



# SLOVENSKI STANDARD

## SIST EN 60095-1:1997/A12:2001

01-februar-2001

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**Amendment to subclauses 1.2 to 1.4, 2.1, 2.3, 3.1.6, 3.2.2, 4.2, 4.5, 5.4 to 5.6, 5.8, 5.10 and annex A of EN**

Lead-acid starter batteries -- Part 1: General requirements and methods of test

Blei-Starterbatterien -- Teil 1: Allgemeine Anforderungen und Prüfungen

Batteries d'accumulateurs de démarrage au plomb -- Partie 1: Prescriptions générales et méthodes d'essai

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**Ta slovenski standard je istoveten z: EN 60095-1:1993/A12:1999**

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**ICS:**

29.220.20	Kislinski sekundarni člani in baterije	Acid secondary cells and batteries
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**SIST EN 60095-1:1997/A12:2001**                      **en**

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EUROPEAN STANDARD

EN 60095-1/A12

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1999

ICS 01.080.20; 29.220.20

UDC 621.355.2:621.43.044.7:620.1

Descriptors: Lead-acid battery, starter battery, identification, labelling, electrical characteristics, mechanical characteristics, test conditions, test methods, tests

English version

## Lead-acid starter batteries Part 1: General requirements and methods of test

Batteries d'accumulateurs de démarrage  
au plomb  
Partie 1: Prescriptions générales et  
méthodes d'essai

Blei-Starterbatterien  
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This amendment A12 modifies the European Standard EN 60095-1:1993; it was approved by CENELEC on 1999-01-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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# CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

### Foreword

This amendment was prepared by the Technical Committee CENELEC TC 21X, Secondary cells and batteries.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A12 to EN 60095-1:1993 on 1999-01-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-01-01
  - latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2000-01-01
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## 1.2 Object

At the end of this subclause, **add** a third indent:

- for several classes and types of starter batteries.

## 1.3 Electrolyte density and open circuit voltage

**Replace** this subclause by the following:

### 1.3 Designation of starter batteries, electrolyte density and open circuit voltage

1.3.1 According to their types :

- Vented (flooded) battery : A vented battery is a secondary battery having a cover provided with one or more openings through which gaseous products may escape.

- Valve regulated (with gas recombination) battery : A valve regulated battery is a secondary battery which is closed under normal conditions but which has an arrangement which allows the escape of gas if the internal pressure exceeds a predetermined value. The battery cannot receive addition to the electrolyte.

In this type of battery, the electrolyte is immobilized.

#### 1.3.2 Electrolyte density and open circuit voltage

The density of the electrolyte in all vented batteries, when fully charged, shall be in the range 1,27 kg/l to 1,30 kg/l at 25 °C unless otherwise specified by the manufacturer.

The open circuit voltage (OCV), when fully charged, but after a minimum 24 h stand on open circuit, shall be in the range 12,70 to 12,90 V for vented batteries and 12,80 V minimum for valve regulated batteries at 25 °C unless otherwise specified by the manufacturer.

Either the manufacturer shall specify the electrolyte density (or OCV) and tolerance, or if such information is not available, vented battery testing shall be carried out with a density of  $(1,28 \pm 0,01)$  /kg/l at 25 °C or an OCV of  $12,76 \text{ V} \pm 0,06\text{V}$  at 25 °C and valve regulated battery testing shall be carried out with a minimum OCV of 12,80 V.

## 1.4 Conditions on delivery

**Replace** the first line by the following:

New vented batteries may be supplied either :

At the end of this subclause, **add** the following sentence :

Valve regulated batteries are normally supplied in a state ready for use. For these batteries the electrolyte is not accessible and therefore its density cannot be checked.

## 2.1 Identification, labelling

**Add** after f) :

- g) valve regulated batteries shall bear a special indication.

### 2.3 Additional designation

Add "Vented" at the beginning of the sentence.

### 3.1 Electrical characteristics

#### 3.1.6 At the end of this subclause, add the following sentence:

Valve regulated batteries have a very low water consumption and are not intended to receive addition to the electrolyte (see 5.8).

### 3.2 Mechanical characteristics

#### 3.2.2 At the end of this subclause, add the following sentence:

Valve regulated batteries are submitted to a special test (see 5.10).

### 4.2 Preparation of batteries prior to test - Definition of a fully-charged battery

Replace the existing last paragraph by the following:

Batteries shall be considered as fully-charged if they have undergone the charging procedures of 4.2.1 for vented batteries or 4.2.2 for valve regulated batteries.

#### 4.2.1 Replace the existing title by "Charging of vented batteries".

At the end of this subclause, add a new subclause :

#### 4.2.2 Charging of valve regulated batteries

Unless otherwise recommended by the manufacturer, the battery shall be charged :

- at a constant voltage of 14,4 V for 20 h with the maximum current limited to  $5 I_n$  (see 3.1.2) and
- then with a constant current of  $0,5 I_n$  for 4 h.

The temperature shall be maintained in the range 25 °C to 35 °C. If necessary an appropriate environmental control system shall be used e.g. water bath.

