सत्यमेव जयते

भारत सरकार

रक्षा मंत्रालय

गुणता आश्वासन महानिदेशालय

GOVERNMENT OF INDIA

MINISTRY OF DEFENCE

(DGQA ORGANISATION)

SPECIFICATION FOR

BATTERY SECONDARY LEAD ACID (MT TYPE)

ISSUED BY

गुणता आश्वासन नियंत्रणालय (इलेक्ट्रॉनिक्स)
CONTROLLERATE OF QUALITY ASSURANCE (ELECTRONICS)
रक्षा मंत्रालय (गुणता अश्वासन महानिदेशालय)
MINISTRY OF DEFENCE (DGQA)
भारत सरकार, जे सी नगर पोस्ट, बंगलुरु-560 006
GOVERNMENT OF INDIA, J.C. NAGARPO, BANGALORE - 560 006

Month & Year of issue : Oct 2014

Amendment Sl No.	Date	Details of amendment	Amendment carried out by (Name & Date)

Specification No. CQAL/ 637(C): 2014

गुणता आश्वासन नियंत्रणालय (इलेक्ट्रॉनिक्स)

CONTROLLERATE OF QUALITY ASSURANCE (ELECTRONICS)

रक्षा मंत्रालय (गुणता अश्वासन महानिदेशालय)

MINISTRY OF DEFENCE (DGQA)

भारत सरकार, जे सी नगर पोस्ट, बंगलोर-560 006

GOVERNMENT OF INDIA, J.C. NAGARPO, BANGALORE - 560 006

SPECIFICATION FOR

BATTERY SECONDARY LEAD ACID (MT TYPE)

MEMBERS ASSOCIATED WITH THE PREPARATION OF THIS DOCUMENT

Srl No.	Name & Rank	Appointment	Representing (Name of Establishment)
1	KalaiSelvan	AE (QA)	CQAL
2	AwanishPathak	JSO	CQAL
3	Sethunath PV	SSO-II	CQAL

Checked by: BholanathSonkar
PScO

Verified by : KD Singh
COL IDC (E)

(YA Kambali)
JC (P)
For CONTROLLER

Date: 22 Oct 2014

CONTENTS

SPECIFICATION FOR BATTERY SECONDARY, LEAD ACID, LOW MAINTENANCE FOR MT PURPOSES

Specification No CQAL/637(C):2014

0. FOREWORD

0.1 This Specification has been prepared by Controllerate of Quality Assurance (Electronics) on behalf of Director General of Quality Assurance, Ministry of Defence, New Delhi.

0.2 This specification supersedes specification CQAL/637(B):2006 (MT Battery) & its Amdt No 1

0.3. This specification shall be used for tender enquiry and Quality assurance.

0.4. Quality Assurance Authority for this store is Controller, Controllerate of Quality assurance Electronics. Enquiries regarding this specification relating to technical or any other contractual conditions shall be referred to the Quality Assurance Authority (QA authority).

0.5. All clauses of this specification shall be complied with in every respect irrespective of the source of supply of the material and/or components.

0.6. Should any discrepancy exist between this specification and any sample or pattern loaned for any purpose, the specification and/or other connected specifications of drawings shall be taken as correct.

0.7. The Manufacturer/Supplier shall offer the QA authority or his authorized representative free of cost, all reasonable facilities including test equipments for satisfying himself that the stores are being manufactured in accordance with the specification and for this purpose QA authority or authorized representative must have free access to the Manufacturer's/Supplier's work at all reasonable times during the run of contract. The Manufacturer/Supplier is required to notify the QA Authority for the sub-contracts placed by him.

0.8 The general workmanship, finish and performance of the batteries shall be of high standard.

1.0 SCOPE

This specification lays down the general/mechanical, electrical and functional requirements of Battery Secondary Lead Acid (low maintenance) and is to be read in conjunction with the relevant drawing of the individual Battery. Batteries covered in this specification for 20hrs rating is for reference of nomenclature only. All tests of Batteries shall be carried out after conversion of Bty capacity to 5 hrs rating

1.1 This specification covers the requirements of Battery Secondary Lead Acid and Low Maintenance and provides guidance to Manufacturers/Suppliers, Quality Assurance Agencies and stockist/indenters.

