BS EN 16585-1:2017

BSI Standards Publication

# Railway applications — Design for PRM use — Equipment and components onboard rolling stock

## Part 1: Toilets

bsi.

**National foreword**

This British Standard is the UK implementation of EN 16585-1:2017. It supersedes PD CEN/TS 16635:2014 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RAE/1/-/15, Railway Applications - People with Reduced Mobility.

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English Version

# Railway applications - Design for PRM use - Equipment and components onboard rolling stock - Part 1: Toilets

Applications ferroviaires - Conception destinée à l'usage par les PMR - Equipements et éléments à bord du matériel roulant - Partie 1 : Toilettes

Bahnanwendungen - Gestaltung für die Nutzung durch PRM - Ausstattung und Bauteile in Schienenfahrzeugen - Teil 1: Toiletten

This European Standard was approved by CEN on 26 September 2016.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN 16585-1:2017) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document supersedes CEN/TS 16635:2014.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2017, and conflicting national standards shall be withdrawn at the latest by July 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

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# Introduction

This document is part of a suite of four 'Design for PRM use' standards that have in total nine parts:

— EN 16584 is a standard that covers both infrastructure and rolling stock — Railway applications — Design for PRM use - General requirements:

  — Part 1: Contrast (EN 16584-1);

  — Part 2: Information (EN 16584-2);

  — Part 3: Optical and friction characteristics (EN 16584-3).

— EN 16585 is a standard that covers rolling stock - Railway applications - Design for PRM use - Equipment and components on board rolling stock:

  — Part 1: Toilets (EN 16585-1);

  — Part 2: Elements for sitting, standing and moving (EN 16585-2);

  — Part 3: Clearways and internal doors (EN 16585-3).

— EN 16586 is a standard that covers rolling stock — Railway applications — Design for PRM use - Accessibility of persons with reduced mobility to rolling stock:

  — Part 1: Steps for access and egress (EN 16586-1);

  — Part 2: Boarding aids (EN 16586-2).

— EN 16587 is a standard that covers infrastructure — Railway applications — Design for PRM use - Requirements for obstacle free routes for infrastructure.

These standards aim to clarify the requirements (with clear and consistent terms and definitions) and to define the associated criteria and, where appropriate, methodologies to allow a clear pass/fail assessment.

# 1 Scope

This European Standard describes the specific 'Design for PRM use' requirements applying to rolling stock and the assessment of those requirements. The following applies to this standard:

— the definitions and requirements describe specific aspects of 'Design for PRM use' required by persons with disabilities and persons with reduced mobility as defined in the PRM TSI;

— this standard defines elements which are universally valid for obstacle free travelling including toilets, elements for sitting, standing and moving and clearways and internal doors. The definitions and requirements of this standard are to be used for rolling stock applications;

— this standard only refers to aspects of accessibility for PRM passengers. It does not define general requirements and general definitions;

— this standard assumes that the rolling stock is in its defined operating condition;

— where minimum or maximum dimensions are quoted these are absolute NOT nominal requirements.

The 'Equipment and Components' standard is written in three parts:

— this document is Part 1 and contains:

  — toilets;

— part 2 contains:

  — handholds;

  — seats;

  — wheelchair spaces;

— part 3 contains:

  — clearways;

  — internal doors.

# 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.

EN 12183, *Manual wheelchairs - Requirements and test methods*

EN 12221-1:2008+A1:2013, *Child use and care articles - Changing units for domestic use - Part 1: Safety requirements*

EN 12221-2:2008+A1:2013, *Child use and care articles - Changing units for domestic use - Part 2: Test methods*

EN 12790, *Child use and care articles - Reclined cradles*

EN 16584-1, *Railway applications - Design for PRM use - General requirements - Part 1: Contrast*

EN 16584-2:2017, *Railway applications - Design for PRM use - General requirements - Part 2: Information*

EN 16585-2, *Railway applications — Design for PRM use — Equipment and components on board rolling stock - Part 2: Elements for sitting, standing and moving*

EN 16585-3, *Railway applications — Design for PRM use — Equipment and components on board rolling stock — Part 3: Clearways and internal doors*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**clear width**
**clear usable width**
unobstructed width of an open door or clearway to allow passengers to pass through

**3.2**
**clearway**
unobstructed space with defined widths and heights to allow movement within a vehicle

**3.3**
**first step**
step that is the first step for a passenger to use, to overcome a height change

Note 1 to entry: For the external access/egress steps this will normally be the step that is closest to the platform edge (it may be a fixed or a moveable step), therefore this is the first step when boarding and the last step when alighting.

Note 2 to entry: In the context of steps for internal height changes (other than the external access/egress steps) this means the first usable step when ascending and the edge of the walking floor when descending.

**3.4**
**handrail**
continuous element with round cross section for passengers to use to aid personal stability by gripping around

**3.5**
**last step**
final step for an ascending passenger to use to overcome a height change, forming the edge of the walking floor

**3.6**
**manual door**
unpowered door which the passenger has to physically open and/or close

**3.7**
**palm operable**
operable by the palm or any part of the hand, not requiring fingers to be unclenched

Note 1 to entry: The design need is that passengers with painful conditions, which affect their joints such as arthritis, may be unable to (and are likely to experience discomfort or pain if they do) exert any force with the tip of a single finger. Many may not be able to unclench their fingers to do this or perform any pulling action.

**3.8**
**proximity sensor**
sensor that can be used to control facilities without the control device being physically touched

**3.9**
**sharp edge**
thin edge capable of cutting or an abrupt end or discontinuity of a surface which has the potential to injure a passenger in normal use

**3.10**
**standard toilet**
toilet not designed to be accessible to a passenger in a wheelchair

**3.11**
**universal toilet**
toilet designed to be used by all passengers including passengers in wheelchairs

**3.12**
**usable width**
unobstructed width of an open door or passageway allowing for passengers to pass through

**3.13**
**wheelchair**
wheeled personal mobility device

Note 1 to entry: Wheelchair characteristics are defined in Annex A.

**3.14**
**wheelchair accessible doorway**
closest doorway to the wheelchair space (and wheelchair accessible sleeping accommodation, where fitted)

**3.15**
**wheelchair space**
designated space in the passenger compartment for the wheelchair users and their wheelchairs

Note 1 to entry: Space can be designed for two wheelchairs, one beside the other (dual).

# 4 Symbols and abbreviations

**Table 1 — Abbreviations**

| Abbreviation | Designation |
|---|---|
| EN | European Standard (Euronorm) |
| PRM | Persons with disabilities and persons with reduced mobility |
| TSI | Technical Specification for Interoperability |

**Table 2 — Symbols**

| Symbol | Designation | Unit |
|---|---|---|
| %ile | Percentile | |
| kg | Weight | kilogram |
| mm | Length | millimetre |
| N | Force | Newton |
| ° | measurement of angles | Degree |

# 5 Requirements and assessment

## 5.1 General

1) Assessment of the requirements identified in Clause 5 shall be according to Annex C and Annex D. Where additional assessment criteria apply, these will be identified against the relevant clause.

2) All dimensions in the figures are in millimetres (mm) unless otherwise stated.

3) When toilets are fitted in a train, a universal toilet shall be provided that is accessible from the wheelchair space and, if provided, the sleeping compartment.

4) The standard toilet shall be compliant with the requirements of 5.2 and 5.3.

5) The universal toilet shall be compliant with the requirements of 5.2 and 5.4.

## 5.2 Standard and universal toilets, common parameters

1) The centre of any door handle, lock or door control device on the exterior or interior of the toilet compartment shall be located at a minimum of 800 mm and a maximum of 1 100 mm above the toilet door threshold.

   — Assessment: this shall be measured vertically above the door threshold.

2) A visual and tactile (or audible) indication shall be given inside and outside the toilet to indicate when a door has been locked.

   — Assessment: tactile and audible information shall be according to EN 16584-2.

   — Assessment: Indication inside the toilet shall be provided by two distinct physical positions of the “lock” device and/or provision of audible indication.

NOTE 1 Current good practice and solutions are shown in EN 16584–2:2017, Annex O.

3) Any door control device and other equipment inside a toilet compartment (except for baby nappy change facilities and call for aid devices) shall be operable by exerting a force not exceeding 20 N.

   — Assessment of force required to operate a control device shall be by pulling or pushing the device depending on its normal mode of operation with e.g. a “force gauge” or “force meter” until the device or equipment is operated or activated.

   — This requirement does not refer to the force required to open or close a manual door itself (this is described in EN 16585-3).

4) Any control device, including flushing system, shall contrast to the background surface, and shall be identifiable by touch.

   — Assessment shall be according to EN 16584-1 and EN 16584-2.

NOTE 2 For systems that are operated by proximity sensors this requirement does not apply.

NOTE 3 For hygiene reasons it is good practice to have the flush control logically positioned that is close to the toilet so a blind or visually impaired passenger can locate it.

5) Clear, precise information for the operation of any control device shall be provided, making use of pictograms and shall be tactile.

   — Assessment shall be according to EN 16584-2.

6) The toilet seat and lid shall contrast with the background.

   — Assessment shall be according to EN 16584-1.

7) Handrails where provided shall:

   i. contrast to the background surface.

      — Assessment shall be according to EN 16584-1.

   ii. comply with the geometric requirements described in the relevant clauses of EN 16585-2.

8) In all areas of double-deck vehicles the minimum height of 1 950 mm shall be replaced by the relative ceiling height provided in those areas. In those areas, reduced ceiling height is only accepted as a consequence of structural constraints (gauge, physical space).

## 5.3 Standard toilet

1) A standard toilet is not designed to be accessible to a wheelchair user.

