BS ISO 7176-22:2014

BSI Standards Publication

Wheelchairs

Part 22: Set-up procedures

bsi.

...making excellence a habit.™

Document Sharing Hub

National foreword

This British Standard is the UK implementation of ISO 7176-22:2014. It supersedes BS ISO 7176-22:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CH/173/1, Wheelchairs.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2014. Published by BSI Standards Limited 2014

ISBN 978 0 580 76447 9

ICS 11.180.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2014.

Amendments issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO 7176-22:2014

INTERNATIONAL STANDARD

ISO 7176-22

Second edition
2014-09-01

Wheelchairs —

Part 22: Set-up procedures

Fauteuils roulants —

Partie 22: Procédures de réglage

Reference number
ISO 7176-22:2014(E)

Documents
Document Sharing Hub

© ISO 2014

Full document details: BS ISO 7176-22:2014

COPYRIGHT PROTECTED DOCUMENT

© ISO 2014

All rights reserved. Unless otherwise specified, 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
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

© ISO 2014 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO 7176-22:2014

Contents

Page

Foreword ..... **iv**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Test apparatus **1**
5 Set-up levels **2**
6 Preparation of the test wheelchair **2**
6.1 Wheelchair equipment 2
6.2 Wheelchair adjustment 3
7 Final adjustments **9**
8 Loading of the wheelchair **10**
8.1 General 10
8.2 Test dummy 10
8.3 Test dummy securement 12
8.4 Human test occupant 12
8.5 Accessories that contribute to the rated load 12
9 Records **13**
Annex A (normative) **Wheelchair brakes and fasteners** **14**
Annex B (informative) **Record of the actual equipment, adjustments and loading settings** **16**
Annex C (normative) **Reference set-up values** **20**
Annex D (informative) **Wheelchair selection** **24**
Bibliography **28**

© ISO 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

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. 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. 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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

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.

This second edition cancels and replaces the first edition (ISO 7176-22:2000), all clauses of which have 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*

© ISO 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

— *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*

— *Part 15: Requirements for information disclosure, documentation and labelling*

— *Part 16: Resistance to ignition of postural support devices*

— *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 25: Batteries and chargers for powered wheelchairs*

— *Part 26: Vocabulary*

— *Part 28: Requirements and test methods for stair-climbing devices*

A Technical Report (ISO/TR 13570-1) is also available giving a simplified explanation of these parts of ISO 7176.

© ISO 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

Introduction

Many wheelchairs have adjustable or optional features, which, depending upon their setting, can have significant effects on the results from test methods in different wheelchair testing standards.

When used in combination with other wheelchair standards the procedure presented within this standard will produce test results which permit comparison between different wheelchairs and give comparable results between different test laboratories.

If a wheelchair is configured in a specific way, some clauses of ISO 7176-22 might not apply.

© ISO 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

INTERNATIONAL STANDARD ISO 7176-22:2014(E)

Wheelchairs —

Part 22: Set-up procedures

1 Scope

This part of ISO 7176 specifies a set-up procedure to be used as a part of the preparation of adjustable wheelchairs for testing. This procedure takes the manufacturer's instructions into account.

This part of ISO 7176 is applicable to manual wheelchairs and electric wheelchairs (including scooters) intended to provide indoor and/or outdoor mobility.

NOTE Other parts of ISO 7176 may have specific requirements for the adjustment of the wheelchair. In such cases, the individual part of ISO 7176 takes precedence over this part of ISO 7176.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7176-11, *Wheelchairs — Part 11: Test dummies*

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

3 Terms and definitions

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

4 Test apparatus

4.1 Test dummy, as specified in ISO 7176-11.

4.2 Means for measuring linear dimensions up to 2 000 mm, to an accuracy of ±1 mm.

4.3 Means for measuring the angles of surfaces to each other and/or to vertical or horizontal, to an accuracy of ±0,2°.

4.4 Means of measuring forces, between 25 N and 250 N to an accuracy of ±5 % of the measurement

4.5 Means of measuring torque, between 2 Nm and 100 Nm to an accuracy of ±10 % of the measurement.

4.6 Means to inflate pneumatic wheelchair tyres, up to 10 bar with an accuracy of ±0,2 bar.

4.7 A hard horizontal test plane, of sufficient size to support the wheelchair during testing, such that the whole surface is contained between two imaginary parallel planes 5 mm apart.

