescent lamps, high intensity discharge  
270 lamps – including high pressure sodium and metal halide lamps, low pressure sodium lamps, and Light Emitting  
271 Diodes (including organic). Special lighting is provided by lamps for the purpose of spreading or controlling light  
272 (UV lamps, projection lamps, xenon lamps, etc.). A non-exhaustive list can be found in Directive 2012/19/EU.

273 **3.21**274 **lamp, gas discharge**

275 void

276 Note 1 to entry: Regulation (EU) No. 1194/2012 contains the following: "Discharge lamp – a lamp in which the  
277 light is produced directly or indirectly by an electric discharge through a gas, a metal vapour, or a mixture of  
278 several gases and vapours".

279 Note 2 to entry: Examples of gas discharge lamps include straight fluorescent lamps, compact fluorescent  
280 lamps, fluorescent lamps, high intensity discharge lamps – including pressure sodium lamps and metal halide  
281 lamps, low pressure sodium lamps, and exclude LED lamps and filament lamps.



282 Note 3 to entry: Some backlighting lamps (typically non-LED types), as mentioned in Annex F of this standard  
283 and Directive 2012/19/EU Annex VII, contain mercury.

284 **3.22**  
285 **logistics facility**

286 facility for receiving and preparing for transportation to WEEE treatment facilities

287 **3.23**  
288 **material recovery**

289 void

290 Note 1 to entry: Decision 2011/753/EU contains the following: “‘material recovery’ means any recovery  
291 operation, excluding energy recovery and the reprocessing into materials which are to be used as fuel”.

292 **3.24**  
293 **national competent authority**

294 body appointed in accordance with the prevailing laws of a Member State to execute various  
295 functions

296 Note 1 to entry: Examples of such functions include performing market surveillance and issuing licences or  
297 permits

298 **3.25**  
299 **operator**

300 entity that performs one or more processes on WEEE

301 Note 1 to entry: Processes on WEEE could include collection, handling, shipping, sorting, storage, transport,  
302 trading, treatment, or preparing for re-use.

303 **3.26**  
304 **photovoltaic panel**  
305 **(PV panel)**

306 equipment intended to be permanently installed to a fixed installation that converts solar  
307 radiation into electrical energy

308 **3.27**  
309 **preparing for re-use**

310 void

311 Note 1 to entry: Directive 2008/98/EC contains the following: “‘preparing for re-use’ means checking, cleaning  
312 or repairing recovery operations, by which products or components of products that have become waste are  
313 prepared so that they can be re-used without any other pre-processing”.

314 **3.28**  
315 **recovery**

316 void

317 Note 1 to entry: Directive 2008/98/EC contains the following: “‘recovery’ means any operation the principal  
318 result of which is waste serving a useful purpose by replacing other materials which would otherwise have been  
319 used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider  
320 economy. Annex II sets out a non-exhaustive list of recovery operations”.

321 **3.29**  
322 **recycling**

323 void

324 Note 1 to entry: Directive 2008/98/EC contains the following: “‘recycling’ means any recovery operation by  
325 which waste materials are reprocessed into products, materials or substances whether for the original or other  
326 purposes. It includes the reprocessing of organic material but does not include energy recovery and the  
327 reprocessing into materials that are to be used as fuels or for backfilling operations”.

328 **3.30**  
329 **removal**

330 void

331 Note 1 to entry: Directive 2012/19/EU contains the following: “‘removal’ means manual, mechanical, chemical  
332 or metallurgic handling with the result that hazardous substances, mixtures and components are contained in an

333 identifiable stream or are an identifiable part of a stream within the treatment process. A substance, mixture or  
334 component is identifiable if it can be monitored to verify environmentally safe treatment".

335 Note 2 to entry: Where used in this standard, it is essential that the word "remove" be construed as having a  
336 meaning that corresponds to the defined word "removal".

### 337 **3.31**

### 338 **re-use**

339 void

340 Note 1 to entry: Directive 2008/98/EC contains the following: "'re-use' means any operation by which products  
341 or components that are not waste are used again for the same purpose for which they were conceived".

### 342 **3.32**

### 343 **storage**

344 process whereby WEEE is selected and deposited in a particular location awaiting treatment  
345 or preparing for re-use

### 346 **3.33**

### 347 **temperature exchange equipment**

348 void

349 Note 1 to entry: This is a category of electrical and electronic equipment covered by Directive 2012/19/EU.  
350 This Directive does not define what is meant by "temperature exchange equipment" but Annex IV contains the  
351 following non-exhaustive list: refrigerators, freezers, equipment which automatically delivers cold products, air  
352 conditioning equipment, dehumidifying equipment, heat pumps, radiators containing oil and other temperature  
353 exchange equipment using fluids other than water for the temperature exchange. If this term is clarified further by  
354 the European Commission or the Courts then it is essential that the term as used in this standard is construed in  
355 the same way as those clarifications.

### 356 **3.34**

### 357 **treatment**

358 void

359 Note 1 to entry: Directive 2008/98/EC contains the following: "'treatment' means recovery or disposal  
360 operations, including preparation prior to recovery or disposal".

### 361 **3.35**

### 362 **treatment facility**

363 location where WEEE undergoes treatment

### 364 **3.36**

### 365 **treatment operator**

366 operator responsible for the treatment of WEEE

### 367 **3.37**

### 368 **volatile fluorocarbon (VFC)**

369 organic chemical compound consisting of carbon and fluorine atoms (in some cases also with  
370 chlorine and/or hydrogen), which is able to change phase when used as a refrigerant or  
371 produce cells in plastic structure of an insulating foam when used as a blowing agent

372 Note 1 to entry: Common commercial designations for these materials are R12, R11 for CFCs, R22, R141b  
373 for HCFCs and R134a for HFCs.

374 Note 2 to entry: Chemically, volatile fluorocarbons could be either alkyl halides or alkene halides.

375 Note 3 to entry: CFC, HCFC, HFC and HC are all VOCs – Volatile Organic Compounds.

376 Note 4 to entry: Annex F of this standard and Directive 2012/19/EU Annex VII part 2 refers to 'foam' rather  
377 than 'insulating foam', as used in the above definition.

378 [EN 50574:2012, 3.2.15]

### 3.38

#### volatile hydrocarbon (VHC)

organic chemical compound consisting entirely of hydrogen and carbon which is able to change phase when used as a refrigerant or produce cells in plastic structure of an insulating foam when used as a blowing agent

Note 1 to entry: Common designations for volatile hydrocarbons are R290 for propane, R600a for isobutane, R1270 for propene and RC601 for cyclopentane. Mixtures of VHC are also possible.

Note 2 to entry: Annex F of this standard and Directive 2012/19/EU Annex VII part 2 refers to 'foam' rather than 'insulating foam', as used in the above definition.

[EN 50574:2012, 3.2.16]

### 3.39

#### waste

void

Note 1 to entry: Directive 2008/98/EC contains the following: "'waste' means any substance or object which the holder discards or intends or is required to discard".

### 3.40

#### WEEE (Waste Electrical and Electronic Equipment)

void

Note 1 to entry: Directive 2012/19/EU contains the following: "'waste electrical and electronic equipment' or 'WEEE' means electrical or electronic equipment which is waste within the meaning of Article 3(1) of Directive 2008/98/EC, including all components, subassemblies and consumables which are part of the product at the time of discarding".

Note 2 to entry: Considering note 1 to entry, this standard covers whole equipment discarded as WEEE and fractions thereof.

## 4 Administrative and organisational requirements

### 4.1 Management principles

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

The treatment operator shall demonstrate continuous improvement of their activities by a review and management process. This management process shall be updated or revised as changes occur to the activities of the treatment operator and evaluated in order to monitor its effectiveness.

The treatment operator shall establish and maintain a procedure in order to identify legal requirements that are applicable to the environmental, health and safety aspects of all activities, services and processes undertaken at the facility.

