Ministry of Defence

INTERIM

Defence Standard

61-9(Part 1)/Issue 4 **18 June 1993**

GENERIC SPECIFICATION FOR BATTERIES, RECHARGEABLE, SECONDARY

PART 1: GENERAL REQUIREMENTS

This Defence Standard supersedes
Def Stan 61-9(Parts 1,2 and 3)
All Parts and Sections

AMENDMENTS ISSUED SINCE PUBLICATION

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Revision Note.

This Standard supersedes Defence Standard 61-9 Part l/Issue 3, dated 3 August 1973, Part 2/Issue 2, dated 31 January 1978 and Part 3/Issue 1, dated 8 February 1979 and has been revised to take into account changes in battery technology and to incorporate all parts of 61-9 into a series of documents comprising in Part 1 the Generic requirements and a series of sectional specifications, as subsequent parts, for each separate secondary battery type.

Historical Record

This is the first publication of the congenerous document and is intended to cover all types and chemistries of secondary batteries.

GENERIC SPECIFICATION

FOR BATTERIES, RECHARGEABLE, SECONDARY

PREFACE

This Defence Standad supersedes
Def Stan 61-9 (Parts 1, 2 and 3)

i This Standard provides the generic specification for secondary batteries for Ministry of Defence use, which together with sectional specifications for each type and related Supplements detail the specific requirements for individual batteries.

ii This Standard has been prepared by the Defence Electrical and Electronic Standardization committee (DELSC) Subcomittee L10: Batteries, because there is no suitable National or other Standard acceptable to the Ministry of Defence.

iii This Defence Standard is being issued as an INTERIM Standard and is provisional in order to obtain information and experience of its application. This will then permit the submission of observations and comments from users.

iv This Standard together with its related specifications and Supplements contains all the necessary technical information and is the definitive specification for these items.

NOTE: The Supplement or sectional specification may call for changes to be carried out to the tests given in this Standard, therefore the Supplement or sectional specification is to be read in conjunction with this Standard before any testing is carried out to ensure that all of the requirements of the Supplement or sectional specification are met.

v This Standard has been agreed by the authorities concerned with its use and shall be incorporated 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 the Defence Standard, the Directorate of Standardization shall be informed so that a remedy may be sought.

vi Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is invoked are to be addressed to the responsible technical or supervising authority named in the invitation to tender or contract.

vii This Standard has been devised for the use of the Crown and of its contractors in the execution of contracts for the Crown and, subject to the Unfair Contract Terms Act 1977, the Crown will not be liable in any way whatever (including but without limitation negligence on the part of the Crown its servants or agents) where the Standard is used for other purposes.

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Section Six. Manufacturing and Test Requirements

DEF STAN 61-9 (PART 1) GENERIC SPECIFICATION FOR BATTERIES, RECHARGEABLE, SECONDARY.

Section One. General.

1 Scope.

This Standard specifies the general requirements for qualification approval, manufacture, quality performance and test procedures for batteries, rechargeable, secondary. Specific requirements relative to separate battery types are included in additional parts which combine to form a series of Def Stan 61-9 documents.

This standard is not intended as a guide to battery selection. For this information reference should be made to Def Stan 61-17.

2 WARNING

This Standard calls for the use of substances and/or test procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and in no way absolves either the supplier or the user from statutory obligations relating to health and safety at any stage of manufacture or use.

3 MOD Procurement Policy.

It is MOD policy to purchase batteries against procurement specifications, whenever possible. Two types of specification are used; Qualification Approval Supplements and Preferred Battery supplements.

These Supplements, which are separate documents and must be read in conjunction with this standard, contain the particular requirements for a specific battery. Their requirements shall take precedence should they differ from those given in either this standard or the sectional specification.

To provide a focal point for expertise on batteries a Technical Authority has been established within each Controllerate. For further details refer to Def Stan 61-17 .

4 Related Documents.

4.1 Reference is made in this Standard to the following documents:

BS 89	Specification for Direct Acting Indicating Electrical Measuring Instruments and their accessories.
BS 2011	Basic Environmental Testing Procedures.
BS 5750 Part 1	Quality Systems. Specification for Design Manufacture and Installation.
BS 5750 Part 2	Quality Systems. Specification for Manufacture and Installation.
BS 6001	Sampling Procedures and Tables for Inspection by Attributes.
Def stan 00-9	General Requirements for Qualification Approval, Capability Approval and Quality Assurance of Components for Ministry of Defence Use.

4.1 (contd)

Def Stan 05–14 Mutual Acceptance of Qualification Approvals for Electronic Components within NATO countries.

Def Stan 61–17 The requirements for the Selection of Batteries for Service Equipment

4.2 Reference in this Standard to any related document implies that the edition and all amendments current at the time shall apply to any tender or contract, unless a specific edition is indicated, from the issue date of the said document.

4.3 The related documents are available from the addresses shown below:

DOCUMENT	SOURCE
British and IEC Standards	BSI Sales Department Linford Wood MILTON KEYNES MK14 6LE
Defence Standards, AQAP and STANAG	Ministry of Defence Directorate of Standardization Kentigern House 65 Brown Street GLASGOW G2 8EX

5 Definitions

For the purpose of this Standard the following definitions apply:

5.1 Generic specification. The generic requirements are those that generally apply to all types of secondary batteries produced to or purchased against this standard.

5.2 Sectional specification. This is a separate but related specification that defines the requirements for a range of batteries of a specific type and are related to this standad by their generic terminology .

5.3 Battery Supplements. These are specific to an individual battery and define all of the requirements related to it. There are two types, qualification approval Supplements (QAS) and preferred battery Supplements(PBS). They are identified to their appropriate sectional specification.

5.3.1 Qualification approval Supplements. These are detail specifications which define the technical requirements for a specific battery type which is used in a critical application and whose design is subjected to configuration management. The dimensional requirements are normally those that apply to commercially available batteries, but the performance requirements are more onerous and designed to match the wide range of applications of Defence equipment.

5.3.2 Preferred battery Supplements. These are basic detail specifications which define the minimum technical requirements for a specific battery type. The requirements are based on commercially available battery specifications with specific requirements for defence use.

5.4 Qualification approval. The process applied to a batch of samples which are representative of production standard batteries to demonstrate that the manufacturer is capable of meeting the requirements of the generic, sectional and Supplement specifications.

5.5 Approving Authority The Approving Authority is the Defence Electrical and Electronic Standardization Committee (DELSC) Subcomittee L10: Batteries. All correspondence should be addressed to:

Secretary DELSC Subcommittee L10
D Stan 8
Kentigern House
65 Brown Street
GLASGOW G2 8EX

5.6 Approving Authority Representative (AAR). The AAR is the authority nominated by DELSC L10 to oversee the qualification approval exercise and its maintenance and also to provide a general focal point for quality assurance aspects when invoked in the contract schedule. The details of the current AAR can be obtained from the Approving Authority.

5.7 Group A, B and C testing. These groups are the categories used for quality conformance testing. The test requirements are specified in the relevant Supplement and the data obtained is used for establishing quality conformance, acceptance of the manufactured lot and also maintenance of the qualification appoval. The groups are as follows:

Group A: Non-destructive tests, normally applied to all samples in the lot, used for the inspection of the battery's principal visual, electrical and dimensional characteristics.

Group B: Tests which are carried out on a sample from the manufacturing lot selected in accordance with the supplement and BS 6001. Typical tests include capacity, charge retention and short term environmental, the results of which are used to provide batch release test data.

Group C: These are normally long term storage, cycle life and environmental tests, data from which is used for the maintenance of qualification approval.

