No : 16/2025

Date : 26 Aug 2025

AIRPORT EMERGENCY SERVICE

FIRE PREVENTION CIRCULAR

To All CAG Staff and Partners,

FIRE SAFETY MANUAL AMENDMENT NOTICE - 02.2025

Fire Safety Guidelines for Lithium Battery-Powered Light Transport Machines (LTMs) in Terminal Buildings

1. With the growing adoption of lithium-ion battery-powered Light Transport Machines (LTMs) in airport operations, it is necessary to establish the fire safety guidelines for their use within terminal buildings.

2. At present, only LTMs fitted with sealed lead-acid batteries are permitted to operate inside terminal buildings. LTMs powered by flooded or non-sealed lead-acid batteries (commonly referred to as wet cell batteries) remain strictly prohibited due to the elevated risks of electrolyte leakage, gas emissions, and fire hazards.

3. The detailed fire safety guidelines for lithium battery-powered LTMs are provided in the attached Annex A.

4. We appreciate your continued cooperation and commitment to upholding fire safety standards at Changi Airport. For further clarification or enquiries, please contact the Fire Prevention (FP) of AES at 6541 2535 or email fire.safety@changiairport.com.

PETER NG
HEAD, INSPECTORATE
AIRPORT EMERGENCY SERVICE

Annex A

Fire Safety Manual Amendment 02.2025 – Chapter 11 (Clause 11.1 - 11.3)

Chapter 11 – Electrical Charging for Battery Powered Light Transport Machine (LTM) and Vehicles

11.1 General

11.1.1. To mitigate fire safety risks associated with battery-powered equipment, only electric Light Transport Machines (LTMs) powered by sealed lead-acid or lithium batteries shall be permitted for operation within passenger terminal buildings. The use of LTMs powered by flooded or non-sealed lead-acid batteries (commonly referred to as wet cell batteries) is strictly prohibited in these areas due to the heightened risk of electrolyte leakage, off-gassing, and fire hazards.

11.1.2. While lithium-ion batteries are integral to modern airport operations, they also pose higher fire and thermal runway risks compared to sealed lead-acid batteries. All CAG stakeholders and partners involved in using, operating, or maintaining lithium battery-powered LTMs should consider the fire safety guidelines and charging requirements outlined in Appendix 3

11.1.3. Reference shall also be made to the latest SS563 for the installation of power supply systems in buildings.

11.2 Electrical Charging Station for LTMs

11.2.1. Installations for charging stations for electrical LTM shall be regarded as electrical installations or components thereof. These installations must adhere to the Electricity Act, the Electricity (Electrical Installations) Regulations, SS638, and shall be approved by CAG IFM in accordance with their specifications.

11.2.2. The electrical LTM shall be connected to the electrical supply equipment so that in normal use conditions, the conductive energy transfer function operates safely.

11.2.3. Cord extension set shall not be used in addition to the cord preset for the connection to the electrical LTM supply equipment.

11.2.4. Adaptors between electrical LTM socket-outlet and plug shall only be used if specifically designated and approved by the vehicle manufacturer or by the electrical supply equipment manufacturer and in accordance with national requirements. (User information shall be provided by the manufacturer on the electrical supply equipment, charging station or in a user's manual. The user manual shall also include information about local usage restriction).

11.2.5. The electrical supply equipment deployed shall be suitable for electric LTM without the need for an external ventilating equipment.

11.2.6. A means of emergency switching complying with the latest SS638 shall be provided to isolate the electricity supply (mains) for the electric LTM charging station in a case of electric shock, fire or explosion. The device for emergency switching shall be provided with a means to prevent accidental operation and suitable for outdoor and other adverse environmental conditions at site. The equipment shall be part of the electric LTM charging station.

11.2.7. Charging cable for connection between charging station and electric LTM should be flexible and possess the mechanical characteristics equivalent to those set up in SS638.

11.2.8. An emergency disconnection device shall be provided at the electric LTM charging station in case of risk of electric shock, fire or explosion.

11.3 Recommended Safety Precautions

a. The battery charging room shall be maintained in a cool, well-ventilated condition at all times.
b. Batteries shall be placed on a non-porous, non-combustible, and non-conductive surface (e.g., slate, glazed tiles) that is always kept dry.
c. The ventilation system for battery rooms shall be designed and installed in full compliance with the Singapore Fire Code and relevant Singapore Standards.
d. Batteries shall not be charged at excessive rates. Any booster used shall be switched off immediately upon completion of charging.
e. Charging operations shall not be left unattended, particularly overnight.
f. All wiring connections shall be properly secured and firmly made.
g. Battery terminals shall be kept clean, lightly greased to prevent corrosion, and capped with insulating material.
h. The charging circuit shall be adequately fused and protected.
i. Equipment shall be switched off before making or breaking battery connections.
j. Hand tools (e.g., wrenches) shall be used with care to prevent accidental short circuits.
k. Battery-cleaning brushes shall be constructed without metal frames or wire bristles.
l. All potential fire hazards shall be identified and controlled. No flammable or combustible materials (other than vehicle components and their associated chargers) shall be stored within the charging area.

Appendix 3

Fire Safety Guidelines on Lithium Battery-Powered Light Transport Machines (LTMs) in Airport Terminals

1. **Background**

These fire safety guidelines aim to highlight key measures to mitigate potential risks associated with lithium battery-powered Light Transport Machines (LTMs), based on the latest best practices. While lithium-ion batteries are integral to modern airport operations, they also pose unique fire hazards that require proactive and robust control measures.

2. **Fire Safety Guideline**

All parties involved in the deployment, operation, and maintenance of lithium battery-powered LTMs should consider the following enhanced fire safety measures.

a. Regular Inspections on LTMs
Conduct routine inspections with a focus on identifying potential fire hazards associated with lithium batteries.

b. Staff Awareness and Training
Organise awareness campaigns and training sessions on lithium battery safety, including early warning signs of battery failure and appropriate emergency response procedures.

c. Equipment Certification
LTMs and their associated charging equipment shall be certified by accredited regulatory bodies (e.g., UL, CE, IEC, or TÜV).

d. Periodic Review of Risk Controls
Periodically review risk mitigation measures to align with technological advancements and emerging fire incident trends.

e. Portable Fire Extinguishers
Consider providing additional portable fire extinguishers rated for lithium battery fires at designated LTM charging stations and on board each LTM.

f. EV Fire Blankets
Consider providing EV fire blankets near designated LTM charging points to enable immediate containment of potential thermal runaway incidents.

g. **Identification Labels**

Display hazard identification labels on LTMs powered by lithium batteries to assist emergency responders during incidents.

h. **Emergency Contact Display**

Display the Airport Emergency Service (AES) hotline number at each LTM charging station and on every LTM unit to ensure rapid access during emergencies.