EUROBAT

THE EUROBAT GUIDE

FOR THE SPECIFICATION OF VALVE REGULATED LEAD-ACID STATIONARY CELLS AND BATTERIES

FOREWORD

This publication is a revision of a document originally commissioned by Eurobat in January 1992 to increase the awareness, understanding and use of stationary valve regulated lead-acid batteries in industry.

It also was, and still is, intended for use in schools and other educational institutions.

More specifically, the document provides the **'User'** with guidance in the preparation of his **Purchasing Specification** and in this revision particular reference is made to **General Definitions, Product Characteristics, Design Life, Safety** and **Operational Recommendations.**

Giovanni Dolcetta

President EUROBAT

DEFINITIONS

General

VALVE REGULATED CELLS AND BATTERIES A cell or battery which is closed under normal conditions by a non-return (control) valve which allows the escape of gas if the internal pressure exceeds a predetermined value.

The valve shall not allow gas (air) to enter into the cell, and the maximum pressure reached inside the cell under any or limited sets of circumstances can be indicated by, or requested from the manufacturer.

The cell cannot normally receive additions to the electrolyte.

This description applies equally to 'Absorbed (AGM)' or 'Gelled' electrolyte.

Characteristics

QUALIFICATION In the absence of any other agreement between the manufacturer and the 'User', the following characteristics may be qualified by test methods in the International Specification, IEC 60896-2. Where a test method is appropriate the text is marked with an asterisk*.

CAPACITY Unless otherwise declared by the manufacturer, the **Nominal Capacity** is defined at 10 hours (C10) at 20°C to 1.80 volts per cell (v.p.c.).

Users should note that the numerical value of capacity quoted is dependant upon the rate, temperature and end voltage of the discharge.

For application purposes other rates of discharge may be requested for capacity.

**User acceptance capacity tests may be agreed separately with the manufacturer, and will be subject to contractual negotiation.*

FLOAT Most standby batteries are electrically 'floating' across the D.C. supply in parallel with the rectifier and the load, and thereby provide uninterrupted power to the system.

The manufacturer shall state the recommended float voltage limits, as defined in IEC 60896-2.

CYCLES This characteristic gives a measure of the endurance of the battery to repeated charge and discharge cycles.

**As a general rule 'Users' should note that the number of cycles is dependent upon the depth of discharge.*

RETENTION Charge retention is important to 'Users' who normally hold stocks of batteries.

Charge retention determines the frequency for recharging batteries held in storage.

**Manufacturers shall state the charge retained.*

DESIGN LIFE The design life is the estimated life determined under laboratory conditions, and is quoted at 20°C using the manufacturer's recommended float voltage conditions.

To facilitate the determination of 'User' requirements, design lives have been structured into four main groups, as follows:

3-5 year - Standard Commercial This group of batteries is at the consumer end of standby applications and are popular in small emergency equipment.

6-9 year - General Purpose This group of batteries is usually used when an improved life is required in comparison to the Standard Commercial product, and also in cases where operational conditions are more severe.

10-12 year - High Performance This group of batteries is used where high power, long life and high safety standards are required.

12 years and longer - Long Life This group of batteries is used in applications where longest life and highest safety standards are required.

There are a number of methods to make laboratory determinations for the design life of VRLA batteries.

The manufacturer shall indicate the method by which the design life was determined, and provide evidence to the 'User' upon request.

Safety

Flammability Some 'Users' have operational procedures that require the use of flame retardant plastics to a defined rating.

The battery manufacturer shall indicate the category of flame retardancy in accordance with test methods FV : flame vertical specimen, of IEC 60707. This test method introduces three categories of flame retardancy, FV0, FV1 and FV2 and the FV0 category is the most resistant to flame propagation.

For the purposes of this publication, the flammability characteristics of valve regulated lead-acid batteries are classified as follows:

S Standard flammability rating FV1, FV2 or lower. e.g. HB.
H High premium flammability rating FV0.

Gas Emission In normal conditions of use, gas emissions for valve regulated lead-acid batteries are considerably lower than flooded batteries.

The manufacturer shall state the value of gas emission.