Section Two. Requirements for Qualification Approval

6 Qualification Approval Procedures

The qualification approval procedures defined below are based on those of Def Stan 00-9 and are incorporated to demonstrate that a manufacturer is capable of producing the type of battery that meets the requirements of this Standard, the sectional specification and the appropriate Supplement.

A battery is eligible for qualification approval to this Standard provided the manufacturer can demonstrate, through his registered Quality System, control over all stages of manufacture, either in its entirety, or commencing at a manufacturing operation which is called the “primary stage".

The procedures of this section apply to both qualification approval and preferred battery Supplements.

6.1 General requirements for qualification approval. For batteries whose primary stage of manufacture is the receipt of raw materials and for which the AAR can witness all stages of manufacture and qualification testing, the manufacturer is required to:

(a) have an approved manufacturing scope which includes the type of battery for which qualification is sought.

(b) be assessed and registered to BS 5750 Part 1 or 2, ISO 9000 or EN 29000 equivalent, by a third party certification body which itself is registered with the National Accreditation Council for Certification Bodies (NACCB). If not assessed and registered meet the requirements of Def Stan 00-9 Section B.

(c) establish the complete manufacturing data package (build standard) of quality control specifications for materials, piece parts and processes for the battery for which approval is sought. The relevant documents and specifications shall be subject to the configuration controls of Def Stan 05-57 and referenced in the battery’s quality plan (see clause 35.2).

(d) provide the AAR with a full programme of the test schedule matrix and permit the AAR to witness any of the tests.

(e) on receipt of authorization from the AAR, provide and test the batteries as directed by the Supplement, free of all charges unless otherwise contractually agreed.

(f) complete a test report (see clause 8).

(g) prepare an application for a qualification approval certificate (see clause 6.6).

(h) maintain his qualification approval (see clause 12).

6.2 Requirements for qualification approval of batteries manufactured within NATO . For batteries whose primary stage of manufacture is the receipt of raw materials, but where the AAR may not be able to witness all stages of manufacture and qualification testing, the general requirements of clause 6.1 shall apply. The qualification approval procedures shall be in accordance with STANAG 4093 and Def Stan 05-14.

6.3 Requirements for qualification approval of batteries manufactured outside NATO. For batteries whose primary stage of manufacture is the receipt of raw materials and where an inter-government agreement (memorandum of understanding) exists between the manufacturers country and the UK, the general requirements of 6.1 shall apply. The qualification approval procedures shall follow the principles of STANAG 4093 and Def Stan 05-14 which shall be defined in an inter–government agreement.

NOTE: In exceptional circumstances the AAR may undertake surveillance of the qualification approval.

6.4 Requirements for qualification approval of batteries manufactured by a sub-contractor. For batteries produced under a sub-contract whose primary stage of manufacture is the finished cell, the finished cell may then be subjected to further stages of manufacture by the prime manufacturer and offered for qualification approval. The procedures used for the qualification approval shall be referenced on the application for qualification approval, all associated certification (see annexes) and the quality plan (see 35.2).

6.4.1. The prime manufacturer shall:

(a) satisfy the general requirements of 6.1;

(b) establish a configuration control agreement with his sub-contractor which is acceptable to the AAR;

(c) be responsible for ensuring compliance with the requirements of this Standard, the Supplement and the quality assurance system including the surveillance of the sub-contract manufacturer to the satisfaction of the AAR;

(d) apply for qualification approval in accordance with 6.6 stating the procedure by which adequate control and compliance with the requirements of this Standard is to be achieved.

6.4.2 The Approving Authority shall:

(a) acknowledge acceptance or define necessary modifications to the proposals given from 6.4.1 above. Modifications, as directed by the Approving Authority, shall be sufficient to ensure that confidence in the original build standard and associated qualification approval is maintained, which may entail either modified group A, B or C testing or additional maintenance of approval requirements.

(b) On successful completion of qualification approval, raise an appropriate qualification approval certificate.

6.4.3 The AAR shall :

(a) approve the sub-contract control and the configuration control procedures or identify areas of risk which the prime manufacturer shall address;

(b) arrange for the surveillance of the qualification approval using their own resources or delegate the activity in accordance with 6.2 or 6.3 above;

(c) authorize commencement of qualification testing.

6.5 Sub-contracted work. The manufacturer may sub-contract work provided it is carried out in accordance with Def Stan 05–61 (Part 3). The rules for qualification approval of a battery which is produced using critical sub-contracted components, such as cells, shall be applied in full and separately for each source of critical sub-contracted component; ie each approval programme, supporting documentation and associated approval certificate will be valid for the proven source of sub-contract cells and only that source.

6.6 Application for qualification approval. A manufacturer seeking qualification approval shall apply in writing to the Secretary of the Approving Authority. The manufacturer will complete three copies of annex A and forward them with the supporting information to the Secretary of the Approving Authority. The Approving Authority will complete the details at the bottom of the form, retain one copy and send a copy to the manufacturer and the AAR.

6.7 Notice of testing. The manufacturer shall give the AAR sufficient notice of their desire to start qualification approval testing. Testing may only start once the AAR has given agreement to the commencement of testing. The manufacturer shall then demonstrate that he is in a position to apply all of the processes, tests, measurements etc, which will result in an approved battery.

7 Qualification Approval Testing.

Tests will be carried out by the manufacturer using his own approved testing facilities or by an independent test laboratory which is acceptable to the AAR. All qualification approval testing shall be carried out in accordance with the requirements of this Standard, the appropriate sectional and Supplement specifications free of all charges to the MoD unless otherwise contractually agreed.

7.1 Qualification approval Supplements. In the case of these the manufacturer is required to test the batteries to the full requirements and will only be permitted to provide supporting evidence where structural similarity can be claimed from an existing qualification approval.

7.2 Preferred battery Supplements. In the case of these the requirements reflect those of commercial standards and not necessarily those of military requirements. In line with the manufacturer’s commercial activities he may well have carried out tests or be able to provide test evidence of conformance to the test requirements. The manufacturer is permitted to provide such test evidence to support his application for approval provided it is supported by a declaration of design performance (DDP).

The DDP is a formal document detailing the test requirements, test results and referencing the reports related to the tests. On completion it will be signed by the manufacturer’s senior technical manager confirming that the results are valid and achievable. The DDP will be countersigned by the AAR who is required to substantiate the test results. An example of a typical DDP is shown at Annex G.

8 Qualification Approval Test Report.

The manufacturer shall compile a test report in accordance with the requirements defined below.

8.1 Information to be included in the test report:

(a) Approving Authority reference number (from the returned annex A.)

(b) Supplement number, issue and date.

(c) manufacturer's name and address.

(d) place of manufacture if different from (b).

(e) manufacturer's part number and description.

(f) a complete record of all the measurements taken with their corresponding measurement uncertainty and ambient conditions at the time of measurement.

(g) a tabulated list of the test equipment used providing the serial number of the equipment and the calibration due date.

(h) the identification of any test carried out by an independent test laboratory.

(i) reference to manufacturing data package including its build standard, construction, terminations, labelling etc .

(j) full details of any supporting test results for read across information, where appropriate.

(k) copy of the countersigned DDP, in the case of preferred batteries.

Note 1: When the requirements of (f) and (g) prove too large to include in the test report the manufacturer shall retain the results for the life of the approval and shall provide a summary of the results in the report.

Note 2: When qualification approval tests have not been carried out at the same address, reports on the separately performed tests shall be submitted in their entirety as appendices to the main report.