NOTE A register of the treatment operator's activities and related legal provisions could be maintained together with valid permits required by all relevant authorities.

### 4.2 Technical and infrastructural pre-conditions

The treatment operator shall possess infrastructure, in terms of size, technologies installed, and characteristics of the operations, that is suitable for the activities performed on site. Suitability of the site shall be assessed by a risk management process for all tasks performed on site and include the identification of hazards, the assessment of risk 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.

NOTE Directive 89/391/EEC provides requirements for the safety and health for the protection of workers at work.

Treatment facilities including storage areas shall be designed, organised, and maintained to provide safe access to, and egress from, the site. Treatment facilities including storage areas shall be secured to prevent access by unauthorized persons, to prevent damage to and theft of WEEE and components.

Weatherproof covering shall be required for the areas where:

- whole equipment and/or components, intended for preparation for re-use are stored and/or prepared for re-use, or;
- WEEE and fractions thereof that can cause emissions that are hazardous to the environment is stored and/or treated.

The treatment operator shall, at all times, provide weatherproof covering for the following types of WEEE; gas discharge lamps and equipment containing gas discharge lamps, CRT equipment, flat panel displays and flat panel display equipment.

Requirements for the storage of WEEE prior to treatment, including requirements for weatherproof covering, are given in 5.4.

#### 4.3 Training

All persons at the treatment facility shall be made familiar with the environmental, health and safety policy of the facility. Employees and contractors involved in operations shall be instructed and trained to perform the tasks assigned to them.

Training shall include emergency response planning, occupational health and safety measures, and training for the relevant operations performed on site. 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.

Employee training materials and information including technical guidance documents, risk assessments, safety statements, information charts, information tables, photos or examples of components of WEEE, and safety data sheets for hazardous chemical components shall be available at the work place and be easily accessible at all times.

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

#### 4.4 Monitoring

The treatment operator shall record the origin of each consignment of WEEE accepted at the treatment facility.

NOTE 1 The origin of each consignment is typically location and reference details of the collection facility or logistics facility.

The treatment operator shall record the downstream treatment of WEEE and fractions thereof until end-of-waste status is reached or until the WEEE is prepared for re-use, recycled, recovered, or disposed of. Documentation, see Clause 6, shall record treatment in accordance with Clause 5.

NOTE 2 Downstream monitoring requirements also apply where the downstream operator is a dealer or broker, and when shipped across borders.

The treatment operator shall maintain the following records from the output fractions resulting from the treatment process:

- for fractions that have reached end-of-waste status, only data on the composition of the fractions;
- for metal fractions which contain less than 2 % of non-metal fractions, data on the mass of the output fraction, and the type of treatment technology(ies);

- for non-metal fractions containing less than 2 % of other materials data on the mass of the output fraction, information on the first acceptor and the final treatment technology(ies)

NOTE 3 The number 2 % is taken as a value which is considered to be sufficiently low when calculating recycling and recovery rates. It is not intended to represent a value that will be acceptable to downstream treatment operators. For calculation of output fractions see D.4.

- for fractions which are classified as hazardous according to the European list of wastes; and/or fractions containing materials and components covered by Annex F, data on the mass of the output fraction, information on the first acceptor and the downstream acceptor(s) of the fractions, and the final treatment technology(ies);
- for all other fractions, the mass of the output fraction, information on the first acceptor, composition of the fractions and the final treatment technology(ies) shall be recorded.
- for final fractions being forwarded for energy recovery or disposal, the final treatment technology, information on the downstream acceptor(s), composition of the fractions and the final treatment technology(ies) shall be recorded.

An overview of documentation required for downstream monitoring and the determination of recycling and recovery rates is given in Annex G.

The information recorded on acceptors shall include the following details: name, address of treatment facility, treatment technology and permit issued by the appropriate governmental organisation.

NOTE 4 The documentation of downstream monitoring for the output fractions means the provision of information regarding each acceptor and not to each shipment.

NOTE 5 Regulations 333/2011, 1179/2012 and 715/2013 establish the criteria for determining when certain types of materials obtained from waste cease to be waste under Directive 2008/98/EC.

NOTE 6 The European List of Waste (Commission Decision 2000/532/EC) provides a harmonised list of waste.

NOTE 7 Final treatment technology means the process used for final treatment of materials, e.g. smelting, incineration with or without energy recovery, plastic recycling.

NOTE 8 Examples of fractions containing materials and components covered by Annex F include washing machines with only the motor removed (where these still contain Annex F components); and a non-ferrous stream containing electrolyte capacitors having a height or diameter > 25 mm or proportionately similar volume.

## 4.5 Shipments

No treatment operator shall initiate or contribute to shipments of WEEE, or fractions thereof, which would result in treatment that is not in compliance with this standard.

NOTE 1 Regulatory requirements for cross border shipments, including monitoring, are covered in Regulation 1013/2006/EC and Article 10 of Directive 2012/19/EU.

NOTE 2 Council Directive 2006/117/EURATOM defines requirements for the supervision and control of shipments of radioactive waste between Member States and into and out of the Community.

## 5 Technical requirements

### 5.1 General

WEEE 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.

NOTE 1 Handling includes loading and unloading.

During handling and storage attention shall be given but not limited to:

- temperature exchange equipment (to avoid damage to the temperature exchange system);
- CRT equipment (to avoid implosion and/or emissions of fluorescent coatings);
- gas discharge lamps, appliances containing gas discharge lamps and appliances containing mercury switches (to avoid breakage resulting in the release of mercury);
- smoke detectors (as they may contain radioactive components);

- 520 • appliances containing oil and other fluids within an internal circuit, or capacitors  
521 containing mineral or synthetic oil (to avoid spillages and other emissions);
- 522 • appliances containing asbestos or ceramic fibres (to avoid release of asbestos or  
523 ceramic fibres); and
- 524 • photovoltaic panels (to prevent injury from broken glass and electrocution caused  
525 through contact with hazardous voltages generated when the panels are exposed to  
526 light).

527 NOTE 2 Temperature exchange equipment includes refrigerators, freezers, equipment which automatically  
528 delivers cold products, dehumidifying equipment, air-conditioning equipment and heat pumps and heat pump  
529 tumble dryers.

530 NOTE 3 Appliances that contain gas discharge lamps include sun beds and flat panel display equipment.

531 NOTE 4 Appliances that may contain asbestos include heaters and stoves.

532 NOTE 5 Vacuum insulation panels, e.g. used in fridges and freezers, can contain ceramic fibres as a bulking  
533 agent.

534 The treatment operator shall demonstrate how confidential and personal data stored in the  
535 permanent memory of WEEE received has been destroyed as a minimum through shredding  
536 or grinding or permanently deleted through secure data erasure is deemed to be sufficient.

537 NOTE 6 Personal data is defined in Directive 95/46/EC and can be found, for example, on hard disks found in  
538 computers, (telephone) memory cards and memory chips (e.g. within debit/credit cards).

## 539 5.2 Receiving of WEEE at treatment facility

540 The treatment operator shall:

- 541 • weigh and record each delivery that is received at the facility;
- 542 • separate the WEEE from the non-WEEE; and
- 543 • weigh and record that part which is WEEE.

## 544 5.3 Handling of WEEE

545 All handling of WEEE, including the loading, unloading and transport, shall be carried out  
546 using appropriate tools, containers and fixings to avoid damage where there is the potential  
547 for preparation for re-use or the risk of hazardous substances being emitted.

548 Uncontrolled tipping of containers with CRT equipment, flat panel display equipment,  
549 temperature exchange equipment, and gas discharge lamps and equipment containing gas  
550 discharge lamps shall not be permitted.

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

553 CRT equipment, flat panel display equipment, temperature exchange equipment, and gas  
554 discharge lamps shall be placed in containers or stacked in a stable manner to prevent  
555 damage or breakage.