Internal resistance and short circuit currents

**Internal resistance can be important to the equipment design and operation. The manufacturer shall state the value of internal resistance for a new battery.*

OPERATIONAL RECOMMENDATIONS

Service Life

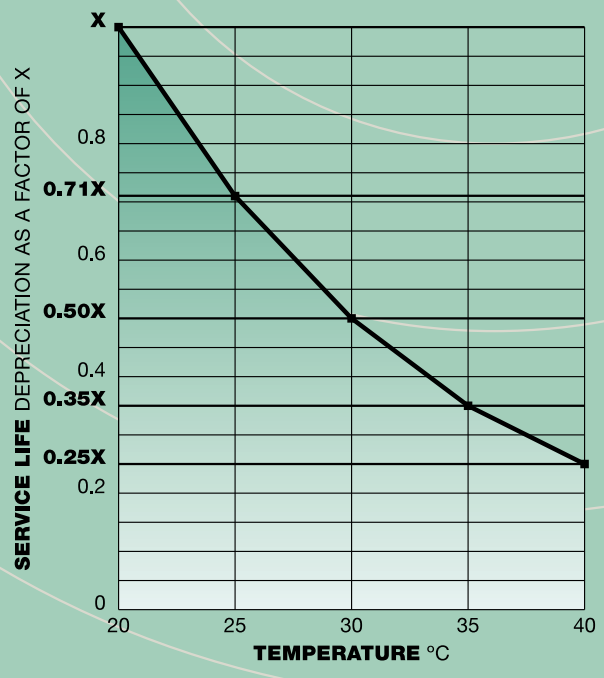
The end of service life is defined as the point at which the cell's actual capacity has reached 80% of the **Nominal Capacity**.

Should the battery be required to perform the full specified discharge duty cycle throughout its life, then a 125% factor for age should be applied in the initial battery size calculation.

FACTORS AFFECTING SERVICE LIFE Service life is strongly related to the working conditions of the battery:

AMBIENT TEMPERATURE Operation of valve regulated batteries at temperatures higher than 20°C will reduce life expectancy.

The following table gives some indication of the depreciation in service life in relationship with temperature.



In case of elevated ambient temperature float voltage compensation is recommended. Reference should be made to the Manufacturer's recommendations.

Temperatures greater than 40°C can produce ever increasing float current values which can create a thermal runaway condition and cause premature failure of the battery.

FLOAT CHARGE RIPPLE Excessive ripple on the D.C. supply across a battery has the effect of reducing life and performance.

It is recommended therefore, that voltage regulation across the system including the load, but without the battery connected, under steady state conditions, shall be better than ± 1% through 5% to 100% load.

Transient and other ripple type excursions can be accommodated provided that, with the battery disconnected but the load connected, the system peak to peak voltage, including the regulation limits, falls within ± 2.5% of the recommended float voltage of the battery.

Under no circumstances should the current flowing through the battery when it is operating under float conditions, reverse into the discharge mode.

FLOAT STABILISATION RIPPLE This form of ripple arises where the demands of the load are out of phase with the capabilities of the rectifier, and the battery is used to stabilise the system.

Some static UPS systems behave in this manner, and the condition is more like shallow cycling.

In these circumstances, normal battery characteristics no longer apply, and the manufacturer should provide the optimum operational conditions.

DEEP DISCHARGING It is recommended that at the discretion of the user, low voltage disconnect features should be used in connected equipment.

It is however recognised that there may be circumstances, particularly for system safety reasons, where the requirements for maximum performance would preclude the use of a low voltage disconnect feature.

In such circumstances it may be necessary to replace the battery following such a discharge.

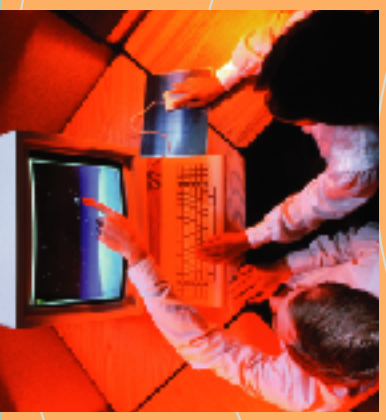
INSTALLATION and COMMISSIONING

Cells and batteries should be installed, commissioned and operated in accordance with:

Manufacturer's Recommendations/Instructions.

National Codes of Practice for Safe Installation and Operation.

Regional/National/Local Standards for the Environment.



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