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Walking trolleys — Requirements and test methods

Trolleys de marche — Exigences et méthodes d'essai

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Foreword

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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 (see 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 (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee 173, *Assistive products for persons with disability*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Some elderly or disabled persons need assistive products for walking. A rollator as defined in ISO 11199-2 can be used effectively to assist such population, but rollators are unnecessary large for many such people because rollators are designed to host the user inside the frame and to possibly carry the full weight of the user. Walking trolleys are designed to improve stability and balance while the user is located outside the frame. The walking trolley does not carry the full body weight of the user while walking. A walking trolley is substantially lighter and more compact than a rollator while providing necessary support to maintain the stability and balance of the user. Walking trolleys can be equipped with accessories such as seats and shopping bags. Walking trolleys are not intended to be moved with the user on the seat like wheelchairs, rather the seat is provided as a resting seat with brakes engaged. In addition to the requirements in this document, Annex B gives general recommendations.

Walking trolleys — Requirements and test methods

1 Scope

This document specifies the requirements and test methods for the testing strength, torque, and durability of parts, and stability and running durability as a whole for walking trolleys.

This document also provides requirements relating to general safety, folding and adjusting mechanisms, lifting and carrying means, ergonomics and information supplied by the manufacturer including marking and labelling.

The requirements and tests are based upon every-day usage of walking trolleys as assistive products for walking, for a maximum user mass as specified by the manufacturer. This document includes walking trolleys specified for a user mass of no less than 35kg.

Excluded are rollators specified in ISO 11199-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3746, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 8191-1, *Furniture — Assessment of the ignitability of upholstered furniture — Part 1: Ignition source: smouldering cigarette*

ISO 8191-2, *Furniture — Assessment of ignitability of upholstered furniture — Part 2: Ignition source: match-flame equivalent*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 10993-1, *Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 14155, *Clinical investigation of medical devices for human subjects — Good clinical practice*

ISO 14971, *Medical devices — Application of risk management to medical devices*

ISO 22442-1, *Medical devices utilizing animal tissues and their derivatives — Part 1: Application of risk management*

IEC 60601-1:2005, *Medical electrical equipment — Part 1: General requirements for basic safety and essential performance*

IEC 60695-1-10, *Fire hazard testing — Part 1-10: Guidance for assessing the fire hazard of electrotechnical products — General guidelines*

EN 614-1, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions provided with the following sites apply in addition to the ones described in this clause.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

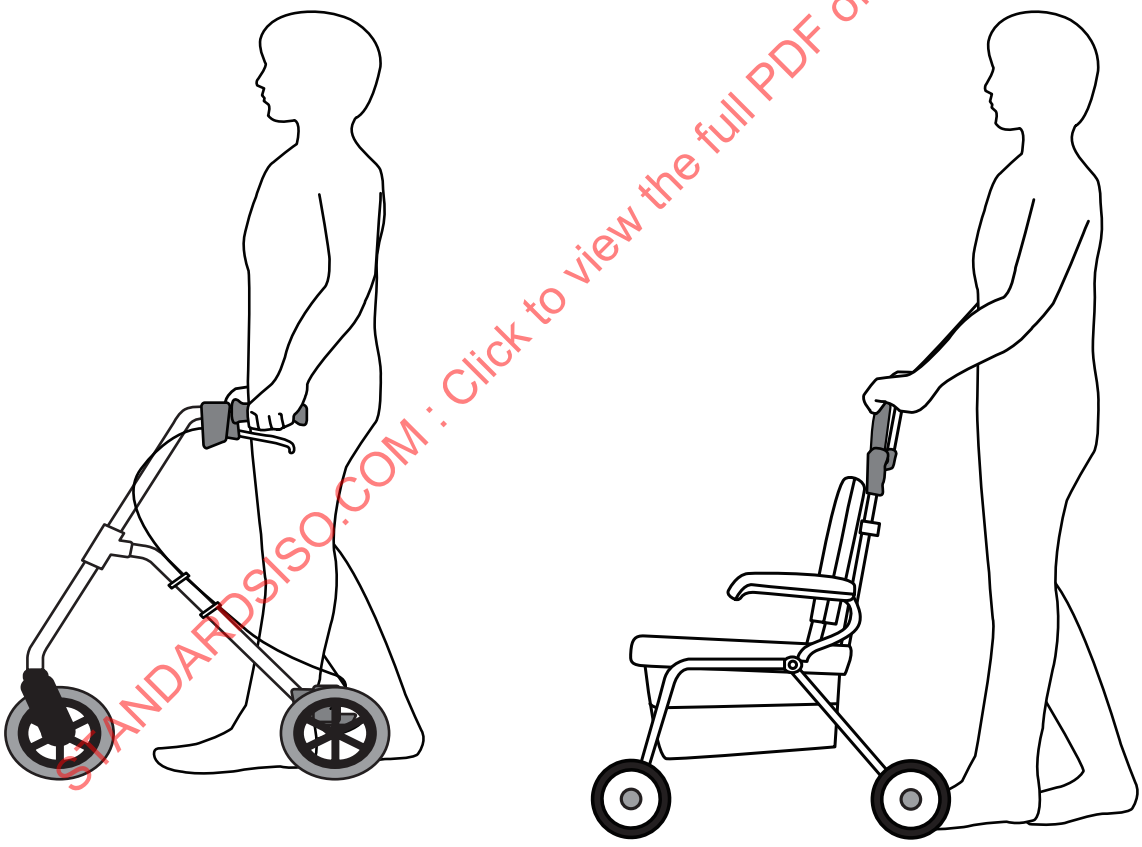
— IEC Electropedia: available at http://www.electropedia.org/

3.1
walking trolley
frames which can be moved by pushing and/or lifting that enable a person to improve stability and balance while walking and standing, with hand grips, without forearm supports and with four or more wheels

Note 1 to entry: All parts are placed in front of the user to guide his/her gait effectively (see Figure 1).

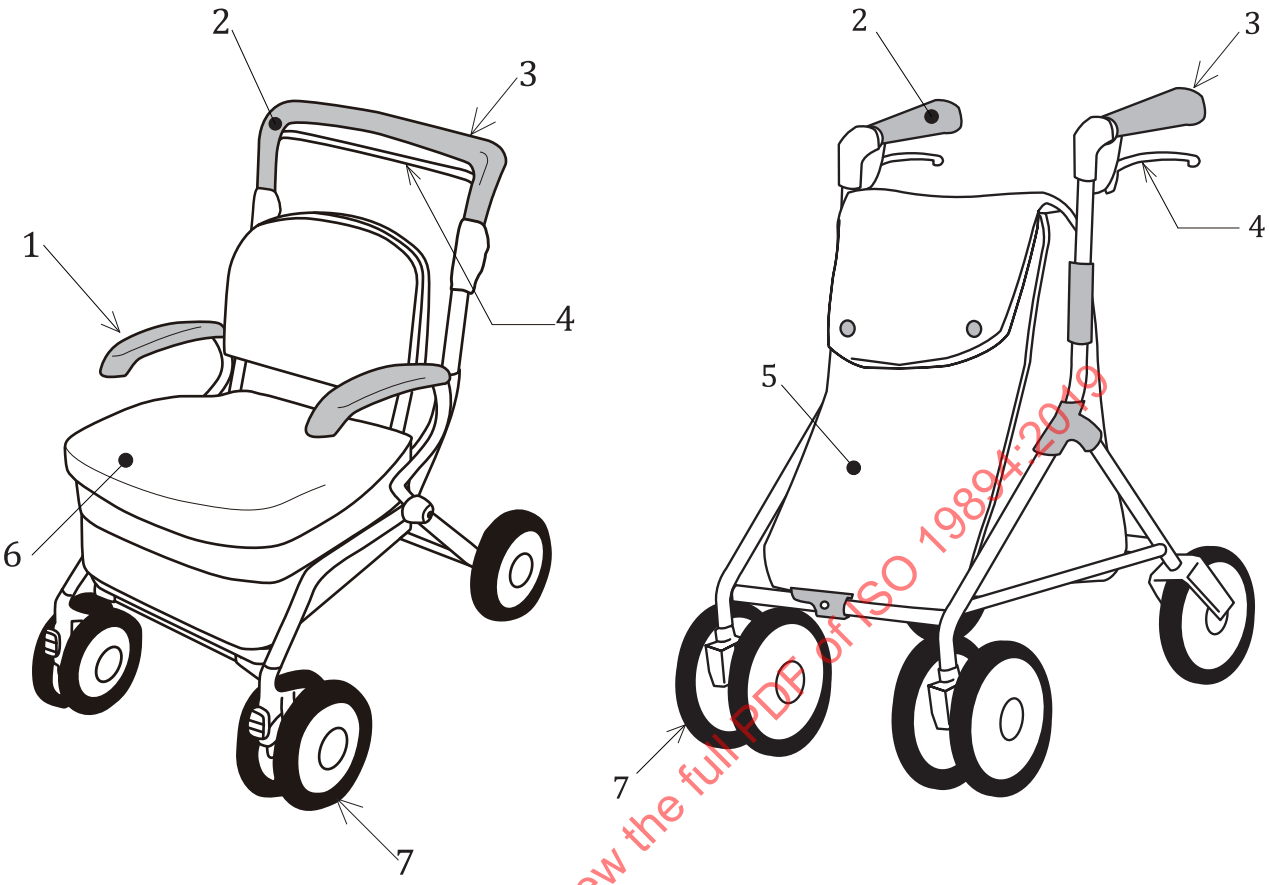
EXAMPLE Walking trolleys with a seat for resting, and/or a bag for carrying goods.

