IEC 60095-2

Edition 4.0 2009-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Lead-acid starter batteries –
Part 2: Dimensions of batteries and dimensions and marking of terminals

Batteries d'accumulateurs de démarrage au plomb –
Partie 2: Dimensions des batteries et dimensions et marquage des bornes

IEC 60095-2:2009

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60095-2 has been prepared by IEC technical committee 21: Secondary cells and batteries.

This fourth edition cancels and replaces the third edition of IEC 60095-2 published in 1984 and its Amendment 1 (1991) and 2 (1993). It constitutes a technical revision.

The main changes consist in a complete update of the dimensions of starter batteries for light vehicles which better reflects the current products in Europe, North America and East Asia. More details are given especially regarding shapes and dimensions of lids, handles, locations of terminals.

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

FDIS	Report on voting
21/699/FDIS	21/702/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 60095 series, published under the general title *Lead-acid starter batteries*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

LEAD-ACID STARTER BATTERIES –

Part 2: Dimensions of batteries and dimensions and marking of terminals

1 Scope

This part of IEC 60095 is applicable to lead-acid batteries used for starting, lighting and ignition of passenger cars and light vehicles with a nominal voltage of 12 V.

All batteries in accordance with this standard can be fastened to the vehicle either by means of the ledges around the container or by means of a hold-down device engaging with the lid.

This standard covers battery sizes of the geographical regions Europe, East Asia and North America.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-482, *International Electrotechnical Vocabulary – Part 482: Primary and secondary cells and batteries*

IEC 60095-1, *Lead-acid starter batteries – Part 1: General requirements and methods of test*

IEC 60417-DB:2002[1], *Graphical symbols for use on equipment*

ISO 1043-1, *Plastics – Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 apply.

4 General

The following specifications are common to all starter batteries, not only for the batteries of this standard.

4.1 Marking

4.1.1 Safety labelling

The batteries shall be marked in accordance with IEC 60095-1.

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1 "DB" refers to the IEC on-line database.

4.1.2 Marking of the polarity

The batteries shall carry the marking of polarity, at least of the positive terminal.

4.1.2.1 Marking of positive polarity

The marking of positive polarity shall take the form of the symbol "**+**" either on the upper surface of the positive terminal or on the lid adjacent to the positive terminal.

4.1.2.2 Marking of negative polarity

If the negative polarity is also marked, the marking shall take the form of the symbol "**-** " either on the upper surface of the negative terminal or on the lid adjacent to the negative terminal.

4.1.2.3 Design and dimensions of marking of polarity

The symbols used for marking the terminals shall be in accordance with the symbol IEC 60417-5005 (DB: 2002-10) for the positive polarity and symbol IEC 60417-5006 (DB: 2002-10) for the negative polarity.

The polarity symbols may be either indented or embossed by (0,4 ± 0,1) mm. Suggested dimensions are shown in Figure 1.

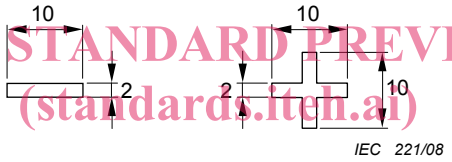


Figure 1 – Marking of polarity

NOTE As an alternative, the wordings "POS" and "NEG" are permitted for the North American market only.

4.2 Marking of plastic material for recycling

4.2.1 Recycling of lead

Various marking schemes exist around the world in line with local regulations, therefore the marking of recycling of lead must be in accordance with this local regulations of the market.

4.2.2 Recycling of plastic material

Batteries are universally marked to identify the plastic material. Various marking schemes exist around the world in line with local regulations. However, all schemes identify the plastic material by embossing or indenting it into the battery housing.

The marking of material content shall be in accordance with ISO 1043-1. For the polypropylene/polyethylene copolymer, the marking is either > PP < or > PP/PE <.

