



**Better Environmental Sustainability Targets
(BEST) Standard 1001
For Lead Battery Manufacturers**

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Annexure 1: Battery Take Back System

Introduction

This first edition of the BEST Standard 1001 is an international voluntary initiative for the purpose of standardizing environmental performance goals for lead battery manufacturers. The standard was developed with input from a wide range of stakeholders who contributed their time to this effort. The standard is intended to be used to perform independent third party audits of lead battery manufacturing facilities. The “Better Environmental Sustainability Targets (BEST) Standard 1001 Audit Protocol” shall help interpret specific provisions of the standard and provide guidance to auditors and facilities seeking certification against this standard.

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**Better Environmental Sustainability Targets
(BEST) Standard 1001
For Lead Battery Manufacturers**

I. Objectives: The objectives of this environmental standard for lead battery manufacturing facilities are as follows:

Objective 1: Reduce lead exposures in communities where lead batteries are manufactured.

Objective 2: Reduce lead exposures and improve the health status of workers in lead battery manufacturing facilities that are occupationally exposed to lead and other hazardous materials.

Objective 3: Increase the adoption of sustainable practices in order to reduce the environmental impact of lead battery manufacturing by encouraging efforts to minimize waste, lower emissions, reduce energy and water consumption, and encourage environmentally sound recycling.

II. Intended Use: This “Better Environmental Sustainability Targets (BEST) Standard 1001 for Lead Battery Manufacturers” is to be used to conduct environmental audits of lead battery manufacturing facilities for a third party verification system.

The provisions of this voluntary standard may differ from applicable local, state, or national regulatory requirements. If regulatory requirements at a lead battery manufacturing facility are more stringent, or require more frequent verification than outlined in this standard, then the regulatory provisions shall take precedence and become the de facto requirement in that jurisdiction.

III. Scope: The “BEST Standard 1001 for Lead Battery Manufacturers” provides the criteria to evaluate the environmental performance of lead battery manufacturing facilities.

IV. Limitations: The “BEST Standard 1001 for Lead Battery Manufacturers” is limited to the environmental performance of manufacturing facilities and does not address recycling, transport, or other processes related to mining, primary smelting, or mineral processing. The standard does not address wages, labour practices, or other social criteria not directly related to occupational health. Verification of performance with this standard is meant to be assessed with the “Better Environmental Sustainability Targets (BEST) Standard 1001 Audit

Protocol” outlining the records and procedures necessary to document compliance with this standard.

V. Definitions

Battery fee is the amount paid in the local currency per returned lead-acid battery and is determined on a quarterly basis with the following inputs in the formula below:

A = The average price of lead (per kilogram) on the London Metal Exchange for the previous quarter ending on March 31, June 30, August 31, or December 31;

B = Dry weight of lead in the battery (in kilograms)

Formula:

$$\frac{A \times B}{1.2} = \text{Battery Fee}$$

Emergency is a non-routine incident that threatens safety, health, or welfare on the inside or outside of a lead battery manufacturing facility.

Engineering controls mean a process to reduce exposures to potential hazards, including all pollution control systems (through isolation or removal), ventilation and enclosure mechanisms, and substituting materials used for less hazardous materials.

Hazardous waste means a substance that is rendered useless or discarded which, because of its source or characteristics, is classified under local, state, or national law as hazardous and may be subject to special handling, shipping, storage, and disposal requirements.

Lead-acid battery means a battery that contains more than one percent lead by weight, uses acid as an electrolyte, and is currently or may have been previously used as a power source.

Lead battery manufacturing facility (or “facility”) means all locations where lead batteries or battery components are manufactured or assembled. The company or business entity that owns or operates the facility is the responsible party for implementing the BEST Standard.

Manufacturer means an entity or person who manufactures/assembles and sells, or has manufactured/assembled and sold, by any means, including but not limited to, transactions conducted through sales outlets, catalogues, or the Internet, a lead-acid battery under its

own brand or sells, or has sold, a lead-acid battery produced by another entity or person under its own brand and label.

mg/Nm³ is a unit for measuring stack emissions. It is defined as milligrams per normal cubic meter of air under standard conditions, i.e., normal temperature and pressure.

Mobius Loop is the symbol signifying that the product is recyclable.

PM10, respirable particulate matter, is defined as particulate matter with a diameter of 10 microns or less. It is also termed “inhalable particulates” as particles of this size are small enough to enter into the lungs.

Qualified recycling facility means an entity or person that processes lead-acid batteries or their component materials for recovery of usable materials and maintains all permits to operate according to all applicable local, state, or national authorities with governing jurisdiction. Energy recovery or energy generation by means of combustion is not recycling.

