
**Road vehicles — Measurement
techniques in impact tests — Optical
instrumentation**

*Véhicules routiers — Techniques de mesure lors des essais de chocs —
Instrumentation optique*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Road vehicles — Measurement techniques in impact tests — Optical instrumentation

1 Scope

This document defines performance criteria for an optical data channel used in impact tests on road vehicles, when numerical time and space data are taken from images to analyse impact test results.

The objective of this document is to facilitate comparison between results obtained by different laboratories by specifying minimum quality criteria.

[Annexes A, B, C and D](#) present a method of measuring several indices like quality parameters of sub processes of the optical data channel, using a calibration target, reference distances and analysis systems.

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 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

3 Terms and definitions

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

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 <https://www.iso.org/obp>

3.1

analysis system

system to measure and collect the coordinates of target points in image space as a function of time

Note 1 to entry: The calculation results of the analysis system are 3D coordinates in object space, whereas in the case of 2D analysis, the depth of the target points is known and considered.

3.2

cell size

distance of neighbouring pixels on the sensor of an image recording device

Note 1 to entry: If there are different distance values in the two main directions of the image, the cell size is the maximum of these values.

3.3

control point

point that was determined with a higher accuracy and is further accepted as an error-free point

3.4
frame rate

f_r
frequency of renewal of information for a given point, expressed in renewals per second, or in images per second if all points of the image are renewed simultaneously

3.5
image recording device
system composed of a camera/lens unit together with a recording system

3.6
location accuracy

a_{loc}
desired accuracy of the object or target being measured

3.7
optical data channel
system composed of one or more image recording devices and a system for analysing the images, including any analysis procedure and data correction that validate and modify the content of the data

3.8
reference distance
known distance between a validation target pair

3.9
synchronism device
device to identify the synchronism effect in two or more corresponding image recording devices

3.10
time base system
device allowing determination of the time interval elapses between any two recorded events for each image recording device

3.11
time origin identification device
device to identify the instant chosen as the time origin, usually the contact between the test objects

3.12
validation target pair
pair of targets placed in the field of view so that the distance separating them remains constant

Note 1 to entry: Both of them are visible during the impact test.

3.13
accuracy value
 a
value that represents the relative overall accuracy of any point measurement within the optical data channel when the performance value is satisfied

3.14
accuracy value limit
 r_{avl}
user-defined limit for the accuracy value that represents the relative overall accuracy of any point measurement within the optical data channel when the performance value is satisfied

3.15
camera position calculation index
 i_{cpc}
index that gives the possibility to evaluate whether the accuracy of the optical data channel determined from one time step is representative for the entire sequence

3.16**camera set-up index** i_{cs}

index that makes it possible to evaluate whether the set-up of the camera with respect to the movement plane permits a reliable analysis

Note 1 to entry: Only for 2D film analysis.

3.17**control point distribution index** i_{cpd}

index that makes it possible to evaluate whether the distribution of the control points in the image permits a reliable orientation of the used images

3.18**distortion index** i_d

index that makes it possible to evaluate whether the interior orientation parameters of the used camera are still valid

3.19**focal length index** i_{fl}

index that makes it possible to evaluate whether the focal length of the used image recording device is still valid

3.20**index value**

value that is determined by its index calculation equation (one value for each index)

Note 1 to entry: For the different index calculation equations see [Annex A](#).

Note 2 to entry: The index value is the result of the index determination and is a floating point number.

3.21**index condition****condition of the check of the index**

Note 1 to entry: The index condition can be true (value 1) or false (value 0). A true or false measure indicating if an index is within its required limits."

3.22**intersection index** i_i

index that makes it possible to evaluate the intersection geometry of the rays from the image recording devices to the object points

Note 1 to entry: Only for 3D film analysis.

3.23**length measurement error**

value that represents the absolute overall accuracy of any point measurement within the optical data channel when the performance value is satisfied

3.24**motion blur index** i_{mb}

index that allows one to evaluate whether the exposure time used in the test is small enough with respect to the appropriate object movement, in order to ensure a reliable point identification and point measurement in the images