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**Car Multimedia systems and equipment for vehicles – Drive monitoring
Surround view system –
Part 3: Measurement methods**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CAR MULTIMEDIA SYSTEMS AND EQUIPMENT FOR VEHICLES –
DRIVE MONITORING SURROUND VIEW SYSTEM –****Part 3: Measurement methods**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 63033-3:2019. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 63033-3 has been prepared by technical area 17: Multimedia systems and equipment for vehicles, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) updates to the text and the title to reflect the change of the scope of the IEC 63033 series.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3734/FDIS	100/3753/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 63033 series, published under the general title *Multimedia systems and equipment for vehicles – Surround view system*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document specifies measurement methods for the ~~drive monitoring~~ surround view system specified in IEC ~~TS~~ 63033-1:2017, which also specifies the model for generating the surrounding visual image of a ~~drive monitoring~~ surround view system. The system allows drivers to monitor the car's perimeter in real time by using "free eye point" technology, which allows drivers to dynamically change the viewing perspective to obtain the most appropriate views according to the driving situation.

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CAR MULTIMEDIA SYSTEMS AND EQUIPMENT FOR VEHICLES – DRIVE MONITORING SURROUND VIEW SYSTEM –

Part 3: Measurement methods

1 Scope

This document specifies measurement methods for the ~~drive monitoring~~ surround view system specified in IEC ~~TS 63033-1:2017~~.

2 Normative references

The following documents are referred to in the text in such a way that ~~any~~ 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.

~~IEC TS 63033-1:2017, Car multimedia system and equipment – Drive monitoring system – Part 1: General~~

IEC 63033-1:2022, *Multimedia systems and equipment for vehicles – Surround view system – Part 1: General*

ISO 16505:2019, *Road vehicles – Ergonomic and performance aspects of Camera Monitor Systems – Requirements and test procedures*

UN Regulation No. 46, *Uniform provisions concerning the approval of devices for indirect vision and of motor vehicles with regards to the installation of these devices*

UN Regulation No. 125, *Uniform provisions concerning the approval of motor vehicles with regards to the forward field of vision of the motor vehicle driver*

3 Terms, definitions and abbreviated terms

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

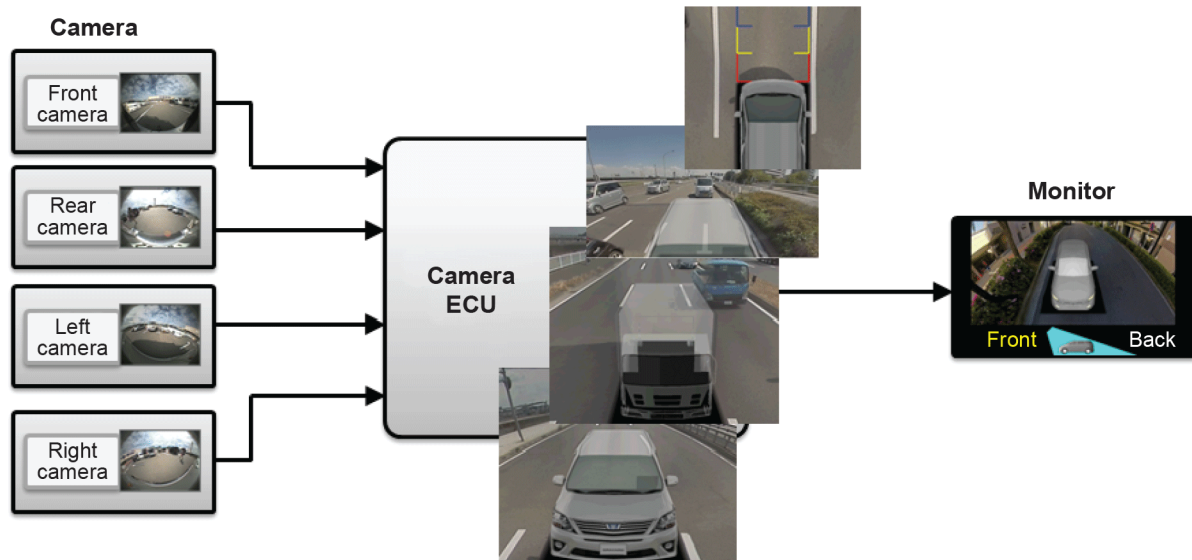
3.1 Abbreviated terms

FOV field of view

4 System model

~~The system model of the drive monitoring system is described in Figure 1.~~ A ~~drive monitoring~~ surround view system shall generate multiple camera composite images and/or single camera images, using cameras that are mounted on the outside the car. The system model of the surround view system is described in Figure 1. The views to be generated by this system shall

capture the fields of view specified in Clause 7. This system shall generate multiple views according to the fields of view to be secured. For measurement methods, the system shall refer to ISO 16505 and UN Regulation No. 46. However, the system *itself* does not need to ~~fully~~ comply with ISO 16505 and UN Regulation No. 46.