Note 2 to entry: The difference between a walking trolley and a rollator is described in Figure 1.



a) An example of rollators **b) An example of walking trolleys**

Figure 1 — Rollators and walking trolleys



a) Example of unified-handle type **b) Example of separated-handle type**

Key

1	arm support	5	bag
2	handle	6	resting seat
3	hand grip	7	caster
4	brake lever		

Figure 2 — Types and names of each part

3.2
user mass
body mass of the person using walking trolleys

3.3
maximum width
maximum outside dimension of a walking trolley when the width is adjusted at its maximum, measured horizontally at right angles to the direction of movement when the walking trolley is in normal use

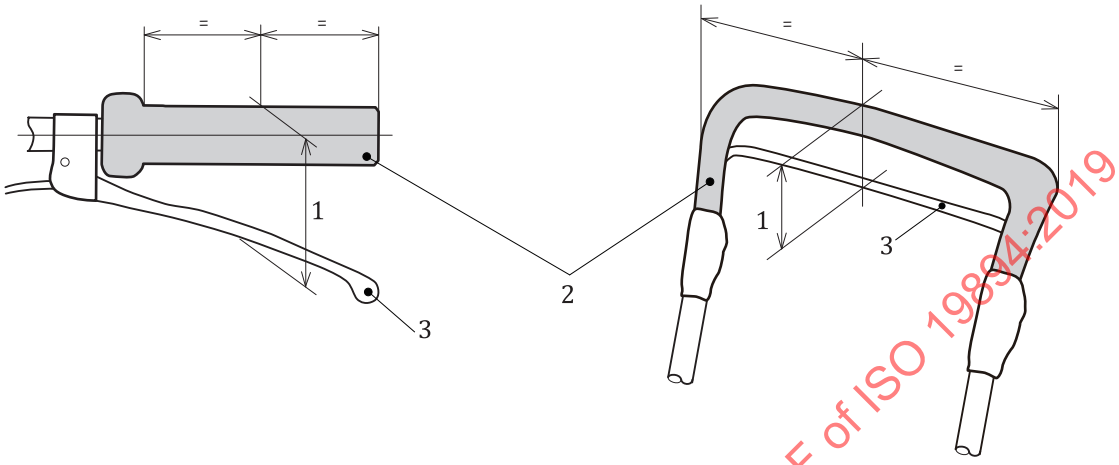
3.4
handle height
vertical distance from the highest point of the handle to the ground surface

3.5
handgrip
part of the walking trolley which is specified by the manufacturer as normally held by the hand when the walking trolley is in use

Note 1 to entry: See Figure 2 and 3.

3.6
grip distance
distance between the upper surface of the handgrip and the lower surface of the brake lever measured vertically at the centre of the hand grip

Note 1 to entry: See Figure 3.



a) Example of separated-handle type **b) Example of unified-handle type**

Key
1 grip distance
2 handgrip
3 brake lever

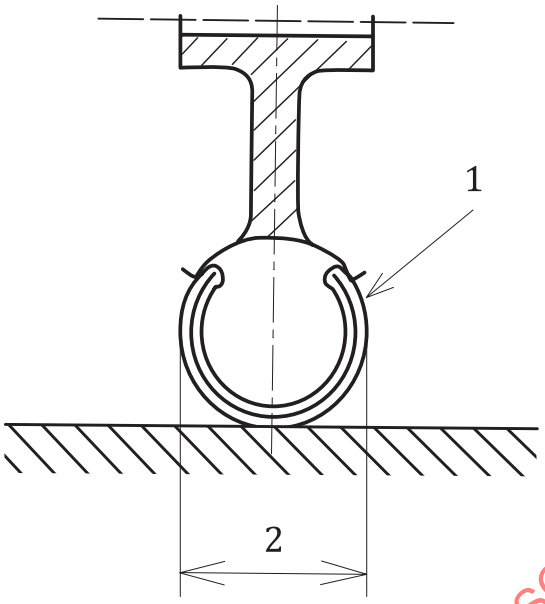
Figure 3 — Details of handle and handgrip

3.7
parking brake
brake to hold the halt condition

3.8
running brake
brake to control the speed while walking

3.9
wheel width
maximum dimension of the tyre of the wheel when the walking trolley is unloaded

Note 1 to entry: See Figure 4.



Key

1 tyre

2 wheel width

Figure 4 — Wheel width

3.10
resting seat
seat for the user to take a rest when necessary while walking

3.11
shopping bag
bag attached on the walking trolley to carry goods bought

3.12
test plane
flat and stiff floor to place the test product on it

4 General requirements and test methods

4.1 Risk analysis

The safety of a walking trolley shall be assessed by identifying hazards and estimating the risks associated with them using the procedures specified in ISO 14971 and, if relevant, ISO 12100.

When a walking trolley is intended by the manufacturer to be used in combination with a device that is not a medical device the device shall behave in a safe way, as a system.

NOTE 1 In the case of certain disabilities, there is a possible need for higher levels of safety for equipment used to offset the effects of that disability.

NOTE 2 For precise information on the hazard causes a risk, refer to Annex A.

4.2 Intended performance

A walking trolley shall have sufficient strength and durability to sustain all loads expected during intended use. This shall be confirmed by using, as appropriate, references to relevant clinical and

scientific literature in addition to the requirements in this document, strength and/or durability calculations, appropriate test standards and their test results.

The intended performance including, if appropriate, strength, durability and tipping stability of a walking trolley shall be described in the information supplied by the manufacturer which sets out its functional characteristics, its application(s) and conditions of use.

The information supplied by the manufacturer shall include, if appropriate, references to relevant clinical and scientific literature, any strength and/or life calculations, conformity with appropriate test standards and their test results.

4.3 Clinical evaluation and investigation

If the risk management demonstrates a need for a clinical evaluation, a clinical evaluation shall be done for all walking trolleys. If, as part of the product conformity assessment, the clinical evaluation requires a clinical investigation, the clinical investigation shall conform to the requirements of ISO 14155. A clinical evaluation shall always be done before performing a clinical investigation.

4.4 Walking trolleys that can be dismantled

If it is intended that a walking trolley can be dismantled for storage or transportation, it shall not be possible to reassemble it in a manner that presents a hazard.

4.5 Fasteners

The fasteners which are loosened or removed to allow this dismantling shall not be single use fasteners.

NOTE For further information, see EN 12182.

EXAMPLE Single use fasteners include wood screws and self-tapping screws. Bolts are examples of fasteners that can be used more than once.

All load-bearing fasteners shall be either self-locking or fitted with a locking device to prevent inadvertent detachment.

4.6 User mass/load limits

The maximum user mass shall be declared. If the maximum load is different, both shall be declared by the manufacturer.

All products with the intended purpose of supporting an occupant/user in a seated or lying position shall be capable of supporting a person with at least 100 kg body mass.

The maximum user mass and the maximum load as specified by the manufacturer shall be used in the relevant test methods of this document.

When the loading pad is used for testing, the mass thereof shall be taken into account for the test value of loading.

4.7 Apparatus

4.7.1 Means to apply a force with an accuracy of ±5 % and with a rate of application less than 1 N/s.

4.7.2 Means to measure force with an accuracy of ±5 % in increments of 1 N.

4.7.3 Means to measure distance in the range of 0 m to 3 m with an accuracy of ±5 mm or ±2 % whichever is the greater.

4.7.4 Means to measure angles to an accuracy of ±0,5°.

4.7.5 Means to measure torque with an accuracy of ±5 % in increments of 1 Nm in the range of 0,5 Nm to 10 Nm.

4.7.6 Means to measure sound levels and frequencies calibrated in accordance with the manufacturer's instructions, using an acoustic calibrator class 1 as described in ISO 3746 with an accuracy of ±3 dB(A).

4.7.7 A hard horizontal and inclinable test plane of sufficient size to support the walking trolley during testing, such that the whole surface is contained between two imaginary parallel planes 5 mm apart. A non-adjustable test plane can be used, if it is set to the correct angle.

NOTE A hardwood board (e.g. >600 kg/m^3) is an example of material used.

4.7.8 Stoppers for walking trolley not smaller than half of the wheel diameter and not greater than the wheel diameter.

4.7.9 Equipment capable of simulating human body parts as used in practice (e.g. test fingers).

4.7.10 Equipment for applying loads with negligible dynamic factor.

NOTE Negligible dynamic force is a small force that does not have a big impact.

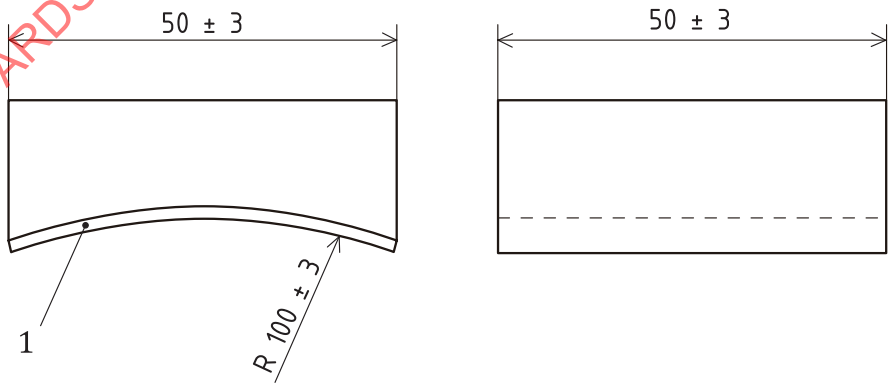
4.7.11 Equipment for measuring pressure of water, oil and air with an accuracy of ±5 %.

4.7.12 Loading pads as follows.

4.7.12.1 Seat loading pad, the loading pad shall be made of metal or hard wood with no sharp edges. The pad shall be round with a diameter of 355 mm ± 5 mm, or rectangular with the dimensions: 340 × 200 mm ± 5 mm and the height to be sufficient for loading pad to be stiff enough to take the test load without deforming significantly.

4.7.12.2 Arm support loading pad, the loading board shall be made of metal or hard wood with no sharp edges. The shape and dimensions are shown in Figure 5.

Dimensions in millimetres



Key

1 loading surface

Figure 5 — Arm support loading pad

NOTE The loading surface can be covered with non-slip material up to 3 mm thick, e.g. plastic foam.

4.7.12.3 Seat loading pad for stability test in a horizontal position, the loading pad shall be made of metal or hard wood with no sharp edges. The pad shall be round with a diameter of 200 mm ± 5 mm and the height to be sufficient for loading pad to be stiff enough to take the test load without deforming significantly.

