IEC 62877-1

Edition 2.0 2023-09
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Electrolyte and water for vented lead acid accumulators – Part 1: Requirements for electrolyte



IEC 62877-1:2023-09 RLV(en)



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.220.20

ISBN 978-2-8322-7550-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROLYTE AND WATER FOR VENTED LEAD ACID ACCUMULATORS –

Part 1: Requirements for electrolyte

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62877-1:2016. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62877-1 has been prepared by IEC technical committee 21: Secondary cells and batteries. It is an International Standard.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Addition of the concentration values of halogens in Table 4.

The text of this International Standard is based on the following documents:

Draft	Report on voting
21/1169/FDIS	21/1172/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 62877 series can be found, under the general title *Electrolyte and water for vented lead acid accumulators*, on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

ELECTROLYTE AND WATER FOR VENTED LEAD ACID ACCUMULATORS –

Part 1: Requirements for electrolyte

1 Scope

This part of IEC 62877 applies to electrolytes and their components used for filling vented lead acid batteries~~, for example~~ with dry-charged cells ~~or batteries,~~ and for electrolyte replenishment, replacement or electrolyte density adjustment of batteries in operation. This document defines the composition, purity and properties of electrolyte, for application where specific instructions from the battery manufacturer are not available.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62877-2, *Electrolyte and water for vented lead acid accumulators – Part 2: Requirements for water*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
lead dioxide lead battery
lead acid battery
secondary battery with an aqueous electrolyte based on dilute sulphuric acid, a positive electrode of lead dioxide and a negative electrode of lead

[SOURCE: IEC 60050-482:2004, 482-05-01, modified – Note 1 deleted and the term "lead acid battery" added.]

3.2
electrolyte
~~diluted sulfuric acid (H_2SO_4) for lead-acid accumulators~~

<of a lead dioxide lead battery> dilute solution of sulphuric acid (H_2SO_4) in purified water

Note 1 to entry: The electrolyte is prepared by mixing concentrated sulphuric acid or sulphuric acid with high density of d > 1,30 kg/l and purified water to achieve the density values specified by the battery manufacturer or specified in standards related to the type and battery design in question for a defined state of charge. Its purity meets the requirements laid down in Table 3.

Note 2 to entry: Concentrated sulphuric acid is a colourless and highly corrosive ~~and etching~~ liquid with a density ~~1,84 kg/l~~ d > 1,82 kg/l.

3.3
water
<for a lead dioxide lead battery> purified water (H_2O) used for the preparation of electrolyte for batteries and for the replacement (topping up) of water loss in the operating electrolyte due to decomposition of water by overcharge and evaporation

Note 1 to entry: The requirements for purified water are specified in IEC 62877-2.

3.4
filling electrolyte
<of a lead dioxide lead battery> diluted sulphuric acid used for the first filling of dry-charged batteries or for the replenishment, density adjustment or replacement of contaminated operating electrolyte

3.5
first filling
<of a lead dioxide lead battery> original filling of a dry-charged battery carried out by ~~the battery manufacturer or~~ the user in accordance with the applicable manufacturer's instructions

3.6
operating electrolyte
<of a lead dioxide lead battery> electrolyte present in the battery following ~~the first~~ electrolyte filling and first use in the application

Note 1 to entry: The density ~~values~~ and the degree of purity of the operating electrolyte ~~may~~ can deviate from the values of the filling electrolyte due to ~~impurity input from replenishment by water and to elution~~ electrolysis, evaporation, introduction of impurities with the replacement water and leaching from ~~e.g.~~ separators, active material and electrode grids.

3.7
~~**electrolyte density**~~
density
<of a battery electrolyte> value for the mass per unit volume expressed in kg/l

Note 1 to entry: The density varies with the battery's state of charge, the electrolyte volume variation due to water loss and the temperature.

Note 2 to entry: The density value is not to be confounded with that of specific gravity (SG). Specific gravity or relative density is the ratio of the density of a substance e.g., the electrolyte, to the density of a given reference material e.g., water, and is dimensionless.

3.8
specified density
~~density of the battery to be stated by the battery manufacturer valid at the maximum electrolyte level (see 3.10) at full state of charge of the battery at the reference temperature~~

~~Note 1 to entry: It is related to the application and design of the battery.~~

<of a battery electrolyte> density of the electrolyte of the battery declared by the manufacturer when being at the maximum upper electrolyte level, at a state of full charge and at the reference temperature

Note 1 to entry: The value is related to the design and application of the battery.

3.9
~~**reference temperature for analytical results**~~
~~reference temperature for analytical results of electrolyte impurities which is 25 °C ± 1 °C~~

~~Note 1 to entry: Density values measured at temperatures deviating from this reference temperature are adjusted accordingly.~~

reference temperature
<for analytical results> temperature of the substance for which the analysis results are applicable

Note 1 to entry: Electrolyte density values measured at temperatures deviating from the reference temperature of 25 °C, are adjusted accordingly.

3.10
~~**measurement of the electrolyte density**~~
~~measurement is carried out by densimeters, in which areometers (hydrometers) are used, or by electronic devices based on e.g. on ultrasonic measurements~~

~~Note 1 to entry: The accuracy of the instrument is better than ± 0,001 kg/l.~~

density measurement
<of the electrolyte> determination of the mass per unit volume of the electrolyte with appropriate tools such as aerometers, hydrometers, diffractometers or vibration-type densitometers

Note 1 to entry: The accuracy of such instruments is typically ± 0,001 kg/l.

3.11
electrolyte level
~~position of the electrolyte surface in the cell/battery, where the recommended tidal movements are indicated by maximum and minimum electrolyte level marks to assist in water replenishment~~

~~Note 1 to entry: Water replenishment should take place in a fully charged state to the upper limit, to avoid over topping and electrolyte loss.~~

position of the electrolyte surface in the cell during operation

Note 1 to entry: The recommended level heights are indicated by the maximum and minimum electrolyte level marks on the cell or filling plug.

Note 2 to entry: Level adjustments such as water replenishment are carried out only when the cell reaches, under charge current flow and gas evolution, a fully charged state so as to avoid spillage due to overflowing electrolyte.

3.12
reference temperature
~~value specified by the battery manufacturer for the indication of properties, such as the nominal electrolyte density, the maximum electrolyte level and the nominal capacity of the battery~~

~~Note 1 to entry: The value of the nominal temperature for the indication of parameters may differ depending on the battery type and application.~~

<for specified values> temperature at which properties, such as the electrolyte density, the maximum electrolyte level and the capacity of the battery are specified by the battery manufacturer

Note 1 to entry: The value of the reference temperature for the indication of parameters can differ depending on battery type and application.

3.13
~~**electrolyte additives**~~
~~compounds which, added to the electrolyte, improve certain properties of the accumulator~~

~~Note 1 to entry: They shall be specified by the manufacturer. Other additives, not specified or not approved by the battery manufacturer, should not be used as they may cause damage to the battery and thus endanger the functional reliability.~~

~~Note 2 to entry: Examples of electrolyte additives are alkaline metal sulfates.~~

additive
<to the electrolyte> compound which, added deliberately to the electrolyte, modifies certain properties of the cell