## 556 5.4 Storage of WEEE prior to treatment

557 The maximum amount of WEEE stored by the treatment operator shall not exceed the amount  
558 of WEEE that can be treated at their treatment facility within twelve months.

559 Locations that store WEEE prior to treatment shall have:

- 560 • impermeable surfaces to prevent ground water and soil contamination;
- 561 • the provision of spillage collection facilities relevant to the type of WEEE stored;
- 562 • where appropriate, decanters and cleanser-degreasers, and
- 563 • weatherproof covering for appropriate areas (see 4.2), so there are no emissions  
564 which give rise to an adverse environmental impact.

565 NOTE 1 Technical requirements of storage of WEEE are described in Annex VIII of Directive 2012/19/EC.

NOTE 2 Weatherproof covering can, for example, be provided by a lid or cover over a container, or a roofed building. The type of weatherproof covering required will depend of the types and quantities of waste and the storage and treatment activities undertaken.

NOTE 3 Provision of weatherproof covering could be required for a number of reasons, e.g.:

- to minimise the contamination of water, air, and land;
- to assist in the containment of hazardous materials and fluids; and
- to facilitate proper treatment of WEEE.

Where containers are used for storage of equipment and fractions, and these have led to pollutant dispersion, the affected containers shall be cleaned and decontaminated prior to their re-use, recycling or disposal.

NOTE 4 Examples of instances where it is appropriate to clean and decontaminate containers include those where the following have occurred: leakage of oil or powdered fluorescent coating materials and contamination from broken glass from devices, or fractions thereof that contained mercury (e.g. gas discharge lamps or CRTs).

## 5.5 De-pollution

The treatment operator shall have procedures to identify WEEE which are known to contain substances, mixtures and/or components listed in Annex F.

NOTE 1 Knowledge regarding which types of WEEE contain substances, mixtures and/or components listed in Annex F can be obtained from previous experience or via information obtained from producers.

The treatment processes identified in the above procedures shall result in the removal of substances, mixtures and components, as listed in Annex F, from WEEE in accordance with Annex A.

NOTE 2 General de-pollution guidelines are described in Annexes A, B and F. Future standards and technical specifications will provide specific de-pollution requirements for particular types of WEEE.

De-pollution shall not damage or destroy components in a way that hazardous substances are released to the environment or distributed to fractions, unless subsequent treatment to remove or render harmless the hazardous substances is carried out. Where release to the environment is possible the fraction containing the hazardous substances shall be contained and/or sealed prior to treatment. The subsequent treatment mentioned above may be performed at the treatment operator's location or another location. Where the subsequent treatment is not performed at the treatment operator's location, the WEEE thus transferred shall be accompanied by information on de-pollution already undertaken.

Fractions containing hazardous substances, hazardous mixtures, or hazardous components shall not be diluted or mixed with other fractions or materials for the purpose of reducing their concentration.

The treatment process to separate material streams shall be documented. Removed substances, mixtures and components (and fractions containing those substances, mixtures and components) shall be kept separate and shall be clearly and identifiable labelled.

NOTE 3 Substances, mixtures and components, to be removed are listed in Annex F.

If it is uncertain whether WEEE contains substances, mixtures or components as listed in Annex F, it shall be treated as though it does contain those substances, mixtures or components.

NOTE 4 Examples of where WEEE could need to be treated as if it contains substances, mixtures or components as listed in Annex F include:

- capacitors that could contain polychlorinated biphenyls (PCB),
- plastics parts that could contain brominated flame retardants or
- products covered by more specific treatment standards, such as temperature exchange equipment, flat panel display equipment, CRT equipment and lamps.

## 5.6 De-pollution monitoring

Monitoring of de-pollution performance is an important criterion to facilitate continuous improvement of the treatment process.

Where appropriate (see Annexes B and D) treatment operators shall carry out monitoring of de-pollution performance in accordance with one or more of the following appropriate methodologies using a systematic approach which documents each step of the process:

- a) target value methodology - compare a measurement of the mass of de-polluted fractions in the outgoing stream with the corresponding target value, or;
- b) mass-balance methodology - establish a mass balance between incoming and outgoing streams, or;
- c) analysis methodology - analysis of representative samples from relevant fractions that result from the treatment of WEEE.

NOTE 1 Benchmarks and target values relative to method (a) can be assessed on the basis of collected data and statistical analyses. In the future target values and limits will be specified in technical specifications.

NOTE 2 In the future specific technical specifications will be developed that will define which method is appropriate to the type of WEEE being treated.

### 5.7 Treatment of non de-polluted WEEE and fractions

Except as specified below, WEEE and fractions containing hazardous substances, hazardous mixtures, or hazardous components shall be treated separately from other waste. It is permitted to treat WEEE and fractions containing hazardous substances, hazardous mixtures, or hazardous components with other hazardous waste if:

- the mixing operation is carried out by a treatment operator which has obtained a permit from the relevant authorities for this activity; and
- the mixing operation does not adversely affect human health, safety, or the environment as determined by review of the relevant risk assessment; and
- the mixing process does not create an additional hazardous waste stream.

If non de-polluted WEEE and fractions are treated by a downstream treatment operator, this treatment operator shall be informed in accompanying documents of the potential presence of hazardous material.

The downstream treatment operator shall be informed of the need for the non-depolluted WEEE or fractions to be depolluted in compliance with the objectives of this standard regardless of the hazardous or non-hazardous nature.

### 5.8 Storage of fractions

All fractions containing hazardous substances shall be stored in a manner that prevents dispersal of the hazardous material to the environment.

Weatherproof covering shall be provided for storage locations for capacitors covered by A.2, mercury containing components, batteries, printed circuit boards, toner cartridges, asbestos and components which contain asbestos, cathode ray tubes, gas discharge lamps, components containing refractory ceramic fibres and components containing radioactive substances.

Containers used for the storage of fractions containing hazardous substances shall be cleaned and decontaminated prior to their re-use, recycling or disposal.

### 5.9 Recycling and recovery targets

Determination of the recycling and recovery rates shall be carried out at least on an annual basis per treatment stream of electrical and electronic equipment according to the requirements of Annex C.

NOTE 1 The recycling and recovery targets are described in Directive 2012/19/EC. The treatment streams mentioned above are identified in Table D.1.

Where only one treatment stream (and no other material) is processed by a treatment operator, then the operator may use annual mass balance data to calculate the recycling and recovery rates.

If more than one treatment stream is treated in the same process then the outcome of the batch process (Annex D) shall be used for the calculation of the recycling and recovery rates



(Annex C). These rates shall be compared with those that are calculated on basis of the annual mass balance. If the difference between the batch and annual mass balance rates is less than 10 % the annual mass balance results shall be used for the calculation. If the difference is more than 10 % the batch results shall be considered and the reason of deviation shall be investigated and explained. When WEEE and non-WEEE are processed together, then batch process data (see D.1) shall be used for the determination of recycling and recovery rates.

Batches shall be performed according to the requirements of Annex D, at least every 2 years per site and per treatment stream.

The recycling and recovery rates shall be determined in accordance with Annex C.

The determination of the recycling and recovery rates shall be completed for each treatment stream, as below, for each WEEE treatment operator, and for each treatment facility.

Where the treatment stream comprises only one WEEE category, or where two or more WEEE categories which are subject to the same targets are treated, the recycling and recovery rates (see C.3) shall be equal or greater than the correspondent recycling and recovery target.

When a treatment stream is a mixture of two or more WEEE categories, which are subject to different targets, the recycling and recovery rates of the mixture shall be equal or greater than the calculated recycling target for the mixture and the calculated recovery target for the mixture (see C.2). The calculated recycling and recovery targets of the mixture shall be determined in accordance with Annex C. In this case the input shares of the WEEE categories shall be based on a known reliable method.

NOTE 2 The recycling and recovery targets for WEEE categories are given in Article 11 and Annex V of Directive 2012/19/EU.

