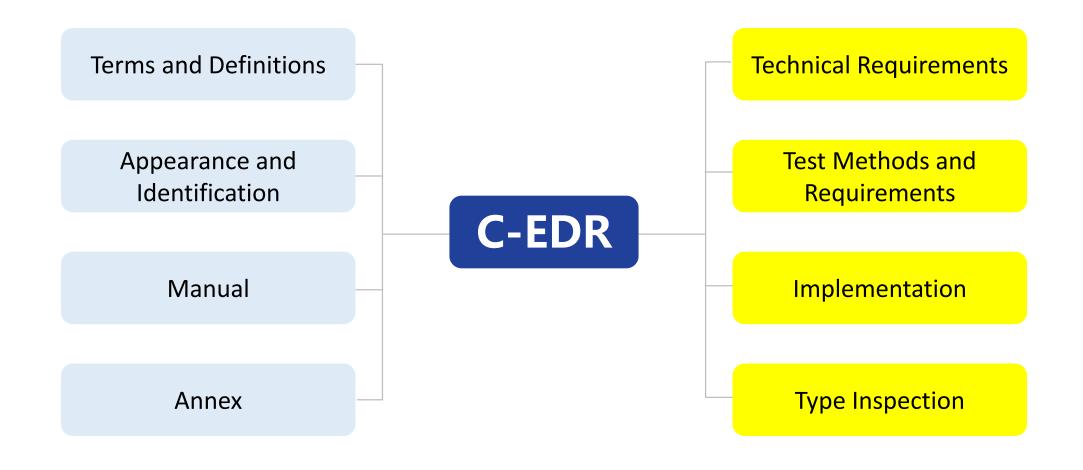
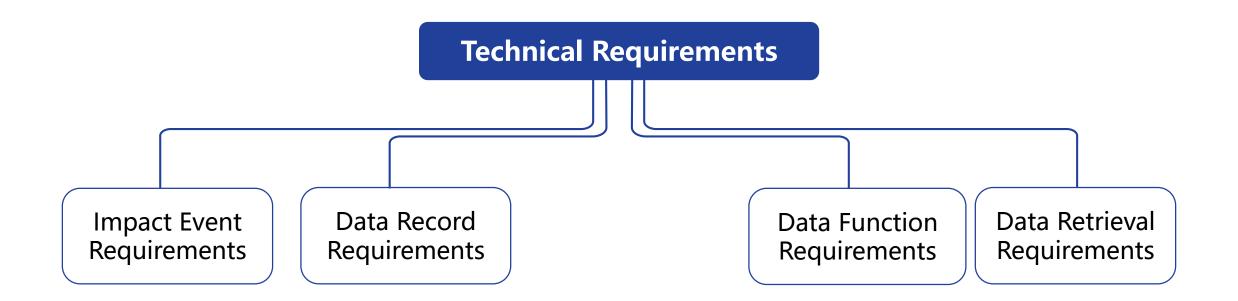
Informal document GRSG-117-05 (117th GRSG, 8-11 October 2019 Agenda item 19)

Chinese Mandatory National Standard GB "Automobile Event Data Recorder system"