Shift means a period of work that has a regular starting and ending time that may repeat itself on a daily, weekly, biweekly, or other basis

Spill or release means an incident that results in exposure to a hazardous material to persons outside of the facility.

Supplier is the entity that provides parts, chemicals and/or materials that go into the production of lead batteries. Suppliers may include off-site facilities owned by the manufacturer, or in which the manufacturer shares ownership.

Worker means a person who is present in a lead battery manufacturing facility, receives compensation or training, and is present for a period of more than five working days (or shifts) per year. Workers include contract labourers employed by an entity other than the owner or operator of the lead battery manufacturing facility.

Work area means a location in a lead battery manufacturing facility where hazardous materials are produced, handled, stored, or used, and where workers are present.

Work practices are procedures or policies that reduce employee exposures or environmental contamination by minimizing the release of airborne dust and by cleaning to limit dust and debris.

VI. Objective 1 Requirements: Reduce lead exposures in communities where lead batteries are manufactured.

Criteria 1.1: Facility shall monitor the emissions into air and water regularly and ensure minimum discharges of lead into the environment.

Indicators

Air Emissions

- 1.1.a. Measure the stack emissions every month for airborne lead and ensure that it does not exceed **10.0 mg/Nm³**.
- 1.1.b. Monitor lead content in ambient air twice a week (24-hr monitoring) and the values should be less than the standard of **1.0 µg/m³** as an annual average.

Wastewater Discharge

- 1.1.c. Identify and classify potential lead sources from various discharge points for wastewater. Facilities must ensure that lead concentration in any wastewater does not exceed **0.1 mg/l** before discharge,

Criteria 1.2: Facility shall check the performance of all pollution abatement techniques/measures and reduce discharges of lead into the air.

Indicators

- 1.2.a. Ensure that control equipment including, but not limited to, bag filters and scrubbers is in place and operational.
- 1.2.b. Carry out performance testing of pollution control equipment at each stage of the process to ensure that it is functioning as intended and that such controls are adequate to minimize air emissions.
- 1.2.c. Ensure that a stack, minimum height 30 m, connected with hood and fan is in place and all the emissions from sources are routed through this.

1.2.d. Ensure that control equipment is operating throughout when the manufacturing process is being carried out in areas serviced by this equipment.

VII. Objective 2 Requirements: Reduce lead exposures and improve the health and safety status of workers in lead battery manufacturing facilities that are occupationally exposed to lead and other hazardous materials.

Criteria 2.1: Facility shall identify the potential for workers to be exposed to lead.

Indicators

2.1.a. List processes and work areas with potential for worker lead exposure.

2.1.b. Catalogue the controls being used by process and work area listed in 2.1.a above.

Criteria 2.2: Facility shall evaluate workers' airborne exposure to lead.

Indicators

2.2.a. Conduct full-shift personal air monitoring on workers and work areas with the greatest potential for lead exposure with a sufficient sample size and frequency necessary to provide representative data for each process and work area listed in 2.1a above.

Criteria 2.3: Facility shall control worker lead exposures to specified permissible levels.

Indicators

2.3.a. Install new or modify existing engineering controls (e.g., local exhaust ventilation) at machines, processes, or work areas where personal air monitoring results exceed **50 $\mu\text{g}/\text{m}^3$** lead.

2.3.b. Repeat personal air monitoring on workers in areas with new or modified production equipment or engineering controls to ensure that controls are effective and lead levels are maintained below 50 $\mu\text{g}/\text{m}^3$.

2.3.c. Require workers to wear respirators with a minimum protection factor in locations where the management has failed to maintain lead exposure levels equal to or less than 50 µg/m³ lead by other means.

Criteria 2.4: Facility shall minimize the potential for lead contamination from workers' skin, hair, and clothing.

Indicators

2.4.a. Provide daily clean coveralls or similar full-body work clothing to include gloves, caps, shoes (or disposable shoe coverings), and eye protection (if needed) to workers.

2.4.b. Provide showers and hand washing facilities with soap and clean water.

2.4.c. Require workers to wash hands with soap before each break and to shower at the end of each shift.

2.4.d. Prohibit the consumption of food or drink in the workplace.

2.4.e. Provide a separate eating area for workers that is removed or protected from the sources of lead exposure.

2.4.f. Do not allow workers to enter eating areas without removing coveralls and washing their hands and face with soap and water.

Criteria 2.5: Facility shall monitor workers' blood lead levels and take steps to reduce levels if necessary.

Indicators

2.5.a. Collect samples for blood lead analysis from all workers:

- Before they start work at the facility;
- After they have been employed for at least 3 months (but before 4 months); and
- Half yearly thereafter as long as levels do not exceed 40 µg/dl for men or 30 µg/dl for women.

