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Manually propelled wheelchairs

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS T 9201:2006** is replaced with this Standard.

However, **JIS T 9201:2006** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until October 19, 2017.

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Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

Manually propelled wheelchairs

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 7176-1:2014** (Edition 3), **ISO 7176-3:2012** (Edition 3), **ISO 7176-8:2014** (Edition 2), **ISO 7176-11:2012** (Edition 2), **ISO 7176-13:1989** (Edition 1), **ISO 7176-15:1996** (Edition 1), **ISO 7176-22:2014** (Edition 2), and **ISO 7176-26:2007** (Edition 1), with some modifications made in the technical contents in order to reflect considerations for the average body type of Japanese users, as well as local needs and situations in Japan.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JD.

1 Scope

This Standard specifies manually propelled wheelchairs of self-propelled standard type, self-propelled posture adjustable type, assistant-propelled standard type and assistant-propelled posture-adjustable type (hereafter referred to as wheelchairs). Self-propelled posture adjustable type wheelchairs do not include those having a height adjustment mechanism, a slewing mechanism or a stand-up mechanism.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 7176-1:2014 *Wheelchairs—Part 1: Determination of static stability*

ISO 7176-3:2012 *Wheelchairs—Part 3: Determination of effectiveness of brakes*

ISO 7176-8:2014 *Wheelchairs—Part 8: Requirements and test methods for static, impact and fatigue strengths*

ISO 7176-11:2012 *Wheelchairs—Part 11: Test dummies*

ISO 7176-13:1989 *Wheelchairs—Part 13: Determination of coefficient of friction of test surfaces*

ISO 7176-15:1996 *Wheelchairs—Part 15: Requirements for information disclosure, documentation and labelling*

ISO 7176-22:2014 *Wheelchairs—Part 22: Set-up procedures*

ISO 7176-26:2007 *Wheelchairs—Part 26: Vocabulary* (Overall evaluation: MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

- JIS B 0205-1 *ISO general purpose metric screw threads—Part 1: Basic profile*
- JIS B 0205-2 *ISO general purpose metric screw threads—Part 2: General plan*
- JIS B 0205-3 *ISO general purpose metric screw threads—Part 3: Selected sizes for screws, bolts and nuts*
- JIS B 0205-4 *ISO general purpose metric screw threads—Part 4: Basic dimensions*
- JIS B 0209-1 *ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data*
- JIS B 0209-2 *ISO general purpose metric screw threads—Tolerances—Part 2: Limits of sizes for general purpose external and internal screw threads—Medium quality*
- JIS B 0209-3 *ISO general purpose metric screw threads—Tolerances—Part 3: Deviations for constructional screw threads*
- JIS B 0209-4 *ISO general purpose metric screw threads—Tolerances—Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*
- JIS B 0209-5 *ISO general purpose metric screw threads—Tolerances—Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*
- JIS D 9420 *Bicycles—Spokes and nipples*
- JIS D 9421 *Bicycles—Rims*
- JIS D 9422 *Tire valves for bicycles*
- JIS K 6253-3 *Rubber, vulcanized or thermoplastic—Determination of hardness—Part 3: Durometer method*
- JIS K 6302 *Cycles—Tyres*
- JIS K 6304 *Inner tubes for bicycle tyres*
- JIS K 7222 *Cellular plastics and rubbers—Determination of apparent (bulk) density*
- JIS T 0102 *Glossary of terms used in assistive products for persons with disabilities*
- ISO 2439 *Flexible cellular polymeric materials—Determination of hardness (indentation technique)*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS T 0102**, and the following apply.

3.1 body support system

parts of the wheelchair which directly support or contain the body of the user

It consists of seat, back support, arm support, leg support, and other accessories.

3.2 frame

part that supports and connects parts of the wheelchair

It consists of the left and right main frames and connecting frames that combine the two main frames. It is either of fixed type or folding type configuration.

3.3 driving system

system consisting of handrims and brake for self-propelled type, and of push handle and brake for assistant-propelled type

3.4 wheels

drive or main wheels, and castors

3.5 folding wheelchair

type of wheelchair which can be made smaller by folding

3.6 modular type wheelchair

type of wheelchair which can be used through assembling replaceable modules together

3.7 user

person supported by the wheelchair seating system

3.8 assistant

person who operates the wheelchair for assistance

3.9 maximum occupant mass

maximum mass of the user (including other loaded matter) specified by the manufacturer that can be safely supported by the wheel chair

3.10 trailing position

alignment of the castor wheel relative to the wheelchair, when the wheelchair is driving straight ahead in the forward direction

Normally, this position puts the castor wheels directly behind the castor spindle.

3.11 reclining mechanism

mechanism for changing the back support angle and adjusting recline of the back support without the use of tools

3.12 tilting mechanism

mechanism for realizing tilt of the seat and back support as they are remaining in the fixed angle to each other, without the use of tools

3.13 tilting and reclining mechanism

mechanism for changing the seat and back support angles and adjusting recline of the back support and seat separately without the use of tools

3.14 operation method

engineering method for operating the reclining mechanism, tilting mechanism and tilting and reclining mechanism

The method includes a mechanical lock method, a gas damper method and so on.

3.15 posture adjustable type

type of wheelchair capable of changing the user's seating posture such as those with a reclining mechanism, a tilting mechanism and a height adjustment mechanism

Height adjustment mechanism, slewing mechanism and stand-up mechanism are outside the scope of this Standard.

