PD ISO/TR 13570-2:2014

BSI Standards Publication

Wheelchairs

Part 2: Typical values and recommended limits of dimensions, mass and manoeuvring space as determined in ISO 7176-5

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National foreword

This Published Document is the UK implementation of ISO/TR 13570-2:2014.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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TECHNICAL REPORT

ISO/TR 13570-2

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2014-06-15

Wheelchairs —

Part 2: Typical values and recommended limits of dimensions, mass and manoeuvring space as determined in ISO 7176-5

Fauteuils roulants —

Partie 2: Valeurs types et limites ou dimensions recommandées, masses et espace requis pour maneuvres comme évalués dans l'ISO 7176-5

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

ISO/TR 13570 consists of the following parts, under the general title *Wheelchairs*:

— *Part 1: Guidelines for the application of the* ISO 7176 *series on wheelchairs*

— *Part 2: Typical values and recommended limits of dimensions, mass and manoeuvring space as determined in* ISO 7176-5

Introduction

The purpose of this part of ISO/TR 13570 is to provide typical values (where enough evidence has been gathered) and recommended limits of important dimensions and masses of manual wheelchairs and electrically powered wheelchairs including scooters. Typical values are based on evidence that was current at the end of 2011. The items are grouped to reflect their importance and utility for the different user groups of the standard. Typical values are reported where there has been enough sampling to give reliable data and contributions are sought to enable the future publication of values currently marked as Insufficient Data (+).

These user groups are:

— wheelchair occupants — for items that are of importance for the estimation of the space needed and the general manoeuvrability;

— architects and public authorities — for items with regard to the accessibility of e.g. dwellings, lifts, kitchen and bathroom equipment, lodging and public buildings, and areas etc.;

— manufacturers, wheelchair providers, clinicians, and test laboratories — for items that need to be considered when manufacturing, setting up, adjusting, repairing, or testing wheelchairs.

The core information of this part of ISO/TR 13570 is contained in two Clauses:

Clause 5 gives the typical values and recommended limits of dimensions and masses of a wheelchair that are most important for the wheelchair occupant (as defined and tested in ISO 7176-5, Clause 8, Required measurements). These dimensions inform the wheelchair occupant before purchase whether the wheelchair will fit to its specific requirements and needs. They also provide guidance to the wheelchair manufacturer for new developments. They inform the wheelchair occupant about the space the wheelchair will need. They also assist architects in planning accessible buildings and environments.

Clause 6 gives the typical values and recommended limits of supplementary dimensions (as defined and tested in ISO 7176-5, Annex A, Technical dimensions), which are of higher influence to good performance of the wheelchair (driving, steering, tracking etc.). They are worthwhile to be known by the technical personnel when designing, making, testing, repairing, setting up or even adjusting the wheelchair.

Call for Contribution

Much work and effort went into this project in order to collect data for the tables in this document. However, there are still values for which there is insufficient data (+) in these tables. Therefore every manufacturer, institution or expert, who can contribute with additional data, preferably for blank boxes, is invited to send any usable information to ISO/TC 173, SC 1, at project@tech4life.com.au.

Wherever possible, the material should be submitted comprising the following auxiliary information:

a. collected data;

b. type of wheelchair (with handrims or without);

c. if the procedures of ISO 7176-5 are not used for the measurements, the actual method of measurement;

d. the occupant mass group I, II, or III claimed for the wheelchair(s);

e. the class of the wheelchair A, B, or C (for electrically powered wheelchairs);

f effective seat width of the test wheelchair;

g. number of samples from which these data are derived;

h. whether the selection of the wheelchair is in accordance with ISO 7176-5, Clause 6 and the preparation for the measurements is in accordance with ISO 7176-5, Clause 7;

All contributions will be highly appreciated.

