INTERNATIONAL STANDARD

ISO 7176-5

Second edition
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Wheelchairs —

Part 5: Determination of dimensions, mass and manoeuvring space

Fauteuils roulants —

Partie 5: Détermination des dimensions, de la masse et de l'espace de manoeuvre

Reference number
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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 7176-5 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 7176-5:1986) 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*

— *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 motorized 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*

Introduction

The purpose of this part of ISO 7176 is to provide technical definitions together with appropriate measurement procedures for measuring important dimensions and masses of manual wheelchairs and electrically powered wheelchairs including scooters, which can be used to estimate the appropriateness for a given environment.

A new approach is used for the pre-selection of the reference size from a wheelchair model with a range of various dimensions by introducing reference dimensions of the intended occupant. This new approach ensures repeatable and comparable test results.

The information in this part of ISO 7176 is intended for three main reader groups:

— prescribers and occupants of wheelchairs;

— architects and public authorities;

— manufacturers, wheelchair providers, clinicians and test laboratories.

Features that are important to wheelchair occupants, architects and public authorities, such as overall dimensions and the estimation of the space needed and general manoeuvrability, are contained in Clause 8. Values for the different features are disclosed in the wheelchair's specification sheet. The values can be used to determine, before purchase, the wheelchair's suitability in relation to specific requirements and needs.

The technical features of a wheelchair which are of importance to manufacturers, wheelchair providers, clinicians and test laboratories, such as items to be considered when manufacturing, setting up, adjusting, repairing or testing wheelchairs, are included in Annex A.

Technical Report ISO/TR 13570-1[1] is also available, giving a simplified explanation of the different parts of ISO 7176.

Technical Report, ISO/TR 13570-2[2], is under consideration.

Wheelchairs —

Part 5: Determination of dimensions, mass and manoeuvring space

1 Scope

This part of ISO 7176 specifies methods for the determination of wheelchair dimensions and mass.

This includes specific methods for the determination of outside dimensions when the wheelchair is occupied by a reference occupant and the required manoeuvring space needed for wheelchair manoeuvres commonly carried out in daily life.

This part of ISO 7176 specifies requirements for the disclosure of the dimensions and masses and contains five informative annexes.

Annex A specifies methods for the determination of technical dimensions that can be important to the performance of the wheelchair.

Annex B provides detailed information about pivot width and reversing width.

Annex C provides detailed information about the turning diameter.

Annex D provides details on determining the wheelchair longitudinal axis and wheelchair centre-point.

Annex E provides technical guidelines and recommendations for many of the measurements specified to facilitate improved understanding, design and construction of wheelchairs.

This part of ISO 7176 is applicable to manual wheelchairs and electrically powered wheelchairs (including scooters).

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

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

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 7176-22:2000, *Wheelchairs — Part 22: Set-up procedures*

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 and the following apply.