8.2 Authentication of test report. Test reports shall be certified by the manufacturer's Quality Manager, or authorized representative, to certify the results and signifying that all of the tests for qualification approval have been carried out. The qualification approval report shall be countersigned by the AAR's representative to signify that the surveillance is complete, the results are confirmed and that the content of the report is agreed. If the report cannot be signed by the AAR and the manufacturer considers he has fulfilled the requirements then the report shall be submitted, with a covering letter from the AAR, to the Approving Authority for their consideration.

8.3 Preparation and distribution of the test reports. Four copies of the test report shall be prepared and distributed as follows:

(a) One copy to the Approving Authority.

(b) Two copies to be forwarded to the AAR.

(c) One copy shall be retained by the manufacturer.

9 Qualification Approval Certificate.

9.1 Application for an approval certificate. At the appropriate point in the qualification approval programme and on completion of a test report, the manufacturer may apply for an approval certificate by completing the appropriate "Application for a qualification approval certificate" (see annex B) and submitting it to the AAR for countersignature who will forward it to the Approving Authority.

Depending upon the application and the progress of the test programme, two levels of certification may be awarded:

9.1.1 Full qualification approval certificate. Full qualification approval may be applied for and granted on the successful completion of all specified tests, once compliance with all of the specification requirements can be demonstrated.

9.1.2 Interim qualification approval certificate. Due to the relatively lengthy storage periods that may be involved in the approval programme, a manufacturer may apply for and be granted an interim approval on the basis of satisfactory completion of the short term tests. The appropriate point for application will vary depending upon the Supplement requirements. Normally this will only be granted after completion of the mechanical, environmental and short term storage tests.

Should the remaining tests yield unsatisfactory results, the interim approval may be withdrawn.

Interim approvals will also be awarded where a performance limitation exists for a marginal deviation from the Supplement's requirements. The certificate may only be uprated to a full certificate once it can be demonstrated that the limitation has been overcome.

In terms of competitive procurement, preference will normally be given to a manufacturer who is in receipt of a full qualification approval certificate.

9.2 Processing the certificate application. The AAR shall examine the application and the supporting documentation. If acceptable, the AAR shall complete section B of Annex B and forward it to the Secretary of the DELSC L10 Subcommittee, which signifies a recommendation for the award of an approval certificate. If the application is unacceptable, the application shall be returned to the manufacturer for appropriate action. (see 8.2)

Once an approval application is received by the DELSC L10 it shall consider it and, if acceptable, prepare and issue an approval certificate. If the application is not acceptable it shall be returned to the manufacturer, with a supporting letter which shall be copied to the AAR.

9.3 Preparation of an approval certificate. The Secretary to the Approving Authority shall prepare, register and number the certificate and arrange for its signature. A completed copy of the certificate (annex C) shall be forwarded to each of the Controllerate Technical Authorities, the Supply Management branches, the manufacturer and the AAR.

The Approving Authority shall ensure that the appropriate certificate and listing clearly identify whether a full or interim qualification approval has been granted.

9.4 Approval certificate reference list. The Secretary of the DELSC L10 Subcommittee shall retain an up to date list of all of the battery approval certificates.

9.5 Periodic review of approval certificates. Approval certificates will be issued for a three year period after which they shall be reviewed and retained provided the approval has been maintained in accordance with clause 12. If they have not been maintained they will be withdrawn (see clause 13).

10 Modification to Batteries Approved to a Qualification Approval supplement.

In the case of any proposed modifications to the battery subsequent to the granting of qualification approval, the manufacturer shall notify the Approving Authority through the AAR. Notification of the modification shall be accompanied by sufficient test evidence to demonstrate that no adverse effects will occur as a result of the change, also the existing standard will be maintained.

The AAR after consultation with the Approving Authority shall decide whether it is necessary to carry out any further qualification approval tests before the change is introduced and the battery is submitted for release.

Failure to comply with this requirement may result in the withdrawal of the qualification approval certificate, which could lead to the cancellation of any associated Ministry contracts. It is in the manufacturer's interest to retain his approval by introducing modifications in a controlled manner by establishing approval of the revised build standard before ceasing production of the qualification approved battery.

11 Modification to batteries Approved to a Preferred Battery Supplement.

Modifications may be made to an approved battery without the agreement of the Approving Authority provided the requirements of all three levels of specifications are not prejudiced. Should there be any doubt that this will occur then the AAR shall be notified and the procedure of clause 10 shall apply.

Provided the specification can still be met, then the manufacturer shall confirm in writing his modification to both the Approving Authority and the AAR so that the records can be maintained and certification amended.

Failure to comply with this requirement may result in the withdrawal of the qualification approval certificate.

12 Maintenance of Qualification Approval.

The manufacturer is responsible for demonstrating that the qualification approval has been maintained.

The manufacturer shall complete the maintenance of approval notification (annex F) for countersignature by the AAR who will forward it to the Approving Authority. This shall be carried out three months before the expiry date of the qualification approval certificate. Failure to carry out this procedure may result in the withdrawal of the certificate.

12 (Contd.)

Maintenance of approval is assured under the following circumstances:

(a) for those batteries continuously and successfully submitted to the procedure of quality conformance testing (Section Five);

(b) when Group C testing has been satisfactorily completed.

The Approving Authority shall acknowledge receipt of annex F. Provided the approval has been maintained, the Approving Authority shall complete section C of annex F, retain one copy and forward one copy to the Controllerate Technical Authorities, the Supply Management Branches, the manufacturer and the AAR.

If the approval has not been maintained it will be withdrawn in accordance with clause 13.

13 Withdrawal of Qualification Approval.

Withdrawal of an approval may prejudice any existing MoD contracts and it is incumbent upon the manufacturer to ensure that his approval is retained.

13.1 Circumstances for withdrawal. Qualification approval may be withdrawn at the discretion of the Approving Authority under the following circumstances:

(a) At the request of the manufacturer, who shall give, except for circumstances beyond his control, at least six months notice to the Approving Authority of his intention to cease production and twelve months notice before ceasing the supply of a battery having qualification approval.

(b) When production of the battery is given up altogether or the manufacturer has not carried out the maintenance of approval (group C) test requirements.

(c) When the manufacturer's Quality Assessment Registration is withdrawn.

(d) In the case of non-conformity with the requirements of this Standard or its associated specifications.

13.2 Procedure for withdrawal. The Approving Authority shall:

(a) complete and sign an approval withdrawal notification (see annex D);

(b) delete the relevant entry in the approval register;

(c) retain one copy of the completed approval withdrawal notification and forward one copy to each of the Controllerate Technical Authorities, Supply Management Branches, the AAR and the manufacturer.

14 Lists of Qualification Approved Batteries.

A cross reference list of all approved batteries for both the qualification approval Supplements and preferred battery Supplements will be retained by the Secretary of the DELSC L10 Subcommittee. Duplicates of the list will be held by the Controllerate Technical Authorities and the AAR. To establish details of approved batteries the appropriate authority should be consulted.

Section Three. Preparation of Supplements .

15 General Requirements.

A Supplement is a specification sheet for a specific battery type. It will be generated by the originator, who may be MoD personnel or a Defence contractor, to meet a service requirement.

The procedures for the acceptance of a battery supplement are defined in Def Stan 61-17 . Once the Supplement has been accepted it will be formally issued and controlled by the Secretary of the DELSC L10 Subcommittee.

The Controllerate Technical Authority shall arrange for each Supplement to be codified by the Defence Codification Authority such that each battery is related to its unique specification by reference to its NATO Stock Number (NSN) and application.