TECHNICAL REPORT **ISO/TR 13570-2:2014(E)**

Wheelchairs —

Part 2: Typical values and recommended limits of dimensions, mass and manoeuvring space as determined in ISO 7176-5

1 Scope

This part of ISO/TR 13570 lists the typical values and recommended limits of the dimensions obtained from measurements taken in accordance with ISO 7176-5. This part of ISO/TR 13570 lists the typical values and recommended limits of the important wheelchair dimensions (ready for occupation and folded or dismantled), space for pivoting or reversing between limiting walls and some dimensions worthwhile to estimate usability of the wheelchair as well as determination of the mass of the wheelchair. It is intended for use of prescribers, clinicians, wheelchair occupants or manufacturers.

This part of ISO/TR 13570 lists the typical values and recommended limits of the dimensions when the wheelchair is occupied and some operating areas when performing special tasks encountered in every day's life. This part of ISO/TR 13570 lists the typical values and recommended limits of the technical dimensions critical to the performance of the wheelchair. This part of ISO/TR 13570 applies to manual wheelchairs and electrically powered wheelchairs (including scooters).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7176-5, *Wheelchairs — Part 5: Determination of dimensions, mass and manoeuvring space*

ISO 7176-26, *Wheelchairs — Part 26: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7176-5 and ISO 7176-26, and the following apply.

3.1
insufficient data
+
there have not been sufficient samples evaluated to produce reliable values for this measurement

4 Wheelchair groups

4.1 General

Wheelchairs appear in a very wide variety of designs, types, models, and sizes. To cope with these circumstances, all wheelchair models are listed into one of four principal groups.

These four principal groups listed in 4.2 to 4.5 comprise wheelchairs with handrims and electrically powered wheelchairs of class A, B, and C.

When measurements are made, the size of the wheelchair is selected according to ISO 7176-5, Clause 6, and equipped and adjusted according to ISO 7176-5, Clause 7, for the respective occupant mass group.

NOTE At the present stage, only data for occupant mass group II and III are available. The test results presented are received from measurements of about 38 different wheelchair models (15 manual wheelchairs with handrim propulsion, about 7 of each class of electrically powered wheelchairs. Because the task of this part of ISO/TR 13570 is to deliver comparable data about typical situations, it is not necessary to support them by large numbers of test wheelchairs and by extensive statistics. Further data collection, in particular for occupant mass group I, and from various sources and with other wheelchair models is in the work plan of ISO TC173 SC1 WG1, which is responsible for the elaboration of ISO 7176-5 and this part of ISO/TR 13570.

4.2 Wheelchairs with handrims

This principal group comprises wheelchairs with manual rear wheel drive by use of handrims and handrim activated power assisted wheelchairs (HAPAW).

4.3 Electrically powered wheelchairs of class A

This principal group comprises electrically powered wheelchairs that usually have rear wheel drive, are compact and manoeuvrable but not necessarily capable of negotiating outdoor obstacles and therefore are primarily intended for indoor use.

4.4 Electrically powered wheelchairs of class B

This principal group comprises electrically powered wheelchairs that usually have rear wheel drive, are sufficiently compact and manoeuvrable for some indoor environments and capable of negotiating some outdoor obstacles and therefore are intended for a combination of indoor and outdoor use.

4.5 Electrically powered wheelchairs of class C

This principal group comprises electrically powered wheelchairs that usually have front wheel drive, are usually large in size, not necessarily intended for indoor use but capable of travelling over longer distances and negotiating outdoor obstacles and therefore are primarily intended for outdoor use.

4.6 Electrically powered wheelchairs (scooter design)

These are electrically powered wheelchairs with tiller steering. Usually they are large in size, not necessarily intended for indoor use but capable of travelling over longer distances and negotiating outdoor obstacles and therefore are primarily intended for outdoor use.

NOTE The values from measurements of scooters are merged into the appropriate class A, B, or C of an electrically powered wheelchair.

5 Typical values and recommended limits for required measurements

5.1 General

The outcome of tests performed with typical wheelchairs and as stipulated in ISO 7176-5, Clause 8 are listed to give an understanding of the state of the art and to provide their recommended limits.

All length dimensions are given in millimetre, all angle dimensions are given in degrees, and all masses are given in kilogram.

NOTE Please see the Call for Contribution in the Introduction.