NOTE The imaginary planes are intended to provide a measure of control on the flatness of the test plane.

AVA Documents Document Sharing Hub

© ISO 2014 – All rights reserved

Full document details: BS ISO 7176-22:2014

4.8 Means to secure the torso and thigh segment of the test dummy, so that the dummy will remain in the intended position, without deformation of the wheelchair or the dummy.

It is important that the means do not prevent rotation of the hip, knee and ankle pivot.

Straps made of Nylon webbing of sufficient strength may be used.

NOTE For some designs of wheelchairs, care is needed to avoid bending the tubes of the back support towards each other.

4.9 Means to secure the feet of the test dummy to the foot supports, so that they will remain in the intended position, without deformation of the wheelchair or dummy.

It is important that the means do not affect the strength of the foot support(s).

The feet of the test dummy may be clamped to the foot support(s) of the wheelchair, or holes may be drilled no greater than 8 mm in diameter and the feet bolted in position, providing the strength of the foot support(s) is not affected.

5 Set-up levels

Other documents that refer to the set-up procedures specified in this document may use or modify parts of the set up procedure contained within this standard according to their own purposes. Other test standards may reference a limited number of the requirements of this standard. This standard provides specific set-up information in 6.2.2 and 6.2.3. The different test standards may choose a set of setup requirements from this standard based on the three set-up levels specified in 6.2.2, 6.2.3 and in Annex C. Set-up-level 3 (from 6.2.2 and 6.2.3) shall be used if there is no reference to another set-up level (see Annex C) or subset of requirements within a specific test standard.

The Reference set-up tables contained in this standard each contain three different occupant mass groups, less than 50 kg, 50 kg to 125 kg and more than 125 kg. Use the maximum occupant mass specified by the manufacturer to determine the occupant mass group.

Reference set-up tables for set-up level 1 and set-up level 2 are presented in Annex C.

NOTE Guidance for wheelchair selection is presented in Annex D.

6 Preparation of the test wheelchair

6.1 Wheelchair equipment

Where a particular standard specifies equipment to be fitted to the wheelchair, use the equipment specified in that particular part. All other equipment shall be used in accordance with this subclause.

Unless specified otherwise in this document or by those commissioning the tests and unless noted in the test report the wheelchair shall be complete and ready for use. It shall comprise all following components or parts, where applicable: seat, back support, arm supports, lower leg support assemblies, posterior lower leg supports, posterior foot supports, frame, wheels, hand rims, motors and drive trains, braking system, battery sets, controllers, steering mechanisms, push handle(s), anti-tip devices, curb-climbing device.

NOTE 1 Some tests can require a part of a wheelchair to be dismantled.

Unless they are an integral part of the wheelchair, or necessary for the successful conduct of a test, the following components or parts, including the means to connect them to the wheelchair, shall be removed:

— cushions,

© ISO 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

— postural support device components such as head supports, lateral trunk supports etc.,

— storage unit such as baskets, backpacks, transfusion containers, urine collection bags and oxygen bottles.

NOTE 2 A component or part that is supplied with the wheelchair and is removable but fixed with hook and loop fastener is not deemed an integral part.

Where a support surface would not normally be used without a cushion (e.g. a solid ply seat support base), an appropriate cushion, such as one provided by the wheelchair manufacturer, should be fitted to the wheelchair.

NOTE 3 For specific tests there are exclusions from this statement (see NOTE in 8.5).

6.2 Wheelchair adjustment

6.2.1 General

This standard shall take precedence in setting up a wheelchair in readiness for testing except:

— when a particular test standard has specific adjustment requirements, then the adjustment procedure specified in that particular standard shall be used. All other adjustments not specified in that standard shall be made in accordance with this subclause.

— when the manufacturer specifies particular requirements or limitations to the setup, then such variations shall be followed to the extent necessary, and such variations used shall be detailed in the test report.

Set-up can be done in any order that is most practicable for each part of ISO 7176.