4.8 Test conditions

a) The tests shall be conducted under a room temperature of 21 °C ± 5 °C.

b) The height of every adjustable part of the product shall be adjusted to the most adverse position as far as a condition is not specified in the test procedure.

c) The wheels shall be adjusted to the most adverse condition as far as a condition is not specified in the test procedure.

d) The handle shall be positioned most adversely as far as a condition is not specified in the test procedure.

e) The running brake and parking brake shall not be operated as far as the test procedure does not specify it.

f) All abnormalities such as breakage on each test shall be recorded and be distinguished from the abnormalities on the subsequent tests.

5 Materials

5.1 General

Manufacturers should, wherever possible, use materials that can be recycled for further use. It should be stated in the instructions for use which parts can be recycled.

5.2 Flammability

5.2.1 General

Manufacturers shall consider the environments and methods of use to which a walking trolley, or any materials that are usually used in combination with this walking trolley, will be exposed and take appropriate steps to minimise any fire hazard.

The manufacturer shall include a warning in the instructions for use about safe combinations of flame resistant and non-flame resistant materials.

NOTE For guidance, see B.5.2.

5.2.2 Upholstered parts and moulded parts

If the manufacturer claims that the upholstered parts are resistant to ignition by cigarette, progressive smouldering ignition and flaming ignition shall not occur when the materials used for the upholstered parts of an assistive product are tested in accordance with ISO 8191-1 and ISO 8191-2.

If the manufacturer claims that moulded parts are resistant to ignition by small flames, such as those from a match, progressive smouldering ignition and flaming ignition shall not occur when tested in accordance with IEC 60695-1-10.

5.3 Biocompatibility and toxicity

Materials which come into contact with the human body shall be assessed for biocompatibility using the guidance in ISO 10993-1.

The assessment shall also take into account the intended use and contact by those involved in user care. The result of the assessment shall be incorporated in the risk analysis (see 4.1).

The assistive products shall be designed and manufactured in such a way as to reduce to a minimum the risks posed by substances leaking from the assistive product. Special attention shall be given to substances which are carcinogenic, mutagenic or toxic to reproduction and other substances of very high concern (SVHCs).

The assessment should follow the guidance given in Annex C.

5.4 Infection and microbiological contamination

5.4.1 Cleaning and disinfection

If a walking trolley is intended to be cleaned and/or disinfected, the method and suitable cleaning or disinfection materials shall be described in the information supplied by the manufacturer.

NOTE For guidance, see B.5.4.1.

If a walking trolley is intended to be cleaned by automatic washing systems or hand-held jet stream/steam washing the details of the procedure, such as temperature, pressure, flow and pH value of cleaning/rinsing solution shall be described in the instructions for use. Where practicable, the walking trolley shall be labelled with appropriate symbols to represent the method of cleaning. See examples of labelling and an example of testing of machine washable walking trolley in B.5.4.1.

5.4.2 Resistance against temperature alternations

If a walking trolley is intended to be heated up during the disinfection or washing process, it shall pass the following test.

The test sample is exposed to the maximum temperature ±2 °C during the washing and disinfection process as described by the manufacturer and afterwards cooled down to a temperature of 30 °C. This cycle of alternating temperatures is repeated ten times.

For products intended to be disinfected by heat one of the following three temperatures and duration of exposition can be used:

a) a temperature of 90 °C for 1 min;

b) a temperature of 85 °C for 3 min;

c) a temperature of 80 °C for 10 min.

The test shall be performed before any strength and/or durability tests of the product.

After the test, the product shall fulfil the following requirements: coating or any relevant labelling on the product shall not come loose from the basic sheet metal, show blisters or any other quality-reducing changes.

5.4.3 Animal tissue

Where a device has been manufactured utilising tissues of animal origin or their derivatives, risk assessment shall be performed and documented according to ISO 22442-1.

NOTE For guidance, see B.5.4.3.

5.5 Resistance to corrosion

The risk of corrosion affecting the safety of the user or an assistant shall be assessed in the risk analysis. Assistive products that are identified to be at risk of corrosion shall be sufficiently protected

against corrosion, which shall be confirmed by using the salt spray test according to ISO 9227 with a test duration of 72 h.

6 Ingress of liquids

6.1 Ingress of liquids

6.1.1 Requirements

If liquid can come unintentionally into an enclosure there shall be a way for the liquid to get out of the enclosure, or the liquid shall not cause any kind of hazard.

The hazards that can be caused by the ingress of liquids to non-electrically powered walking trolleys shall be assessed in the risk analysis (see 4.1).

NOTE Hazards might be risk of corrosion or bacterial growth.

6.1.2 Test method

Test if there is a way for the liquid to get out of the enclosure, by using procedures as in normal use and handling of the product. If possible tilt the product in different directions to verify this.

7 Temperatures of parts that come in contact with human skin

The risk analysis (see 4.1) shall identify hazards and evaluate the risks associated with the surface temperature of parts which can come into contact with human skin during the intended conditions of use.

The risk analysis shall take account of:

a) the range of ambient temperatures to be expected during the intended use and foreseeable misuse;

NOTE These temperatures could include direct exposure to sunshine, hot water, hot air, extreme cold, saunas, etc.

b) temperatures that can result from single fault conditions;

c) the ergonomic data on acceptable temperatures of touchable surfaces in IEC 60601-1:2005, Table 24 adapted to the use of walking trolley by people with insensitive skin (i.e. cannot feel heat) and/or damaged skin for a duration of 10 min or more. In this case the maximum temperature shall not exceed 41 °C (see Table 1 below) when measured by the methods of test in IEC 60601-1:2005.

If a manufacturer cannot meet the requirement of c) without impairing the intended performance of the walking trolley, each assistive product should be supplied with a warning identifying which surfaces can reach a higher temperature than that specified in Table 1 and a description of the precautions necessary to offset the increased risk.

Table 1 — Allowable maximum temperatures for skin contact with walking trolley (applied parts)

Applied parts of walking trolley		Maximum temperature[a] °C		
		Metal and liquids	Glass, porcelain, vitreous material	Moulded material, plastic, rubber, wood
Applied part having contact with a person for a time "*t*"	*t* < 1 min	51	56	60
	1 min ≤ *t* < 10 min	48	48	48
	10 min ≤ *t*	41	41	41

[a] These temperature limit values are applicable for the healthy skin of adults, but in the temperature limitation for durations of more than 10 min, persons with disability with sensitive skin or no sensation have also been considered. They are not applicable when large areas of the skin (10 % of total body surface or more) can be in contact with a hot surface. They are not applicable in the case of skin contact with over 10 % of the head surface. Where this is the case, appropriate limits shall be determined and documented in the risk management file.

8 Safety of moving and folding parts

8.1 Squeezing

Unless the intended purpose of a walking trolley, or part of a walking trolley, is to grip, cut, squeeze etc., or if the intended use cannot be achieved without a hazard such as risk of squeezing:

a) any moving parts that constitute a safety hazard shall be provided with guards that can only be removed by the use of a tool; or

b) the gap between exposed parts of an assistive product that move relative to each other shall be maintained throughout the range of movement at less than the minimum value or more than the maximum value set out in Table 2.

The following measurements shall be made before and after any relevant strength, durability and impact testing.

Table 2 — Safe distances between moving parts

To avoid	Safe distances for adults	Safe distances for children[a]
Finger traps	Less than 8 mm or more than 25 mm	Less than 4 mm or more than 25 mm
Foot traps	Less than 35 mm or more than 120 mm	Less than 25 mm or more than 120 mm
Head traps	Less than 120 mm or more than 300 mm	Less than 60 mm or more than 300 mm
Genitalia traps	Less than 8 mm or more than 75 mm	Less than 8 mm or more than 75 mm

[a] Also includes adults with a height of less than 146 cm, or a mass of less than 40 kg, or a Body Mass Index (BMI) of less than 17.

For moving parts that can cause squeezing, manufacturers shall take into consideration those part/parts of the body that are at risk. The user/user group has to be specified, so that correct safety distances can be applied.

To avoid a hazard where parts of the body can be trapped when the walking trolley is folded, the following shall be assessed:

— the walking trolley shall incorporate means to protect the user from trapping and/or squeezing hazards; or

— the gap between exposed parts of a walking trolley that move relative to each other shall be maintained throughout the range of movement at less than the minimum value or more than the maximum value set out in Table 2; or

— if the intended purpose of a walking trolley cannot be met without a hazard such as squeezing, a warning and instructions on how to operate the walking trolley safely shall be provided in the instructions for use.

If guards are applied, the design of a guard shall take into consideration the forces that can be applied in normal use.

8.2 Mechanical wear

Parts subject to mechanical wear likely to result in a safety hazard shall be accessible for inspection, unless it is intended to be replaced by a service interval specified by the manufacturer.

9 Prevention of traps for parts of the human body

9.1 Holes and clearances

Holes in and clearances between stationary parts that are accessible to the user and/or assistant during the intended use of a walking trolley shall be as specified in Table 3.

These measurements shall be done before and after any relevant strength, durability and impact testing.

Table 3 — Safe distances between stationary parts

To avoid	Safe distances for adults	Safe distances for children[a]
Finger traps	Less than 8 mm or more than 25 mm	Less than 5 mm or more than 12 mm
Foot traps	Less than 35 mm or more than 100 mm	Less than 25 mm or more than 45 mm
Head traps	Less than 120 mm or more than 250 mm	Less than 60 mm or more than 250 mm
Genitalia traps	Less than 8 mm or more than 75 mm	Less than 8 mm or more than 75 mm

[a] Also includes adults with a height of less than 146 cm, or a mass of less than 40 kg, or a BMI of less than 17.

If the intended purpose of a walking trolley cannot be met without a hazard caused by the size of holes and the clearance between stationary parts, a warning and instructions on how to operate the walking trolley safely shall be provided in the instructions for use.

For stationary parts that can cause a trap, manufacturers shall take into consideration those parts of the body that are at risk. The user/user group has to be specified, so that correct safety distances can be applied.

The design of parts that confine a hole or clearance shall take into consideration the forces that can be applied in normal use.

NOTE A force might cause a hole/clearance to widen. This can then cause a failure, as specified in Table 3.

On holes with the shape of a keyhole or V-shaped openings, the lower limit shall not apply. When inspecting the walking trolley for traps for body parts, any flexibility/elasticity of adjacent parts shall be taken into account.

