ICS 29.220.99

CCS K 82

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 31241-2022

Replacing GB 31241-2014

Lithium ion cells and batteries used in portable electronic equipment - Safety technical specification

便携式电子产品用锂离子电池和电池组 安全技术规范

Issued on: December 29, 2022 **Implemented on: January 01, 2024**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

Preview: page 1 of 5 shown, 64 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-31241-2022

Table of Contents

FOREWORD 2
INTRODUCTION 4
1 SCOPE 6
2 NORMATIVE REFERENCES 6
3 TERMS AND DEFINITIONS 7
4 TEST CONDITIONS 13
5 GENERAL SAFETY REQUIREMENTS 19
6 ELECTRICAL SAFETY TEST OF CELL 23
7 ENVIRONMENTAL SAFETY TEST OF CELL 25
8 ENVIRONMENTAL SAFETY TEST OF BATTERY 30
9 ELECTRICAL SAFETY TEST OF BATTERY 33
10 SAFETY REQUIREMENTS FOR BATTERY PROTECTIVE CIRCUIT 35
11 SAFETY REQUIREMENTS FOR SYSTEM PROTECTIVE CIRCUIT 38
12 REQUIREMENTS FOR CONSISTENCY 40
REFERENCES 63

Preview: page 2 of 5 shown, 64 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-31241-2022

Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020, *Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents*.

This document replaces GB 31241-2014 *Lithium ion cells and batteries used in portable electronic equipment - Safety requirements*. Compared with GB 31241-2014, in addition to structural adjustments and editorial changes, the main technical changes of this document are as follows:

a) Change the terms, as well as definitions, for lithium ion cell (see 3.1; 3.1 of the 2014 edition), lithium ion battery (see 3.2; 3.2 of the 2014 edition), upper limited charging voltage (see 3.11; 3.9 of the 2014 edition), upper limited charging temperature (see 3.23; 3.19 of the 2014 edition) and upper limited discharging temperature (see 3.25; 3.20 of the 2014 edition); add the terms and definitions of nominal voltage (see 3.7), nominal energy (see 3.9), reference test current (see 3.10), limited charging voltage (see 3.13), end of discharge voltage (see 3.14), lower limited charging temperature (see 3.24), lower limited discharging temperature (see 3.26) and allowable maximum surface temperature (see 3.27); delete the terms and definitions of gas leakage (see 3.22 of the 2014 edition) and rupture (see 3.23 of the 2014 edition);

b) Change the voltage measurement tolerance [see 4.3a); 4.3a) of the 2014 edition; add the speed measurement tolerance [see 4.3f)];

c) Change the temperature measurement method (see 4.4; 4.4 of the 2014 edition), charging and discharging procedures for test (see 4.5; 4.5 of the 2014 edition), sample requirements (see 4.7.1; 4.7.1 of the 2014 edition), sample capacity test (see 4.7.3; 4.7.3 of the 2014 edition), sample pretreatment (see 4.7.4; 4.7.4 of the 2014 edition), test items (see 4.7.5; 4.7.5 of the 2014 edition) and test sequence (see 4.7.6; 4.7.6 of the 2014 edition);

d) Change the requirements for general safety considerations (see 5.1; 5.1 of the 2014 edition), safety working parameters (see 5.2; 5.2 of the 2014 edition) and labeling and warning instructions (see 5.3; 5.3 of the 2014 edition);

e) Change the high temperature external short circuit (see 6.1; 6.1 of the 2014 edition), overcharge (see 6.2; 6.2 of the 2014 edition) and forced discharge (see 6.3; 6.3 of the 2014 edition); delete the normal temperature external short circuit (see 6.1 of the 2014 edition);

f) Change the low air pressure (see 7.1; 7.1 of the 2014 edition), temperature cycle (see 7.2; 7.2 of the 2014 edition), vibration (see 7.3; 7.3 of the 2014 edition), acceleration impact (see 7.4; 7.4 of the 2014 edition) and extrusion (see 7.6; 7.6 of the 2014 edition);

