PUBLICLY AVAILABLE SPECIFICATION

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Electrically propelled road vehicles — Dimensions and designation of secondary lithium-ion cells

Véhicules routiers à propulsion électrique — Dimensions et désignation d'accumulateurs lithium-ion

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

— an ISO/IEC Publicly Available Specification (ISO/IEC PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

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An ISO/IEC PAS or ISO/IEC TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/IEC PAS or ISO/IEC TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC PAS 16898 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 21, *Electrically propelled road vehicles*.

Introduction

The vehicle traction battery system as a large and very costly component of an electrically propelled vehicle has a huge influence on the vehicle design. Depending on vehicle dimensions and package constraints, the shape of battery packs and systems has to follow a top-down procedure. The dimensional requirements on lithium-ion cells for automotive application are given by the battery system, which is influenced by the vehicle design. Therefore, this Publicly Available Specification (PAS) was developed in a joint ISO and IEC Working Group consisting of experts from the automotive industry, the automotive suppliers, the battery and the cell industry.

Today there is a huge variety of different cell types and dimensions on the market. When a traction battery system design is finished based on one specific cell, a change to another cell or cell supplier is quite difficult or may not be possible. It is necessary to reduce this variety in order to:

— lower the cell costs through encouraging competition and allowing cell suppliers access to the worldwide market,

— enable an exchange of the cells from different suppliers during and after the battery system development, and

— support the battery system design by specifying basic outer dimensions per known design type of lithium-ion cells for automotive traction battery systems.

By specifying only a certain number of cell dimensions for vehicle propulsion, this PAS aims to reduce the number of different dimensions. It should furthermore ensure that cells of the dimensions as listed in this PAS will be used in the long term by the vehicle manufacturers for their current and future models. Cells of these dimensions need to be available for the vehicle production time, plus the vehicle life time, plus the legally required spare part availability time.

This PAS lists only those battery cells, chosen from the currently existing variety, which will be used for the current and planned vehicle models and which are currently available. This PAS does not exclude the usage of other cell dimensions in vehicle models.

This PAS is not intended to restrict the development of cell technology. Therefore no requirements are specified in this PAS for the cell chemistry, the usage of materials or any electrical characteristics.

Electrically propelled road vehicles — Dimensions and designation of secondary lithium-ion cells

1 Scope

This Publicly Available Specification (PAS) specifies a designation system as well as the shapes and dimensions for secondary lithium-ion cells for integration into battery packs and systems used in electrically propelled road vehicles including the position of the terminals and any over-pressure safety device (OPSD). It is related to cylindrical, prismatic and pouch cells.

The cell designation according to this PAS is intended to be applied to the cells used for electrically propelled road vehicles. This PAS does not apply to cells specifically used for mopeds, motorcycles and vehicles not primarily defined as road vehicles, i.e. material handling trucks or forklifts.

The cell dimensions listed in this PAS are recommended but not restricted for use in passenger cars up to 3,5 t.

The inner design, the cell chemistry, the electrical characteristics and any further properties of the cells are not defined in this PAS.

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 62660-1, *Secondary lithium-ion cells for the propulsion of electric road vehicles — Part 1: Performance testing*

3 Terms and definitions

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

3.1
cylindrical cell
secondary lithium-ion cell with a cylindrical hard case housing, terminal and over-pressure safety device

3.2
over-pressure safety device
OPSD
safety device to limit the gas pressure inside the cell

EXAMPLE burst disc, pressure valve or predetermined breaking point

3.3
pouch cell
secondary lithium-ion cell with a laminated housing consisting of compound foil and terminal

3.4
prismatic cell
secondary lithium-ion cell with a prismatic hard case housing, terminal and over-pressure safety device

3.5
secondary lithium-ion cell
secondary single cell whose electrical energy is derived from the insertion/extraction reactions of lithium ions between the anode and the cathode

NOTE 1 A secondary cell is a basic manufactured unit providing a source of electrical energy by direct conversion of chemical energy. The cell consists of electrodes, separators, electrolyte, container and terminals and is designed to be charged electrically.

NOTE 2 In this PAS, "cell" means the secondary lithium-ion cell to be used for the propulsion of electric road vehicles.

