SLOVENSKI STANDARD
oSIST prEN IEC 62877-1:2023

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Elektrolit in voda za oddušne svinčeve akumulatorje - 1. del: Zahteve za elektrolit

Electrolyte and water for vented lead acid accumulators - Part 1: requirements for electrolyte

Electrolyte et eau pour accumulateurs plomb-acide ouverts - Partie 1: Exigences pour l'électrolyte

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COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 21 : SECONDARY CELLS AND BATTERIES	
SECRETARIAT: France	SECRETARY: Mr Yves Boudou
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
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TITLE:

Electrolyte and water for vented lead acid accumulators - Part 1: requirements for electrolyte

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

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

The text of this standard is based on the following documents:

FDIS	Report on voting
21/874/FDIS	21/881/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

The contents of the corrigendum of May 2017 have been included in this copy.

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 dry- or wet-charged cells or batteries, and for electrolyte replacement or electrolyte density adjustment of batteries in operation. This international standard defines the composition, purity and properties of electrolyte to be applied where specific instructions from the battery manufacturer are not available.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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

3.1
electrolyte
<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 colorless and highly corrosive liquid with a density d >1,82 kg/l.

3.2
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.

3.3
filling electrolyte
<of a lead dioxide lead battery>

diluted sulphuric acid used for the first filling of dry- or wet-charged batteries or for the replacement of contaminated operating electrolyte.

3.4
first filling
<of a lead dioxide lead battery>

original filling of a dry- or wet-charged battery carried out by the battery manufacturer or the user in accordance with the applicable manufacturer's instructions.

3.5
operating electrolyte
<of a lead dioxide lead battery>

electrolyte present in the battery following electrolyte filling and first use in the application.

Note 1 to entry: The density and the degree of purity of the operating electrolyte can deviate from the values of the filling electrolyte due electrolysis, evaporation, introduction of impurities with the replacement water and leaching from separators, active material and electrode grids.

3.6
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.

3.7
specified density
<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.

3.8
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.

3.9
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.

3.10
electrolyte level
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 to avoid spillage due to overflowing electrolyte.

3.11
reference temperature
<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.

3.12
additive
<to the electrolyte>

compounds which, added deliberately to the electrolyte, modify certain properties of the cell.

Note 1 to entry: Additives and their level are specified by the battery manufacturer. Non-specified additives can result in cell damages and voiding of warranty conditions.

Note 2 to entry: Examples of electrolyte additives are alkaline metal sulphates or phosphoric acid.

3.13
Impurities
constituents in the electrolyte impairing the performance and life of a cell

Note 1 to entry: The type and maximum permissible quantity of impurities are specified in Tables 3 and 4.

4 Preparation of electrolyte for lead-acid accumulators

The electrolyte shall be prepared from sulphuric acid of high concentration by pouring it into purified water and not the reverse.

Concentrated and diluted sulphuric acid has a highly irritating and burning effect on skin and corrosive effect on clothes and many materials. The electrolyte shall be prepared by the battery manufacturer or by skilled personnel only. Adequate personal protection equipment such as goggles, face shields, rubber gloves, aprons and similar shall be used.

The mixing of sulphuric acid of high concentrations with water releases a great amount of heat. To avoid splashing of hot acid, sulphuric acid shall be always poured into water and not the reverse. The relevant material safety data sheets (MSDS shall be consulted.

The density measurement of the electrolyte can be carried out with appropriate tools such as aerometers, hydrometers, diffractometers or vibration-type densitometers. The obtained values have to be normalized to the specified reference temperature.

5 Physical properties of diluted sulphuric acid as electrolyte

5.1 Dependence of sulphuric acid electrolyte density on temperature

The value of sulphuric acid electrolyte density obtained at the measuring temperature shall be converted to the value of sulphuric acid electrolyte density at the reference temperature of 25 °C with the following equation:

$$d_{\mathrm{n}} = d_{\mathrm{T}} + f_{\mathrm{d}} \, (T - T_{\mathrm{n}})$$

where

d_{n} is the acid electrolyte density at 25 °C;

d_{T} is the acid electrolyte density at measuring temperature T;

f_{d} is the correction factor according to Table 1;

T is the measuring temperature;

T_{n} is the reference temperature of 25 °C.

Table 1 – Correction factor to convert the acid electrolyte density found at the measuring temperature to that at the specified reference temperature

Acid electrolyte density d_{n}	Correction factor f_{d} [a]
kg/l	kg/l per K
1,10	0,00050
1,15	0,00060
1,20	0,00070
1,30	0,00075

[a] The correction factor is applicable for a temperature range from 0 °C to 55 °C.