



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

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**General Specification
for
Batteries
Supplement 004
Specification for Alkaline
Manganese Dioxide Battery
1.5V, NSN 6135-99-109-9428**



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 Def Stan 61-3 Supplement 85 Issue 1

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PREFACE

Standards for Defence

Specification for

Alkaline Manganese Dioxide Battery

1.5V, NSN 6135-99-109-9428

- 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 1.5V Alkaline Manganese Dioxide 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.

TEXT

Standards for Defence
Specification for
Alkaline Manganese Dioxide Battery
1.5V, NSN 6135-99-109-9428

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 an 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 1.5V Alkaline Manganese Dioxide battery, NSN 6135-99-109-9428, NBA 3030, BS EN 60086-2 designation LR20. 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.

SECTION 2 ELECTRICAL CHARACTERISTICS

6 ELECTROCHEMICAL SYSTEM

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

7 NOMINAL AND OFF-LOAD VOLTAGE

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

8 ON-LOAD VOLTAGE

The on-load voltage shall exceed 1.0V during the application of a $1.0\Omega \pm 0.5\%$ load for 2 seconds.

SECTION 3 PHYSICAL CHARACTERISTICS

9 DIMENSIONS

The dimensions of the battery will be in accordance with BS EN 60086-2 designation LR20.

10 MASS

The mass of the battery shall not exceed 130g.

11 MARKING

Marking shall be in accordance with figure 2 of this supplement.

SECTION 4 PERFORMANCE REQUIREMENTS

12 DISCHARGE REQUIREMENTS

When subjected to a continuous discharge load of $6.8 \Omega \pm 0.5\%$ to an end-point of 0.9V, the batteries shall meet the duration requirements given in Table 1. Prior to undertaking a discharge test, the batteries shall be pre-conditioned at the test temperature for a minimum of 24 hours.

Table 1 Discharge Duration Requirements			
Pre-Discharge Test	Supplement Clause Reference	Minimum Discharge Duration (Hours)	
		Discharge Temperature	
		$20 \pm 2^\circ\text{C}$	$-18 \pm 2^\circ\text{C}$
Immediate Discharge	12	70	12
78 Weeks Temperate Storage	13.2	65	-
156 Weeks Temperate Storage	13.2	60	-
8 Weeks Jungle Storage	13.3	65	-
13 Weeks High Temperature Storage	13.4	65	-
Environmental Tests	14	60	-

13 STORAGE REQUIREMENTS

13.1 Examination During Storage

At the start, and on completion of each storage test, the off-load and on-load voltage tests (clauses 7 and 8) shall be carried out, and the batteries examined. Any battery showing signs of leakage, corrosion or distortion shall be deemed to have failed.

13.2 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.

13.3 Jungle Storage

Batteries shall be stored for eight weeks at a temperature of $35^\circ\text{C} \pm 2^\circ\text{C}$, for six hours per day, five days per week. The temperature in the intervening period shall be $20^\circ\text{C} \pm 5^\circ\text{C}$. A relative humidity of not less than 95% shall be maintained during this test. Batteries shall be stored without packaging.

SECTION 4 PERFORMANCE REQUIREMENTS**13.4 High Temperature Storage**

13.5 Batteries shall be stored in an ambient temperature of $45 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 15\%$ for a period of 13 weeks. Batteries shall be stored in manufacturer's packaging as supplied.

14 ENVIRONMENTAL REQUIREMENTS

Batteries allocated to the environmental tests shall be subjected to the sequence 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 $20 \pm 2^{\circ}\text{C}$. At the start, and on completion of each test, the off-load and on-load voltage tests (clauses 7 and 8) shall be carried out, and the batteries examined. Any battery showing signs of leakage or distortion shall be deemed to have failed.

