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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Event video data recorder for road vehicle accidents – Part 2: Test methods for evaluating performance of basic functions

Enregistreurs de données vidéo pour l'identification et l'analyse des causes des accidents des véhicules routiers – Partie 2: Méthodes d'essai pour l'évaluation des performances des fonctions de base

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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EVENT VIDEO DATA RECORDER FOR ROAD VEHICLE ACCIDENTS –

Part 2: Test methods for evaluating performance of basic functions

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

FDIS	Report on voting
100/3314/FDIS	100/3342/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 63005 series, published under the general title *Event video data recorder for road vehicle accidents*, can be found on the IEC website.

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EVENT VIDEO DATA RECORDER FOR ROAD VEHICLE ACCIDENTS –

Part 2: Test methods for evaluating performance of basic functions

1 Scope

This part of IEC 63005 describes test methods on evaluating performance of basic functionalities of EVDR described in IEC 63005-1.

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.

IEC 63005-1:2017, *Event video data recorder for road vehicle accidents – Part 1: Basic requirements*

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

ISO 12233, *Photography – Electronic still picture imaging – Resolution and spatial frequency responses*

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 http://www.iso.org/obp

3.1
EVDR
event video data recorder
system that stores vehicle video data of the accident on an electronic recording medium before, during, and after collision accident events with other vehicles, with passers-by and with any other objects

Note 1 to entry: This note applies to the French language only.

3.2
event data
information recorded by the EVDR to facilitate analysis of accident scenarios in the case of collision accident events with other vehicles, pedestrians or objects

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3.3
vehicle dynamics data
information on a vehicle's dynamic behaviour such as acceleration, angular velocity, and physical quantities related to collision

3.4
integrity verification value
information used to detect doctoring and/or deletion of event data

4 Abbreviated terms

FOV field of view

fps frames per second

g gravitational acceleration

5 General requirements for tests

5.1 Test environment

The test environment of the event video data recorder shall be maintained at (23 ± 5) °C.

5.2 Simulation of accident events

5.2.1 General

Acceleration-generating equipment is used to generate the required acceleration for the simulation of a road accident event.

5.2.2 Simulation device

The acceleration-generating equipment shall be able to maintain 3 g for at least 50 ms. Peak acceleration error shall be within 10% of each of the absolute values of 0,5 g, 1 g, 1,5 g, and 2 g. The equipment also shall be able to generate a triangular waveform with a peak greater than 2 g.

The triangular waveform generated by the acceleration generating equipment for the simulation of a single or multiple accident event is illustrated in Figure 1. Here, g_i is the peak acceleration value applied to the EVDR under test. The peak acceleration shall be applied for at least 50 ms during the period of t_2, and the acceleration and deceleration period, t_1, shall be less than 10 s.

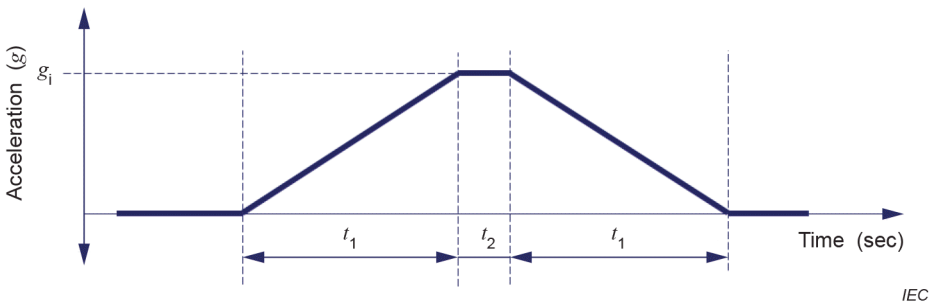

Figure 1 – An example of the triangular waveform caused by the acceleration-generating equipment

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5.2.3 Applying a simulated accident event

The simulated road accident event is generated using one of the following two methods.

a) **Using the event data recording function with the recording button on the EVDR:** If an event data recording function is available with any kind of switching button, the simulation test can be conducted without applying acceleration.

b) **Using the acceleration-generating equipment:** The following acceleration is generated and applied to the EVDR system.

- A triangular waveform is generated, with a peak acceleration of 2 g lasting for at least 50 ms (t_2 shall be longer than 50 ms) and the acceleration and deceleration period, t_1, shall occur within 10 s.

5.2.4 Simulating multiple collision events

The acceleration-generating equipment shall be employed to generate acceleration for the multiple collision event test.