3.16 elevating mechanism

mechanism for adjusting the angle of seat to foot and leg support (also referred to as angle adjustable type)

4 Types of wheelchair, classification of types, and names of parts and components

4.1 Types of wheelchair

The applicable wheelchair types are as follows.

a) Classification according to driving system

- 1) Self-propelled (see Figure JB.1)
- 2) Assistant-propelled (see Figure JB.2)

b) Classification according to seat adjusting mechanism

- 1) Standard
- 2) Posture adjustable

4.2 Type classification

4.2.1 Type classification of wheelchairs

The type classification of wheelchairs shall be in accordance with Annex JA.

4.2.2 Classification of brake types

Brake types are classified as follows.

a) Parking brake, for keeping the wheelchair stationary.

Optionally, it can be applied with a brake extension to enable actuation of the braking with less force (see example in Figure 1). The brake extension includes a screwing-in type, a capping type, a folding type, etc.

b) Running brake, for stopping or slowing the wheelchair.

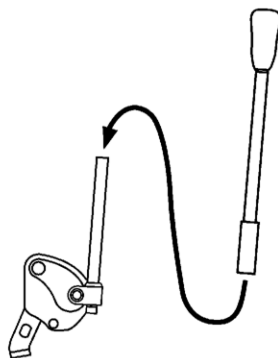


Figure 1 Example of brake extension

4.3 Names of parts

The name and type of each part constituting the wheelchair shall be, in principle, in accordance with Table JB.1 and Figures JB.3 to JB.8.

4.4 Names of components

The name of each component of the wheelchair shall be, in principle, in accordance with Table JB.2 and Figures JB.9 to JB.12.

5 Performance

The wheelchair shall conform to the requirements given in Tables 1 to 4 when tested in accordance with clause 10.

Table 1 Performance related to function

Item	Criteria		Applicable test subclause
	Self-propelled	Assistant-propelled	
Braking force of parking brake	The wheelchair shall be stationary.		10.1.1.1
Braking force of running brake	The wheelchair shall not move more than 50 mm.		10.1.1.2
Static stability	No uphill wheel castor shall be apart from the ground surface of the tilted test platform.		10.1.2
Straight travelling property	Displacement from the travelling direction shall be not more than 130 mm.		10.1.3
Drive wheel and main wheel runout	Vertical runout shall be not more than 2 mm. Horizontal runout shall be not more than 2 mm.		10.1.4
Handrim runout	Vertical runout shall be not more than 5 mm. Horizontal runout shall be not more than 3 mm.	—	10.1.5

Table 2 Performance related to strength

Item	Criteria		Applicable test subclause
	Self-propelled	Assistant-propelled	
Withstand load of seat	Permanent deformation after removal of load shall be not more than 3 mm. Requirements in Annex D shall be satisfied.		10.2.1
Downward withstand load of arm support	Requirements in Annex D shall be satisfied.		10.2.2
Upward withstand load of arm support	Requirements in Annex D shall be satisfied. Not applicable to detachable arm support with no locking mechanism.		10.2.3
Upward withstand load of foot support	Requirements in Annex D shall be satisfied. Not applicable to detachable foot and leg support with no lock mechanism.		10.2.4
Withstand load of tipping lever	Requirements in Annex D shall be satisfied.		10.2.5
Upward withstand load of push handle	Requirements in Annex D shall be satisfied.		10.2.6
Withstand load of back support of posture adjustable type wheelchair	Requirements in Annex D shall be satisfied.		10.2.7
Pull-off resistance of handgrip	Handgrips shall not come off.		10.2.8
Withstand load of castor	Castors shall satisfy the following after the test: a) The working of the swivel part is smooth without any looseness. b) The recovering property of the tyre is good and the rotation of the wheels is smooth. c) All parts are free from cracks, caving or dislodgement of tyre.		10.2.9
Strength of running brake	No abnormalities.		10.2.10

Table 3 Performance related to impact resistance

Item	Criteria		Applicable test subclause
	Self-propelled	Assistant-propelled	
Oblique impact resistance of back support	Requirements in Annex D shall be satisfied. Not applicable to wheelchairs with back support height less than 320 mm.		10.3.1
Impact resistance of foot support	Requirements in Annex D shall be satisfied.		10.3.2
Impact resistance of handrim	Requirements in Annex D shall be satisfied.	—	10.3.3
Impact resistance of castor	Requirements in Annex D shall be satisfied.		10.3.4
Seat impact resistance of posture adjustable type wheelchair			10.3.5

Table 4 Performance related to endurance

Item	Criteria	Applicable test subclause
Endurance of parking brake	Requirements in Annex D shall be satisfied.	10.4.1
Travelling endurance of standard type wheelchair		10.4.2.1
Travelling endurance of posture adjustable type wheelchair		10.4.2.2
Fall endurance of standard type wheelchair		10.4.3.1
Fall endurance of posture adjustable type wheelchair		10.4.3.2
Repetitive castor tipping		10.4.4

6 Construction and materials

6.1 Construction of body support system

The construction of the body support system shall be as follows.