The following additions are permissible (see Figure 2):

- the recycling symbol (ISO 7000-1135);
- the material code 7 or 07, and
- the addition of "other" to cover additives to the polypropylene.

Figure 2 – Example of marking of material

NOTE Producers are encouraged to consult the regulations of the target market.

4.3 Dimensions and design

All dimensions are in millimetres.

Details of the design that are not indicated in the generic drawings have to be chosen appropriately.

The designs illustrated in this standard, especially those of the lid, handles, ribs, ledges, vent caps and their locations are not mandatory.

5 Recommended types

5.1 Recommended types used in Europe (EU)

5.1.1 General

The object of this clause is to update the previous edition of this standard and to introduce an updated version of LS and LBS models. Those updated versions LN and LBN are so designed that they may replace the earlier models LS and LBS. Therefore for new developments only the recommended series LN and LBN shall be used.

This clause specifies:

- the main dimensions of starter batteries of the two preferred series LN and LBN;
- the location of the positive and negative terminals with respect to the fastening system;
- the dimensions of tapered terminals of starter batteries;
- the main dimensions and design of the “Semi Lid” (SL);
- the top clamping area (M) for fastening on the upper part.

5.1.2 Recommended types LN and LBN

5.1.2.1 General

Starter batteries in accordance with this subclause are marked with LN and LBN (N = new). Both battery series have the same width (L = large) but different height:

LN = standard height (H = 190 mm)

LBN = low height (H = 175 mm)

Of the two series, the model LN (large, standard height, new) shall be considered as the most preferred series.

5.1.2.2 Main dimensions of batteries

The main dimensions of the batteries are represented by symbols as indicated on the drawings. These schematic drawings do not represent any design details of the top of the battery.

The dimensions corresponding to the symbols below shall be in accordance with Figure 3, Figure 4, Figure 5, Table 2 and Table 3.

Symbols used:

a_1 = overall length at the battery base with ledges

a_2 = length at the battery base without ledges

a_3 = length at battery lid

H = overall height including lid, plugs and terminals

h = height of the upper surface M, supporting the hold-down device

a_4 = distance of the inside notches

a_5 = distance between terminal and the edges of the lid at the short side (Figures 4 and 5)

a_6 = distance of the robotic-grips-segments (see Figure 11 and Table 4)

5.1.2.3 Handles

5.1.2.3.1 General

Batteries with a weight of less than or equal to 20 kg can be designed with or without handles. Batteries with a weight of more than 20 kg shall have handles.

5.1.2.3.2 Handles, if any

If the batteries have handles, the handles shall be integrated in the lid (see Figure 3).

NOTE The handle design shown in all the pages of this standard is for information only. It is left to the battery manufacturer to propose a design in accordance with this standard with respect to overall dimensions.

5.1.2.4 Standard fastening on the bottom

5.1.2.4.1 General

All batteries in accordance with this clause shall have ledges for fastening over the length of all sides as an integral part of the battery container and allowing the battery to be fixed by means of the bottom of the container.

5.1.2.4.2 Design of ledges

The profile of the ledges shall be in accordance with Figure 6. The length of the ledges on the back side shall be reduced (see Figure 3); 20 mm from both sides compared the one on the front side.

5.1.2.4.3 Notches

The hold-down clamps of the support shall match with the ledges and the notches to provide secure fastening in either direction.

To allow a symmetrical rotation for fastening, the opposite ledges contain an equal number of notches, and, to secure correct positioning of the battery on the support, the ledges shall have 5 notches on the long sides and 3 notches on the short sides.

5.1.2.4.4 Arrangement and dimensions of ledges and notches

The shape and dimensions of ledges and notches shall be in accordance with Figure 3, Figure 4, Figure 5 and Figure 6 (details "X", "Y" and "Z").