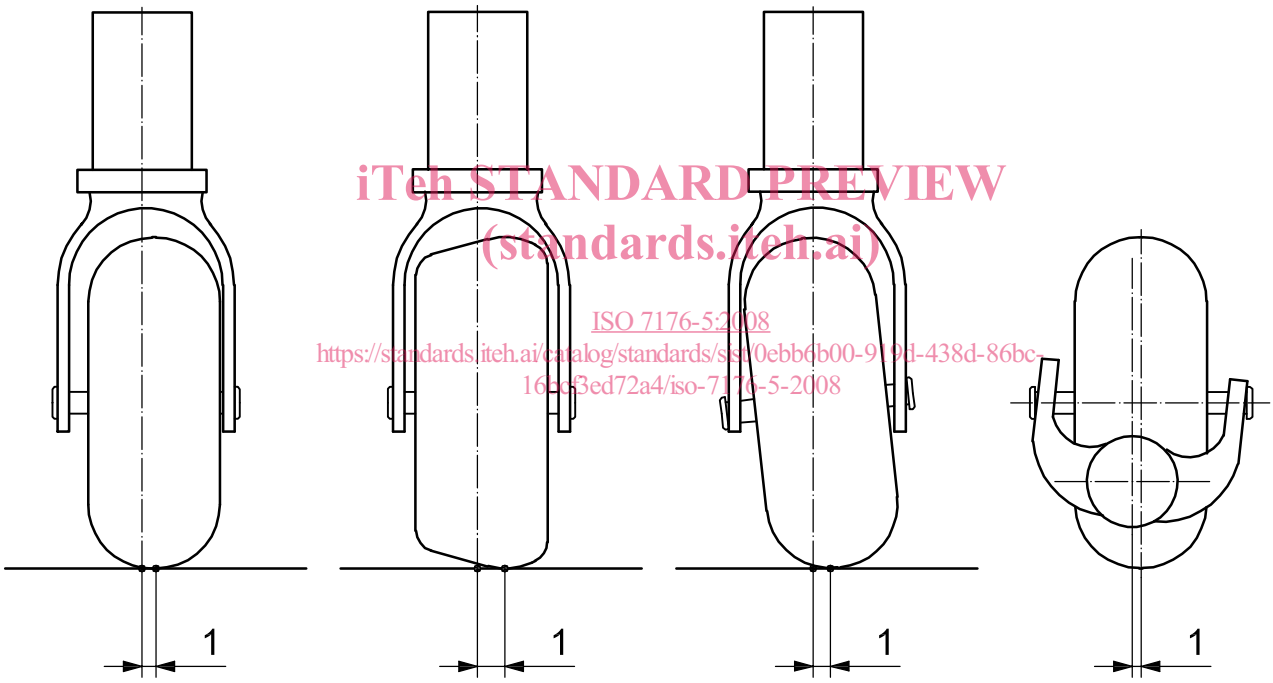
3.1
castor wheel misalignment
lateral distance between the ground contact point of the castor wheel and that point where the castor stem axis intersects with the ground

See Figure 1.

NOTE 1 Measurement is in accordance with A.22.

NOTE 2 A non-zero value usually indicates a misalignment. The value is positive if the ground contact point of the castor wheel is medial to the point of intersection of the castor stem axis with the ground, zero if in the desired neutral position and negative if the ground contact point of the castor wheel is lateral to the point of intersection of the castor stem axis with the ground.

NOTE 3 Sketches a), b) and c) in front view; d) in top view.



a) shifted wheel **b) conical wheel** **c) tilted axle** **d) oblique axle**

Key

1 castor wheel misalignment

Figure 1 — Castor wheel misalignment (exaggerated)

3.2
fixed wheel
wheel that cannot change its axial orientation relative to the wheelchair during motion

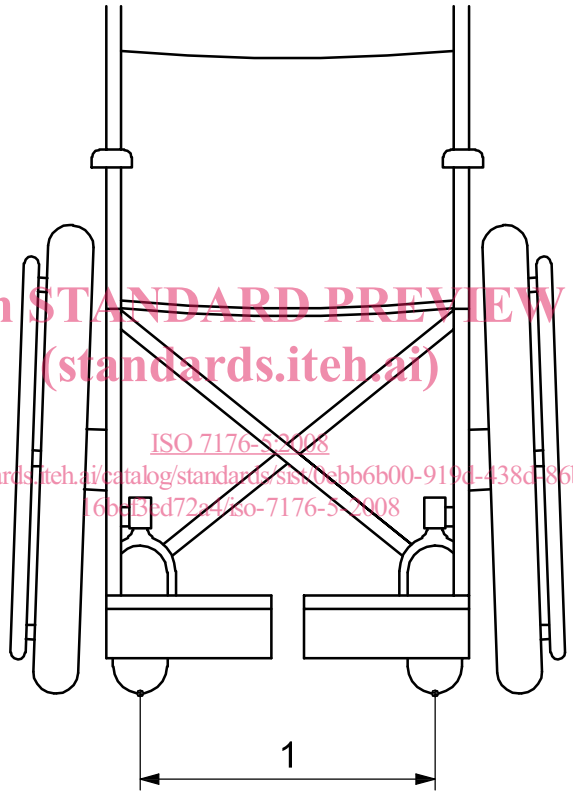
EXAMPLE Drive wheel, manoeuvring wheel or guide wheel.