Allow for more frequent sampling intervals if requested in writing by a licensed physician. When a worker's blood lead level is greater than 40 µg/dl for men, and 30

µg/dl for women, require more frequent blood lead monitoring and action as specified below.

- 2.5.b. Obtain the services of a qualified phlebotomist, occupational physician, or nurse and arrange for blood lead analysis by a laboratory that is accredited by the respective National Accreditation Authority for biological/medical testing, which certifies that the reported results are accurate to a confidence level of 95 percent within plus or minus 5 percent. If blood lead analysis is conducted by an in-house laboratory, arrange for an independent accredited laboratory to analyze duplicates of at least 10 percent of the blood samples for validation purposes.
- 2.5.c. Notify workers in writing of their individual blood lead levels within 5 working days of receipt of the results from the laboratory.
- 2.5.d. Ensure that blood lead levels of workers do not exceed **40 µg/dl** for men and **30 µg/dl** for women. Workers with a blood lead level exceeding the level specified above shall be temporarily relocated from work having an exposure to airborne lead that exceeds 10 µg/m³. During this relocation period the worker shall maintain the same rate of pay, working hours, and benefits that he/she was previously afforded.
- 2.5.e. Workers relocated from working around lead due to a blood lead level at or above 40 µg/dl for men and 30 µg/dl for women shall be eligible to return to work when two consecutive blood sampling tests taken 10 days apart for men and three consecutive blood sampling tests taken 10 days apart for women indicate that the worker's blood lead level is at or below 35 µg/dl for men and 25 µg/dl for women. In no case shall the worker be returned to work within 30 days of the date of medical relocation.

Criteria 2.6: Facility shall institute a medical surveillance program.

Indicators

- 2.6.a. Make the employment of workers conditional upon the following factors:
 - A medical examination under the supervision of a licensed physician before the worker enters employment;
 - A periodic medical examination at least annually; and
 - A signed certification by the licensed physician following each examination indicating that the worker may work around lead and other hazards with or without

limitations as specified and may wear a negative pressure respirator (if assigned). Such certificate should be kept on file by the employer.

2.6.b. Make available to workers upon termination or resignation one medical examination within 30 days at no charge.

Criteria 2.7: Facility shall take measures to prepare for an emergency and shall train all workers on the same.

Indicators

2.7.a. Ensure that the necessary information, internal communication, and coordination are provided to protect all people in the event of an emergency at the work area.

Criteria 2.8: Facility shall have a formal program to train all workers on occupational safety and health issues and shall demonstrate awareness and compliance among workers.

Indicators

2.8.a. Require attendance of all workers at training courses.

2.8.b. Ensure that each training course is conducted by a competent person and includes the following information:

- The nature of operations that can cause lead exposures;
- The health effects of lead;
- The collection procedures and interpretation of personal air monitoring results;
- The purpose and description of the medical surveillance and blood lead monitoring programs;
- The engineering controls and work practices used to minimize exposures;
- The use, limitations, and fit testing of respirators; and
- Good personal hygiene practices and the potential for take-home exposures.

2.8.c. Conduct training programs within 10 days of initial assignment and refresher training programs at least annually.

VIII. Objective 3 Requirements: Increase the adoption of sustainable practices in order to reduce the environmental impact of lead battery manufacturing by encouraging efforts to minimize waste, lower emissions, reduce energy and water consumption, and encourage environmentally sound recycling.

Criteria 3.1: All types of waste and emissions from the facility are reduced. Where possible, waste is recycled and re-used and any residual waste is disposed of in an environmentally responsible manner.

Indicators

Air

3.1.a. Ensure that the facility is in compliance with the most stringent national, state, or local requirements for air emissions. Conduct ambient air quality monitoring to ensure that values are less than the annual average standards (based on a minimum of 104 measurements in a year taken twice a week) as given below:

- Respirable Particulate Matter (PM10) **50 µg/m³**
- NO_x **60 µg/m³**
- SO₂ **60 µg/m³**

Water

3.1.b. Maintain operating logs, records, and analytical results of discharges of wastewater for pH level.

Solid Waste

3.1.c. Deploy a systematic process for continual monitoring and recording of the quantities and types of all non-hazardous waste generated.

Medical Wastes

3.1.d. Prepare and implement a plan for the effective handling and disposal of medical waste (if any is generated on-site).

Hazardous Wastes

3.1.e.i. Monitor the type and quantity of hazardous waste generated.

- 3.1.e.ii. Maintain all records and manifests regarding off-site disposal of hazardous wastes for at least 3 years and records regarding on-site disposal of hazardous wastes indefinitely.
- 3.1.e.iii. Restrict on-site disposal sites to solid waste and ensure that they meet all applicable local requirements, have sufficient security to restrict access, and have warning signs posted.