### 4.5 Test sequence

#### Table 1

Replace the existing note by the following :

NOTE: The test for water consumption should be applied only to « low water loss » vented batteries according to 2.3 and to valve regulated batteries.

### 5.4 Charge acceptance test

#### 5.4.2 At the end of this subclause, add the following note:

NOTE: It is generally accepted that the required temperature will be achieved after a minimum period of 24 hours in the cooling chamber.

#### 5.4.4 Replace the contents of this subclause by the following:

$I_{ca}$ shall be :	vented batteries :	$\geq 2I_0$
	valve regulated batteries :	level 1 $\geq I_0$
		level 2 $\geq 2I_0$

**5.5 Charge retention test****5.5.1** Replace the title of this subclause by the following:**5.5.1 Requirement for standard vented batteries****5.5.3** Replace the title of this subclause by the following:**5.5.3 Requirement for “low water loss” vented batteries and valve regulated batteries****5.6 Endurance test****5.6.2.3** Replace 5.6.2.3 b) by the following :

b) immediately followed by a recharge for 2 h at a constant voltage of  $14,8 \text{ V} \pm 0,05 \text{ V}$  for vented batteries and  $14,4 \text{ V} \pm 0,05 \text{ V}$  for valve regulated batteries, the maximum current being limited to :

$$I_{\max} = 10I_n$$

**5.6.2.6** After “0,6  $I_{cc}$ ”, add “(measured in a central cell, this measurement being not applicable to valve regulated batteries)”.**5.6.3.3** Replace 5.6.3.3 a) by the following :

a) a charge for 5 h at a constant voltage of  $14,8 \text{ V} \pm 0,05 \text{ V}$  for vented batteries and  $14,4 \text{ V} \pm 0,05 \text{ V}$  for valve regulated batteries, the maximum current being limited to :

$$I_{\max} = 5 I_n \pm 2 \% \text{ (A)}$$

**5.6.3.5** After “0,6  $I_{cc}$ ”, add “(measured in a central cell this measurement being not applicable to valve regulated batteries)”.

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**5.8 Water consumption test****5.8.1** Add a title to this subclause:**5.8.1 Vented batteries**

**Renumber** the existing subclauses 5.8.1, 5.8.2, 5.8.3, 5.8.4, 5.8.5, 5.8.6 as, respectively, 5.8.1.1, 5.8.1.2, 5.8.1.3, 5.8.1.4, 5.8.1.5, 5.8.1.6.

After the new subclause 5.8.1.6, **add** a new subclause 5.8.2 :

**5.8.2 Valve regulated batteries****5.8.2.1** The battery is charged according to 4.2.

**5.8.2.2** The battery shall be placed in a water-bath maintained at a temperature of  $40 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ . The top of the battery case shall emerge not more than 25 mm above the level of the water. A minimum space of 25 mm shall be maintained around each battery.

**5.8.2.3** The battery shall be charged at a constant voltage of  $14,4 \text{ V} \pm 0,05 \text{ V}$  (measured across the battery terminals) for a period of 500 h.

**5.8.2.4** Immediately after this first period the battery shall be cleaned, dried and weighed to an accuracy of  $\pm 0,05 \%$  (weight  $W_1$ ).

**5.8.2.5** The battery shall be placed in a water-bath maintained at a temperature of  $40 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ . The top of the battery case shall emerge not more than 25 mm above the level of the water. A minimum space of 25 mm shall be maintained around each battery.

**5.8.2.6** The battery shall be charged at a constant voltage of  $14,4 \text{ V} \pm 0,05 \text{ V}$  (measured across the battery terminals) for a period of 1 000 h.

**5.8.2.7** Immediately after this overcharge period, the battery shall be weighed under the same conditions as in 5.8.2.4 with the same scales (weight  $W_2$ ).

**5.8.2.8** The loss in weight divided by 2 ( $(W_1 - W_2) / 2$ ) shall not exceed the value  $1 \text{ g/Ah } C_e$  (or  $0,67 \text{ g/min } C_{re}$ ).

## 5.10 Electrolyte retention test

**5.10.1** Add a title to this subclause:

### 5.10.1 Vented batteries

**Renumber** the existing subclauses 5.10.1, 5.10.2, 5.10.3, 5.10.4 as, respectively, 5.10.1.1, 5.10.1.2, 5.10.1.3, 5.10.1.4.

After the new subclause 5.10.1.4, **add** a new subclause 5.10.2 :

### 5.10.2 Valve regulated batteries

**5.10.2.1** The battery shall be charged according to 4.2.

**5.10.2.2** Immediately after the end of charge, the battery shall be placed upside down on a sheet of blotting paper, put on a flat insulated surface, for 6 h at a temperature of  $25 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ .

**5.10.2.3** After this test, no liquid shall be visible on the blotting paper.

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## Appendix A

**Add:**

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For valve regulated batteries the value of  $C_r$  (min) may be estimated from  $C_n$  (Ah) by use of the following equation :

$$C_r = \beta (C_n)^\alpha$$

with

$$\alpha = 1,13$$

$$\beta = 1,07$$

Reciprocal formula :  $C_n = \delta (C_r)^\gamma$

with

$$\gamma = 0,885$$

$$\delta = 0,94$$