Framework

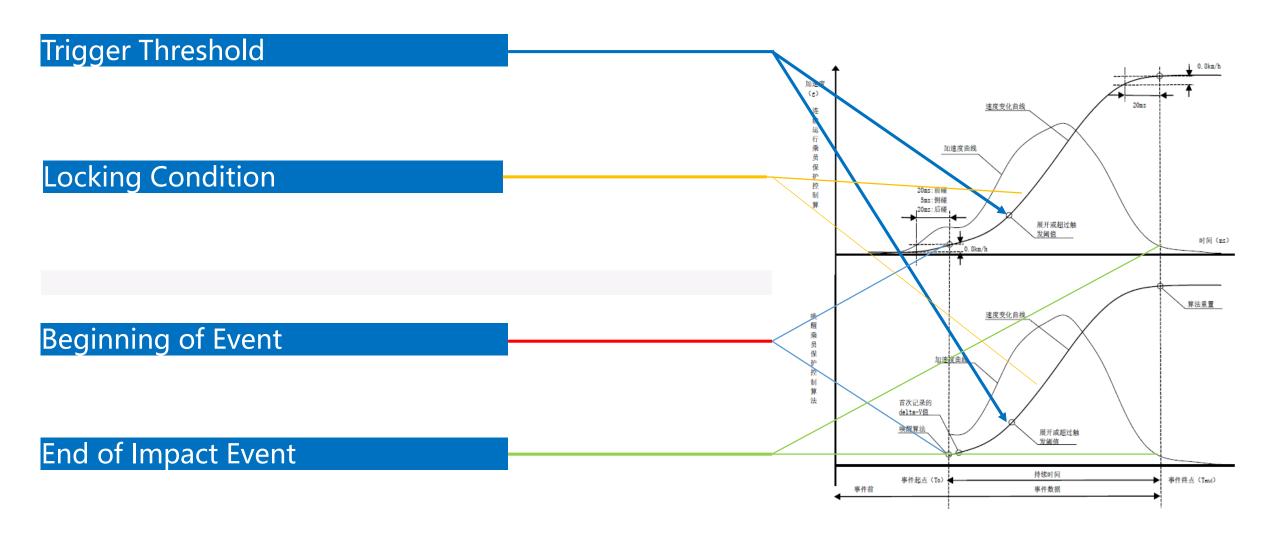
C-EDR





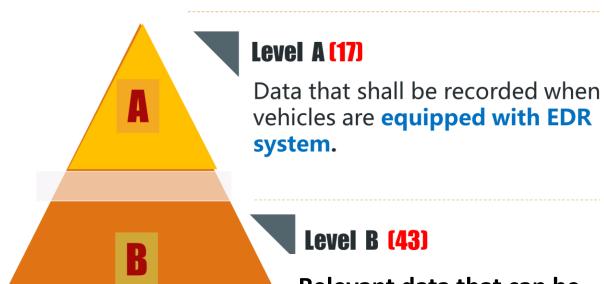
C-EDR

IMPACT EVENT REQUIREMENTS



C-EDR

DATA RECORD REQUIREMENTS



Relevant data that can be recorded when the vehicle is featured with specific functions or equipped specific devices.



Lateral delta-V

Maximum Recorded Lateral delta-V

Clipping Flag

Vehicle Velocity

Acceleration pedal position%

Revolution per minute

Power-on cycle at retrieving

Time interval from this event to the last event

ECU hardware number that records EDR data ECU software number that records EDR data Time to Maximum Recorded delta-V

Service brake , on or off

Driver seatbelt status

Complete status of event data record

ECU serial number that records EDR data

C-EDR

Time to Maximum

Recorded delta-V

lateral

Steering Lamp

Status

DATA RECORD REQUIREMENTS

Level В Data Elem ent

Workin g status and event status Restrain t system **Active** system Time

Longitudinal acceleration Time to Maximum Recorded delta-V. Resultant **Occupant Protection System Warning Status** Driver's seat belt pretensioner **Deployment time**

acceleration **Tend**

Lateral

Gear **Position**

Lateral delta-V

Pre-event synchronization timing time

Engine Throttle Position

Tire Pressure Monitoring System Warning Status

Maximum Recorded Lateral delta-V

> Yaw Angle **Velocity**

Brake Pedal Position

Square of Maximum Recorded Resultant delta-V

> **Steering** Angle

Parking System Status

Braking System Warning Status

Driver's front airbag Deployment time (phase II)

Driver's side airbag **Deployment time**

Driver's side air curtain **Deployment time**

Front-row passenger seat belt Status

Front-row passenger seat belt pretensioner **Deployment time**

Front-row passenger 's front airbag suppression status

Driver's front airbag

Deployment time

(phase I)

Front-row passenger 's front airbag Deployment time(phase I)

Front-row passenger 's front airbag Deployment time (phase II)

Front-row passenger's side airbag **Deployment time**

Front-row passenger's side air curtain **Deployment time**

Cruise Control system status

Adaptive Cruise Control system status **Anti-brake system** status

AEB status

Electronic stability control system status **Traction control** system status

Year

Month

Dav

Hour

Minute

Second



DATA RECORD FUNCTION REQUIREMENTS

Storage media and storage frequency requirements

- Non-volatile storage medium
- At least 3 times of impact event data.