5.2 Full overall length

NOTE For wheelchairs with leg supports and/or foot supports.

5.2.1 Occupant mass group I

Table 1 — Typical full overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

Table 2 — Recommended maximum limits of full overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

5.2.2 Occupant mass group II and III

Table 3 — Typical full overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 040	1 100	1 170	1 150

Table 4 — Recommended maximum limits of full overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 200	1 200	1 200	1 200

5.3 Overall width

5.3.1 Occupant mass group I

Table 5 — Typical overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

Table 6 — Recommended maximum limits of overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

5.3.2 Occupant mass group II

Table 7 — Typical overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
640	620	680	700

Table 8 — Recommended maximum limits of overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
700	700	700	700

5.3.3 Occupant mass group III

Table 9 — Typical overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

Table 10 — Recommended maximum limits of overall width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

5.4 Handgrip height

5.4.1 Occupant mass group I

Table 11 — Typical handgrip height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
	+	+	+

Table 12 — Recommended maximum limits of handgrip height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 090	1 090	1 090	1 090

5.4.2 Occupant mass group II and III

Table 13 — Typical handgrip height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
900	920	960	960

Table 14 — Recommended maximum limits of handgrip height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	**Class B**	**Class C**
1 090	1 090	1 090	1 090

5.5 Stowage length

5.5.1 Occupant mass group I

Table 15 — Typical stowage length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	**Class B**	**Class C**
	+	+	+

Table 16 — Recommended maximum limits of stowage length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	**Class B**	**Class C**
	+	+	+

5.5.2 Occupant mass group II and III

Table 17 — Typical stowage length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	**Class B**	**Class C**
630	920	950	1 050

Table 18 — Recommended maximum limits of stowage length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	**Class B**	**Class C**
700	1 000	1 000	1 200

5.6 Stowage width

5.6.1 Occupant mass group I

Table 19 — Typical stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

Table 20 — Recommended maximum limits of stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

5.6.2 Occupant mass group II

Table 21 — Typical stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	250	620	680	700
Rigid frame	500			

Table 22 — Recommended maximum limits of stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	300	640	700	720
Rigid frame	520			

5.6.3 Occupant mass group III

Table 23 — Typical stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

Table 24 — Recommended maximum limits of stowage width

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

5.7 Stowage height

5.7.1 Occupant mass group I

Table 25 — Typical stowage height

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

Table 26 — Recommended maximum limits of stowage height

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	+	+	+	+
Rigid frame	+			

5.7.2 Occupant mass group II and III

Table 27 — Typical stowage height

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	900	600	720	870
Rigid frame	690			

Table 28 — Recommended maximum limits of stowage height

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Folding frame	1 090	1 000	1 000	1 000
Rigid frame	690			

5.8 Rising

5.8.1 Occupant mass group I

Table 29 — Typical rising

All dimensions in mm

Wheelchair with handrims
+

Table 30 — Recommended maximum limits of rising

All dimensions in mm

Wheelchair with handrims
+

5.8.2 Occupant mass group II and III

Table 31 — Typical rising

All dimensions in mm

Wheelchair with handrims
+

Table 32 — Recommended maximum limits of rising

All dimensions in mm

Wheelchair with handrims
+

5.9 Total mass

5.9.1 Occupant mass group I

Table 33 — Typical total mass

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 34 — Recommended maximum limits of the total mass

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.9.2 Occupant mass group II and III

Table 35 — Typical total mass

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
16	65	130	150

Table 36 — Recommended maximum limits of the total mass

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
20	100	160	200

5.10 Mass of heaviest part

5.10.1 Occupant mass group I

Table 37 — Typical mass of heaviest part

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 38 — Recommended maximum limits of the mass of heaviest part

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.10.2 Occupant mass group II and III

Table 39 — Typical mass of heaviest part

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
8	30	100	150

Table 40 — Recommended maximum limits of the mass of heaviest part

All masses in kilogram

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
10	40	120	150

5.11 Pivot width

NOTE For wheelchairs with full differential steering.

