AIS -192

AUTOMOTIVE INDUSTRY STANDARD

Type approval of Motor Vehicles with regards to Event Data Recorder (EDR)

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT and HIGHWAYS
GOVERNMENT OF INDIA

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INTRODUCTION

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CMVR-TSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the Secretariat of the AIS Committee, will publish this standard. For better dissemination of this information ARAI may publish this document on their Website.

Based on the discussion in the 66th AISC held on 14th July, 2021 Committee agreed in principle to formulate an Automotive Industry Standard (AIS) for type approval procedure for Event Data Recorder (EDR) as defined in this standard. The intention of this Standard is to establish uniform provisions for Event Data Recorder (EDR) fitted to motor vehicles of the category M1 only.

The purpose of this standard is to ensure that EDRs record, in a readily usable manner, data valuable for effective crash investigations and for analysis of safety equipment performance (e.g., advanced restraint systems). These data will help provide a better understanding of the circumstances in which crashes and injuries occur and will facilitate the development of safer vehicle designs.
While preparation of this standard considerable assistance is derived from UNR 160 (Supplement 1 to the original version of the regulation).

The AISC panel and the Automotive Industry Standards Committee (AISC) responsible for preparation of this standard are given in Annexure-D and Annexure-E respectively.

CONTENTS

Uniform provisions concerning the approval of vehicles with regards to Event Data Recorder (EDR)

1.0 SCOPE

1.1 This Standard applies to the approval of vehicles of M1 category with regard to their Event Data Recorder (EDR).

1.2 This Standard is without prejudice to requirements of national laws related to privacy, data protection and personal data processing.

1.3 The following data elements are excluded from the scope: VIN, associated vehicle details, location/positioning data, information of the driver, date and time of an event.

1.4 If there is no system or sensor designed to provide the data element to be recorded and stored under clause 3, in the format (range, resolution, and sample rate) indicated in Annexure C. "DATA ELEMENTS" or it is not operational at the time of recording, this document requires neither recording of such data nor fitting or making such systems or sensors operational. However, if the vehicle is fitted with an original equipment manufacturer sensor or system designed to provide the data element in the format specified in Annexure C. "DATA ELEMENTS", then it is mandatory to report the data element in the specified format when the sensor or system is operational. In the case the reason for not being operational at the time of recording is a failure of this system or sensor, this failure state shall be recorded by the EDR as defined in the data elements Annexure C – “Data elements”.

2.0 DEFINITIONS

For the purposes of this standard the following definitions shall apply.

2.1 **"Anti-lock braking activity"** means, the anti-lock brake system is actively controlling the vehicle's brakes.

2.2 **"Air bag warning lamp status"** means, whether the air bag malfunction warning lamp is on or off.

2.3 **"Capture"** means, the process of buffering EDR data in a temporary, volatile storage where it is continuously updated at regular time intervals.

2.4 **"Delta-V, lateral"** means, the cumulative change in velocity, as recorded by the EDR of the vehicle, along the lateral axis.

2.5 **"Delta-V, longitudinal"** means, the cumulative change in velocity, as recorded by the EDR of the vehicle, along the longitudinal axis.

2.6 **"Deployment time, frontal air bag"** means (for both driver and front passenger), the elapsed time from crash time zero to the deployment command or for multi-staged air bag systems, the deployment command for the first stage.

2.7 **"End of event time"** means, the moment at which the cumulative delta-V within a 20 ms time period becomes 0.8 km/h or less, or the moment at which the crash detection algorithm of the air bag control unit resets.

2.8 **"Engine RPM"** means:

(a) For vehicles powered by internal combustion engines, the number of revolutions per minute of the main crankshaft of the vehicle's engine, and

(b) For vehicles not entirely powered by internal combustion engines, the number of revolutions per minute of the motor shaft at the point at which it enters the vehicle transmission gearbox, and

(c) For vehicles not powered by internal combustion engines at all, the number of revolutions per minute of the output shaft of the device(s) supplying motive power.

2.9 **"Engine throttle, percent full"** means, the driver-requested acceleration as measured by the throttle position sensor on the accelerator control compared to the fully depressed position.