- a) Body support system shall be designed so that it can surely support the body of the user.
- b) The back support of detachable type shall not easily come off in service and attachment and detachment shall be easy. The back support of folding type shall not easily come off in service and the folding shall be easy.
- c) The arm support of fixed type shall be securely fixed.
- d) The arm support of detachable type shall not easily come off in service and attachment and detachment shall be easy.
- e) The up-down adjuster of the foot and leg support shall not be loosened by an impact, vibration, etc. to the body of the wheelchair.
- f) The foot and leg support of detachable type shall not easily come off the body of the wheelchair by an impact, vibration, etc.
- g) The foot and leg support shall be of such a structure as not easily injuring human body or damaging building structures.

6.2 Construction of frame

The construction of frame shall be as follows.

- a) The folding mechanism of the frame shall work smoothly but it shall not allow inadvertent fold while the user is on the wheelchair. In addition, the frame shall be designed so that it does not easily nip hands or fingers when the wheelchair is folded according to the instruction manual.

- b) The front wheels shall be easily lifted by means of tipping lever, etc.

6.3 Construction and material of driving system

The construction and material of the driving system shall be as follows.

- a) The handrim shall be installed securely and not be easily loosened by an impact, vibration, etc.
- b) The parking brake shall be provided.
- c) Assistant-propelled standard type shall be equipped with a running brake.
- d) Brake operation shall be easy, with left and right drive or main wheels capable of being controlled with precision.
- e) The construction and material of the running brake shall be as follows.
 - 1) No brake material containing asbestos shall be used.
 - 2) The brake lever for the right-hand brake is normally placed on the right-hand side of the push handle and that for the left-hand brake is placed on the left-handle side of the push handle. This does not apply to wheelchairs with a single brake lever which locks both wheels.
 - 3) The distance between the outermost point of the brake lever and that of the grip (brake lever opening, d , in Figure 2) shall not exceed 90 mm between A and B, and 100 mm between B and C as shown in Figure 2.

The dimension L in Figure 2 is the distance from the centre of the lever pivot point to the lever extremity.

An adjustable brake lever may be used as far as it can be adjusted within the range of this requirement.

- 4) The brake shall be designed so that the required braking force is maintained by adjustment for any wear, wire elongation or the like.

Unit: mm

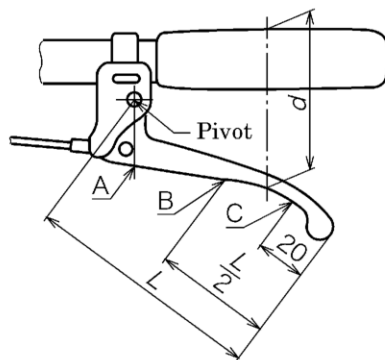


Figure 2 Example of running brake

6.4 Construction of wheels

The construction of wheels shall be as follows.

- a) The rotary part of the drive or main wheels and the castors shall work smoothly and the installation shall be so secure that no noticeable runout occurs during travelling.
- b) The spoke, rim, valves of tyres, tyres and tubes shall be of the quality specified in **JIS D 9420**, **JIS D 9421**, **JIS D 9422**, **JIS K 6302** and **JIS K 6304**, respectively, or those of quality equivalent or superior thereto.

6.5 Construction of screws

The machine screws used for assembling the parts of the wheelchair usually should be the standard metric screw threads specified in **JIS B 0205-1** to **JIS B 0205-4** and **JIS B 0209-1** to **JIS B 0209-5**.

6.6 Construction of accessories

The accessories used for the wheelchairs shall be securely attachable or detachable.

7 Shape and dimensions

7.1 Definitions of wheelchair dimensions

The symbols and definitions of the reference dimensions of the wheelchairs shall be as given in Table 5.

Dimensions presented in a catalogue, etc. shall be based on the system of dimensions and definitions given in the said table.

Table 5 Definitions of reference dimensions

Term	Symbol	Definition	Note
Reference point of dimension	A	Reference point of all dimensions of wheelchair, and intersection of frontal part of supporting frames of the back support and upper surface of supporting frames of the seat	
Handrim mounting distance	W_2	Distance between outside of tyre rim of drive wheel and inside of handrim	
Drive wheel or main wheel diameter	D_1	Maximum diameter of drive or main wheel (nominal diameter is allowed)	
Wheel axis position in horizontal direction	L_3	Horizontal distance between the reference point of dimension and the centre of wheel axis of drive or main wheel (fore: -, aft: +)	
Wheel axis position in vertical direction	H_5	Vertical distance between the reference point of dimension and the centre of wheel axis of drive or main wheel	
Castor diameter	D_2	Maximum diameter of castor (nominal diameter is allowed)	
Front sitting height	H_2	Vertical distance between the floor and the upper surface of the front end of the seat attached to the seat supporting frames	
Rear sitting height	H_3	Vertical distance between the floor and the reference point of dimension	

Table 5 (continued)