## **5.10 Recovery and disposal of fractions**

The following applies to output fractions comprising mixed materials.

- Where such a fraction is less than or equal to 20 % of the mass of the original input material to the treatment process the treatment operator shall use the composition of this output fraction, as declared by the downstream treatment operator; however, where this is not available a documented simplified analyses (e.g. hand-picking analysis) for a representative composition of this fraction shall be used.
- Where such a fraction contains 2 % or more impurities by mass, and this fraction is greater than 20 % of the mass of the original input material to the treatment process, then the treatment operator shall require that a batch process be carried out by the downstream treatment operator using this material. If this fraction is used by a final acceptor an analysis of a representative sample by the final acceptor is sufficient to determine the composition.

Fractions resulting from the WEEE treatment process can have reached end-of-waste status, or they can be sent for recycling, recovery, or disposal. The principles of the waste hierarchy shall be adhered to.

Hazardous waste that is designated for disposal shall only go to a facility that is designed and designated for the acceptance and disposal of hazardous waste. Hazardous substances or preparations shall, prior to landfill disposal, either be broken down into non-hazardous substances, or be immobilized, or properly managed such that the hazardous substances, mixtures or components cannot be released into the environment.

## **6 Documentation**

The treatment operator shall maintain the following:

- records demonstrating compliance with legal and regulatory obligations applying to all activities undertaken on site;

- 714 • process diagrams with information on each treatment step carried out by the treatment  
715 operator and the resulting fractions;
- 716 • internal administrative procedures and documentation relating to management reviews  
717 and related improvement processes according to 4.1 and in particular, results of  
718 internal controls and de-pollution monitoring (see Annex B);
- 719 • internal administration procedures and documentation relating to the destruction  
720 during the treatment of WEEE of confidential and personal data stored in the  
721 permanent memory, according to 5.1;
- 722 • records concerning health, safety, and environmental monitoring including records of  
723 maintenance of site and servicing of machinery according to 4.2;
- 724 NOTE Records concerning health, safety, and environmental monitoring include first aid measures,  
725 emergency plans, risk assessment documents and records describing incidents, accidents, work related  
726 illness, leakages, fires, and related damages.
- 727 • records concerning training of employees and instructions/guidance regarding  
728 treatment processes including manual dismantling according to 4.3;
- 729 • records of cleaning and decontamination of containers used for storing fractions  
730 containing hazardous substances according to 5.4;
- 731 • results from batch processes performed according to Annex D, and;
- 732 • documents that record downstream monitoring of each fraction according to 4.4 and  
733 records describing the determination of recycling and recovery rates prepared in  
734 accordance with Annex C. An overview of the documentation required is given in  
735 Annex G.
- 736 The treatment operator shall maintain records of each mass balance conducted. Each mass  
737 balance calculation shall be supported by documentation of all material flows (summaries of  
738 incoming and outgoing deliveries and all stored quantities of WEEE and WEEE fractions). An  
739 overall mass balance describing the material flow through the facility shall be prepared at  
740 least on an annual basis; information about individual mass balance calculations, if any, shall  
741 be accumulated to provide an annualised mass balance.
- 742 All batch documents shall be stored securely for a period of five years, with other documents  
743 stored securely for a period of three years.

## **Annex A** **(normative)**

### **De-pollution**

#### **A.1 Introduction**

This annex refers to 5.5, de-pollution, and gives additional information about substances, mixtures, and components to be removed from WEEE according to Annex F.

Substances, mixtures and components shall be removed such that they are contained as an identifiable stream or identifiable part of a stream by the end of the treatment process. A substance, mixture or component is identifiable if it can be monitored to prove environmentally safe treatment. As a consequence of this interpretation of the phrase "have to be removed" two different categories are distinguished in this annex:

- 1) The following shall be removed as a distinct step during the treatment process and prior to size reduction and separation unless the treatment technology captures the materials and components identified in Annex F in an identifiable stream such that it is not released to the environment:

capacitors containing polychlorinated biphenyls (PCB), cathode ray tubes, gas discharge lamps, volatile fluorocarbons, volatile hydrocarbons contained in a refrigerant system, batteries which are accessible in the equipment without using tools, toner cartridges; and components containing asbestos, mercury, refractory ceramic fibres, and radioactive substances (see Annex F).

- 2) The following shall be removed as an identifiable (part of a) stream during the treatment process:

batteries which are not accessible in the equipment without using tools, printed circuit boards, plastics containing brominated flame retardants, volatile fluorocarbons and volatile hydrocarbons other than those contained in a refrigerant system, liquid crystal displays, external electric cables and electrolyte capacitors (> 25 mm or proportionately similar volume) containing substances of concern.

#### **A.2 Capacitors**

The following capacitors shall be removed from separately collected WEEE:

- polychlorinated biphenyls (PCB) containing capacitors;
- electrolytic capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume).

If the treatment operator is not capable of identifying the capacitors described above then they shall remove and consider all such capacitors as though they contained PCBs and/or are electrolytic capacitors containing substances of concern.

The effectiveness of the separation process shall be checked annually in accordance with Annex B.

NOTE As it can be difficult to tell whether capacitors contain PCBs it is suggested to screen all capacitors as below. Capacitors meeting one of the criteria below do not need to be removed as they are presumed to be free of PCBs:

- if it is evident that the capacitor was manufactured after 1986 or they come from appliances produced after 1987;
- if they are declared and/or labelled as being free of PCBs and

Capacitors do not need to be removed from WEEE if there is evidence to show that the presence of PCBs or substances of concern contained in electrolytic capacitors can be discounted where certain identifiable conditions apply. The evidence is only considered acceptable if it is contained in a report that utilizes statistically and

792 scientifically accepted methods and has been issued by an independent body accepted by the relevant national  
793 competent authority.

### 794 **A.3 Printed circuit boards**

795 Printed circuit boards with an area greater than 10 cm<sup>2</sup> shall be removed from separately  
796 collected WEEE.

797 Consideration should be given to potential hazards from printed circuit boards.

798 NOTE 1 During mechanical processing of printed circuit boards there can be a risk of diffuse emission to the  
799 environment and contamination of workplaces with dust and heavy metals.

800 NOTE 2 Printed circuit boards can contain lead, tin, antimony, chromium, beryllium oxide and cadmium.  
801 Plastic parts mounted on the printed circuit board can contain restricted brominated flame retardants.

802 NOTE 3 Printed circuit boards occur in a wide range of electronic appliances and also in the electronic parts  
803 of large and small household appliances, tools, toys, sport equipment, and medical devices.

### 804 **A.4 Gas discharge lamps and components containing mercury**

805 Gas discharge lamps and components containing mercury shall be removed before any  
806 treatment process that can cause damage to the item, or shall be treated in such a way that  
807 the mercury can be removed and monitored to prove environmentally safe treatment.

808 NOTE 1 Mercury tilt switches or vapour pressure switches can be found in boilers, washing machines, chest  
809 freezers, irons, coffee machines and old telephone installations. Mercury containing relay switches were used in  
810 old high quality electronic and sophisticated monitoring equipment.

811 NOTE 2 Straight fluorescent lamps, compact fluorescent lamps, fluorescent lamps, high intensity discharge  
812 lamps - including pressure sodium lamps and metal halide lamps, and low pressure sodium lamps contain mercury.

### 813 **A.5 Batteries and accumulators**

814 Batteries which are accessible in the equipment without using tools shall be removed from  
815 WEEE before any treatment process that can cause damage to them. Batteries which are not  
816 accessible in the equipment without using tools shall be (part of) an identifiable stream in  
817 accordance with A.1.

818 Special precautions and safety measures shall be in place for the treatment of WEEE, which  
819 may contain lithium batteries and for operations involving used lithium batteries, and for  
820 fractions containing lithium batteries.

