

SPECIFICATION FOR  
BATTERY, NON-RECHARGEABLE, ALKALINE MANGANESE DIOXIDE, 1.5V,  
NATO STOCK NO 6135-99-109-9428 (NATO TYPE DESIGNATION NBA 3030)



1 This Supplement is to be read in conjunction with the General Specification for Primary Batteries (Leclanché, Mercuric Oxide and Alkaline Manganese Dioxide Types) contained in DEF STAN 61-3 (PART 1). The requirements of DEF STAN 61-3 (PART 1) shall be applicable unless otherwise stated in this Supplement.

2 NOMINAL VOLTAGE

2.1 Cell

1.5V

2.2 Battery

1.5V

3 DIMENSIONS

Dimensions shall be in accordance with the requirements specified for Battery Type LR20 in BS 397. An outline drawing is given at the end of this Supplement.

4 MASS

Mass shall not exceed 130g.

5 MARKING

Marking shall be in accordance with the requirements of the General Specification contained in DEF STAN 61-3 (PART 1), Clause 11, and of the attached drawing.

6 CONSTRUCTION

6.1 Assembly

Metal jacketed single-cell battery, or approved alternative.

6.2 Terminations

As specified for Battery Type LR20 in BS 397.

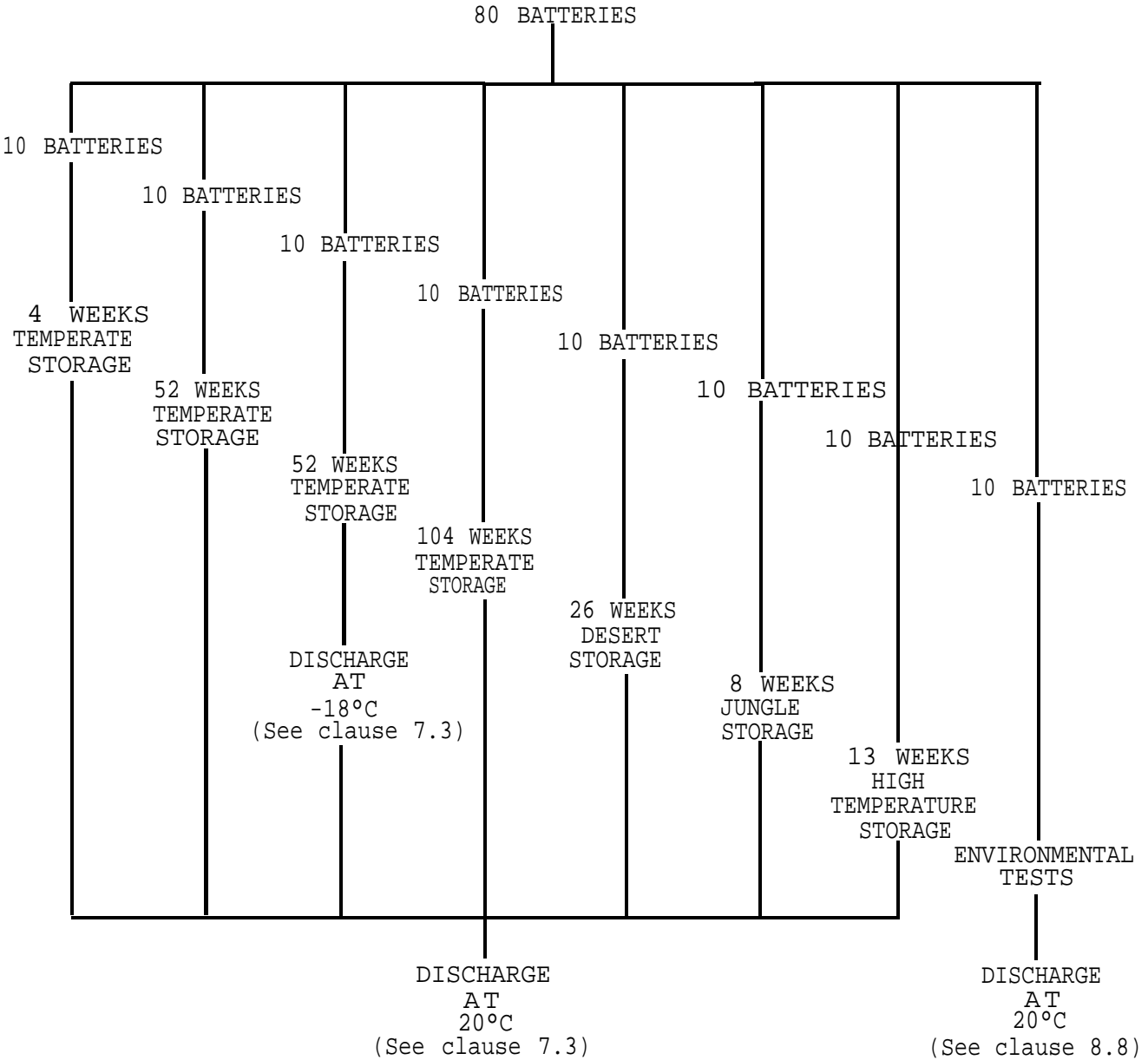
7 STORAGE AND PERFORMANCE TESTS

7.1 Allocation of Sample Batteries

7.1.1 For Qualification Approval testing

Allocation shall be in accordance with the following test schedule:-

Test Schedule



At least 8 batteries in any Sub-group of 10 and at least 71 batteries of the total of 80 batteries tested shall give not less than the minimum service output specified in clause 7.2, or clause 8.8.

7.1.2 For Quality Assurance testing

The number of sample batteries supplied shall be 0.25% of each batch or production run and shall be allocated to the storage tests as follows:-

10% Jungle with the balance divided equally between Temperate 4 weeks, Temperate 104 weeks, Desert and Temperate (Spare).

7.2 Storage Conditions and Performance Requirements

TYPE OF STORAGE	GENERAL SPECIFICATION CLAUSE	STORAGE PERIOD (WEEKS)	MINIMUM SERVICE OUTPUT AFTER STORAGE (MINUTES)	
			DISCHARGE TEMPERATURTE	
			20 ± 2°C	-18 ± 2°C
Temperate	17.1	4	3120	-