2.10 **"Event"** means, a crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or any non-reversible deployable restraint to be deployed, whichever occurs first.

2.11 **"Event Data Recorder" (EDR)** means, a device or function in a vehicle that records the vehicle's dynamic, time-series data during the time period just prior to an event (e.g., vehicle speed vs. time) or during a crash event (e.g., delta-V vs. time), intended for retrieval after the crash event. For the purposes of this definition, the event data does not include audio and video data.

2.12 **"Frontal air bag"** means, an inflatable restraint system that requires no action by vehicle occupants and is used to meet the applicable national frontal crash protection requirements.

2.13 **"If recorded"** means, if data is recorded in non-volatile memory for the purpose of subsequent downloading.

2.14 **"Ignition cycle, crash"** means, the number (count) of power mode cycles as determined by the EDR ECU at the time when the crash event occurred since the first use of the EDR.

2.15 **"Ignition cycle download"** means, the number (count) of power mode cycles as determined by the EDR ECU at the time when the data was downloaded since the first use of the EDR.

2.16 **"Lateral acceleration"** means, the component of the vector acceleration of a point in the vehicle in the y-direction. The lateral acceleration is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

2.17 **"Longitudinal acceleration"** means, the component of the vector acceleration of a point in the vehicle in the x-direction. The longitudinal acceleration is positive in the direction of forward vehicle travel.

2.18 **"Maximum delta-V, lateral"** means, the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis.

2.19 **"Maximum delta-V, longitudinal"** means, the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the longitudinal axis.

2.20 **"Maximum delta–V, resultant"** means, the time-correlated maximum value of the cumulative change in velocity, as reported by the EDR, along the vector-added longitudinal and lateral axis.

2.21 **"Multi-event crash"** means, the occurrence of a minimum of 2 events, the first and last of which begin not more than 5 seconds apart.

2.22 **"Non-volatile memory"** means, the memory reserved for maintaining recorded EDR data in a semi-permanent fashion. Data recorded in non-volatile memory is retained after a loss of power and can be retrieved with EDR data extraction tools and methods.

2.23 **"Normal acceleration"** means, the component of the vector acceleration of a point in the vehicle in the z-direction. The normal acceleration is positive in a downward direction.

2.24 **"Occupant size classification"** means, for front passenger, the classification of an occupant as an adult and not a child, and for the driver, the classification of the driver as not being of small stature as indicated in the data format.

2.25 **"Operational"** means that the system or sensor, at the time of the event, is active or can be activated/deactivated by the driver.

2.26 **"Passenger air bag suppression status"** means, the status of the passenger air bag (suppressed or not suppressed).

2.27 **"Pretensioner"** means, a device that is activated by a vehicle's crash sensing system and removes slack from a vehicle safety belt system.

2.28 **"Record"** means, the process of saving captured EDR data into a non-volatile storage for subsequent retrieval.

2.29 **"Rollover"** means, any vehicle rotation of 90 degrees or more about any true longitudinal or lateral axis.

2.30 **"Safety belt status"** means, the feedback from the safety system that the vehicle's safety belt is fastened or unfastened.

2.31 **"Seat track position switch, foremost, status"** means, the status of the switch that is installed to detect whether the seat is moved to a forward position.

2.32 **"Service brake, on and off"** means, the status of the device that is installed in or connected to the brake pedal system to detect whether the pedal was pressed. The device can include the brake pedal switch or other driver-operated service brake control.

2.33 **"Side air bag"** means, any inflatable occupant restraint device that is mounted to the seat or side structure of the vehicle interior, and that is designed to deploy in a side impact crash to help mitigate occupant injury and/or ejection.

Note: Side air bags can also deploy in other crash modes as determined by the vehicle manufacturer.

2.34 **"Side curtain/tube air bag"** means, any inflatable occupant restraint device that is mounted to the side structure of the vehicle interior, and that is designed to deploy in a side impact crash or rollover and to help mitigate occupant injury and/or ejection.

Note: Side curtain/tube air bags can also deploy in other crash modes as determined by the manufacturer.

2.35 **"Speed, vehicle indicated"** means, the vehicle speed indicated by a manufacturer-designated subsystem designed to indicate the vehicle's ground travel speed during vehicle operation.

