
**Electrically propelled road vehicles —
Safety specifications —**

Part 1:
**Rechargeable energy storage system
(RESS)**

*Véhicules routiers électriques — Spécifications de sécurité —
Partie 1: Système de stockage d'énergie rechargeable (RESS)*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General requirements	4
4.1 General electrical requirements.....	4
4.2 General safety requirements.....	5
5 Technical requirements	5
5.1 Mechanical requirements.....	5
5.2 Climatic requirements.....	5
5.2.1 Thermal shock cycling.....	5
5.3 Simulated vehicle accident requirements.....	5
5.3.1 Vehicle crash.....	5
5.3.2 Immersion into water.....	6
5.3.3 Exposure to fire.....	6
5.4 Electrical requirements.....	7
5.4.1 Isolation resistance.....	7
5.4.2 Clearance and creepage distance.....	7
5.4.3 Short-circuit protection.....	8
5.5 Functional requirements.....	8
5.5.1 General.....	8
5.5.2 Overcharge protection.....	8
5.5.3 Overdischarge protection.....	8
5.5.4 Protection against internal overheating.....	8
5.6 Requirements for the emission of hazardous gases and other hazardous substances.....	9
6 Test procedures	9
6.1 General test conditions.....	9
6.1.1 Test types and post-test observation.....	9
6.1.2 Test parameters.....	9
6.1.3 DUT requirements and preparation of the DUT for testing.....	10
6.1.4 Preconditioning of the DUT.....	10
6.1.5 Standard cycle (SC).....	11
6.1.6 Testing of general safety requirements.....	11
6.2 Mechanical test.....	12
6.2.1 General.....	12
6.2.2 Vibration.....	12
6.2.3 Mechanical shock.....	14
6.3 Climatic test.....	15
6.3.1 Thermal shock cycling.....	15
6.4 Simulated vehicle accident tests.....	15
6.4.1 Vehicle crash.....	15
6.4.2 Immersion into water.....	18
6.4.3 Exposure to fire.....	19
6.5 Electrical test.....	20
6.5.1 Short circuit.....	20
6.6 Functional tests.....	21
6.6.1 General procedures.....	21
6.6.2 Overcharge protection.....	21
6.6.3 Overdischarge protection.....	21
6.6.4 Protection against internal overheating.....	22
Annex A (informative) Damage calculation	23
Annex B (informative) Example of the OEM specific test	24

Annex C (informative) Description of the screen	25
Bibliography	26

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 37, *Electrically propelled vehicles*.

This third edition cancels and replaces the second edition (ISO 6469-1:2009) and ISO 12405-3:2014, which have been technically revised.

The main changes compared to ISO 6469-1:2009 and ISO 12405-3:2014 are as follows:

- test descriptions and requirements were reworked to include specific characteristics for lithium-ion based battery systems;
- document was reworked to become a general safety standard for all RESS types; and
- almost all test procedures and descriptions as given in the previous versions of both documents have been adapted to the latest technical developments.

A list of all parts in the ISO 6469 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Electrically propelled road vehicles — Safety specifications —

Part 1: Rechargeable energy storage system (RESS)

1 Scope

This document specifies safety requirements for rechargeable energy storage systems (RESS) of electrically propelled road vehicles for the protection of persons.

It does not provide the comprehensive safety information for the manufacturing, maintenance and repair personnel.

NOTE 1 Requirements for motorcycles and mopeds are specified in ISO 13063 and ISO 18243.

NOTE 2 Additional safety requirements can apply for RESS that can be recharged by means different from supplying electric energy (e.g. redox flow battery).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6469-3, *Electrically propelled road vehicles — Safety specifications — Part 3: Electrical safety*

ISO 20653, *Road vehicles — Degrees of protection (IP code) — Protection of electrical equipment against foreign objects, water and access*

IEC 60068-2-27, *Environmental testing - Part 2-27: Tests — Test Ea and guidance: Shock*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

bus

<vehicle type> vehicle designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5 t

3.2

capacity

total number of ampere-hours that can be withdrawn from a fully charged RESS (3.22) under specified operating