Temperate	17.1	52	2820	300
Temperate	17.1	104	2520	-
Desert †	17.2	26	2280	-
Jungle ††	17.3	8	2880	-
High Temperature †	Supplement Clause 7.4	13	2820	-
Temperate (Spare)	18.4	-	-	-

Notes:

1. † Indicates batteries to be stored in manufacturer's packaging as supplied.
2. †† Indicates insulation resistance after Jungle Storage (General Specification DEF STAN 61-3 (PART 1), Clause 19) to be not less than 100,000 ohms. The insulation resistance shall be measured between the positive terminal and the outer jacket by the method described in clause 19.1 of the general specification. If the outer jacket is painted metal, electrical contact must be made directly on to the bare metal.

7.3 Discharge Test Conditions

7.3.1 Load

6.8 ohms, continuous.

7.3.2 On-load voltage end-point

0.90V.

7.4 High Temperature Storage

This storage shall be preceded by temperate storage in accordance with clause 17.1 of the general specification for a period of 4 weeks. Sample batteries shall then 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.

8 ENVIRONMENTAL TESTS

The battery shall be subjected to the following tests in the order stated.

8.1 Voltage Tests

8.1.1 Before and after each environmental test, the battery, whilst at a temperature of  $20 \pm 5^{\circ}\text{C}$  shall be subjected to the following voltage tests.

8.1.2 Off-load voltage: this shall be not more than 15% above the normal voltage of 1.5V.

8.1.3 On-load voltage: the battery shall be loaded with a resistance of 1 ohm  $\pm 0.5\%$  for 2 seconds during which time the voltage shall not fall below 1.0V.

8.2 Shock

8.2.1 Test Ea of BS 2011: Part 2.1 shall apply.

8.2.2 The test is a demonstration of survival.

8.2.3 The battery may be mounted on the shock machine by any suitable method.

8.2.4 The test severity shall be  $100g_n$  peak acceleration, half-sine pulse shape, 6ms duration.

8.2.5 Three shocks shall be applied in both senses of each direction of the longitudinal axis and in each direction of a transverse axis (ie a total of 12 shocks).

