

21st December 1973

SPECIFICATION
FOR

BATTERY, SECONDARY - PORTABLE, LEAD-ACID TYPE
12V, 100 Ah (FULLY DRY CHARGED) NO 4, MK 3 (UK/6TN)
NATO STOCK NO 6140-99-803-4364

This Supplement supersedes Supplement No 7, Issue 1,
to DEF STAN 61 - 9(PART 1), dated 26th June 1971

1. GENERAL

This Supplement is to be read in conjunction with the general specification for batteries, secondary, portable, lead-acid type contained in DEF STAN 61 - 9 (PART 1), Issue 3, dated 3rd August 1973.

2. CONSTRUCTION

The construction is to be in accordance with the requirements of Drawing FV 546133, Sheets 1 and 2 (latest issue) and all associated drawings obtainable from the Procurement Executive, Ministry of Defence, Military Vehicles and Engineering Establishment (MVEE), Chobham Lane, Chertsey, Surrey, KT16 0EE.

3. CONTAINER AND LID MATERIALS (general specification, Annex A)

a. Impact strength (Annex A, clause 3.).

The value obtained from any sample is to be not less than 0.136 J.

b. Plastic yield (Annex A, clause 4.).

The value obtained from any sample is to be not greater than 5.0 millimetres.

c. Resistance to attack by acid (Annex A, clause 6.).

The change of mass and volume of samples tested is to be not greater than 1%.

4. MASS

The mass of the battery, when filled with electrolyte to the level of the perforated separator guard in the fully charged state, shall not exceed 37 kilograms.

5. QUALIFICATION APPROVAL TESTING

Ten batteries are to be provided, four each for sub-groups I and IV and one each for sub-groups II and III of the group C tests specified in clause 6. of this Supplement.

6. APPLICABLE TESTS

a. Qualification Approval and production inspection group A tests.

Tests to be applied to each battery:

TEST	SPECIFICATION CLAUSE	
	GENERAL	SUPPLEMENT
Polarity of plates	20.a.	-
Plate separation	20.b.	-
Sealing	20.c.	7.
Dryness	20.d.	8.

b. Production inspection group B tests.

Tests to be applied to each sample battery:

TESTS IN ORDER OF APPLICATION	SPECIFICATION CLAUSE	
	GENERAL	SUPPLEMENT
Immediate discharge high rate	21.h.(3)	9.
Mass	21.e.	4.
Capacity discharge 20-hour rate	21.j.(1)	10.
Capacity discharge high rate at -40°C	21.j.(9)	12.

c. Qualification Approval and production inspection group C tests.

At intervals of 2000 batteries produced, ten batteries are to be subjected to the full range of Qualification Approval tests (see clause 5.).

6. c. (Contd)

TEST IN ORDER OF APPLICATION	SPECIFICATION CLAUSE		SUB - GROUP			
	GENERAL	SUPPLEMENT				
Two years storage	21.q	-	-	-	-	IV
Sealing	20.c.	7.b.	-	-	-	IV
Immediate discharge high rate	21.h.(3)	9.	I	II	III	IV
Mass	21. e.	4.	I	II	III	IV
Capacity discharge 20-hour rate	21.j.(1)	10.	I	II	III	IV
Electrolyte retention	21.f.	11.	I	II	III	IV
Capacity discharge high rate at -40°C	21.j.(9)	12.	I	II	III	IV
Capacity discharge high rate at 25°C	21.j.(6)	13.	I	II	III	IV
Charge retention test B	21.k.(2)	14.	I	II	III	IV
Thermal shock test	-	15.	-	II	-	-
Short-circuit test	-	16.	-	-	III	-
Vibration test	-	17.	-	-	III	-
Life test B	21.n.	18.	I	-	-	IV

Note: Tests on sub-groups I, II, and III are to commence within 60 days from date of manufacture of the sample batteries.

7. TEST FOR EFFICIENCY OF SEALING (general specification, clause 20.c.)

- a. The test shall be applied before final assembly of the central venting block.
- b. The test shall be repeated after assembly of the central venting block with the air pressure applied to the venting nozzle.

8. TEST FOR DRYNESS (general specification, clause 20.d.)

For production inspection group A, the test for dryness shall be applied before the battery lid is fitted.

9. IMMEDIATE DISCHARGE TEST - HIGH RATE (general specification, clause 21.h.(3))

The discharge current shall be 300 amperes.