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Figure 1 – System model of ~~drive-monitoring~~ surround view system

5 Camera image quality

5.1 Camera resolution

The resolution of the camera shall be 300 000 pixels or more.

5.2 Camera image quality

The camera's image quality shall comply with ISO 16505:2019, 6.7, and shall be measured as specified in ISO 16505:2019, 7.8. The monitor's image quality shall comply with ISO 16505:2019, 6.7, and shall be measured as specified in ISO 16505:2019, 7.8, as well. For the measurement of the camera's image quality, a monitor satisfying the requirements in the previous sentence shall be used.

6 Camera calibration

6.1 General

The calibration of the camera shall be performed as specified in IEC ~~TS~~ 63033-1:2017/2022, Annex C.

6.2 Verification

Draw an orthogonal frame at a distance of 1,5 m from the outline of the vehicle; this frame is to be captured within the camera's image. This frame is shown in Figure 2 and can be seen on the captured camera image. The guidance lines shown in Figure 3 representing the frame 1,5 m around the car's body that is later drawn on the composite video shall match up within a tolerance of 10 cm.

Dimension in metres

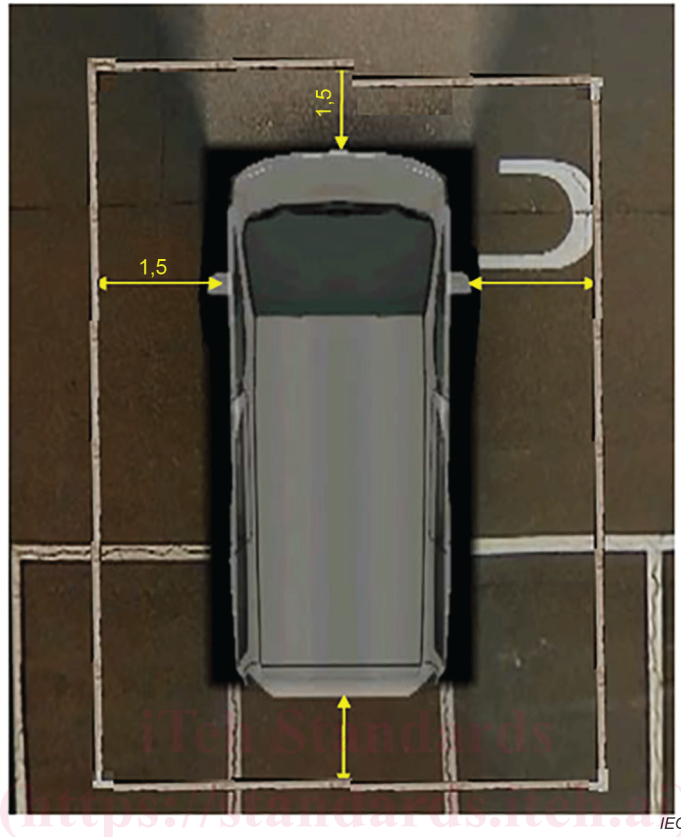


Figure 2 – Orthogonal reference

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Dimension in metres

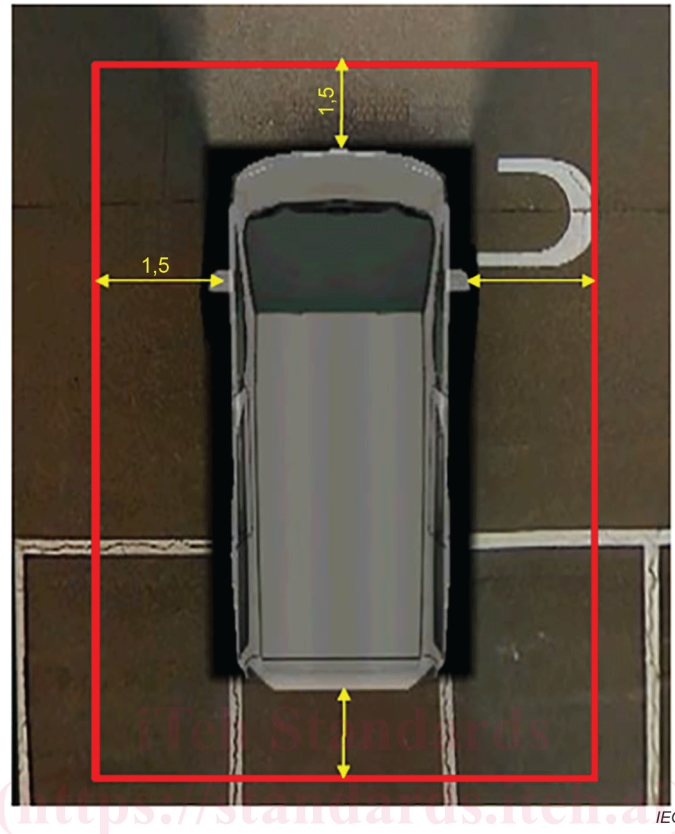


Figure 3 – Reference ~~guideline~~ guidance line

7 Field of view

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The field of view of the system is the visible area displayed by composite images (i.e. from the multiple cameras composing the system) or the image captured by any single camera that is then converted and