5.11.1 Occupant mass group I

Table 41 — Typical pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	–
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

Table 42 — Recommended maximum limits of the pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	–-
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

5.11.2 Occupant mass group II

Table 43 — Typical pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 260	1 270	1 330	–-
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

Table 44 — Recommended maximum limits of the pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 410	1 400	1 400	–-
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

5.11.3 Occupant mass group III

Table 45 — Typical pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	–-
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

Table 46 — Recommended maximum limits of the pivot width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	–-
NOTE Class C wheelchairs and scooters usually do not have differential steering.			

5.12 Reversing width

NOTE For wheelchairs with direct steering or limited differential steering.

5.12.1 Occupant mass group I

Table 47 — Typical reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	+
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

Table 48 — Recommended maximum limits of the reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	+
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

5.12.2 Occupant mass group II

Table 49 — Typical reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	1700
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

Table 50 — Recommended maximum limits of the reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	1800
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

5.12.3 Occupant mass group III

Table 51 — Typical reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	+
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

Table 52 — Recommended maximum limits of the reversing width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
–-	–-	–-	+
NOTE Wheelchairs with handrims and Class A and B wheelchairs usually do not have direct steering.			

5.13 Turning diameter

5.13.1 Occupant mass group I

Table 53 — Typical turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 54 — Recommended maximum limits of turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.13.2 Occupant mass group II

Table 55 — Typical turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 770	1 980	1 990	2 710

Table 56 — Recommended maximum limits of turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
2 060	2 040	2 040	2 920

5.13.3 Occupant mass group III

Table 57 — Typical turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 58 — Recommended maximum limits of turning diameter

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.14 Ground clearance

5.14.1 Occupant mass group I

Table 59 — Typical ground clearance

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 60 — Recommended minimum limits of ground clearance

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.14.2 Occupant mass group II and III

Table 61 — Typical ground clearance

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 62 — Recommended minimum limits of ground clearance

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
30	40	40	50

5.15 Required width of angled corridor

5.15.1 Occupant mass group I

Table 63 — Typical required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 64 — Recommended maximum limits of required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.15.2 Occupant mass group II

Table 65 — Typical required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
880	850	900	980

Table 66 — Recommended maximum limits of required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 030	990	990	1 100

5.15.3 Occupant mass group III

Table 67 — Typical required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 68 — Recommended maximum limits of required width of angled corridor

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.16 Required doorway entry depth

5.16.1 Occupant mass group I

Table 69 — Typical required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 70 — Recommended maximum limit of the required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.16.2 Occupant mass group II

Table 71 — Typical required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 190	1 230	1 290	1 380

Table 72 — Recommended maximum limit of the required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 670	1 590	1 590	1 590

5.16.3 Occupant mass group III

Table 73 — Typical required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 74 — Recommended maximum limit of the required doorway entry depth

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.17 Required corridor width for side opening

5.17.1 Occupant mass group I

Table 75 — Typical required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 76 — Recommended maximum limits of the required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

5.17.2 Occupant mass group II

Table 77 — Typical required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 010	1 070	1 090	1 700

Table 78 — Recommended maximum limits of the required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 380	1 290	1 290	1 970

5.17.3 Occupant mass group III

Table 79 — Typical required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 80 — Recommended maximum limits of the required corridor width for side opening

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6 Typical values and recommended limits for Technical dimensions

The outcome of tests performed with typical wheelchairs and as stipulated in ISO 7176-5, Annex A (Technical dimensions) are listed to give an understanding of the state of the art and to provide their recommended limits.

All length dimensions are given in mm, all angle dimensions are given in degrees.

NOTE Please see the Call for Contribution in the Introduction.

6.1 Reduced overall length

NOTE For wheelchairs without leg supports and/or foot supports or with removable leg supports and/or foot supports.

