



DPC: 24/30452599 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 20 March 2024

Origin: International

Latest date for receipt of comments: 13 May 2024

Project No. 2022/00403

Responsible committee: CH/173 Assistive products for persons with disability

Interested committees:

Title: Draft BS ISO 7176-21 Wheelchairs. Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers.

Please notify admin.start@bsigroup.com if you are aware of any keywords that might assist in clarifying or identifying the standard or of the content of this standard:

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 13 May 2024

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

E-mail: admin.start@bsigroup.com

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 7176-21

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*

ICS: 11.180.10; 33.100.01

ISO/TC 173/SC 1

Secretariat: **SABS**

Voting begins on:
2024-03-20

Voting terminates on:
2024-06-12

This document is circulated as received from the committee secretariat.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENTS AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

Reference number
ISO/DIS 7176-21:2024(en)

Full document details: 24/30452599 DC

© ISO 2024
 **Documents**
Document Sharing Hub



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

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
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO 2024 – All rights reserved

Contents

Page

Foreword	v
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
5.2.1 Radiated emissions	4
5.2.2 Electrostatic discharge immunity	4
5.2.3 Radiated r.f. field immunity	5
5.2.4 Power frequency magnetic field immunity	5
5.2.5 Stability of speed and direction	5
5.3 Wheelchairs with an on-board battery charger	6
5.3.1 Mains terminal disturbances	6
5.3.2 Radiated emissions	6
5.3.3 Harmonic current emissions	6
5.3.4 Voltage fluctuations and flicker	6
5.3.5 Electrostatic discharge immunity	6
5.3.6 Radiated r.f. field immunity	6
5.3.7 Fast transient/burst immunity	7
5.3.8 Surge immunity	7
5.3.9 Conducted disturbance immunity	7
5.3.10 Voltage dips and short interruptions immunity	8
5.4 Off-board and carry-on battery chargers	8
5.4.1 Mains terminal disturbances	8
5.4.2 Radiated emissions	8
5.4.3 Harmonic current emissions	8
5.4.4 Voltage fluctuations and flicker	8
5.4.5 Electrostatic discharge immunity	8
5.4.6 Radiated r.f. field immunity	9
5.4.7 Fast transient/burst immunity	9
5.4.8 Surge immunity	9
5.4.9 Conducted disturbance immunity	9
5.4.10 Voltage dips and short interruptions immunity	9
6 Test apparatus	9
7 Preparation	10
7.1 Wheelchairs – driving	10
7.1.1 Set-up	10
7.1.2 Operation	11
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
9.1.1 Wheelchairs with an on-board battery charger	11
9.1.2 Off-board and carry-on battery chargers	12
9.2 Radiated emissions	12
9.2.1 Wheelchair drives	12

9.2.2	Wheelchairs with an on-board battery charger	12
9.2.3	Off-board and carry-on battery chargers	12
9.3	Harmonic current emissions	12
9.3.1	Wheelchairs with an on-board battery charger	12
9.3.2	Off-board and carry-on battery chargers	13
9.4	Voltage fluctuations and flicker	13
9.4.1	Wheelchairs with an on-board battery charger	13
9.4.2	Off-board and carry-on battery chargers	13
10	Test methods for immunity	13
10.1	Electrostatic discharge immunity	13
10.1.1	Wheelchair drives	13
10.1.2	Wheelchairs with an on-board battery charger	14
10.1.3	Off-board and carry-on battery chargers	14
10.2	Radiated r.f. field immunity	15
10.2.1	Wheelchair drives	15
10.2.2	Wheelchairs with an on-board battery charger	16
10.2.3	Off-board and carry-on battery chargers	16
10.3	Fast transient/burst immunity	17
10.3.1	Wheelchairs with an on-board battery charger	17
10.3.2	Off-board and carry-on battery chargers	17
10.4	Surge immunity	17
10.4.1	Wheelchairs with an on-board battery charger	17
10.4.2	Off-board and carry-on battery chargers	17
10.5	Conducted disturbance immunity	18
10.5.1	Wheelchairs with an on-board battery charger	18
10.5.2	Off-board and carry-on battery chargers	18
10.6	Power frequency magnetic field immunity	18
10.7	Voltage dips and short interruptions immunity	18
10.7.1	Wheelchairs with an on-board battery charger	18
10.7.2	Off-board and carry-on battery chargers	18
11	Wheel speed change calculations	18
12	Test report	19
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 third edition cancels and replaces the second edition (ISO 7176-21:2009), which has been technically revised

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

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.

Wheelchairs —

Part 21:

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

WARNING — This part of ISO 7176 calls for the use of procedures that can be hazardous if adequate precautions are not taken. It refers only to technical suitability and does not absolve the manufacturer or test house from any legal obligations relating to health and safety.

1 Scope

This part of ISO 7176 specifies requirements and test methods for electromagnetic emissions and for electromagnetic immunity of electrically powered wheelchairs and scooters, intended for indoor and/or outdoor use by people with disabilities. It is also applicable to manual wheelchairs with an add-on power kit. It is not applicable to vehicles designed to carry more than one person.

This part of ISO 7176 also specifies requirements and test methods for the electromagnetic compatibility of battery chargers intended for use with electrically powered wheelchairs and scooters.

A reference configuration is specified for adjustable wheelchairs and scooters in order to enable test results to be used for comparison of performance.

2 Normative references

The following referenced documents are indispensable for the application 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 7176-5, *Wheelchairs — Part 5: Determination of dimensions, mass and manoeuvring space*

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

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

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

IEC 61000-3-2, *Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) — Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*