821 Lithium batteries shall be protected to prevent exposure to excessive heat, water, or any  
822 crushing or physical damage during handling, sorting, and storage.

### 823 **A.6 Plastics**

#### 824 **A.6.1 Introduction and flow diagram**

825 The informative flow diagram shown in Figure A.1 shows the input and various outputs with  
826 regard to the treatment of plastics containing brominated flame retardants (BFRs).

827

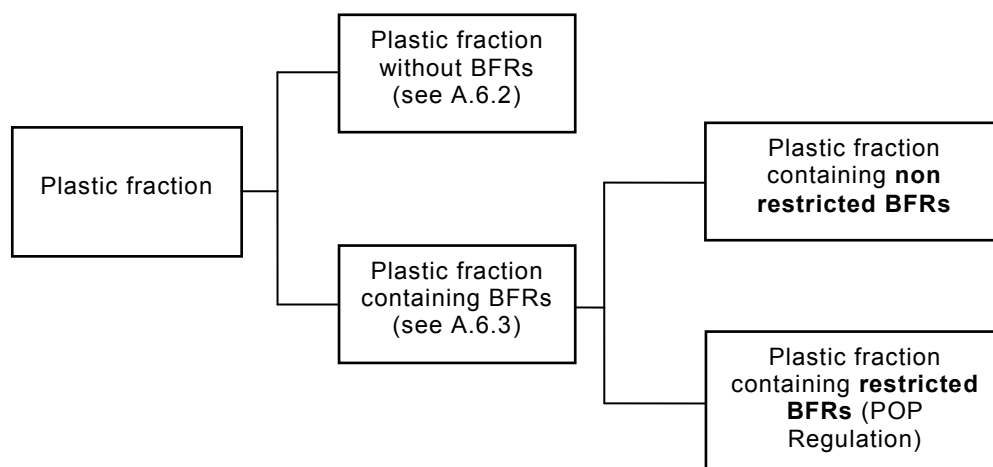


Figure A.1 – Flow diagram for plastic fractions

#### A.6.2 Plastics fractions without brominated flame retardants (BFRs)

Plastic fractions extracted from waste streams consisting of temperature exchange equipment which contains volatile fluorocarbons or volatile hydrocarbons and large household appliances shall be deemed free of BFRs and may be recycled.

#### A.6.3 Plastic streams containing brominated flame retardants

##### A.6.3.1 General

Plastic fractions from other appliances than those detailed in A.6.2 shall be deemed to contain brominated flame retardants except if there is evidence to the contrary i.e. if it is contained in a report that utilizes statistically and scientifically accepted methods and has been issued by an independent body.

The evidence of absence of restricted BFRs shall also be considered acceptable if it is contained in a report that utilizes statistically and scientifically accepted methods and has been issued by an independent body.

##### A.6.3.2 Treatment requirements for plastics containing brominated flame retardants

Plastic fractions containing any BFRs shall be segregated from plastic fractions that do not contain BFRs and the resulting fractions shall be treated according to the appropriate legislation. Any plastic fraction that is not separated as above shall be considered as a BFR fraction and shall be managed accordingly.

NOTE 1 This segregation activity can be carried out by a downstream operator, see Annex G.

NOTE 2 Annex VII of Directive 2012/19/EU prescribes the removal of all plastics containing brominated flame retardants into an identifiable stream before the end of the recycling process.

NOTE 3 Annex V of Regulation 850/2004 on persistent organic pollutants details requirements regarding the disposal and/or treatment of plastic fractions containing certain BFRs.

#### A.7 Volatile fluorocarbons and volatile hydrocarbons

WEEE containing either volatile fluorocarbons or volatile hydrocarbons shall be sorted to a separate WEEE stream and treated according to the requirements of EN 50574:2012.

NOTE In addition to temperature exchange equipment, for example volatile fluorocarbons or volatile hydrocarbons can be found in insulating foam from water boilers and as a cooling agent in the circulation system of heat pump tumble driers.

**879 A.8 Asbestos**

880 Waste and components that contain asbestos shall be removed as an identifiable stream from  
881 the remaining WEEE stream. This shall occur before any treatment process that can cause  
882 damage to such waste and components.

883 Handling shall avoid any emissions of asbestos fibres. Waste and components that contains  
884 asbestos shall be sealed with an impermeable covering and clearly marked with the related  
885 asbestos danger label.

886 NOTE Directive 87/217/EEC contains requirements for operators performing removal and disposal of asbestos.

**887 A.9 Components containing radioactive substances**

888 Treatment facilities shall have a procedure in place to monitor for the presence of radioactive  
889 materials in waste and components.

890 Waste and components that contain radioactive substances (see Annex F) shall be removed  
891 as an identifiable stream from the remaining WEEE stream. This shall occur before any  
892 treatment process that can cause damage to such waste and components.

893 NOTE Council Directive 96/29/Euratom lays down basic safety standards for the protection of the health of  
894 workers and the general public against the dangers arising from ionising radiation and establishes limit values.

## **Annex B** (normative)

### **De-pollution monitoring**

#### **B.1 Introduction**

This annex supplements 5.6 and lays down the rules of monitoring de-pollution performance. Although only selected substances, mixtures and components shall be described in this annex, all such materials as described in Annex F shall be removed from WEEE.

Monitoring and control of the quality of de-pollution of capacitors and batteries for all flows is based on two of the three possible methodologies. In the first methodology batch processing results are compared with a benchmark system (see B.2). For the second methodology a chemical analysis of relevant fractions is required (see B.3).

The weighing process and the fraction considered shall facilitate comparison with the target value for that fraction.

NOTE 1 In addition to the general de-pollution requirements, CENELEC will be developing standards covering the treatment of specific products such as CRT equipment, lamps, flat panel display equipment. Requirements to run batch processes are described in Annex D of this document.

NOTE 2 Specific support to this general de-pollution monitoring annex will be given through the Technical Specification.

Unless otherwise specified, requirements relating to capacitors and batteries are those that apply through application of Annex F.

#### **B.2 Capacitors, batteries**

During the processing of a batch, see 5.6 and 5.9 and Annex D, removed batteries and capacitors covered by Annex F shall be weighed separately and compared to the input volume of that batch.

To verify the efficiency of de-pollution during the processing of a batch, target values of removed batteries and capacitors shall be reached.

The treatment operator shall, through documentation, demonstrate that the batches are representative of day-to-day conditions. Records shall include the mass of:

- Batteries and capacitors sent to a downstream treatment operator facility over a twelve month period;
- Batteries and capacitors stored at the facility at the beginning of the twelve month period and again at the end of a twelve month period; and
- the related input categories of WEEE.

Related weighing records and supply notes shall be documented.

#### **B.3 Analysis of fractions**

In addition to the monitoring methodology (B.2) the quality of de-pollution shall be measured on the basis of a chemical analysis of the physically smallest non-metallic shredder fraction. The amount of some distinct pollutants (e.g. Polychlorinated Biphenyls, Mercury, Cadmium and Brominated Flame Retardants) shall not exceed the limit values.

NOTE The output fractions to be analysed will be specified in the Technical Specification and in the standards on specific WEEE flows.

A mixed sample that is representative of the input material treated shall be taken and analysed at least once per year using a recognised sampling method, such as that specified in EN 14899.

940     **B.4                   Plastics**

941     De-pollution monitoring shall take place with materials that are generated from fractions  
942     which represents at least 20 % of input material and that might contain the brominated flame  
943     retardants referred to in A.6 and are likely to contain at least 10 % by mass of plastic.

944     An appropriate statistical sampling and analysis shall be carried out on those plastic fractions  
945     not containing brominate flame retardants that have been segregated in accordance with  
946     A.6.3.2.

947     NOTE The above sampling and analysis will be contained in a Technical Specification.

948     Provided that the removed materials are incinerated for energy recovery, or incinerated, or  
949     sent for chemical conversion, or disposal at appropriately licenced facilities no further  
950     analysis is required.