3.3
front wheel track
distance between the ground contact points of the front wheels

See Figure 2.

NOTE 1 Measurement is in accordance with A.15.

NOTE 2 Sketch in front view.



Key
1 front wheel track

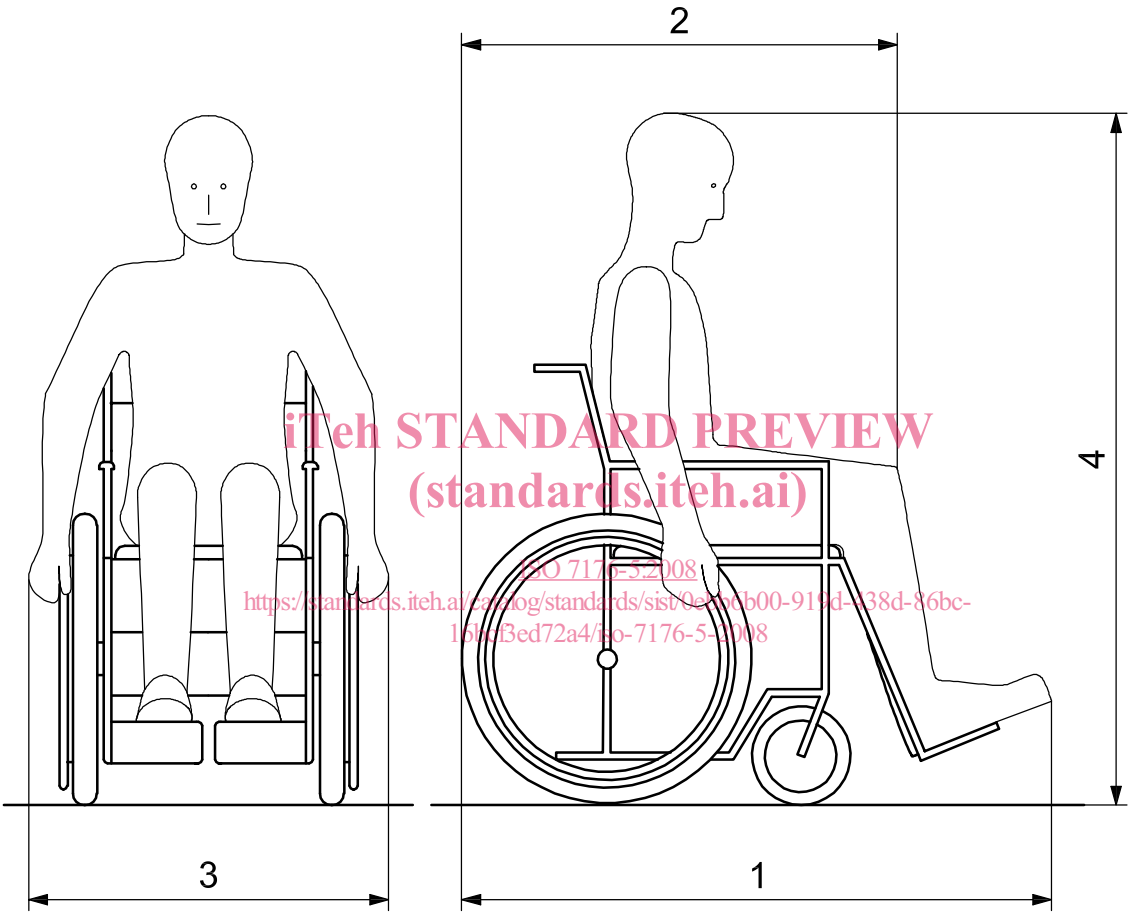
Figure 2 — Front wheel track (example)

3.4
full occupied length
distance between the most forward and most rearward point of the wheelchair including lower leg support assemblies and a reference occupant

See Figure 3.