Term	Symbol	Definition	Note
Seat angle	θ_s	Angle of the seat surface attached to the seat supporting frames to the horizontal plane	
Seat depth	L_1	Distance between the reference point of dimension and the frontal end of seat attached to the seat supporting frames	
Seat width	W_1	Effective width of seat in service (inner dimension of side guard, inner dimension between the seat side pipes and maximum seat width, etc.)	
Angle between seat and back support	θ_{SB}	<u>Internal angle between the surface of seat attached to the seat supporting frames and the surface of back support attached to the back support supporting frames</u>	
Back support height	H_4	Distance between the reference point of dimension and upper end of back support attached to the back support supporting frames	
Back support width	W_5	Effective width of the back support in service	
Distance between foot support and seat	L_6	Distance between the outside upper surface of foot support and front surface of upper end of the seat attached to the seat supporting frames	
<u>Foot support height</u>	<u>H_7</u>	<u>Vertical distance from the floor to the lowest end of foot and leg support (also referred to as the lowest height from the ground)</u>	
Foot support length	L_5	Maximum length of foot support in fore-aft direction	
Angle between seat and leg support	θ_{SF}	Angle formed by the seat and the leg support	
Angle between foot support and leg support	θ_{FL}	Angle formed by the foot support and the leg support	
Back support angle	θ_B	<u>Angle between vertical line and back support</u>	
Arm support height	H_1	Vertical distance between the reference point of dimension and the upper surface of arm support	
Arm support length	L_4	Length of arm support	
Arm support width	W_3	Width of arm support	
Arm support angle	θ_A	Angle of arm support surface to the horizontal plane	
Distance between arm supports	W_4	Internal distance between left and right arm supports	
Tipping lever length	L_2	Length of tipping lever	
Push handle height	H_6	Vertical distance between the floor and the upper surface of the rear end of push handle	

Table 5 (continued)

Term	Symbol	Definition	Note
Wheelbase	W_B	The distance, at the sagittal plane ^{a)} , between the contact point of the front wheel (castor wheel) with the ground and the contact point of the drive or main wheel with the ground. If the front wheels are castors, the castors shall be in the trailing position.	
Camber angle	θ_{CM}	Angle, at the frontal plane ^{b)} , of drive or main wheel to vertical line. (For wheelchairs with a pair of left and right wheels, the camber angle is negative when the bottom of the wheel is farther out than the top, and positive when the opposite is true.)	See Figure 4 a). Positive camber angle clearly reduces the maneuverability of the wheelchair, and the negative camber angle, if too large, will influence the overall width and also adversely affects the maneuverability of the wheelchair. Reference value: -5° to 0°
Camber dimension	W_6	Horizontal distance, at the frontal plane, between upper end and lower end of drive or main wheel produced by the angle of drive or main wheel	
Toe angle	θ_T	Angle, at the horizontal plane, of drive/main wheel to the travelling direction. (For wheelchairs with a pair of left and right wheels, the toe angle is negative when the bottom of the wheel is farther out than the top, and positive when the opposite is true. Positive toe angle is referred to as the toe-in angle, and negative, as the toe-out angle.)	See Figure 4 b). Any toe angle other than 0° will adversely affect the maneuverability of the wheelchair. Reference value: 0°
Castor angle	θ_{CS}	Angle of swivel shaft of castor to the vertical line at the sagittal plane. (The castor angle is negative when the shaft is inclined backwards, and positive when the opposite is true.)	See Figure 4 c). 0° is desirable. Reference value: -2° to 0°
Castor trail	C_T	The distance between the point where the extension from the castor swivel shaft reaches the ground and the contact point of castor wheel with the ground	
Castor offset	C_O	The distance between the centre of swivel shaft of castor and the centre of the castor wheel axis measured at the 90° position to the castor axis	
Overall height	H_0	Vertical distance between the floor and the highest point of the wheelchair in service	
Overall width	W_0	Maximum lateral dimension of the wheelchair, which is the distance between the right and left outer edges of the wheelchair in service	

Table 5 (concluded)

Term	Symbol	Definition	Note
Overall length	L_0	Maximum dimension of the wheelchair in anterior-posterior direction in service	
Folding overall height	H_H	Vertical distance between the floor and the highest point of the folded wheelchair	
Folding overall width	W_H	Maximum lateral dimension of the folded wheelchair, which is the distance between the right and left outer edges of the folded wheelchair	
Folding overall length	L_H	Maximum dimension of the folded wheelchair in anterior-posterior direction	
Wheel axis position in anterior-posterior direction	L_7	Normally (in the case of a wheelchair having a configuration as shown in Figure 3), the distance between the vertical lines passing through the centre of the drive or main wheel axis and that passing through the centre of the back pipe.	
Notes ^{a)} A plane which is parallel to the anterior-posterior axis of the wheelchair and vertical to the horizontal plane. ^{b)} A plane which is parallel to the lateral axis of the wheelchair and vertical to the horizontal plane.			

7.2 Dimensions of wheelchair

The dimensions of wheelchair shall be as given in Table 6, Figures 3 and 4. If so required by particular needs of the individual users, dimensions other than those given in Table 6 may be applied.

Table 6 Dimensions of wheelchair

Position	Dimensional value ^{b)}
Overall length (L_0)	1 200 mm max.
Overall width (W_0)	700 mm max.
Foot support height (H_7)	50 mm min.
Overall height (H_0) ^{a)}	1 200 mm max.
Notes ^{a)} Dimension with head support removed. ^{b)} Dimensions in the reference configuration of wheelchairs equipped with a reclining mechanism and/or a tilting mechanism	