1.2 The Batteries should give optimum performance in the temperature range from –30°C to +55°C. Storage in the temperature range from –30°C to +70°C shall not affect the Battery performance.

1.3 For purpose of interpretation in case of any omission, conflicts, ambiguities or inconsistencies to the extent that the contract includes any or all of the following documents, each documents shall rank in the following order or precedence:-

(a) Contract / SO
(b) This Specification and drawings
(c) Applicable documents and/or patterns

1.4 Copies of Indian standard can be obtained on payment from Bureau of Indian Standard, 9 Bahadur Shah ZafarMarg, New Delhi - 110 002.

1.5 Reference in this specification to Defence specification or any other specification or documents in any tender or contract means the edition "current" at the date of tender or contract, unless specifically, stated otherwise.

2. RELATED SPECIFICATIONS

Specification/drawing	Title
a) IS: 14257-1995	Lead Acid Storage Batteries for Motor Vehicles with light weight and high cranking performance.
b) JIS – D5301: 2006	Lead-acid starter battery for water consumption test.
c) IS 266: 1993 (Reaffirmed 2003)	Sulphuric Acid (Third revision)
d) IS 1069: 1993 (Reaffirmed 2003)(Second Revision)	Quality Tolerances for Water for Storage Batteries
e) IS: 1146-1981 (Reaffirmed 2003)	Specification for Rubber & Plastics Containers For Lead-Acid Storage Batteries (Second Revision).

f)	IS 6071: 1986 (Reaffirmed 2002)	Specification for synthetic separators for Lead-Acid batteries (First revision)
g)	JSS 55555: 2000 (Revision No.2)	Environmental Test methods for Electronic& Electrical Equipment.
h)	DIN-VDE-0304-3 (Part 3)	Battery Container
k)	IS 12292: 1988 (Reaffirmed 1999)	Specification for Lead Suboxide (Lead Oxide) for Lead-Acid Storage Battery
l)	IS 1654: 1992 (Reaffirmed 2003)	Lead-Antimony Alloys-Specification (Third revision)
m)	IS-4905:1968 (Reaffirmed 2001)	Methods for Random Sampling
n)	IS-2102 (Part I):1993 (Reaffirmed 2003)	General Tolerances: Part I -Tolerances for Linear & Angular Dimensions without individual tolerance Indications (Third revision)
p)	IS-1885 (Part 15):2008	Electro-technical Vocabulary (Part 15): Primary & Secondary Cells and Batteries (Second Revision).
q)	CQAL drawings	for individual Batteries
r)	IS 13568:1992	Lead Acid light weight storage batteries for motor Cycles and similar vehicles fitted with AC circuitry.
(s)	IS-3116-2002	Sealing compound for Lead Acid Batteries (Bitumen Based)
(t)	IS: 157	for paint
(u)	IS 1248 (Part 2):2003	Direct Acting Indicating Analogue Electrical Measuring Instruments & their Accessories (3rd Rev)
(v)	IEC 60095-1/2006	Cranking performance test
(w)	IS 7372:1995	HRD tests at normal temperature

2.1 ILLUSTRATION AND DRAWINGS

2.1.1 First angle projection is used.

2.1.2 Dimensions are given in International system of units (SI-units).

2.1.3 Where official drawings are quoted, they are mandatory. Copies of such drawings can be obtained from QA-authority/AHSP.

2.1.4 Patent or design rights or copy rights may subsist in connection with items defined as standards and issue of this specification does not convey or imply any license to use information, which is the subject of such rights.

2.1.5 For the purpose of this specification the term battery shall be taken to cover patterns consisting one or more cells. In addition, definitions indicated in IS-1885 (Part 15):2008 – Electro-technical Vocabulary (Part 15): Primary & Secondary Cells and Batteries (Second Revision) shall apply.

3. TERMINOLOGY, DEFINITIONS & SYMBOLS

As per definitions given in IS-1885 (Part 15):2008

3.1 **Battery:** A battery consists of six/three elements connected in series and housed in a Plastic, Polypropylene, ABS etc Monobloc container. Each element consists of a +ve plate, a -ve plate and separators. The lid shall be of one piece construction sealed to the container by heat sealing or ultrasonic sealing or by adhesion with sealing material with one positive and one negative terminal.