displayed. If the target of the application of this system is to replace an existing type approval that is required for vehicular equipment, it shall ~~comply with~~ follow the respective regulation. For example, the FOV shall capture the respective FOV defined in UN Regulations No. 46 and No. 125 (Class I to VI) if the system is intended to be used in such an application. ~~Some examples of views representing FOVs of Class I to VI is~~ The details are described in Annex A. The compulsory or optional FOV shall follow the requirement specified in the table under paragraph 15.2.1.1.1. in UN Regulation No. 46.

8 Time behaviour

8.1 Start-up time

The manufacturer of the camera ECU shall provide information of the start-up time of the system. The start-up time means the time from powering on the ignition to the initial composite view being displayed on the monitor. The start-up time shall be 7 s or less. The start-up time shall be measured as specified in ISO 16505:2019, 7.3.

8.2 Frame rate

The manufacturer of the camera ECU shall provide information on the frame rate of the system. The frame rate shall be more than ~~30 fps~~ 15 fps. ~~While manoeuvring at low speed, the frame rate can drop (e.g. owing to image processing) but shall be never be below 15 fps.~~ The frame rate shall be measured as specified in ISO 16505:2019, 7.9.1.

8.3 Latency

The camera's ECU should have a sufficiently short latency to render the image to display at nearly the same time as the camera image is captured. The latency is the time difference from when a light is captured by the camera until the time it becomes visible to the display. The latency shall be lower than 200 ms and shall be measured as specified in ISO 16505:2019, 7.9.3.