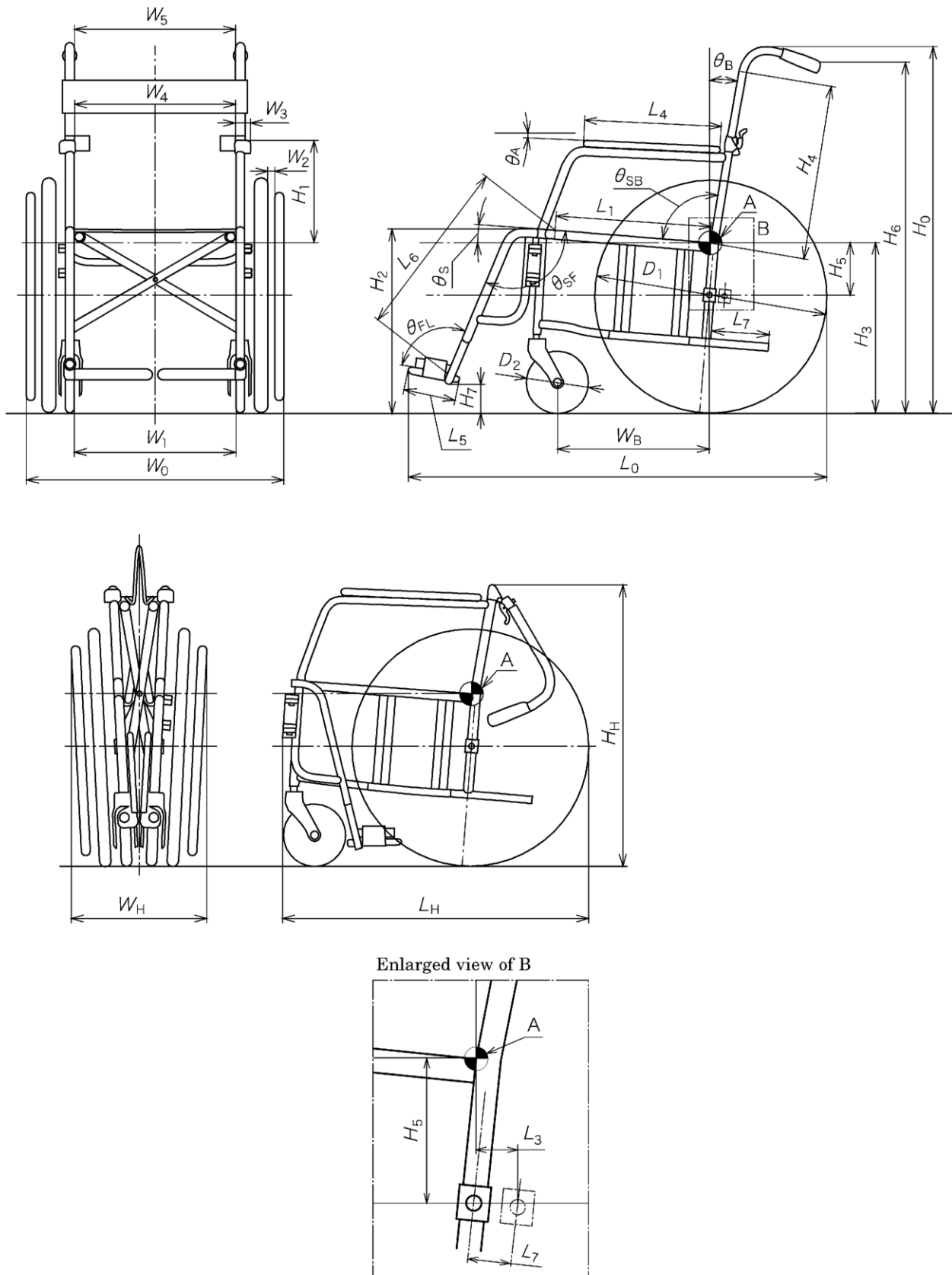


Figure 3 Dimensions of wheelchair

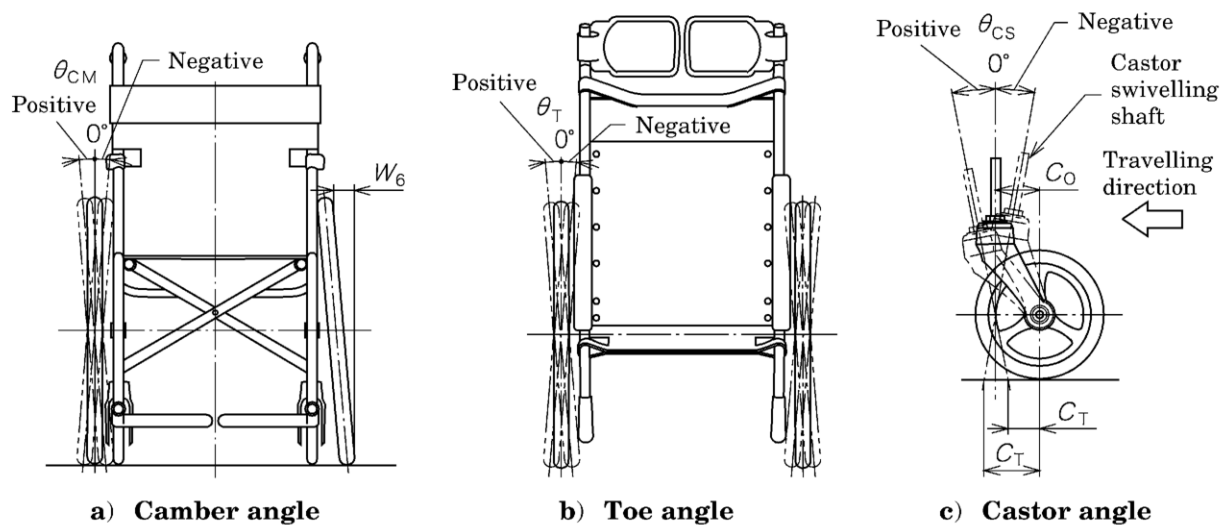


Figure 4 Angle of parts of wheelchair

8 Appearance

The appearance of the wheelchair, as well as conforming to the following, shall be free from defects that may imperil the safety of the user and the assistant.