10. CAPACITY DISCHARGE TEST - 20-HOUR RATE AT 25°C (general specification clause 21.j.(1))

For the purpose of this test the 20-hour rating shall be taken as 100 ampere-hours.

11. ELECTROLYTE RETENTION (general specification, clause 21.f.)

Test A is to be applied with the battery on open circuit.

12. CAPACITY DISCHARGE TEST - HIGH RATE AT -40°C (general specification, clause 21.j.(9))

a. The discharge current shall be 300 amperes.

b. The voltage at five seconds shall be not less than 8.0 volts.

c. Duration of discharge to the on-load voltage end-point of 6.0 volts shall be not less than 75 seconds.

13. CAPACITY DISCHARGE TEST - HIGH RATE AT 25°C (general specification, clause 21.j.(6))

a. The discharge current shall be 300 amperes.

b. The voltage at five seconds shall be not less than 10 volts.

c. Duration of discharge to the on-load voltage end-point at 8.0 volts shall be not less than five minutes and 50 seconds.

14. CHARGE RETENTION TESTS - TEST B (general specification, clause 21.k.(2))

a. The discharge current shall be 300 amperes.

b. Duration of discharge to the on-load voltage end-point of 6.0 volts shall be not less than 45 seconds:

15. THERMAL SHOCK TEST

a. The battery shall be charged in accordance with the general specification, clause 21.c.

b. With the battery at room temperature, an internal pressure of 137.9 millibars shall be applied for two minutes.

c. The pressure shall be removed and the battery placed in a mean ambient air temperature of $-54 \pm 1^\circ\text{C}$ for 24 hours or until the electrolyte has stabilized at that temperature. An internal pressure of 68.95 millibars shall be then applied to the battery for two minutes.

d. The pressure shall be removed and the battery immediately placed in a mean ambient air temperature of $88 \pm 1^\circ\text{C}$ for 24 hours. An air pressure of 137.9 millibars shall then be applied to the battery for two minutes.

e. The pressure shall be removed and the battery allowed to cool gradually to $25 \pm 2^\circ\text{C}$ for 24 hours. Electrolyte level shall be adjusted if necessary by the addition of distilled water. The battery shall be then brought to full charge.

f. Test procedures as stated in sub-clauses 15.c. to 15.e. inclusive shall be repeated.

