ISO 18243:2025-12 (E)

Electrically propelled mopeds and motorcycles - Test specifications and safety requirements for lithium-ion battery systems

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Normative references 1

3 Terms and definitions 1

4 Symbols and abbreviated terms 5
4.1 Symbols 5
4.2 Abbreviated terms 6

5 Technical requirements 6
5.1 General safety requirements 6
5.2 Testing of general safety requirements 7
5.2.1 Evidence of leakage 7
5.2.2 Evidence of rupture 7
5.2.3 Evidence of fire 7
5.2.4 Evidence of explosion 7
5.2.5 Isolation resistance 7
5.3 Mechanical requirements 7
5.4 Climatic requirements 7
5.4.1 Thermal shock 7
5.4.2 Dewing 8
5.4.3 Salt spray 8
5.5 Simulated accident requirements 8
5.5.1 Immersion into water 8
5.5.2 Exposure to fire 9
5.6 Electrical requirements 9
5.6.1 Isolation resistance 9
5.6.2 Short circuit protection 9
5.7 Functional requirements 10
5.7.1 General 10
5.7.2 Overcharge protection 10
5.7.3 Overdischarge protection 10
5.7.4 Overcurrent protection 10
5.7.5 Protection against internal overheating 10
5.7.6 Low-temperature protection 10

6 General test methods 11
6.1 General conditions 11
6.2 Measurement accuracy 11
6.3 DUT requirements and preparation of the DUT for testing 12
6.3.1 DUT requirements 12
6.3.2 Preparation of the battery subsystem and test bench 12
6.3.3 Preparation of the battery pack or system and test bench 12
6.4 Test sequence plan 12
6.5 Tests 12
6.6 Preconditioning cycles 13

6.6.1 Purpose 13
6.6.2 Test procedure 13
6.7 Standard cycle (SC) 14
6.7.1 Purpose 14
6.7.2 Test procedure 14

7 Safety test procedures 14
7.1 Mechanical tests 14
7.1.1 Vibration 14
7.1.2 Mechanical shock 15
7.1.3 Drop 15
7.2 Climatic tests 15
7.2.1 Thermal shock 15
7.2.2 Dewing 16
7.2.3 Salt spray 18
7.3 Simulated accident tests 18
7.3.1 Immersion into water 18
7.3.2 Exposure to fire 18
7.4 Electrical test -- Short circuit protection 19
7.5 Functional tests 20
7.5.1 General procedures 20
7.5.2 Overcharge protection 20
7.5.3 Over discharge protection 21
7.5.4 Overcurrent protection 21
7.5.5 Protection against internal overheating 22

8 Performance test methods 23
8.1 Energy and capacity at RT 23
8.1.1 Purpose 23
8.1.2 Test procedure 23
8.1.3 Requirements 23
8.2 Energy and capacity at different temperature and discharge rates 24
8.2.1 Purpose 24
8.2.2 Test procedure 24
8.2.3 Requirements 26
8.3 Power and internal resistance 27
8.3.1 Purpose 27
8.3.2 Pulse power characterization profile 27
8.3.3 Test procedure 30
8.3.4 Requirements 32
8.4 No load SOC loss 32
8.4.1 Purpose 32
8.4.2 Test procedure 32
8.4.3 Test sequence 33
8.4.4 Requirements 34
8.5 SOC loss at storage 34
8.5.1 Purpose 34
8.5.2 Test procedure 34
8.5.3 Test sequence 35
8.5.4 Requirements 35
8.6 Cycle life 35
8.6.1 Purpose 35
8.6.2 Preparation 36
8.6.3 Test procedure 36
8.6.4 Conditions 37
8.6.5 Monitoring and data logging 37
8.6.6 SOC determination 37
8.6.7 End of test criteria 37
8.6.8 Capacity fade 38
8.6.9 Self-discharging rates 38
8.6.10 Requirements 38

8.7 Cycle life specific test (optional) 39

Annex A (informative) Battery pack and system 40

Annex B (normative) Description of the screen referenced in 7.3.2 44

Annex C (informative) Example of the cycle life specific test 45

Bibliography 46