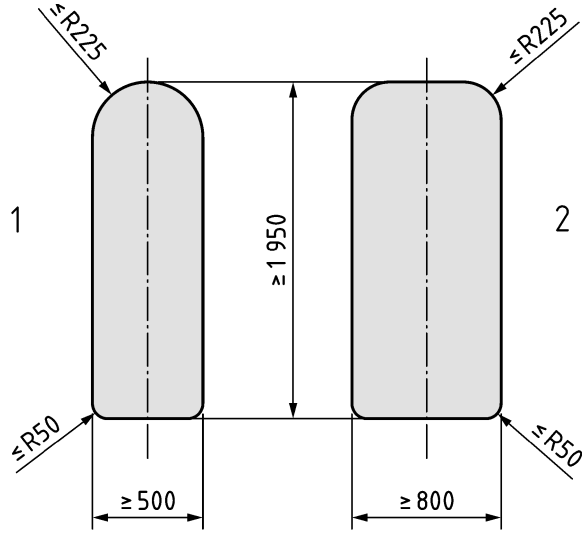
2) The minimum door usable width shall be 500 mm.

   — This shall be assessed according to Figures 1 and 2a;

   — There are to be no protrusions into the minimum usable width of 500 mm in its open position, such as handles or other features, from the floor up to a minimum of 1 950 mm as shown in Figures 1 and 2. (see also 5.2, (8));

— Minimum door usable width of a manual hinged door includes the swept envelope and should ensure that no part of the door shall be in that area when open. See Figure 2a.

Dimensions in millimetres




**Key**

1 clear width through the standard toilet door

2 clear width through the universal toilet door

**Figure 1 — Toilet door clear usable width (standard and universal)**

Dimensions in millimetres


**a) standard toilet door 500 mm usable width**

**b) manual hinged toilet door 800 mm usable width**

**Figure 2 — Usable width of toilet doors**

3) A fixed vertical and/or horizontal handrail shall be provided adjacent to the toilet seat and the wash basin.

— Assessment: the handrail shall be according to point 5.2 (7).

## 5.4 Universal toilet

1) A universal toilet is a toilet designed to be used by **ALL** passengers including **ALL** persons with disabilities and persons with reduced mobility.

2) The area of use of a universal toilet is defined by:

i. Using 'method A' as described in Clause 6;

ii. However, where 'method A' cannot be used, it is permitted to use 'method B' described in the assessment methodologies in Clause 6. This alternative is only provided for the following cases:

(a) vehicles where the available floor width is narrower than 2 400 mm;

— Assessment shall be between the interior trim panels at a height of 25 mm above the walking floor;

(b) existing rolling stock when it is renewed or upgraded;

3) The toilet access door shall provide a minimum clear usable width of 800 mm.

— This shall be assessed according to Figure 1 (see also 5.2 (8));

— There are to be no protrusions into the minimum usable width of 800 mm in its open position, such as handles or other features, from the floor up to a minimum of 1 950 mm as shown in Figure 1 and Figure 2b).

4) Where the door is semi-automatic, it shall be possible to open it partially in order to allow a wheelchair user's assistant to leave and re-enter the toilet module.

i. Allowing the wheelchair users assistant to activate the door open control, exit the toilet compartment and then press the door control to close the door without it having to finish a complete open cycle.

ii. The assistant can then wait outside the closed but unlocked door until they are required to re-enter the compartment whereby they can partially open the door, enter and then close the door without it having to finish a complete open cycle.

5) The exterior of the door shall be marked with a sign.

— Assessment shall be according to EN 16584-2;

6) There shall be sufficient space inside the toilet compartment to enable a wheelchair as defined in Annex A to:

i. Enter the toilet compartment.

— Assessment shall be according to EN 16585-3.

ii. Manoeuvre to a position allowing a 'lateral or side' approach **AND** also to a position allowing a 'diagonal or frontal' transfer of the wheelchair occupant to the toilet seat. (see Figure 3 for the two required approaches, that position can be either to the left or the right of the toilet seat (and Figures E.1 and E.2 for examples));

— Assessment shall be according to Clause 6.

iii. Exit the toilet compartment.

— Assessment shall be according to EN 16585-3.


a) lateral or side approach b) diagonal or frontal approach

**Figure 3 — Examples of the two required wheelchair positions adjacent to toilet seat**

7) There shall be a clear space with a minimum length of 700 mm in front of the toilet seat.

— Assessment: this shall be measured horizontally from the leading edge of the toilet seat, on the centre axis of the toilet seat, and for the full width of the toilet seat from a height of 50 mm above the floor to a point 1 450 mm above the floor (see Figure 4).

— Assessment: the 700 mm as a minimum shall follow the seat profile and is represented in Figure 4 by the bold line

— Assessment: the wash basin and/or handrail (vertical and/or horizontal) is permitted to overlap up to 50 mm with this clear space, for handrails this overlap shall only be at a height above 800 mm.

Dimensions in millimetres

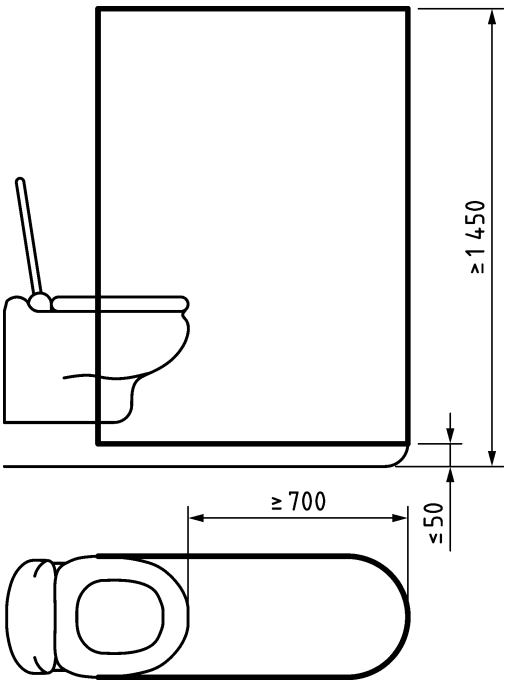


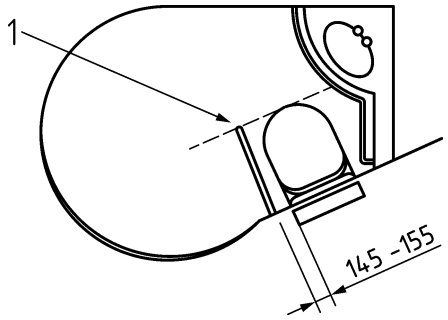

**Figure 4 — Example of minimum required clear space in front of toilet seat**

8) A horizontal handrail shall be provided at each side of the toilet seat extending at least to the leading edge of the toilet seat.

— Assessment of that handrail shall be to confirm it complies with the requirements of 5.2 (7);

— Assessment method shall be by measuring the extension at least to the leading edge of the toilet pan, measured parallel to the toilet seat centre axis. See Figure 5.

Dimensions in millimetres




**Key**
1 handrail

**Figure 5 — Extended hinged handrail in an example toilet compartment**

9) The handrail on the wheelchair accessible side shall (see Figure 6):

i. be hinged in such a way so as to enable an unobstructed transfer for the wheelchair user to and from the toilet seat.

— Assessment method shall be by measuring at least 350 mm from leading edge of toilet seat to handrail in the stored position. See Figure 7.

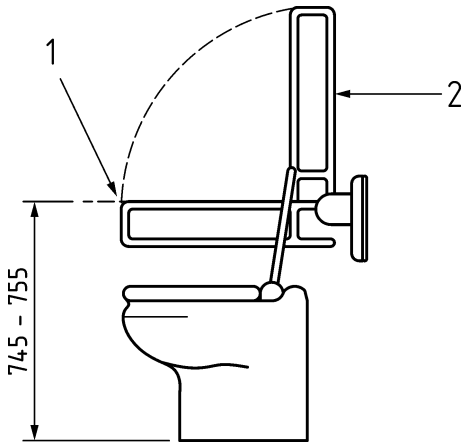
ii. be at a distance of (150 ± 5) mm from the side of the toilet seat; see Figure 5.

— Assessment: measured horizontally, perpendicular to the toilet seat centre axis.

iii. be placed at a height of (750 ± 5) mm above floor in the deployed position.

— Assessment measurement shall be vertical above the walking floor to the top surface of the handrail. See Figure 6.

Dimensions in millimetres




**Key**

1 deployed position

2 stored position

**Figure 6 — Height requirement applied to an example hinged handrail**

iv. be operable by exerting a force not exceeding 20 N.

— Assessment: the force required at a point within the first 50 mm of the free end of the handrail and no higher than 1 100 mm measured above the floor to stow and deploy the handrail shall not exceed 20 N. Figure 7 shows the direction that the force is applied to stow or deploy.

— Assessment: the mechanism used to retain the handrail in the stowed position shall not require a force greater than 20 N to overcome when releasing and securing that handrail with only one hand applying a force as described above.

Dimensions in millimetres

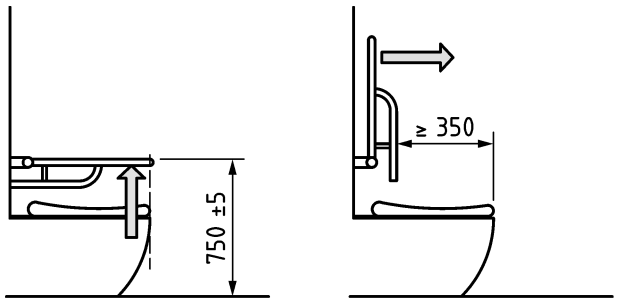



**Figure 7 — Direction of force applied to an example hinged handrail**

10) The surface of the toilet seat, when lowered, shall be at a height of 450 mm to 500 mm above the floor level.

— Assessment method shall be to measure the height for the full distance between 20 mm and 360 mm from leading edge of toilet seat, (see Figure 8).