16 Requirements to be Incorporated in a Qualification Approval Supplement.

A qualification approval Supplement (QAS) is a detail specification for a battery type which is used in a critical application and the test requirements shall define the worst case conditions (see clause 5.3.1).

16.1 The qualification approval Supplement (QAS) shall contain the following details :

(a) a sequential number and issue date, provided by the Approving Authority once the "DRAFT" becomes approved and is published.

(b) a suitable heading which describes the battery type, similar to the following format: Battery, Rechargeable, Secondary, Portable, Lead Acid, 12V 50Ah, (Fully Dry Charged), UK 2HN, NATO STOCK No. 6140-99-111-5238.

(c) a scope introducing the environmental and electrical (discharge rate) use of the battery and referencing any charging equipment, if applicable.

(d) nominal voltage of the cell or battery.

(e) rated capacity, in Ah.

(f) details of the battery dimensions. Whenever possible these shall be the same as those given in the appropriate national or international standards (IEC, BS, EN, Mil etc.). In the case of multicell batteries the dimensions given shall take account of the accumulative dimensions of individual cells. In addition to the battery dimensions an outline drawing shall be given which shows the full dimensions of the label including the size of the lettering.

(g) mass of the battery.

(h) marking of the battery.

(i) charge characteristics, identifying equipment or special characteristics such as diodes, thermal switches, fuses etc.

(j) construction of the battery, including details of its assembly, terminations, outer casing and associated requirements.

16 (Contd)

(k) specific handling and disposal instructions either in detail or by reference to other procedures which satisfy the Health and Safety requirements.

(l) storage and performance requirements. These must reflect the design requirements of the battery for the application and include conditions for environmental, mechanical, temperature, safety and electrical aspects. The envelope of these requirements shall reflect the worst case condition of the known applications.

The test requirements given shall be based upon those given in this standard and its associated specifications or other nationally agreed criteria whilst reflecting the required performance of the battery for its defence application. Such environmental standards as Def Stan 00-35 and BS2011 shall be used.

(m) conditions for cycle life performance.

(n) quality assurance and quality conformance requirements. Details of the requirements for Group A, B and C testing and a sampling plan.

(o) maintenance of approval requirements. The requirements shall be such as to provide sufficient confidence that the original approval has been maintained. Refer to clause 12.

(p) a test schedule identifying the number of batteries to be tested and the quantity allocated to each sub-group.

16.2 Test Schedule. A typical test schedule, detailing a comprehensive list of appropriate and possible tests, is detailed in Table 1. The test schedule identifies the tests, the order of application and sub-groups. The sub-groups enable a number of tests to be progressed in parallel.

In designing the test schedule it is important that each sub-group enables the batteries to be tested to as many of the requirements it is likely to see in service as possible. The environmental tests should be kept together so that the test regime simulates the service application. In the example of Table 1 the cycle life is carried out in two sub-groups so that any effects of environmental testing can be identified. Destructive test will always be the last tests carried out in any sub-group.

17 Requirements to be incorporated in Preferred Battery Supplement.

A preferred battery Supplement (PBS) shall only be raised for non critical applications or where the specified requirements of Nationally recognised specifications are adequate for the battery application (see clause 5.3.2).

17.1 General. The rules of procedure will be the same as those for qualification approval Supplements but the specified test requirements will be less onerous and reflect more closely those of "commercial" applications. The test detail will be aligned with the requirements of nationally recognised "commercial standards" (such as BS, IEC, EN etc.).

It is not possible for the MOD to procure to commercial standards directly because in many instances the quality requirements do not exist, also additional supplementary requirements are necessary such as air transportation, altitude, non-reflectivity, ruggedisation, etc. Furthermore, commercial type standards relate in the main to single cells rather than batteries.

17.2 Specific test requirements. The test requirements of the PBS shall make reference to those in an appropriate national specification. Additional test requirements may only be generated where no national tests are considered appropriate. The PBS shall contain appropriate quality assurance and conformance test requirements similar to those required for QASs.

17.3 Typical test schedule. A typical test schedule is shown in Table 2 in which the test clauses shall define those of the appropriate sectional specification or an appropriate national standard.

Table 1

A Typical Test Schedule for a Qualification Approval Supplement.

Test in order of application	Spec. Clause	Sub-group			
		I	II	III	IV
Dimensional inspection	x.x	*	*	*	*
Mass	x.x	*	*	*	*
Construction	x.x	*	*	*	*
Markings	x.x	*	*	*	*
Two years storage	x.x				*
Insulation resistance	x.x		*		*
Actual capacity	x.x	*	*	*	*
Cold cranking performance	x.x		*		*
Environmental tests (note 2)	x.x	*			*
– Vibration	x.x	*			*
– shock	x.x	*			*
- bump	x.x	*			*
– Free fall	x.x	*			*
– Topple	x.x	*			*
Performance at the lowest operational temperature	x.x		*		
Performance at the highest operational temperature	x.x		*		
Deep discharge	x.x	*		*	
Rate capacity test	x.x			*	
Internal resistance (note 1)	x.x	*	*	*	*
Charge retention, (note 1)	x.x			*	
Abusive overcharge (note 1)	x.x			*	
Cycle life (note 1)	x.x	*	*		*
Short circuit	x.x			*	
Leakage and distortion	x.x	*	*		*
Case containment	x.x		*		
Altitude	x.x			*	
Air transportation	x.x	*			

Key: * - indicates test to be carried out.

NOTES: 1 – one battery to be tested at each temperature; the lowest operational temperature, 20°C annd he highest operational temperature.

2 – provided the manufacturer can demonstrate that the original qualified design/build standard has not changed then this test may be omitted from the group C test programme.

Table 2

A Typical Test Schedule for a Preferred Battery Supplement.

Test in order of application	Test Clause	Sub-group			
		I	II	III	IV
Dimensional inspection	x.x	*	*	*	*
Mass	x.x	*	*	*	*
Construction	x.x	*	*	*	*
Markings	x.x	*	*	*	*
Actual capacity	x.x	*	*	*	*
Cold cranking performance	x.x		*		*
Performance at the lowest operational temperature	x.x		*		
Performance at the highest operational temperature	x.x		*		
Rated capacity test	x.x			*	
Charge retention (note 1)	x.x			*	
Leakage and distortion	x.x	*	*		*
Air transportation	x.x		*		

Key: * – indicates test to be carried out.

NOTES: 1 - one battery to be tested at each temperature; the lowest operational temperature, 20°C and the highest operational temperature.

2 - The test clauses shall reference the appropriate, BS, IEC, EN, or other nationally recognised specification.

Section Four. General Requirements for Secondary Batteries.

18 General Requirements Common to Secondary Batteries.

General technical requirements applicable to secondary batteries are defined below. Specific requirements particular to each battery type are defined in the appropriate sectional specification and Supplement.

19 Definitions

Specific definitions related to each battery type are included in the respective sectional specification.

19.1 Cells. An individual electrochemical unit used to store or convert energy is referred to as a cell. A cell may contain one or more pairs of electrodes of opposing potentials. In the case of a Traction battery each unit is referred to as a cell. Similar nomenclature applies to a nickel cadmium sealed cylindrical cell and also to a single prismatic aviation nickel cadmium vented cell.

19.2 Battery. A battery is normally a group of single cells connected together to form a multicell battery, such as a 12V automotive lead acid battery which maintains 6 cells connected in series. Single cells can be supplied and packaged as single units which are also referred to as a battery. For the purposes of this standard and its associated specifications a battery shall be taken to mean either a single cell or multicell battery unless it is specifically mentioned as a cell.

