

Implementation Guidelines for Recyclers & Refurbishers under E-Waste(Management) Rules, 2016



**Central Pollution Control Board
Waste Management Division, III (WM-III)**

7.0 Guidelines for Environmentally Sound Recycling of E-Waste

7.1 Recycler

- As per these rules any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their component is a recycler. Recyclers may set up their collection centres, details of which shall be entered in their authorisation. These collection centres shall not require separate authorisation. Recyclers can obtain raw material such as waste electrical and electronic assemblies or components or used components from producers/PRO/e-waste exchange/dismantlers and consumers / bulk consumers.
- The Product of recyclers has to be sent or sold to users or other recyclers having valid CTO from SPCBs/PCCs. Any hazardous waste generated during the recycling processing will be sent to TSDF'
- A recycler should be part of producer's channelization system.
- A recycler has to obtain consent to establish from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act,1981.
- A recycler has to obtain consent to operate from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act,1981.
- A recycler should have weigh bridge and other appropriate weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- The unloading of end of life product should be carried out in such a way that there should not be any damage to health, environment and to the product itself. Unloading of Cathode Ray Tubes (CRT), LCD/LED/Plasma TV, Refrigerator, Air Conditioners and fluorescent and other mercury containing lamps should be carried out under supervision in such a way to avoid breakage.
- A recycler should have facilities for destroying or permanently deleting data stored in the memory of end of life products (Hard Disk, Telephones, Mobile phones) either through shredding or grinding or through data eraser.

7.2 Recycling Process

- The functions of the recyclers include dismantling along with recovery operation. There shall be no restriction on degree of operations that can be permitted for

recyclers provided they have requisite facilities. The following processes should be employed by recyclers:

- (i) Manual / semi- automatic / automatic dismantling operations.
 - (ii) Shredding / crushing / fine grinding/wet grinding/ enrichment operations, gravity/ magnetic/density/eddy current separation.
 - (iii) Pyro metallurgical operations - Smelting furnace.
 - (iv) Hydro metallurgical operations.
 - (v) Electro-metallurgical operations.
 - (vi) Chemical leaching.
 - (vii) CRT/LCD/Plasma processing.
 - (viii) Toner cartridge recycling.
 - (ix) Melting, casting, moulding operations (for metals and plastics).
- A recycling facility may accept e-waste and even those electrical and electronic assemblies or components not listed in Schedule- I for recycling, provided that they do not contain any radioactive materials and same shall be declared while taking the authorisation from concerned SPCBs/PCCs;
 - The recycling facilities shall comply with the requirements as specified for dismantlers in the guidelines for dismantling in section 6.0.
 - A recycling facility shall install adequate wastewater treatment facilities for process wastewater and air pollution control equipment (off gas treatment, wet/alkaline/packed bed scrubber and carbon filters) depending on type of operations undertaken.
 - De dusting equipment such as suction hood shall be installed where manual dismantling is carried out.
 - Fume hoods connected with bag dust collectors followed wet (chemical) scrubbers and carbon filters shall be installed for control of fugitive emissions from furnaces or reactor.
 - Noise control arrangement for equipment like crusher, grinder and shredder needs to be provided.
 - The discharges from the facility shall comply with general standards under E (P) Act, 1986 for discharge of wastewater. Discharge standard are at Annexure IV.
 - In case of air emissions, the unit shall comply with emission norms prescribed under Air (Prevention and Control of Pollution) Act, 1981. In case of furnace, a minimum

stack height of 30 meter shall be installed depending on emission rate of SO₂. Emission Standards are at Annexure V.

- The workers involved in recycling operations shall use proper personal protective equipment such as goggles, masks, gloves, helmet and gumboot etc.
- Adequate facilities for onsite collection and storage of bag filter residues, floor cleaning dust and other hazardous material shall be provided and sent to secure landfill by obtaining membership of TSDF.
- The CRT / LCD / Plasma TV should be processed only at a recycler's facility.
- For recycling of CRT monitor and TVs care should be taken to contain release of harmful substances. The steps for processing of CRT are as below:
 - (i) CRT monitors and TVs should be manually removed from plastic/ wooden casing. The CRT should be split into funnel and panel glass using different splitting technology such as Ni-Chrome hot wire cutting, Diamond wire method or Diamond saw separation in a closed chamber under low vacuum conditions (650 mm of Hg).
 - (ii) The funnel section is then lifted off from the panel glass section and the internal metal gasket is removed for facilitating the removal of internal phosphor coating.
 - (iii) The internal phosphor coating from the inner side of panel glass is removed by using an abrasive wire brush with suction arrangement under low pressure as given above at (i).

The extracted air is cleaned through high efficiency bag-filter system and collected in appropriate labelled containers and then disposed at an authorised TSDF.

