



**Ministry of Defence
Defence Standard 61-21**

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**General Specification
for
Batteries
Supplement 013
Lithium Thionyl Chloride Battery
3.6V, NSN 6135-99-770-2535**



DEF STAN 61-21 SUPPLEMENT 013
AMENDMENT RECORD

Amd No	Date	Text Affected	Signature and Date

REVISION NOTE

This supplement has been revised to align its content with the new Defence Standard for batteries, Def Stan 61-21.

HISTORICAL RECORD

This standard supersedes the following:

This Supplement supersedes Battery Specification 219 Issue 1.

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PREFACE

Standards for Defence

Specification for

3.6V Lithium Thionyl Chloride Battery

NSN 6135-99-770-2535

- a.** This supplement shall be read in conjunction with Def Stan 61-21.
- b.** This supplement provides a definitive specification for the electrical, physical, performance and nomenclature requirements for a 3.6V Lithium Thionyl Chloride battery.
- c.** This supplement has been agreed by the authorities concerned with its use and is intended to be used whenever relevant in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of this Defence Standard and its associated supplements, the UK Defence Standardization (DStan) shall be informed so that a remedy may be sought.
- d.** Any enquiries regarding this standard in relation to an invitation to tender or a contract in which it is incorporated are to be addressed to the responsible technical or supervising authority named in the invitation to tender or contract.
- e.** Compliance with this Defence Standard shall not in itself relieve any person from any legal obligations imposed upon them.
- f.** This standard has been devised solely for the use of the Ministry of Defence (MOD) and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Standards for Defence

3.6V Lithium Thionyl Chloride Battery

NSN 6135-99-770-2535

SECTION 1 GENERAL REQUIREMENTS

0 INTRODUCTION

It is Ministry of Defence (MOD) policy to purchase batteries against performance specifications whenever possible. Defence Standard 61-21 and its series of supplements has been generated to address the current requirements for batteries. This supplement is applicable when invoked directly by a MOD invitation to tender, contract, or when referred to by other MOD battery specifications.

1 SCOPE

This supplement provides a definitive specification for the electrical, physical, performance and nomenclature requirements for a 3.6V Lithium Thionyl Chloride battery, NSN 6135-99-770-2535. This supplement invokes Product Conformity Certification.

2 WARNING

The Ministry of Defence (MOD), like its contractors, is subject to both United Kingdom and European laws regarding Health and Safety at Work, without exemption. All Defence Standards either directly or indirectly invoke the use of processes and procedures that could be injurious to health if adequate precautions are not taken. Defence Standards or their use in no way absolves users from complying with statutory and legal requirements relating to Health and Safety at Work.

SECTION 1 GENERAL REQUIREMENTS

3 RELATED DOCUMENTS

3.1 For the purposes of this supplement all related documents are listed in Defence Standard 61-21.

3.2 Reference in this standard to any related document means in any invitation to tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated.

3.3 In consideration of **3.2** above, users shall be fully aware of the issue and amendment status of all related documents, particularly when forming part of an invitation to tender or contract. Responsibility for the correct application of standards rests with users.

3.4 DStan can advise regarding where related documents are obtained from. Requests for such information can be made to the DStan Helpdesk. How to contact the helpdesk is shown on the outside rear cover of Def Stans.

4 DEFINITIONS

Def Stan 61-21 definitions shall apply.

5 ABBREVIATIONS

Def Stan 61-21 abbreviations shall apply.

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SECTION 2 ELECTRICAL CHARACTERISTICS

6 ELECTROCHEMICAL SYSTEM

The electrochemical system shall be defined by BS EN 60086-1: system designation E.

7 NOMINAL AND OFF-LOAD VOLTAGE

The nominal and off-load voltage shall be defined by BS EN 60086-1: system designation E.

SECTION 3 PHYSICAL CHARACTERISTICS**8 BATTERY SYSTEM**

The battery comprises a single hermetically sealed ½ R6 size cell in a PVC plastic sleeve.

The cell may incorporate a pressure relief mechanism that will relieve excessive internal pressure at a value and rate which will preclude explosion or self ignition. Operation of the pressure relief mechanism, for whatever reason, will lead to expulsion of quantities of Thionyl Chloride and Sulphur Dioxide.