9.2 V-shaped openings

The risk of entrapment in V-shaped openings shall be assessed by the manufacturer. A V-shaped opening should be at least 75 degrees. This will reduce the risk of a user being trapped by the head at any position.

10 Folding and adjusting mechanisms

10.1 General

Folding and adjusting mechanisms can cause a hazard if parts of the body can enter a gap between parts and be trapped when the gap is closed. See Clause 8 for safety requirements.

If a walking trolley incorporates folding and/or adjusting mechanisms it shall conform to 10.2.

If a product is able to be height adjustable the increments shall not exceed 25 mm.

10.2 Locking mechanisms

The mechanisms shall be capable of being securely locked when the walking trolley is in any fixed working configuration. It shall also be capable of being securely locked when folded if it constitutes a risk for the user or assistant. It shall be protected against unintended release.

10.3 Folding function

10.3.1 Requirements

When equipped with a folding function, the function part shall not come off and not fold during use. There shall be no breakage, departure, or deformation after the test specified in 10.3.2.

10.3.2 Retaining test and strength test of folding mechanism

Retaining test and strength test of folding mechanism shall be as follows:

a) Set the product in use condition securely on a flat horizontal test plane.

b) Apply a force of 100 N on the product in the direction of normal use and retain the force for 10 sec. Repeat this 10 times. During that time, confirm that the body is not folded. The section in which to apply the force is generally on the handle, but if the product has a section which makes the retaining easier, application of force on such a section shall also be attempted.

c) Check the condition of the walking trolley.

d) Apply a force of 100 N to the most adverse position in a folding direction of the products agreed between manufacturer and testing institute. Hold this condition for 10 sec and remove the force. Repeat this procedure 10 times and confirm that the body is not folded during that time. The point of force application and direction shall be documented in the test report.

e) Check the condition of the walking trolley.

11 Lifting and carrying means

11.1 General

Manufacturers should note that national or other requirements can demand test loads different to the following.

If a walking trolley or a part of a walking trolley has a mass of 10 kg or more and the intended use is for it to be portable or to be handled according to manufacturer's instructions, it shall either:

a) have one or more handles suitably placed which enable the walking trolley or part to be carried by two or more persons, or be provided with suitable handling devices (e.g. handles, lifting eyes); or

b) the instructions for use shall indicate the points where the walking trolley or its part can be lifted safely and describe how they should be handled during lifting, assembly and/or carrying. If practical, the walking trolley or component parts shall be labelled to indicate where it can be lifted safely and/or how it can be handled during assembly and/or carrying.

11.2 Requirement

If a walking trolley incorporates carrying handles or grips, they shall not become detached from the walking trolley and there shall not be any permanent distortion, cracking or other evidence of failure when tested as specified in 11.3.

After the completion of the test, the walking trolley shall operate as intended by the manufacturer.

11.3 Test method

If a walking trolley has one handle or grip, or if a walking trolley can readily be carried or lifted by one of a number of handles or grips, determine the force on each handle or grip when it is carried or lifted.

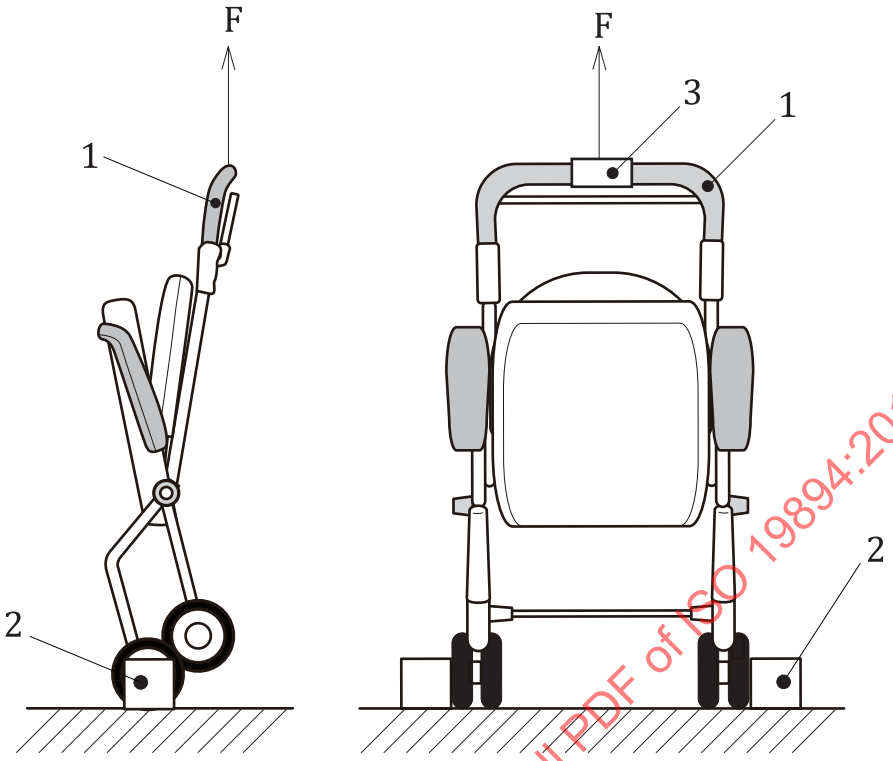
If a walking trolley has more than one handle or grip, determine the force on each handle or grip when the walking trolley is carried or lifted in the intended manner.

On each handle or grip, determine the force necessary to carry the walking trolley in the intended manner with a tolerance of ±3 %. If there is more than one intended manner, determine the highest force.

Restrain the walking trolley from being lifted or moved during the following test. Apply a force to each handle or grip, equal to twice that determined above with a tolerance of ±3 %, uniformly distributed over a 70 mm ± 5 mm length in the centre of the handle or grip, avoiding shock (see Figure 6).

Maintain the force for at least 60 s.

Remove the force and the restraints and inspect the walking trolley for damage and satisfactory operation.



Key

1 handle of walking trolley
2 restraints
3 test force uniformly distributed over a 70 mm ± 5 mm length in the centre of the handle

Figure 6 — Carrying handle test (an example)

12 Strength, torque, durability

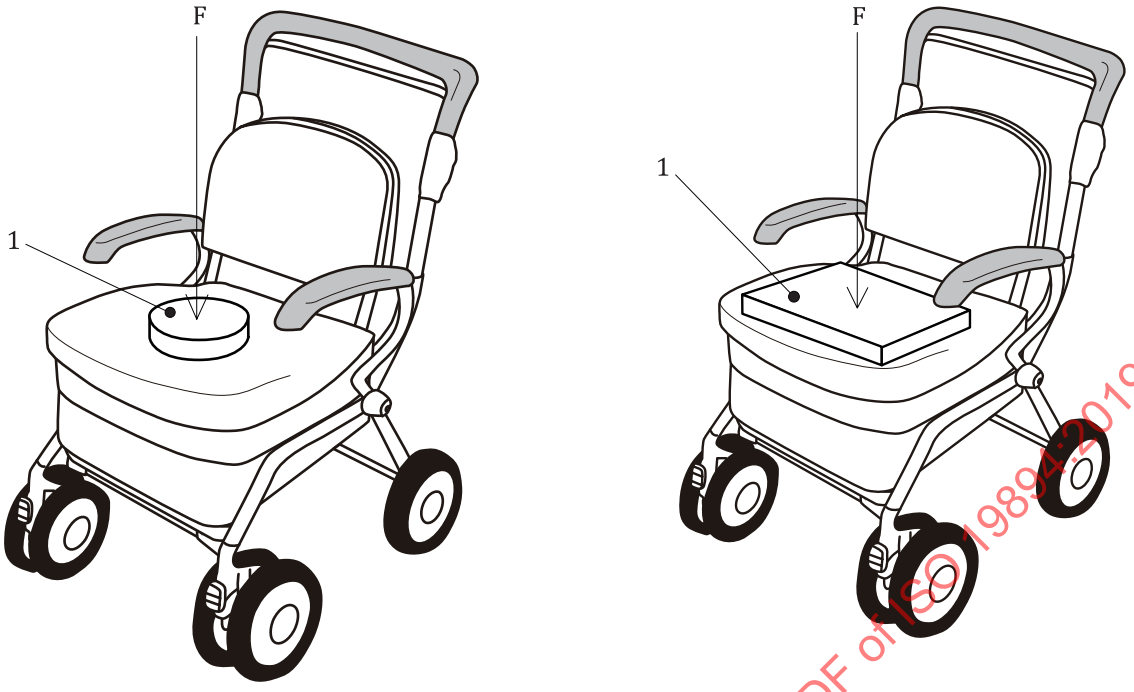
12.1 Strength of the resting seat

12.1.1 Requirements

There shall be no breakage, departures or deformation that cause troubles for use after the test specified in 12.1.2 is conducted.

12.1.2 Strength test of the resting seat

The strength test of the resting seat shall be as follows (see Figure 7).



a) Round loading pad **b) Rectangular loading pad**

Key

1 loading pad

Figure 7 — Strength test of resting seat

a) Set the product stationary on a flat horizontal test plane. When equipped with a parking brake, apply the brake and hold it. When equipped with a shopping bag, put polystyrene foam in the bag evenly to the height of 15 cm, and then put a weight equivalent to the load mass on the polystyrene foam.

b) Put the seat loading pad on the seat so that the midpoint of the base of the loading pad is vertically aligned with the centre of the resting seat.

c) Gradually apply the force of 1 200 N including the mass of the loading pad vertically downward on the centre of the loading pad. If the maximum user mass specified for the walking trolley deviates from a user mass of 100 kg, a force of 12 N per kilogram of maximum user mass ±2 % shall be applied. The load shall be no less than 420 N ± 2 %.

d) After holding this condition for 2 min, remove the vertical force and check the condition of the walking trolley.

12.2 Strength of the arm support

12.2.1 Requirements

No part of the product shall crack or break after the test.