 - (iv) Manual shredding, cutting, and segregation operations for CRTs should be carried out in low vacuum (650 mm of Hg) chambers where the dust is extracted through cyclones, bag filters, ID fan and a suitable chimney.
 - (v) Segregated CRTs can also be shredded in mechanical/automatic shredding machines connected with dust control systems. The mixed shredded glass is separated into leaded glass and glass cullet using electro-magnetic field or by density separation.
- For LCD and Plasma TV a recycler should have sealed vacuum dismantling platform for dismantling of LCD / Plasma panels. The LCD / Plasma TV should be dismantled piece by piece, starting with the removal of the plastic backing shell, printed circuit boards, aluminium or steel frame, screen, PET plastics, LCD Panel and backlight. The metal frame, wire, other metallic material and plastic backing cabinet may be sent to recyclers with valid CTO. Printed Circuit Board and LCD panel may be recycled or in case recycling facility is not available then sent to respective authorised recycling facility.
- The user of the products obtained in the recycler facility should be identified and an agreement may be entered with them for selling of the products obtained in these

recycling facilities. This is for tracking the product of recycling, to ascertain where the products are going.

- Recovery of resource and particularly of precious metals present in the e-waste should be given importance.
- For fluorescent and other mercury containing lamp recycling, the unit shall have at least following systems:
 - (i) Mechanical feeding system.
 - (ii) Mercury spill collection system.
 - (iii) Lamp Crushing System, under vacuum, for separation of mercury-contaminated phosphor powder & mercury vapors from other crushed components, so as not to cause release of any pollutant, including mercury vapor.
 - (iv) System for segregation of mercury vapour from the phosphor powder through a distillation system for separation & recovery of mercury.
 - (v) Air pollution control system (APCS) which shall include HEPA (High Efficiency Particulate Arrestor) filter system or activated carbon filter system or any other equivalent efficient system for separation/ removal of mercury vapor from mercury-contaminated phosphor powder'
 - (vi) Arrangement for disposal of mercury contaminated filter pads to TSDF.
 - (vii) On line mercury monitoring system, to have check on emission of mercury, which has to be in compliance to the consented norms.
- The fluorescent and other mercury containing lamp recycling unit shall have following obligations:
 - (i) The emission outlet shall comply with the norms for mercury prescribed in the consent document. The norm for mercury emission is 0.2 mg/m³ (Normal) as prescribed under E (P) Act, 1986 for mercury emission from other category of industries.
 - (ii) For discharge of effluent the limit for mercury as (Hg) should be less than equal to 0.01mg /liter as prescribed under E (P) Act, 1986.
 - (iii) The unit shall have trained / skilled manpower to handle hazardous substances such as mercury mixed phosphor in respect of treatment/recycling.
 - (iv) The unit shall dispose all the unrecoverable wastes from the treatment site, to a TSDF.
 - (v) The unit shall maintain record of used fluorescent and other mercury containing lamp collected & recycled, recovery of mercury and other components. It shall, also, maintain the records pertaining to the generation, storage, transport and disposal of the wastes generated in the process.

(vi) The unit shall take up ambient air quality monitoring, particularly, in reference to mercury levels with a frequency of once in a month through a recognized laboratory, for third party verification.

8.0 Guidelines for Refurbisher

- Refurbishment means repairing of used electrical and electronic equipment and it should be carried out in such a way that there should not be any damage to health and environment.
- A refurbisher has to obtain consent to establish under the Water (Prevention and Control of Pollution) Act, 1974, (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981(21 of 1981) from the concerned State Pollution Control Board/Pollution Control Committee.
- A refurbisher has to obtain certificate of registration and proof of installed capacity from District Industries Centre or any other government agency authorised in this regard;
- A refurbisher should have system to manage leakage of coolant/refrigerant gases and compressor oils from used electrical and electronic equipment during refurbishing operations.
- The refurbishing area should be ventilated and have proper dust control equipment.
- De-dusting system over refurbishment tables should be provided.
- Any e-waste generated during refurbishment should be collected separately and sent to collection centre /authorised recycler. In case of refurbisher not having own collection centre, the e-waste so generated may be channelized to an authorised recycler.
- The premise for refurbishing should fulfil the following requirements:
 - (i) Water proof roofing and impermeable surfaces
 - (ii) As a general rule a refurbisher of capacity of 1 Ton per day shall require a minimum of 150 square meters' area for refurbishing, temporary storage of e waste generated and space for refurbished EEE.
- If refurbisher opts to sell refurbished EEE then he is required to seek EPR authorisation from CPCB. In no circumstances, the refurbisher shall sell any refurbished EEE without having EPR authorization.