



Defence  
Infrastructure  
Organisation

# Safety Alert

# Part A, B & C

**Subject: Standby Generator - Battery Explosion**

**Number: SA 2020/56**

**DIO Sponsor:** Bryan Dunn

Date of issue: 11<sup>th</sup> Oct 2020

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**This Safety Alert is to be read by the following so appropriate action can be taken:**

- 1. DIO's Maintenance Management Organisations and their Supply Chains**
- 2. DIO Regional Delivery Manager (or equivalent for non-NGEC contracts)**
- 3. Head of Establishments**
- 4. Others**

Others interested in the content of this Safety Alert might include:

Assurance Managers, Estate Facility Managers, Assurance Managers in Regional (Service) Delivery Health & Safety Advisors, Top Level Budget Holders, Prime Contractors, Project Managers, Infrastructure Managers and Property Managers with responsibility for MOD projects and Property Management Works Services (including the legacy work of EWCs/WSMs), Authorised Persons (Electrical), Authorising Engineer (Electrical) etc.

**When it takes effect:** Immediately

**When it is due to expire:** When updated or rescinded.

Health and Safety

This Safety Alert does not necessarily cover all aspects of the subject matter and readers should make themselves aware of other potential issues. Readers should also not rely on DIO Publications as their only means of becoming aware of safety issues, but they should consult widely across other media to maintain awareness.

## **Aims**

1. The aims of this Safety Alert are to bring to the attention of appropriate persons or organisations on:
  - a. The type of batteries to use with generators and associated risks; and
  - b. the inspection and maintenance requirements for generator batteries set out in the Maintenance Management Organisations' (MMO) PPM Schedule and Tasks;

## **Introduction**

2. Compliance with the contents of this Safety Alert will enable compliance with the Health & Safety at Work etc. Act 1974 and Electricity at Work Regulations 1989.
3. Any work required as a result of this Safety Alert must be carried out in accordance with the Management of Health & Safety in Ministry of Defence - JSP375.

## **Background**

4. An incident occurred at building 100 Pathfinder A3 Generator plantroom, RAF Wyton.
5. The generators for Building 100 Pathfinder are tested on load every month for a period of 1 hour in accordance with the maintenance task schedule. On start-up it was realised that there was an issue with the A3 generator, and this was shut down remotely from within the main plantroom.
6. On investigation, it was found that one of the four left hand generator start batteries had exploded throwing debris and sulphuric acid across the plantroom. (See photographs at Annex A.)
7. The most recent generator maintenance identified the need to change the batteries based on their age. Following receipt of the service report, these batteries were identified for replacement; this replacement didn't happen.
8. Excessive temperatures can lead to premature aging and reduce battery life. An increase of 8.3°C can reduce lead-acid battery life by 50% or more and this should be considered as part of design life.
9. A similar incident has also been reported at RAF Neatishead.
10. The type of battery installed in this case (a sealed lead acid automotive battery) normally used for large commercial vehicles is not suitable for use with standby generators fitted with continuous trickle chargers.
11. The main contributing factor as to why the battery ruptured was probably due to accelerated water loss within the battery cell - although this type of battery is sealed thermal runaway can lead the battery to explode. As this is a sealed battery the loss of electrolyte cannot be determined when maintenance is undertaken and even if this was possible there is no facility provided to top up the cells.
12. In consultation with the generator manufacturer, they have recommended that this type of sealed lead acid (automotive) battery is not to be used for auto-start standby generator installations fitted with continuous trickle chargers.

## **Part A**

13. This Safety Alert concerns all standby generator plant with battery start and permanently connected trickle chargers. Where access is required to plantrooms containing generator plant and associated start batteries, access control measures are to be implemented until the battery type and design life is confirmed and the replacement of any batteries in

accordance with Part B paras (a) and (b) below has been implemented. During this period, prior to entering the plant room the generator should be changed from automatic on loss of mains to manual start and reverted back upon completion of works and exiting the plant room.

14. The MMO, on direction from the DIO Regional Delivery Manager or Equivalent, shall initiate the following task:
  - a) Establish all sites with standby generator plant with battery start and permanently connected trickle chargers and identify whether the design life has been exceeded, and type of the batteries installed to the standby generator plant.
15. The MMO is to notify the DIO Regional Delivery Safety Alerts Team ([DIO-RDSafetyAlerts@mod.gov.uk](mailto:DIO-RDSafetyAlerts@mod.gov.uk)) through their respective DIO Regional Delivery Manager identifying the location, quantity, date of manufacture and whether design life has been exceeded.
16. The requested data is required within 1 calendar month from issue date of this Safety Alert.

## **Part B**

17. The MMO, on direction from the DIO Regional Delivery Manager or Equivalent, shall initiate the following:
  - a. All automotive type batteries currently installed to standby generator plant are to be replaced with a battery suitable for standby generators on constant trickle charge and sized as per manufacturer's information.
  - b. All batteries currently installed to standby generator plant exceeding their design life are to be replaced with batteries suitably for standby generators on constant trickle charge sized as per manufacturer information.
  - c. Ensure all standby generator batteries are be replaced before they exceed their design life. (The design life is based on ideal conditions and may need to be reduced based on temperature, overcharging, undercharging and DC ripple current. A reduction to 80% of the rated capacity in ampere-hours should also be defined as the end of life.)
18. Regular maintenance as per MMO schedules must be conducted. This should include:
  - a. Tailored maintenance to the type of batteries installed i.e. unsealed lead acid, VRLA other.
  - b. checking the battery charger for correct operation should include a check for overcharging, undercharging and DC ripple current, any of these can reduce design life.
  - c. Ventilation should be checked and confirmed working correctly.
  - d. Room temperature should be checked against manufacturers parameters.
19. The following actions shall be conducted as part of the first 6 monthly maintenance task from the date of issue of this Safety Alert i.e. all works shall be conducted within a maximum of 6 months but generally sooner. During this period access should be controlled and limited to essential personnel as detailed within Part A.

20. The exception to this would be if the operative carrying out the monthly maintenance check of the batteries highlighted a danger, in this case the battery replacement works should be expedited.

### **Part C**

21. The MMO is to notify the DIO Regional Delivery Safety Alerts Team ([DIO-RDSafetyAlerts@mod.gov.uk](mailto:DIO-RDSafetyAlerts@mod.gov.uk)), through their respective DIO Regional Delivery Manager or equivalent, of the actions resulting from implementing the actions in Part B, Paragraphs 14 (a) and (b) when completed.

Photographs



Photograph – 01: A3 Generator Plantroom (Battery No 2). Point of Explosion.



Photograph – 02 : Photograph shows extent debris was deposited within the generator room.  
Note: Plastic battery casing at front of generator opposite side approximately 4 Metres from discharge point.



Photograph – 03 : Photograph shows extent debris was deposited within the generator room.  
Note: Plastic battery casing to side of generator adjacent to discharge point.