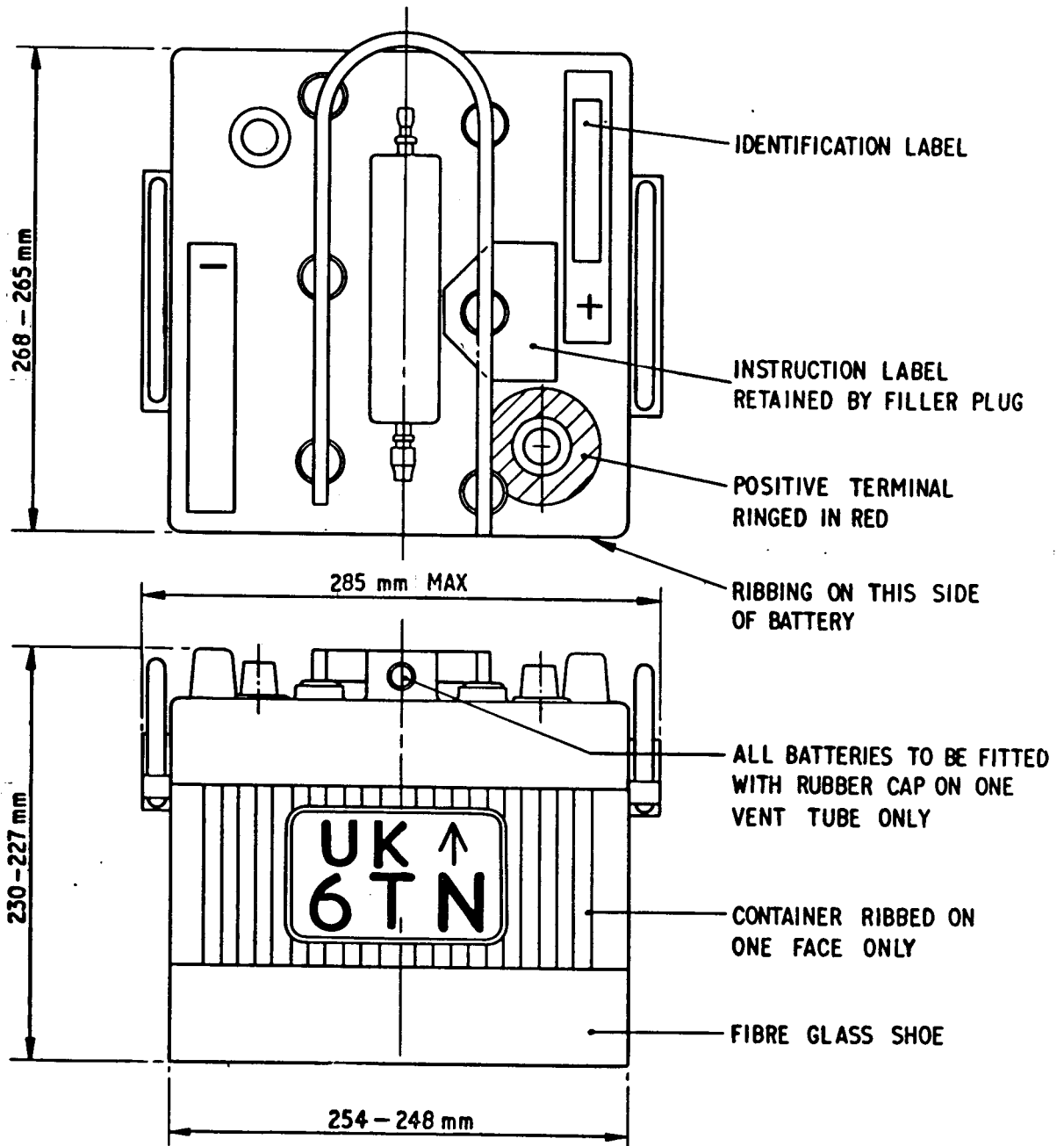
15. g. Internal pressures as stated in sub-clauses 15.b., 15.c., and 15.d., shall be applied to the battery as a whole through one of the two venting connections. Filling plugs shall be held in place by external means. On completion of tests in accordance with sub-clause 15.f., the central venting manifold cover of the battery shall be removed and the individual cell sealing checked in accordance with clause 7. of the Supplement.
- h. The battery shall be subjected to the performance test specified in clause 10. of this Supplement. The specified requirements shall be met in full.
- j. During and on completion of the above tests, efficiency of the sealing shall be unimpaired and the battery shall show no evidence of other damage.
16. SHORT CIRCUIT TEST
- a. The battery shall be fully charged in accordance with the general specification, clause 21.c.
- b. The battery shall be left to stand until the temperature of the electrolyte has fallen to $25 \pm 2^\circ\text{C}$ and any gassing has ceased.
- c. The test circuit shall employ the specified mating connectors and maximum size of copper conductor to fit this connector.
- d. A switch shall be connected with the minimum length of cable to provide the test circuit. The resistance of the test circuit including connectors, cable, and switch contact resistance shall not exceed 2 milliohms (0.002 ohms).
- e. The test circuit shall be connected to the battery for a period of 60 seconds.
- f. No damaging effect on the battery or its performance shall result from the short-circuit test.
17. VIBRATION TEST
- a. Batteries subjected to vibration tests are first to have satisfied the requirements of the performance tests detailed in the Supplement.
- b. On completion of the tests in accordance with clause 17.a. the battery is to be recharged in accordance with clause 21.c. of the general specification.
- c. The battery is to be placed in an ambient temperature of 55°C for a period of 24 hours.
- d. On completion of conditioning in accordance with clause 17.c., the battery is to be stabilized at $25 \pm 5^\circ\text{C}$.
- e. The battery is to be secured to a vibration test machine by means of a holding device conforming to Drawing FV 546118 which is not to bear on vents, cell connectors, or terminals. The battery is then to be vibrated for 2 hours (40 minutes in each of three mutually perpendicular planes) at a frequency of 33 to 35 hertz at an amplitude of 1.14 to 1.27 millimetres (total excursion 2.29 to 2.54 millimetres). Throughout this test the battery shall be under discharge at 5 amperes.