8.3 Vibration (sinusoidal)

8.3.1 Test Fc of BS 2011: Part 2.1 shall apply.

8.3.2 The test is a demonstration of survival.

8.3.3 The battery may be mounted on the vibration machine by any suitable method.

8.3.4 Test Procedure A (clause 2.4.1) shall be applied.

8.3.5 Sweep duration shall be 15 minutes.

8.3.6 The frequency range shall be 10 to 500Hz. The battery shall be vibrated with a displacement amplitude of 0.75mm or an acceleration amplitude of  $10g_n$  whichever is the less severe, these amplitudes being measured on a battery surface that is perpendicular to the direction of vibration. The duration of the test shall be 6 hours, 3 hours parallel to the longitudinal axis and 3 hours parallel to a transverse axis.

8.4 Bump

- 8.4.1 Test Eb of BS 2011: Part 2.1 shall apply.
- 8.4.2 The test is a demonstration of survival.
- 8.4.3 The battery may be mounted on the bump machine by any suitable method.
- 8.4.4 The peak acceleration shall be  $40g_n$ , corresponding to a pulse duration of 6ms.
- 8.4.5 The total number of bumps shall be  $4000 \pm 8$ , at a rate between 1 and 3 bumps per second,  $1000 \pm 2$  in each direction of the longitudinal axis and direction of the transverse axis.

8.5 Free Fall

- 8.5.1 Test Ed of BS 2011: Part 2.1 shall apply.
- 8.5.2 The test is a demonstration of survival.
- 8.5.3 The battery may be dropped in any attitude except such as to fall on either of its terminals.
- 8.5.4 One fall only is to be made.
- 8.5.5 The height of the fall shall be 1 metre.

8.6 Rapid Change of Temperature, Two-Chamber Method

- 8.6.1 Test Na of BS 2011: Part 2.1 shall apply.
- 8.6.2 The test is a demonstration of survival.
- 8.6.3 One cycle is to be applied.
- 8.6.4 The low temperature  $T_A$  shall be  $-40 \pm 2^\circ\text{C}$  and the high temperature  $T_B$  shall be  $70 \pm 2^\circ\text{C}$ . The duration of exposure  $t_1$  at each temperature shall be 3 hours after the battery case temperature has stabilized. The duration of the change-over time  $t_2$  in the ambient temperature of the laboratory shall be not less than 2 minutes nor more than 3 minutes.
- 8.6.5 At the end of the final period the battery shall be removed from the hot chamber and shall remain in an ambient temperature of  $20 \pm 5^\circ\text{C}$  until its temperature is stable.

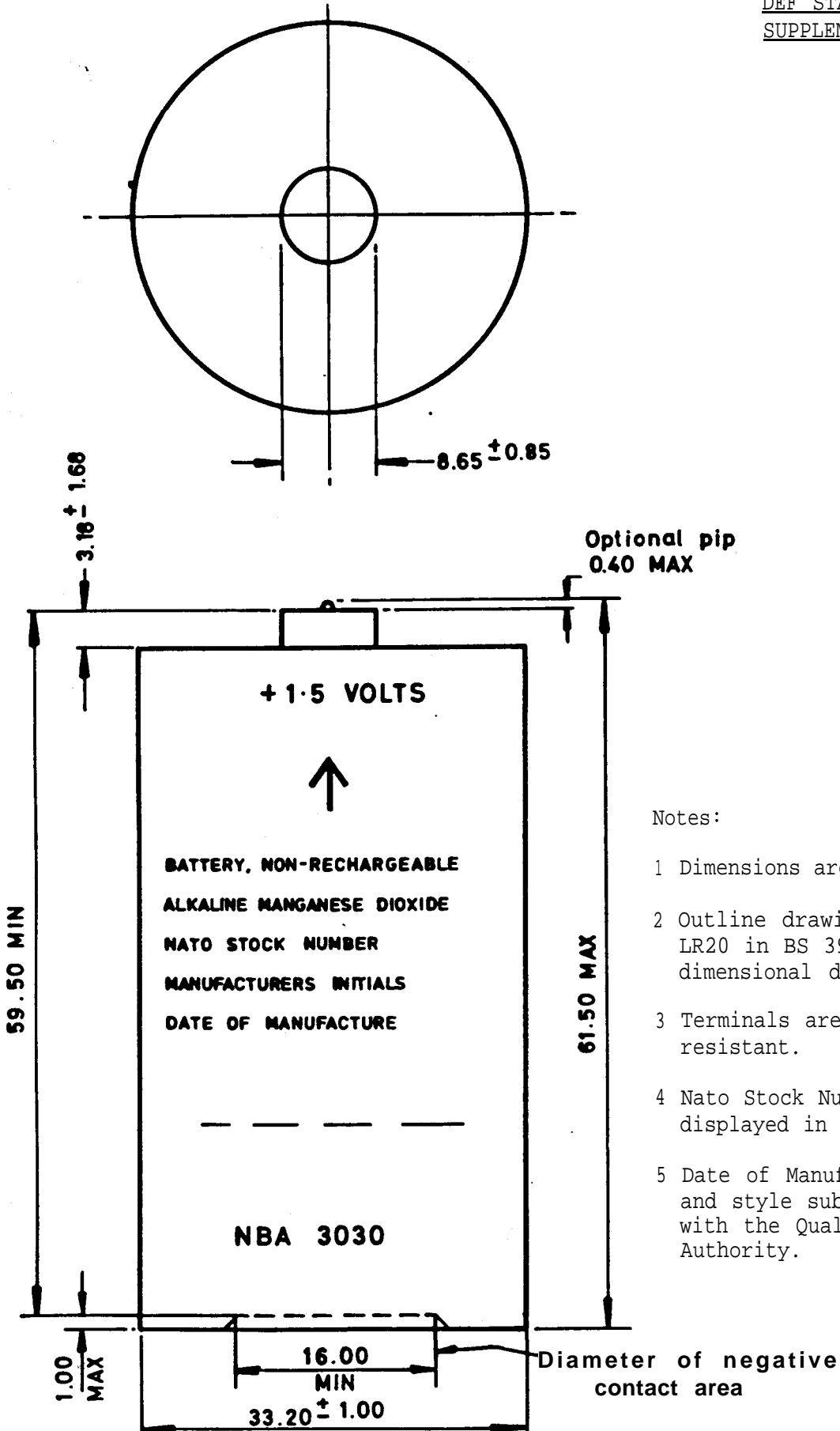
8.7 Dry Heat for Non Heat-Dissipating Specimen with Sudden Change of Temperature