12.2.2 Strength test of the arm support

Strength test of the arm support shall be as follows (see Figure 8).

a) Set the walking trolley stationary on a flat horizontal test plane. When equipped with a parking brake, apply the brake and hold it.

b) Place the arm support loading pad specified in 4.7.12.2 on the arm support at the most adverse position of the arm support.

c) Set up means for applying the test force, so that its line of action intersects the support surface of the arm support as shown in Figure 8 using the loading pad.

NOTE Figure 8 shows the configuration of the loading equipment at the start of the test. This configuration will change as the test deforms the walking trolley.

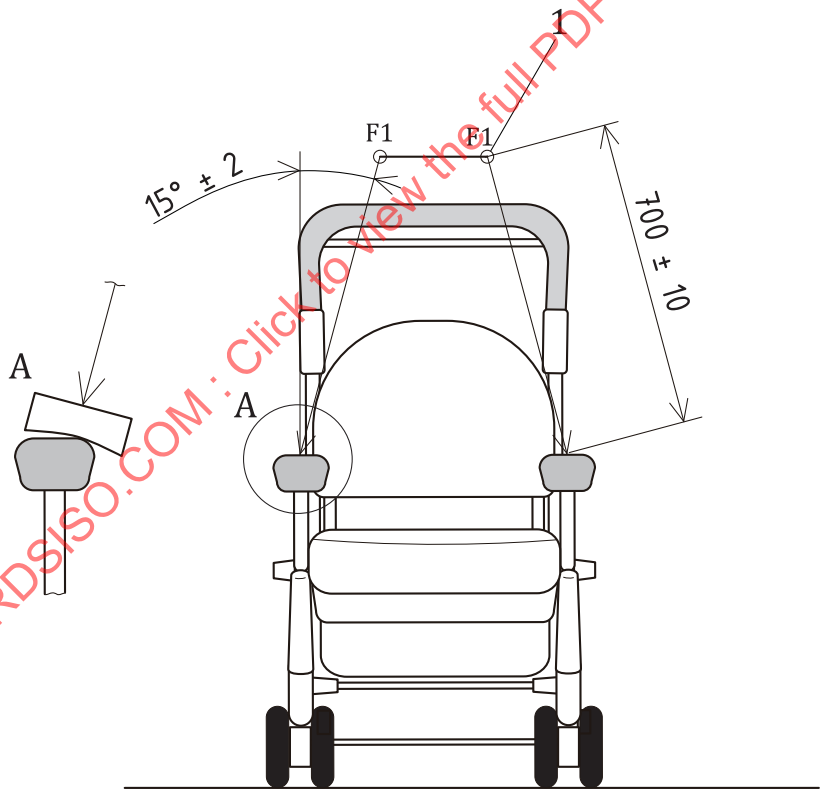
d) Before commencing the test, set up the means to prevent the walking trolley from tipping and moving fore-and-aft.

e) Test load can be applied to both arm supports simultaneously or one at a time.

f) Gradually apply 500 N load including the weight of the pad on the centre of the pad as shown in Figure 8. If the maximum user mass specified for the walking trolley deviates from a user mass of 100 kg, a force of 5 N per kilogram of maximum user mass 2 % shall be applied. The load shall be no less than 210 N 2 %.

g) After keeping this condition for one minute, remove the load and the pad, and check the condition of the walking trolley.

Dimensions in millimetres



Key

1 pivot(s) for load application

Figure 8 — Strength test of arm support

12.3 Torque of the handle

12.3.1 Requirements

No part of the product shall crack or break after the test.

12.3.2 Torque test of the handle

Torque test for the handle shall be as follows (see Figure 9):

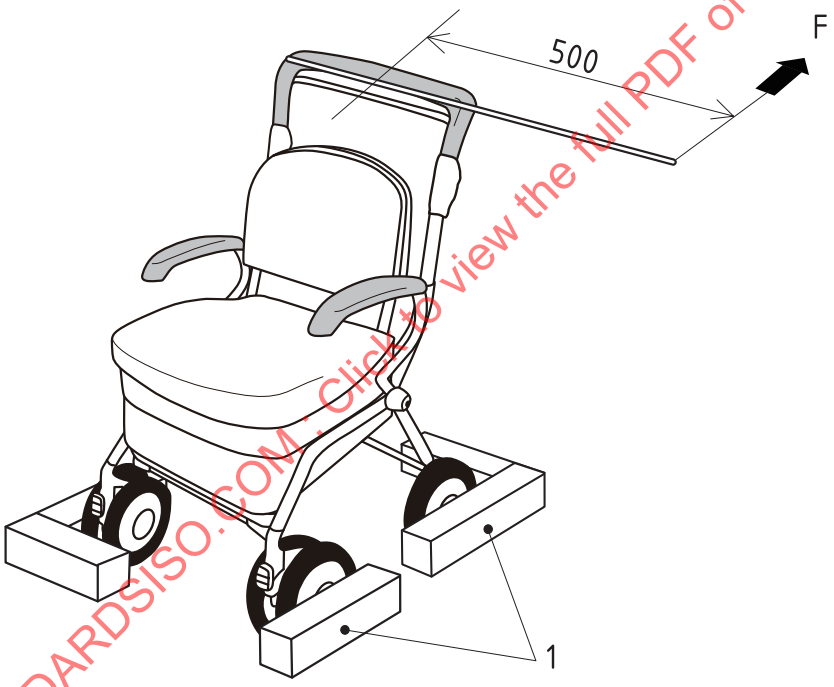
a) Set the product stationary on a flat horizontal test plane and fix the bottom of 4 wheels.

b) Fix a bar on and along the handle as the Figure shows.

c) Apply a force of 100 N on the bar 500 mm away from the centre of the handle rearward horizontally and hold it.

d) After 1 min, remove the horizontal force and check if there is no breakage, no departure nor deformation that causes troubles for use.

Dimensions in millimetres



Key

1 fix the wheels

Figure 9 — Torque test of the handle

12.4 Running durability

12.4.1 Requirements

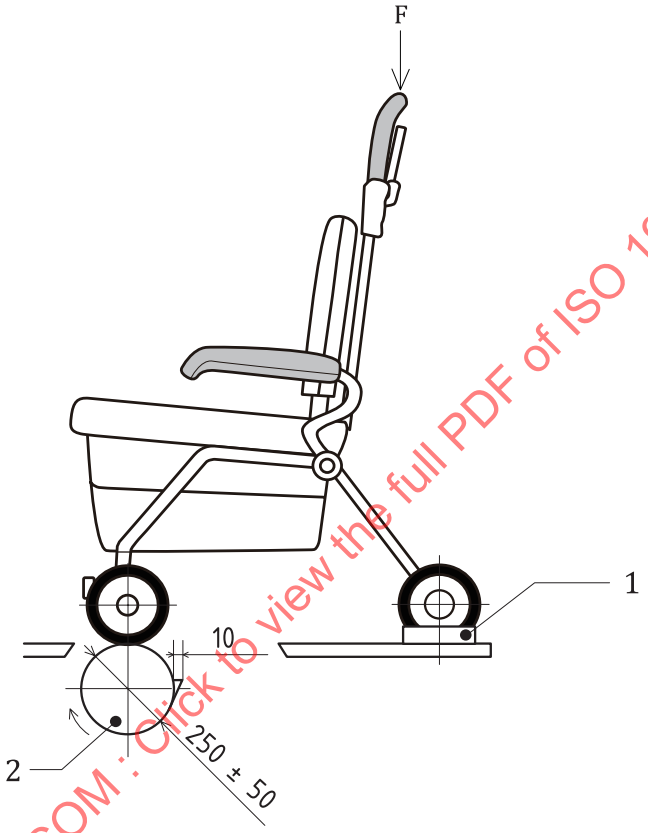
There shall be no cracks, breakage, coming-off and deformation that cause troubles for use after the test. The lock for fixing shall not be loosened and the folding mechanism shall not become unlocked.

12.4.2 Running durability test

The Running durability test shall be as follows (see Figure 10).

a) Place the product in using condition on the test equipment with 250 mm ± 50 mm diameter drum that has a 10 mm height bump. Fix the rear wheel on the floor so that the front wheels are just on the centre of the drum. It shall be fixed not to hinder the free up-and-down move and, at the same time, to prevent the lateral swing.

Dimensions in millimetres



Key

1 fix the rear wheels

2 drum

Figure 10 — Running durability

b) Next, apply a force of 100 N on the centre of the handle. When equipped with a separated-type handle, connect the left and right handles with a bar, and apply a force equivalent to be 100 N including the weight of the bar. When equipped with a shopping bag, put polystyrene foam in the bag evenly to the height of 15 cm and put a weight equivalent to the maximum safe working load mass on the polystyrene foam.

c) In this condition, rotate the drum at the speed between 24 m and 30 m per minute. The number of cycles shall be 60 000.

d) Subsequently, carry out the same test with placing the rear wheels on the drum.

NOTE Both rear and front wheels can be tested at the same time with a double drum test equipment.

13 Appearance (Surfaces, corners, edges and protruding parts)

There shall be no burrs, sharp edges, or protrusions on the parts of walking trolleys possible to blemish clothes or injure the users.

14 Stability

14.1 Requirements for static stability on slope

The product shall not fall.

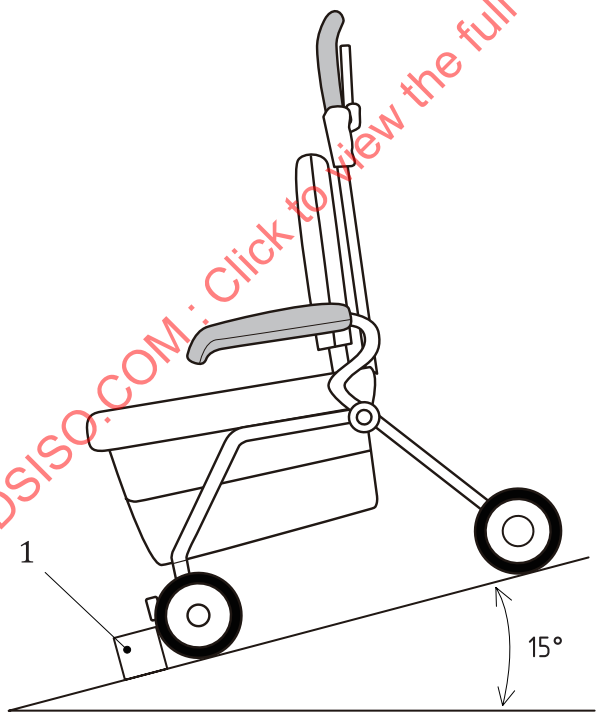
14.2 Test method for static stability on slope

14.2.1 Forward stability test

Forward stability test shall be performed as follows (see Figure 11).

a) Set the product stationary on a flat tiltable test plane with hinges and a stopper (shall be more than 1/2 and less than 2/3 height of the wheel diameter) as shown in Figure 11.

b) Make the left and right front wheels contact with the stopper. Adjust the left and right casters to face backward. When the handle height is adjustable, it shall be adjusted to be its highest.



