
Wheelchairs —

Part 14:

Power and control systems for electrically powered wheelchairs and scooters — Requirements and test methods

Fauteuils roulants —

*Partie 14: Systèmes d'alimentation et de commande des fauteuils
roulants et des scooters électriques — Exigences et méthodes d'essai*



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Contents

Page

Foreword.....	vii
Introduction.....	viii
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
4 Apparatus.....	5
5 Preparation of test wheelchair.....	9
5.1 Wheelchair set-up.....	9
5.2 Loading the wheelchair.....	9
5.3 Wheelchair attributes.....	9
5.4 Wheelchair documentation.....	9
5.5 Preparation records.....	10
6 Guidance for tests.....	10
6.1 Test order.....	10
6.2 Batteries.....	10
6.3 Test conditions.....	10
7 Single fault safety.....	10
7.1 Single fault conditions.....	10
7.1.1 General.....	10
7.1.2 Requirements.....	10
7.2 Controller command signal processing failure.....	11
7.2.1 General.....	11
7.2.2 Requirements.....	11
7.2.3 Test method.....	11
7.3 Controller output device failure.....	14
7.3.1 General.....	14
7.3.2 Requirements.....	14
7.3.3 Test method.....	14
7.4 Ability to stop when power is removed.....	17
7.4.1 General.....	17
7.4.2 Requirements.....	17
7.4.3 Test method.....	17
8 Design.....	18
8.1 On/off switch.....	18
8.1.1 Requirements.....	18
8.1.2 Test method.....	18
8.2 Current consumption while switched off.....	19
8.2.1 General.....	19
8.2.2 Requirement.....	19
8.2.3 Test method.....	19
8.3 Control signal at switch on.....	19
8.3.1 Requirement.....	19
8.3.2 Test method.....	19
8.4 Safe operation as the battery set becomes depleted.....	20
8.4.1 General.....	20
8.4.2 Requirements.....	20
8.4.3 Test method.....	20
8.5 Over-discharge protection.....	22
8.5.1 Requirement.....	22
8.5.2 Test method.....	22
8.6 Controller over-voltage protection.....	23

8.6.1	General	23
8.6.2	Requirements	23
8.6.3	Test method	23
8.7	Switch-off while driving	23
8.7.1	General	23
8.7.2	Requirements	23
8.7.3	Test method	24
8.8	Measuring devices	24
8.8.1	General	24
8.8.2	Battery gauge	24
8.9	Drive inhibit during charging	25
8.9.1	General	25
8.9.2	Requirement	25
8.9.3	Test method	25
8.10	Charging connection voltage drop	25
8.10.1	General	25
8.10.2	Requirements	25
8.10.3	Test method	26
8.11	Non-powered mobility	26
8.11.1	General	26
8.11.2	Requirements	26
8.11.3	Brake release	27
8.11.4	Test method	27
8.12	Brakes	28
8.12.1	General	28
8.12.2	Requirement	28
8.13	Battery enclosures	29
8.13.1	Requirements	29
8.13.2	Test method	29
8.14	Symbols	29
8.15	Safety of moving parts	29
8.15.1	General	29
8.15.2	Requirements	30
8.16	Software faults	30
8.16.1	General	30
8.16.2	Requirements	30
8.17	Use in combination with other devices	30
8.18	Wireless technology	31
8.18.1	General	31
8.18.2	Wireless technology related labelling	31
8.18.3	Risk assessment	31
8.18.4	Wireless coexistence testing and verification	32
8.19	Maintenance and evaluation	32
9	Protection against electric shock, burns, fire and explosion	32
9.1	Electrical Isolation of a wheelchair frame	32
9.1.1	General	32
9.1.2	Requirements	33
9.1.3	Test method	33
9.2	Protection from non-insulated electrical parts	33
9.2.1	General	33
9.2.2	Requirement	33
9.2.3	Test method	34
9.3	Circuit protection	34
9.3.1	General	34
9.3.2	Requirements	34
9.3.3	Test methods	35
9.4	Stalled condition protection	39
9.4.1	General	39

9.4.2	Requirements	39
9.4.3	Test method	40
9.5	Maximum thermal drive test	41
9.5.1	General	41
9.5.2	Test method	41
9.6	Surface temperatures	43
9.7	Isolation of battery system	43
9.7.1	General	43
9.7.2	Requirement	44
9.7.3	Isolate switch requirements	44
9.7.4	Implementation	44
9.7.5	Test Methods	45
9.8	Resistance to ignition	45
9.8.1	General	45
9.8.2	Requirements	45
10	Ergonomics	45
10.1	Operator interface	45
10.2	Operating forces	46
10.2.1	General	46
10.2.2	Requirements	46
10.2.3	Test method	46
10.3	Display position	48
10.4	On/off indicator	48
10.5	Connectors	48
10.6	Audible noise	48
10.6.1	General	48
10.6.2	Requirement	48
10.6.3	Test method	48
10.6.4	Ancillary equipment test	49
10.7	Acoustic warning device	50
10.7.1	General	50
10.7.2	Requirements	50
10.7.3	Test method	50
11	Durability	51
11.1	Control devices	51
11.1.1	General	51
11.1.2	Requirement	51
11.2	Switches	52
11.2.1	General	52
11.2.2	Durability requirements	52
11.2.3	Safety requirements	52
11.3	Connectors	52
11.3.1	General	52
11.3.2	Requirements	52
12	Electrical connections	53
12.1	Interchangeability	53
12.2	Wire routing	53
12.2.1	General	53
12.2.2	Requirements	53
12.2.3	Test method	53
12.3	Wire colours	53
12.4	Intermediate battery connection power drains	54
12.4.1	General	54
12.4.2	Requirements	54
12.4.3	Test method	54
13	Environmental	54