Preview: page 3 of 5 shown, 64 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-31241-2022

g) Change the low air pressure (see 8.1; 8.1 of the 2014 edition), temperature cycle (see 8.2; 8.2 of the 2014 edition), vibration (see 8.3; 8.3 of the 2014 edition), dropping (see 8.5; 8.5 of the 2014 edition) and flame retardant requirements (see 8.9; 8.9 of the 2014 edition);

h) Change the general (see 9.1; 9.1 of the 2014 edition), overvoltage charging (see 9.2; 9.2 of the 2014 edition), overcurrent charging (see 9.3; 9.3 of the 2014 edition), overcurrent discharging (see 9.5; 9.5 of the 2014 edition) and reverse charging (see 9.7; 9.7 of the 2014 edition); move the electrostatic discharge to sample pretreatment (see 4.7.4; 9.8 of the 2014 edition);

i) Change the general (see Chapter 10; 10.1 of the 2014 edition), overcurrent for charge protection (see 10.2; 10.3 of the 2014 edition) and overcurrent for discharge protection (see 10.4; 10.5 of the 2014 edition); delete the high voltage resistance (see 10.7 of the 2014 edition);

j) Change the general (see Chapter 11; 11.1 of the 2014 edition) and charging and discharging temperature control (see 11.5; 11.6 of the 2014 edition);

k) Change the conformance requirements (see 12.1; 12.1 of the 2014 edition) and test requirements (see 12.2; 12.2 of the 2014 edition);

l) Add the example of working range (see Appendix A), swallowing gauge test tooling (see C.1 in Appendix C), reference standard for safety-critical components (see Appendix D) and test method for flammability (see Appendix F);

m) Change the test sequence (see Appendix B; Appendix C of the 2014 edition);

n) Delete the example of quality control process requirements (see Appendix A of the 2014 edition), design and manufacturing process (see Appendix B of the 2014 edition), example of the working range of lithium cobalt oxide-graphite system cell (see Appendix D of the 2014 edition) and heavy impact test tooling (see E.1 of the 2014 edition).

Please note that some of the contents of this document may involve patents. The issuing organization of this document is not responsible for identifying patents.

This document is proposed and managed by the Ministry of Industry and Information Technology of the People's Republic of China.

The previous versions of this document and the documents which are replaced by this document are as follows:

-- In 2014, it was first released as GB 31241-2014; in 2017, the first amendment was released;

-- This is the first revision.

Preview: page 4 of 5 shown, 64 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-31241-2022

Introduction

The purpose of this introduction is to introduce the principles upon which the requirements of this document are based. An understanding of these principles is necessary for the design and production of safe lithium ion cells and batteries. It should be noted that this document only considers the most basic safety requirements for lithium ion cells and batteries to provide personal and property safety protection, and does not involve performance and functional characteristics.

Further developments in technology and processes will necessarily require further revisions of this document.

Hazards posed by lithium ion cells and batteries within the scope of this document refer to:

-- Leakage, which may directly cause chemical corrosion hazards to the human body, or lead to internal insulation failure of battery-powered electronic products and indirectly cause dangers such as electric shock and fire;

-- Fire, which may directly burn the human body, or cause fire hazards to battery-powered electronic products;

-- Explosion, which may directly endanger the human body, or damage the equipment;

-- Overheating, which may directly cause burns to the human body, or cause a decrease in the insulation level and performance of safety components, or ignite flammable liquids.

Leakage hazards may be caused by breakage of the enclosure due to internal stress or external stress. Fire and explosion hazards may be caused by thermal runaway inside the cell, which may be caused by a short circuit inside the cell, a strong oxidation reaction of the cell material, etc.

When determining which design scheme is used for a cell or battery, observe the following priorities:

-- Firstly, if possible, give priority to choosing materials with high safety, and try to avoid using materials that are prone to thermal runaway;

-- Secondly, if the above principles cannot be implemented, it is necessary to design protective devices to reduce or eliminate the possibility of hazards, such as adding protective devices, etc.;

-- Finally, if none of the above-mentioned schemes and other measures can completely avoid the occurrence of hazards, take measures to identify and explain the residual hazards.

Preview: page 5 of 5 shown, 64 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-31241-2022