PD ISO/TS 21957:2023



BSI Standards Publication

Road vehicles — Visibility — Specifications and test procedures for head-up displays (HUD)

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AUE/1, Vehicle Lighting & Visibility.

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

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Published by BSI Standards Limited 2023

ISBN 978 0 539 02901 7

ICS 43.040.15

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 July 2023.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TS 21957:2023

TECHNICAL SPECIFICATION

ISO/TS 21957

First edition
2023-07-25

Road vehicles — Visibility — Specifications and test procedures for head-up displays (HUD)

Véhicules routiers — Visibilité — Spécifications et procédures d'essai pour les affichages tête haute (HUD)

Reference number
ISO/TS 21957:2023(E)

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Foreword

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 35, *Lighting and visibility*.

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

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Introduction

This document outlines ergonomic specifications, evaluations and test methods for the design and laboratory assessment measurement of head-up display (HUD) image qualities like virtual image distance (X), aspect ratio (Y and Z), luminance, contrast and image height adjustment ranges. This document also outlines procedures for measuring HUD images for the purpose of laboratory assessments, as measured from observation areas defined by an eyebox, and provides the definition of the eyebox from the locating the driver's eyellipse (see ISO 4513).

This document also provides a standard measurement practice of HUD virtual images for HUD bench testing, static and dynamic laboratory test, as well as methods for documenting HUD virtual image attributes such as size, luminance, contrast, field of view, image location adjustment ranges and HUD eyebox attributes using image readability standards from SAE J1757-1, SAE J1757-2, ISO 15008 or other applicable standards where required.

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Road vehicles — Visibility — Specifications and test procedures for head-up displays (HUD)

1 Scope

This document provides a common framework of definitions and measurement methods for the design, and ergonomics testing of automotive head-up displays (HUDs) independent of technologies except where noted. Applications in both passenger cars (including sport utility vehicles and light trucks) and commercial vehicles (including heavy trucks and buses) are covered. This document does not include helmet-mounted HUDs or other head carried gear such as glasses.

Areas covered in this document include:

— guidance on how to establish reference points and representative viewing conditions based on vehicle coordinates and ranges of driver's/passenger's eye points;

— descriptions of the HUD image geometry and optical properties measurements;

— definitions of the HUD virtual image and driver vision measurements;

— static and dynamic laboratory tests, and dynamic field operational assessments that include suggested vehicle setup procedures in order to measure HUD image attributes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4130, *Road vehicles — Three-dimensional reference system and fiducial marks — Definitions*

ISO 4513, *Road vehicles — Visibility — Method for establishment of eyellipses for driver's eye location*

ISO 16750-2:2023, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads*

ISO 16750-3:2023, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 3: Mechanical loads*

ISO 16750-4:2023, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 4: Climatic loads*

ISO 16750-5:2023, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 5: Chemical loads*

3 Terms and definitions

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

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

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

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

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