

ICS

English version

**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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100 Foreword

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

103

104 This document is currently submitted to the Unique Acceptance Procedure.

105

106 The following dates are proposed:

107

- 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- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

108

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

112

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

115 Introduction

116 This European Standard aims to assist organisations in:

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

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

131 This European Standard contains requirements applicable to the treatment of all types WEEE.
132 In the future it will be supported by other standards covering particular treatment
133 requirements for (gas discharge) lamps, flat panel displays, cathode ray tubes (CRTs),
134 photovoltaic panels and other equipment containing volatile fluorocarbons or volatile
135 hydrocarbons. Additionally this standard will be supported by a technical report which will
136 provide a more detailed comparison between normative treatment requirements derived
137 directly from the legal text of Directive 2012/19/EC, especially Annex VII, and between
138 informative treatment requirements going beyond the strict requirements of Directive
139 2012/19/EC.

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

145

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 cm²
- 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]

379 **3.38**

380 **volatile hydrocarbon (VHC)**

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

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

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

388 [EN 50574:2012, 3.2.16]

389 **3.39**

390 **waste**

391 void

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

394 **3.40**

395 **WEEE (Waste Electrical and Electronic Equipment)**

396 void

397 Note 1 to entry: Directive 2012/19/EU contains the following: "waste electrical and electronic equipment' or
398 'WEEE' means electrical or electronic equipment which is waste within the meaning of Article 3(1) of Directive
399 2008/98/EC, including all components, subassemblies and consumables which are part of the product at the time of
400 discarding".

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

403 **4 Administrative and organisational requirements**

404 **4.1 Management principles**

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

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

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

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

416 **4.2 Technical and infrastructural pre-conditions**

417 The treatment operator shall possess infrastructure, in terms of size, technologies installed,
418 and characteristics of the operations, that is suitable for the activities performed on site.
419 Suitability of the site shall be assessed by a risk management process for all tasks performed
420 on site and include the identification of hazards, the assessment of risk and, where
421 appropriate, the elimination or reduction of the risk, and documentation of the process.

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

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

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

429 Weatherproof covering shall be required for the areas where:

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

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

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

439 4.3 Training

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

443 Training shall include emergency response planning, occupational health and safety
444 measures, and training for the relevant operations performed on site. The effectiveness and
445 suitability of training shall be checked regularly. Training programmes shall be delivered at a
446 level suitable to the trainee in form, manner and language.

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

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

453 4.4 Monitoring

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

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

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

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

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

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

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

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

- 476 • for fractions which are classified as hazardous according to the European list of
477 wastes; and/or fractions containing materials and components covered by Annex F,
478 data on the mass of the output fraction, information on the first acceptor and the
479 downstream acceptor(s) of the fractions, and the final treatment technology(ies);

- 480 • for all other fractions, the mass of the output fraction, information on the first acceptor,
481 composition of the fractions and the final treatment technology(ies) shall be recorded.

- 482 • for final fractions being forwarded for energy recovery or disposal, the final treatment
483 technology, information on the downstream acceptor(s), composition of the fractions
484 and the final treatment technology(ies) shall be recorded.

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

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

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

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

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

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

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

501 4.5 Shipments

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

504 NOTE 1 Regulatory requirements for cross border shipments, including monitoring, are covered in Regulation
505 1013/2006/EC and Article 10 of Directive 2012/19/EU.

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

508 5 Technical requirements

509 5.1 General

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

512 NOTE 1 Handling includes loading and unloading.

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

- 514 • temperature exchange equipment (to avoid damage to the temperature exchange
515 system);
- 516 • CRT equipment (to avoid implosion and/or emissions of fluorescent coatings);
- 517 • gas discharge lamps, appliances containing gas discharge lamps and appliances
518 containing mercury switches (to avoid breakage resulting in the release of mercury);
- 519 • 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.

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

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

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

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

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

579 5.5 De-pollution

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

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

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

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

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

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

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

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

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

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

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

613 5.6 De-pollution monitoring

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

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

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

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

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

629 **5.7 Treatment of non de-polluted WEEE and fractions**

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

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

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

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

645 **5.8 Storage of fractions**

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

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

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

655 **5.9 Recycling and recovery targets**

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

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

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

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

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

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

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

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

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

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

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

689 **5.10 Recovery and disposal of fractions**

690 The following applies to output fractions comprising mixed materials.

691 • Where such a fraction is less than or equal to 20 % of the mass of the original input
692 material to the treatment process the treatment operator shall use the composition of
693 this output fraction, as declared by the downstream treatment operator; however,
694 where this is not available a documented simplified analyses (e.g. hand-picking
695 analysis) for a representative composition of this fraction shall be used.