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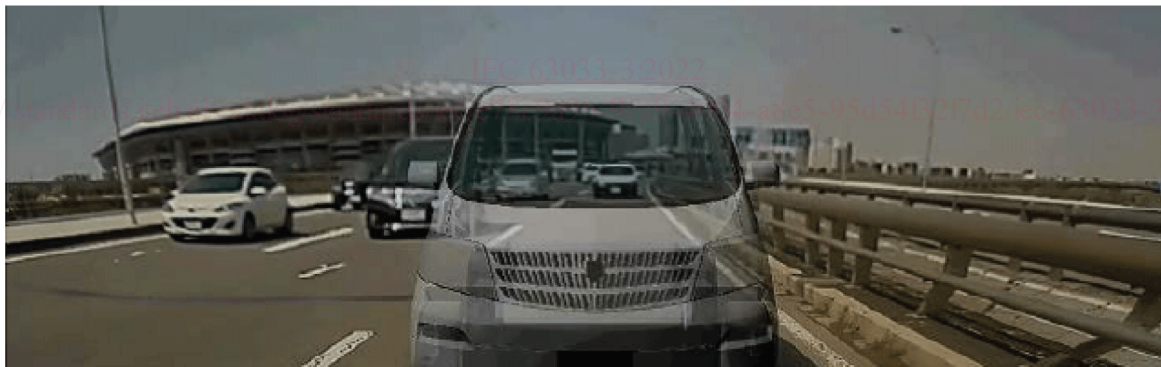
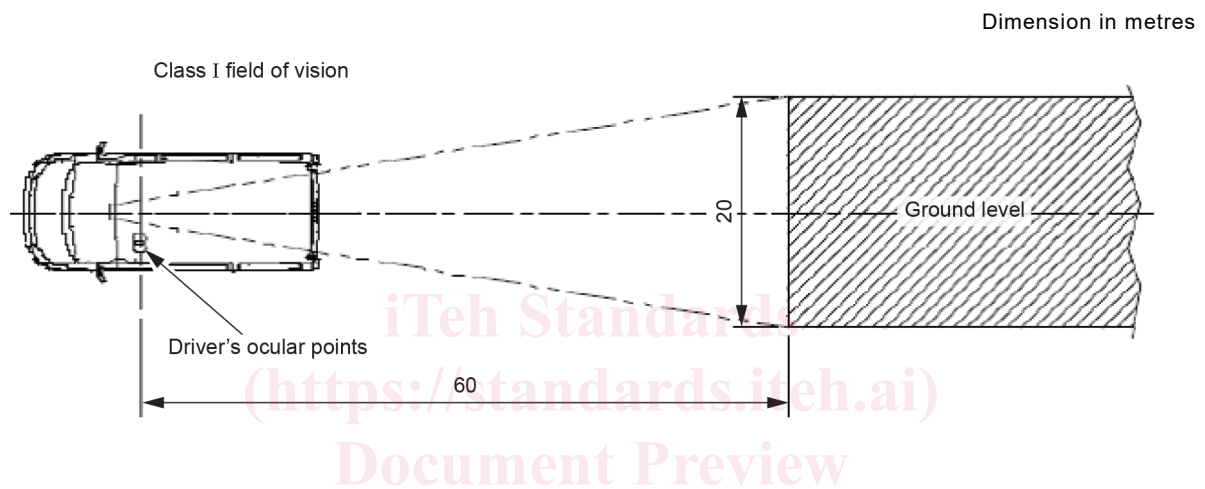
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Annex A (informative)

Field of view (FOV)

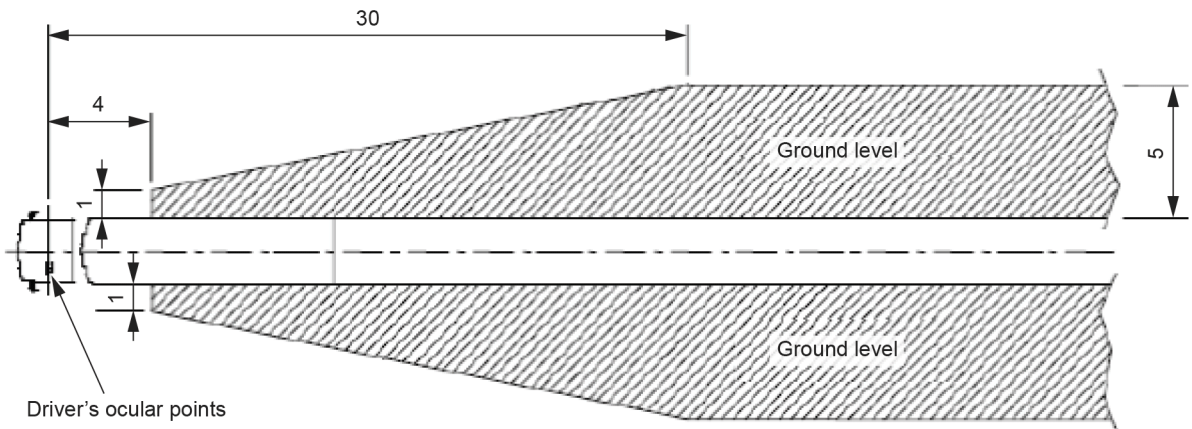
Figure A.1 to Figure A.8 provide some examples of views representing FOVs of class I to VI, a larger FOV on the passenger side, and also some example of views as specified within section 5.4.1 of UN Regulation No. 125, using an image generated by more than two cameras comprising a ~~drive monitoring~~ surround view system. However, the generated example views provided in this document do not necessarily comply with uniform provisions as described, for example, in the UN Regulation No. 46 or UN Regulation No. 125. For more details on what can be displayed and what cannot be displayed, it is strongly recommended to check the ~~applicable~~ existing regulations.



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Figure A.1 – Example view for class I FOV

Dimension in metres



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Figure A.2 – Example view for class II FOV