## **Annex C** **(normative)**

### **Determination of recycling and recovery rates**

#### **C.1 Introduction**

This annex provides additional detail to 5.9 of this standard. It lays down the rules of determination and calculation of the recycling and recovery rates based on the processing of a batch or on the annual mass balance.

Fractions and components are considered to be recovered or recycled when they achieved end of waste status.

NOTE 1 Where the end-of-waste criteria, as specified in Article 6 of Directive 2008/98/EC, have been fulfilled it is not necessary to supply detailed information on downstream operators when determining the recycling and recovery rates.

The classification of the use of final fractions and components in technologies shall not deviate from the classification in C.5.

NOTE 2 This annex aims to report treatment results, following and covering the whole treatment chain and including the classification of the use of final fractions and components in final technologies (model classifications).

#### **C.2 Principles**

Determination of the recycling and recovery rates shall start with the untreated WEEE and end:

- when the end-of-waste status for fractions is achieved, or;
- with the final recovery or disposal of fractions.

The determination of the recycling and recovery rates shall be based on the input/output analysis of every step, of every operator, within the WEEE treatment chain. The input/output analysis encompasses the following elements:

- mass and description of the input material;
- information on the type of treatment technology(ies) used by the treatment operator;
- composition of the output fractions according to batch results or equivalent methods;
- information to identify all downstream treatment operators and the type of treatment technologies provided by them, and;
- classification of final use (see Annex G) of fractions sent for recovery or disposal.

The composition shall be described for the output fraction with the constituent materials (e.g. iron, copper, acrylonitrile butadiene styrene (ABS) without brominated flame retardant, polypropylene (PP), wood) together with the percentage of these materials in each fraction except if a) the fraction contains less than 2 % impurities or b) the fraction goes for energy recovery or disposal.

To determine the recycling and recovery rates the calculation shall follow all fractions until final treatment operations have been concluded. Except where the end-of-waste status has been achieved for a particular material, fractions having a level of impurities of less than 2 % by mass are considered to be free of impurities, whereas fractions having a level of impurities of 2 % or greater by mass the proportion of the components shall be taken into account in the calculation.

NOTE 1 Impurity is taken to mean a material, other than an intended output (target) material, e.g. for a specific metal fraction this means all materials other than this specific metal. Material is taken to refer to the matter of which the item is made, e.g. copper, iron, wood, ABS, PP, glass.

NOTE 2 The number of 2 % is taken as a value which is considered to be sufficiently low when calculating recycling and recovery rates. It is not intended to represent a value that will be acceptable to downstream treatment operators. For calculation of output fractions see D.4.

Information required on the output fractions forwarded to final treatment technologies are, for:

- fractions that have reached end-of-waste status, data on the mass of the output fraction, composition of the fractions and the intended technology(ies), and/or;
- fractions which are considered to contain less than 2 % impurities, data on the mass of the output fraction, the composition of the fraction, and/or;
  - for such metal fractions, the final treatment technology(ies) and the classification of final use of the fraction in the treatment technology(ies) may be estimated,
  - for such non-metal fractions, the final treatment technology(ies) and the classification of final use of the fraction in the treatment technology(ies);
- fractions which are not considered to contain less than 2 % of impurities, data on the mass of the output fraction, data on the composition of the fractions, information on the first acceptor, the final treatment technology(ies) and the classification of final use of the materials of the fractions in the final treatment technology(ies);
- for final fractions being forwarded for energy recovery or disposal, data on the mass of the output fraction, classification of final use and information on the downstream acceptor(s);

in case of fractions which are not considered to contain less than 2 % of impurities, the percentage of each fraction shall be provided.

An overview of the documentation required for downstream monitoring and the determination of recycling and recovery rates is given in Annex G.

NOTE 3 Regulations 333/2011, 1179/2012 and 715/2013 establish the criteria for determining when certain types of materials obtained from waste cease to be waste under Directive 2008/98/EC.

For different WEEE categories A, B, ... E etc. having masses  $m_a$ ,  $m_b$ , ...  $m_e$  respectively and a mixture of mass  $m_t$  the recycling and recovery targets of the mixture is calculated according to the following formulae:

- calculated recycling target for the mixture = recycling target for A  $\times m_a/m_t$  + recycling target for B  $\times m_b/m_t$  + ... + recycling target for E  $\times m_e/m_t$  ;
- calculated recovery target for the mixture = recovery target for A  $\times m_a/m_t$  + recovery target for B  $\times m_b/m_t$  + ... + recovery target for E  $\times m_e/m_t$  .

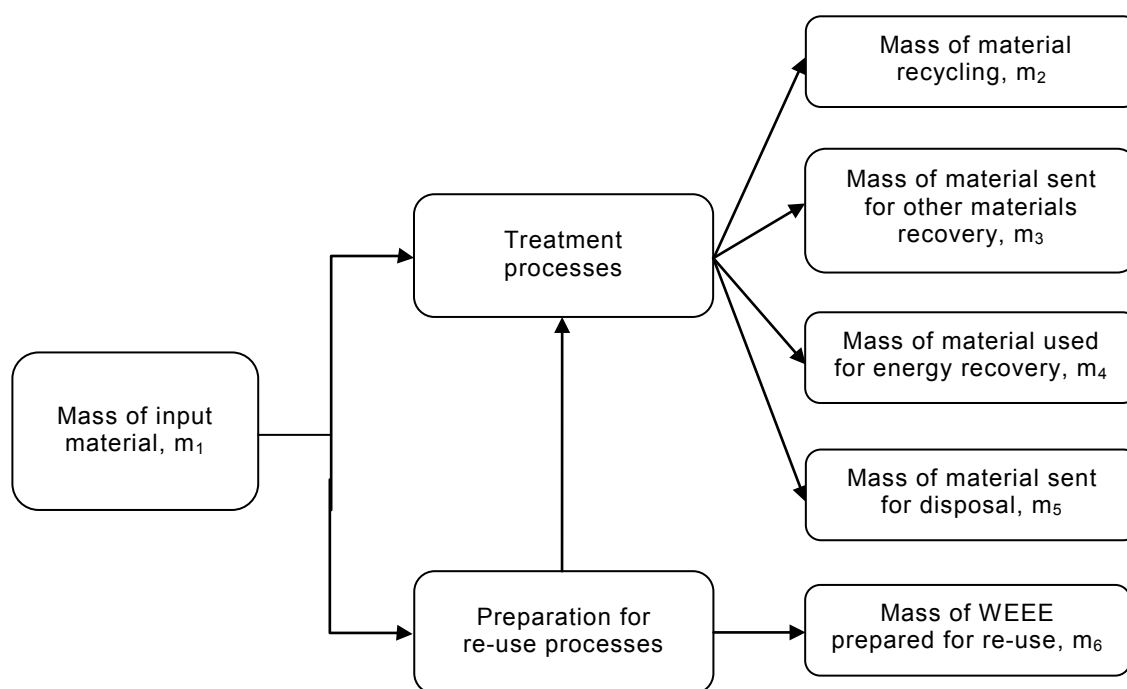
NOTE 4 The recycling and recovery targets for WEEE categories are given in Article 11 and Annex V of Directive 2012/19/EU.

### C.3 Calculation

The calculation of the recycling and recovery rates shall include each of the following quantities, as relevant:

- WEEE prepared for re-use;
- fractions recycled;
- fractions used for other material recovery (e.g. backfilling);
- fractions used for energy recovery, and;
- fractions sent for disposal by this treatment operator and all downstream operators.

During preparation for re-use a certain amount of the WEEE designated for potential preparation for re-use will not be capable of being prepared for re-use; this material shall be returned to the treatment process.