696 • Where such a fraction contains 2 % or more impurities by mass, and this fraction is
697 greater than 20 % of the mass of the original input material to the treatment process,
698 then the treatment operator shall require that a batch process be carried out by the
699 downstream treatment operator using this material. If this fraction is used by a final
700 acceptor an analysis of a representative sample by the final acceptor is sufficient to
701 determine the composition.

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

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

710 **6 Documentation**

711 The treatment operator shall maintain the following:

712 • records demonstrating compliance with legal and regulatory obligations applying to all
713 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.

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Annex A (normative)

De-pollution

748 **A.1 Introduction**

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

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

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

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

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

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

773 **A.2 Capacitors**

774 The following capacitors shall be removed from separately collected WEEE:

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

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

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

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

- 786 • if it is evident that the capacitor was manufactured after 1986 or they come from appliances produced after
787 1987;
- 788 • if they are declared and/or labelled as being free of PCBs and

789 Capacitors do not need to be removed from WEEE if there is evidence to show that the presence of PCBs or
790 substances of concern contained in electrolytic capacitors can be discounted where certain identifiable conditions
791 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 cm² 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

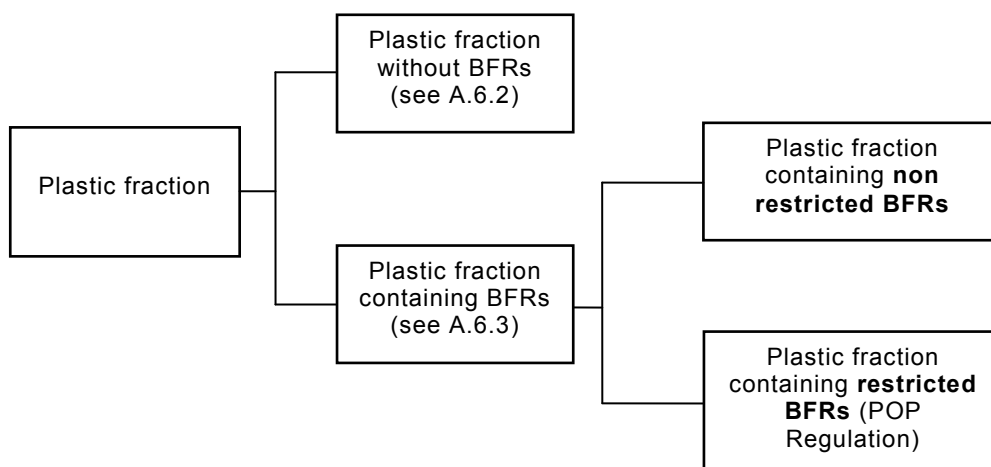


Figure A.1 – Flow diagram for plastic fractions

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.

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Annex B (normative)

De-pollution monitoring

899 B.1 Introduction

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

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

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

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

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

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

916 B.2 Capacitors, batteries

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

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

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

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

929 Related weighing records and supply notes shall be documented.

930 B.3 Analysis of fractions

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

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

937 A mixed sample that is representative of the input material treated shall be taken and
938 analysed at least once per year using a recognised sampling method, such as that specified
939 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.

951 **Annex C**
952 (normative)

953 **Determination of recycling and recovery rates**
954

955 **C.1 Introduction**

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

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

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

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

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

968 **C.2 Principles**

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

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

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

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

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

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

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

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

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

- 1000 • fractions that have reached end-of-waste status, data on the mass of the output
 1001 fraction, composition of the fractions and the intended technology(ies), and/or;
- 1002 • fractions which are considered to contain less than 2 % impurities, data on the mass of
 1003 the output fraction, the composition of the fraction, and/or;
- 1004 ○ for such metal fractions, the final treatment technology(ies) and the classification of
 1005 final use of the fraction in the treatment technology(ies) may be estimated,
- 1006 ○ for such non-metal fractions, the final treatment technology(ies) and the
 1007 classification of final use of the fraction in the treatment technology(ies);
- 1008 • fractions which are not considered to contain less than 2 % of impurities, data on the
 1009 mass of the output fraction, data on the composition of the fractions, information on
 1010 the first acceptor, the final treatment technology(ies) and the classification of final use
 1011 of the materials of the fractions in the final treatment technology(ies);
- 1012 • for final fractions being forwarded for energy recovery or disposal, data on the mass of
 1013 the output fraction, classification of final use and information on the downstream
 1014 acceptor(s);

1015 in case of fractions which are not considered to contain less than 2 % of impurities, the
 1016 percentage of each fraction shall be provided.

1017 An overview of the documentation required for downstream monitoring and the
 1018 determination of recycling and recovery rates is given in Annex G.

1019 NOTE 3 Regulations 333/2011, 1179/2012 and 715/2013 establish the criteria for determining when certain
 1020 types of materials obtained from waste cease to be waste under Directive 2008/98/EC.

