

Australian/New Zealand Standard™

Wheelchairs

Part 22: Set-up procedures



AS/NZS ISO 7176.22:2015

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Wheelchairs

Part 22: Set-up procedures

Originated as AS/NZS 3696.22:2008.
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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 3696.22:2008, *Wheelchairs*, Part 22: *Set-up procedures*.

The objective of this revision is to update the requirements for testing of set-up procedures for wheelchairs in line with international requirements.

This Standard is identical with, and has been reproduced from ISO 7176-22:2014, *Wheelchairs*, Part 22: *Set-up procedures*.

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 ISO
7176 Wheelchairs	7176 Wheelchairs
7176-11 Part 11: Test dummies	7176.11 Part 11: Test dummies
7176-26 Part 26: Vocabulary	7176.26 Part 26: Vocabulary

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex 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

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.

AUSTRALIAN/NEW ZEALAND STANDARD

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 $\pm 0,2^\circ$.

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 $\pm 0,2$ 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.

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,

- 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 $\pm 2^\circ$. 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

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 $\pm 1^\circ$ 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.			

Table 1 (continued)

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)
Back support angle	10°	10°	10°
Back support height	340	420	420
Handgrip height	820	950	950
Back support width	In accordance with formula in NOTE 2		
Foot support to seat	340	450	450
The foot support clearance shall not be less than.	50	40	40
Foot support length	150	150	150
Foot support to leg angle	90°	90°	90°
Leg to seat surface angle	90°	97°	97°
Arm support height	160	200	200
Front of arm support to back support	200	320	320
Handrim diameter	490	530	530
Manoeuvring wheels, diameter	560	610	610
Wheelbase	340	400	400
Camber	-3°	0°	0°
Manoeuvring wheels, horizontal position	20	20	20
Manoeuvring wheels, vertical position	166	184	184
Castor wheels, diameter	150	175	175
Properties of the chassis (see NOTE 3)			
Manoeuvring wheels, track	mid-position (see NOTE 4)		
Castor wheels, track	mid-position (see NOTE 4)		
Castor stem housings, horizontal position	mid-position (see NOTE 4)		
Castor stem housings, vertical position	mid-position (see NOTE 4)		
Castor wheel axle, vertical position in fork	mid-position (see NOTE 4)		
Castor rake	$0^{\circ} +1^{\circ} / -0^{\circ}$		
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.			

Table 1 (continued)

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)
Castor cant	$0^{\circ} \pm 0,5^{\circ}$		
Castor trail	50		

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.

6.2.3 Wheelchairs without handrims

NOTE Wheelchairs without handrims include electrically powered wheelchairs, manual wheelchairs with lever propulsion and push wheelchairs.

Set any adjustable dimensions of the wheelchair to the reference set-up values specified in [Table 2](#), with an accuracy of ± 3 mm for longitudinal dimensions or $\pm 1^\circ$ for angular dimensions respectively, 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.

Adjust the anti-tip devices (where applicable) as close as possible to the following position.

- Set the rising to (50 ± 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 the default setting.

Adjust any kerb-climbing devices to their working position as recommended by the manufacturer.

If the wheelchair has a tiller, adjust the horizontal distance between the tiller and the back support as recommended by the manufacturer. If there is no recommendation, adjust to (460 ± 25) mm for wheelchairs intended for occupant mass group I and (640 ± 25) mm for wheelchairs intended for occupant mass group II or III. If this is not possible set it as close as possible to the reference value.