If the seat is capable of swivelling to more than one position around the vertical axis (e.g. in a scooter), adjust the seat to the forward facing position, so that the longitudinal axis of the seat is parallel to the longitudinal axis of the wheelchair with an accuracy of ±2°. If this position or accuracy is not achievable set the axes as close as possible and document the variation in the test report.

If the seat can be attached in a forward or rearward facing position, attach the seat to the default position specified by the manufacturer, or, where there is no such specification attach it so that the wheelchair has a rear wheel drive.

In the case of an adjustable component with no defined greatest and or smallest position or dimension, the mid position shall be half way between the position fully contracted or inserted and the position fully extended or expanded.

If the wheelchair has pneumatic tyres, inflate them to the pressure recommended by the wheelchair manufacturer. If a pressure range is given, inflate to the highest pressure in the range. If there is no recommendation for inflation pressure from the wheelchair manufacturer, inflate the tyres to the maximum pressure recommended by the tyre manufacturer.

If head supports are an integral part of the body support system and are adjustable in height, the “head support height above seat” shall be set to (680 ± 5) mm for occupant mass group I and (780 ± 5) mm for occupant mass group II and III. If this is not possible set it as close as possible to the reference value.

If the characteristics of wheel suspensions can be adjusted, adjust them to the default setting specified by the manufacturer, or, where there is no such specification adjust it so that the wheelchair has the shortest and hardest spring suspension.

Adjust the brakes in accordance with Annex A.

Record all adjustments in accordance with Annex B.

6.2.2 Wheelchairs with handrims

© ISO 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014

NOTE 1 Wheelchairs with handrims include wheelchairs with manual handrim propulsion and handrim activated power assisted wheelchairs (HAPAW).

Set any adjustable dimensions of the wheelchair to the reference set-up values specified in Table 1, with an accuracy of ±3 mm for longitudinal dimensions or ±1° for angular dimensions, except where otherwise stated. If this is not possible set it as close as possible to the reference value.

If the reference set-up value is not available/possible (e.g. the two nearest positions are centred above and below the reference set-up value with equal distance), give preference to the next smaller value.

NOTE 2 An active wheelchair might not have castor sizes as indicated in Table 1.

Adjust the anti-tip devices (where applicable) to the following position:

— Set the rising to (25 ± 3) mm (see ISO 7176-5).

— When the wheelchair is standing on level ground the anti-tippers protrude to the rear as far as possible.

— If it is not possible to achieve both settings at one time, give priority to the setting of the rising.

— If this is not possible set it as close as possible to the reference value.

— If the manufacturer recommends more than one setting, use the recommended setting closest to these default settings.

If any of the adjustments results in an unwanted setting, e.g. the castor wheels contact any other part of the wheelchair, increase/decrease the adjustment just enough to ensure a proper function of the wheelchair and record the actual dimension together with the reason in accordance with Annex B.

Table 1 — Reference set-up values for wheelchairs with handrims (LEVEL 3)

Item	**Reference set-up values**		
	Occupant mass group I (<50 kg)	**Occupant mass group II** (50 kg to 125 kg)	**Occupant mass group III** (>125 kg)
Properties for seating and ergonomics (see NOTE 1)			
Seat plane angle	4°	4°	4°
Effective seat depth	340	450	450
Effective seat width	In accordance with formula in NOTE 2		
Seat surface height at front edge	470	520	520

NOTE 1 All dimensions in millimetres unless otherwise indicated.

NOTE 2 For the purpose of establishing the reference value for the effective seat width or back support width use the formula:

$$W = 42 \times \sqrt{M_0} + 35$$

where

W is the desired width (effective seat width or back support width);

M_0 is the maximum occupant mass (kg).

NOTE 3 When any of these adjustments are in conflict with any seating adjustments, correct the setting to the minimum extent.

NOTE 4 If the mid-position is not available/possible, set as close as possible to the mid-position. If this is not possible (e.g. there are only two positions), set to the position next smaller than the mid-position. If two positions are equally distant from the mid position, set to the smaller of the two.

NOTE 5 If a set value is in conflict with the test, adjust to closest setting not to interfere.

© ISO 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 7176-22:2014