1021 For different WEEE categories A, B, ... E etc. having masses m_a , m_b , ... m_e respectively and a
 1022 mixture of mass m_t the recycling and recovery targets of the mixture is calculated according to
 1023 the following formulae:

- 1024 • calculated recycling target for the mixture = recycling target for A $\times m_a/m_t$ + recycling
 1025 target for B $\times m_b/m_t$ + ... + recycling target for E $\times m_e/m_t$;
- 1026 • calculated recovery target for the mixture = recovery target for A $\times m_a/m_t$ + recovery
 1027 target for B $\times m_b/m_t$ + ... + recovery target for E $\times m_e/m_t$.

1028 NOTE 4 The recycling and recovery targets for WEEE categories are given in Article 11 and Annex V of
 1029 Directive 2012/19/EU.

1030 C.3 Calculation

1031 The calculation of the recycling and recovery rates shall include each of the following
 1032 quantities, as relevant:

- 1033 • WEEE prepared for re-use;
- 1034 • fractions recycled;
- 1035 • fractions used for other material recovery (e.g. backfilling);
- 1036 • fractions used for energy recovery, and;
- 1037 • fractions sent for disposal by this treatment operator and all downstream operators.

1038 During preparation for re-use a certain amount of the WEEE designated for potential
 1039 preparation for re-use will not be capable of being prepared for re-use; this material shall be
 1040 returned to the treatment process.

1041

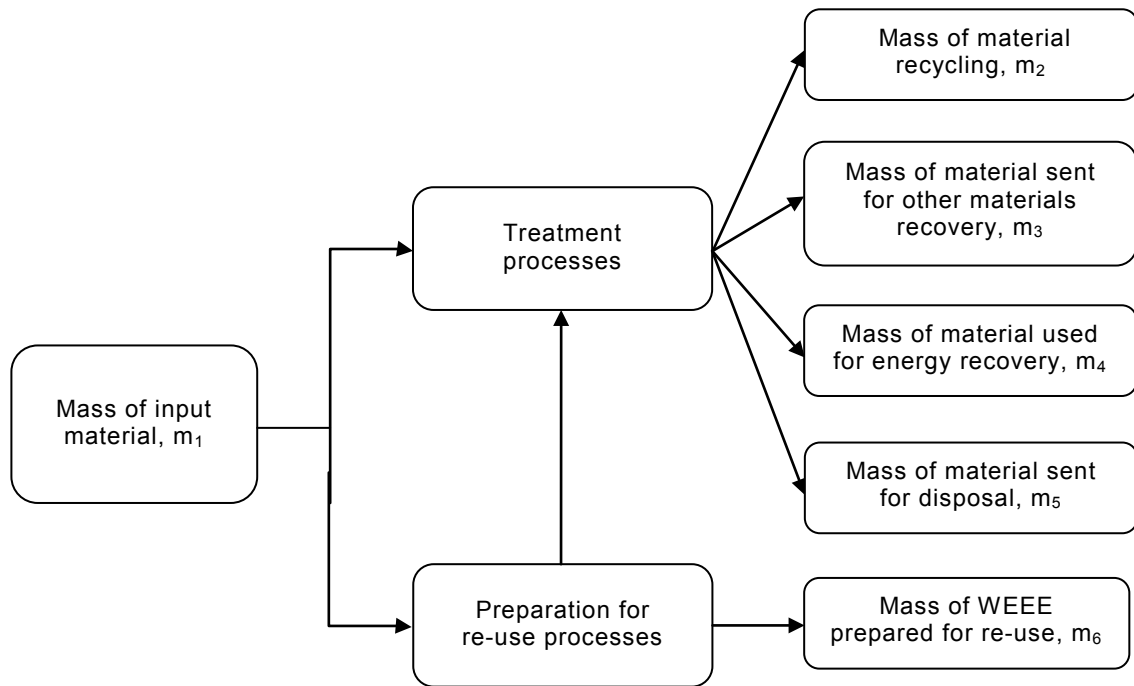


Figure C.1 - Flow chart showing separate parts of the WEEE treatment process

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

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1093 **D.1 Introduction**

1094 This annex supplements 5.6 and 5.9 and lays down the requirements and preconditions to
1095 plan, to prepare, to carry out and to evaluate the processing of a batch.

1096 A batch process shall be performed at least once every two years per site and per treatment
1097 stream, as specified in Table D.1. An additional batch process shall be carried out following
1098 significant changes of the input quality or subsequent to significant changes of the treatment
1099 technology(ies).

1100 Batch processing results shall be representative of normal day-to-day conditions, especially
1101 with respect to the composition of the input material and processing operations and
1102 parameters. The input material to the batch shall not be prepared or selected in order to
1103 change original composition. The method for collecting the input material to be used for the
1104 batch process shall be documented by the treatment operator.

