

Second edition
2009-04-01

Wheelchairs —

Part 21:

Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers

Fauteuils roulants —

*Partie 21: Exigences et méthodes d'essai pour la compatibilité des
fauteuils roulants électriques et scooters motorisés*



Reference number
ISO 7176-21:2009(E)

© ISO 2009

This is a preview of "ISO 7176-21:2009". [Click here to purchase the full version from the ANSI store.](#)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 7176-21:2009". Click here to purchase the full version from the ANSI store.

Contents

Page

Foreword.....	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	2
4 Classification of electrically powered wheelchairs.....	4
5 Requirements	4
5.1 General.....	4
5.2 Wheelchair drives	4
5.3 Wheelchairs with an on-board battery charger	6
5.4 Off-board and carry-on battery chargers	8
6 Test apparatus	9
7 Preparation	10
7.1 Wheelchairs – driving.....	10
7.2 Wheelchairs – non-driving.....	11
7.3 Wheelchairs with on-board battery chargers	11
7.4 Off-board and carry-on battery chargers	11
8 Sequence of tests	11
9 Test methods for emissions	11
9.1 Mains terminal disturbances	11
9.2 Radiated emissions	12
9.3 Harmonic current emissions	12
9.4 Voltage fluctuations and flicker	12
10 Test methods for immunity.....	13
10.1 Electrostatic discharge immunity	13
10.2 Radiated r.f. field immunity.....	14
10.3 Fast transient/burst immunity	17
10.4 Surge immunity.....	17
10.5 Conducted disturbance immunity.....	18
10.6 Power frequency magnetic field immunity.....	18
10.7 Voltage dips and short interruptions immunity.....	18
11 Wheel speed change calculations	19
12 Test report	20
13 Disclosure.....	20
14 User manual	20

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

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 7176-21 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

This second edition cancels and replaces the first edition (ISO 7176-21:2003), which has been technically revised.

ISO 7176 consists of the following parts, under the general title *Wheelchairs*:

- *Part 1: Determination of static stability*
- *Part 2: Determination of dynamic stability of electric wheelchairs*
- *Part 3: Determination of effectiveness of brakes*
- *Part 4: Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range*
- *Part 5: Determination of dimensions, mass and manoeuvring space*
- *Part 6: Determination of maximum speed, acceleration and deceleration of electric wheelchairs*
- *Part 7: Measurement of seating and wheel dimensions*
- *Part 8: Requirements and test methods for static, impact and fatigue strengths*
- *Part 9: Climatic tests for electric wheelchairs*
- *Part 10: Determination of obstacle-climbing ability of electrically powered wheelchairs*
- *Part 11: Test dummies*
- *Part 13: Determination of coefficient of friction of test surfaces*
- *Part 14: Power and control systems for electrically powered wheelchairs and scooters — Requirements and test methods*

This is a preview of "ISO 7176-21:2009". [Click here to purchase the full version from the ANSI store.](#)

- *Part 15: Requirements for information disclosure, documentation and labelling*
- *Part 16: Resistance to ignition of upholstered parts — Requirements and test methods*
- *Part 19: Wheeled mobility devices for use as seats in motor vehicles*
- *Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers*
- *Part 22: Set-up procedures*
- *Part 23: Requirements and test methods for attendant-operated stair-climbing devices*
- *Part 24: Requirements and test methods for user-operated stair-climbing devices*
- *Part 26: Vocabulary*

A Technical Report (ISO/TR 13570-1, *Wheelchairs — Part 1: Guidelines for the application of the ISO 7176 series on wheelchairs*) is also available, giving information on how to use the ISO 7176 standards when selecting a wheelchair and helping readers to understand the purpose for, and content of, the International Standards on wheelchairs.

Introduction

Electrically powered wheelchairs and their battery chargers are meant to operate without introducing significant electromagnetic disturbances into the environment and without significant degradation of operational performance in the presence of electromagnetic disturbances expected in normal use. Wheelchairs are often used near roads and therefore should be immune to radio frequency fields from both static and mobile communications equipment, as well as from other sources of electromagnetic disturbance. Injury could occur in the event of unintentional movement or change in direction of movement of a wheelchair.

This part of ISO 7176 specifies requirements and test methods for wheelchairs and their battery chargers to minimize the risks associated with their exposure to reasonably foreseeable electromagnetic interference and electrostatic discharge and with their production of electromagnetic fields that could impair the operation of other devices or equipment in their usual environment.

The upper frequency limit and test level for radiated r.f. immunity requirements are selected according to the environment in which the wheelchair is used and the related risk. Hence the requirements for a wheelchair while it is driving are consistent with its use as a medical device, but the requirements for charging are consistent with use of the wheelchair and charger as domestic electrical equipment.