The battery shall be designed such that it shall not leak, vent or explode under normal operation or storage.

9 BATTERY LIMITATIONS

It is essential that the battery be operated only within its design and performance parameters and that it is **NEVER EXPOSED TO TEMPERATURES EXCEEDING 75 C, DISCHARGED BELOW 1 VOLT, CRUSHED, PIERCED OR DEFORMED IN ANY WAY.**

10 DIMENSIONS

The dimensions of the batteries will be in accordance with **figure 2** of this supplement.

11 MASS

The nominal mass of the battery is 9.5g.

12 MARKING

The battery shall be indelibly marked with the manufacturers name or initials and part number, date of manufacture, a polarity indication, chemistry (Lithium) and the Nato Stock Number.

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SECTION 4 PERFORMANCE REQUIREMENTS

13 DISCHARGE REQUIREMENTS

Prior to undertaking a discharge test, the batteries shall be pre-conditioned at the test temperature for a minimum of 16 hours.

The batteries shall meet the duration requirements given in **Table 1** when subjected to either of the following constant current loads to an end point of 2V:-

- a. In the temperature range -32°C to $+23^{\circ}\text{C}$ discharge at 35mA.
- b. In the temperature range $+23^{\circ}\text{C}$ to $+52^{\circ}\text{C}$ discharge at 40mA.

The voltage throughout the discharge shall be recorded. The battery voltage delay time to reach 2.0 Volts shall be measured and recorded.

Table 1 Discharge Duration Requirements					
Pre-Discharge Test	Supplement Clause Reference	Minimum Discharge Duration (Hours)			
		Discharge Temperature			
		$+52^{\circ}\text{C}$	$+20^{\circ}\text{C}$	0°C	-32°C
Immediate Discharge		11.5	14.0	9.5	6.5
1 Years Temperate Storage		10.5	13.0	8.5	5.5
2 Years Temperate Storage		10.0	12.5	8.0	5.0

14 STORAGE REQUIREMENTS

14.1 Examination During Storage

At the start, and on completion of each storage test, the off-load voltage test (**clause 7**) shall be carried out, and the batteries examined. Any battery showing signs of leakage, corrosion or distortion shall be deemed to have failed.

14.2 Temperate Storage

Batteries shall be stored in an ambient temperature of $20 \pm 5^{\circ}\text{C}$ and a relative humidity between 45% and 75% for the specified duration.

SECTION 4 PERFORMANCE REQUIREMENTS

15 ENVIRONMENTAL REQUIREMENTS

Batteries allocated to the environmental tests, not sequential, shall be subjected to the tests shown in **Table 2**. During the mechanical tests, the batteries may be mounted by any suitable method. Unless otherwise specified, all tests shall be carried out at an ambient temperature of $20 \pm 2^\circ\text{C}$. Any battery showing signs of leakage or distortion shall be deemed to have failed. On completion of the environmental tests the batteries shall meet the immediate discharge requirements of **Table 1**.

Table 2 Environmental Test Requirements			
Test	Title	Spec.	Additional Information
15.1	Rapid Decompression	D. Stan 00-35 (Part 3)/3 Chapter 3-09 Test CL9	Two unpackaged batteries shall be subjected to the rapid decompression test. Severity D (875–115mbar in 1 minute) shall apply.
15.2	Vibration	D. Stan 00-35 (Part 3)/3 Chapter 2-01 Test M1	Two unpackaged batteries shall be subjected to the vibration test using severity 5.4.5(a) which simulates vibration levels in the main fuselage of Rotary Wing Aircraft. The vibration shall be applied for a total of 6 hours split equally between the longitudinal axis and the transverse axis.
15.3	Shock	BS EN 60068-2-27	Two unpackaged batteries shall be subjected to the shock test. Peak acceleration: 100 g _n . Pulse shape: half-sine. Duration: 11 ms. Three shocks shall be applied in each direction of the longitudinal axis and in each direction of the transverse axis (i.e. a total of 12 shocks).
15.4	Free Fall	BS EN 60068-2-32	Two unpackaged batteries shall be tested and may be dropped in any attitude so as not to fall on either of their terminals. One fall only shall be made. The height of the fall shall be 1 metre.
15.5	Rapid Temp. Change	BS EN 60068-2-1 (Cold)	Two unpackaged batteries shall be tested. A single cold - hot cycle is to be applied using two test chambers. The general requirements of test procedure Aa shall apply. The low temperature shall be $-40 \pm 2^\circ\text{C}$ and the high temperature shall be $70 \pm 2^\circ\text{C}$. The duration of exposure at each temperature shall be 3 hours. The duration of the changeover time shall be not less than 2 minutes or more than 3 minutes.