1105 **D.2 Input material**

1106 The processing of batches shall be performed using a representative quantity (of both
1107 volumes and WEEE category) of input materials. The treatment operator shall demonstrate,
1108 through documentation that the batches are representative of day-to-day conditions.

1109 The total mass of the input material shall be recorded by a means that provides traceability
1110 and data integrity. Each batch process shall be performed with the following treatment
1111 streams and minimum amounts of input WEEE.

1112 **Table D.1 – Mass of WEEE to be treated in a batch per treatment stream**

Treatment stream	Minimum mass of a batch
large appliances ^a	<ul style="list-style-type: none"> • 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 • A minimum of 10 t in a WEEE specific medium shredder where the WEEE is completely treated at the end of the batch, or • 5 t or 100 units for manual dismantling for large appliance
CRT display appliances and FPD appliances ^b	<ul style="list-style-type: none"> • 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 • 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 • 5 t or 250 units for manual dismantling
cooling and freezing appliances ^c	<ul style="list-style-type: none"> • 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 • 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

small appliances ^d	<ul style="list-style-type: none"> • 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 • A minimum of 10 t in a WEEE specific medium shredder where the WEEE is completely treated at the end of the batch, or • 5 t for manual dismantling
gas discharge lamps ^e	<ul style="list-style-type: none"> • One day equivalent production, and at least 1 t, in a gas discharge specific treatment facility
fractions of WEEE (for output fractions from WEEE process and also for fraction in agreement with 5.9) ^f	<ul style="list-style-type: none"> • minimum 2 h of average capacity of the fraction specific treatment process, or • 1 day full capacity for manual process
<p>^a 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>^b 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 cm².</p> <p>^c In alignment with Annex I of 2012/19/ EU the treatment stream cooling & 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>^d 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>^e 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>^f 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

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1192 The text of this annex is taken verbatim from Directive 2012/19/EU Annex VII "Selective
1193 treatment for materials and components of waste electrical and electronic equipment referred
1194 to in Article 8(2)".

1195 Annex VII requires:

1196 "1. As a minimum the following substances, mixtures and components have to be removed
1197 from any separately collected WEEE:

1198 – polychlorinated biphenyls (PCB) containing capacitors in accordance with Council
1199 Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls
1200 and polychlorinated terphenyls (PCB/PCT) ¹,

1201 – mercury containing components, such as switches or backlighting lamps,

1202 – batteries,

1203 – printed circuit boards of mobile phones generally, and of other devices if the surface of
1204 the printed circuit board is greater than 10 square centimetres,

1205 – toner cartridges, liquid and pasty, as well as colour toner,

1206 – plastic containing brominated flame retardants,

1207 – asbestos waste and components which contain asbestos,

1208 – cathode ray tubes,

1209 – chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons
1210 (HFC), hydrocarbons (HC),

1211 – gas discharge lamps,

1212 – liquid crystal displays (together with their casing where appropriate) of a surface greater
1213 than 100 square centimetres and all those back-lighted with gas discharge lamps,

1214 – external electric cables,

1215 – components containing refractory ceramic fibres as described in Commission
1216 Directive 97/69/EC of 5 December 1997 adapting to technical progress for
1217 the 23rd time Council Directive 67/548/EEC relating to the classification, packaging
1218 and labelling of dangerous substances ²,

1219 – components containing radioactive substances with the exception of components that
1220 are below the exemption thresholds set in Article 3 of, and Annex I to, Council
1221 Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the
1222 protection of the health of workers and the general public against the dangers arising
1223 from ionising radiation ³,

1224 – electrolyte capacitors containing substances of concern (height > 25 mm,
1225 diameter > 25 mm or proportionately similar volume)

1226 These substances, mixtures and components shall be disposed of or recovered in
1227 compliance with Directive 2008/98/EC.
1228

1 OJ L 243, 24.9.1996, p. 31.

2 OJ L 343, 13.12.1997, p. 19.

3 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

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1247 **G.1 Information requirements**

1248 Table G.1 summarises all the information required on fractions for the purpose of downstream
1249 monitoring and establishment of recycling and recovery rates. It is a figurative summary of the
1250 texts in 4.4, 5.9 and Annex C. The information recorded shall give a just account of day-to-
1251 day business and all outlets used. It will therefore be applicable to both batch and annual
1252 data.

1253

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)

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

1258 This European Standard has been prepared under a mandate given to CENELEC by the
1259 European Commission and the European Free Trade Association and within its scope the
1260 standard covers Article 8. In particular it covers:

- 1261 • proper treatment, other than preparing for re-use,
- 1262 • recovery or recycling operations include the removal of all fluids and
- 1263 • selective treatment in accordance with Annex VII.

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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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