Test	Title	Spec.	Additional Information
14.1	Shock	BS EN 60068-2-27	Peak acceleration: $100 g_n$. Pulse shape: half-sine. Duration: 6 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).
14.2	Vibration	BS EN 60068-2-6	Frequency range: 10 to 500 Hz. Amplitude: 0.75 mm or $10 g_n$ (whichever is the less severe). The test to be carried out shall be endurance by sweeping, and shall consist of 15 sweeps in the longitudinal axis and 15 sweeps in the transverse axis
14.3	Bump	BS EN 60068-2-29	Peak acceleration: $40 g_n$. Duration: 6 ms. The total number of bumps shall be 4000 ± 8 , at a rate between 1 and 3 bumps per second, 1000 ± 2 in each direction of the longitudinal axis and in each direction of the transverse axis.
14.4	Free Fall	BS EN 60068-2-32	The battery may be dropped in any attitude so as not to fall on either of its terminals. One fall only shall be made. The height of the fall shall be 1 metre.
14.5	Rapid Temp. Change	BS EN 60068-2-1 (Cold)	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.
14.6	Dry Heat	BS EN 60068-2-2	The test severity shall be a temperature of $85 \pm 2^{\circ}\text{C}$ for a duration of 16 hours.

SECTION 5 PRODUCT CONFORMITY CERTIFICATION

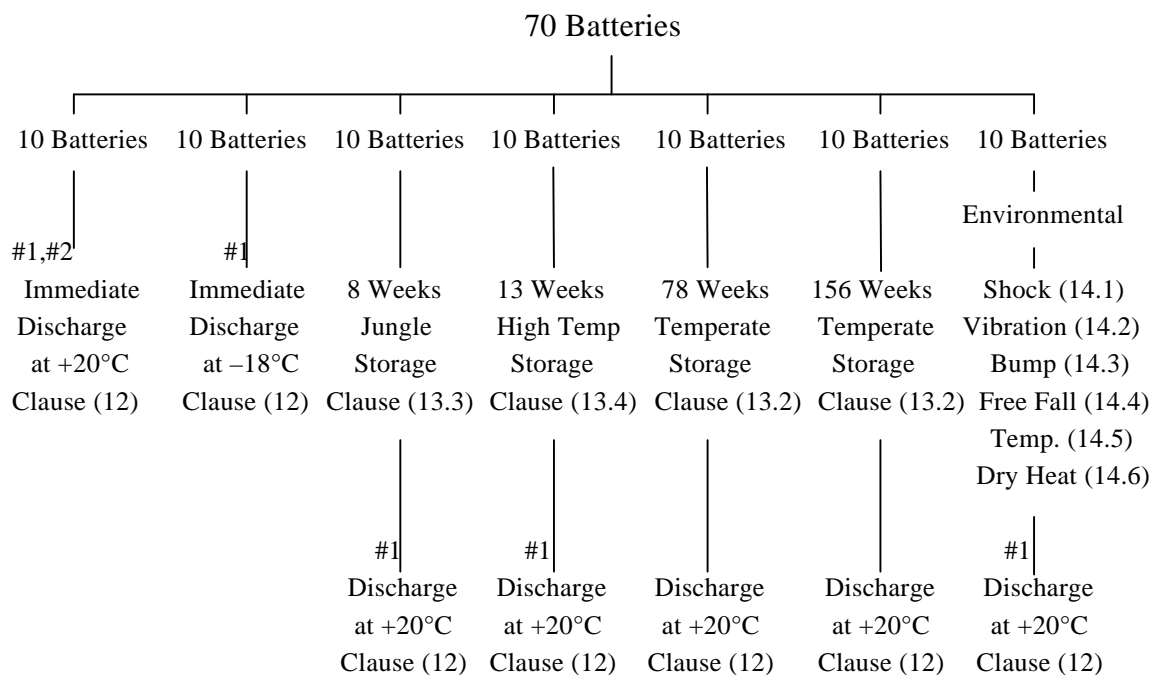
15 GENERAL REQUIREMENTS

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

15.1 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.