5.1.2.5 General information concerning permissible alternative fastening

5.1.2.5.1 General

Starter batteries in accordance with this part may be fixed to the vehicles either:

- by a bottom hold-down device at the long side,
- by a bottom hold-down device at the short side or
- by means of a hold-down device engaging with the upper part of the battery (for example, a metal frame), connected to the top clamping area M (see 5.1.2.5.3).

In either case, such batteries shall have on the long sides top clamping areas “M”.

5.1.2.5.2 Fastening by ledges at the short side

For fastening at the short sides only batteries of this standard series are recommended to be used because of reduced tolerances in the length. The shape and dimensions of the ledges and notches shall correspond to Figure 6.

The hold-down clamps of support shall match with the ledges and notches to provide secure fastening in both direction and height.

5.1.2.5.3 Fastening by upper part of the battery

Batteries for fastening by the upper part (top clamping area M) shall be designed so that the lid provides appropriate support for the hold-down device, for instance a metal frame.

5.1.2.6 Dimensions and position of terminals

The position of positive and negative terminals “P” (see Figure 4 or 5) with respect to the shortened ledge shall be in accordance with Figure 3.

5.1.2.7 Dimensions of battery terminals (P)

5.1.2.7.1 Dimensions of the positive terminal

The tapered positive terminal shall be in accordance with Figure 7a.

5.1.2.7.2 Dimensions of the negative terminal

The tapered negative terminal shall be in accordance with Figure 7b.

5.1.2.8 Marking of polarity and dimensions of corresponding symbols

Batteries in accordance with this part shall be marked twice in the area of the terminals as indicated (Figure 3 or 10), when applied on the lid (see 4.1.2).

The symbol of the polarity shall be in accordance with 4.1.2.

5.1.2.9 Special features of lid

The properties of the battery lid are as follows.

5.1.2.9.1 Semi monobloc lid

This describes a monobloc lid which includes the terminals and the vent plugs so that they are not higher than the lid surface. The special feature of the Semi monobloc lid is the top clamping area “M” (Figures 3 to 5).

5.1.2.9.2 Spray water proof

That means a flat surface and water sealed maintenance openings, if any.

5.1.2.9.3 Central degassing

That means a central degassing system and gas outlets “E” on one or both front ends, vertical to the surface of the short side of the battery (Figure 8).

5.1.2.9.4 Recessed holes

That means recessed holes “K” for optional terminal protection on both sides (Figure 9).

5.1.2.9.5 Reversible vent plugs

That means, if reversible vent plugs “V” are present, they are relevant to safety of the degassing systems (Figure 10).

5.1.2.9.6 Information for tooling the lid

For further developments of lid tooling, provision should be made to enable sensor-holes “S” of 28 mm maximal diameter (Figure 10) to be included.

Position of alternatives is demonstrated in Figure 10 in conjunction with the dimensions of Table 1. Details will be given by the battery makers.

Table 1 – Position of sensor holes of Figure 10

Lid size	A ± 2	B ± 2
LN 0 / LNB 0	13	40
LN 1 / LBN 1	18	48
LN 2 / LBN 2	19	57
LN 3 / LBN 3	27	65
LN 4 / LBN 4	27	74
LN 5 / LBN 5	28	84
LN 6 / LNB 6	31	94

5.1.2.10 Welded lid

The welded lid shall exceed the container walls equal or more than 2,5 mm along all sides.

5.1.2.11 Handling of starter batteries by robot-equipment

5.1.2.11.1 General

Starter batteries are increasingly being installed by car manufacturers into vehicle bodies by robot units. This practice requires appropriate means for the exact positioning of robot arms on the battery container.

The object of this subclause is to specify the position and dimensions of grips on battery containers according to the series LN and LBN for handling by robot assembly equipment. Such ledges may optionally be requested by agreement between the car manufacturer and the battery manufacturer.

5.1.2.11.2 Position and dimensions of robotic grips

If robot grips are requested, they shall conform to the dimensions and positions shown in Figures 11a, 11b and 11c:

- Figure 11a shall correspond to series LN.
- Figures 11a and 11b are alternative, both corresponding to series LBN.