Key

1 stopper

Figure 11 — Forward stability test

c) When equipped with a shopping bag, the most adverse condition shall be applied. If a load is necessary for a shopping bag to make the most adverse condition, put polystyrene foam in the bag evenly to the height of 15 cm, and then put a weight equivalent to the maximum safe working load on the polystyrene foam. No load shall be required to a resting seat.

d) With this condition, incline the test plane gradually up to 15° and check the presence or absence of falling.

14.2.2 Rearward stability test

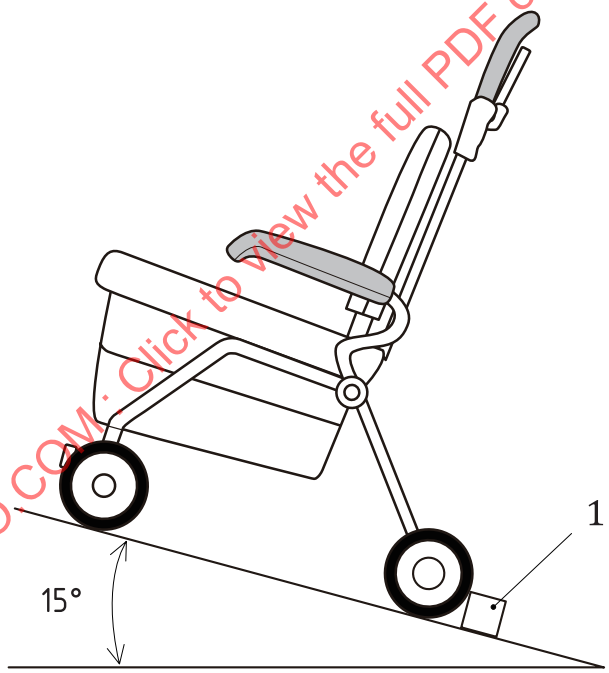
Rearward stability test shall be performed as follows (see Figure 12).

a) Set the product stationary on a flat tiltable test plane with hinges and a stopper (shall be more than 1/2 and not less than 2/3 height of the wheel diameter) as shown in Figure 12. When equipped with a parking brake, the brake shall not be activated.

b) Make the left and right rear wheels contact with the stopper. Adjust the left and right casters to face backward. When equipped with the height-adjustable handle, adjust the handle to be highest.

c) When equipped with a shopping bag, the most adverse condition shall be applied. If a load is necessary for a shopping bag to make the most adverse condition, put polystyrene foam in the bag evenly to the height of 15 cm, then put a weight equivalent to the maximum safe working load on the polystyrene foam. No load shall be required to a resting seat.

d) With this condition, incline the test plane gradually up to 15° and check the presence or absence of falling.



Key

1 stopper

Figure 12 — Rearward stability test

14.2.3 Lateral stability test

The lateral stability test shall be performed as follows (see Figure 13).

a) Set the product stationary on a flat tiltable test plane with hinges and a stopper parallel to the hinges (shall be more than 1/2 and not less than 2/3 height of the wheel diameter) as shown in Figure 13. When equipped with a parking brake, apply the brake and hold it.

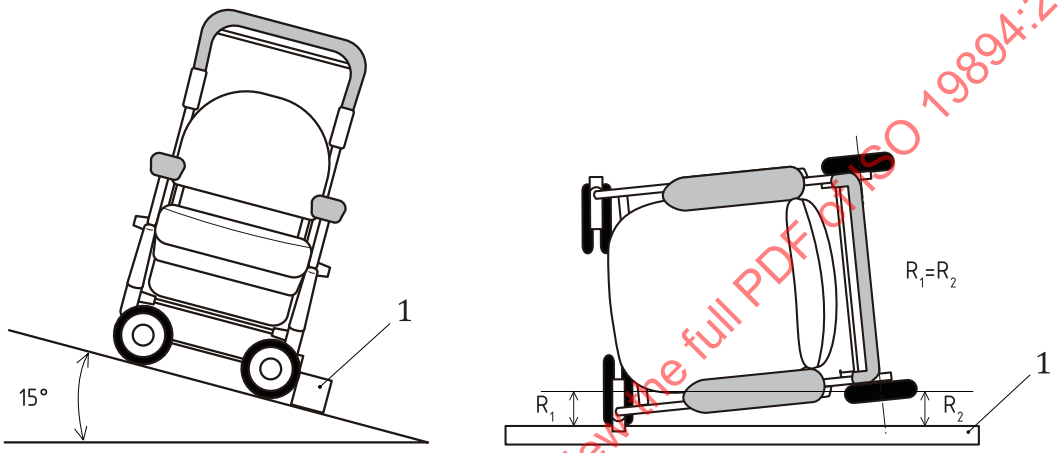
b) Make the front wheels contact with the stoppers, adjusting the wheels to be 90° to the running direction inward. Adjust the product so that the line connecting the front axis and rear axis to be

parallel to the hinges. When the rear wheels are the fixed type, the rear wheels cannot contact the stopper because the wheel centre of the front wheel and the rear wheel axis are set to be the same distance from the stopper, R1=R2 in Figure 13. When equipped with the height-adjustable handle, adjust the handle to be highest.

c) When equipped with a shopping bag, the most adverse condition shall be applied. If a load is necessary for a shopping bag to make the most adverse condition, put polystyrene foam in the bag evenly to the height of 15 cm, and then put a weight equivalent to the maximum safe working load on the polystyrene foam. No load shall be required to a resting seat.

d) With this condition, incline the test plane gradually up to 15° and check the presence or absence of falling.

e) Carry out the same test for other sides.



Key

1 stopper

Figure 13 — Lateral stability test

14.3 Requirements for stability and strength when the handle is loaded

The product shall not fall and have no breakage or departure.

14.4 Stability test and strength test when the handle is loaded

14.4.1 In the case of unified-type handle

The test of the product with unified-type handle shall be as follows (see Figure 14 a):

a) Set the test product stationary on a flat horizontal test plane. When equipped with a parking brake, do not apply the brake. When equipped with a shopping bag, keep it empty.

b) Apply a vertical downward force of 200 N at 1/4 of the handle length from the either outer end of the handle [F1 in a) of Figure 14].

c) Keep this condition for 2 min and check the presence or absence of falling.

d) After that, remove the force and check the condition of the walking trolley.

e) Carry out the same test on another side [F2 in a) of Figure 14].

14.4.2 In the case of separated-type handles

The test of the product with separated-type handles shall be as follows.

a) Set the test product securely on a flat horizontal test plane. When equipped with a parking brake, do not apply the brake. When equipped with a shopping bag, keep it empty.

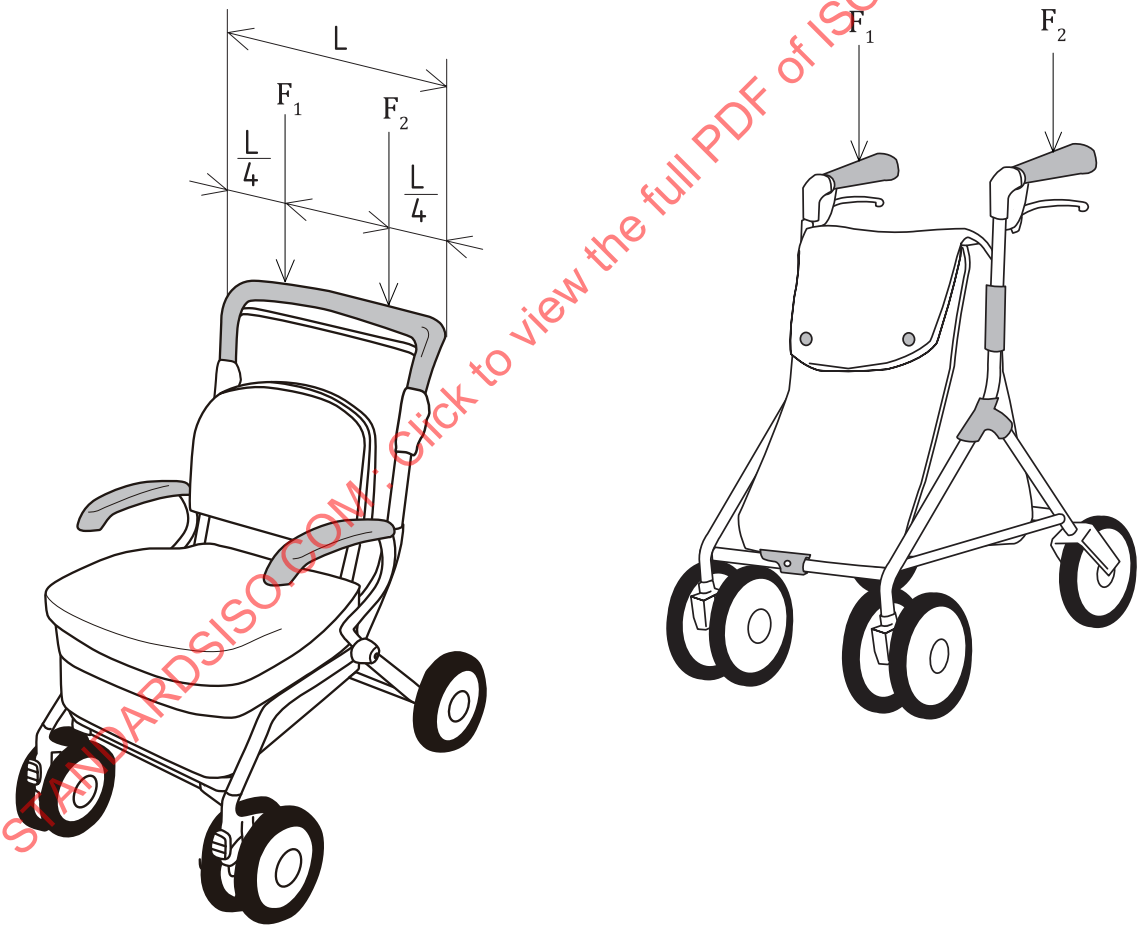
b) Apply the vertical downward force of 200 N at the centre point of the handgrip of either handle. [F1 in b) of Figure 14]

NOTE If the rear end of the handgrip is not clear, the rear end is to be the point of 10 mm from the real end of the grip. If a handle is a bent tube or bent bar, apply the force at 30 mm from the beginning of straight part of the handle.

c) Keep this condition for 2 min and check the presence or absence of falling.

d) After that, remove the force of 200 N, and check the condition of the walking trolley.

e) Carry out the same test on the other side [F2 in b) of Figure 14].



a) Unified-handle type **b) Separated-handle type**

Figure 14 — Stability and strength test when handle is loaded

14.5 Requirements for stability in a horizontal position when the resting seat is loaded

The product shall not fall.