2.36 **"Stability control"** means, any device that complies with national, "Electronic stability control systems".

2.37 **"Steering input"** means, the angular displacement of the steering wheel measured from the straight-ahead position (position corresponding to zero average steer angle of a pair of steered wheels).

2.38 **"Time from event 1 to 2"** means, the elapsed time from time zero of the first event to time zero of the second event of a multi-event crash.

2.39 **"Time, maximum delta–V, lateral"** means, the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral axis.

2.40 **"Time, maximum delta-V, longitudinal"** means, the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the longitudinal axis.

2.41 **"Time, maximum delta–V, resultant"** means, the time from crash time zero to the point where the maximum delta–V resultant occurs, as reported by the EDR.

2.42 **"Time to deploy, pretensioner"** means, the elapsed time from crash time zero to the deployment command for the safety belt pretensioner (for both driver and front passenger).

2.43 **"Time to deploy, side air bag/curtain"** means, the elapsed time from crash time zero to the deployment command for a side air bag or a side curtain/tube air bag (for both driver and front passenger).

2.44 **"Time to first stage"** means, the elapsed time between time zero and the time when the first stage of a frontal air bag is commanded to fire.

2.45 **"Time to nth stage"** means, the elapsed time from crash time zero to the deployment command for the nth stage of a frontal air bag (for both driver and front passenger).

2.46 **"Time zero"** is the time reference for the EDR data timestamps of an event.

2.47 **"Trigger threshold"** means, the appropriate parameter has met the conditions for recording an EDR event.

2.48 **"Vehicle roll angle"** means, the angle between the vehicle y-axis and the ground plane as determined by the sensing system.

2.49 **"Vehicle type with regard to its Event Data Recorder"** means, vehicles which do not differ significantly in such essential aspects as:

(a) The manufacturer’s trade name or mark;

(b) Vehicle features which significantly influence the performances of the EDR; Addition of new trigger(s), new data (elements), or modification in their format, shall not be considered as "significantly influencing the performance of EDR";

(c) The main characteristics and design of the EDR.

2.50 **"Volatile memory"** means, the memory reserved for buffering of captured EDR data. The memory is not capable of retaining data in a semi-permanent fashion. Data captured in volatile memory is continuously overwritten and is not retained in the event of a power loss or retrievable with EDR data extraction tools.

2.51 **"Vulnerable road user secondary safety system"** means, a deployable vehicle system outside the occupant compartment designed to mitigate injury consequences to vulnerable road users during a collision.

2.52 **"X-direction"** means, in the direction of the vehicle's X-axis, which is parallel to the vehicle's longitudinal centerline. The X-direction is positive in the direction of forward vehicle travel.

2.53 **"Y-direction"** means, in the direction of the vehicle's Y-axis, which is perpendicular to its X-axis and in the same horizontal plane as that axis. The Y-direction is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

2.54 **"Z-direction"** means, in the direction of the vehicle's Z-axis, which is perpendicular to the X and Y-axes. The Z-direction is positive in a downward direction.

3.0 APPLICATION OF APPROVAL

3.1 The application for approval of a vehicle type with regard to its EDR shall be submitted by the vehicle manufacturer or by his authorized representative to the respective test agencies as specified in CMV Rule 126.

3.2 It shall be accompanied by the following documentation (a model of the information document is given in Annex B):

3.2.1 A description of the vehicle type with regard to the items specified in clause 5 below, in particular related to the location of the EDR in the vehicle, the triggering parameters, storing capacity and the resistance to high deceleration and mechanical stress of a severe impact;

3.2.2 The data elements and format stored in the EDR;

3.2.3 Instructions for retrieving data from the EDR.

3.3 A vehicle representative of the vehicle type to be approved shall be submitted to the test agency or its designated test agency responsible for conducting the approval tests.

4.0 APPROVAL

4.1 If the vehicle type submitted for approval pursuant to this Standard meets the requirements of clause 5.0 below, approval of that vehicle type shall be granted.

5.0 REQUIREMENTS

Requirements for vehicles fitted with an EDR include data elements, data format, data capture, and crash test performance and survivability.