- A triangular waveform is generated, with a peak acceleration of 2 g lasting for at least 50 ms (t_2 shall be longer than 50 ms) and the acceleration and deceleration period, t_1, shall occur within 10 s.

5.3 Evaluating performance of storing acceleration

The acceleration storing performance shall be assessed beforehand for the simulation test with acceleration generated by the acceleration-generating equipment.

- A triangular waveform is generated, with a peak acceleration of 1,5 g lasting for at least 50 ms ($t_2$shall be longer than 50 ms). The acceleration and deceleration period, t_1, shall occur within 10 s.

The vector sum of a_x and a_y stored in the EVDR shall have the maximum value within the range of 1,2 g to 1,8 g for the compatibility of the event data.

5.4 Test conditions

Only the main body of the EVDR is subjected to the conditions listed below. If the GNSS receiver and/or video acquisition devices have been separately installed, the conditions do not apply to the external input devices.

- The DC voltage for operation specified in Table 1 shall be supplied to the EVDR under test.

Table 1 – DC voltage for operation of the subject

DC voltage for operation V	Test voltage V
12	13,5 ± 0,5
24	27,0 ± 1,0
24 V conditions shall be applied if the device covers both 12 V and 24 V.	

- If more than one EVDR device with same model number are under test at one test organization, it may apply the simulated accident event only one time to one of those devices. There are many tests in this document, so the EVDR manufacturer can submit more than one EVDR device at one time in order to conduct different tests simultaneously, thereby reducing the overall duration of the tests.

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5.5 Test order

The order of the test and the required specimens for each test are described in Table 2.

Table 2 – Order of test items and number of specimens

No.	Test item	Clause or subclause	Number of specimens		
			1	2	3
1	Functional requirements	6 in IEC 63005-1:2017	✓		For back-up
2	Power unit performance test/ General requirements for test	6.3 in IEC 63005-1:2017	✓		
3	Vehicle dynamics data and other performance	6.2	✓		
4	Video camera performance	6.3	✓		
5	Data storage and cyber security	6.4	✓		
6	Integrity verification function	6.4.2		✓	
7	Environmental reliability test	6.5	✓		
8	Labelling	7	✓		

6 Evaluation of performance of the EVDR

6.1 Evaluating the performance of power component

6.1.1 Overvoltage test

The evaluation procedures for the overvoltage test are as follows:

a) Apply the simulated accident described in 5.2.3 to the EVDR under test.

b) Check the recorded event video data from the EVDR.

c) After connecting the input device and the EVDR under test, apply DC voltage 1,5 times higher than the normal operating voltage for 60 min. The DC voltage values are given in Table 1.

d) After the procedure c), the system shall be checked to verify whether the recorded event video data remains as it was recorded in the procedure b). The EVDR is considered to have passed the overvoltage test if the system has preserved the recorded event video data as it was recorded in the procedure b).

6.1.2 Protection from power failure and of event data recording time

Even when the power supply to the EVDR is cut for 15 days after normal operation, the recorded event video data shall be preserved in a sound state.

a) Set the internal clock of the EVDR under test to the present time.

b) Cut off the electric power to the EVDR under test after applying a simulated accident event two times as described in 5.2.3.

c) After 15 days, the EVDR under test shall resume normal operation. The event video data recorded previously shall be checked to verify whether it remains as it was recorded.

d) The difference between the points in time when the simulated accident event is applied and the event video data is recorded shall be less than 1 s for two events.

e) The internal clock of the EVDR shall continue operation even when the power supply is cut. The error in time indication of the EVDR shall be less than 1 min.

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NOTE Item e) implies that the error in time indication of systems with the backup power supply operating the internal clock also needs to be less than 1 min.

6.1.3 Prevention of vehicle battery from complete discharge (applicable to continuously recording EVDR only)

EVDRs capable of continuous recording shall be equipped with a complete discharge prevention function to protect vehicle batteries.

EVDRs with continuous recording capability are usually connected to vehicle's battery all the time. So, these EVDRs shall be able to record the event video data even when the vehicle is in ignition condition.

Any test organization shall check whether the EVDR cuts the power off when the DC voltage of the battery reaches less than 90 % (10,8 V for 12 V or 21,6 V for 24 V). If an effective discharge prevention technology other than detection of voltage drop has been applied and verified by relevant testing organizations, the test described below can be skipped.

a) Input voltages of 10,4 V and 10,0 V shall each be applied twice for the 12 V EVDR system (20,8 V and 20 V shall be applied for 24 V system).

b) After 1 min, check if the power consumption by the EVDR has been stopped. At this point, the leakage current shall be less than 10 mA. After the test, the EVDR shall function normally.