NOTE 1 Measurement is in accordance with A.8.

NOTE 2 This measurement applies where the wheelchair has fixed leg supports and/or foot supports or where the leg supports and/or foot supports are removable but not removed.



Key

1 full occupied length
2 reduced occupied length
3 occupied width
4 occupied height

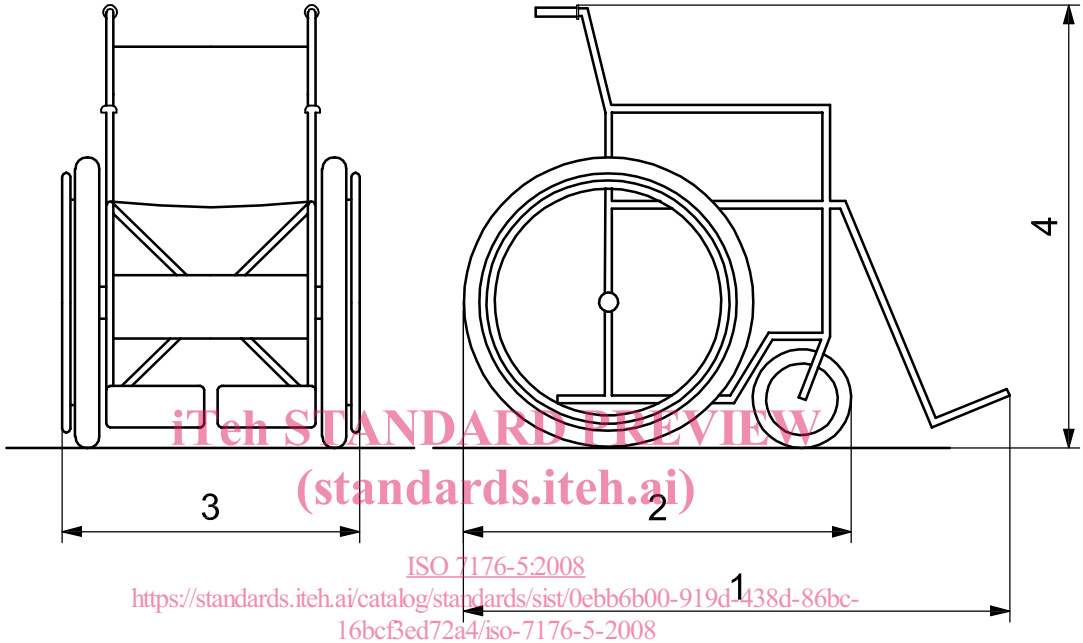
Figure 3 — Dimensions of the wheelchair when occupied

3.5
full overall length
distance between the most forward and most rearward point of the wheelchair when assembled and ready for use with any leg supports, foot supports and any anti-tipping devices fitted

See Figure 4.

NOTE 1 Measurement is in accordance with 8.2.

NOTE 2 This measurement applies where the wheelchair has fixed leg supports and/or foot supports or where the leg supports and/or foot supports are removable but not removed.