- The wheelchair shall be finished in good condition and each of its components shall be free from deformation, cracks, or incomplete welds.
- There shall be no burrs, flashes or sharp protrusions on any parts of the wheelchair that will be or can be in contact with human body during service.
- Visible joints shall be finished smoothly.
- Treated surfaces shall be free from exposure of base material, peeling, rust or other defects.
- Untreated surfaces shall be free from rust, cracks or other defects.

9 Test conditions

The following test conditions shall apply.

- The temperature for testing shall, unless otherwise specified, be within the range of $20\text{ }^{\circ}\text{C} \pm 15\text{ }^{\circ}\text{C}$ and the temperature and humidity actually applied for testing shall be recorded.
- The function test of the wheelchairs shall be carried out on a flat running way.

Further, the coefficient of friction (μ) of test surface shall be adjusted to 0.75 to 1.0 as specified in Annex E.

- The test dummy to be used for function test and strength and durability tests of the wheelchairs (hereafter referred to as the test dummy) shall be as specified in Annex A. The mass of the test dummy according to the maximum occupant mass is given in Table 8.
- In the case of the wheelchair with adjusting function, the test dummy shall be placed on the middle of the seat of the wheelchair, and the wheelchair shall be adjusted to the foot support height (H_7) of 50 mm, the seat angle (θ_s) of 4° , the angle

between seat and back support (θ_{SB}) of 100° and the angle (θ_{SF}) between seat and leg support of 90° .

In the case where the above values cannot be realized, adjustment to the closest value practicable shall be made. Other parts shall be adjusted to the reference configuration.

- e) The tyres of the wheelchair shall be inflated to the pneumatic pressure specified by the manufacturer.

Unless otherwise specified, a pneumatic pressure of 300 kPa is applied.

- f) Unless otherwise specified, the wheelchair shall be tested under the reference configuration specified in Table 7. If adjusting to the values in Table 7 is not practicable due to the design of the wheelchair, adjustment to the closest value practicable shall be made.

Table 7 Reference configuration of wheelchair

Item	Reference configuration
Foot support height	50 mm from the floor surface
Seat angle	4°
Angle between seat and back support	100°
Angle between seat and leg support	90°

Table 8 Test dummy mass

Unit: kg

Maximum occupant mass	Mass of test dummy
25 or under	25
Over 25 up to and incl. 50	50
Over 50 up to and incl. 75	75
Over 75 up to and incl. 100	100

10 Test methods

10.1 Tests for verification of function

10.1.1 Brake test

10.1.1.1 Braking force test of parking brake

As shown in Figure 5, with the test dummy mounted on the wheelchair, engage the parking brake of the wheelchair on a running way inclined to 7° to see if the wheelchair is stationary. Perform this test twice on each wheelchair, once by positioning it so that its travelling direction is upwards the inclined plane, and once so that it is downwards. If the wheelchair is equipped with more than one parking brakes, each of the brakes shall be tested.

Further, the castors of the wheelchair to be tested shall be in trailing position.

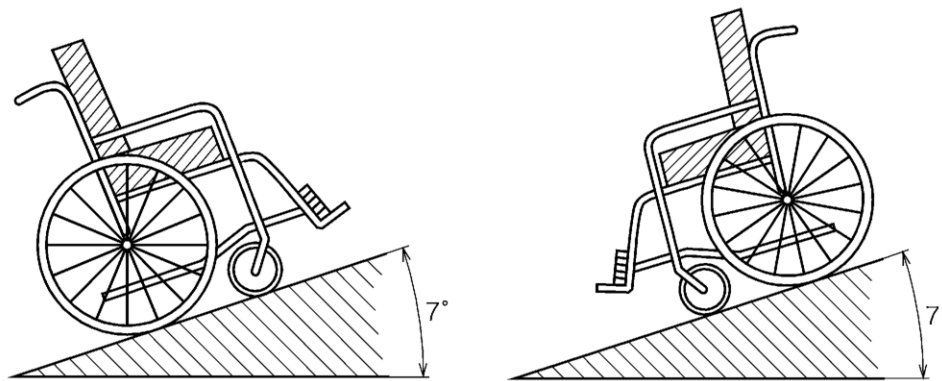


Figure 5 Braking force test of parking brake (upward and downward)

10.1.1.2 Braking force test of running brake

The braking force test of a running brake shall be carried out as follows.

- Mount the test dummy on a wheelchair equipped with a brake.
- Engage the running brake by applying a force of 100 N to the brake lever at a position 25 mm from the lever extremity as shown in Figure 6 and in the tangential direction to the lever movement in the lever movement plane.
- Leave the wheelchair on the slope inclined by 5° in downward and upward directions for 1 min each, and see if the wheelchair does not move more than 50 mm in each direction.

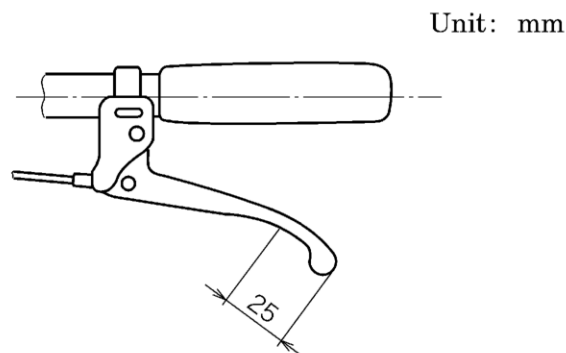


Figure 6 Braking force test of running brake

10.1.2 Static stability test

10.1.2.1 Test conditions

The test dummy corresponding to the maximum occupant mass of the wheelchair to be tested shall be used.