19.3 Battery voltage. The measured voltage between the anode and cathode (negative and positive) terminals of a battery. The battery voltage varies depending upon its state of charge. It is highest when in the fully charged state and reduces as the battery discharges. The voltage varies dependant upon the type of battery and the materials used for the electrodes. Batteries are normally classified by defining a nominal voltage, a value which reflects the battery's normal operating voltage and is defined by the manufacturer. For specific information it is recommended that the manufacturers technical literature is consulted.

19.4 Monobloc. A battery may contain a monobloc which is in itself a multicell unit. A number of these multicell units, monoblocs, can be connected in series or parallel configurations to provide the required battery.

19.5 Valve regulated cells. A cell which is closed under normal conditions but which has an arrangement which allows gas, generated within the cell, to escape if the internal pressure exceeds the preset valve value. This type of cell cannot normally receive additions to the electrolyte in use.

19.6 Open vented cells. A cell which has a removable cap which is open to the atmosphere and will allow gases to breath in and out of the cell as well as the ability to spill eltrolyte if inverted. This type of cell can accept additions to the electrolyte in use.

19.7 Regular maintenance battery. One which requires regular maintenance and additions to the electrolyte. They tend to be used in applications where abuse is likely and the charging regime is uncontrolled. Regular maintenance is essential to counter premature failure.

19.8 Low maintenance battery. One which requires additions to the electrolyte, but to a lesser extent than those classified regular maintenance. They are usually referred to as "flooded" in that they contain larger volumes of electrolyte compared to those with limited electrolyte which are referred to as "starved" electrolyte batteries.

19.9 Maintenance free battery. One which normally requires no electrolyte addition during it's operational life and tends to have minimal electrolyte (including starved electrolyte) system. These are not tolerant to electrical abuse and require tightly controlled charging methods.

19.10 Sealed for life. A battery which is sealed prior to use and hence no additions to the electrolyte are possible.

19.11 Dry charged battery One that contains charged plates but no electrolyte. Once electrolyte is added the battery is then given a commissioning charge and is ready for use.

20 Capacity testing.

One of the critical characteristics of a secondary cell is its capcity, C. The capacity is the amount of electrical charge, expressed in ampere-hours (Ah), that can be given under a specific set of conditions. The capacity given varies depending on such conditions as; charge input, charged stand time, temperature, discharge output, discharge terminal voltage.

20.1 Rated Capacity. The rated capacity C_{rt} is a reference figure which is valid for a new cell or battery under a specified set of conditions. The conditions are normally obtained at 20°C but the discharge period varies. To define the discharge period the capacity is normally expressed as C_n where n = time of discharge period, in hours, ie C_5 or C_{20} are commonly used for sealed nickel cadmium and automotive types respectively.

20.2 Discharge terminal voltage. Generally the discharge voltage decreases as the discharge time increases, the extent of which is more pronounced at the beginning and end of discharge. To obtain reliable and optimum performance a discharge cut-off voltage is used, which varies dependant upon the type of battery (number of cells) under test. It is normally expressed as an end point voltage.

20.3 Charge input. The charge input is normally constant current, expressed as a fraction of C such as 0.1C, and is defined for a given period of time, in hours. In some cases it may also be expressed as a function of the rated capacity ie $0.1C_{20}$. Constant potential charge is also used.

20.4 Discharge output. The discharge output is a measure of the actual capacity C_a. To achieve the capacity the battery is charged and then discharged at a rate, normally expressed as a function of the rated capacity, eg $0.1C_{20}$ to a given end point voltage. The output achieved under specific conditions is calculated from the duration in hours and the applied discharge current in amps to obtain the actual capacity in ampere-hours . Alternatively capacity may be expressed as the discharge duration.

21 Charge Retention.

A further characteristic of secondary batteries is that of charge retention, C_r and is the amount of available capacity that can be achieved after a period of charged stand. Secondary batteries suffer from self discharge to varying degrees, the extent of which is a function of the battery type and the storage conditions. C_r is normally expressed as a percentage of the rated capacity and provides an indication of the periodicity of re-charge.

22 Cycle Life.

The cycle life of a battery is expressed as the number of times it can be charged and discharged and is used to determine battery life. The termination of life is normally expressed as a function of C_a against a factor of C_{rt}, a typical figure being $0.8C_{rt}$ ie 80% of the original rated capacity.

23 Charging Requirements for Secondary Batteries

Batteries for MOD use will be charged using a wide variety of charging equipments some constant current others constant potential, some with low current limits others with high limits. Where possible the charger will be identified in the Supplement, but this is not always possible as some battery types will be used on a number of chargers. Normally the charging regime will be one that is recommended by the battery manufacturer.

23.1 Electrical power supplies. The electrical power supply characteristics are defined in Def Stan 61-5. This details the range of supplies for generating sets, surface ships and vehicles. These standards shall be used to determine the charging requirements.

23.2 Aircraft batteries. Specific requirements for batteries used in aircraft and supporting ground installations are defined in AP113C-0001-1.

24 Shelf Life of Batteries

The shelf life is the period of time a battery can be stored before it requires maintenance, such as a recharge. Batteries have a finite shelf life. A dry charged battery will have a longer shelf life than a conventional battery. Nickel cadmium batteries can be stored for long periods in a discharged state whereas lead acid batteries must not be left in a discharged state. Specific details are defined in the relevant sectional specification.

25 Transportation and Airworthiness

To enable batteries to be assessed as air transportable they shall be assessed and satisfy the following test. Alternatively separate clearance shall be provided by Mov Frt 2 (RAF).

25.1 Air transportation test. This test is based on the ICAO regulations and has been agreed by Mov Frt 2 (RAF) and is used to assess lead acid batteries.

25.1.1 Temperature variation test. After cleaning the battery shall be placed onto a suitable tray, which is capable of retaining any electrolyte, whose base is lined with methyl red impregnated filter paper(s)*. The assembly shall then be stored, with the battery vertical on its base with terminals uppermost, for 12 hours, at the test temperature, removed and allowed to stabilise to room temperature for 2 hours and then inspected for evidence of damage and electrolyte leakage (as evidenced by a colour change of the impregnated papers). The two test temperatures shall be -40°C and +55°C

25.1.2 Rapid decompression test. After adjustment of the electrolyte level in accordance with the manufacturers instructions (for sealed batteries this is not necessary) place the battery onto a suitable tray, which is capable of retaining any electrolyte, such that the battery is vertical on its base with the terminals uppermost. Transfer the assembly to an altitude test chamber.

The chamber pressure shall be adjusted to the equivalent of an altitude of 8000 ft and retained for 5 minutes, after which it is then reset to the equivalent of 35000 ft, which shall be achieved within 1.75 minutes and then retained for a duration of 1 hour after which the chamber pressure shall be returned to normal ambient conditions. The assembly shall be removed from the chamber and examined for evidence of electrolyte leakage and damage to the battery.

25.1.3 Pressure variation test. The same test arrangements and conditions as for 25.1.2 shall be used except that the pressure is set at an equivalent of 35000 ft which shall be achieved within 15 minutes from the start of the test. Three separate tests shall be carried out with the battery positioned in the tray firstly at 45° to the horizontal, then on its side and then upside down. Prior to each test the battery shall be filled with electrolyte, in accordance with the manufacturers instructions, and thoroughly cleaned. After each test the assembly shall be examined for evidence of electrolyte leakage and the battery examined for damage.

25.1.4 Pass/ fail criteria. No electrolyte shall leak from the battery case under any of these tests neither shall the battery show any visible damage.