Key

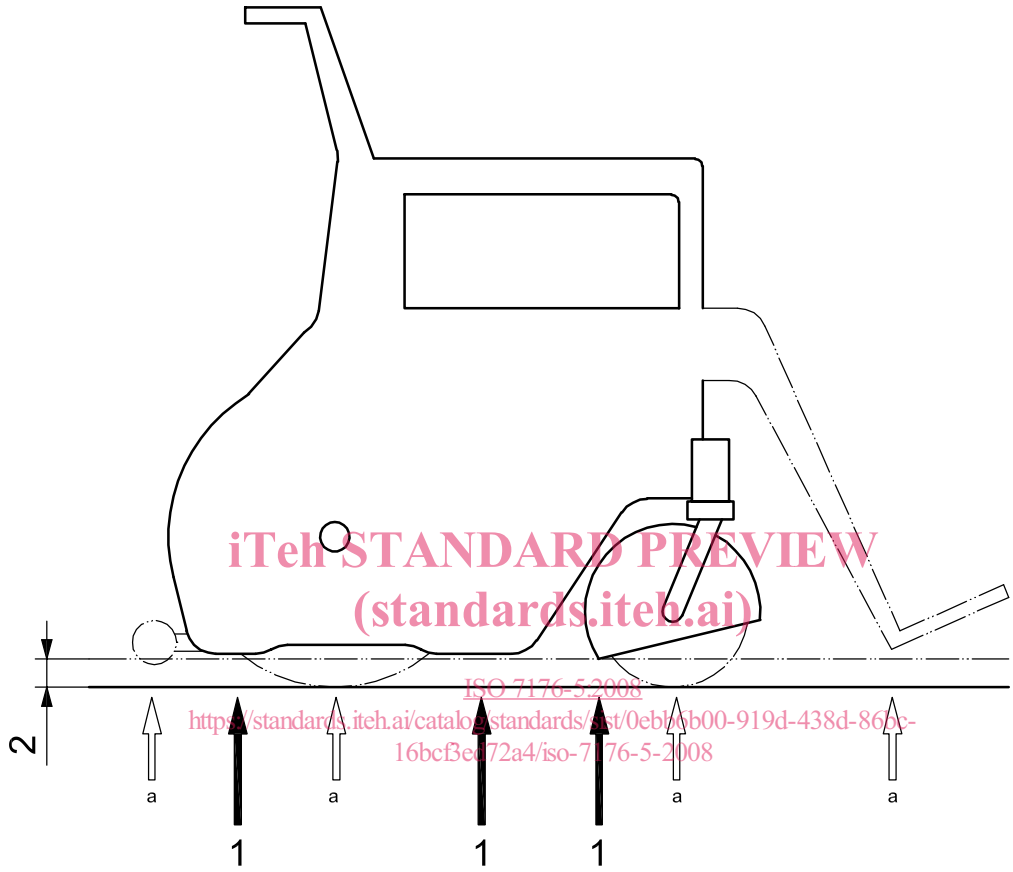
1 full overall length
2 reduced overall length
3 overall width
4 overall height

Figure 4 — Overall wheelchair dimensions

3.6
ground clearance
minimum clearance between the occupied wheelchair and the ground

See Figure 5.

NOTE Measurement is in accordance with 8.14.



Key

1 typical critical points
2 ground clearance

[a] Wheels, adjustable leg/foot supports and anti-tip devices are not considered.