- The test of standard type wheelchairs shall be performed with the wheelchair adjusted to the reference configuration.
- The test of posture adjustable type wheelchairs shall be performed with the test dummy mounted on the wheelchair in parallel to the back support and under up to eight of the following conditions at the maximum.

- 1) For testing, the back support and the seat shall be adjusted to
 - reference configuration;
 - angle between seat and back support 160° (for a wheelchair with a reclining mechanism), or maximum reclining angle available with the wheelchair if 160° is not achievable;
 - maximum tilting angle (applicable only to a wheelchair with a tilting mechanism);
 - maximum tilting angle (applicable only to a wheelchair with a tilting or reclining mechanism), with the back support horizontal, or maximum reclining angle available for the wheelchair if the back support cannot be reclined to horizontal.
- 2) For testing, the foot and leg support shall be adjusted to
 - reference configuration;
 - maximum elevated position.

10.1.2.2 Test method

By carrying out the following tests, examine whether or not the upper positioned wheels lift off the test plane when the test plane is inclined by 10° (in each of the forward, rearward and lateral directions). The angle shall be measured by means of an angle meter (such as a digital angle meter).

- a) **Forward stability test** Place the wheelchair on the inclined test plane so that it faces down the slope as shown in Figure 7. Position the wheelchair so that a line through the axis of the downhill running wheels is parallel within $\pm 3^\circ$ to the hinge of the test plane, around which the test plane is rotated to give the specified slope angle.

NOTE : Anti-tip device or the like should be provided for avoiding any risks of the wheelchair falling during the test.

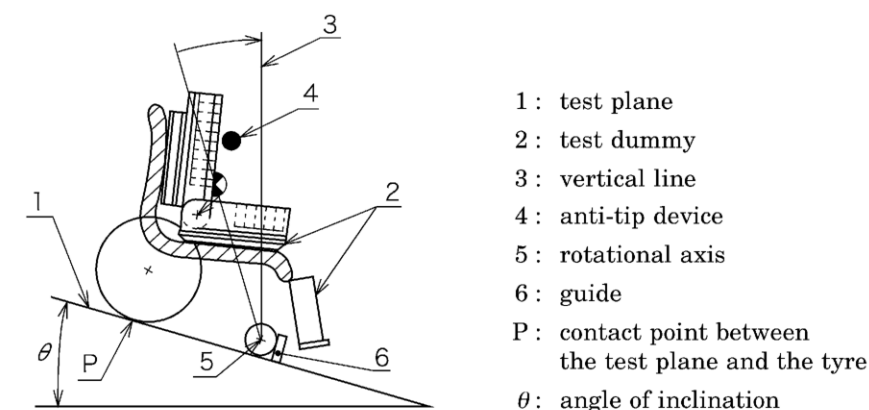


Figure 7 Forward stability test

- b) **Rearward stability test** Place the wheelchair on the inclined test plane so that it faces up the slope as shown in Figure 8. Position the wheelchair as specified for the forward stability test.

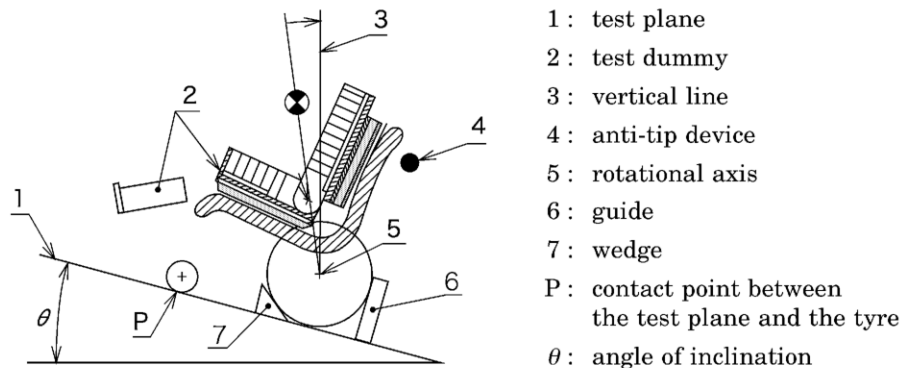


Figure 8 Rearward stability test

- c) **Lateral stability test** Place the wheelchair on the inclined test plane so that it is laid across the slope as shown in Figure 9. Position the wheelchair as specified for the forward stability test.

