No : 08/2013

Date : 4 April 2013

AIRPORT EMERGENCY SERVICE

FIRE SAFETY CIRCULAR

To all building and equipment maintenance contractors in CAG buildings,

NEW GUIDELINES FOR THE MAINTENANCE OF UNINTERRUPTED POWER SUPPLY (UPS) UNITS, BATTERY BANK & CHARGERS

In early 2012, the Airport Emergency Service (AES) attended to a case of overheating of a UPS in one of the passenger terminal buildings. In this incident, the battery casing had cracked causing the electrolyte to leak and charring to occur. (Please see Annex A - Images of UPS Battery Fire at a Data Centre in Changi Airport on 22 March 2012).

2 Upon further investigation, AES concluded that lack of maintenance and neglect of the UPS was the main factor causing the battery casing to crack. AES has since reviewed the present UPS, battery bank and charger maintenance frequency and with immediate effect all building and equipment maintenance contractors in CAG buildings shall adhere to the new maintenance frequency guidelines in Annex B - Uninterrupted Power Supply (UPS) & Battery Bank and Charger Checklist. The records of such checks shall be made available for sighting upon request by any AES fire safety inspector.

3 The checklist attached in Annex B (S/N 6) addresses the issue of checks to be done on lead acid batteries that are used as part of UPS, battery bank and charger. Please note the this check does not apply to electrical buggies equipped with flooded or non-sealed lead acid batteries (commonly known as ‘wet’ or ‘wet cell’ batteries) as with effect from 1 July 2009, such batteries have been barred from usage on electrical buggies.

4 Please note that this circular supersedes Fire Safety Circular 06/2009 - Use Of Lead Acid Electric Vehicles And Equipment In Passenger Terminal Buildings and Fire Safety Circular 12/2012 - Maintenance Guideline on UPS, Battery Banks & Charger.

5 For more information, please contact the AES FSU at 65412535 or refer to the fire safety manual at http://www.changiairportgroup.com/cag/html/our-services/airport-emergency-services/fire-safety.

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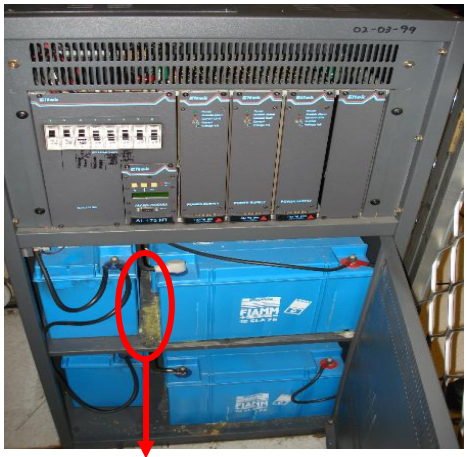
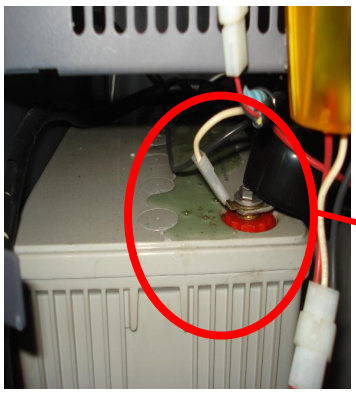
Annex A – **Images of UPS Battery Fire at a Data Centre in Changi Airport on 22 March 2012**



Residues of electrolyte found within the UPS cabinet

Cracked UPS battery leading to leaking electrolyte

Burnt marks originating from a small fire on the side cabinet of the UPS



Leakage of Electrolyte from another UPS within the premises probably due to poor maintenance

Annex B - Uninterrupted Power Supply (UPS) & Battery Bank and Charger Checklist^

S/N	Description	Frequency
1	Check batteries including terminals for cleanliness and correct level of electrolyte (where applicable) in each cell to ensure that they are in good serviceable condition*	Weekly
2	Check condition of battery cabinet for corrosion and ensure that batteries are stored in a secure condition*	
3	Check to ensure that all indicating lights are operating correctly and replace if faulty	
4	Check battery voltage and charging current in accordance with the manufacturer's instructions and record them in the maintenance record*	
5	Simulate power supply failure by disconnecting the main supply and check the proper operation of the changeover device. Record the battery voltage under load condition in the maintenance records*	Weekly for Battery Bank & Charger, Monthly for UPS
6	For lead-acid batteries, select randomly 10 per cent of the total number of cells in the battery and record the electrolyte density and state of charge of each cell, determined from the measured electrolyte density and the data provided in the operating and maintenance manual*	Monthly for UPS, Six - monthly for Battery Bank and Charger
7	Record the date of manufacture, installation and end of life (EOL) of batteries. Replace batteries based on manufacturer’s instructions*	Monthly
8	Visually inspect panel meters and check panel lamps of battery charger	
9	Check and record float voltage of batteries*	
10	Clean terminals of the battery. Inspect all cell containers for electrolyte leakage. Mop up any spilt liquid and neutralize as necessary. Clean all cells with a moist cloth*	Quarterly
11	Check / Equalize voltage of battery charger	
12	Check and record load current	
13	Visually inspect all components for signs of malfunction of the battery charger. Pay particular attention to indicating lamps, relays and contactors	Six - Monthly
14	Check that the battery earth-fault detection system, is provided, operates satisfactorily	Yearly
15	Check that the battery low-voltage alarm, if provided, operates satisfactorily	
16	Check the calibration of voltmeters and ammeters of battery charger using an instrument having an accuracy of class 1.5 or better in accordance of IEC 60051	
17	With the battery on float charge, measure the overall battery voltage and individual cell voltages using an instrument with an accuracy of 1.5 per cent or better. Check the readings to the second decimal place. Record the cells which have a voltage differing from the average by more than ± 0.03V	

^The checklist above is in accordance to 'NFPA 111 Standard on Stored Electrical Energy Emergency and Standby Power Systems 2010 Edition' and 'Code of Practice for The design, installation and maintenance of emergency lighting and power supply systems in buildings SS 563 : Part 2 : 2010‘

"*" denotes for UPS, Battery Bank & Charger, otherwise for Battery Bank & Charger only