- ➤ Learning from relevant research, 94% of the accidents will be covered when EDR records 3 events , while only 84% when EDR records 2 events.
- > Depends on different forms or phases, an accident can be recorded as several events.



DATA RECORD FUNCTION REQUIREMENTS

Storage coverage mechanism requirements

- Unlocked event data should be overwritten by subsequent un-locked event data, in chronological order.
- Locked event data should not be overwritten by data from subsequent events.
- For unlocked events, the manufacturer is allowed to set **other** storage coverage mechanisms.

Power-off storage requirements

Data before T0 and after T0 to (150±10)
 ms should be recorded.



DATA RETRIEVAL REQUIREMENTS



1 Unified data retrieval connector

GB/T 34589-2017 "Road Vehicles diagnostic connector"

Unified data retrieval ID

OxFA13, 0xFA14 and 0xFA15
Where,
OxFA13 for the most recent event,
OxFA14 for the second event from the bottom,
OxFA15 for the third event from the bottom.

Unified data retrieval protocol

- 2
- √ Use diagnostic service 0x22 "ReadDatabyldentifier " in
 ISO 14229 "Road Vehicles unified diagnostic service " to
 retrieve EDR data.
- √ compatible with CAN bus and k-line.
- √ Compatible with functional addressing and physical addressing
- √ Compatible with 11-bit and 29-bit CANID

Unified data arrangement

4

Unified data range, accuracy, resolution and data arrangement order

	ID (1)(2)(3)			Signal Name	Unit	Record Level	Length of Single Signal (bit)	Length of Single Signal (byte)	Number of Single Event Signals (#)	Length of Single Event Signal (Byte)	Serial Number of Byte	Conversion Formula	Unobtainable Value	Fault or Invalid Value
				Longitudinal delta-V	km/h	Α	8	1	26	26	0-25	E=N-150	FF ₁₆	FE ₁₆
				Maximum recorded longitudinal delta-V	km/h	Α	8	1	1	1	26	E=N-150	FF ₁₆	FE ₁₆
				Time to maximum recorded delta-V, longitudinal	ms	Α	7	1	1	1	27	E=N*2.5	FF ₁₆	FE ₁₆
n.c	M12 N	NEA1A	0 √€ λ 15	Clipping flag	ms	A	16	2	1	2	28-29	E=N 1 ≠ byte: longitidinal acceleration clipping flag; 2 d byte: lateral acceleration	FFFF ₁₆	FFFE ₁₆

TEST METHODS

Test Methods

IMPACT TEST

After the existed mandatory impact test, following two requirements are checked:

- (1) Requirement conformance of post crash time-series data (EDR delta-V or acceleration data): the EDR output is compared with the reference accelerometer sensor data. And there is no delta-V data clipping, or acceleration data outrange
- **(2) Survivability:** the EDR system shall completely record all data.

DRIVER OPERATION DATA TEST

After the EDR is triggered, the **requirement** conformance of pre-crash driver operation data elements are checked.

- Pedal: certain stroke
- Steering wheel: certain angle
- Safe belt buckle: locked
- Lamp: ON
- Electronic/electric systems recorded by EDR shall be set and kept on

Note: the EDR can be triggered in any way, e.g.

- -- impact the vehicle
- -- fix the vehicle on the trolley, and impact the trolley
- -- physically trigger the EDR
- -- input trigger signal to the EDR

BENCH TEST

The following EDR requirements are checked:

- EDR trigger performance
- Event storage times
- Storage overwrite mechanism
- Power off storage performance

by thrusting the EDR controller using a electromagnetic thruster to physically generating relevant impact waveform.

Note: A test box is required to simulate the real vehicle peripheral signals or loads except for the EDR delta-V or acceleration signal during bench test.



- > When we developed the C-EDR standard, the following factors were considered:
 - International standards and regulations;
 - Chinese traffic condition;
 - Requirements of Traffic Accident Identification Agency and Ministry of Public Security
 -
- ➤ A large number of vehicle manufacturers and component suppliers all over the world have been taken part in this standard's development.
- > We would like to share the experience of C-EDR standard development to WP.29.

Thank you for your attention!