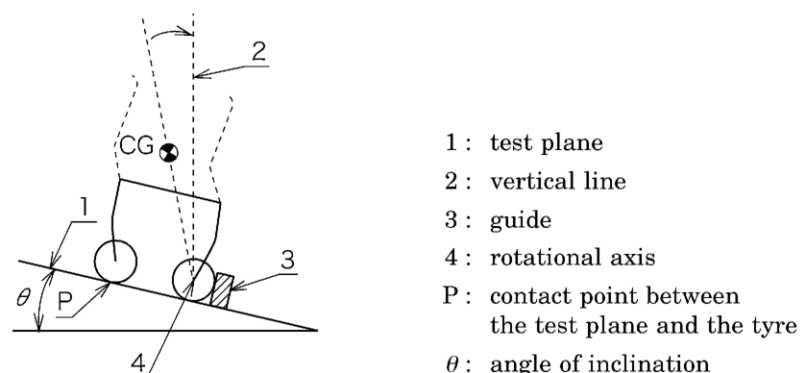


Figure 9 Lateral stability test

10.1.3 Straight travelling property test

As shown in Figure 10, draw a straight line (reference line for measurement) on the running way and position one of the drive wheels or main wheels of the wheelchair loaded with a test dummy on the reference line for measurement and the remaining drive wheel or opposite main wheel and both castors in parallel to the line. At this time, check that the pneumatic pressures of left and right wheels are equal. Allow the wheelchair, made stationary at the beginning of the test, to naturally move forward. When the wheelchair has run 1 800 mm on the slope, measure the distance between the reference line for measurement and the ground contact centre point of the drive wheel or main wheel and record it as the displacement. Perform this measurement 10 times and obtain the average value.

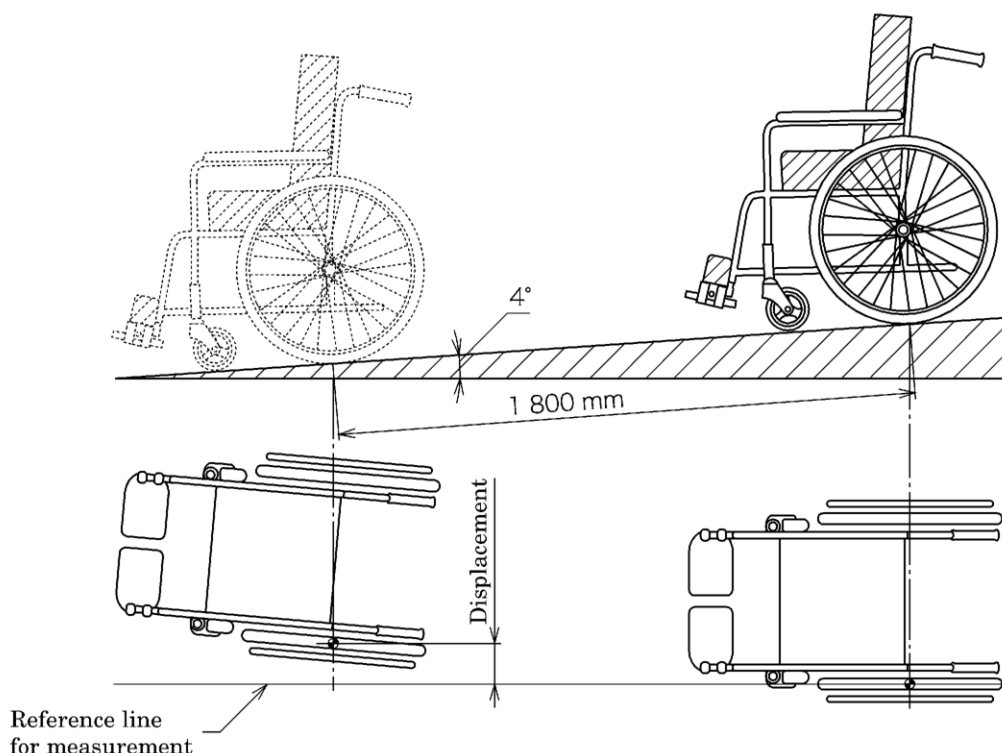


Figure 10 Straight travelling property test

10.1.4 Drive wheel and main wheel runout test

Measure the vertical and horizontal runout of wheel axis by fixing the hub shaft in the apparatus as shown in Figure 11 and by reading the maximum amplitude of the needle of the dial gauge applied on the rim surface when the wheel is rotated through one revolution.

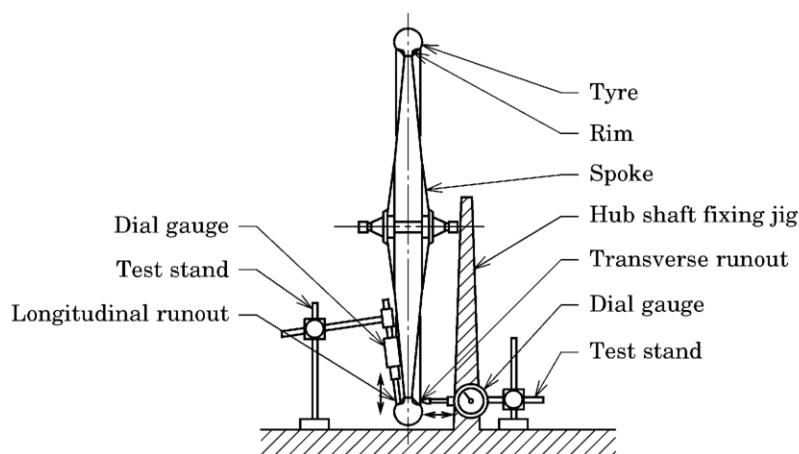


Figure 11 Example of drive wheel and main wheel runout test

10.1.5 Handrim runout test

As shown in Figure 12, fix securely the hub shaft of the drive wheel assembled with the handrim and rotate the drive wheel to measure the runout of the handrim in vertical and horizontal directions using a dial gauge. This test is not applicable to assistant-propelled wheelchairs.