Chemical Storage and Handling

- 3.1.f.i. Inventory and monitor the type and quantity of chemicals used and stored on-site.
- 3.1.f.ii. Ensure the integrity of aboveground and underground storage tanks with regular monitoring.
- 3.1.f.iii. Provide instructions to all workers on safe handling of all hazardous materials used or stored at the facility.
- 3.1.f.iv. Ensure appropriate storage of chemicals.

Criteria 3.2: Provide instructions to end users on safe handling and disposal of lead batteries.

Indicators

- 3.2.a. Display cautions related to battery usage and disposal on a permanent label legible on the product; the label must indicate the following through a graphic or text:
 - That the battery casing material, metals, and alloys in the battery can all be recycled; with the Mobius loop prominently displayed;
 - That the battery must not be dumped in a landfill or municipal waste dump;
 - A local telephone help line number where safe disposal or battery collection information can be obtained in the local language;
 - Instructions to recycle the used lead acid battery properly when it is at the end of its useful life, including the contact details of the battery supplier or recycler for correct collection or disposal provisions;
 - Information on any deposit or reward system for returning the used battery to a specific location;
 - A reminder to wear the appropriate personal safety equipment during battery maintenance or servicing;

- The international warning symbol for acid and instructions explaining what first aid to apply in the event of an acid burn or a splash to the face and eyes;
- Indication of positive and negative terminals;
- Indication of the voltage of the battery;
- A battery marked as a “lead-acid battery;” and
- A bar code to indicate the name of the manufacturer, date of production, place of manufacture, battery type, and unique serial number for each battery.

Criteria 3.3: Provide information to all communities, emergency response agencies, medical providers, and local governments within a five-kilometre radius of the facility on emergency response procedures in case of an accidental spill or release.

Indicators

3.3.a. Develop and disseminate awareness material in the local language indicating the necessary steps to be taken during an emergency situation including any accidental spills or releases.

Criteria 3.4: Conservation of natural resources by reducing water and energy consumption.

Indicators

Water Consumption

3.4.a. Record the use of water from all sources.

Energy Consumption

3.4.b. Record the total energy use for the facility.

Criteria 3.5: Develop, implement, and monitor a plan to reduce greenhouse gas emissions.

Indicators

3.5.a. Maintain a record of greenhouse gas emissions in tonnes of CO₂ or an equivalent on an annual basis to include direct and indirect sources.

Criteria 3.6: Establish a mechanism to ensure the performance of a collection system for used batteries that is compliant with the Model BEST Take Back System in Annexe 1.

Criteria 3.7: Monitor suppliers and track the collection of used batteries to ensure compliance with the BEST Standard.

Indicators

3.7.a. Maintain a record of all sources of parts, chemicals, or other materials used in production of lead batteries including the name, address, and contact information of the supplier. The quantity and source of lead purchased must be reported on an annual basis in a manner sufficient to determine the recycled content of all lead inputs.

3.7.b. Require all suppliers to comply with applicable portions of the BEST Standard and provide written verification that all suppliers are compliant with the BEST Standards based on an annual audit conducted by the manufacturer or its agent.

3.7.c. Provide access with 15 days notice to facilitate audits of all suppliers' facilities where they manufacture lead-based components or parts of any supplied battery for the purpose of conducting an audit according to this standard.

3.7.d. Record the volume of used batteries collected from dealers or directly from customers and the release or sale of used batteries to qualified recycling facilities.

Criteria 3.8: Benchmark environmental performance against annual battery production.

Indicators

3.8.a. Report the number, size, and type of batteries produced on an annual basis.

Criteria 3.9: Increase transparency through the disclosure of legal and administrative actions relevant to provisions of the BEST Standard.

Indicators

3.9.a. Describe any material settlement or pending legal proceedings, other than ordinary routine litigation incidental to the business, that occurred or has been revealed in the past year to which the manufacturer or any of its subsidiaries are a party.

3.9.b. Describe any material settlement, pending proceedings, fines, or violations concerning environmental or occupational laws and regulations advanced by a local, federal or state government, that occurred or were revealed in the past year to which the manufacturer or any of its subsidiaries are a party.

**Better Environmental Sustainability Targets
For Lead Battery Manufacturers**

**Annexure I
Battery Take Back System**

Battery Take Back Provisions

- (a) The manufacturer shall report the number of lead-acid batteries sold and the number of lead-acid batteries collected on a half-yearly basis.
- (b) The manufacturer shall report the percentage of lead-acid batteries collected back per the number of lead-acid batteries sold for the same period.
- (c) The manufacturer shall adopt a plan indicating measures to continually improve the rate of lead-acid batteries collected per the number of lead-acid batteries sold.