Dimensions in millimetres

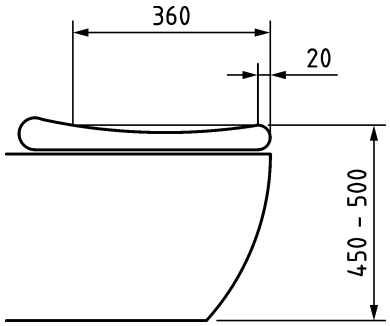



**Figure 8 — Height of example toilet seat**

11) All amenities shall be readily accessible.

i. For the following amenities; wash basin, soap dispenser, water dispenser, hand dryer or paper towel dispenser and the door control devices:

— Assessment: shall require the wheelchair to manoeuvre into position where the amenities are within the reach range of a 5 %ile female to a 95 %ile male sitting in a wheelchair demonstrated by 3D model and or drawing using relevant anthropometric data or the simplified reach range according to Figure B.2 (See Figure 9 for an example).

— Assessment: shall have a knee space (according to Figure 9) accommodating a person in a wheelchair as described in Annex A.

ii. For the toilet paper dispenser:

— Assessment: accessibility to the toilet paper dispenser shall be according to the reach range of a 5 %ile female to a 95 %ile male sitting on the toilet seat (NOT in the wheelchair) demonstrated by 3D model and or drawing using relevant anthropometric data or the simplified reach range according to Figure B.2 (See Figure 9 for an example).

iii. For the toilet flush:

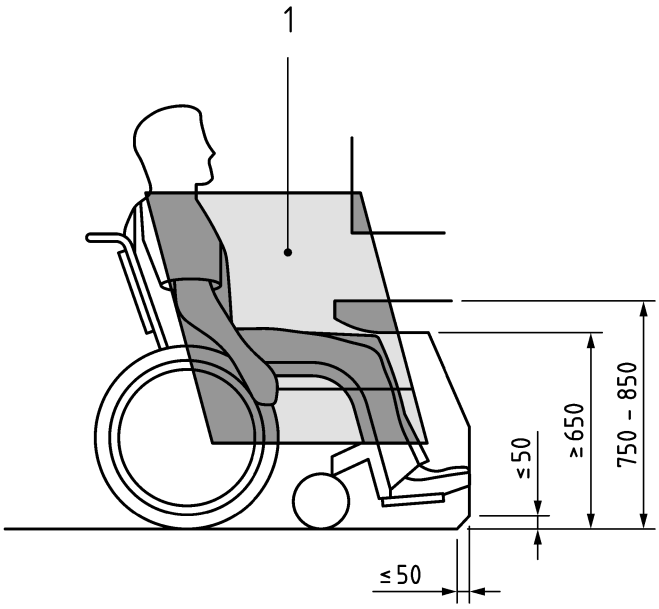
— Assessment: accessibility to the toilet flush shall be according to the reach range of a 5 %ile female to a 95 %ile male, either from the toilet seat or the wheelchair, demonstrated by 3D model and or drawing using relevant anthropometric data or the simplified reach range according to Figure B.2 (See Figure 9 for an example).

iv. For mirrors

— Assessment: If mirror(s) are provided, at least one should be positioned in such a way to consider the eye point of a person in a wheelchair (See EN 16584-2:2017, Annex C for eye point dimensions).

NOTE 1 This may be achieved by angling the mirror (for example above a wash basin) towards the wheelchair user.

Dimensions in millimetres




**Key**

1 reach range

**Figure 9 — Example of amenities reach range assessment**

12) The toilet cubicle shall be fitted with not less than two call for aid devices that shall, when operated, send a signal to a person who can take appropriate action; they need not initiate a communication.

i. The interface of the call for aid devices shall be as defined in 5.6.

ii. One call for aid device shall be placed not more than 450 mm above the floor, it shall be positioned so that the control can be reached by a person lying on the floor.

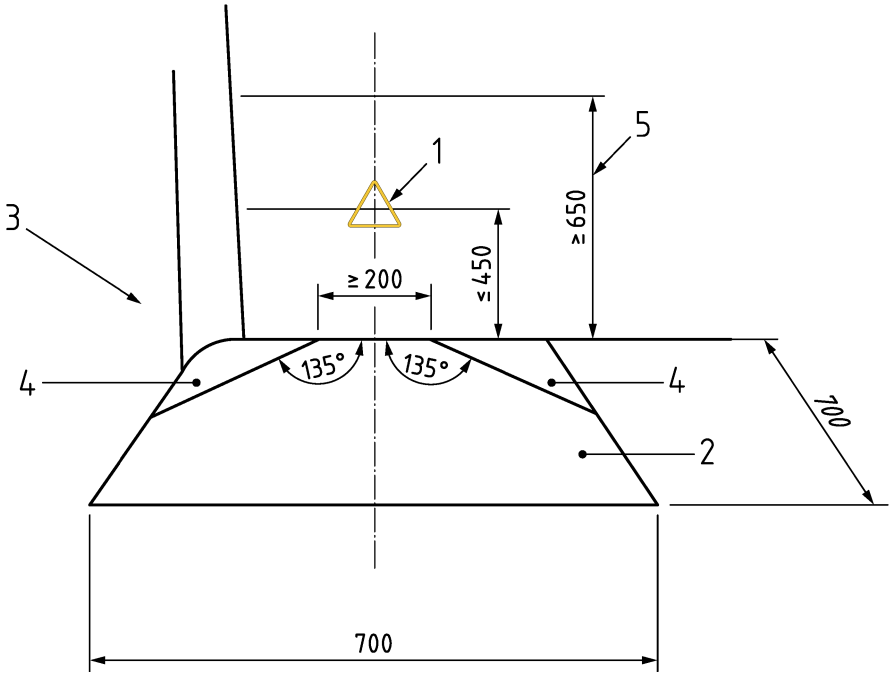
— Assessment: this shall be measured vertically from the surface of the floor to the centre of the control.

iii. The call for aid device shall have a clear space consisting of:

a) An unobstructed floor area with a minimum length of 700 mm in front of the call for aid device as shown in Figure 10; and

b) minimum 650 mm unobstructed height above floor as shown in Figure 10.

Dimensions in millimetres




**Key**

1 call for aid
2 unobstructed floor area
3 side wall
4 permitted reduction to required unobstructed floor area
5 height of unobstructed wall zone

NOTE Due to the range of shapes and forms for toilet designs it is unlikely to have a continuous 700 mm flat surface wall on which to mount a call for aid device. Therefore, an allowance of up to 135° is permitted for the variations in form.

**Figure 10 — Example of lower call for aid device in toilet**

iv. The other call for aid device shall be not less than 800 mm and not more than 1 100 mm above the floor.

— Assessment: this shall be measured vertically above the walking floor to the centre of the control.

— Assessment: shall be within the normal reach as described in Annex B - Figure B.2.

v. These two call for aid devices shall be located on different vertical surfaces of the cubicle so that they may be reached from a range of positions.

vi. The controls of the call for aid devices shall be distinct from any other control within the toilet, be coloured differently from other control devices and contrast with their background.

— Assessment shall be according to EN 16584-1 and EN 16584-2 for the relevant parts of this requirement.

13) When toilets are fitted in a train a baby nappy changing facility shall be provided.

i. If separate nursery facilities are not provided or if separate nursery facilities are provided but are not accessible to a wheelchair user, a baby nappy changing table shall be incorporated within the universal toilet(s).

ii. If a baby nappy changing table is provided, when in the lowered position, the height of the usable surface shall be between 800 mm and 1 000 mm.

— Assessment: shall be measured vertically above the walking floor level to the uncompressed changing area between barriers (as in EN 12221-1:2008+A1:2013, Figure 3).

14) For a universal toilet when assessing wheelchair movements, the measurements are permitted to be taken 50 mm above the walking floor, this is to allow for covings between the floor and wall. The maximum permitted overlap will be 50 mm. See Figure 11.

Dimensions in millimetres

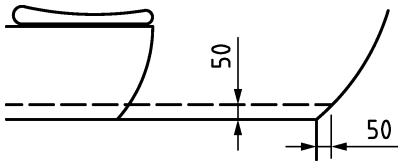



**Figure 11 — Example of an acceptable measuring point between walls and floor in a toilet**

## 5.5 Baby nappy changing table

1) The usable surface of the baby nappy changing table shall be a minimum of 500 mm wide and 700 mm long.

— Assessment shall be measured according to EN 12221-1:2008+A1:2013, 5.1, the 500 mm and 700 mm dimensions are the usable dimensions.

2) It shall:

i. be designed to prevent a baby from inadvertently sliding off;

— Assessment shall be according to EN 12221-1:2008+A1:2013, 5.11, EN 12221-2:2008+A1:2013, 5.8 if side barriers are used or if a restraining belt is used EN 12790.

ii. have no sharp edges;

— Assessment shall be according to EN 12221-1:2008+A1:2013, 5.2 and 5.3.6.

iii. be able to take a minimum weight of 80 kg.

— Assessment: there shall be no permanent deformation after 80 kg loading distributed over the first half of the baby nappy change area, measured from the leading edge.

3) It shall be possible to put it into the stowed position with only one hand, using a force not exceeding 25 N.

It should be also possible to deploy the nappy changing table with only one hand using a force not exceeding 25 N.

— Assessment: the force required at a point within the first 50 mm of the free end of the table and finishing no higher than 1 100 mm above floor to stow the table shall not exceed 25 N in any position. This is similar to the hinged handrail in Figure 7 above which shows the direction that the force is applied to stow.

— Assessment: the mechanism used to retain the table in the stowed position shall not require a force greater than 25 N when securing that table with only one hand applying a force as described above.

### 5.6 Interface of the call for aid device

A call for aid device shall:

1) be according to the relevant clauses of EN 16584-1 for contrast and EN 16584-2 for information provided;

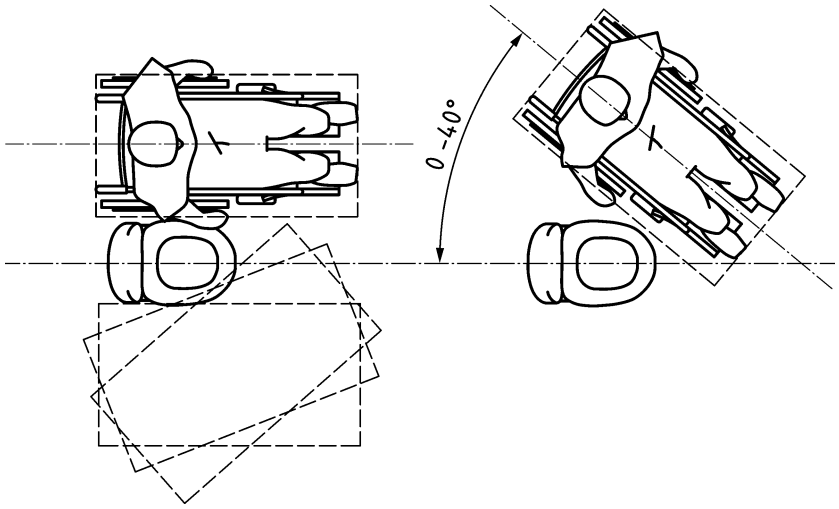
2) be palm operable and not require a force exceeding 30 N to operate.

— Assessment according to EN 16585-3.

## 6 Assessment methodologies

### 6.1 Lateral or side approach

There shall be sufficient space inside the toilet compartment to enable a wheelchair to be manoeuvred to a position adjacent to the toilet seat to allow a lateral or side transfer as shown in Figure 12 at a position between 0° (parallel to the centreline of the toilet pan) and 40°.




NOTE This figure shows a range of example positions but only one within the limits needs to be assessed

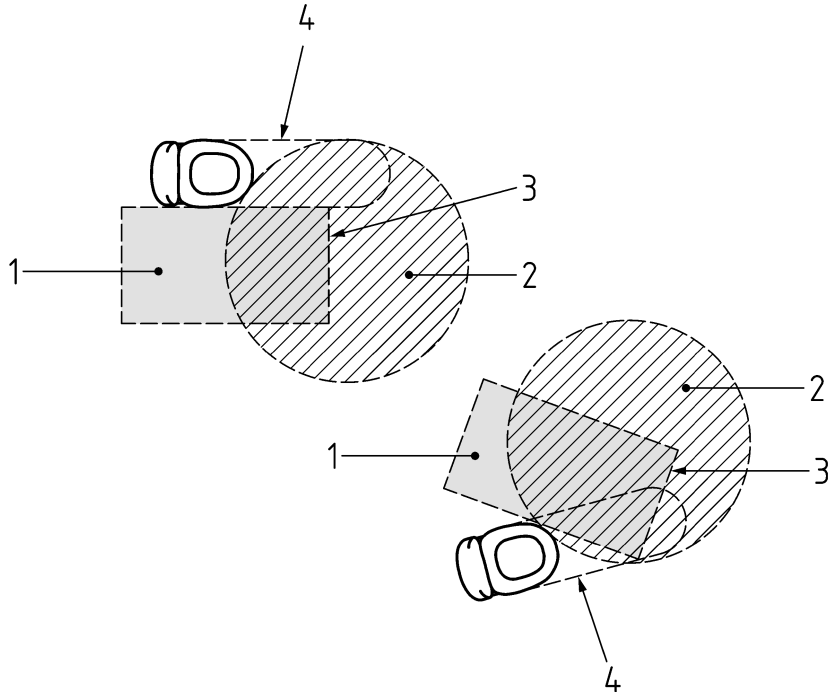
**Figure 12 — Lateral or side approach for transfer to toilet seat (the figure shows a range of example positions)**

**Assessment for a lateral or side approach:**

— **Method A:** Lateral or side transfer wheelchair position is between 0° (parallel to pan centreline) and 40° (see Figure 12) with a turning circle of 1 500 mm in diameter that overlaps a rectangular 1 250 mm × 700 mm wheelchair space envelope across the full 700 mm side that would be the front of the wheelchair. See Figure 13. The wash basin may overlap the turning circle by up to

300 mm if complying with knee and toe space requirements as in Figure 9 and Annex B. See Figure B.1. The handrail (vertical and/or horizontal) is permitted to overlap up to 50 mm with this turning circle only at a height above 800 mm.

Care should be taken to ensure that the wheelchair can be positioned relative to the toilet seat to allow the transfer to take place especially when assessing the position parallel to the centre line of the toilet seat. A means of achieving compliance is demonstrated in Figure E.7.




**Key**

1 the light grey box represents a wheelchair in a lateral or side position
2 turning circle (manoeuvring space)
3 indicates the front of the wheelchair
4 clear space in front of toilet

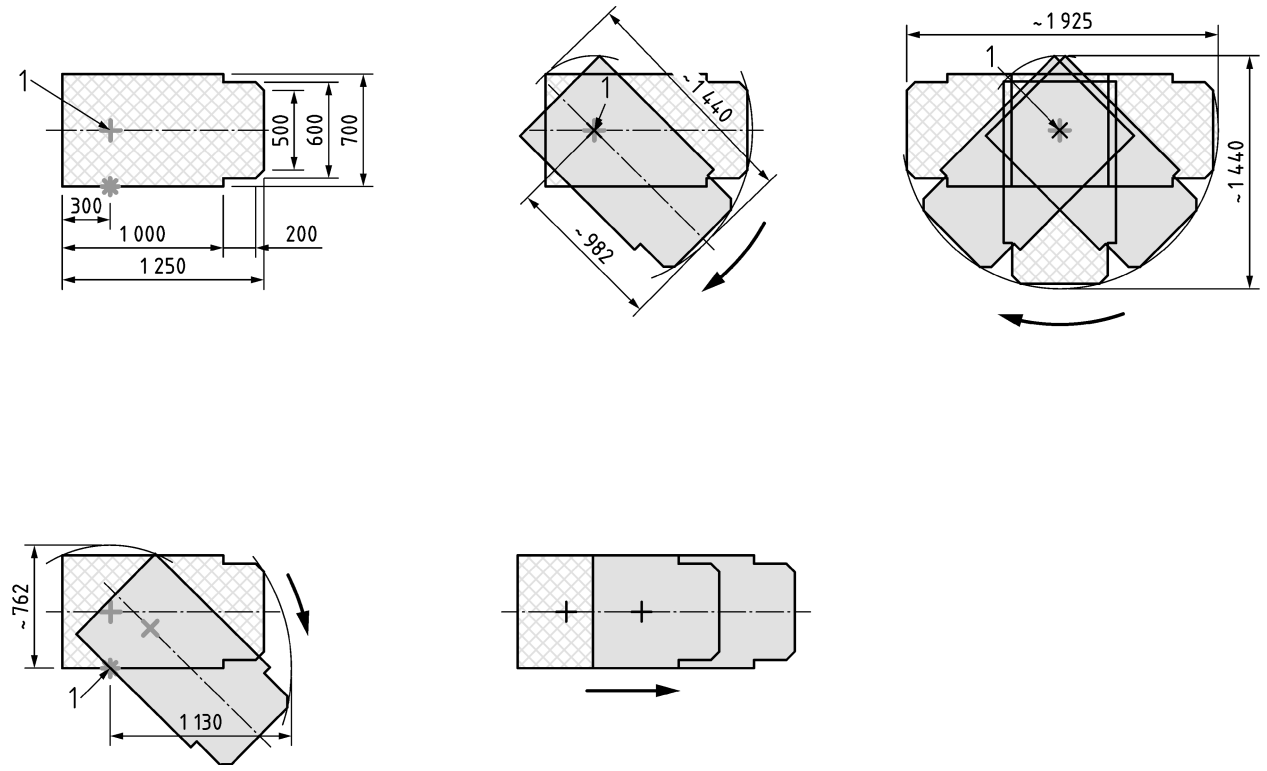
**Figure 13 — Method 'A' assessment of lateral or side approach**

NOTE 1 See Figure E.3 for examples of current toilet designs with this assessment method overlaid.

— **Method B**: movement through door to a position touching the toilet pan at an angle of maximum ± 40° to its centre line (as shown in Figure 12) demonstrated through no more than five manoeuvres (after entering the toilet compartment) using the simplified manoeuvres of a wheelchair as defined in Figure 14 with the simplified wheelchair profile in Annex B – Figure B.1. The wash basin may overlap the manoeuvring space by up to 300 mm if complying with knee and toe space requirements as in Figure 9 and in Annex B. See Figure B.1. The handrail (vertical and/or horizontal) is permitted to overlap up to 50 mm with this manoeuvring space only at a height above 800 mm.

NOTE 2 The 50 mm allowance for hands either side needs to be considered when assessing manoeuvring, this is to be provided above the toilet lid level. See EN 16585–2:2017, Figure B.4. A method to allow the correct position of the wheelchair relative to the toilet pan is demonstrated in Figure E.7.

Dimensions in millimetres



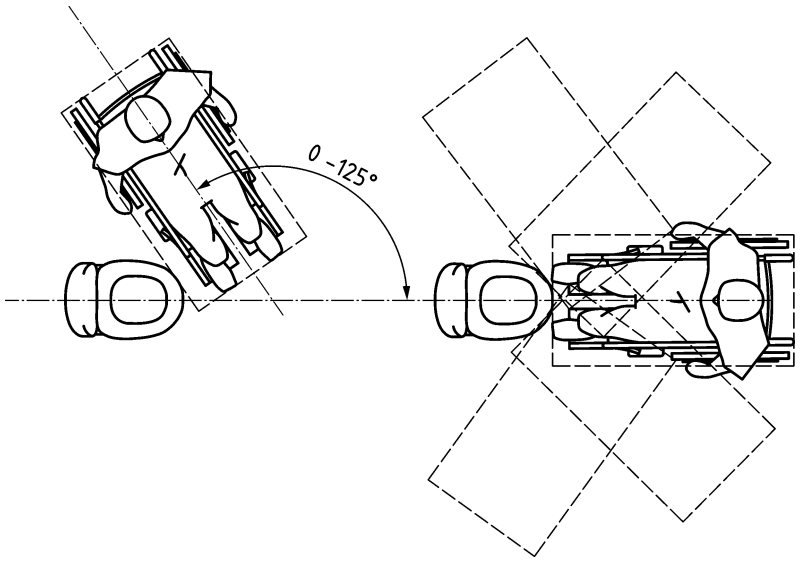

**Key**

1 simplified pivot points on rear wheel axis (rear wheel propelled wheelchairs) permissible

**Figure 14 — Simplified wheelchair profile and four simplified manoeuvres for Method 'B'**

## 6.2 Frontal or diagonal approach

There shall also be sufficient space inside the toilet compartment to enable a wheelchair as defined in Annex A to be manoeuvred to a frontal or diagonal transfer position adjacent to the toilet seat, between 0° (parallel to pan centreline) and 125°, as shown in Figure 15:

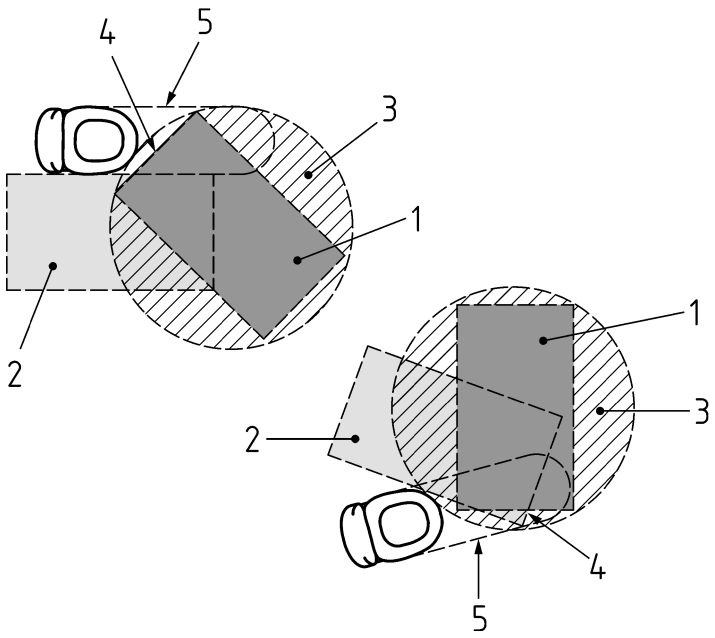



NOTE This figure shows a range of example positions but only one within the limits needs to be assessed.

**Figure 15 — Frontal or diagonal approach for transfer to toilet seat (the figure shows a range of example positions as dashed rectangles)**

**Assessment for a frontal or diagonal approach:**

— **Method A**: Frontal or diagonal transfer wheelchair position is between 0° (parallel to pan centreline) and 125° (see Figure 15) with a turning circle of 1 500 mm in diameter and a rectangular 1 250 mm × 700 mm wheelchair space envelope where the front of the wheelchair and that turning circle overlap the clear space required in the front of the toilet seat. See Figure 4 and Figure 16. The wash basin may overlap the turning circle by up to 300 mm if complying with knee and toe space requirements as in Figure 9 and Annex B, see Figure B.1. The handrail (vertical and/or horizontal) is permitted to overlap up to 50 mm with this turning circle only at a height above 800 mm.




**Key**

1 wheelchair in a frontal or diagonal position
2 wheelchair in a lateral or side position
3 turning circle (manoeuvring space)
4 front of the wheelchair
5 clear space in front of toilet (see Figure 4)

**Figure 16 — Method 'A' assessment of frontal or diagonal approach example**

— **Method B**: movement through door to a position touching the toilet pan at an angle of maximum ± 125° to its centre line (as shown in Figure 15) demonstrated through no more than five manoeuvres (after entering the toilet compartment) using the simplified manoeuvres of a wheelchair, as defined in Figure 14 and the simplified wheelchair profile in Annex B – Figure B.1. The wash basin may overlap the manoeuvring space by up to 300 mm if complying with knee and toe space requirements as in Figure 9 and Annex B. See Figure B.1. The handrail (vertical and/or horizontal) is permitted to overlap up to 50 mm with this manoeuvring space only at a height above 800 mm.

NOTE The 50 mm allowance for hands either side needs to be considered when assessing manoeuvring, this is to be provided above the toilet lid level.

# Annex A
(normative)

# Engineering limits for a wheelchair transportable by train

## A.1 Engineering limits

This annex identifies the engineering limits for a wheelchair transportable by train and is therefore the minimum requirements when designing a train.

## A.2 Characteristics

The technical requirements are as follows below.

1) Basic dimensions:

   — width of 700 mm plus 50 mm min each side for hands when moving;

   — length of 1 200 mm plus 50 mm for feet;

   — height of 1 375 mm max including a 95th %ile male occupant.

Dimensions in millimetres

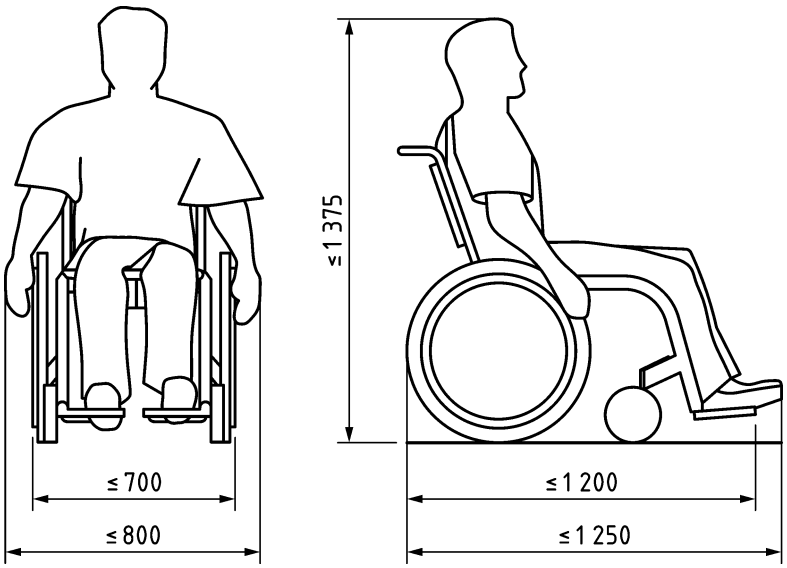



**Figure A.1 — Basic dimensions of wheelchair and occupant**

2) The turning space shall be as a minimum a 1 500 mm diameter circle but this would require several manoeuvres to achieve a 180° turn. A simple pivot would create a swept envelope of approximately 1 925 mm longitudinally and 1 450 mm vertically (see Figure A.2 and Figure B.1).

Dimensions in millimetres

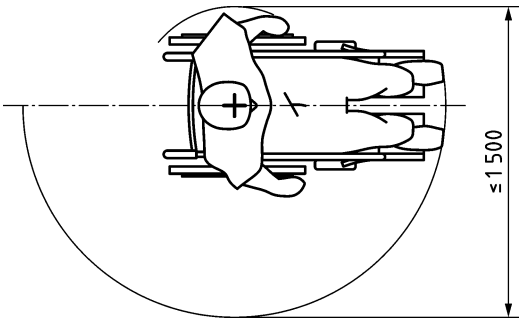



**Figure A.2 — Swept envelope of 180° pivot**

3) The smallest wheel shall accommodate a gap of dimensions 75 mm horizontal and 50 mm vertical.

Dimensions in millimetres

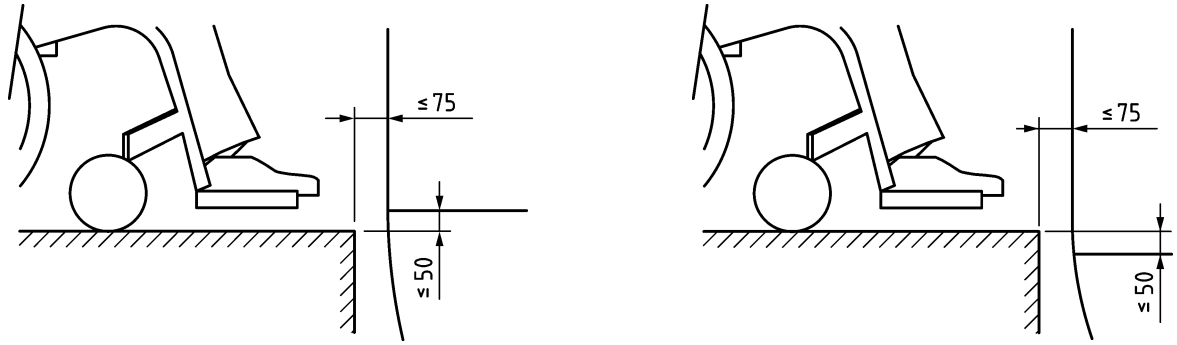
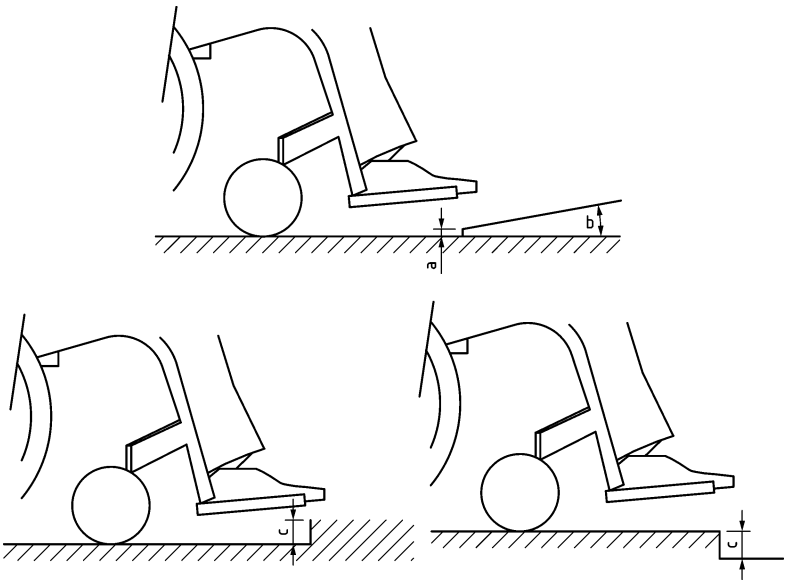



**Figure A.3 — Small wheel gap accommodation**

4) Obstacle height and ground clearance that can be overcome:

   — obstacle height that can be overcome 50 mm (max);

   — ground clearance 60 mm (min). with an upward slope angle of 10° on top for going forward (under the foot rest).




**Key**

a max 20 mm

b max 10°

c max 50 mm

**Figure A.4 — Maximum obstacle heights to be overcome**

5) Fully laden weight of:

   — 300 kg for wheelchair and occupant (including any baggage) in the case of an electric wheelchair for which no assistance is required for crossing a boarding aid;

   — 200 kg for wheelchair and occupant (including any baggage) in the case of a manual wheelchair.

6) Maximum safe slope on which the wheelchair will remain stable:

   — shall have dynamic stability in all directions at an angle of 6°;

   — shall have static stability in all directions (including with brake applied) at an angle of up to 9°;

   — stability shall be measured according to EN 12183.

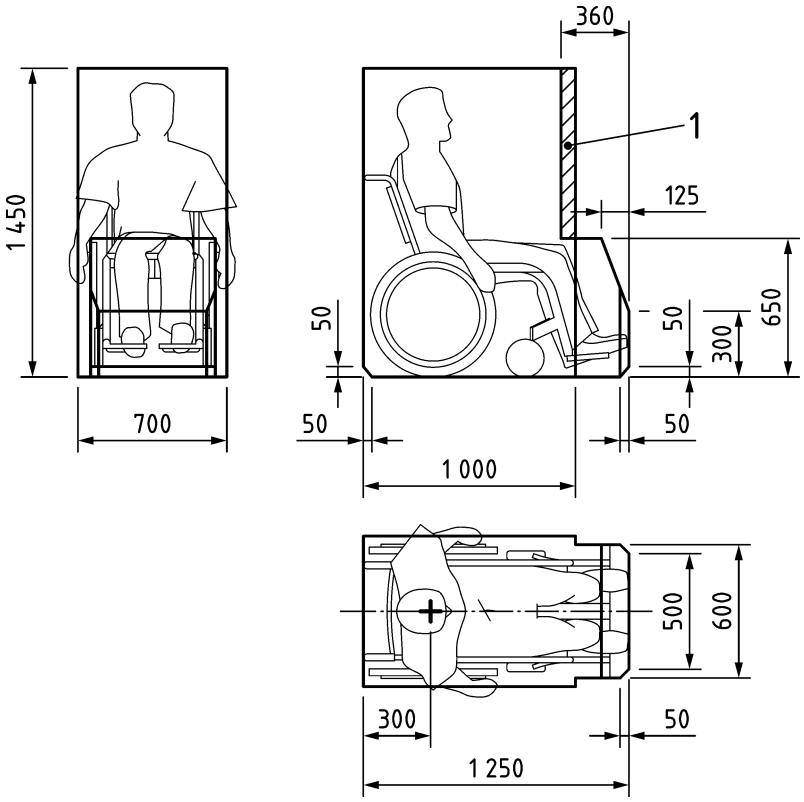
# Annex B
(normative)

# Simplified wheelchair profile and occupants reach range

## B.1 Wheelchair profiles

This annex presents simplified profiles, manoeuvres and reach ranges, usable for assessment of space requirements for a person in a wheelchair transportable by train.

Dimensions in millimetres



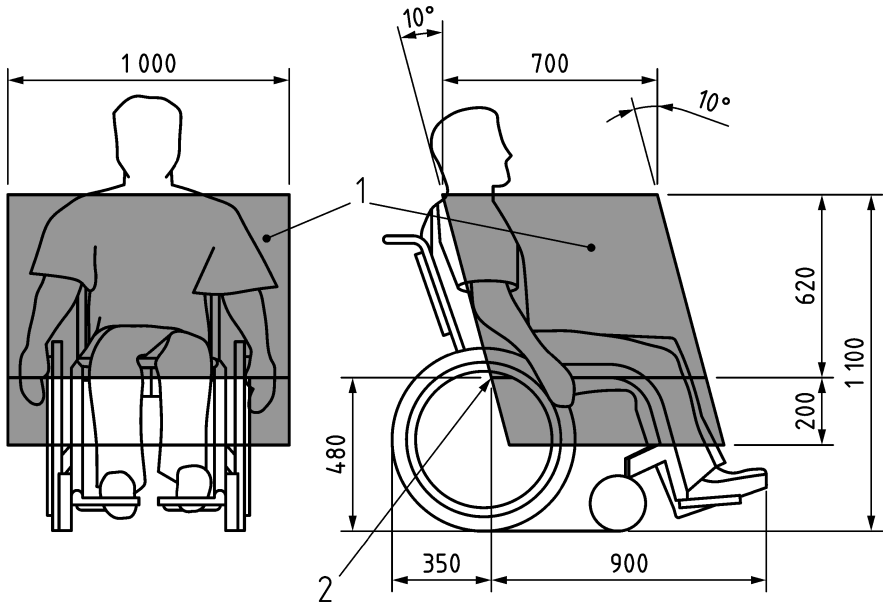

**Key**

**+** simplified central pivot point on rear wheel axis (rear wheel propelled wheelchairs)

1 maximum intrusion area for assessing turning circles

**Figure B.1 — Simplified profile of a person in wheelchair (as defined in Annex A)**

Dimensions in millimetres




**Key**

1 Reach range (Shown as a rectangle centred on the wheelchair centre line in the front elevation and shown as a parallelogram with internal angles of 100° and 80° in the side elevation where the rear line of the parallelogram intersects the seat reference point)

2 Seat reference point

**Figure B.2 — Reach range of a person in a wheelchair (as defined in Annex A)**

# Annex C
(normative)

# EC verification

## C.1 Interoperability constituents

### C.1.1 Conformity assessment

An EC declaration of conformity or suitability for use shall be drawn up by the manufacturer or his authorized representative established in the Union before placing an interoperability constituent on the market.

The conformity assessment of an interoperability constituent shall be according to the prescribed module(s) of that particular constituent specified in C.1.2 of this standard.

### C.1.2 Application of modules

The modules for the EC certification of conformity of interoperability constituents are listed in Table C.1.

**Table C.1 — Modules for EC certification of conformity of interoperability constituents**

| | |
|---|---|
| Module CA | Internal production control |
| Module CA1 | Internal production control plus product verification by individual examination |
| Module CA2 | Internal production control plus product verification at random intervals |
| Module CB | EC-Type examination |
| Module CC | Conformity to type based on internal production control |
| Module CD | Conformity to type based on quality management system of the production process |
| Module CF | Conformity to type based on product verification |
| Module CH | Conformity based on full quality management system |
| Module CH1 | Conformity based on full quality management system plus design examination |
| Module CV | Type validation by in service experience (Suitability for use) |

The manufacturer or his authorized representative established within the Union shall choose one of the modules or module combinations indicated in Table C.2 for the constituent to be assessed.

**Table C.2 — Combination of modules for EC certification of conformity of interoperability constituents**

| Clause | Constituents to be assessed | Module CA | Module CA1 or CA2[a] | Module CB +CC | Module CB +CD | Module CB +CF | Module CH[a] | Module CH1 |
|---|---|---|---|---|---|---|---|---|
| 5.2, 5.3 and 5.4 | Toilet modules | | X | X | X | | X | X |
| 5.5 | Baby nappy changing table | X | | X | | | X | |
| 5.6 | Call for aid device | X | | X | | | X | |

[a] Modules CA1, CA2 or CH may be used only in the case of products manufactured according to a design developed and already used to place products on the market before the application of relevant TSIs applicable to those products, provided that the manufacturer demonstrates to the notified body that design review and type examination were performed for previous applications under comparable conditions, and are in conformity with the requirements of the relevant TSI; this demonstration shall be documented, and is considered as providing the same level of proof as module CB or design examination according to module CH1.

## C.2 Subsystems

### C.2.1 EC verification (general)

The EC verification procedure shall be performed according to the prescribed modules(s) specified in C.2.2 of this standard.

For the infrastructure subsystem, if the applicant demonstrates that tests or assessments of a subsystem or parts of a subsystem are the same or have been successful for previous applications of a design, the notified body shall consider the results of these tests and assessments for the EC verification.

The approval process and the contents of the assessment shall be defined between the applicant and a notified body according to the requirements defined in the relevant TSI and in conformance with the rules set out in section 7 of that TSI.

### C.2.2 Procedures for EC verification of a subsystem (modules)

The modules for the EC verification of subsystems are listed in Table C.3.

**Table C.3 — Modules for the EC verification of subsystems**

| | |
|---|---|
| Module SB | EC-type examination |
| Module SD | EC verification based on quality management system of the production process |
| Module SF | EC verification based on product verification |
| Module SG | EC verification based on unit verification |
| Module SH1 | EC verification based on full quality management system plus design examination |

The applicant shall choose one of the modules or module combinations indicated in Table C.4.

**Table C.4 — Combination of modules for the EC verification of subsystems**

| Subsystem to be assessed | Module SB+SD | Module SB+SF | Module SG | Module SH1 |
|---|---|---|---|---|
| Rolling Stock Subsystem | X | X | | X |

The characteristics of the subsystem to be assessed during the relevant phases are indicated in Annex D, Table D.2 for rolling stock subsystem. The applicant shall confirm that each subsystem produced complies with the type.

# Annex D
(normative)

# Summary of testing requirements

The sub-system characteristics that shall be assessed in the different phases of design, development and production are marked by X in Table D.1 for interoperable constituents.

**Table D.1 — Test plan for Interoperable Constituents**

| Characteristics to be assessed | Design and development phase | | Production phase |
|---|---|---|---|
| | Design review and/or design examination | Type Test | Verification of conformity to type |
| 5.2 Standard and universal - common parameters | X | X | X |
| 5.3 Standard toilets | X | X | X |
| 5.4 Universal toilets | X | X | X |
| 5.5 Baby nappy changing table | X | X | X |
| 5.6 Interface of the call for aid device | X | X | X |

The sub-system characteristics that shall be assessed in the different phases of design, development and production are marked by X in Table D.2 for Rolling stock subsystem.

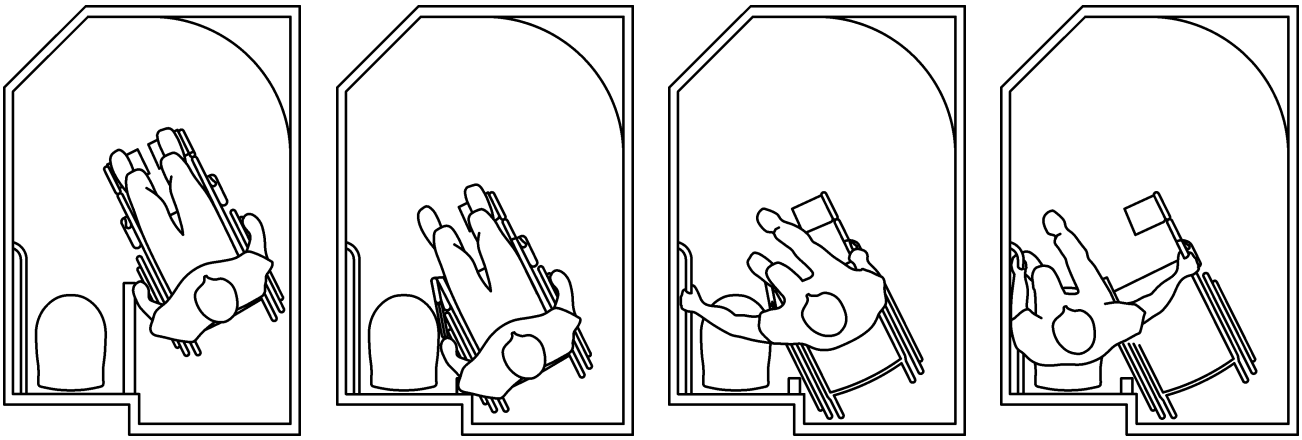
**Table D.2 — Test plan for rolling stock requirements**

| Characteristics to be assessed | Design and development phase | | Production phase |
|---|---|---|---|
| | Design review and/or design examination | Type test | Routine test |
| 5.2 Standard and universal toilets - common parameters | X | | |
| 5.3 Standard toilets | X | | |
| 5.4 Universal toilets | X | | |

# Annex E
(informative)

# Wheelchair accessible toilet guidance and good practice

Examples of wheelchair accessible toilet guidance and good practice.



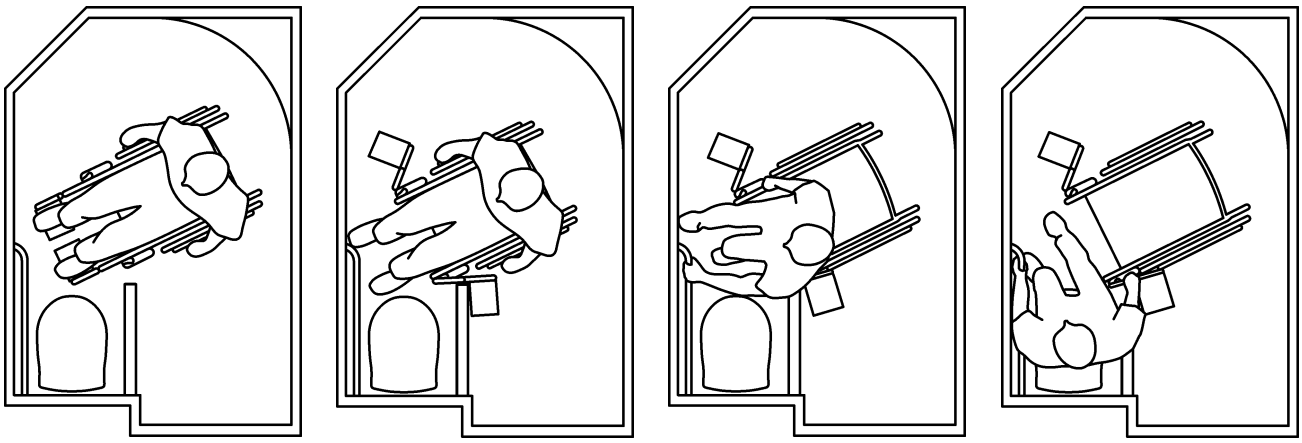
Manoeuvres wheelchair to side of toilet, raises hinged handrail

Swings away footrest, moves closer to side of toilet, sets brakes

Holds on to handrail and wheelchair, starts lateral transfer

Positions on toilet

**Figure E.1 — Typical side approach transfer**



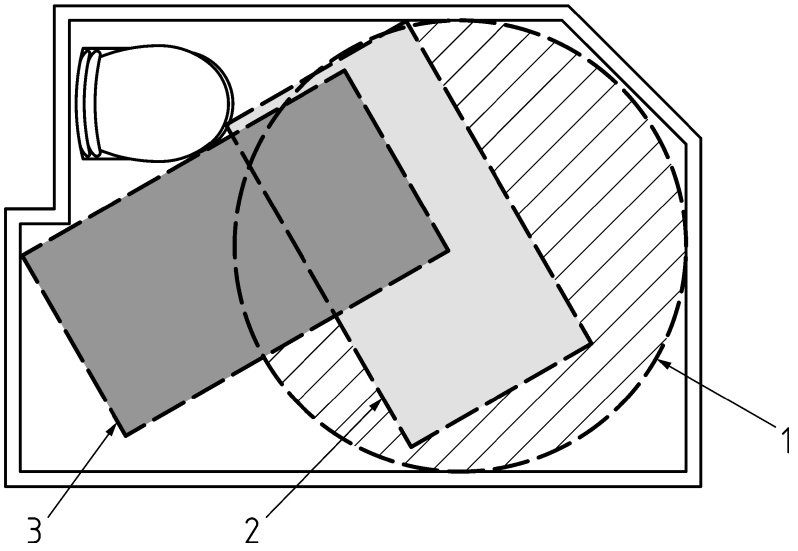
Manoeuvres wheelchair to frontal or diagonal position

Swings away footrests, moves closer to toilet, sets brakes

Holds on to handrail and wheelchair, starts diagonal transfer

Positions on toilet

**Figure E.2 — Typical diagonal approach transfer**




**Key**

1 turning circle with a diameter of 1 500 mm
2 a diagonal transfer position
3 a side approach position

**Figure E.3 — Example of combined transfer position assessment according to method A**

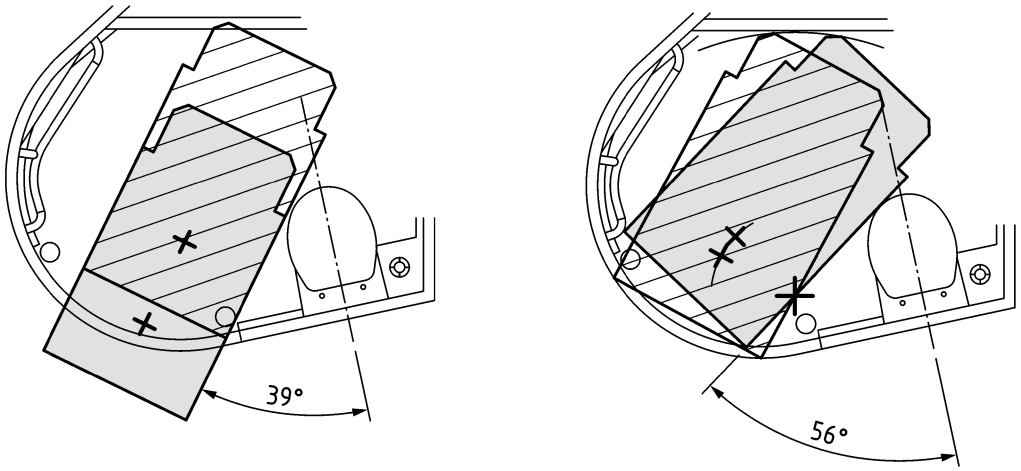
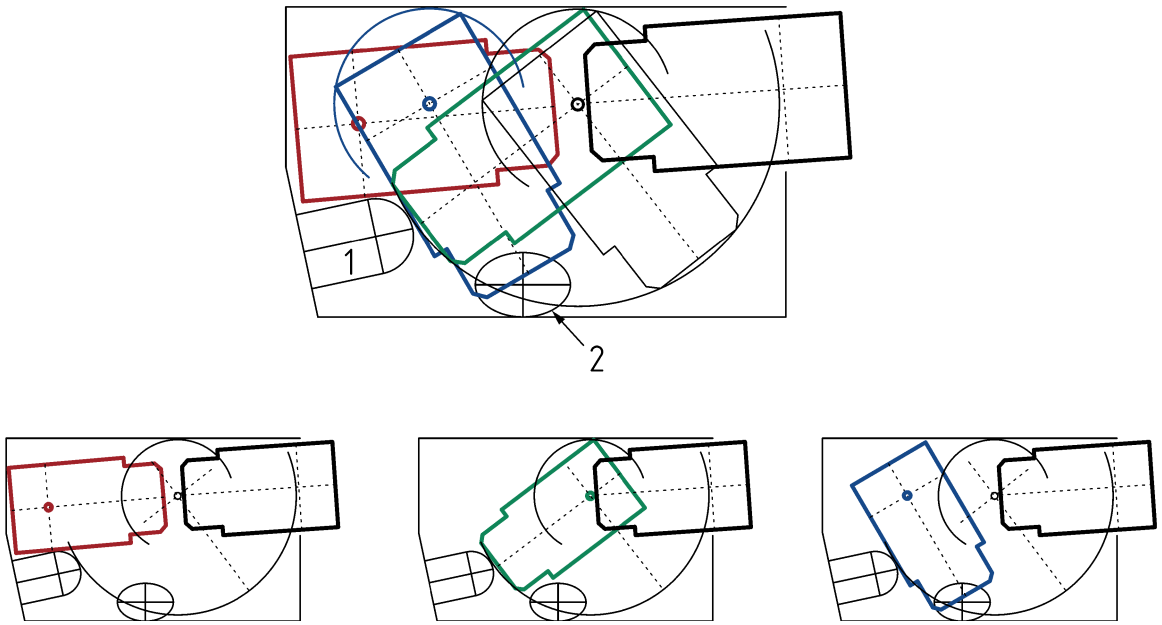



**Figure E.4 — Example of transfer position assessment according to method B in the restrictive toilet footprint that mandates method B assessment**

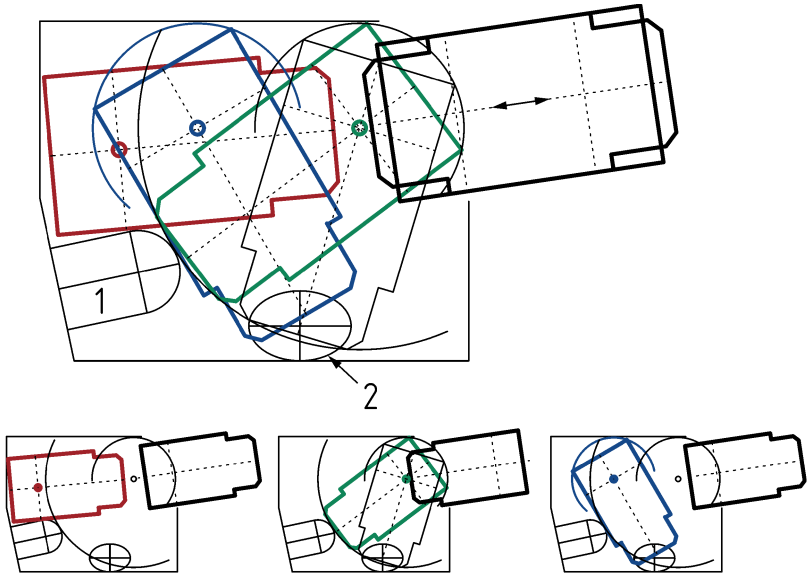



**Key**

1 toilet seat

2 wash basin

**Figure E.5 — Example of transfer position assessment type B, turning inside toilet cubicle**



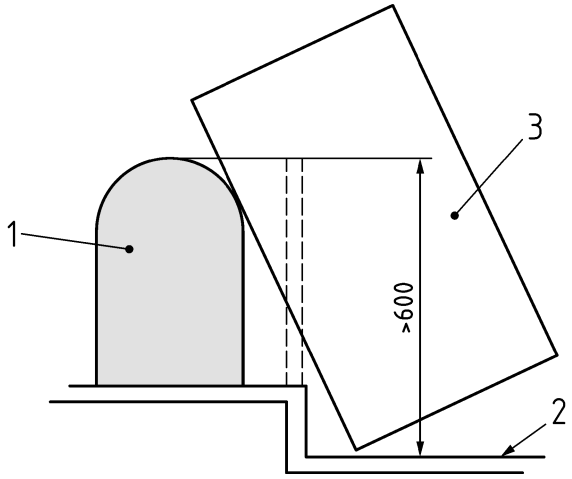

**Key**

1 toilet seat

2 wash basin

**Figure E.6 — Example of transfer position assessment type B, turning outside of toilet cubicle**

Dimensions in millimetres




**Key**

1 toilet pan

2 rear wall

3 wheelchair plan view in an example position for a side transfer

The minimum dimension for the front of the toilet pan to the wall behind should be 600 mm.

**Figure E.7 — Example arrangement to achieve the minimum required dimension to front of the toilet pan**

# Annex ZA
(informative)

# Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC

This European Standard has been prepared under a Commission's standardization request M/483 to provide one voluntary means of conforming to the Essential Requirements of the Directive 2008/57/EC on the interoperability of the rail system (recast) and with the associated TSIs.

Once this standard is cited in the Official Journal of the European Union under that Directive 2008/57/EC, compliance with the normative clauses of this standard given in Table ZA.1 for TSI LOC&PAS and Table ZA.2 for TSI PRM confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations and with the TSI requirements.

**Table ZA.1 — Correspondence between this European Standard, the Commission regulation (EU) No 1302/2014 of 18 November 2014 concerning the technical specification for interoperability relating to the 'rolling stock locomotives and passenger rolling stock' of the rail system in the European Union (published in the *Official Journal L 356, 12.12.2014, p.228*) and Directive 2008/57/EC**

| Clause/subclauses of this European Standard | Chapter/§/annexes of the Technical Specification for Interoperability (TSI) | Corresponding text, articles/§/annexes of the Directive 2008/57/EC | Comments |
|---|---|---|---|
| Clauses 3, 4, 5, 6<br>Annexes A, B, C, D | 4. Characterization of the rolling stock subsystem<br>4.2. Functional and technical specification of the sub-system<br>4.2.5. Passenger related items<br>§4.2.5.1 Sanitary systems<br>4.2.12. Documentation for operation and maintenance | Annex III, Essential Requirements<br>1 General requirements<br>1.1 Safety<br>Clauses 1.1.1, 1.1.5<br>1.2 Reliability and availability<br>1.3 Health<br>1.6 Accessibility<br>Clause 1.6.1<br>2 Requirements specific to each subsystem<br>2.4 Rolling stock<br>Clauses 2.4.1§4, 5, 6, 7, 8, 9, 10,<br>2.4.2, 2.4.3, 2.4.5 | The Essential Requirements incorporate those relating to Accessibility added to Directive 2008/57/EC by Commission Directive 2013/9/EU.<br>When EN 16585–1 has been harmonized, reference in Appendix A Index 9 of the PRM TSI to TS 16635:2014 for assessment of the Universal toilet module can be replaced by reference to EN 16585–1. |

**Table ZA.2 — Correspondence between this European Standard, the Commission Regulation (EU) No 1300/2014 of 18 November 2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility and repealing Decision 2008/164/EC (published in the *Official Journal L 356, 12.12.2014, p.110*) and Directive 2008/57/EC**

| Clause/subclauses of this European Standard | Chapter/§/annexes of the Technical Specification for Interoperability (TSI) | Corresponding text, articles/§/annexes of the Directive 2008/57/EC | Comments |
|---|---|---|---|
| Clauses 3, 4, 5, 6<br>Annexes A, B, C, D | 4. Characterization of the subsystems<br>4.2. Functional and technical specifications<br>4.2.2. Rolling Stock Subsystem<br>§4.2.2.5. Toilets<br>§4.2.2.6. Clearways<br>§4.2.2.7 Customer information<br>§4.2.2.9. Handrails<br>§4.2.2.10. Wheelchair accessible sleeping accommodation<br>5. Interoperability constituents<br>5.3 List and characteristics of constituents<br>5.3.2 Rolling stock<br>§5.3.2.2. Standard and universal toilets: common parameters<br>§5.3.2.3. Standard toilet<br>§5.3.2.4. Universal toilet<br>§5.3.2.5. Baby nappy changing table<br>§5.3.2.6. Interface of the call for aid device | Annex III, Essential Requirements<br>1 General requirements<br>1.1 Safety<br>Clauses 1.1.1, 1.1.5<br>1.2 Reliability and availability<br>1.3 Health<br>1.6 Accessibility<br>Clause 1.6.1<br>2 Requirements specific to each subsystem<br>2.4 Rolling stock<br>Clauses 2.4.1§4, 5, 6, 7, 8, 9, 10,<br>2.4.2, 2.4.3, 2.4.5 | The Essential Requirements incorporate those relating to Accessibility added to Directive 2008/57/EC by Commission Directive 2013/9/EU.<br>When EN 16585–1 has been harmonized, reference in Appendix A Index 9 of the TSI to TS 16635:2014 for assessment of the Universal toilet module can be replaced by reference to EN 16585–1. |

| Clause/subclauses of this European Standard | Chapter/§/annexes of the Technical Specification for Interoperability (TSI) | Corresponding text, articles/§/annexes of the Directive 2008/57/EC | Comments |
|---|---|---|---|
| | 6. Assessment of conformity and/or suitability for use<br>6.1 Interoperability constituents<br>§6.1.3.1. Particular assessment procedures, Universal Toilet Module<br>6.2. Subsystems<br>Appendix D: Assessment of interoperability constituents<br>Appendix E: Assessment of the subsystems<br>Annex L: Reach zone of a wheelchair user<br>Appendix N: PRM Signage | | |

**WARNING 1 —** Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

**WARNING 2 —** Other Union legislation may be applicable to the products falling within the scope of this standard.

# Bibliography

[1] Commission Regulation (EU) No 1300/2014 of 18 November 2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility; OJEU L 356, 12.12.2014

[2] EN 16584-3, *Railway applications - Design for PRM use - General requirements - Part 3: Optical and friction characteristics*

[3] EN 16586-1, *Railway applications — Design for PRM use — Accessibility of persons with reduced mobility to rolling stock — Part 1: Steps for access and egress*

[4] EN 16586-2, *Railway applications — Design for PRM use — Accessibility of persons with reduced mobility to rolling stock — Part 2: Boarding aids*

[5] EN 16587, *Railway applications — Design for PRM use — Requirements for obstacle free routes for infrastructure*

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