5.1 Data elements

5.1.1 Each vehicle fitted with an EDR shall record the data elements specified as mandatory and those required under specified minimum conditions during the interval/time and at the sample rate specified in Annex C, Table 1.

5.2 Data format

5.2.1 Each data element recorded shall be reported in accordance with the range, accuracy, and resolution specified in Annexure C, Table 1.

5.2.2 Acceleration Time-History data and format: the longitudinal, lateral, and normal acceleration time-history data, as applicable, shall be filtered either during the recording phase or during the data downloading phase to include:

5.2.2.1 The Time Step (TS) that is the inverse of the sampling frequency of the acceleration data and which has units of milliseconds.

5.2.2.2 The number of the first point (NFP), which is an integer that when multiplied by the TS equals the time relative to time zero of the first acceleration data point.

5.2.2.3 The number of the last point (NLP), which is an integer that when multiplied by the TS equals the time relative to time zero of the last acceleration data point; and

5.2.2.4 NLP - NFP + 1 acceleration values sequentially beginning with the acceleration at time NFP * TS and continue sampling the acceleration at TS increments in time until the time NLP * TS is reached.

5.3 Data capture

The EDR shall record the captured data in the vehicle and this data shall remain in the vehicle subject to the provisions of clause 5.3.4, at least until they are retrieved in compliance with national or regional legislation or they are overwritten in compliance with clause 5.3.4.

The EDR non-volatile memory buffer shall accommodate the data related to at least two different events.

The data elements for every event shall be captured and recorded by the EDR, as specified in clause 5.1 in accordance with the following conditions and circumstances:

5.3.1 Conditions for triggering recording of data

An event shall be recorded by the EDR if one of the following threshold values is met or exceeded:

5.3.1.1 Change in longitudinal vehicle velocity more than 8 km/h within a 150 ms or less interval.

5.3.1.2 Change in lateral vehicle velocity more than 8 km/h within a 150 ms or less interval.

5.3.1.3 Activation of Non-reversible occupant restraint system.

5.3.1.4 Activation of Vulnerable road user secondary safety system

If a vehicle is not fitted with any Vulnerable Road User (VRU) secondary safety system, this document requires neither recording of data nor fitting of such systems. However, if the vehicle is fitted with such a system, then it is mandatory to record the event data following activation of this system.

5.3.2 Conditions for triggering locking of data

In the circumstances provided below, the memory for the event shall be locked to prevent any future overwriting of the data by subsequent events.

5.3.2.1 In all the cases where a non-reversible occupant restraint system is deployed.

5.3.2.2 In the case of a frontal impact, if the vehicle is not fitted with a non-reversible restraint system for front impact, when the vehicle's velocity change in x-axis direction exceeds 25 km/h within 150 ms or less interval.

5.3.2.3 Activation of Vulnerable road user secondary safety system

5.3.3 Conditions for establishment of time zero

Time zero is established at the time when any of the following first occurs:

5.3.3.1 For systems with "wake-up" air bag control systems, the time at which the occupant restraint control algorithm is activated; or

5.3.3.2 For continuously running algorithms,

5.3.3.2.1 The first point in the interval where a longitudinal, cumulative delta-V of over 0.8 km/h is reached within a 20 ms time period; or

5.3.3.2.2 For vehicles that record "delta-V, lateral," the first point in the interval where a lateral, cumulative delta-V of over 0.8 km/h is reached within a 5 ms time period; or

5.3.3.3 Deployment of a non-reversible deployable restraint or activation of VRU secondary safety protection system.

5.3.4 Overwriting

5.3.4.1 If an EDR non-volatile memory buffer void of previous-event data is not available, the recorded data shall, subject to the provisions of clause 5.3.2., be overwritten by the current event data, on a first-in first-out basis, or according to different strategies decided by the manufacturer and made available to the Test Agencies.

5.3.4.2 Furthermore, if an EDR non-volatile memory buffer void of previous-event data is not available, data originating from non-reversible restraint system or Vulnerable road user secondary safety system deployment events referred to in clause 5.3.2 shall always overwrite any other data that is not locked per 5.3.2.