3.6
terminal
point of connection of the cell with other electric circuit elements

3.7
Type A cell
cell with terminals located on the same side of the cell

3.8
Type B cell
cell with terminals located on the opposite side of the cell

3.9
Type C cell
cell other than Type A or Type B

4 Shape of construction and constituent parts of secondary lithium-ion cell

4.1 Shape of construction

4.1.1 General

There are at least the following three construction shapes of cell:

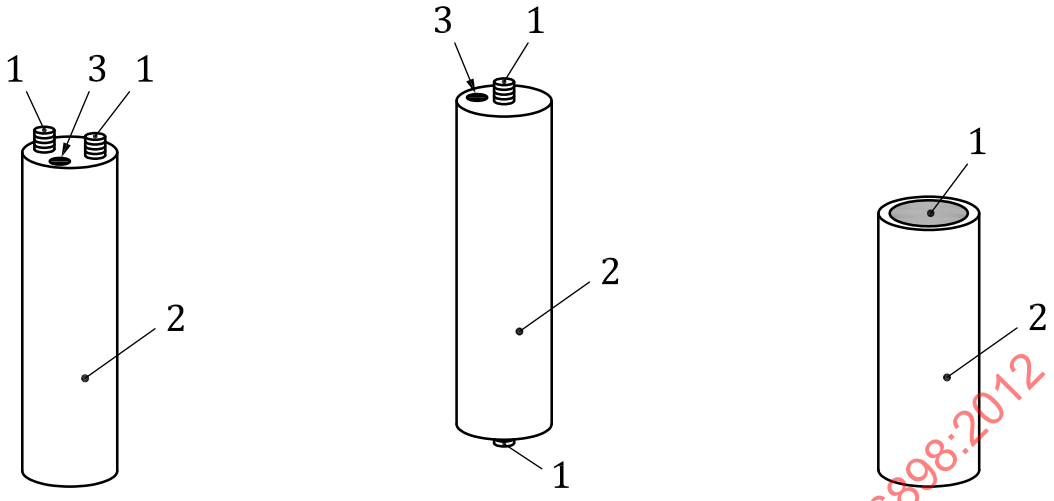
— cylindrical cell;

— prismatic cell;

— pouch cell.

4.1.2 Cylindrical cell

The cylindrical cell consists of a cell housing and one or two terminals. Figure 1 shows the types of cylindrical cell according to the location of the terminals.



a) Type A **b) Type B** **c) Type C**

Key

1 terminal
2 cell housing
3 OPSD

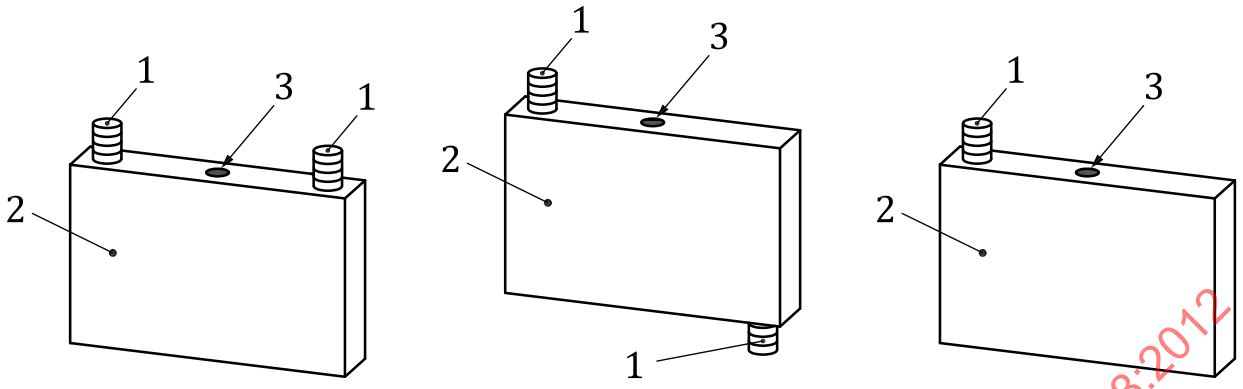
NOTE 1 For Type C, the cell housing may be used as terminal.