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17. f. The battery is to be removed from the vibration test machine and cooled until the electrolyte temperature is stabilized at $40 \pm 2^\circ\text{C}$. The battery is then to be immediately replaced on the vibration test machine and tested in accordance with clause 17.e. (except that periods are for 20 minutes in each of three mutually perpendicular planes) for a further period of 1 hour. Throughout this period the battery shall be under discharge at 5 amperes.
- g. Voltage and discharge current of the battery shall be monitored throughout the vibration test. There shall be no evidence of instability. On completion of the vibration tests, the battery is to show no evidence of external damage or flooding of the electrolyte.
- h. After the battery temperature has been stabilized at $25 \pm 2^\circ\text{C}$, the battery is to be recharged in accordance with clause 21.c. of the general specification. The battery shall be then discharged at the 20-hour rate (general specification 21.j.(1)). Duration of discharge to 10.5 volts shall be not less than 20 hours.
- j. The battery is then to be dismantled and examined. There is to be no evidence of excessive sediment, broken connections, straps, plates, broken or defective separators, or other damage.
18. LIFE TEST B (general specification clause 21.n.)
- a. 20-hour rate capacity - 100 ampere-hours.
- b. High rate discharge current - 300 amperes.
- c. Minimum number of 14-day life test sequences - 4.

NSN 6140-99-803-4364

THIRD ANGLE PROJECTION



NOTES

- 1 ALL DIMENSIONS ARE IN mm
- 2 FOR FURTHER DETAILS SEE DRAWING No FV546133 SHEETS 1 & 2

SPECIFICATION

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BATTERY, SECONDARY - PORTABLE, LEAD-ACID TYPE
12V, 100 Ah (FULLY DRY CHARGED) NO 4, MK 3 (UK/6TN)
NATO STOCK NO 6140-99-803-4364

AMENDMENT 9

1. Page 4, clause 15

Delete in toto

Substitute new clause as follows:

15. THERMAL SHOCK TEST

- a. The battery shall be charged in accordance with clause 21 c of the general specification.
- b. The battery shall be tested at room temperature for efficiency of sealing in accordance with clause 20c of the general specification, except that the test shall be applied to the battery as a whole through one of the two venting nozzles, whilst holding the filler plugs in place by external means.
- c. The battery shall be placed in an ambient air temperature of minus $40 \pm 2^{\circ}\text{C}$ for 24 hours.
- d. The battery shall be removed from the cold environment and immediately placed in an ambient air temperature of $65 \pm 2^{\circ}\text{C}$ for 24 hours.
- e. The battery shall be removed from the hot environment, allowed to cool to room temperature for 24 hours and then tested for efficiency of sealing as in sub-clause 15b of this Supplement.
- f. Electrolyte levels shall be adjusted if necessary and the battery brought to the fully charged condition.
- g. Test procedures stated in sub-clauses 15 c to 15 f shall be repeated.
- h. The central venting manifold cover of the battery shall be removed and individual cell sealing tested in accordance with clause 20c of the general specification.
- j. The battery shall be subjected to the performance test specified in clause 10 of this Supplement. But if the duration of discharge is less than 20 hours the battery should be fully recharged and subjected to a second 20 hour rate capacity discharge test. The duration of discharge in the first or second discharge is to be not less than 20 hours.

k. During and on completion of the above tests, the efficiency of the sealing shall be unimpaired and the battery shall show no evidence of other damage.

(AMDT 9)

2. Make a note of this amendment on the Amendment Record.

19 JANUARY 1981

DIRECTORATE OF STANDARDIZATION
MINISTRY OF DEFENCE
LONDON

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BATTERY SECONDARY - PORTABLE, LEAD-ACID TYPE
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AMENDMENT 6

1. Page 5, sub-clause 16d, line 4
Delete the full stop at the end of the clause

Insert: and shall not be less than 1.5 milliohms
 (0.0015 ohms).
2. Make a note of this amendment on the Amendment Record.

8 APRIL 1980

DIRECTORATE OF STANDARDIZATION
MINISTRY OF DEFENCE
LONDON



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Date : 9 November 1998

Removal of Product Qualification Approval

IMPORTANT ANNOUNCEMENT

1. This Standard contains a Product Qualification Approval (PQA) scheme. ⁱMOD policy requires that all PQA schemes are removed from Defence Standards called up in contracts placed after 1st 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. ⁱⁱProduct 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.

T R Leaver
Head of Standards Programme Management
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ⁱ Defence Council Instruction (General) 197/97; Quality Temporary Memorandum 5/98; Chief of Defence Procurement Instruction CDPI/TECH/250 (draft)

ⁱⁱ 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.