The robot grips shall be integral parts of the battery container.

It is emphasised that, according to the detail drawing U (see Figure 11c), the robot grips shall not exceed dimensions of the battery lid.

In all cases, they should confirm to the dimensions given in this standard.

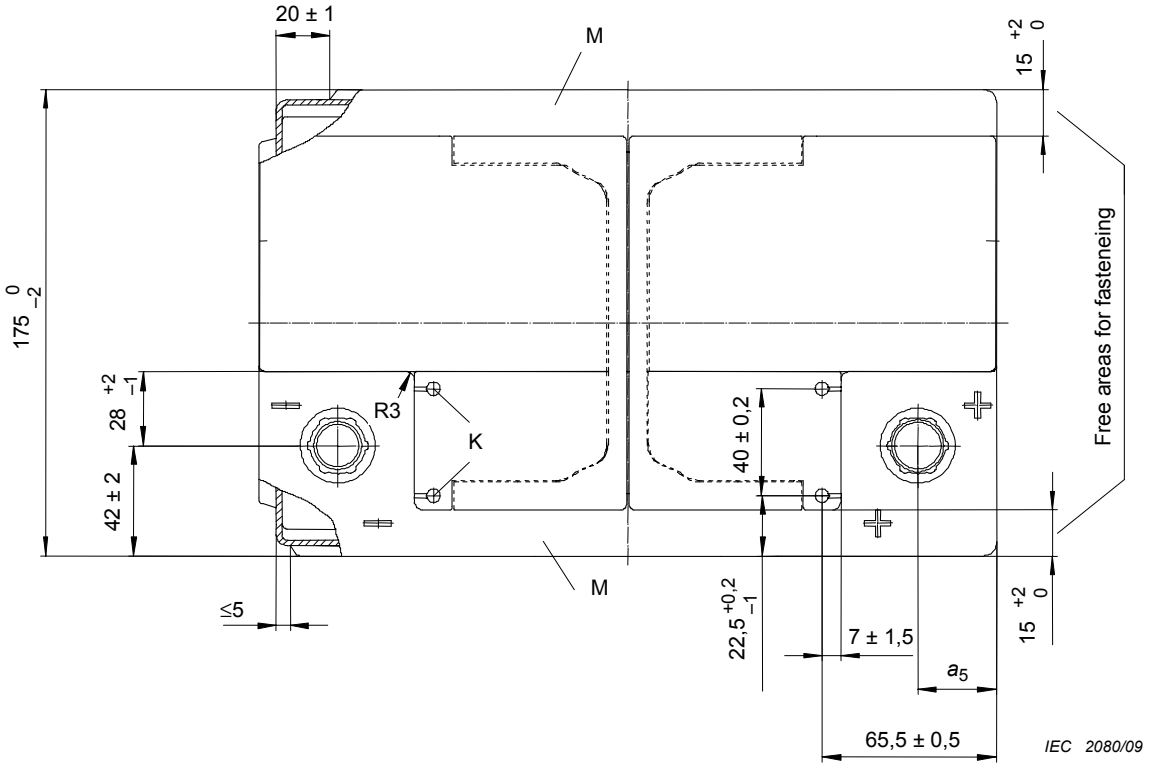
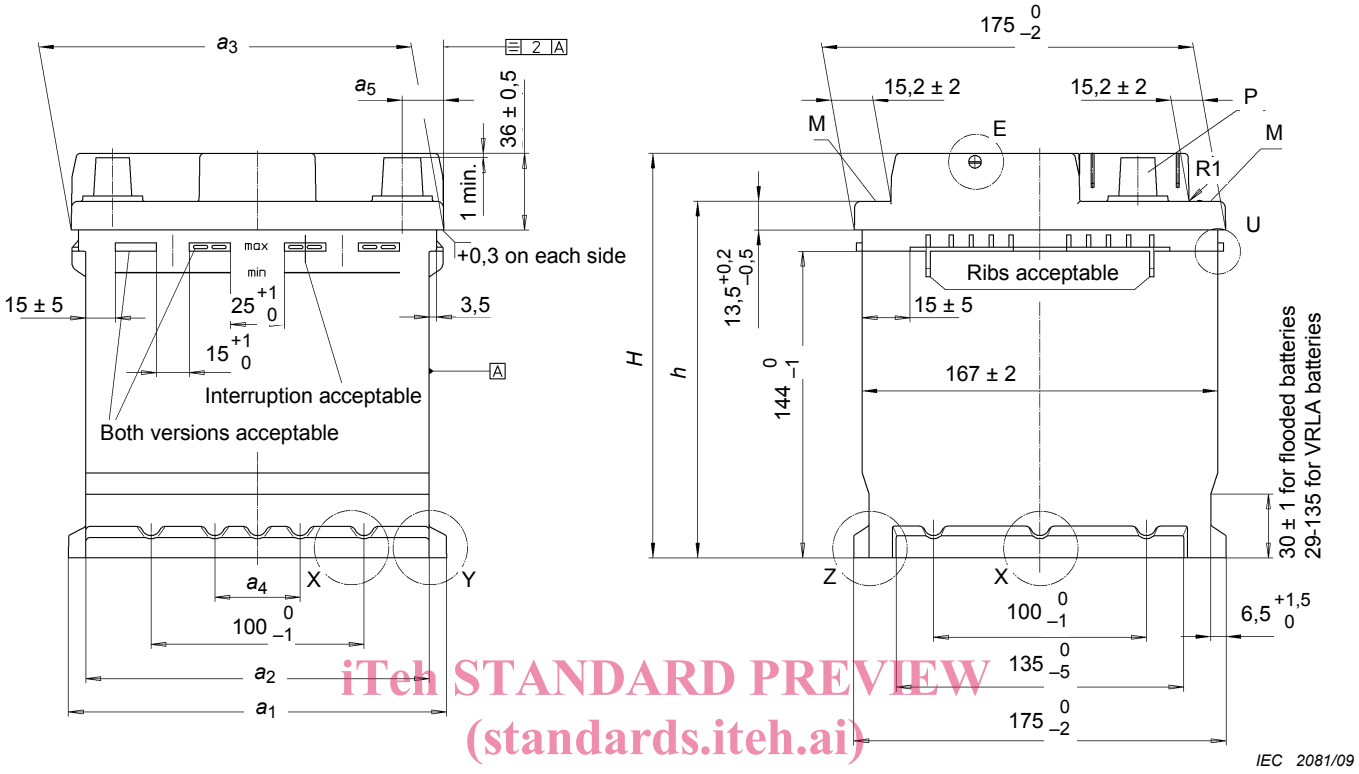


Figure 3 – Main dimensions of batteries and arrangement of standard fastening system, the top clamping area "M", the terminals, recessed holes "K" and the integrated handles (if any)



E = degassing outlet (see detail "E" in Figure 8)

M = top clamping area (see detail "M" in Figure 3, Figure 4 and Figure 5)

P = positive and negative terminal (see Figure 7)

U = robotic grips (see detail "U" in Figure 11c)

X = notches on ledges (see detail "X" in Figure 6a)

Y = ledges (see detail "Y" in Figure 6b)

Z = ledges (see detail "Z" in Figure 6c)

NOTE 1 The datum "A" shows that container and lid has to be positioned by process of welding with the given tolerance in accordance with ISO 1101.

NOTE 2 Holes for fixation of adapters in the notches of the ledges along all sides are permissible.

NOTE 3 The space between the measurements a_1 and a_2 must be kept clear by the car maker from assembly parts because of wall expansion of the battery.

Figure 4 – Main dimensions of batteries and arrangement of standard fastening system