26 Safety Hazards.

26.1 Short circuit conditions. If batteries are used in confined spaces, where the risk of accidental short circuit is high, adequate precautions must be taken in use.

* the impregnated papers used to line the base of the tray shall be suitable for identifying the presence of the electrolyte used within the battery under test. Prior to using any papers a sample shall be tested with the appropriate electrolyte to ensure that the colour change is effective.

26.2 Thermal runaway

26.2.1 When a valve regulated battery is operating in the full oxygen recombination mode there is virtually no net chemical reaction taking place, other than very small losses of vented gas arising from the level of recombination inefficiency. Most of the float charge energy passing into the cell is converted into heat. If the heat generation within the cell exceeds the ability of the cell to dissipate the heat then a self propagating reaction occurs which could lead to a violent explosion.

26.2.2 To minimise thermal runaway the following should be observed:

(a) The battery should be operated with assisted ventilation.

(b) The battery should not be operated above its design temperature as defined in the appropriate Supplement.

(c) The manufacturer's instructions regarding charging methods must be strictly adhered to.

26.3 Operation in enclosd containers. Batteries, due to their electrochemical behaviour, emit gases which can produce an explosive hazard. The extent of the hazard and the precautions taken depend on the battery type and use. It should be borne in mind that in the event of fault conditions in either the battery or the charging system, what may be considered as a safe system could become a hazardous one. Certain types of battery should only be operated in ventilated enclosures.

26.4 Electrolyte spillage. The electrolyte in secondary batteries is normally corrosive and adequate precautions must be taken to prevent and deal with electrolyte splillage. To establish the extent of the hazard the appropriate COSHH (Control of Substances Hazardous to Health) data sheets should be consulted, which are available from the manufacturer of the battery concerned.

27 Disposal of Waste Batteries.

Guidance can be obtained from the Controllerate Technical Authorities who are defined in Defence Standard 61-17.

28 Packaging Labelling and Hazard Marking.

The requirements are defined in Defence Standard 81-41 Parts (l-6). In addition, the current UN and ICAO regulations as well as the Defence Packaging Unit publication CPU/DR/6-l are also to be complied with.

Section Five. Quality Conformance Testing

29 General Requirements.

Quality conformance is achieved by the production of batteries within a total quality management system and is confirmed by carrying out group A, B and C tests, the results of which demonstrate whether or not the lot offered for release has achieved the prescribed quality. Under the responsibility of the Quality Manager and under the surveillance of the AAR, the manufacturer shall carry out those tests or arrange for them to be carried out free of all charges to MOD unless otherwise contractually agreed.

The requirements for quality conformance inspection are defined in the relevant Supplement and shall be carried out in accordance with BS6001.

A battery is only considered to be approved and may be released to a Supplement when an approval certificate has been issued and maintained in accordance with this standard.

29.1 Specific requirements. The specific requirements are defined in the appropriate supplement. The identified Group A tests shall be applied to all of the samples in the lot, either at the end of manufacture or during the process of manufacture. The Group B tests shall be carried out on the statistical sample selected from the manufacturing lot in accordance with BS6001 and the results used for sentencing the lot for release and delivery. The group C samples shall be selected and tested in accordance with the Supplement and used for the maintenance of the approval.

Should any battery fail Group A inspection it shall be rejected and not used for Group B or C tests. Any additional batteries required for Group B and C tests, ie due to equipment malfunction or operator error shall be drawn from the same manufacturing lot and shall have met the Group A requirements.

29.2 Batch release procedure. Provided the test results of the manufacturing lot are acceptable then it may be released using the certificate of conformity shown in Annex E. If the test results are not acceptable then the manufacturer shall take action as defined in clause 31.5.

30 Acceptance Sampling Procedure

Where the supplements include inspection levels and acceptable quality levels, the statistical sampling procedures and tables to be used shall be those specified in BS 6001. Alternative sampling procedures shall only be used once agreed with the AAR and incorporated into the Quality Plan.

31 Quality Conformance Tests.

31.1 General. The conformance tests and requirements are defined in the relevant Supplement.

For group C, maintenance of approval tests, the sample size shall be randomly selected from each manufacturing lot and allocated, in sequence to a sub-group of the test schedule (see Tables 1 and 2) and subjected to it's requirements. The objective being to repeat the test requirements of the sub-groups by the end of three contracts but no later than the three yearly certificate review dates.

31.2 Tolerances. The limits prescribed in the relevant Supplement are true values. When carrying out the specified test the manufacturer shall employ sufficient inset from the specified limits to cover the uncertainty of his measurement. Where there is a technical difficulty in the assessment of measurement uncertainty the criteria for acceptance shall be agreed with the AAR.

31.3 Alternative test methods. The test and measurement methods given in this Standard and its associated specifications are intended to unify test and measurement procedures.

They are not necessarily the only methods which can be used. Should the manufacturer wish to use an alternative method he shall consult with and satisfy the AAR that the chosen method will provide results equivalent to or better than those obtained by the method specified.

31.4 Procedure in the case of defective test equipment or operator error. Any battery whose failure during testing can be attributed to a verified test equipment defect or test operator error shall where possible be replaced by another battery from the same manufacturing lot. The replacement battery shall be subjected to all of the tests to which the discarded battery was subjected prior to its failure and to any remaining specified tests to which the discarded battery was not subjected.

31.5 Procedure in the event of failures. Failure of a battery in one or more of the prescribed tests shall be counted as a single defective.

The Quality Manager shall keep records of such defects in samples taken in the course of periodic tests. The records shall be made available to the AAR for examination.

When a sample fails to meet the requirements of a test the manufacturer shall :

(a) Suspend release of the lot from which the sample was drawn.

(b) Initiate an investigation to determine the reason for failure.

(c) Report the situation to the AAR.

The Quality Manager shall maintain this suspension until the investigation has been concluded and the AAR informed accordingly.

If the failure can be attributed to a test procedure error then the lot may be released and suitable corrective action taken accordingly.

If the failure is due to an identified manufacturing fault that can be immediately corrected then once corrected and satisfactorily tested the lot may be released.

If the failure is concluded to be due to an identified manufacturing fault which cannot be corrected immediately but defective batteries can be identified and rejected by a suitable screening method acceptable to the AAR then the acceptable batteries from the lot may be released.

The Quality Manager shall determine, to the satisfaction of the AAR, if any deliveries have been made from lots affected by the manufacturing fault. In the event of any deliveries having been made the Quality Manager shall notify the recipients giving identities and sufficient details of the manufacturing faults to allow any necessary action to be taken.

32 Release for Delivery (Attestation of Conformity).

32.1 General. Each manufactured lot shall be unambiguously identified by a certificate of conformity, the affixing or issue of which is under the surveillance of the AAR. This certifies that the batteries have been released in accordance with the requirements of this Standard and its associated specifications. It shall allow reference to be made to the test documents against which the batteries have been released.

32.1 (Contd)

The authority to issue the certificate of conformity shall be suspended or withdrawn by the AAR if there is persistent non-conformity with this specification or its Supplements or if the provisions of this procedure are not complied with.

32.2 Certificate of conformity. An example of a certificate of conformity is shown at annex E which shall be used for each manufactured lot released against a Supplememt.

33 Date of Manufacture.

33.1 Date of manufacture on the battery. When marking the date of manufacture on the battery, the information may be given explicitly or by use of the four digit code given below. The code indicates the year and the month of manufacture in which the first two digits indicate the year and the last two digits indicate the number of the month. The months earlier than the 10th month are a single digit preceded by "0".