3.2 **Battery Assembly**. A battery assembly is defined as a unit consisting of batteries as defined above which can be connected together in multiple, in a separable fashion and fitted in a common container.

3.3 **Initial Charge**

This charge is for commissioning the Battery for the first time or whenever the battery is to be re-commissioned after a long period of idle storage. Maintenance procedure should be followed as specified in the instruction manual supplied along with the battery by the Manufacturer/Supplier.

3.4 Normal Charge:

This charge is given during the course of actual use or during Laboratory tests.

3.5 Charging of battery

3.5.1 Fully charged battery

A battery is deemed to be fully charged when the terminal voltage and specific gravity of electrolyte (corrected for temperature) measured every 30 min towards end of charging at the recommended current shows a constant value three times consecutively.

3.6. Accelerated charge:

3.6.1 This is a fast mode of charging adopted when the battery is required to be brought into use within a short time.

3.6.2 The battery, which has been discharged to the end voltage of 10.5 V, is charged at a voltage/current and time as specified by the 5 hr rating as per IS 14257: 1995.

3.7 Over Charge:

Extra Charge given to the battery in continuation of Normal charge.

3.8 Retention of Charge:

When battery left in open circuit, the capability of fully charged battery to retain its Charge within specified tolerances for a specified duration.

3.9 Rated Capacity:

The 5 hr rating is the ampere-hour obtainable when the battery is discharged at a Constant current I = 0.2C5 amperes down to a final terminal voltage of 10.50V, the Capacity being corrected to an electrolyte temperature of 27°C.

3.10 Nominal Voltage

The nominal voltage of the battery is defined as 12 Volts / 6 Volts

3.11 Life Cycle: As per Para 15.10.

3.12 High Rate Discharge Test:

Test conducted to assess the capability of a battery to deliver high current for a Specified duration.

3.13 Specific Gravity.

For the purpose of the tests, with the battery fully charged and the electrolyte level corresponding to the upper level marked on the battery, a specific gravity of 1.280 $\pm$0.01 (corrected to 27°C) shall be used.
The temperature correction shall be made by the following formula:

$$SG_{27} = SG_t + 0.0007(t-27)$$

Where

SG_{27} = specific gravity at 27° C.
SG_t = specific gravity at t° C.
t = temperature of electrolyte at the time of measurement, °C

3.14 **Water Consumption Test**

Batteries used should necessarily be with low maintenance characteristics, a procedure for assessing the topping up requirement of distilled water has been included. It is recognized that the loss of water from the battery is a function of several factors like alloy composition, electrolyte volume, venting system, ambient temperature, the overcharge current and the charging system (with good voltage regulation). These are taken into account while designing the test procedure.

4. **MATERIALS, CONSTRUCTION AND WORKMANSHIP**:

4.1 **Container and Lid**.

The container and lid shall be of plastic, such as polypropylene, ABS, etc conforming to IS 1146: 1981.Each cell shall be fitted with an anti-splash type vent plug or have a venting system that arrests acid spray and splashing of acid without impeding the free escape of gases.

4.2 **Separator**

Separators shall be preferably envelope type, with glass mat conforming to IS 6071: 1986.

4.3 **Sealing Material**

The Lid shall be sealed to the container by heat sealing or by ultrasonic welding as per IS-3116-2002. Wherever the sealing is not affected by heat sealing or ultrasonic welding sealing shall be done by addition of sealing material with one + ve and one – ve terminal .Sealing material thus used shall be an acid resistant adhesive.

4.4 **Terminals**.

The terminals shall be made of lead alloy and shall conform in shape and dimensions to Table II.

4.5 **Lead Alloys and Active Materials**:

Lead alloys used shall not contain impurities inexcess of those shown below. Reclaimed lead if used shall be refined, to a degree of purity equivalent to the minimum required for alloys. Active material shall be prepared from the best grade Lead Oxide suitable for the performance of the battery. The inspectors may test for absence of impurities beyond the limit given. Specification of impurities and free lead in lead sub oxideshallbe as below. A typical limiting percentage % of impurities in lead suboxide is shown below (in this clause we are insisting alloy composition shall be as per the table below):-