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SECTION 4 PERFORMANCE REQUIREMENTS

16 SAFETY ASSESSMENT

The batteries shall be allocated to the following safety tests. There shall be no leakage of material, nor any potential hazard to personnel or equipment under any of the abuse conditions specified.

The Authority may allow read-across from a test report demonstrating compliance to the test regime specified in UN Manual of Tests and Criteria (ST/SG/AC.10/11) as revised or amended.

16.1 External Short Circuit

The test regime specified in UN Manual of Tests and Criteria (ST/SG/AC.10/11) as revised or amended shall apply. However, additional tests shall be carried out on undischarged, fully discharged and half discharged batteries. Pre-conditioning will be carried out at 35mA in accordance with clause **13a**.

16.2 Forced discharge

The test regime specified in UN Manual of Tests and Criteria (ST/SG/AC.10/11) as revised or amended shall apply. Pre-conditioning will be carried out at 35mA in accordance with clauses **13a**.

SECTION 5 PRODUCT CONFORMITY CERTIFICATION

17 GENERAL REQUIREMENTS

The Product Conformity Certification requirements defined in **Section 2** of **Def Stan 61-21** are applicable to this supplement.

18 PRODUCT CONFORMITY TEST REQUIREMENTS

The test schedule shown in figure 1 shall apply for product conformity certification. All of the tests shall be carried out in the stated order. The number of samples for each test shall be in accordance with the suppliers quality procedures, but shall be not less than the minimum quantities shown in **figure 1**.

18.1 Interim Certification

Interim certification may be considered after the satisfactory completion of the tests marked ‘#1’ in the schedule shown in **figure 1**.

18.2 Periodic Verification of Critical Performance

All tests marked ‘#2’ in the schedule shown in **figure 1**, shall be carried out in accordance with the contractor’s quality procedures. Alternative tests may be adopted by the contractor, with the prior agreement of the Authority.

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19 HAZARD CLASSIFICATION AND TRANSPORTATION REQUIREMENTS

For transportation considerations, lithium cells and batteries are designated as UN 3090 and may be either classified as Class 9 Dangerous Goods or are exempt, in either case compliance with various constructional and safety test requirements are mandatory within a range of transport regulations.

Within the Declaration of Conformity, the manufacturer shall state:

1. The UN hazard Classification (ie either Class 9 Dangerous Goods or Exempt from Class 9)
2. Compliance with the range of UK National and Multi-National mode specific transport regulations stipulated in Def Stan 61-21.
3. The maximum lithium content of an individual cell (expressed in grams).
4. Reference to a test report demonstrating compliance to UK National and Multi-National mode specific transport regulations stipulated in Def Stan 61-21. The report shall also indicate the date of assessment.
5. Reference to the manufacturing data package (build standard) for materials, piece parts and processes used in the battery construction.
6. A statement on the hermeticity of the cell and indication of any safety devices (such as vents, fuses, diodes and positive temperature coefficient resistors etc) built into the product.

SECTION 6 MARKING REQUIREMENTS

20 GENERAL REQUIREMENTS

Product shall be marked in accordance with **clause 12** of this supplement.

Alternative methods of identifying the DOM may be submitted to the Authority for their consideration.

