

SOP: Drone Battery E-Waste Management  
(For DGCA Approved RPTO Operations)

## 1. Purpose

The purpose of this SOP is to ensure the **safe handling, storage, monitoring, and disposal of drone batteries** that have reached end-of-life in compliance with the **Drone Rules 2021** and the **E-Waste Management Rules 2022** issued by the **Ministry of Environment, Forest and Climate Change**.

Drone batteries such as **Lithium Polymer (LiPo)** and **Lithium-ion batteries** fall under **electronic hazardous waste**, and improper disposal can cause **fire hazards, toxic leakage, and environmental contamination**.

This SOP aims to:

- Prevent fire hazards
- Protect environmental safety
- Ensure regulatory compliance
- Maintain proper documentation and traceability

## 2. Scope

This SOP applies to:

- All drone batteries used in **RPTO operations**
- Batteries used in:
  - Training drones
  - Demonstration drones
  - Agriculture drones
  - Mapping drones
  - FPV drones

Battery types covered include:

- Lithium Polymer (LiPo)
- Lithium-ion (Li-ion)
- Smart drone batteries with integrated Battery Management Systems (BMS)

These batteries may contain materials such as:

- Lithium
- Cobalt

- Nickel
- Copper
- Electrolytes

These materials are considered **hazardous if discarded improperly**.

### 3. Responsibility

Accountable Manager / RPTO Head

Responsible for overall compliance with battery safety, storage, and disposal regulations.

Chief Instructor / Master Trainer

Responsible for:

- Monitoring battery condition
- Maintaining battery logbooks
- Declaring batteries as **End-of-Life (EOL)**

Technical / Ground Staff

Responsible for:

- Safe storage of batteries
- Segregation of damaged batteries
- Maintaining documentation and E-waste records

### 4. Battery Life Monitoring

Each battery used in RPTO operations shall be assigned a **unique Battery Identification Number (Battery ID)** and recorded in the **Battery Log Register** as per the format mentioned in the RPTO's **Training and Procedures Manual**.

The following details are recommended to be recorded during internal inspections:

Battery ID	Drone Model	Purchase Date	Charge Cycles	Condition	Status
B001	Agriculture Drone	Jan 2025	140	Normal	Active
B002	Mapping Drone	Feb 2025	210	Swelling	End-of-Life

Battery inspection shall be conducted:

- **Before every flight**
- **After charging**
- **During monthly maintenance inspection**

## 5. Criteria for Battery End-of-Life (EOL)

A drone battery shall be declared **End-of-Life (EOL)** or **E-Waste** if any of the following occurs:

1. Battery capacity drops below **70–80% of rated capacity**
2. Visible **swelling or puffing**
3. **Physical damage** or puncture
4. Battery **overheating during charging**
5. **Abnormal voltage drop**
6. Exceeding manufacturer recommended **charge cycles (typically 150–300 cycles)**
7. **Crash damage**

Such batteries must be **immediately removed from operational use**.

## 6. Safe Handling of E-Waste Batteries

Once a battery is declared **End-of-Life**, the following procedure shall be followed:

1. Discharge battery to **0–10% charge level**
2. **Insulate battery terminals** using electrical tape
3. Place battery in a **LiPo fireproof bag**
4. Label the battery clearly as:

**“USED DRONE BATTERY – FOR RECYCLING”**

5. Record the battery in the **E-Waste Register**

## 7. Temporary Storage of Battery E-Waste

A designated **Battery Waste Storage Area** shall be maintained at the RPTO facility.

Storage requirements:

- Fire-resistant **metal storage cabinet**
- Temperature controlled environment
- Away from **combustible materials**
- Protected from **moisture and direct sunlight**

Required safety equipment:

- Sand bucket
- Fire blanket
- Class ABC or Class D fire extinguisher

Maximum storage duration:

**90 days before disposal or recycling**

#### 8. Disposal and Recycling

All drone battery waste shall be disposed of through **authorized e-waste recyclers registered with the Central Pollution Control Board.**

Procedure:

1. Prepare **Battery Disposal Record**
2. Package batteries safely for transport
3. Send batteries to **authorized recycler**
4. Obtain **Recycling Certificate**

All disposal records shall be retained for **minimum five (5) years.**

Recycling processes can recover materials such as:

- Lithium
- Nickel
- Copper
- Aluminum

Recovery efficiency may reach **90–95%**, reducing environmental impact.

#### 9. Documentation and Records

The RPTO shall maintain the following records:

1. Battery Logbook
2. Battery Inspection Checklist
3. Battery End-of-Life Declaration
4. Battery E-Waste Register
5. Recycling Certificate from authorized recycler

These records must be made available during **DGCA inspections, safety audits, or environmental compliance checks.**

#### 10. Emergency Procedures

In case of **battery fire or thermal runaway:**

1. Immediately move the battery to an **open and safe area**
2. Use **sand or appropriate fire extinguisher**

3. **Do NOT use water** on LiPo battery fires
4. Inform the **RPTO Safety Officer**
5. Record the incident in the **Incident Register**

If the fire spreads, contact **local fire authorities immediately**.

#### 11. Training and Awareness

All instructors, ground staff, and drone operators shall receive training on:

- Drone battery handling safety
- Charging procedures
- Identifying early signs of battery damage
- Emergency response procedures for battery fires
- E-waste disposal regulations

Training should be conducted **at least once every year**.

#### 12. Compliance

This SOP complies with:

- **Drone Rules 2021**
- **E-Waste Management Rules 2022**

Failure to comply with these procedures may lead to:

- Safety incidents
- Environmental violations
- Regulatory action by authorities