6.1.1 Occupant mass group I

Table 81 — Typical reduced overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 82 — Recommended maximum limits of reduced overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.1.2 Occupant mass group II and III

Table 83 — Typical reduced overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
810	920	950	1 050

Table 84 — Recommended maximum limits of reduced overall length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
900	1 000	1 000	1 200

6.2 Overall height

6.2.1 Occupant mass group I

Table 85 — Typical overall height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 86 — Recommended maximum limits of overall height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.2.2 Occupant mass group II and III

Table 87 — Typical overall height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
900	920	960	980

Table 88 — Recommended maximum limits of overall height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 120	1 200	1 200	1 200

6.3 Radial wheel deviation for mass group I, II, and III

Table 89 — Typical radial wheel deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
0,5	1	1	1
NOTE Wheelchairs with handrims are more sensitive for radial wheel deviation.			

Table 90 — Recommended limits of radial wheel deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1	2	2	2
NOTE Wheelchairs with handrims are more sensitive for radial wheel deviation.			

6.4 Lateral wheel deviation for mass group I, II, and III

Table 91 — Typical lateral wheel deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
0,5	1	1	1
NOTE Wheelchairs with handrims are more sensitive for radial wheel deviation.			

Table 92 — Recommended limits of lateral wheel deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1	2	2	2
NOTE Wheelchairs with handrims are more sensitive for radial wheel deviation.			

6.5 Radial handrim deviation for mass I, II, and III

Table 93 — Typical radial handrim deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1	–-	–-	–-

Table 94 — Recommended limits of radial handrim deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
2	–-	–-	–-

6.6 Lateral handrim deviation for mass I, II, and III

Table 95 — Typical lateral handrim deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1	–-	–-	–-

Table 96 — Recommended limits of lateral handrim deviation

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
2	–-	–-	–-

6.7 Full occupied length

NOTE For wheelchairs with leg supports and/or foot supports.

6.7.1 Occupant mass group I

Table 97 — Typical full occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 98 — Recommended maximum limits of full occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.7.2 Occupant mass group II and III

Table 99 — Typical full occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 190	1 230	1 290	1 290

Table 100 — Recommended maximum limits of full occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 330	1 320	1 320	1 340

6.8 Reduced occupied length

NOTE For wheelchairs without leg supports and/or foot supports or with removable leg supports and/or foot supports.

6.8.1 Occupant mass group I

Table 101 — Typical reduced occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 102 — Recommended maximum limits of reduced occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.8.2 Occupant mass group II and III

Table 103 — Typical reduced occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
970	1 010	1 070	1 090

Table 104 — Recommended maximum limits of reduced occupied length

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 100	1 100	1 100	1 100

6.9 Occupied width

6.9.1 Occupant mass group I

Table 105 — Typical occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 106 — Recommended maximum limits of occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.9.2 Occupant mass group II

Table 107 — Typical occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
740	620	680	700

Table 108 — Recommended maximum limits of occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
800	700	700	700

6.9.3 Occupant mass group III

Table 109 — Typical occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 110 — Recommended maximum limits of occupied width

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.10 Occupied height

6.10.1 Occupant mass group I

Table 111 — Typical occupied height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 112 — Recommended maximum limits of occupied height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.10.2 Occupant mass group II and III

Table 113 — Typical occupied height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 440	1 500	1 530	1 590

Table 114 — Recommended maximum limits of occupied height

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
1 600	1 600	1 600	1 600

6.11 Ramp transition angle

6.11.1 Occupant mass group I

Table 115 — Typical ramp transition angle

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 116 — Recommended minimum limits of ramp transition angle

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+
NOTE The recommended minimum limit of ramp transition angle should correspond to the steepest slope for which the wheelchair is recommended by the manufacturer.			

6.11.2 Occupant mass group II and III

Table 117 — Typical ramp transition angle

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
10	12	15	20

Table 118 — Recommended minimum limits of ramp transition angle

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
8	10	10	15
NOTE The recommended minimum limit of ramp transition angle should correspond to the steepest slope for which the wheelchair is recommended by the manufacturer.			

6.12 Wheelbase

NOTE For wheelchairs with handrims.