Fig 1 Product Conformity Test Schedule



Note #1 Indicates the tests to be carried out for interim certification (see clause 15.2).

#2 Indicates the tests to be carried out for periodic verification (see clause 15.3).

SECTION 5 PRODUCT CONFORMITY CERTIFICATION

15.2 Interim Certification

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

15.3 Periodic Verification of Critical Performance

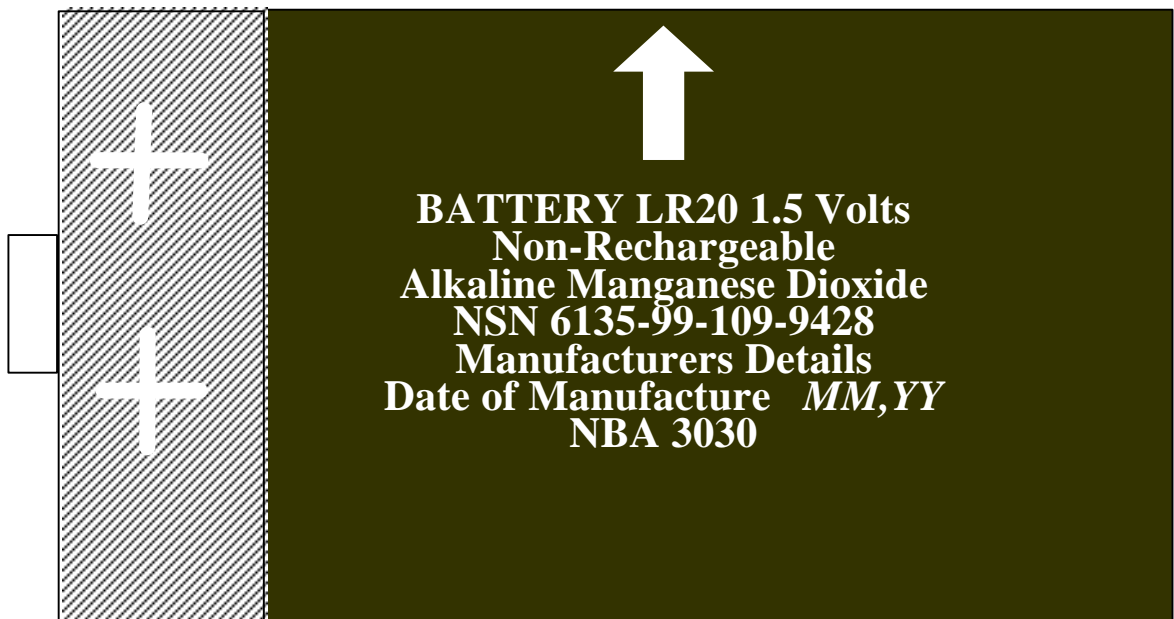
All tests marked '#2' in the schedule shown in figure 1, shall be carried out in accordance with the contractor's quality procedures. Alternative tests may be adopted by the contractor, with the prior agreement of the Authority.

SECTION 6 MARKING REQUIREMENTS

16 GENERAL REQUIREMENTS

Product shall be marked in accordance with figure 2.

Fig 2 Battery Marking



Note:

The battery polarity shall be identified by silver 'positive' markings on a red background, which shall occupy between 15% and 30% of the label at the positive terminal.

The remaining text shall be silver on olive drab green.

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

SECTION 7 PACKAGING AND LABELLING REQUIREMENTS

17 GENERAL REQUIREMENTS

In addition to the packaging requirements stated in the contract, all levels of packaging shall include:

- a. The battery NATO Stock number.
- b. The date of manufacture.
- c. The battery shelf life in the format "NOT TO BE STORED BEYOND *MM,YY*" which shall be 36 months from the date of cell/battery manufacture.

The product shall be packed to enable transportation by all modes (land, sea and air).

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Outside Rear Cover

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The DStan file reference relating to work on this standard is D/DStan/61/21/4.

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.