

Lead-acid stationary cells and batteries —

Part 2: Specification for the high-performance Planté positive type

ICS 29.220.20

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- British Industrial Truck Association
- British Telecommunications plc
- Electricity Association
- Electric Vehicle Association of Great Britain
- Lighting Industry Federation Ltd.
- Ministry of Defence
- Society of British Battery Manufacturers
- Society of Motor Manufacturers and Traders Ltd.
- Co-opted members

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Foreword

This part of BS 6290 has been prepared by Technical Committee PEL/21.

This British Standard is part 2 of a series of standards. It specifies requirements for high-performance cells and batteries with Planté type positive plates and pasted negative plates. It supersedes BS 6290-2:1984 which is withdrawn.

BS 6290-1 has been withdrawn, having been superseded jointly by BS 6290-2:1999, BS 6290-3:1999, BS 6290-4:1997 and BS EN 60896-1:1992.

BS 6290-3 specifies requirements for lead-acid pasted positive plate type cells and batteries.

BS 6290-4 specifies the criteria for classifying lead-acid valve-regulated cells and batteries.

BS EN 60896-1 specifies general requirements for all free-venting types of stationary lead-acid cells and batteries.

Guidance on safety and health aspects of the handling, installation, usage and maintenance of lead-acid stationary cells and batteries is given in BS 6133.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

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1 Scope

This part of BS 6290 specifies requirements for the materials, design and performance of stationary cells and batteries comprising individual lead-acid cells of the high-performance Planté positive type.

NOTE Information on applications is given in annex A. Annex B clarifies the position of these cells and batteries with respect to electromagnetic compatibility.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 3908-1, *Methods for the sampling and analysis of lead and lead alloys — Part 1: Sampling of ingot lead, lead alloy ingots, sheet, pipe and cable sheathing alloys*.

BS 3908-3, *Methods for the sampling and analysis of lead and lead alloys — Part 3: Bismuth in lead and lead alloys (photometric method)*.

BS 3908-6, *Methods for the sampling and analysis of lead and lead alloys — Part 6: Tellurium in lead and lead alloys (photometric method)*.

BS 3908-9, *Methods for the sampling and analysis of lead and lead alloys — Part 9: Sulphur in lead and lead alloys*.

BS 3908-15, *Methods for the sampling and analysis of lead and lead alloys — Part 15: Iron in lead and lead alloys (photometric method)*.

BS 6133:1995, *Code of practice for safe operation of lead-acid stationary batteries*.

BS 6334:1983, *Methods of test for the determination of the flammability of solid electrical insulating materials when exposed to an igniting source*.

BS EN 60896-1, *Stationary lead-acid batteries — General requirements and methods of test — Part 1: Vented types*.

3 Terms and definitions

For the purposes of this part of BS 6290, the terms and definitions given in BS 6133:1995, 1.3.2 apply, together with the following.

3.1

stationary cell

cell that is installed on a fixed site and is not intended to be moved continually during its life

3.2

stationary battery

two or more stationary cells electrically connected in series

3.3

lead-acid cell

cell in which the electrolyte is dilute sulfuric acid, and which is fitted with plates in which the active materials are:

- a) positive electrode: lead dioxide;
- b) negative electrode: spongy lead

3.4

free-venting enclosed cell

cell that is fitted with a vent plug which allows free venting of electrolysis gas

NOTE Provision is made for the addition of water and for measurement of the level and density of electrolyte. The cover is not intended to be readily removable.

3.5

high-performance Planté cell

free-venting enclosed cell containing Planté type positive plates and pasted negative plates

3.6

container

box in which plate groups and separators are assembled

3.7

group bar

bar to which a plate or group of plates is attached

3.8

vent plug

plug, provided with a gas vent or vents and baffled to arrest acid spray, that is fitted in the vent hole in the cover of an enclosed cell

NOTE A vent plug normally also provides access for filling.

3.9

length

dimension of a container or cell measured at right angles to the plates

3.10

width

horizontal dimension of a container or cell measured parallel to the plates

3.11

charging

passing of an electric current through a cell so as to bring it to a chemical condition in which it is capable of supplying electricity to an external circuit

NOTE The quantity of electricity passed is known as the charge and is usually measured in ampere hours.

