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Railway applications – Front windscreens for train cabs



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EN 15152

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English Version

Railway applications - Front windscreens for train cabs

Applications ferroviaires - Vitres frontales des cabines des
trains

Bahnanwendungen - Frontscheiben von Führerräumen

This European Standard was approved by CEN on 13 July 2007.

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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 Management Centre has the same status as the official versions.

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Foreword

This document (EN 15152:2007) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2008 and conflicting national standards shall be withdrawn at the latest by February 2008.

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 Directives 96/48 as modified by EU Directive 2004/50.

For relationship with EU Directive 96/48, see informative Annex ZA, which is an integral part of this document.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EN 15152:2007 (E)

1 Scope

This European Standard specifies the functional requirements for cab windscreens of high speed trains including testing and conformity assessment. The same requirements can be applied to the windscreens of other types of rolling stock if some of the performance criteria are adjusted to suit the application. Such changes should be based on national standards or infrastructure controller's regulations where they exist.

This European Standard does not specify all interfaces between the windscreen and the vehicle.

This European Standard does not apply to the renewal of windscreens of high speed rolling stock already in operation.

2 Normative references

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

EN 2155-9, *Aerospace series — Test methods for transparent materials for aircraft glazing — Part 9: Determination of haze*

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

EN ISO 4892 (all parts), *Plastics — Methods of exposure to laboratory light sources*

ISO 3537, *Road vehicles — Safety glazing materials — Mechanical tests*

ISO 3538:1997, *Road vehicles — Safety glazing materials — Test methods for optical properties*

ISO 6362-2:1990, *Wrought aluminium and aluminium alloy extruded rods/bars, tubes and profiles — Part 2: Mechanical properties*

CIE 15:2004, *Colorimetry*¹⁾

CIE 38:1977, *Radiometric and photometric characteristics of materials and their measurement*¹⁾

CIE S 004:2001, *Colours of light signals*¹⁾

3 Terms and definitions

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

3.1

high speed train

train which is designed to operate at speeds equal to or greater than 190 km/h

NOTE This includes Class 1 and Class 2 high speed trains as defined in the HS TSI RS.

1) To be purchased from: International Commission of Illumination, CIE Central Bureau, Kegelgasse 27, A-1030 Wien.

3.2

windscreen

transparent pane built wholly or partly into external walls or doors positioned transversely to the running direction and used for observing the tracks and signals ahead of the train

3.3

primary vision area (area A)

area of the windscreen through which track and signals shall be visible from the driving position

3.4

secondary vision area (area B)

area of the windscreen outside the primary vision area through which the driver may also be required to look

3.5

peripheral area (area C)

area of the windscreen outside the secondary vision area

3.6

secondary image separation

angular separation between the primary and the brightest secondary images (due to internal reflection) of a distant light source or object when viewed through a windscreen

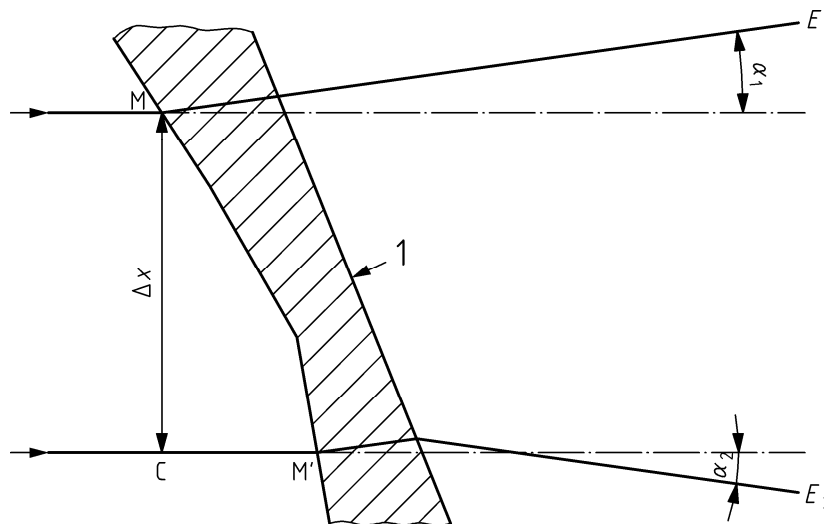
3.7

optical distortion (in a given direction)

algebraic difference $\Delta\alpha$ in angular deviations α_1 and α_2 measured between two points M and M' on the surface of the windscreen, the distance between them being such that their projections on a plane at right angles to the direction of vision are separated by a given distance Δx (see Figure 1).