Examples:

A battery manufactured in March 1979 will bear the code 7903. A battery manufactured in November 1982 will bear the code 8211.

33.2 Date of manufacture on the packaging. To provide an explicit date of manufacture the actual date of manufacture shall be clearly marked on the outside of the unit level packaging defined in the contract.

Section Six. Manufacturing and Test Requirements.

34 General Requirements.

This section defines the various test methods that shall be used, as directed by the relevant Supplement, for qualification approval (Section Two) and quality conformance testing (Section Five). The manufacturer shall ensure that the requirements of the relevant section are met.

34.1 Qualification approval tests. The manufacturer shall provide and test the batteries, as directed by the relevant supplement, free of all charges unless otherwise contractually agreed.

34.2 Quality performance tests. The manufacturer shall provide and test the required number of batteries, as directed by the relevant Supplement, free of all charges unless otherwise contractually agreed. Those batteries from test groups which were subjected to group A and B test, if acceptable, may be subsequently released provided the applied tests are not destructive.

34.3 Test schedule. Unless otherwise specified in the relevant supplement, a test schedule shall be produced, similar to that shown in Tables 1 and 2, which may be modified to suit a particular requirement after consultation with the AAR and the Approving Authority and used for a test programme.

34.4 Test equipment. The range of test equipment used shall be appropriate for the maqnitude of the parameter to be measured. It shall be regularly calibrated and shall be of sufficient accuracy and quality to permit performance of the required test.

35 Manufacturing Requirements.

This clause defines the requirements that are specified for the battery construction and are the minimum requirements to be met by the manufacturer.

35.1 Battery construction. The construction of the battery shall comply with the following:

(a) The requirements specified in the Supplement.

(b) Any electrical or electronic parts used shall be selected in accordance with Def Stan 59-59.

(c) Any applied finishes shall comply with the requirements of Def Stan 00-10.

(d) If injection mouldings are to be used in a particular battery construction then the requirements of Def Stan 93-42 shall be complied with.

(e) The manufacturer shall not deviate from the approved build standard without the consent of the Approving Authority. (Refer to the appropriate clause 10 or 11).

35.2 Quality Plans. To satisfy the requirements of this standard the manufacturer is required to generate a Quality Plan which shall be sufficiently definitive to cover all aspects of the manufacture of the battery concerned. It shall provide adequate reference to demonstrate that the requirements of this standard and its associated specifications can be met. It shall define any minor amendments to the specified requirements such as alternative test methods, sampling rates and associated test requirements as well as controls for sub-contract activities and maintenance of approval requirements.

The Quality Plan shall be produced in an acceptable format and approved by the AAR.

35.3 Component cells.

35.3.1 Conditioning. All unit cells shall be stored at 20±5°C and 70% RH.

35.3.2 Testing before assembly. All component cells (or cell stacks where individual cell testing is impracticable) shall be tested at 20±5°C immediately before assembly. The testing shall comprise determination of the OCV and OLV. The results shall be measured to three significant figures.

In the case of capacity matching, the requirements of the Supplement shall be met and records made available to the AAR to demonstrate compliance.

35.3.2 (Contd)

The minimum acceptance voltage or current shall be determined by a statistical quality control procedure applied to a representative sample taken from each lot and used for analysis.

The method of test and any statistical sampling procedure employed shall be acceptable to the AAR.

35.4 Terminations. The terminations shall be as shown in the appropriate Supplement.

The materials, processes and finishes selected for the terminations shall be corrosion resistant and maintain good electrical contact at all times when tests are carried out in accordance with this Standard or its associated specifications.

The materials and finishes shall be in accordance with the specified requirements of Def Stan 00–10, where appropriate.

35.5 Leakage. When batteries are stored or tested under the conditions given in this Standard or its associated specifications, no electrolyte, sealing compound or other internal material shall appear on any of the external surfaces of the battery except under abusive test conditions.

35.6 Dimensional stability. The dimensions of the battery shall conform with the specified dimensions at all times when tested to the requirements of this Standard or its associated specifications.

35.7 Marking.

35.7.1 Marking of the batteries. Each battery is to be indelibly marked or permanently labelled in accordance with 35.8 with the following:

(a) the NATO type designation, where applicable, (consisting of a symbol NBA, followed by a three or four digit number).

(b) the NATO Stock Number.

(c) the item name.

(d) nominal voltage and ampere-hour capacity at the rate stated in the supplement.

(e) date of manufacture (see clause 33)

(f) manufacturer’s identification and place of manufacture.

(g) polarity of the terminals.

(h) battery serial number for traceability of manufacture.

(i) instructions for use (if appropriate).

35.7.1 (Contd)

In the case of difficulty in meeting the above, the manufacturer shall seek guidance from the AAR who shall refer any decision to the contracting authority before implementation.

35.7.2 Marking of the packaging. The marking on all stages of packaging of the batteries shall include the same marking as listed above with the exception of the polarity of the terminals, the explicit date of manufacture, clause 33.2 and the instructions for use. The latter, if appropriate, should be contained within the packaging or secured to the battery terminals.

For batteries classed as hazardous materials an appropriate marking shall be securely fixed to the packaging and where practical, to the battery. Def Stan 05-34 shall be used as a guide in respect of hazard marking.

Any special storage requirements shall be clearly marked on the outer packaging.

The proposed battery labels shall be submitted to the Approving Authority for acceptance.

35.8 Instruction Labels. Permanent labels are to be resistant to electrolyte. They are to remain firmly fixed and clearly legible during and at the completion of any of the tests defined in this standard or its related specifications.

Tag labels, detailing instructions on the first charge, are to be durable and secured so that they will not become detached during storage and transportation of the battery.

36 Conformance Test Requirements.

The inspection and test requirements given, which should be read in conjunction with section five, are used as directed by the sectional specification or Supplement to ensure that batteries released against the accompanying certificate of conformity are acceptable for use. The requirements define the extent of testing for qualification approval, maintenance of approval and quality conformance.

36.1 Test conditions. Unless otherwise specified the environmental conditions of 20±5°C, relative humidity of betwem 45 and 75% shall be used.

36.2 Test equipment. Unless otherwise specified, the test equipment used shall have at least the following degree of accuracy and have a range appropriate to the measurement.

(a) Voltmeters shall comply with BS 89, class index 0.3.

(b) Ammeters shall comply with BS 89, class index 0.3.

(c) Temperature measurement devices shall have an accuracy of 1°C.

(d) Chronometers shall have an error not exceeding 2% for periods less than 10 secs, 0.5% for periods between 10 secs and 24 hrs, and 0.1% for periods greater than 24 hrs.

(e) Resistors shall have an accuracy of 0.5% up to 100 W dissipation and 1.0% above 100 W dissipation.

36.3 Conditions for storage tests. Batteries shall be stored after manufacture in an ambient temperature of 20±5°C. The periods of storage shall be calculated from the date of manufacture and shall be those required by the relevant Supplement.

36.4 Open circuit voltage tests. Batteries shall be subjected to OCV tests during and after storage, as directed by the relevant Supplement. The voltage of each battery shall not differ by more than 15% either side of the nominal cell voltage(s) or as stated in the relevant Supplement.

36.5 On load voltage tests. Batteries shall be subjected to OLV during and after storage testing as directed by the relevant Supplement. Unless otherwise specified the value of the applied load and the time interval shall be agreed between the manfacturer and the AAR.

36.6 Shelf life storage. To confirm the specified shelf life of the battery, for the period and under the conditions specified, the battery shall be stored in accordance with the requirements after which it shall be commissioned and tested during which it will be expected to meet the specified requirements.