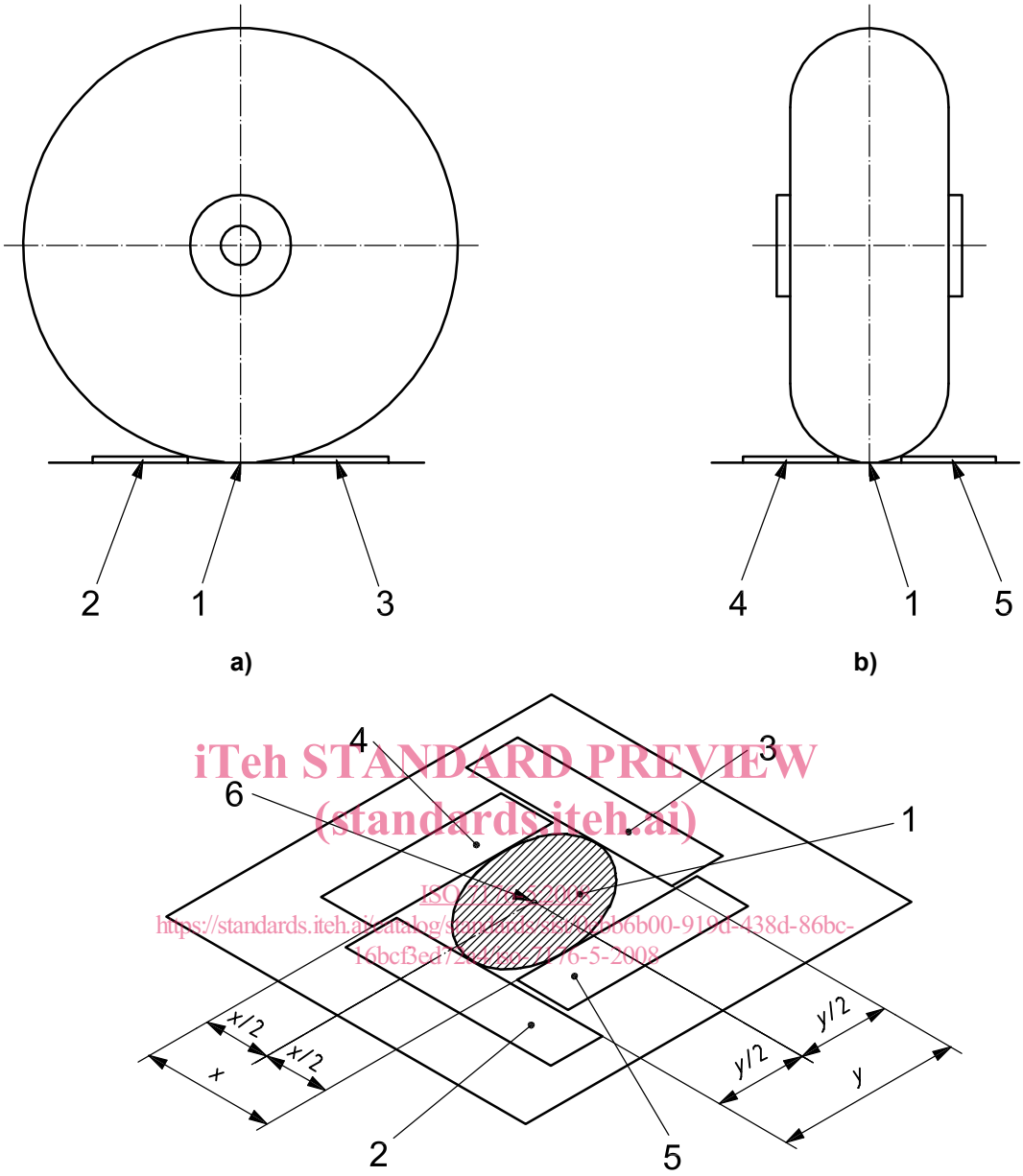
Figure 5 — Ground clearance (example)

3.7
ground contact point
midpoint of the area where the wheel contacts the ground

See Figure 6.

NOTE 1 One means of identifying the ground contact point is to place four feeler gauges of equal thickness, and with at least one straight edge, on the test plane (an example of a feeler gauge is a piece of tin or other rigid material, 0,5 mm ± 0,2 mm thick). Push two of them from the front and rear under the wheels with their straight edges horizontal and perpendicular to the wheelchair longitudinal axis and push the other two of them, from both sides, under the wheels with their straight edges parallel to the wheelchair longitudinal axis. Push all feeler gauges until they contact the wheel. The ground contact point is located in the middle of the rectangle created by the straight edges of the four feeler gauges.

NOTE 2 Sketch a) in side view; b) in front view; c) in 3/4 view with wheelchair removed.



a) b) c)

Key

1 area of contact between wheel and ground
2 front feeler gauge
3 rear feeler gauge
4 right feeler gauge
5 left feeler gauge
6 ground contact point

Figure 6 — Identification of ground contact point

3.8
handgrip height
vertical distance from the ground to the handgrip reference points of the wheelchair

NOTE Measurement is in accordance with 8.4.