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SECTION 7 PACKAGING AND LABELLING REQUIREMENTS

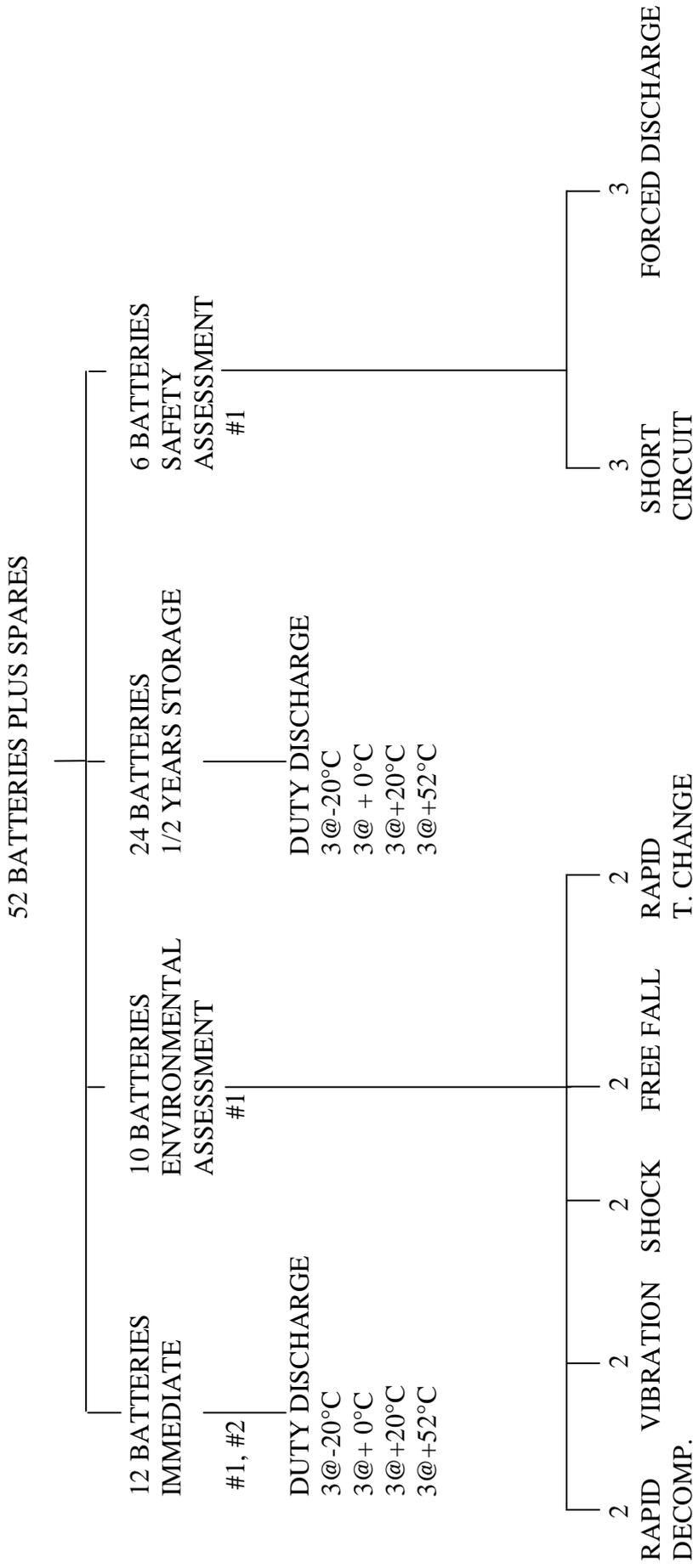
21 GENERAL REQUIREMENTS

In addition to the packaging and labelling requirements stated in the contract, all packaging and labelling shall comply with the requirements of the civil dangerous goods transport regulations governing land, sea and air modes of transport. Except where specified in the contract or excluded within the regulations this shall include packaging requirements for mixed passenger and cargo aircraft.