6.12.1 Occupant mass group I

Table 119 — Typical wheelbase and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Minimum	+	–-	–-	–-
Reference	+	+	+	+
Maximum	+	–-	–-	–-
Maximum difference between left and right	+	+	+	+
Minimum number of settings	2	1	1	1

Table 120 — Recommended limits of wheelbase and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Minimum	+	–-	–-	–-
Reference	+	+	+	+
Maximum	+	–-	–-	–-
Maximum difference between left and right	+	+	+	+
Minimum number of settings	3	1	1	1

6.12.2 Occupant mass group II and III

Table 121 — Typical wheelbase and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Minimum	380	–-	–-	–-
Reference	400	500	510	790
Maximum	480	–-	–-	–-
Maximum difference between left and right	2	2	1	1
Minimum number of settings	2	1	1	1

Table 122 — Recommended limits of wheelbase and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Minimum	380	–-	–-	–-
Reference	400	600	700	900
Maximum	500	–-	–-	–-
Maximum difference between left and right	3	3	2	2
Minimum number of settings	3	1	1	1

6.13 Rear wheel track

6.13.1 Occupant mass group I

Table 123 — Typical rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 124 — Recommended maximum limits of rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.13.2 Occupant mass group II

Table 125 — Typical rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
550	520	580	560

Table 126 — Recommended maximum limits of rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
620	620	620	620

6.13.3 Occupant mass group III

Table 127 — Typical rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 128 — Recommended maximum limits of rear wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.14 Front wheel track

6.14.1 Occupant mass group I

Table 129 — Typical front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 130 — Recommended limits of front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.14.2 Occupant mass group II

Table 131 — Typical front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
390	490	530	590

Table 132 — Recommended limits of front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
600	620	620	620

6.14.3 Occupant mass group III

Table 133 — Typical front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

Table 134 — Recommended limits of front wheel track

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
+	+	+	+

6.15 Camber

6.15.1 Occupant mass group I

Table 135 — Typical camber and asymmetry between left and right camber

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference setting	+	––	––	––
Most positive setting	+	––	––	––
Most negative setting	+	––	––	––
Maximum asymmetry between left and right	+	––	––	––
Minimum number of settings	3	––	––	––
NOTE Usually, only wheelchairs with handrims use camber.				

Table 136 — Recommended limits of the camber and asymmetry between left and right camber

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference setting	+	––	––	––
Most positive setting	+	––	––	––
Most negative setting	+	––	––	––
Maximum asymmetry between left and right	+	––	––	––
Minimum number of settings	3	––	––	––
NOTE Usually, only wheelchairs with handrims use camber.				

6.15.2 Occupant mass group II and III

Table 137 — Typical camber and asymmetry between left and right camber

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference setting	- 2	--	--	--
Most positive setting	0	--	--	--
Most negative setting	- 6	--	--	--
Maximum asymmetry between left and right	0,5	--	--	--
Minimum number of settings	3	--	--	--
NOTE Usually, only wheelchairs with handrims use camber.				

Table 138 — Recommended limits of camber and asymmetry between left and right camber

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference setting	- 2	--	--	--
Most positive setting	0	--	--	--
Most negative setting	- 6	--	--	--
Maximum asymmetry between left and right	0,5	--	--	--
Minimum number of settings	3	--	--	--
NOTE Usually, only wheelchairs with handrims use camber.				

6.16 Toe of occupant mass group I, II, and III

Table 139 — Typical toe

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
$0\ ^{+0,3}_{-0}$	$0\ ^{+0,3}_{-0}$	$0\ ^{+0,1}_{-0}$	$0\ ^{+0,1}_{-0}$
NOTE Most wheelchairs with handrims and electrically powered wheelchairs of class A have a foldable frame and therefore may not be aligned so exactly.			

Table 140 — Recommended maximum limits of toe

All angles in degrees

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
$0\ ^{+1}_{-0}$	$0\ ^{+1}_{-0}$	$0\ ^{+0,3}_{-0}$	$0\ ^{+0,3}_{-0}$
NOTE Most wheelchairs with handrims and electrically powered wheelchairs of class A have a foldable frame and therefore may not be aligned so exactly.			