NOTE 2 The OPSD for Type C is often combined with the terminal, but may also be located elsewhere.

Figure 1 — Cylindrical cell

4.1.3 Prismatic cell

The prismatic cell consists of cell housing and one or two terminals. Figure 2 shows the types of prismatic cell according to the location of the terminals.



a) Type A b) Type B c) Type C

Key

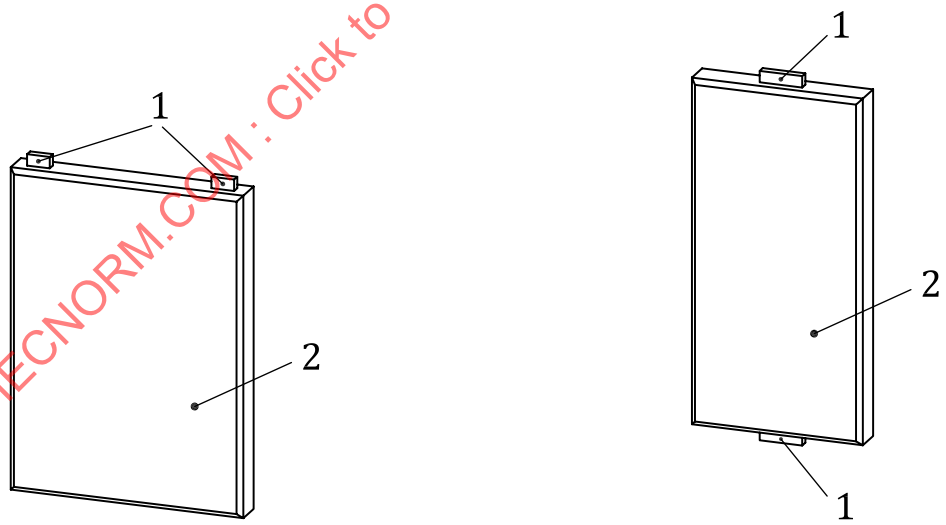
1 terminal
2 cell housing
3 OPSD

NOTE For Type C, the cell housing may be used as terminal.

Figure 2 — Prismatic cell

4.1.4 Pouch cell

The pouch cell consists of cell housing and two terminals. Figure 3 shows the types of pouch cell according to the location of the terminals.



a) Type A b) Type B

Key
1 terminal
2 cell housing

Figure 3 — Pouch cell

4.2 Position of the OPSD

The OPSD, if present, shall be included in the outer geometry of the cell. For the determination of the location of the OPSD the following code shall be used.

a) Cylindrical cells:

— RA OPSD is located between the terminals for Type A cells;

— RO OPSD is located opposite the terminals for Type A cells;

— RT OPSD is located at the terminal side for Type B and C cells;

— RM OPSD is located at the casing.

b) Prismatic cells:

— PA OPSD is located between the terminals for Type A cells;

— PO OPSD is located opposite the terminals for Type A cells;

— PF OPSD is located on the flat side of the cell;

— PW OPSD is located at the wide side of the cell.

5 Designation of cell

Cells shall be designated as follows:

$A_1A_2A_3A_4N_1/N_2/N_3$

where

A_1 designates application in which:

V is the application of batteries for electrically propelled road vehicles

A_2 designates battery system in which:

I is lithium ion

A_3 designates the construction shape (see 4.1) of the cell in which:

R is cylindrical;

P is prismatic;

F is pouch;

A_4 designates the type of the cell in terms of the locations of the terminals, in which:

A is Type A;

B is Type B;

C is Type C;

N_1 is the diameter (if R) or the thickness (if P and F) in millimetres rounded up to the next whole number;

N_2 is the width (if P and F) in millimetres rounded up to the next whole number (N_2 not shown if R);

N_3 is the height in millimetres rounded up to the next whole number excluding the terminals;

N_3' is the total height in millimetres rounded up to the next whole number including the terminals

If A_3 is R and A_4 is C (cylindrical cell of Type C), then the value of N_3' shall be used instead of N_3.