**Figure C.1 - Flow chart showing separate parts of the WEEE treatment process**

The recycling rate shall be calculated using by the following formula with reference to Figure C.1:

$$\text{Recycling rate} = \frac{m_2 + m_6}{m_1}$$

The recovery rate shall be calculated using by the following formula with reference to Figure C.1:

$$\text{Recovery rate} = \frac{m_2 + m_3 + m_4 + m_6}{m_1}$$

#### **C.4 Documentation**

The treatment operator shall make available a document detailing the calculation of the recycling and recovery rates, comprising the following elements:

- a flow chart showing the entire treatment stream with names of fractions, composition of fractions, and information on treatment technologies;
- records relating to the calculation of recycling and recovery rates from downstream operators, or where this is not available, a documented simplified analysis (e.g. hand-picking analysis) on a representative composition of this fraction, and;
- detailed calculations of the recycling rates and recovery rates which are traceable and based on the flow chart.

The determination of the recycling and recovery rates shall be completed and updated at least once every year, but also following any changes within the processing chain which may influence the recycling and recovery rates. The documents and records relating to this process shall be stored for three years.

#### **C.5 Classification of final use of fractions**

To calculate the recycling and recovery rates the use of fractions and components forwarded to the final treatment technologies shall be classified according to their final use.

1078 The options for classification of the use of fractions and components forwarded to the final  
1079 treatment technologies shall be:

- 1080 a) preparing for re-use;
- 1081 b) recycling
- 1082 c) other material recovery (e.g. backfilling);
- 1083 d) energy recovery;
- 1084 e) disposal.

1085 The treatment operators shall document the destination and treatment technologies for  
1086 fractions and the results of the downstream treatment in terms of the classification given in  
1087 this clause.

1088 NOTE If required by legal or regulatory requirements, a different classification could apply at national level.

## Annex D (normative)

### Requirements concerning processing of a batch

#### D.1 Introduction

This annex supplements 5.6 and 5.9 and lays down the requirements and preconditions to plan, to prepare, to carry out and to evaluate the processing of a batch.

A batch process shall be performed at least once every two years per site and per treatment stream, as specified in Table D.1. An additional batch process shall be carried out following significant changes of the input quality or subsequent to significant changes of the treatment technology(ies).

Batch processing results shall be representative of normal day-to-day conditions, especially with respect to the composition of the input material and processing operations and parameters. The input material to the batch shall not be prepared or selected in order to change original composition. The method for collecting the input material to be used for the batch process shall be documented by the treatment operator.

#### D.2 Input material

The processing of batches shall be performed using a representative quantity (of both volumes and WEEE category) of input materials. The treatment operator shall demonstrate, through documentation that the batches are representative of day-to-day conditions.

The total mass of the input material shall be recorded by a means that provides traceability and data integrity. Each batch process shall be performed with the following treatment streams and minimum amounts of input WEEE.

**Table D.1 – Mass of WEEE to be treated in a batch per treatment stream**

Treatment stream	Minimum mass of a batch
large appliances <sup>a</sup>	<ul style="list-style-type: none"> <li>a minimum of 50 t in large shredders (40 - 50 t/h capacity) where the WEEE is completely treated at the end of the batch, or</li> <li>A minimum of 10 t in a WEEE specific medium shredder where the WEEE is completely treated at the end of the batch, or</li> <li>5 t or 100 units for manual dismantling for large appliance</li> </ul>
CRT display appliances and FPD appliances <sup>b</sup>	<ul style="list-style-type: none"> <li>a minimum of 10 t in a specific shredder for CRT display appliances where the WEEE is completely treated at the end of the batch, or</li> <li>a minimum of 5 t in a specific shredder for FPD appliances where the WEEE is completely treated at the end of the batch, or</li> <li>5 t or 250 units for manual dismantling</li> </ul>
cooling and freezing appliances <sup>c</sup>	<ul style="list-style-type: none"> <li>for step one treatment (in case of separate batch): a minimum of 10 t where the step one treatment is completed at the end of the batch, or</li> <li>for step two treatment: a minimum of 10 t in a special shredder for cooling and freezing appliances where the WEEE is completely treated at the end of the batch</li> </ul>

small appliances <sup>d</sup>	<ul style="list-style-type: none"> <li>• a minimum of 50 t in large shredders (40 - 50 t/h capacity) where the WEEE is completely treated at the end of the batch, or</li> <li>• A minimum of 10 t in a WEEE specific medium shredder where the WEEE is completely treated at the end of the batch, or</li> <li>• 5 t for manual dismantling</li> </ul>
gas discharge lamps <sup>e</sup>	<ul style="list-style-type: none"> <li>• One day equivalent production, and at least 1 t, in a gas discharge specific treatment facility</li> </ul>
fractions of WEEE (for output fractions from WEEE process and also for fraction in agreement with 5.9) <sup>f</sup>	<ul style="list-style-type: none"> <li>• minimum 2 h of average capacity of the fraction specific treatment process, or</li> <li>• 1 day full capacity for manual process</li> </ul>
<p><sup>a</sup> In alignment with Annex I of 2012/19/ EU the treatment stream for large appliances is typically related to: category 1; large household appliances: category 8; medical devices: category 9; monitoring and control instruments: or category 10; automatic dispensers. In alignment with Annex III of 2012/19/ EU the treatment stream large appliances is typically related to: category 4; large equipment.</p> <p><sup>b</sup> In alignment with Annex I of 2012/19/ EU the treatment stream for CRT and FPD display appliances is related to: category 3; IT and telecommunications equipment: and category 4; consumer equipment and photovoltaic panels. In alignment with Annex III of 2012/19/ EU the treatment stream CRT display appliances is typically related to: category 2; screens, monitors, and equipment containing screens having a surface greater than 100 cm<sup>2</sup>.</p> <p><sup>c</sup> In alignment with Annex I of 2012/19/ EU the treatment stream cooling &amp; freezing appliances is typically related to: category 1; large household appliances (if they contain volatile fluorocarbons or volatile hydrocarbons): and category 10; automatic dispensers (if they contain volatile fluorocarbons or volatile hydrocarbons). In alignment with Annex III of 2012/19/ EU the treatment stream cooling and freezing appliances is typically related to: category 1; temperature exchange equipment.</p> <p><sup>d</sup> In alignment with Annex I of 2012/19/ EU the treatment stream for small appliances is typically related to: category 2; small household appliances: category 3; IT and telecommunications equipment: category 4; consumer equipment and photovoltaic panels: category 6; electrical and electronic tools (with the exception of large-scale stationary industrial tools): and category 7; toys, leisure and sports equipment. In alignment with Annex III of 2012/19/ EU the treatment stream small appliances is typically related to category 5; small equipment and: category 6; small IT and telecommunications equipment.</p> <p><sup>e</sup> In alignment with Annex I of 2012/19/ EU the treatment stream for gas discharge lamps is related to: category 5; lighting equipment. In alignment with Annex III of 2012/19/ EU the treatment stream gas discharge lamps is related to: category 3; lamps.</p> <p><sup>f</sup> The treatment stream for fractions of WEEE is not covered by particular a category in either Annex I or Annex III of Directive 2012/19/ EU.</p>	

1113 Where the treatment facility usually treats mixed categories of WEEE the batches shall be  
 1114 representative of the normal conditions. In the case of a batch of mixed categories, the  
 1115 minimum input mass of the mixed batch shall be the sum of the minimum mass of the  
 1116 individual categories. The composition of the input categories shall be known and shall be  
 1117 consistent during the batch.

1118 The presence of water in the input material shall be avoided, for example, by storing it under  
 1119 weatherproof conditions. The mixture and consistency of the input material shall be checked  
 1120 and evaluated visually, compared with normal supplies. Results and interpretation shall be  
 1121 reported.

### 1122 **D.3 Processing**

1123 Processing of batches shall involve the removal of substances, mixtures and components as  
 1124 listed in Annex F.