6.17 Skew of occupant mass group I, II, and III

Table 141 — Typical skew

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
0 ± 4	0 ± 4	0 ± 2	0 ± 2
NOTE Most wheelchairs with handrims and electrically powered wheelchairs of class A have a foldable frame and therefore may not be aligned so exactly.			

Table 142 — Recommended maximum limits of skew

All dimensions in mm

Wheelchair with handrims	Electrically powered wheelchair		
	Class A	Class B	Class C
0 ± 10	0 ± 10	0 ± 4	0 ± 4
NOTE Most wheelchairs with handrims and electrically powered wheelchairs of class A have a foldable frame and therefore may not be aligned so exactly.			

6.18 Castor rake of occupant mass group I, II, and III

Table 143 — Typical castor rake and maximum difference between left and right

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Fixed wheels in reference set-up	$0\ ^{+0,5}_{-0}$	$0\ ^{+1}_{-0}$	$0\ ^{+1}_{-0}$	see NOTE 1
Maximum difference between left and right	0,2	0,2	0,2	see NOTE 1
Adjustment, that was not possible to be corrected completely	$0\ ^{+0,5}_{-0}$	see NOTE 2	see NOTE 2	see NOTE 1

NOTE 1 Class C wheelchairs and in particular scooters usually use direct steering and therefore have no castor wheels.

NOTE 2 Only wheelchairs with handrims are known to have fixed wheels with adjustable positioning which may affect the castor rake.

Table 144 — Recommended maximum limits of castor rake and maximum difference between left and right

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Fixed wheels in reference set-up	$0\ ^{+1}_{-0}$	$0\ ^{+1}_{-0}$	$0\ ^{+1}_{-0}$	see NOTE 1
Maximum difference between left and right	0,2	0,2	0,2	see NOTE 1
Adjustment, that was not possible to be corrected completely	$0\ ^{+1}_{-0}$	see NOTE 2	see NOTE 2	see NOTE 1

NOTE 1 Class C wheelchairs and in particular scooters usually use direct steering and therefore have no castor wheels.

NOTE 2 Only wheelchairs with handrims are known to have fixed wheels with adjustable positioning which may affect the castor rake.

6.19 Castor cant for occupant mass group I, II, and III

Table 145 — Typical castor cant and asymmetry between left and right

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference set-up	0 ± 0,5	0 ± 0,5	0 ± 0,3	see NOTE
Maximum asymmetry between left and right	0,2	0,2	0,2	see NOTE
NOTE Most wheelchairs of class C use direct steering and therefore have no castor wheels.				

Table 146 — Recommended maximum limits of castor cant and asymmetry between left and right

All angles in degrees

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference set-up	0 ± 1	0 ± 1	0 ± 0,5	see NOTE
Maximum asymmetry between left and right	0,2	0,2	0,2	see NOTE
NOTE Most wheelchairs of class C use direct steering and therefore have no castor wheels.				

6.20 Castor trail for occupant mass group I, II, and III

Table 147 — Typical castor trail and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference set-up	50	50	60	–-
Maximum difference between left and right	1	1	1	–-

Table 148 — Recommended maximum limits of castor trail and difference between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference castor trail	50	50	60	–-
Maximum difference between left and right	2	2	2	–-

6.21 Castor wheel misalignment of occupant mass group I, II, and III

Table 149 — Typical castor wheel misalignment and asymmetry between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference set-up	0 ± 0,3	0 ± 0,3	0 ± 0,3	see NOTE
Maximum asymmetry between left and right	0,2	0,2	0,2	see NOTE
NOTE Most wheelchairs of class C use direct steering and therefore have no castor wheels.				

Table 150 — Recommended maximum limits of castor wheel misalignment and asymmetry between left and right

All dimensions in mm

	Wheelchair with handrims	Electrically powered wheelchair		
		Class A	Class B	Class C
Reference set-up	0 ± 0,3	0 ± 0,3	0 ± 0,3	see NOTE
Maximum asymmetry between left and right	0,2	0,2	0,2	see NOTE
NOTE Most wheelchairs of class C use direct steering and therefore have no castor wheels.				

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