If P and R, the dimensions N_1, N_2 and N_3 shall be the dimension of cell housing that is composed of can and lid. The other components of cell such as terminal, OPSD, label, sensor, outer film, etc. are not included in the dimensions N_1, N_2 and N_3.

6 Measurement conditions

The dimension of a cell shall be measured at (25 ± 2) °C in accordance with the tolerance as specified in IEC 62660-1. The cell shall be measured at position which is not affected by the state of charge and pressure of cell. The measuring position shall be documented by the cell supplier.

The thickness N_1 of a pouch cell shall be measured at 100 % SOC by applying a force to the entire electrode stack area of the cell while holding the cell between boards for 2 s. The applied surface pressure shall be in the range 5 kPa to 30 kPa as agreed between customer and manufacturer.

Other measurement conditions may be defined according to the agreement between customer and manufacturer.

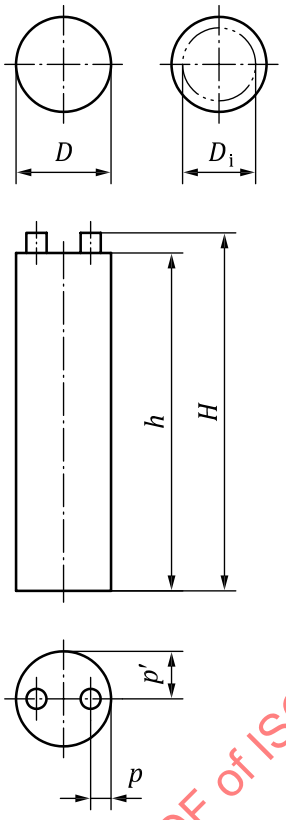
7 Dimensions for the selected cell design

7.1 General

The tolerances for the dimensions given in the data sheets of the cell manufacturers should be considered.

7.2 Cylindrical cells

The dimensions for cylindrical cells are specified in Figure 4 and Table 1.



NOTE 1 Values for the variables are given in Table 1.

NOTE 2 For Type C cells, the dimensions *h* and *H* are identical.

Figure 4 — Designation of dimensions for a cylindrical cell

Table 1 — Dimensions for cylindrical cells

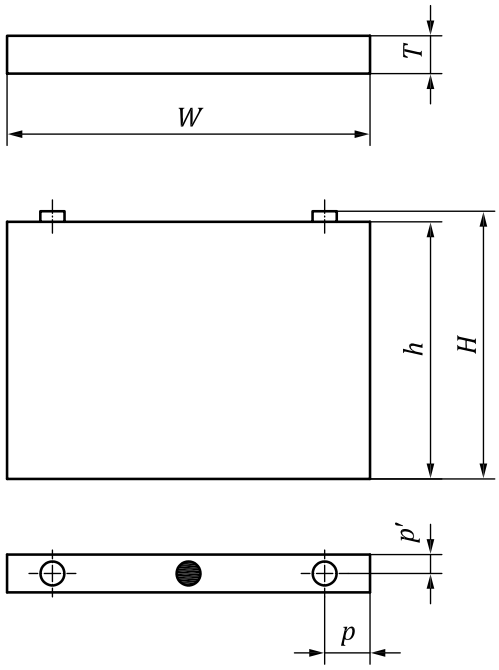
Dimensions in millimetres

Designation[a] ($A_1A_2A_3A_4N_1/N_2/N_3$)	Design dimensions						OPSD
	D	*h*	*H*	D_i	*p*	*p'*	
VIRA38/—/136	37,7	136	< 145	32,5	–	*D*/2	RO
VIRA38/—/138	38	138	143	29	8	19	RO
VIRA54/—/137	54	137	145	35	13	27	RO
VIRA54/—/215	54	215	223	35	13	27	RO
VIRB27/—/—	27	–	66	–	–	–	RM
VIRC19/—/66	19	–	66	–	–	–	RM
VIRC40/—/92	40	–	92	–	–	–	RM
VIRC40/—/108	40	–	108	–	–	–	RM

[a] Details for designation are given in Clause 5.

7.3 Prismatic cells

The dimensions for prismatic cells are specified in Figure 5 and Table 2.



NOTE Values for the variables are given in Table 2.

Figure 5 — Designation of dimensions for a prismatic cell