NOTE 1 $\alpha_1 - \alpha_2$ is the optical distortion in the direction MM'. The sign of the angles shall be considered to achieve a correct value of $\Delta\alpha$. $\Delta x = MC$ is the distance between two straight lines parallel to the direction of vision, and passing through the points M and M'.

NOTE 2 Anti-clockwise deviation should be regarded as positive, and clockwise deviation as negative.



Key

1 windscreen

Figure 1 — Diagrammatic representation of optical distortion

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[ISO 3538:1997]

3.8 Ultra-Violet radiation
electromagnetic radiation of a wavelength shorter than that of visible light and which, for the purposes of this document, is described as having wavelengths between 200 nm and 400 nm

3.9 spalling
particles or pieces of the inner ply of the windscreen that may be propelled into the cab as a result of an object striking the outside surface

4 Functional requirements

4.1 General

The windscreen shall be able to withstand the normal operational conditions including environmental conditions according to EN 50125-1.

The peripheral area may be deliberately obscured (in whole or in part) e.g. by silk-screen printing for any of the following reasons:

- aesthetic purposes;
- elimination of distracting items from the driver's field of vision;
- for windscreens that are glued into position, to protect the glued area, if necessary, from the effect of Ultra-Violet (UV) radiation. In this case, the obscuration shall not permit more than 0,1 % of incident UV light to reach the glued area.

4.2 Specific performance requirements

4.2.1 General

The windscreen has three optical areas:

- A: primary vision area;
- B: secondary vision area;
- C: peripheral area.

The extent of these areas is described in 5.2.

4.2.2 Secondary image separation

In the case of more than one secondary image, a maximum of one secondary image is to be evaluated. The image to be considered is that which appears brightest to an observer looking through the windscreen from the driving position.

The secondary image separation shall not exceed:

- maximum 15 min of arc in area A;
- maximum 25 min of arc in area B.

See 6.2.1 for the test method.

4.2.3 Optical distortion

The limit of optical distortion shall be:

- maximum 2 min of arc in area A;
- maximum 6 min of arc in area B.

See 6.2.2 for the test method.

4.2.4 Haze

The maximum value of haze shall be 2,5 % for a new windscreen.

See 6.2.3 for the test method.

4.2.5 Luminous transmittance

The minimum value of luminous transmittance for areas A and B shall be:

65 % when viewed horizontally through the windscreen in its mounted position.

See 6.2.4 for the test method.

4.2.6 Chromaticity

The windscreen shall not affect the colour of light transmitted through the windscreen to an extent that will cause the driver to misread signals.

The minimum requirement for this European Standard is that the windscreen shall not cause a colour shift so that a red signal lamp observed to lie within coordinates of the CIE 1931 Colour Diagram as illustrated in CIE S 004 (0,700; 0,295), (0,705; 0,295), (0,720; 0,280), (0,715; 0,280) would appear, when viewed through the windscreen, to lie outside a zone with co-ordinates (0,680; 0,305), (0,695; 0,305), (0,730; 0,270), (0,715; 0,270).

See 6.2.5 for the test method.

If an additional requirement to support recognition of yellow signals is specified for the train to which the windscreen is to be fitted, then the further criterion shall be as follows:

The windscreen shall not cause a colour shift such that a yellow signal lamp observed to lie within co-ordinates (0,590; 0,410), (0,575; 0,410), (0,612; 0,382), (0,618; 0,382), would appear, when viewed through the windscreen, to lie outside a zone with co-ordinates (0,560; 0,440), (0,546; 0,426), (0,612; 0,382), (0,618; 0,382).

4.2.7 Impacts

The windscreen shall be able to resist the impact of an object accidentally or deliberately hitting the windscreen.

This shall be demonstrated by the test requirements as defined in 6.2.6.

4.2.8 Residual visibility after breakage

The windscreen, when impacted or cracked under requirement 4.2.7, shall remain in its position and have sufficient residual visibility for the train to be driven to a place of safety.