5.3.5 Power failure

Data recorded in non-volatile memory is retained after loss of power.

5.4 Crash test performance and survivability

5.4.1 Each vehicle subject to the requirements of national frontal crash test regulations, shall conform with the specifications in clause 5.4.3.

5.4.2 Each vehicle subject to the requirements of national side impact crash test regulations shall conform with the specifications of clause 5.4.3.

5.4.3 The data elements required by clause 5.1, shall be recorded in the format specified by clause 5.2, exist at the completion of the crash test and the complete data recorded element shall read "yes" after the test. Elements that are not operating normally in crash tests (e.g., those related to engine operation, braking, etc.) are not required to meet the accuracy or resolution requirements in these crash tests.

The data shall be retrievable even after an impact of a severity level set by AIS-098 (for offset frontal collision), AIS-099 (for lateral collision) or AIS-201 (for full frontal collision).

5.5 It shall not be possible to deactivate the Event Data Recorder.

6.0 MODIFICATION OF VEHICLE TYPE AND EXTENSION OF APPROVAL

6.1 Every modification of the vehicle type as defined in clause 2., of this Standard shall be notified to the test agency which approved the vehicle type. The test agency may then either:

6.1.1 Consider that the modifications made do not have an adverse effect on the conditions of the granting of the approval and grant an extension of approval;

6.1.2 Consider that the modifications made affect the conditions of the granting of the approval and require further tests or additional checks before granting an extension of approval.

6.2 In case of clause 6.1.2, tests shall be carried out for only those parameters which are affected by the modifications.

6.3 In case of fulfilment of criteria of clause 6.1.1 or after successful results of further verification as per clause 6.1.2 the approval of compliance shall be extended for the changes carried out.

ANNEXURE A - RESERVED

ANNEXURE B

INFORMATION DOCUMENT ON THE TYPE APPROVAL OF A VEHICLE TYPE WITH REGARD TO ITS EVENT DATA RECORDER (EDR)

0.0	A list of contents shall be included.					
0.1	Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.					
0.2	Photographs, if any, shall show sufficient detail.					
0.3	General					
1.0	Trademark:.....					
2.0	Vehicle Type:					
3.0	Means of identification of type, if marked on the vehicle:					
4.0	Location of the marking:					
5.0	Location of and method of affixing the approval mark:					
6.0	Category of vehicle:					
7.0	Name and address of manufacturer:					
8.0	Address(es) of assembly plant(s):					
9.0	Photograph(s) and/or drawing(s) of a representative vehicle					
10.0	EDR:					
10.1	Make (trade name of manufacturer):					
10.2	Type and general commercial description(s):					
10.3	Drawing(s) or photographs showing the location and method of attachment of the EDR in the vehicle:					
10.4	Description of the triggering parameter:					
10.5	Description of any other relevant parameter (storing capacity, resistance to high deceleration and mechanical stress of a severe impact, etc.):					
10.6	The data elements and data format stored in the EDR:					
	Data Element	*Recording interval/ time (relative to time zero)*	*Data sample rate (samples per second)*	*Minimum range*	*Accuracy*	*Resolution*
10.7	Instructions for retrieving data from the EDR:					

ANNEXURE C -

DATA ELEMENTS AND FORMAT(1)

Table 1

Data element	*Condition for requirement(2)*	*Recording interval / time(3) (relative to time zero)*	*Data sample rate (sample per second)*	*Minimum range(4)*	*Accuracy (5)*	*Resolution(4)*	*Event (s) recorded for(6)*
Delta-V Longitudinal	Mandatory - not required if longitudinal acceleration recorded at ≥500 Hz with sufficient range and resolution to calculate delta-v with required accuracy	0 to 250ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	100	-100 km/h to + 100 km/h	±10%	1 km/h	Planar
Maximum delta-V, longitudinal	Mandatory - not required if longitudinal acceleration recorded at ≥500 Hz	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A	- 100 km/h to + 100 km/h	±10%	1 km/h	Planar
Time, maximum delta-V, longitudinal	Mandatory - not required if longitudinal acceleration recorded at ≥500 Hz	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A	0–300 ms, or 0-End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms	Planar
Speed, vehicle indicated	Mandatory	-5.0 to 0 sec	2	0 km/h to 250 km/h	±1 km/h	1 km/h	Planar VRU Rollover
Engine throttle, % full (or accelerator pedal, % full)	Mandatory	-5.0 to 0 sec	2	0 to 100%	±5%	1%	Planar Rollover VRU

(1) Format requirements specified below are minimum requirements and manufacturers can exceed them.