13.1	Substance/liquid ingress (in)	54
13.2	Leakage of substances (out)	54
13.3	Electromagnetic compatibility	54
13.4	Biocompatibility and toxicity	54
14	Misuse and abuse	55
14.1	Reversed polarity at the battery set	55
14.1.1	General	55
14.1.2	Requirements	55
14.1.3	Test method	55
14.2	Integrity of enclosures	55
14.2.1	General	55
14.2.2	Requirements	56
14.2.3	Test method	56
14.3	Protection against unauthorized access	56
15	Information provided with the wheelchair related to control systems	56
15.1	General	56
15.2	Operator diagrams	57
15.3	Operation of wheelchair	57
15.4	Safety information provided to operators	58
15.5	Removable parts	58
16	Test report	58
17	Disclosure	59
	Annex A (informative) Guidance on wheelchair wire sizing and protection	60
	Annex B (informative) Guidance to estimate reverberation time for an acoustic area	62
	Annex C (informative) Guidance for switch circuit design	63
	Bibliography	65

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 (see 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 (see 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 173, *Assistive products*, Subcommittee SC 1, *Wheelchairs*.

This third edition cancels and replaces the second edition (ISO 7176-14:2008), which has been technically revised.

The main changes compared to the previous edition are as follows:

- addition of provisions on the following:
 - wireless communication technology;
 - thermal drive test;
 - occupant operable battery isolation switch;
 - battery chemistries other than lead-acid.

A list of all parts in the ISO 7176 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.

Introduction

Electronic control systems in electric powered wheelchairs and scooters are critical for the safety, functionality and reliability of the vehicle.

This document specifies some wheelchair tests that are conducted on an inclined test plane. The intention of these tests is not to evaluate the performance of a wheelchair at the maximum gradient on which it is capable of operating. Instead, the objective is to reveal any changes in the wheelchair's behaviour that might occur under fault conditions, and these changes are more readily discovered when it is operated on a slope. For convenience, the inclined test plane has a fixed gradient, representative of those on which the wheelchair might be used.

The range of ambient temperatures under which testing is carried out is limited to allow comparison between the performance of a wheelchair in normal operation and performance when faults are introduced.

With inter-module wireless communication becoming more common with the possibility that the communication may cause changes in the behaviour of other devices, a subclause has been added to assist with an associated safety assessment.

Wheelchairs —

Part 14:

Power and control systems for electrically powered wheelchairs and scooters — Requirements and test methods

1 Scope

This document specifies requirements and associated test methods for the power, and control systems of electrically powered wheelchairs and scooters. It sets safety and performance requirements that apply during normal use and some conditions of abuse and failure. It also specifies methods of measurement of the forces necessary to operate controls and sets limits on the forces needed for some operations.

This document is applicable to electrically powered wheelchairs and scooters with a maximum speed no greater than 15 km/h intended to provide indoor and/or outdoor mobility for one disabled person whose mass lies in the range specified in ISO 7176-11.

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.

EN 12182, *Assistive products for persons with disability — General requirements and test methods*

IEC 60332-1-2, *Tests on electrical and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60601-1, *Medical electrical equipment — Part 1: General requirements for basic safety and essential performance*

IEC 61032, *Protection of persons and equipment by enclosures — Probes for verification*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

IEC 62304, *Medical device software – Software life cycle processes*

ISO 10993-1, *Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process*

ISO 7176-2, *Wheelchairs — Part 2: Determination of dynamic stability of electrically powered wheelchairs*

ISO 7176-3, *Wheelchairs — Part 3: Determination of effectiveness of brakes*

ISO 7176-4, *Wheelchairs — Part 4: Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range*

ISO 7176-5, *Wheelchairs — Part 5: Determination of dimensions, mass and manoeuvring space*

ISO 7176-6, *Wheelchairs — Part 6: Determination of maximum speed of electrically powered wheelchairs*

ISO 7176-7, *Wheelchairs — Part 7: Measurement of seating and wheel dimensions*

ISO 7176-9:2009, *Wheelchairs — Part 9: Climatic tests for electric wheelchairs*

ISO 7176-10, *Wheelchairs — Part 10: Determination of obstacle-climbing ability of electrically powered wheelchairs*

ISO 7176-13, *Wheelchairs — Part 13: Determination of coefficient of friction of test surfaces*

ISO 7176-15, *Wheelchairs — Part 15: Requirements for information disclosure, documentation and labelling*

ISO 7176-21:2009, *Wheelchairs — Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers*

ISO 7176-22, *Wheelchairs — Part 22: Set-up procedures*

ISO 7176-26, *Wheelchairs — Part 26: Vocabulary*

ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces*

ISO 14971, *Medical devices — Application of risk management to medical devices*

UL 94, *Tests for flammability of plastic materials for parts in devices and appliances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7176-26 and the following apply.

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

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

3.1

analogue signal

signal in which the characteristic quantity representing information can at any instant assume any value within a continuous interval

Note 1 to entry: An analogue signal can follow continuously the values of another physical quantity representing information.

[SOURCE: IEC 702-04-02]

3.2

battery

one or more cells that are electrically connected together and fitted with devices necessary for use

EXAMPLE Case, terminals, marking and protective devices.

[SOURCE: IEC 482-01-04, modified]

3.3

battery charger

device that is connected to supply mains and to a battery set for the purpose of charging the batteries