14.6 Stability test in a horizontal position when the resting seat is loaded

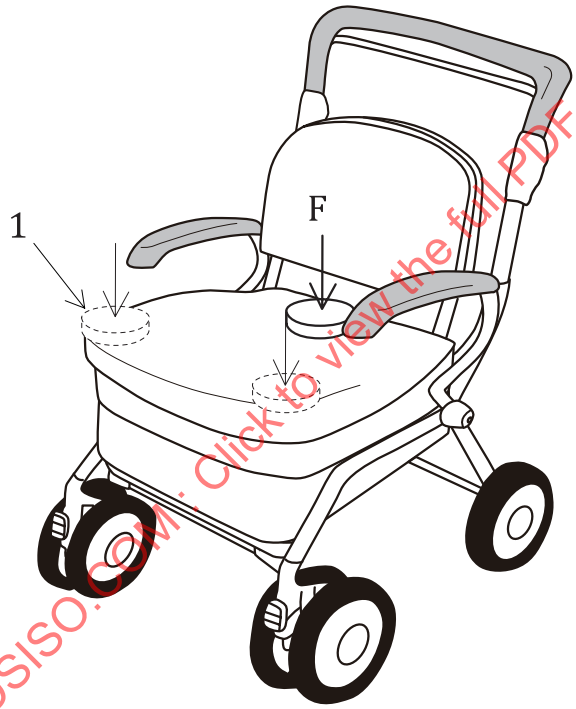
The Stability test when the walking trolley is in horizontal position and the resting seat is loaded shall be as follows (see Figure 15).

a) Set the product stationary on a flat horizontal test plane. When equipped with a parking brake, apply the brake and hold it. When equipped with a shopping bag, the most adverse condition shall be applied.

b) Place a seat loading pad for stability test in a horizontal position specified in 4.7.12.3 at the most adverse position for stability on the resting seat (usually either on the left or right corner at the front end, or on the centre of the back end of the resting seat) and put on the centre of the pad a weight of 60 kg including the weight of the pad in sequence.

c) Keep this condition for 1 min and check the presence or absence of falling.

d) If there are plural points that are supposed to be most unstable, the test shall be performed on each of those points.



Key

1 seat loading pad

Figure 15 — Stability test in a horizontal position

15 Forces in soft tissues of the human body

The hazards that can be caused by forces applied to the soft tissues of the body shall be assessed in the risk analysis (see 4.1).

NOTE For guidance, see Annex B.

16 General structure

16.1 Structure

The structure of the walking trolley shall be as follows:

a) The diameter of the front and rear wheels shall be not less than 100 mm.

b) The width of the front wheels shall be more than 22 mm. When the wheel consists of double tires, the dimension measured at the outside of the tires shall be more than 22 mm.

c) The walking trolley shall be equipped with running brakes. The brake shall be easy and sure to operate and it shall be possible to control both left and right of rear wheels.

d) The walking trolley shall have parking brakes. It shall be easy and sure to operate and be possible to fix both left and right rear wheels.

e) When equipped with a folding function, it shall be easy and sure to operate and the function part shall not come off and not fold during use.

f) When equipped with a height adjusting mechanism, it shall be easy to adjust the height and not readily come loose during use. It should be marked with maximum extended position.

g) When equipped with a resting seat, it shall not readily come off and not fold during use.

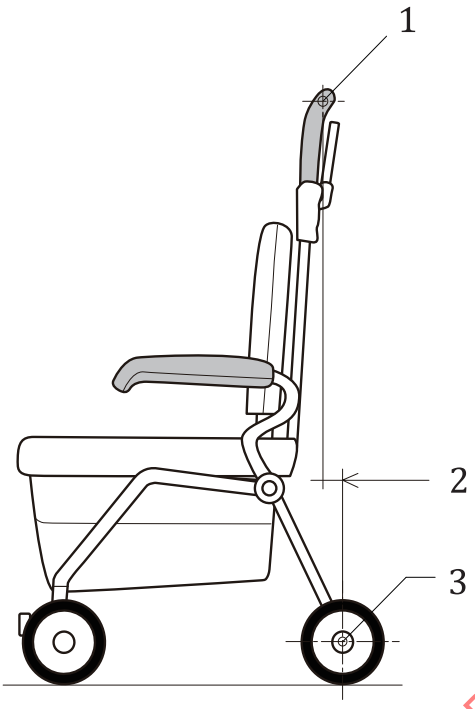
h) The diameter of the handgrip shall be not less than 20 mm and not more than 50 mm. This requirement is not applicable to anatomic handgrip.

i) When equipped with castors, it shall have measures not to move free.

j) The location of the handle shall not be horizontally behind the axis of rear wheels (see Figure 16).

k) Handgrips shall be securely fixed to the handle.

l) When equipped with a resting seat, the height of the seat surface shall be no less than 350 mm high from the ground.



Key

1 the handle

2 the location of the handle is in front of the rear wheel axis

3 axis of the rear wheel

Figure 16 — Location of the handle

16.2 Brakes

16.2.1 Requirements of running brakes

The free descending force when the running brakes are on shall be 1/2 or less of the force when the brake is not applied.

16.2.2 Braking test of the running brakes

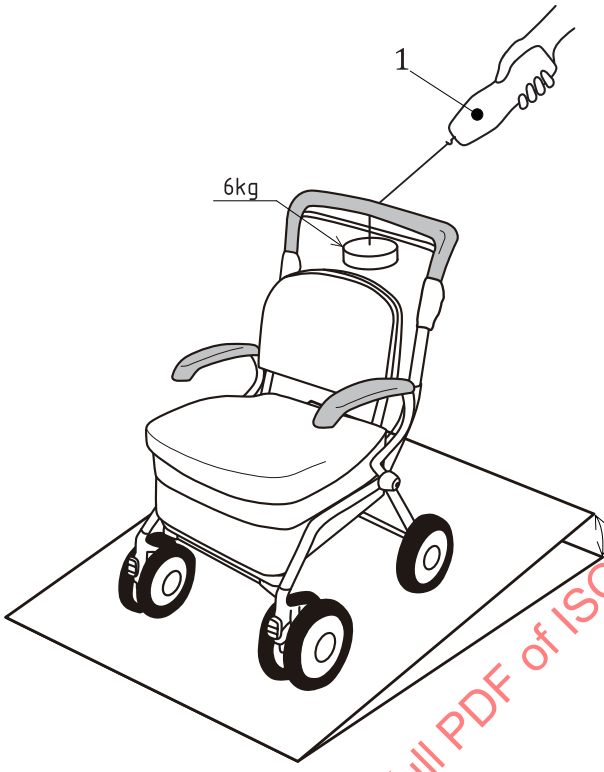
The braking test of the running brakes shall be as follows (see Figure 17).

a) Place the test unit horizontally on the tiltable test plane without applying the running brakes and parking brakes (holding the brakes free). When equipped with a shopping bag, put polystyrene foam in the bag evenly to the height of 15 cm, and then put a weight equivalent to the safe working load mass on the polystyrene foam.

b) Put a weight of 6 kg mass on the centre of the handle when it is a unified-type handle. When equipped with a separated-type handle, connect the left and right handles with a bar, and put the weight of 6 kg (including the weight of the bar) on the centre of the bar.

c) Adjust the test table to be 6 degrees inclined forward, and measure on the handle the force of free running down of the test unit using a load indicator in a horizontal direction.

d) Then, hold the running brake with 40 N of braking force and measure on the handle the force of free running down of the test unit.



Key

1 loading indicator

Figure 17 — Braking test for the running brakes

16.2.3 Requirements of parking brakes

The wheels shall not rotate when the parking brakes are applied, and the braking operation shall be effective even after the test.

16.2.4 Braking test of the parking brakes

The braking test of the parking brakes shall be as follows (see Figure 18).

a) Place the test unit horizontally on the tiltable test plane. Apply the parking brake. When equipped with a shopping bag, put polystyrene foam in the bag evenly to the height of 15 cm, and then put a weight equivalent to the load mass on the polystyrene foam. When equipped with a seat, place a weight of 60 kg on the centre of the seat.

b) In this condition, adjust the test plane to incline the product 6 degrees forward and confirm that the wheels do not rotate.

c) Then, adjust the test table to incline the product 6 degrees rearward and confirm that the wheels do not rotate.

d) Return the test table to nearly horizontal position and check the braking function (smoothness) and the running function.