- 8.7.1 Test Ba of BS 2011: Part 2.1 shall apply.
- 8.7.2 The test is a demonstration of survival.
- 8.7.3 The test severity shall be a temperature of  $85 \pm 2^\circ\text{C}$  for a duration of 16 hours.

8.7.4 At the end of this period the battery shall remain in an ambient temperature of  $20 \pm 5^{\circ}\text{C}$  until its temperature is stable.

8.8 Discharge after Environmental Tests

Following completion of the tests in Clause 8.1 to 8.7, the battery is to be discharged in accordance with Clause 7.3 at an ambient temperature of  $20 \pm 2^{\circ}\text{C}$ . The duration of discharge shall be not less than 2160 minutes.



Notes:

- 1 Dimensions are in mm.
- 2 Outline drawing only. See LR20 in BS 397 for full dimensional details.
- 3 Terminals are to be corrosion resistant.
- 4 Nato Stock Number: to be displayed in full.
- 5 Date of Manufacture: Position and style subject to agreement with the Quality Assurance Authority.

Third angle projection



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## **Removal of Product Qualification Approval**

### **IMPORTANT ANNOUNCEMENT**

1. This Standard contains a Product Qualification Approval (PQA) scheme. <sup>i</sup>MOD policy requires that all PQA schemes are removed from Defence Standards called up in contracts placed after 1<sup>st</sup> January 1998.
2. Users of this Standard are to contact the Project Manager (PM), Equipment Support Manager (ESM) or Technical Service Authority (TSA) named in the contract or order, to identify whether there is a continuing need for an approvals scheme.
3. <sup>ii</sup>Product Conformity Certification (PCC) is a risk based process that replaces PQA. Once a risk has been identified PCC can be included as a contract clause. In exceptional circumstances agreement can be sought from AD/Stan for PCC to be included in a Defence Standard.
4. At the next revision of this Standard the PQA scheme will be removed.

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<sup>i</sup> Defence Council Instruction (General) 197/97; Quality Temporary Memorandum 5/98; Chief of Defence Procurement Instruction CDPI/TECH/250 (draft)

<sup>ii</sup> PCC is certification that a product meets its specification. When PC is required by the contract, the contractor is responsible for obtaining the necessary PCC. Certification shall be provided from a NAMAS accredited laboratory when appropriate. PCC shall apply where a Risk Assessment has been identified by the PM; ESM or TSA.