3.12

float

operation of a cell or battery in parallel with a load and a charging source at constant voltage

3.13**discharge**

taking out of a quantity of electricity from a cell by connecting it to an external circuit in such a way that the current flows through the cell in the reverse direction to that for charging

NOTE The quantity of electricity taken out is usually measured in ampere hours.

3.14**capacity**

quantity of electricity that can be taken from a cell (or battery) at a particular rate of discharge, under specified conditions of voltage and temperature

NOTE Capacity is usually measured in ampere hours.

3.15**rated capacity**

designation, by the manufacturer, of the capacity of a cell (or battery) under specified conditions of discharge

4 Materials and components**4.1 Positive plates**

Positive plates shall be of the Planté lamelle type and shall be made of chemical lead conforming to Table 1. Sampling and chemical analysis of the lead shall be in accordance with relevant parts of BS 3908.

NOTE Analysis for impurities which are not covered by BS 3908 should be by documented instrumental methods.

The thickness and mass of the plates shall conform to Table 2.

4.2 Negative plates

Negative plates shall be of the open-grid type, pasted to sustain at least the capacity of the corresponding positive plate, as given in Table 2. The width and length of the negative plates shall not be less than those of their corresponding positives.

Intermediate negative plates shall have a capacity, at the C_{13} rate (see 6.1), at least 20 % greater than the rated capacity of their corresponding positives. The minimum thickness of the intermediate plates shall be as given in Table 2

4.3 Separators

Separators shall be made of a microporous material. They shall be designed to cover the facing surfaces of all the plates and to overlap the edges of the positive plates by no less than the dimensions given in Table 2.

4.4 Group bar

Group bars shall be made of pure lead or lead alloy. Where more than one pillar/group bar assembly is used in the assembly of the plate section, electrical continuity between group bars of like polarity shall be achieved by tack welding.

The current density at the 1 min discharge rate shall not exceed 1.5 A/mm^2 in any part of a group bar.

4.5 Terminal pillars

Terminal pillars or pillar/group bar assemblies shall be cast in lead alloy. They shall have a smooth surface finish, free from porosity and other defects, shall be compatible with the electrochemical conditions within the cell, and shall be suitable for mechanical connections.

If pillars contain copper inserts, this shall be stated by the manufacturer. If copper inserts are used, the covering of lead around the insert within the cell shall be at least 3.5 mm thick.

NOTE Pillars containing copper inserts are normally used in cells designed for high-discharge duties.

The current density at the 1 min discharge rate shall not exceed 2.5 A/mm^2 for lead pillars or 15.0 A/mm^2 for lead pillars with copper inserts.

The terminal pillars shall not carry any part of the weight of either plate group.

4.6 Containers

Containers shall be made of transparent material, e.g. styrene acrylonitrile.

The positive plates shall be hung from ledges moulded in the container. The negative plates shall be supported from the bottom of the container.

The weight of each plate group shall be transmitted vertically on to a flat base.

The clearance between the sides of the container and the positive plates, and between the bottom of the container and the positive plates, shall conform to Table 3.

4.7 Cell lids

Cell lids shall be sealed to the container. Terminal pillars shall be sealed where they pass through the lid

NOTE The sealing should be designed to prevent corrosion of the pillar above the lid.

Apart from the vent holes, the complete cell shall be sealed sufficiently to withstand an internal pressure of $1\,961 \text{ Pa}$ ($200 \text{ mmH}_2\text{O}$).

4.8 Vent plugs

Vent plugs shall allow no visible wetting of the cell lid when the cell is being overcharged at the $0.09C_{13}$ rate at 20°C ambient temperature.

4.9 End springs or packing pieces

End springs or packing pieces shall be provided to hold the plate groups in position.

NOTE The end springs or packing pieces should be designed to hold the plate groups in position throughout the anticipated life of the cell.

5 Cell design

The number of plates per cell and the maximum external dimensions of the container shall be as given in Table 4.