1125 Prior to commencing the mechanical processing of a batch, the treatment operator shall either  
1126 process about 10 % of the batch input volume, or empty the shredder.

1127 Containers for the output material shall be identified. All output fraction areas or receptacles  
1128 (boxes, containers) shall be emptied; in case of big bags and any internal receptacles to  
1129 collect fractions (e.g. filters), these shall be empty. The tare mass of receptacles shall be  
1130 determined.

1131 The input mass of the batch shall be determined coincident with the processing of the batch  
1132 whenever possible.

1133 Process conditions shall be determined and documented. If the ratio of material input to  
1134 output material is lower than 95 % or higher than 105 % of the total input amount processed  
1135 the batch procedures shall be checked and the batch process repeated if required. If the  
1136 reason for this deviation is unknown, another batch shall be processed. Breakdown or  
1137 malfunctions of equipment during the batch shall be documented.

1138 The check mentioned above should aim to identify the cause of the deviation.

1139 EXAMPLE An increase in mass of one or more fractions could be caused by the presence of rainwater.

#### 1140 **D.4 Output fractions**

1141 The total mass of the fractions shall to be measured and recorded using a means that  
1142 provides traceability and data integrity.

1143 Fractions containing less than 2 % impurities by mass shall not be subject to further analysis  
1144 regarding composition. For:

- 1145 • mixtures of metal fractions or metal components, the proportion of metal content by  
1146 mass shall be estimated;
- 1147 • non-metallic fractions, this criteria applies where the non-target material is considered  
1148 as impurity.

1149 NOTE Final fractions being forwarded for disposal do not require analysis regarding their composition.

1150 The composition of fractions which contain 2 % or more impurities by mass dedicated to  
1151 further separation steps or to final recovery operations shall be analysed in accordance with  
1152 one of the following methods:

- 1153 • batch of the fraction, if the composition is higher than 20 % of the input material in  
1154 accordance with 5.9. If this fraction is used by a final acceptor an analysis of a  
1155 representative sample by the final acceptor is sufficient to determine the composition.
- 1156 • records of the downstream operator performing the next separation step or thermal  
1157 recovery;
- 1158 • hand-picking analysis, by using a representative sample of known mass, manually  
1159 separate the metallic fraction from the non-metallic fraction and determine the mass of  
1160 each of these fractions ;
- 1161 • chemical analysis of a representative sample.

1162 If none of these analyses is possible (for example for fractions of low volume which may not  
1163 be sorted by handpicking analysis and where there is too small a quantity for analysis), best  
1164 estimations of the composition should be carried out.

#### 1165 **D.5 Documentation and validation**

1166 The treatment operator shall make available an understandable and well-structured record of  
1167 the batch process, comprising the following elements:

- 1168 • description and pictures of the input material, with special focus on composition (types  
1169 and categories of appliances);
- 1170 • input/output mass balance of the batch including information on losses and comments;

- 1171 • description of the processing technologies with output fractions, including a  
1172 compositional flow chart of further downstream separation, treatment or disposal of  
1173 fractions;
- 1174 • description and documentation of output fractions including photographs of the output  
1175 fractions and the weighing documents, and;
- 1176 • the assessment of the composition of mixed output fractions including the  
1177 methodology.
- 1178 Results of the batch process and the supporting documentation shall be completed no later  
1179 than one month after processing the batch; all documents shall be stored for five years.
- 1180 The batch process results shall be validated. Validation shall comprise: a visual check during  
1181 the batch, a visual check of all input and output fractions, verification of the documentation,  
1182 and assessment of compliance with this annex.



**Annex E**  
**(Void)**

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1186 NOTE This annex has been included for future use. It is a placeholder for a potential normative annex.

## Annex F (informative)

### Materials and components of WEEE requiring selective treatment

The text of this annex is taken verbatim from Directive 2012/19/EU Annex VII "Selective treatment for materials and components of waste electrical and electronic equipment referred to in Article 8(2)".

Annex VII requires:

"1. As a minimum the following substances, mixtures and components have to be removed from any separately collected WEEE:

- polychlorinated biphenyls (PCB) containing capacitors in accordance with Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) <sup>1</sup>,
- mercury containing components, such as switches or backlighting lamps,
- batteries,
- printed circuit boards of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 square centimetres,
- toner cartridges, liquid and pasty, as well as colour toner,
- plastic containing brominated flame retardants,
- asbestos waste and components which contain asbestos,
- cathode ray tubes,
- chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),
- gas discharge lamps,
- liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimetres and all those back-lighted with gas discharge lamps,
- external electric cables,
- components containing refractory ceramic fibres as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress for the 23rd time Council Directive 67/548/EEC relating to the classification, packaging and labelling of dangerous substances <sup>2</sup>,
- components containing radioactive substances with the exception of components that are below the exemption thresholds set in Article 3 of, and Annex I to, Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation <sup>3</sup>,
- electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)

These substances, mixtures and components shall be disposed of or recovered in compliance with Directive 2008/98/EC.

<sup>1</sup> OJ L 243, 24.9.1996, p. 31.

<sup>2</sup> OJ L 343, 13.12.1997, p. 19.

<sup>3</sup> OJ L 159, 29.6.1996, p. 1.

1229

1230 2. The following components of WEEE that is separately collected have to be treated as  
1231 indicated:

1232 – cathode ray tubes: the fluorescent coating has to be removed,

1233 – equipment containing gases that are ozone-depleting or have a global warming potential  
1234 (GWP) above 15, such as those contained in [] foams and refrigeration circuits: the  
1235 gases must be properly extracted and properly treated. Ozone-depleting gases must  
1236 be treated in accordance with Regulation (EC) No 1005/2009,

1237 – gas discharge lamps: the mercury shall be removed.

1238 3. Taking into account environmental considerations and the desirability of preparation for  
1239 re-use and recycling, points 1 and 2 shall be applied in such a way that environmentally  
1240 sound preparation for re-use and recycling of components or whole appliances is not  
1241 hindered."

## Annex G

(informative)

## Documentation for downstream monitoring and establishment of recycling and recovery rates

### G.1 Information requirements

Table G.1 summarises all the information required on fractions for the purpose of downstream monitoring and establishment of recycling and recovery rates. It is a figurative summary of the texts in 4.4, 5.9 and Annex C. The information recorded shall give a just account of day-to-day business and all outlets used. It will therefore be applicable to both batch and annual data.

### Table G.1 - Summary of information requirements

Information Required for Downstream Monitoring (4.4) and Establishment of Recycling & Recovery rates (5.9 and Annex C):	Mass	Composition	Classification of final use of fractions	Final Treatment Technology(ies)	Information on First Acceptor	Information on Downstream Acceptor(s), including Final Acceptor
Fractions that have reached end-of-waste status	(ii)	(iii)		(ii)		
Metal fractions which contain less than 2 % of non-metal fractions	(iii)	(ii)	(ii)	(ii)		
Non-metal fractions containing less than 2 % of other materials	(iii)	(ii)	(ii)	(iii)	(i)	
Fractions which are classified as hazardous according to the European list of wastes and/or fractions containing materials and components covered by Annex F	(iii)	(ii)	(ii)	(iii)	(iii)	(i)
Final fractions being forwarded for energy recovery or disposal	(ii)		(ii)	(i)		(iii)
All other fractions	(iii)	(iii)	(ii)	(iii)	(iii)	

Key

- (i) Requirement specified in 4.4
- (ii) Requirement specified in Annex C
- (iii) Requirement specified in both 4.4 and Annex C

**Annex ZZ**  
(informative)

**Coverage of Requirements of Commission Directive (EU) 2012/19/EU**

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers Article 8. In particular it covers:

- proper treatment, other than preparing for re-use,
- recovery or recycling operations include the removal of all fluids and
- selective treatment in accordance with Annex VII.

**WARNING: Other requirements and other EU Directives or Commission Regulations may be applicable to waste falling within the scope of this standard.**

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