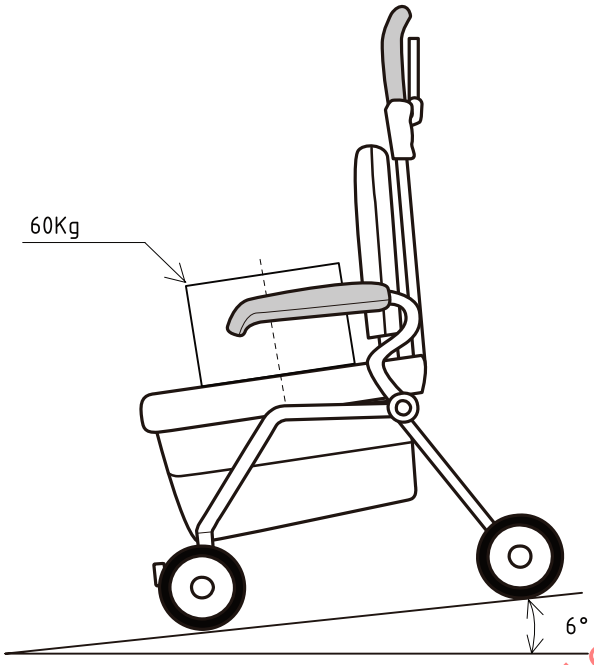


Figure 18 — Braking test for the parking brakes

17 Ergonomic principles

A walking trolley can be used not only by whom it is primarily intended for, but also by an assistant. The ergonomic principles set out in EN 614-1 shall apply to all involved persons.

Grips, handles and pedals shall suit the functional anatomy of the operator, according to the intended use, and meet the following requirements (where applicable, the walking trolley shall be loaded with the maximum load):

a) The surface of buttons shall at least cover a circle of 15 mm in diameter; any distance between buttons shall be more than 10 mm.

NOTE 1 Shape of buttons is not specified, e.g. they do not need to be circular.

b) The distance between any handle (part intended to be grabbed) requiring an operating force of more than 10 N and any construction part of the walking trolley shall not be less than 35 mm.

c) The distance between any upper surface of a pedal (in any operating position), and any other part of the walking trolley shall have a vertical toe clearance of not less than 75 mm.

d) The diameter of any operating handles and/or knobs requiring an operating force of more than 10 N shall be between 19 mm and 43 mm.

NOTE 2 The handles and knobs can be of any shape.

e) For a walking trolley operated from a standing position, pedals shall be placed not more than 300 mm above the surface of the floor.

f) For a walking trolley operated from a standing position, hand operated controls shall be placed at a height of 800 mm to 1 200 mm above the surface of the floor.

g) For a walking trolley operated from a sitting position, controls intended to be operated by the occupant while seated shall be within the occupant's reach space.

NOTE 3 Regarding e), f) and g), there is a possibility to locate other operating controls at alternative positions depending upon the use of the walking trolley.

h) The operating forces or torques required for those parts of the device that are designed to be operated by fingers, hands/arms or feet shall not exceed the values in Table 4.

Table 4 — Operating forces

Operation	Force/torque
Operation by using a finger	5 N
Operation by using a hand/arm	60 N
Operation by using a foot	300 N
Operation by turning	1,9 Nm
Rotation of seat surface	60 N

18 Information supplied by the manufacturer

18.1 General

The information supplied by the manufacturer comprises the data in the instructions for use and the details on the label.

The information applied to, and supplied with, assistive product for walking shall conform to EN 1041.

Assistive products for walking covered by the scope of a specific standard shall also, in addition to ISO 17966, conform to the requirements according to clauses dealing with electrical aspects of the product, if applicable.

Any means of provision of information with assistive products for walking shall take into account the intended users, the conditions of use and any issues specific to individual assistive product type that are necessary for the safe and effective use of the product.

Special attention shall be paid to the user information, particularly the instructions on operation and the design of labels and the design and presentation of warnings.

Further guidance on requirements for persons with different types of impairments can be found in ISO/IEC Guide 71 and ISO 21801[1]. In addition, the manufacturer should provide the information in the instructions for use as specified in 18.2, and 18.3. These may be provided as separate printed documents or in other forms of media to meet the needs of individual users or their assistants.

Further guidance on the preparation of instructions can be found in IEC 82079-1.

18.2 Markings or labelling

Walking trolleys that comply with all the requirements shall have marks and/or labels with the following information on a legible part of the product using a method which does not easily disappear:

a) Name, and the type of the product;

b) Maximum user mass;

c) Name or trade name and address of the manufacturer or trader according local legislation;

d) Manufacturer's model identification name and/or number;

e) Year and month of manufacture;

f) Maximum extension position of height adjustment, marked on each adjusting member;

g) Maximum safe working load of all accessories.

1) Under preparation. Stage at the time of publication: ISO/DIS 21801:2019.

18.3 Instruction manual

An instruction manual shall include the following items:

a) Instruction (or warning) which states: “Read the instruction manual and keep the manual after reading";

b) Intended users (persons who can walk independently);

c) Maximum user mass;

d) Main dimensions of the product (width, depth, max. height, min. height when assembled and when folded respectively);

e) Maintenance and cleaning instructions;

f) Cautions to avoid corrosion and aging degradation;

g) Cautions for use (caution when using on slopes, caution when using on irregular grounds, caution to make momentary stop before the gaps of kerbs and stairs, caution when using the arm support, etc.);

h) Instructions for assembly, adjustment of all kinds including brakes, folding and unfolding;

i) Warnings and advice about precautions relating to safe distances between moving and stationary parts;

j) Maximum safe working loads for load carrying accessories such as basket, shopping bag, etc.;

k) Name and address of the manufacturer or trader according local legislation.

19 Packaging

The hazards that can be caused by inadequate protective packaging shall be assessed in the risk analysis (see 4.1).

NOTE For guidance, see Annex B.

20 Test report

The test report shall at least contain the following information:

a) unique report number;

b) the name, address and the specific accreditation number of the testing institution if applicable;

c) the date of issue of the test report;

d) a reference to this edition of this document, i.e. ISO 19894:2019;

e) the name and address of the manufacturer of the walking trolley;

f) a description of the sample including the manufacturer's or vendor's trade mark, model or type, serial number and any variations or accessories fitted;

g) the source of the sample;

h) the ambient temperature at which each test was carried out;

i) the point of the test force applied for the retaining test and strength test (see 10.3.2);

j) a photograph of the sample equipped as during the test;

k) the results of the tests including record of maintenance, if any;

l) a statement of whether or not the tested sample met all of the applicable requirements of this document and a list of all the failed requirements;

m) any deviations from the standardised test procedure.

Annex A
(informative)

Consideration items for hazards when designing the products

The hazards and their factors that can exist on walking trolleys are described below from ISO 14971. However, not every hazard can be covered here, and other hazards that are noticed should be added.

A.1 Hazards and their factors that are supposed on general assistive products

a) Persons that use the assistive products are elderly or impaired in many cases, and assisting persons also use the products.

b) Hazards that originate depending on the circumstances, such as the location of use, condition of the ground, floor, temperature, humidity, etc.

c) Whether the products get dirty with human fluids.

d) Hazards originating from a combination of other products, such as the clearance between the handles and the frames. Hazards originated by an inappropriate combination with other products.

e) Risks originating from inappropriate display and instructions, such as complex explanations, unclear explanations and unclear wording.

f) Insufficient instruction for service and maintenance.

g) Specification sheet with insufficient information.

h) Insufficient instruction for checking before use.

i) Existence of structure which can injure assisting persons.

j) Foreseeable misuse based on past experience.

k) Unintended move of the user or assistance persons.

l) The risk of arbitrary modifications by users.

m) Insufficient information for the life, checking and servicing of the products.

A.2 Hazards from ergonomic factors of various users

For various users whose physical function has become limited such as elderly or impaired people, the following ergonomic factors are considered:

a) Unintended movement due to decrease of moving ability, muscle strength or physical strength.

b) Unintended movement to operate the products due to the decrease of physical strength.

c) Unintended movement due to the decrease of the ability to keep stability and avoid falling.

d) Abnormal movement due to the decrease of mental ability and remembrance ability.

e) Unintended movement due to the insufficient gaining of information caused by the decrease of the colour recognition ability, hearing ability and tactile sensibility.

f) Abnormal movement from miscalculation, error of judgment or carelessness.

A.3 Hazards originating from mechanical damage, insufficient maintenance and/or aging

a) Hazards arising from accidental product damage.

b) Hazards arising from inappropriate or insufficient maintenance or insufficient inspection after maintenance.

Annex B
(informative)

Rationale

The numbering of the subclauses in this annex corresponds to the numbering of the subclauses in the main text to which the guidance applies (e.g. B.5.2 refers to 5.2 in the main text).

B.5.2 Flammability

When considering the flame resistance of walking trolley, manufacturers should note that persons with disability can be at greater risk than able-bodied persons as they can be unable to escape from fire.

Hazards which should be considered include:

— smoker's materials;

— fires and other space heaters;

— electrostatic charges.

Particular care is needed if a walking trolley can be used near or in conjunction with flammable substances.

B.5.4.1 Cleaning and disinfection

A walking trolley should be easy to clean and should not incorporate features which will retain dust, liquid and/or contaminated material, except where the intended function of the walking trolley is to retain such material.

A walking trolley which can come into contact with body fluids should be able to be disinfected repeatedly by readily available disinfectants without damage to the walking trolley.

Example of marking for machine washable assistive walking trolleys by an automatic washing system is shown in Figure B.1.

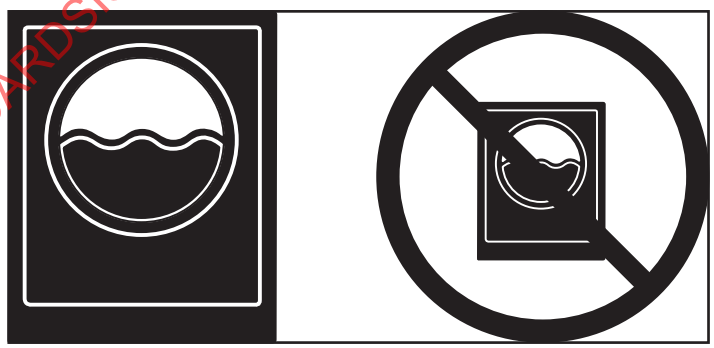


Figure B.1 — Example of marking for machine washable walking trolley

Example of marking for walking trolleys intended to be cleaned by hand held jet stream/steam cleaning is shown in Figure B.2.