6.1.4 Tests on conducted emission, radiated emission, and radiated immunity

Tests on conducted emission, radiated emission, and radiated immunity shall comply with **the radio waves act** (electromagnetic compatibility) of each country.

6.2 Vehicle dynamics data and other performance

The EVDR shall be checked to verify that it satisfies the performance indicators described in 6.2 of IEC 63005-1:2017.

a) Audio shall remain unrecorded even if the EVDR has an audio recording function that can be disabled.

b) Using the acceleration-generating equipment, apply the acceleration described in 5.2.4 on the EVDR under test three times to simulate multiple collision events. The interval between acceleration application shall be greater than 10 min.

c) Using the acceleration-generating equipment, apply the acceleration described in 5.3 on the EVDR under test two times to simulate multiple collision events. The interval between acceleration application shall be greater than 10 min.

d) The maximum value of vector sum of recorded acceleration data a_x and a_y shall be within the range of 1,2 g to 1,8 g. The EVDR under test shall meet this criterion at least one time out of 2 attempts.

e) The EVDR under test shall be checked to verify if all the mandatory event data have been properly stored.

   1) The output values through the suggested interface of the EVDR products shall include time when event data was recorded, front camera image, acceleration a_x, and acceleration a_y. The recorded data including video, acceleration a_x and acceleration a_y shall be verified through a dedicated software program suggested by the manufacturer. The means for verifying recorded data shall be described in the product manual.

   2) The stored event video data shall be checked to verify that it contains 3 sets of recorded event data.

   3) Recorded event video data shall be inspected if proper time synchronization among them is possible.

   4) The sampling frequency of a_x and a_y to be recorded shall be greater or equal to 20 Hz.

   5) The resolution of recorded a_x and a_y shall be less than or equal to 0,01 g.

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6) The recorded product identification number shall match the identification number provided by the manufacturer. The identification number can be printed on the manual, product label or separate product information document.

6.3 Video camera performance

6.3.1 Basic camera performance

The video data downloaded from the EVDR shall be checked if it meets the requirements listed in Table 2 of IEC 63005-1:2017 for resolution, colour and sampling rate in accordance with the procedure below:

a) Set the camera of the EVDR under test ready to record video data and apply the simulated accident event as described in 5.2.3.

b) Check if resolution, colour, and sampling rate of the recorded data meet the requirements.

c) Frame rate of video data from the front camera shall be greater than or equal to 20 fps, and that from the side and rear camera shall be greater than or equal to 10 fps.

d) The video data shall include product identification number and time for video data to be recorded.

e) If the product has a function to change the resolution, the test shall be executed under factory settings and conditions and methods to change the resolution shall be specified in the manual.

6.3.2 Camera field of view (FOV)

The camera of the EVDR under test shall meet the FOV requirements specified in 6.2.2 of IEC 63005-1:2017. Details on the measuring equipment are described in Annex A of IEC 63005-1:2017.

a) Set up the front camera or a camera built in the EVDR as illustrated in Figure A.1 of IEC 63005-1:2017.

b) Let the EVDR under test record the event video data.

c) Take the recorded event video data out of the EVDR and check the conformity of the horizontal and vertical FOV.

d) The video data from the front camera shall have a minimum horizontal FOV of 80°, and a minimum vertical FOV of 50°. The resolution shall be greater than or equal to 900 000 pixels. The video data from the front camera shall include all of four corners of the square described in Figure A.1 and Figure A.2 of IEC 63005-1:2017.

6.3.3 Performance of registration plate identification

The camera of the EVDR shall be capable of identifying registration plates of vehicles.

a) Acquire two recorded event video data under two different illumination conditions, which represent a night condition (4 lx at the centre of the resolution test chart) and daytime condition (400 lx at the centre of the resolution test chart),

b) The registration plate identification capability shall be evaluated in accordance with ISO 12233 and Annex C of IEC 63005-1:2017.

c) The resolution test chart shall be located at 2 m from the camera. When measuring the distance between camera and the resolution test chart, the extruded lens of the camera is not included. The size of the resolution test chart is 60 inches (1 524 mm) in width, and it can be found and acquired in accordance with ISO 12233:2000.

d) After the recorded event video is converted into the static scene, use the SFR (spatial frequency response) analysis to inspect whether the resolution value is greater than 278 lines. The SFR analysis method is described in ISO 12233:2000.

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