

Australian/New Zealand Standard™

Wheelchairs

Part 3: Determination of effectiveness of brakes



AS/NZS ISO 7176.3:2015

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee ME-067, Assistive Technology Products for Persons with Disability. It was approved on behalf of the Council of Standards Australia on 9 July 2015 and on behalf of the Council of Standards New Zealand on 21 July 2015. This Standard was published on 12 August 2015.

The following are represented on Committee ME-067:

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Australian Rehabilitation and Assistive Technology Association
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Commercial Vehicle Industry Association of Australia
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee, ME-067 Assistive Technology Products for Persons with Disability, to supersede AS/NZS 3696.3:2008.

The objective of this standard is to specify test methods for the measurement of the effectiveness of brakes of wheelchairs, including scooters, intended to carry one person, with a maximum speed not exceeding 15 km/h. It also specifies operational requirements for brakes and disclosure requirements for the manufacturer.

This Standard is identical with, and has been reproduced from, ISO 7176-3:2012, *Wheelchairs, Part 3: Determination of effectiveness of brakes*.

As this Standard is reproduced from an International Standard, the following applies:

- (a) In the source text ‘this part of ISO 7176’ should read ‘this Australian/New Zealand standard’.
- (b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>	<i>Australian/New Zealand Standard</i>
ISO	AS/NZS
7176 Wheelchairs	3696 Wheelchairs
7176-6 Part 6: Determination of maximum speed, acceleration and deceleration of electric wheelchairs	3696.6 Part 6: Determination of maximum speed, acceleration and retardation of electric wheelchairs
7176-11 Part 11: Test dummies	3696.11 Part 11: Test dummies
7176-13 Part 13: Determination of coefficient of friction of test surfaces	3696.13 Part 13: Determination of coefficient of friction of test surfaces
	AS/NZS ISO
7176 Wheelchairs	7176 Wheelchairs
7176-26 Part 26: Vocabulary	7176.26 Part 26: Vocabulary

Only normative references that have been adopted as Australian or Australian/New Zealand Standard have been listed.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annexes to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

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INTRODUCTION

The performance of a wheelchair's brakes can be critical for safety. The tests specified in this part of ISO 7176 determine the ability of a wheelchair to stop in a safe manner on level ground and on a slope, and determine the ability of a wheelchair to remain stationary when parked on a slope.

AUSTRALIAN/NEW ZEALAND STANDARD

Wheelchairs**Part 3:
Determination of effectiveness of brakes****1 Scope**

This part of ISO 7176 specifies test methods for the measurement of the effectiveness of brakes of manual wheelchairs and electrically powered wheelchairs, including scooters, intended to carry one person, with a maximum speed not exceeding 15 km/h. It also specifies disclosure requirements for the manufacturer.

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 7176-6, *Wheelchairs — Part 6: Determination of maximum speed, acceleration and deceleration of electric wheelchairs*

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, *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**tipping**

rotational movement of the wheelchair that occurs when the vertical projection of the centre of mass of the occupied wheelchair moves outside of a polygon connecting the ground contact points of all the running wheels

Note 1 to entry: The instant at which the wheelchair starts to tip is reached when the forces become zero under all uphill running wheels (i.e. there is only force through one side of the polygon). See ISO 7176-1 for more details.

3.2**sliding**

movement of the wheelchair across the test surface where there is a difference in velocity between the test surface and the braked wheel rolling surface

4 Principle

A number of wheelchair braking operations are carried out and the resulting responses of the wheelchair are measured and observed.

5 Apparatus

5.1 Rigid, flat test planes and ramp

5.1.1 All test planes specified under this clause shall be rigid with a surface coefficient of friction as specified in ISO 7176-13 and of sufficient size to conduct the tests. The surface shall be flat such that any two points 1 m apart on the plane shall be contained between two imaginary horizontal planes 5 mm apart, as an indication of flatness. Conformity with this requirement may be evaluated using a 1 m straight edge.

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

The planes and ramps in 5.1.2 to 5.1.4 may be combined into one or two units providing the plane/ramp requirements for each applicable type of plane/ramp are satisfied.

5.1.2 Rigid, flat, horizontal test plane, which shall meet the requirements of 5.1.1 and have no more than 0,5 degrees of variation in slope or cross slope from the horizontal throughout the test.

5.1.3 Rigid, flat, adjustable test plane, which shall meet the requirements of 5.1.1 and be of sufficient size to accommodate the wheelchair during parking brake testing, having a slope which can be adjusted from the horizontal about a single axis.

If the slope of the test plane is increased in a continuous fashion, the rate of increase should not exceed 1°/s as the angle of wheelchair instability is approached.

If the slope of the test plane is increased in a stepwise fashion, the size of the steps shall not exceed 0,5° and the movement between steps should be sufficiently smooth that it does not affect the test results.

NOTE A range of inclinations from horizontal to 25° is usually sufficient for most wheelchairs.

5.1.4 Rigid, flat, inclined test ramp, which shall meet the requirements of 5.1.1 and be of sufficient size to accommodate the wheelchair during running brake testing, having a slope which is adjustable to a specific inclination ($+0,5^{\circ}$) or which is fixed at that inclination. Conformity with the inclination requirement may be evaluated using the inclinometer specified in 5.5.

NOTE 1 If the angle is fixed, several different test ramps will have to be used.

NOTE 2 The recommended minimum size is 5 m × 1,5 m, but a size of 10 m × 1,5 m will often be necessary.

5.2 Test dummy, as specified in ISO 7176-11, with appropriate restraints, or a human test occupant.

NOTE 1 If a dummy is used, remote control devices may be used to operate the wheelchair controls.

NOTE 2 A human test occupant should take care to minimize any movement during testing as it can affect the results.

5.3 Supplementary weights, with appropriate restraints, to add to the human test driver to give the mass and mass distribution equivalent to the applicable dummy.

5.4 Braking distance measurement equipment to measure the braking distance of a wheelchair with an accuracy of ± 50 mm.

5.5 Inclinometer to measure the angle of the slope of a test plane with respect to the horizontal to an accuracy of $\pm 0,2^{\circ}$.

5.6 Force measurement equipment to measure force with an accuracy of 5 % over a range of 10 N to 250 N.