36.7 Failure criterion. The batteries shall be examined for leakage and distortion, also any faults in their operation or non compliance with the specified requirements will be regarded as a failure.

The procedure to be followed in the event of failures is given in section five of this standard.

ANNEX A

APPLICATION FOR QUALIFICATION APPROVAL

This form should be completed in accordance with 6.6.

Please write ‘none’ or ‘Not Applicable’ in the sections which do not apply.

Manufacturer’s Name:

Place of Manufacture:

Telephone Number:

PARTICULARS OF ITEMS TO BE SUBMITTED TO QUALIFICATION APPROVAL

Supplement Details:

Battery Type :

NATO Stock Number:

NATO Type Designation:

Manufacturer’s Drawing Number, issue and Date:

(Two copies of General Arrangement drawing to accompany this form).

Additional Comments:

This section is for MOD use

Reference Number:

Date Received:

Date Copy Forwarded to AAR:

ANNEX B

APPLICATION FOR FULL/INTERIM* QUALIFICATION APPROVAL CERTIFICATE.

This application is forwarded through the AAR to the Secretary of DELSC L10.

(*Delete as appropriate)

Section A (To be Completed by the Manufacturer).

Supplement Number:

Issue Number: Date:

Manufacturer's Name:

Place of Manufacture:

Name and Address of
Test Laboratory:
(if applicable)

Test Report Number and Date:

L10 Reference Number:
(allocated by Approval Authority)

Quality Manager's signature: Date:

SECTION B (To be completed by AAR)

Tests satisfactorily completed in accordance with specified procedures.

Signed: Date:

SECTION C (Approving Authority use)

Qualification Approval Expiry Date:

Signed: Date:

ANNEX C

FULL QUALIFICATION APPROVAL CERTIFICATE

DATE OF ISSUE: DATE OF EXPIRY:

CERTIFICATE NUMBER: SUPPLEMENT NUMBER:

This certificate is issued after examination of the detailed test results which indicate that the items detailed below comply with the Supplement quoted. It is issued by the Ministry of Defence under the conditions specified in Defence Standard 61-9 and is subject to withdrawal at the discretion of the Approving Authority.

Manufacturer:

Place of Manufacture:

Test Report Number :

Description of Item:

Manufacturers Drawing Reference:
(Master Record Index/Issue)

Approved on behalf of . . . . . .

Signed: Date:

ANNEX C

INTERIM QUALIFICATION APPROVAL CERTIFICATE.

DATE OF ISSUE: DATE OF EXPIRY:

CERTIFICATE NUMBER: SUPPLEMENT NUMBER:

This certificate is issued after examination of the detailed test results which indicate that the items detailed below comply with the Supplement quoted. It is issued by the Ministry of Defence under the conditions specified in Defence Standard 61–9 and is subject to withdrawal at the discretion of the Approving Authority.

Manufacturer:

Place of Manufacture:

Test Report Number:

Description of Item:

Manufacturers Drawing Reference:
(Master Record Index/Issue)

Restrictions/Limitations Applied:

Approved on behalf of . . . . . .

Signed: Date :

ANNEX D

APPROVAL WITHDRAWAL NOTIFICATION.

REFERENCE NUMBER:

This notice is issued by the Approving Authority to give notice to the manufacturer that the Full/Interim (Delete as appropriate) Qualification Approval has been withdrawn.

Manufacturer's Name:

Place of Manufacture:

Supplement Details:

Description of Batteries:

Reason for Withdrawal of Approval:
(indicate the appropriate category, a-f)

a. At manufacturer's request.
b. Failure to meet Standard/Supplement requirements.
c. Confirmed failure of batteries in service.
d. Significant changes to products or processes without prior notification.
e. Qualification Approval not reviewed by/on review/Expiry date.
f. When the manufacturer's AQAP, BS 5750 or DEF STAN 00–9 approval is withdrawn.
g. Other reasons.

Comments :

Issued on behalf of the DELSC Subcommittee L10.

Signed: Date:

ANNEX E

CERTIFICATE OF CONFORMITY.

Serial Number:

Manufacturer's Name:

Battery Name:

Supplement Number:

Inspection Batch Identification Number:

The batteries detailed above have been manufactured, inspected and tested in conformity with DEF STAN 61-9, Part and the relevant supplement quoted and are released with my authority under Qualification Approval Certificate Number:

Signed: Quality Manager:

Date:

ANNEX F

MAINTENANCE OF APPROVAL NOTIFICATION.

Section A (To be completed by the Manufacturer)

This notice is issued by the manufacturer, in accordance with clause 12 to demonstrate that the Qualification Approval related to the undermentioned battery has been maintained.

Qualification Approval Certificate Number:

Certificate Expiry Date:

Manufacturer:

Battery Description:

Supplement Number:

Details of contracts against which the approved battery has been supplied.

Group C report Reference numbers (a summary of results is to be attached).

We certify that the requirements of DEF STAN 61–9 and the relevant supplement are satisfied and that we can comply with the requirements under which the original certificate was issued.

Quality Manager's Signature: Date:

Section B (To be be completed by the AAR)

We confirm that the certificate has been maintained and should be revalidated:

Signed: Date:

Section C (To be completed by the Approving Authority)

Qualification Approval Certificate revalidated.

New Expiry Date:

Signed: Date:

ANNEX G

DECLARATION OF DESIGN PERFORMANCE.

Section A (To be completed by the Manufacturer.

This DDP is issued by the manufacturer, and certified by the AAR, to confirm that the information provided in the undermentioned Preferred Battery Supplement can be met.

DDP Reference Number. . . .. .Issue Number. . . . . .

NSN..... .

DELSC LIO Reference . . . . . .

Preferred Battery Supplement Number and Issue . . . . . .

(Name and Address of Manufacturer)

. . . . . .

. . . . . .

. . . . . .

. . . . . .

Declaration of Design Performance.

Battery Description.....

Design Specification Reference.....

Drawing Schedule Reference. . ...

Quality Plan Reference. . ...

Test Report Reference . . ..

. . . . . .

The above information confirms that the requirements specified in the PBS can be satisfied. Any subsequent changes which may be made to the battery will be notified to the approving authority.

Technical Manager..... Date.....

(Signed by the Senior Technical Manager)

Section B (To be completed by the AAR)

We confirm that the above information is correct.

Signed: Date :

Copies of the completed form shall be retained by the Approving Authority and copied to the Controllerate Technical Authorities, Supply Managers and Procurement Authorities.

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Published and obtainable from:
Ministry of Defence
Directorate of Standardisation
Kentigern House
65 Brown Street
Glasgow G2 8EX

The following Defence Standard file reference relates to the work on this Standard – D/D Stan/371/04/l.

Contract Requirements.

When Defence Standards are incorporated into contracts users are responsible for their correct application and for complying with contract requirements.

Revision of Defence Standards.

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

Procurement Executive, Ministry of Defence

Directorate of Standardization
Room 1138, Kentigern House, 65 Brown Street, GLASGOW, G2 8EX

Telephone: 0141-224 2595 (Direct Dialling) Fax: 0141-224 2503
0141-248 7890 (Switchboard)
Internet e-mail address: t.leaver@dstan.mod.uk

Your Reference :

Our Reference : D/DStan/11/2

Date : 9 November 1998

Removal of Product Qualification Approval

IMPORTANT ANNOUNCEMENT

1. This Standard contains a Product Qualification Approval (PQA) scheme. [i]MOD 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. [ii]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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[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.