(2) Mandatory" is subject to the conditions detailed in Section 1.

(3) Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is -0.1 to 1.0 sec (e.g., T = -1 would need to occur between -1.1 and 0 seconds.)

(4) For data elements with system states, the term “engaged” also means “actively controlling” or “actively intervening” and “non-engaged” also means “on but not controlling”, likewise, “off” also means “deactivated”.

(5) Accuracy requirement only applies within the range of the physical sensor. If measurements captured by a sensor exceed the design range of the sensor, the reported element shall indicate when the measurement first exceeded the design range of the sensor.

(6) Planar" includes triggered events in clauses 5.3.1.1, 5.3.1.2, and 5.3.1.3 and “VRU” includes triggered events in section 5.3.1.4.

Data element	*Condition for requirement[2]*	*Recording interval / time[3] (relative to time zero)*	*Data sample rate (sample per second)*	*Minimum range[4]*	*Accuracy[5]*	*Resolution[4]*	*Event (s) recorded for[6]*
Service brake, on/off	Mandatory	-5.0 to 0 sec	2	On or Off	N/A	On or Off.	Planar VRU Rollover
Ignition cycle, crash	Mandatory	-1.0 sec	N/A	0 to 60,000	±1 cycle	1 cycle.	Planar VRU Rollover
Ignition cycle, download	Mandatory	At time of download [7]	N/A	0 to 60,000	±1 cycle	1 cycle.	Planar VRU Rollover
Safety belt status, driver	Mandatory	-1.0 sec	N/A	Fastened, not fastened	N/A	Fastened, not fastened	Planar Rollover
Air bag warning lamp[8]	Mandatory	-1.0 sec	N/A	On or Off	N/A	On or Off	Planar Rollover
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, driver.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, front passenger.[9]	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar

[7] The ignition cycle at the time of download is not required to be recorded at the time of the crash but shall be reported during the download process.

[8] The air bag warning lamp is the readiness indicator specified in national air bag requirements and may also illuminate to indicate a malfunction in another part of the deployable restraint system.

[9] List this element n times, once for each device.

Data element	***Condition for requirement[2]***	***Recording interval / time[3] (relative to time zero)***	***Data sample rate (sample per second)***	***Minimum range[4]***	***Accuracy[5]***	***Resolution[4]***	***Event (s) recorded for[6]***
Multi-event crash, number of events	If Recorded[10]	Event	N/A	1 or more	N/A	1 or more	Planar VRU Rollover
Time from event 1 to 2	Mandatory	As needed	N/A	0 to 5.0 sec	±0.1 sec	0.1 sec	Planar Rollover
Complete file recorded	Mandatory	Following other data	N/A	Yes or No	N/A	Yes or No	Planar VRU Rollover
Lateral acceleration (post-crash)	If Recorded	0–250 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.[11]	500	-50 to +50 g	+/- 10%	1 g	Planar Rollover
Longitudinal acceleration (post-crash)	If Recorded	0–250 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	500	-50 to +50 g	+/- 10%	1 g	Planar
Normal acceleration (post-crash)	If recorded	0 to at least 250 ms[11]	10	-5 g to +5 g	±10%	0.5 g	Rollover
Delta-V, lateral	Mandatory - not required if lateral acceleration recorded at ≥500 Hz and with sufficient range and resolution to calculate delta-v with required accuracy	0–250 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	100	-100 km/h to + 100 km/h	±10%	1 km/h	Planar

[10] "If recorded" means if the data is recorded in non-volatile memory for the purpose of subsequent downloading.

[11] For rollover events the time at which the event is determined to have started as defined by the manufacturer.

Data element	*Condition for requirement[2]*	*Recording interval / time[3] (relative to time zero)*	*Data sample rate (sample per second)*	*Minimum range[4]*	*Accuracy[5]*	*Resolution[4]*	*Event (s) recorded for[6]*
Maximum delta-V, lateral	Mandatory - not required if lateral acceleration recorded at ≥500 Hz	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A	-100 km/h to + 100 km/h	±10%	1 km/h	Planar
Time maximum delta-V, lateral	Mandatory - not required if lateral acceleration recorded at ≥500 Hz	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A	0–300 ms, or 0-End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms	Planar
Time for maximum delta-V, resultant.	Mandatory - not required if relevant acceleration recorded at ≥500 Hz	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A	0–300 ms, or 0-End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms	Planar
Engine rpm	Mandatory	-5.0 to 0 sec	2	0 to 10,000 rpm	±100 rpm [12]	100 rpm	Planar Rollover
Vehicle roll angle	If recorded	0 to at least 250 ms[11]	10	-1080 deg to + 1080 deg.	±10%	10 deg	Rollover
Anti-lock braking system activity	Mandatory	-5.0 to 0 sec	2	Faulted, Non Engaged, Engaged	N/A	Faulted, Non Engaged, Engaged	Planar VRU Rollover
Stability control	Mandatory	-5.0 to 0 sec	2	Faulted, On, Off, Engaged	N/A	Faulted, On, Off, Engaged	Planar VRU Rollover
Steering input	Mandatory	-5.0 to 0 sec	2	-250 deg CW to + 250 deg CCW.	±5%	±1%.	Planar Rollover VRU
Safety belt status, front passenger [9]	Mandatory	-1.0 sec	N/A	Fastened, not fastened	N/A	Fastened, not fastened	Planar Rollover
Passenger air bag suppression status, front [9]	Mandatory	-1.0 sec	N/A	Suppressed or not suppressed	N/A	Suppressed or not suppressed	Planar Rollover
[12] These elements do not need to meet the accuracy and resolution requirements in specified crash tests.							

Data element	***Condition for requirement[2]***	***Recording interval / time[3] (relative to time zero)***	***Data sample rate (sample per second)***	***Minimum range[4]***	***Accuracy[5]***	***Resolution[4]***	***Event (s) recorded for[6]***
Frontal air bag deployment, time to nth stage, driver[13]	Mandatory if fitted with a driver's frontal air bag with a multi-stage inflator.	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar
Frontal air bag deployment, time to nth stage, front passenger [13] [9]	Mandatory if fitted with a front passenger's frontal air bag with a multi-stage inflator.	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar
Side air bag deployment, time to deploy, driver.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar
Side air bag deployment, time to deploy, front passenger.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar
Side curtain/tube air bag deployment, time to deploy, driver side.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar Rollover
Side curtain/tube air bag deployment, time to deploy, passenger side.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar Rollover
Pretensioner deployment, time to fire, driver.	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar Rollover
Pretensioner deployment, time to fire, front passenger.[9]	Mandatory	Event	N/A	0 to 250 ms	±2 ms	1 ms	Planar Rollover

[13] List this element n - 1 times, once for each stage of a multi-stage air bag system.

Data element	***Condition for requirement[2]***	***Recording interval / time[3] (relative to time zero)***	***Data sample rate (sample per second)***	***Minimum range[4]***	***Accuracy[5]***	***Resolution[4]***	***Event (s) recorded for[6]***
Seat track position switch, foremost, status, driver.	Mandatory if fitted and used for deployment decision	-1.0 sec	N/A	Yes or No	N/A	Yes or No	Planar Rollover
Seat track position switch, foremost, status, front passenger.[9]	Mandatory if fitted and used for deployment decision	-1.0 sec	N/A	Yes or No	N/A	Yes or No	Planar Rollover
Occupant size classification - driver	If recorded	-1.0 sec	N/A	5th percentile female or larger.	N/A	Yes or No	Planar Rollover
Occupant size classification - front passenger[9]	If recorded	-1.0 sec	N/A	6yr old HIII US ATD or Q6 ATD or smaller	N/A	Yes or No	Planar Rollover

ANNEXURE D

(See Introduction)

COMPOSITION OF AISC PANEL ON EVENT DATA RECORDER (EDR)

Convener	
Mr. Darshan Lokesha	ACMA (Continental Automotive Components India Pvt. Ltd.)
MEMBERS	**REPRESENTING**
Mr. A. A. Badusha	The Automotive Research Association of India
Mr. Manoj M. Desai	The Automotive Research Association of India
Mr. Tushar Kamble	The Automotive Research Association of India
Mr. Kamalesh Patil	The Automotive Research Association of India
Mr. Pratik R. Nayak	The Automotive Research Association of India
Mr. Vishal Rawal	The Automotive Research Association of India
Mr. U. Sreekumar	The Automotive Research Association of India
Ms. Sneha R. Pawar	The Automotive Research Association of India
Mr. Sagar Babar	The Automotive Research Association of India
Ms. Vijayanta Ahuja	International Centre for Automotive Technology
Mr. Tarun Sharma	International Centre for Automotive Technology
Mr. Nagarajan	Global Automotive Research Centre (GARC)
Mr. S. Perumal	Global Automotive Research Centre (GARC)
Mr. V. M. Dhanasekkar	Global Automotive Research Centre (GARC)
Mr. V. Faustino	SIAM (Ashok Leyland Ltd)
Mr. Ved Prakash Gautam	SIAM (Ashok Leyland Ltd)
Mr. Tangri Devinder	SIAM (Mahindra & Mahindra Ltd)
Mr. Shailesh Kulkarni	SIAM (Mahindra & Mahindra Ltd)
Mr. Abhijeet Dhotre	SIAM (Mahindra & Mahindra Ltd)
Ms. Pushpanjali Pathak	SIAM (Mahindra & Mahindra Ltd)
Ms. R. Deepa	SIAM (Mahindra & Mahindra Ltd)

Mr. Gururaj Ravi	SIAM (Maruti Suzuki India Ltd.)
Mr. Arun Kumar	SIAM (Maruti Suzuki India Ltd.)
Mr. Sumit Kumar	SIAM (Maruti Suzuki India Ltd.)
Mr. P. Jebin-Jowhar	SIAM (Renault Nissan Technical Business Centre India.)
Mr. Uday Salunkhe	SIAM (Tata Motors Ltd)
Mr. B. Sudarshan	SIAM (Tata Motors Ltd)
Ms. Seema Babal	The Automotive Component Manufacturers Association of India (ACMA)
Mr. Ankit Dhiman	ACMA
Ms. Sujith Sobha	ACMA (Continental Automotive Components India Pvt. Ltd.)
Ms. S. Anusha meenakshi	ACMA (Continental Automotive Components India Pvt. Ltd.)
Mr. Manoj Nair	ACMA (Continental Automotive Components India Pvt. Ltd.)
Mr. P S. Rajesh	ACMA (Continental Automotive Components India Pvt. Ltd.)
Mr. Suren Zambre	ACMA (Uno Minda)
Mr. Sachin Deshmukh	ACMA (ZF Group)

ANNEXURE E
(See Introduction)

COMMITTEE COMPOSITION *
Automotive Industry Standards Committee

Chairperson	
Dr. Reji Mathai	Director, The Automotive Research Association of India
Members	**Representing**
Representative from	Ministry of Road Transport and Highways
Representative from	Ministry of Heavy Industries
Representative from	Office of the Development Commissioner, MSME, Ministry of Micro, Small and Medium Enterprises
Shri Shrikant R. Marathe	Former Chairman, AISC
Head-TED	Bureau of Indian Standards
Director	Central Institute of Road Transport
Director	Global Automotive Research Centre
Director	International Centre for Automotive Technology
Director	Indian Institute of Petroleum
Director	Vehicles Research and Development Establishment
Director	Indian Rubber Manufacturers Research Association
Representatives from	Society of Indian Automobile Manufacturers
Representatives from	Tractor and Mechanization Association
Representatives from	Automotive Components Manufacturers Association of India
Representative from	Indian Construction Equipment Manufactures' Association
Member Secretary	
Shri Vikram Tandon	The Automotive Research Association of India

* At the time of approval of this Automotive Industry Standard (AIS)