All levels of packaging shall also include:

1. The product NATO Stock Number.
2. The date of manufacture.

FIGURE 1. PRODUCT CONFORMITY CERTIFICATION TEST SCHEDULE

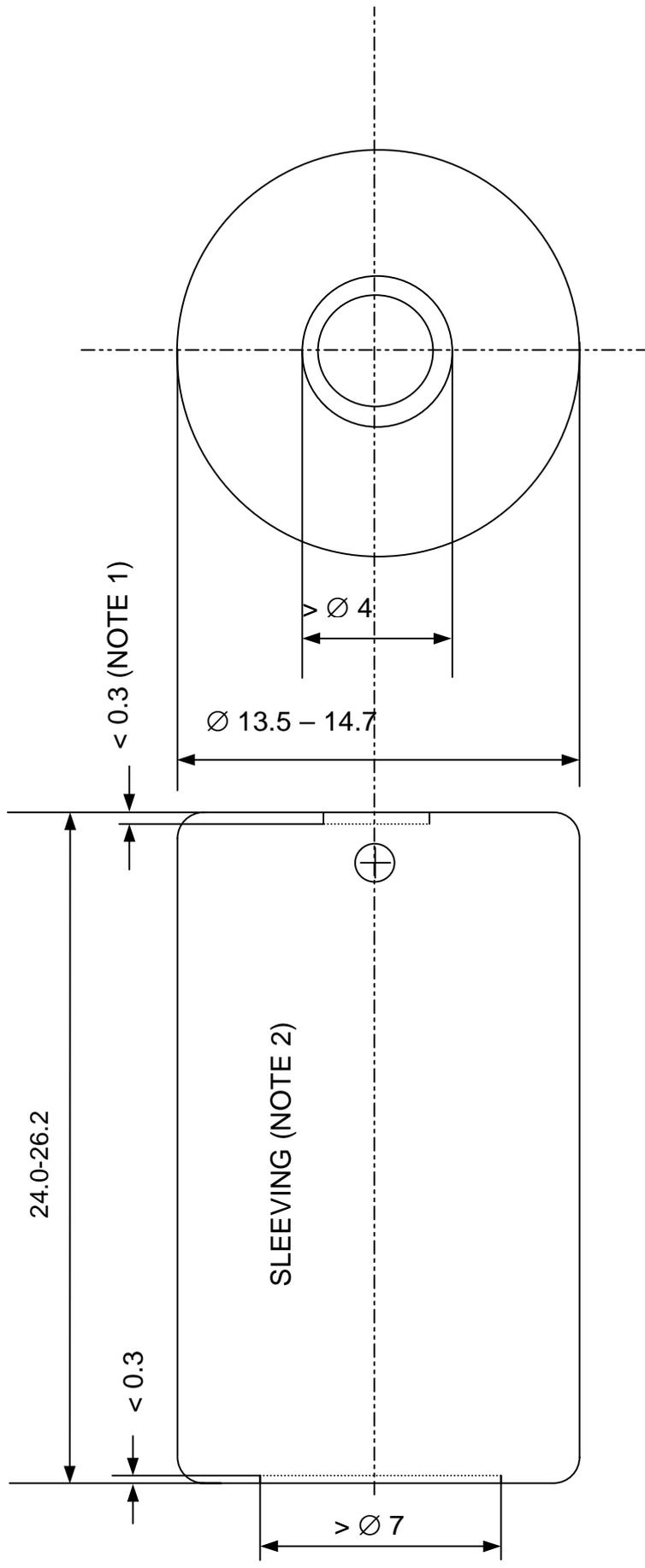


Note This Schedule excludes any requirements for sample testing to demonstrate compliance with Dangerous Good Legislation.

#1 Indicates the tests to be carried out for interim certification (see clause 18.1).

#2 Indicates the tests to be carried out for periodic verification (see clause 18.2).

Figure 2. Outline Drawing of Battery NSN 6135-99-770-2535



NOTES: 1. The positive and negative terminals shall be flush or proud of outer sleeving ideally, but may be sunken by a maximum of 0.3mm.

2. Sleeving bearing (a) Manufacturer's part number.
(b) Manufacturer's Name. (c) Positive terminal polarity

All dimensions are in mm. NOT TO SCALE

Inside Rear Cover

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Contract Requirements

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by up issue or amendment. It is important that users of Defence Standards should ascertain that they are in possession of the latest issue or amendment. Information on all Defence Standards is contained in Def Stan 00-00 Standards for Defence Part 3 , Index of Standards for Defence Procurement Section 4 'Index of Defence Standards and Defence Specifications' published annually and supplemented regularly by Standards in Defence News (SID News). Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify the Directorate of Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken.