BS EN 16186-1:2014

BSI Standards Publication

Railway applications — Driver's cab

Part 1: Anthropometric data and visibility

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National foreword

This British Standard is the UK implementation of EN 16186-1:2014.

The UK committee draws users' attention to the distinction between normative and informative elements, as defined in Clause 3 of the CEN/CENELEC Internal Regulations, Part 3.

Normative: Requirements conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted.

Informative: Information intended to assist the understanding or use of the document. Informative annexes do not contain requirements, except as optional requirements, and are not mandatory. For example, a test method may contain requirements, but there is no need to comply with these requirements to claim compliance with the standard.

When speeds in km/h require unit conversion for use in the UK, users are advised to use equivalent values rounded to the nearest whole number. The use of absolute values for converted units should be avoided in these cases. Please refer to the table below for agreed conversion figures:

INS, RST and ENE speed conversions			
km/h	**mph**	**km/h**	**mph**
2	1	160	100
3	1	170	105
5	3	180	110
10	5	190	120
15	10	200	125
20	10	220	135
30	20	225	140
40	25	230	145
50	30	250	155
60	40	280	175
80	50	300	190
100	60	320	200
120	75	350	220
140	90	360	225
150	95		

The UK participation in its preparation was entrusted to Technical Committee RAE/4/-/4, Railway Applications - Driver's Cab.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Bahnanwendungen - Führerraum - Teil 1: Anthropometrische Daten und Sichtbedingungen

This European Standard was approved by CEN on 18 October 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 16186-1:2014) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

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 June 2015 and conflicting national standards shall be withdrawn at the latest by June 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] 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 [1].

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

EN 16186, *Railway applications — Driver’s cab* consists of the following parts:

— *Part 1: Anthropometric data and visibility;*

— *Part 2: Integration of displays, controls and indicators;*

— *Part 3: Design of displays.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This part of EN 16186 applies to driver's cabs of interoperable rolling stock.

This part of EN 16186 applies to driver's desks installed on the left, on the right, or in a central position in the driver's cab.

For OTMs, see EN 14033-1 [2] and EN 15746-1 [3].

This part of EN 16186 defines:

— anthropometric data;

— visibility conditions from the driver's cab, including forward visibility and the reference positions of line-side signals to be considered;

— assessment methods.

NOTE Due to railway systems constraints the level of visibility provided to the persons outside the defined anthropometric range may vary. Usually the operators manage the potential restriction of front visibility, if the driver uses extreme seat positions combined with extreme body heights.

The occupational aptitude of drivers regarding visibility, whether drivers are in or outside the range of anthropometric data of this standard is outside the scope of this document.

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 15152, *Railway applications — Front windscreens for train cabs*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
driver
person tasked with operating a vehicle or a train by operating controls in a driver's cab or on a remote control unit

3.1.2
driver's cab
compartment of a vehicle which is equipped with controls and instruments with which the driver controls traction unit(s) in the train

3.1.3
vision area A
windscreen vision area represented by the trapezoid defined by the intersection of the lines of sight

Note 1 to entry: See Annex A and Annex B.

3.1.4
vision area B
windscreen vision area outside area A through which the driver may also be required to look

3.1.5
technical specification
document describing specific parameters and/or product requirements, which have to be agreed by contracting parties

3.1.6
seat reference point
SRP
reference point at the back pan of a new seat design with a horizontal distance of 135 mm and a vertical distance of 98 mm from the H point according to ISO 20176:2011 [4]

Note 1 to entry: See Figure 2.

Note 2 to entry: For existing seat designs, the SRP may be defined as an alternative via Directive 78/764/EEC [5].

3.2 Abbreviations

For the purposes of this document, the following abbreviations are used.

DMU	Diesel Multiple Unit
EMU	Electric Multiple Unit
OTM	On-Track Machine

4 Driver's anthropometric data

4.1 General

This clause defines the anthropometric data on which the requirements for cab forward visibility are based.

The background on these anthropometric data will be provided in CEN/TR 16823.

4.2 Data

Figure 1 and Figure 2 give the body size measures.

Dimensions in millimetres

	Min.	Max.
a[a]	1 580	1 940
b[a]	1 480	1 815
c	820	985
d	710	860
e	545	665
f[a]	510	635
g[a]	405	510
h	120	180
i	440	525

[a] Includes 30 mm allowance for shoes.

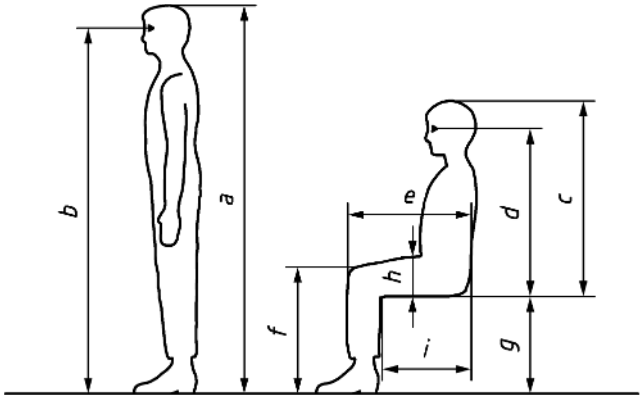
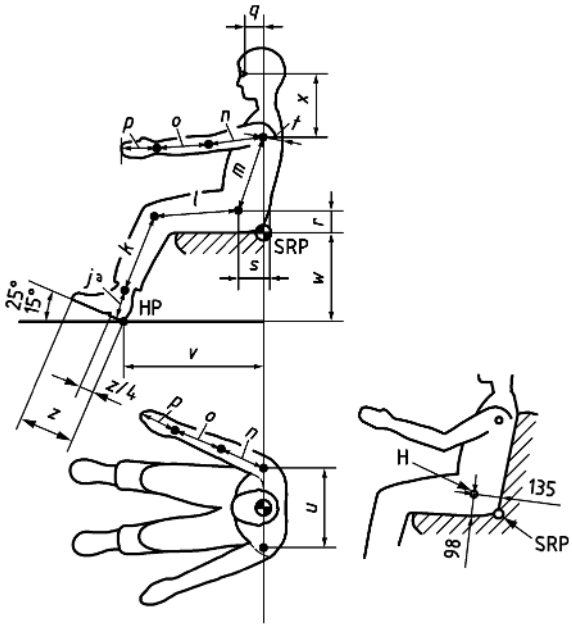


Figure 1 — Principal body size measures

Dimensions in millimetres

	Min.	Max.
j [a]	107	126
k	353	457
l	377	473
m	411	498
n	257	312
o	223	266
p	170	221
q	78	90
r	75	101
s	105	121
t	104	131
u	295	387
v	450 to 550	600 to 700
w	390 to 405	470 to 510
x	232	261
z	220	290
[a] Includes 30 mm allowance for shoes.		



Key

H	source for hip point: ISO 20176:2011
HP	heel point (lowest rear point of the heel)
SRP	seat reference point
z/4	non-flexible part of the shoe pad

Figure 2 — Additional body size measures

5 Forward visibility

5.1 General

For the seated driving position the forward visibility requirements of 5.2.1 shall be ensured (see also Annex A and Annex B).

The horizontal distance from the driver's eye to the windscreen in seated position shall be a minimum of 500 mm and an absolute maximum of 1 715 mm. It is recommended to have a maximum of 1 500 mm.

The sightlines as defined in 5.2.1 shall not be infringed by any permanent equipment of the rolling stock, whether inside or outside the cab.

5.2 Forward visibility requirements

5.2.1 General

This applies for all units equipped with a cab. For rolling stock which are not covered by the Directive 2008/57/EC, other requirements may apply.

NOTE In this case, for Ireland and UK, the Annex C applies.

The forward visibility for the driver from the normal seated position is covered by the following assessment based on standard reference points and on a vehicle in design mass under normal payload conditions on a straight and level track. The reference points (see Annex A) shall be:

— high reference point: positioned at a height of 6,30 m above the top of rail at a distance of 10 m from the front plane of the buffer or automatic coupler or the most external leading point of the vehicle and positioned laterally right and left from the straight track axis at a distance of 3,50 m; and

— low reference point: positioned at top of rail level at a distance of 15 m from the front plane of the buffer or automatic coupler or the most external leading point of the vehicle and positioned laterally right and left from the straight track axis at a distance of 3,15 m.

The position of the eye points shall be defined by using Figure B.1 for fixed foot rest only or Figure B.2 for fixed seat only or Figure B.3 for seat and foot rest both vertically adjustable.

In case of Figure B.3, the eye points of the small driver are covered by the method defined for the tall driver as defined below:

The demonstration of forward visibility shall be done based on a drawing with theoretical lines of sight:

— to the high reference points, from the mid-point (Point A) between the tall driver's eyes;

— to the low reference points, from a check-point (Point B) vertically below this mid-point at a vertical distance that shall be at least 115 mm and should be 190 mm. As an exception for high-speed trains with a front windscreen inclined less than 35° from the horizontal, the vertical distance for Point B may be reduced to 100 mm.

It is recommended that the minimum longitudinal distance at which low reference points are visible should be reduced.

In the case of using Figure B.1 or Figure B.2, the demonstration of forward visibility shall be performed from a point mid-way between the driver's eyes for both the small and the tall drivers' positions.

The height of the above mid-point between the eyes applied in the demonstration of vertical forward visibility shall apply also for lateral forward visibility.

With this assessment all effects like track curvature, track geometry and vehicle conditions are completely covered, i.e. no additional requirements resulting from those effects shall apply.

5.2.2 Particular cases

For vehicles with centre gangway the lateral forward visibility may be demonstrated only on one side.

For vehicles with central cab the lateral forward visibility for the low reference point may be demonstrated only for the side of the driver's seat, if the movement of the driver in the cab for seeing the low reference point on the other side is not hindered while driving.

5.3 Windscreen requirements

5.3.1 General

Windscreen characteristics are defined by EN 15152.

The projection area of the windscreen (vision area A plus vision area B) on a vertical plane shall have a minimum height of 600 mm and a minimum width of 800 mm. For split windscreen (associated with lateral desk) the width may be reduced to 750 mm.

For centre gangway cabs, the minimum width of the projection area shall be 580 mm.

The minimum height of the upper limit of the transparent windscreen shall be 1 810 mm above cab floor. No permanent equipment shall infringe this limit.

For train sets (defined in TSI) with a windscreen inclined by less than 35° from the horizontal or train sets with maximum design speed greater than 190 km/h, a lower value of the upper limit of the transparent windscreen is permitted.

5.3.2 Windscreen cleaning devices

The location and function of windscreen cleaning and clearance devices shall ensure the external view according to this European Standard in most weather and operating conditions. This is deemed to be fulfilled by provision of cleaning and clearance devices as defined in this standard.

Cleaning and clearance devices shall not permanently inhibit the driver's external view.

The applicable classes as defined in EN 50125-1 [6] shall be defined in the technical specification.

The wiped area shall cover at least 80 % of vision area A. It is recommended to wipe the upper middle zone and the bottom corner zones of vision area A.

If the wiping device is switched off and the cab is activated, the wiper blade shall be outside vision area A (the park position).

The wiper shall provide at least two different wiping speeds.

There shall be a windscreen washing device under control of the driver from inside the cab. Fluid windscreen washing detergents shall be usable by this device.

During windscreen washing and for two to four cycles after the washing jets have stopped, wiping shall automatically be applied.

5.3.3 Windscreen sun protection

A sun protection device shall be provided without affecting the forward visibility in its stowed position.

The position of the sun protection device shall be continuously adjustable and shall not change any adjusted position unintentionally.

If the protection depends on an external energy supply, it shall also allow manual adjustment.

If transparent panels are used for sun protection, they shall comply with the chromaticity requirements set out in EN 15152.

The sun protection device, if not transparent, should have a heat-reflective surface facing outwards.

In case of sun protection for additional use of preventing the cab from solar radiation, the following shall apply: For cabs with a windscreen inclined by more than 35° from the horizontal, the combination of fixed desk equipment from the bottom and sun protection from the top shall cover at least 90 % of the projection on a vertical plane of the vision areas A and B. For other cabs, it shall be at least 70 %.

5.3.4 Windscreen de-icing and de-misting

The windscreen shall be equipped with de-icing and de-misting devices.

Heating for the windscreen shall include the windscreen wiper's park position.

Where the front window is heated on a permanent basis, EN 15152 requirements shall apply.

6 Lateral visibility

For locomotives, cabs shall be provided with at least one opening side window on each side, in order to, for example, communicate with ground level staff.

For vehicles other than locomotives, cabs should be provided with at least one opening side window on each side.

If there is no opening side window in the cab, non-opening side windows shall have a minimum transparent area of 200 mm × 300 mm in total per cab side.

If an opening side window is provided and not defined as emergency exit, it shall have a minimum unimpeded opening of 200 mm × 300 mm and it should have a minimum unimpeded opening of 2 000 cm^2 with a minimum inner dimension of 400 mm.

The side window shall reduce the effects of glare, distortions, loss of visibility and loss of recognizability of instruments in the cab. This is deemed to be fulfilled by the use of glass of any degree of tinting or by other types of sun protection.

7 Rear visibility

The cab shall be designed to allow the driver to have a rear view of each side of the train at stand still. For locomotives and driving coaches intended to be used in a train composition with a locomotive, it shall be at the same time possible to operate the emergency brake. This requirement is permitted to be met by one of the following means: opening side windows or panel at each side of the cab, exterior mirrors, camera system.

In case of rear view being realized by an opening side window or panel, the opening shall have a minimum inner dimension of 300 mm × 400 mm and the bottom edge shall be located in a range above cab floor:

— between 1 100 mm and 1 300 mm;

— only for EMU/DMU with design maximum speed of 190 km/h or greater: between 600 mm and 1 300 mm.

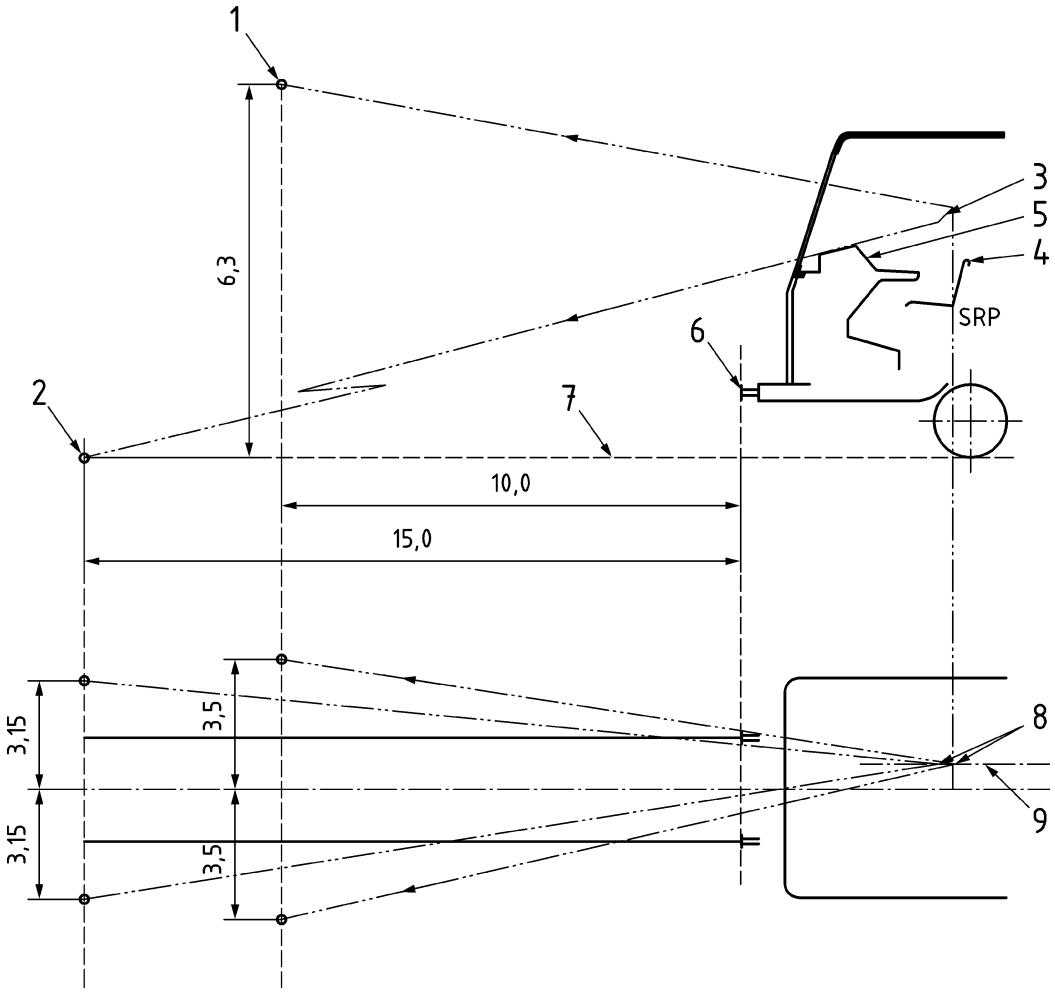
NOTE Requirements related to a side window for rear view exceed the minimum side window requirements for side view.

In case of rear view being realized by a vehicle integrated exterior mirror, this mirror should be equipped with heating.

Annex A
(normative)

Forward visibility reference surfaces

Dimensions in metres



Key

SRP	seat reference point	5	desk
1	high reference points	6	buffer front plane
2	low reference points	7	top of rail
3	driving seated (see Figure 1 and Figure 2)	8	driving seated
4	seat	9	median line of seat

Figure A.1 — Forward visibility reference surfaces

Figure A.1 shows the reference surfaces of the eyes and conditions of forward visibility of high and low reference points.

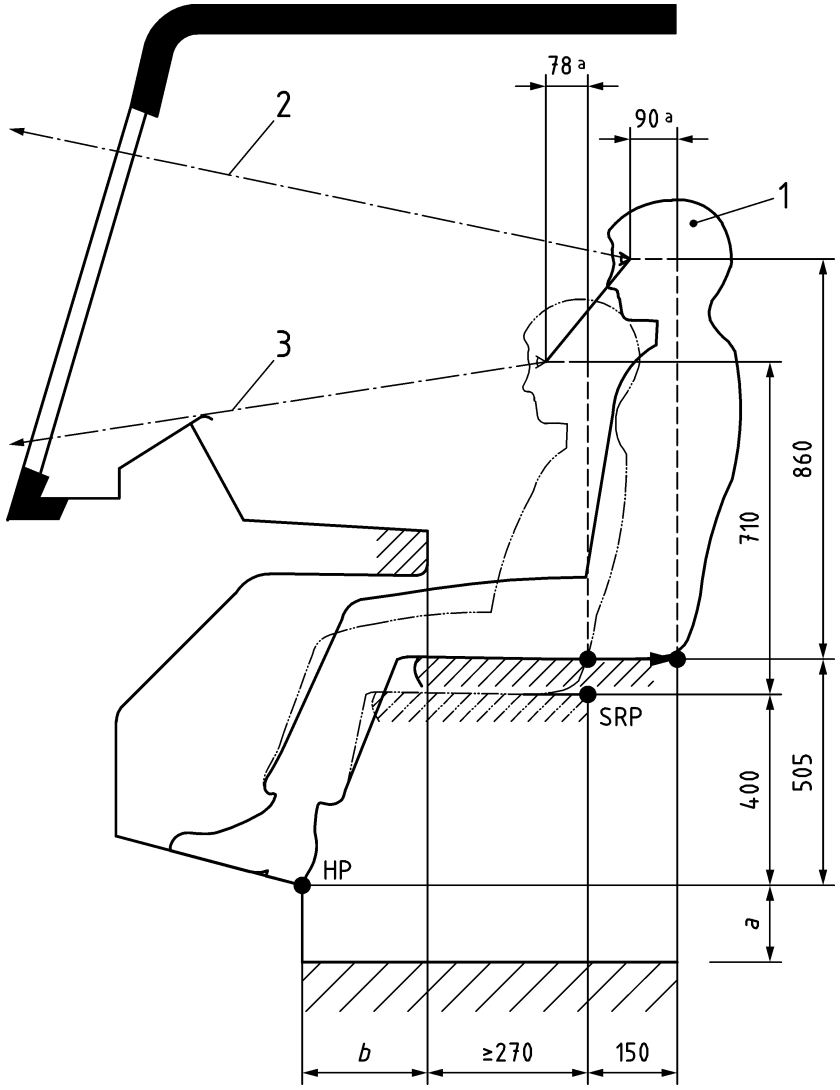
The driving position on the right side serves only as an example. The driver can also be located in the centre or on the left side of the cab.

Annex B
(normative)

Forward visibility reference eye points

B.1 Method 1 – Fixed foot rest and adjustable seat

Dimensions in millimetres



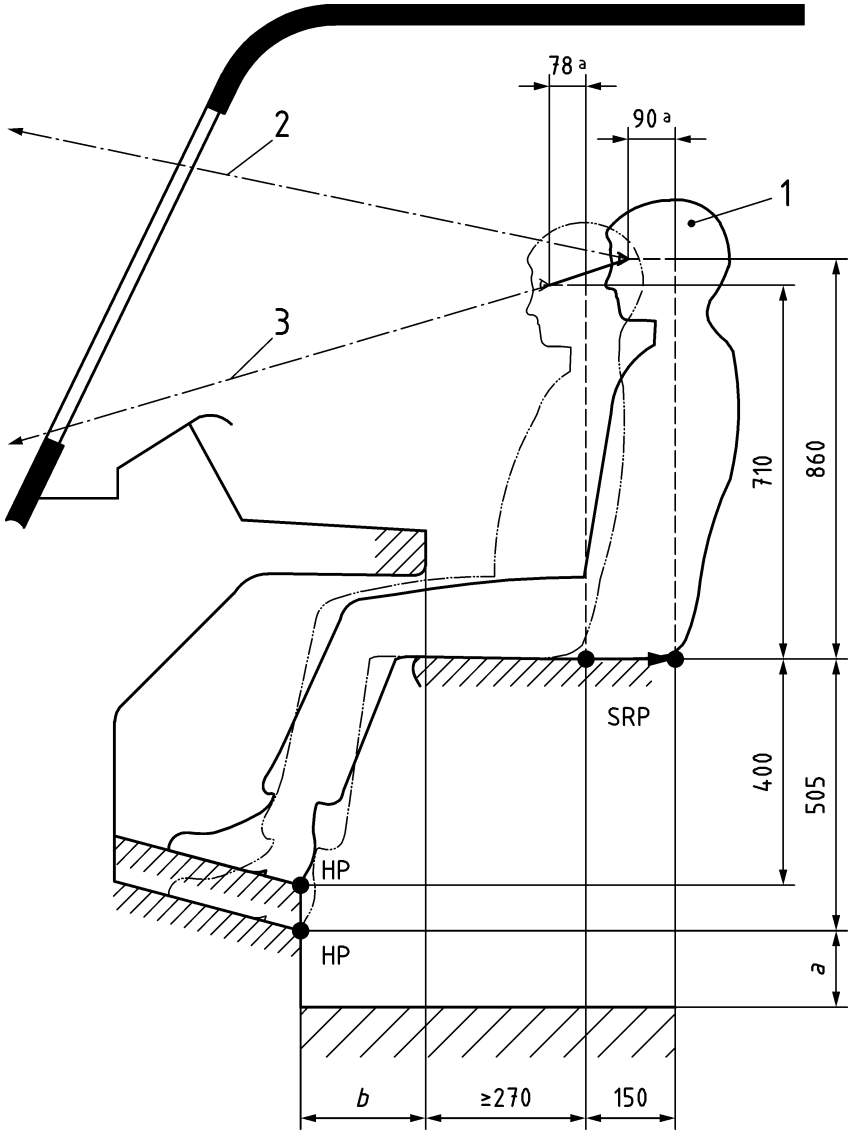
Key

SRP	seat reference point	1	driving seated
HP	heel point	2	forward visibility of high reference points
a, b	construction dimensions	3	forward visibility of low reference points
		a	See Figure 2.

Figure B.1 — Method 1: Fixed foot rest and adjustable seat

B.2 Method 2 – Adjustable foot rest and fixed seat

Dimensions in millimetres



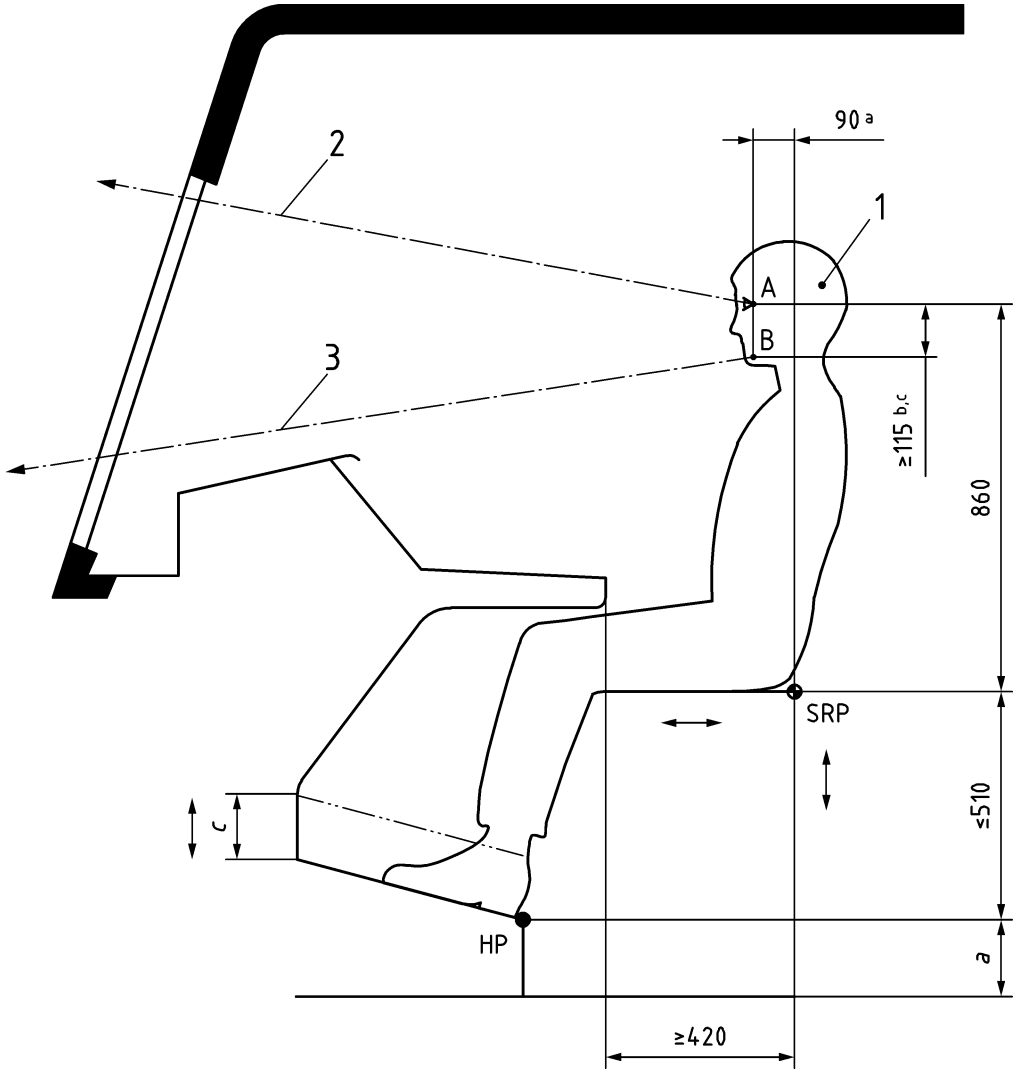
Key

SRP	seat reference point	1	driving seated
HP	heel point	2	forward visibility of high reference points
a, b	construction dimensions	3	forward visibility of low reference points
		a	See Figure 2.

Figure B.2 — Method 2: Adjustable foot rest and fixed seat

B.3 Method 3 – Adjustable foot rest and adjustable seat

Dimensions in millimetres



Key

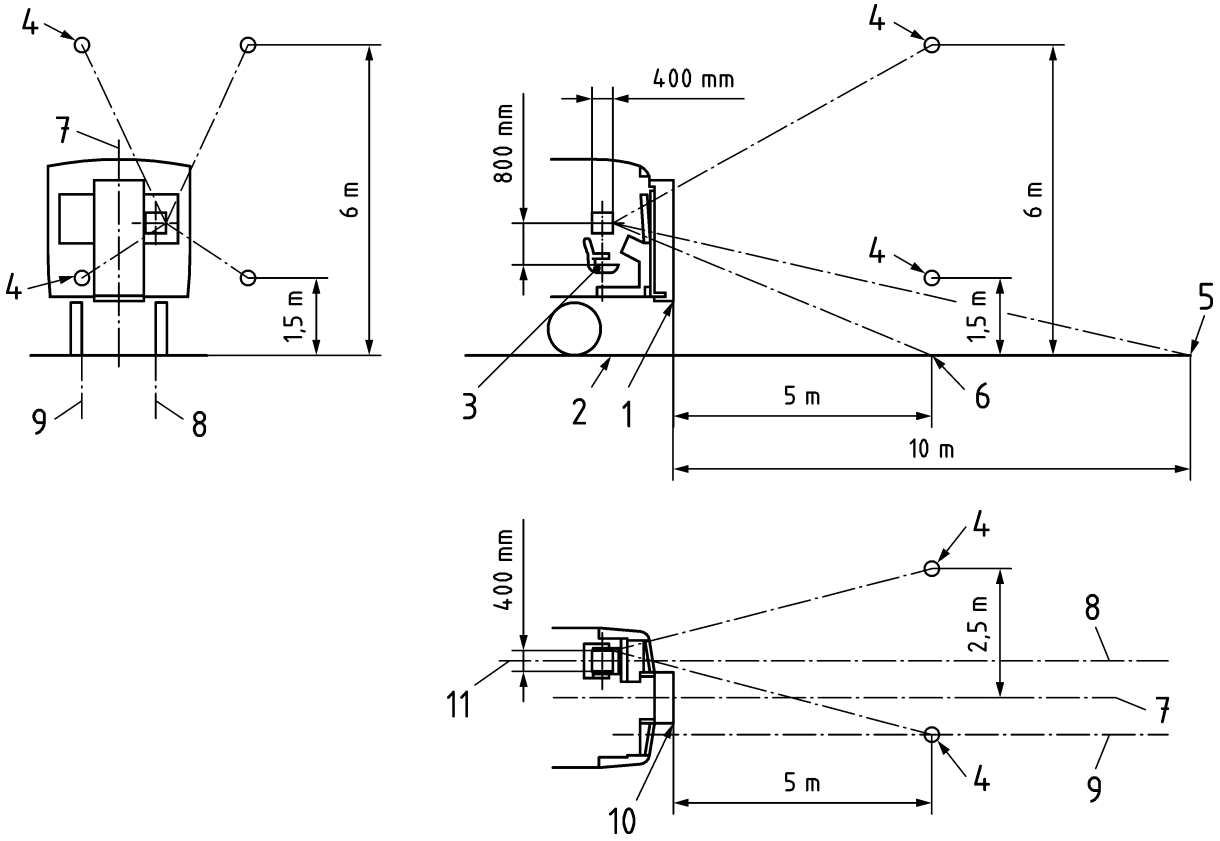
A	Point A	1	tallest driver in a seated position
B	Point B	2	forward visibility of high reference points
SRP	seat reference point	3	forward visibility of low reference points
HP	heel point	a	See Figure 2.
a, c	construction dimensions	b	Recommended dimension: 190.
		c	For exception of 100 mm, see 5.2.1.

Figure B.3 —Method 3: Adjustable foot rest and adjustable seat

Annex C
(informative)

Forward visibility reference surfaces for UK and Ireland

C.1 General



Key

1	gangway	5	case (a), 10 m	9	centre line of RH rail
2	rail height	6	case (a), 5 m	10	front of vehicle
3	position of driver's seat	7	centre line of rails	11	centre line of seat
4	case (b)	8	centre line of LH rail		

Figure C.1 — Forward visibility reference surfaces for UK and Ireland

C.2 Reference Cube

For each viewing case below, a person’s eyes shall be considered to be at a point contained within an imaginary reference cube. The reference cube shall have 400 mm long sides and have its centre situated 800 mm above the centre of the surface of the driver’s seat cushion, with the seat adjusted vertically and horizontally to its mid-position. The imaginary cube shall be orientated with sides parallel to the longitudinal axis of the vehicle.

C.3 Cases

C.3.1 Case (a): Coupling requirements

A view of the track (at rail height) shall be 5 m beyond the coupling plane for vehicles subject to frequent coupling and uncoupling activities. For other vehicles, the viewing distance shall be 10 m beyond the coupling plane.

C.3.2 Case (b): Signal visibility requirements

A view of signals positioned 5 m beyond the coupling plane at all heights between 1,5 m and 6,0 m above rail level and at all lateral positions between the right-hand rail through to 2,5 m to the left of track centreline. This view together with the view in case (a) shall be visible from the same point within the reference cube.

Where vehicles are not fitted with a central gangway the lateral view should be 2,5 m both sides of the track centreline.

C.3.3 Case (c): Curves

A view of level track up to 500 m beyond the coupling plane when entering a curve of 1 000 m radius. This view shall be visible, whether on a left-hand curve or a right-hand curve, from a common point within the reference cube.

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 mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the Directive 2008/57/EC [1)].

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 for HS Rolling Stock and Table ZA.2 for CR Locomotives and Passenger Rolling Stock, 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.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

1) This Directive 2008/57/EC adopted on 17th June 2008 is a recast of the previous Directives 96/48/EC 'Interoperability of the trans-European high-speed rail system' and 2001/16/EC 'Interoperability of the trans-European conventional rail system' and revisions thereof by 2004/50/EC 'Corrigendum to Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system'.

Table ZA.1 — Correspondence between this European Standard, Commission Decision 2008/232/EC (TSI HS RST) [7] and Directive 2008/57/EC [1] 2)

Clause/subclause of this European Standard	Chapter/§/annex of the TSI	Corresponding text, article/§/annex of Directive 2008/57/EC	Comments
The whole standard is applicable, except for Annexes A, B, E and F	4. Characterization of the subsystem 4.2 Functional and technical specification of the subsystem 4.2.2 Structure and mechanical parts 4.2.2.6 Driver's cab 4.2.2.7 Windscreen and front of the train 4.2.2.8 Storage facilities for use by staff 4.2.7 System protection 4.2.7.1 Emergency exits 4.2.7.1.2 Driver's cab emergency exits 4.3 Functional and technical specification of the interfaces 4.3.2 Infrastructure subsystem 4.3.2.2 Driver's cab	Annex III, Essential requirements 1 General requirements 1.1 Safety Clauses 1.1.4, 1.1.5 1.3 Health Clauses 1.3.1, 1.3.2 1.4 Environmental protection Clause 1.4.2 1.5 Technical compatibility §1 2 Requirements specific to each subsystem 2.3 Control-command and signalling 2.3.2 Technical compatibility §2 2.4 Rolling stock 2.4.1 Safety §4, 5, 7	Annexes A, B, E and F of the standard related to anthropometric data and front visibility will probably be used in future revision of the TSI. For the current TSI, the data and requirements of its Annex B shall be used.

2) This Directive 2008/57/EC adopted on 17th June 2008 is a recast of the previous Directives 96/48/EC 'Interoperability of the trans-European high-speed rail system' and 2001/16/EC 'Interoperability of the trans-European conventional rail system' and revisions thereof by 2004/50/EC 'Corrigendum to Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system'.

Table ZA.2 — Correspondence between this European Standard, the CR LOC and PASS RST TSI (ST05EN 05 dated 2010.06.10 accepted by RISC) and Directive 2008/57/EC

Clause/subclause of this European Standard	Chapter/§/annex of the TSI	Corresponding text, article/§/annex of Directive 2008/57/EC	Comments
The whole standard is applicable, except for Annexes A, B, E and F	4.Characterization of the Rolling stock subsystem 4.2 Functional and technical specifications of the subsystem. 4.2.9. Driver's Cab and driver-machine interface 4.2.9.1 Driver's cab 4.2.9.1.1 General 4.2.9.1.2 Access and egress 4.2.9.1.2.1 Access and egress in operating conditions 4.2.9.1.2.2 Driver's cab emergency exit 4.2.9.1.3 External visibility 4.2.9.1.3.1 Front visibility 4.2.9.1.3.2 Rear and side view 4.2.9.1.4 Interior layout 4.2.9.1.5 Driver's seat 4.2.9.1.6 Driver's desk-Ergonomics 4.2.9.1.7 Climate control and air quality 4.2.9.1.8 Internal lighting 4.2.9.2 Windscreen 4.2.9.3 Driver machine interface 4.2.9.3.4 Controls and indicators 4.2.9.3.5 Labelling 4.2.9.4 Onboard tools and portable equipment 4.2.9.5 Storage facility for staff personal effects	Annex III, Essential requirements 1 General requirements 1.1 Safety Clauses 1.1.4, 1.1.5 1.3 Health Clauses 1.3.1, 1.3.2 1.4 Environmental protection Clause 1.4.2 1.5 Technical compatibility §1 2 Requirements specific to each subsystem 2.3 Control-command and signalling 2.3.2 Technical compatibility §2 2.4 Rolling stock 2.4.1 Safety §4, 5, 7	Annexes A, B, E and F of the standard related to anthropometric data and front visibility will probably be used in future revision of the TSI. For the current TSI, the data and requirements of its Annexes E and F shall be used.

Bibliography

[1] Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community; OJEU L 191, 18.7.2008

[2] EN 14033-1, *Railway applications — Track — Railbound construction and maintenance machines — Part 1: Technical requirements for running*

[3] EN 15746-1, *Railway applications — Track — Road-rail machines and associated equipment — Part 1: Technical requirements for running and working*

[4] ISO 20176:2011, *Road vehicles — H-point machine (HPM-II) — Specifications and procedure for H-point determination*

[5] Council Directive 78/764/EEC on the approximation of the laws of the Member States relating to the driver's seat on wheeled agricultural or forestry tractors; OJ L 255, 18.9.1978

[6] EN 50125-1, *Railway applications — Environmental conditions for equipment — Part 1: Equipment on board rolling stock*

[7] Commission Decision of 21 February 2008 (2008/232/EC) concerning a technical specification for interoperability relating to the 'rolling stock' subsystem of the trans-European high-speed rail system (TSI HS RST); OJEU L 84, 26.3.2008

European legislation, recommended publications:

Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC), OJ L 177 of 6.7.2002, p. 13–20

2006/66/EC: Commission Decision of 23 December 2005 concerning the technical specification for interoperability relating to the subsystem 'rolling stock – noise' of the trans-European conventional rail system, OJ L 37, 8.2.2006, p. 1–49 (TSI CR Noise)

2006/679/EC: Commission Decision of 28 March 2006 concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system, OJ L 284, 16.10.2006, p. 1–176 (TSI CR CCS)

2006/920/EC: Commission Decision of 11 August 2006 concerning the technical specification of interoperability relating to the subsystem Traffic Operation and Management of the trans-European conventional rail system, OJ L 359, 18.12.2006, p. 1–160 (TSI CR OPE)

2008/231/EC: Commission Decision of 1 February 2008 concerning the technical specification of interoperability relating to the operation subsystem of the trans-European high-speed rail system adopted referred to in Article 6(1) of Council Directive 96/48/EC and repealing Commission Decision 2002/734/EC of 30 May 2002, OJ L 84, 23.3.2008, p. 1–131, (TSI HS OPE)

2009/965/EC: Commission Decision of 30 November 2009 on the reference document referred to in Article 27(4) of Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community, OJ L 341, 22.12.2009, p. 1–13

European and International Standards, recommended publications:

CLC/TS 50459 (all parts), *Railway applications — Communication, signalling and processing systems — European Rail Traffic Management System — Driver-Machine Interface*

EN 13272, *Railway applications — Electrical lighting for rolling stock in public transport systems*

EN 14813 (all parts), *Railway applications — Air conditioning for driving cabs*

EN 15153 (all parts), *Railway applications — External visible and audible warning devices for high speed trains*

EN 15220-1, *Railway applications — Brake indicators — Part 1: Pneumatically operated brake indicators*

EN 15380-4, *Railway applications — Classification system for railway vehicles — Part 4: Function groups*

EN 15663, *Railway applications — Definition of vehicle reference masses*

EN 15892, *Railway applications — Noise Emission — Measurement of noise inside driver's cabs*

EN 16116-1, *Railway applications — Design requirements for steps, handrails and associated access for staff — Part 1: Passenger vehicles, luggage vans and locomotives*

prEN 16186-2, *Railway applications — Driver's cab — Part 2: Integration of displays, controls and indicators*

EN 45545-4, *Railway applications — Fire protection on railway vehicles — Part 4: Fire safety requirements for rolling stock design*

EN 45545-6, *Railway applications — Fire protection on railway vehicles — Part 6: Fire control and management systems*

EN 50129, *Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling*

EN ISO 3411, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope (ISO 3411)*

EN ISO 15537:2004, *Principles for selecting and using test persons for testing anthropometric aspects of industrial products and designs (ISO 15537:2004)*

ISO 9186 (all parts), *Graphical symbols — Test methods for judged comprehensibility and for comprehension*

ISO 10263-2, *Earth-moving machinery — Operator enclosure environment — Part 2: Air filter element test method*

ISO 22727, *Graphical symbols — Creation and design of public information symbols — Requirements*

Other standards, recommended publications:

DIN 5566 (all parts):2006, *Railway vehicles — Driver cabs*

UIC 612-0:2009, Driver Machine Interfaces for EMU/DMU, Locomotives and driving coaches - Functional and system requirements associated with harmonised Driver Machine Interfaces

UIC 612-1:2009, Rolling stock configurations and main activated functions for EMU/DMU, locomotives and driving coaches

UIC 612-2:2009, Specific sub-system requirements (traction, braking, etc.) for EMU/DMU, locomotives and driving coaches (Rolling stock sub-system requirements, requirements for economic purposes, requirements for railway standardisation)

UIC 641:2001, Conditions to be fulfilled by automatic vigilance devices used in international traffic

UIC 651:2002, Layout of driver's cabs in locomotives, railcars, multiple unit trains and driving trailers

Other documents, recommended publications:

Anthropometric data in standards, KAN Report 44; Commission for Occupational Health and Safety and Standardization, July 2009

ETCS Driver Machine Interface; ERA ERTMS Unit, Draft December 2008

EU Project “EUDDplus”: Final Report (2010), Project No: 031555 — EUDDplus “European Driver’s Desk advanced concept implementation — contribution to foster interoperability”, Specific Targeted Research or Innovation Project, Priority 6.2 — Sustainable Surface Transport, EU 6th framework programme

EU Project “Modtrain/Modlink/EUCAB”: EUCAB: Report on functional test results (L6.6), Project nb. FP6-PLT-506652 / TIP3-CT-2003-506652, Priority 6.3 — Transport, EU 6th Framework Programme for Research and Technological Development

PEOPLESIZE. 2008 Professional, Version 1.10, Open Ergonomics Ltd., www.openerg.com

Technical Recommendation Driver Machine Interfaces in the scope of TSI High Speed and Conventional Rail, UNIFE and UIC, June 2010

Trans-European Conventional Rail System, Subsystem Rolling Stock, Technical Specification for Interoperability of Locomotives and Passenger coaches (TSI CR LOC/PAS); ERA Interoperability Unit, Final draft November 2009

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