# C-EDR

# Introduction of Chinese Mandatory National Standard GB “Automobile Event Data Recorder "

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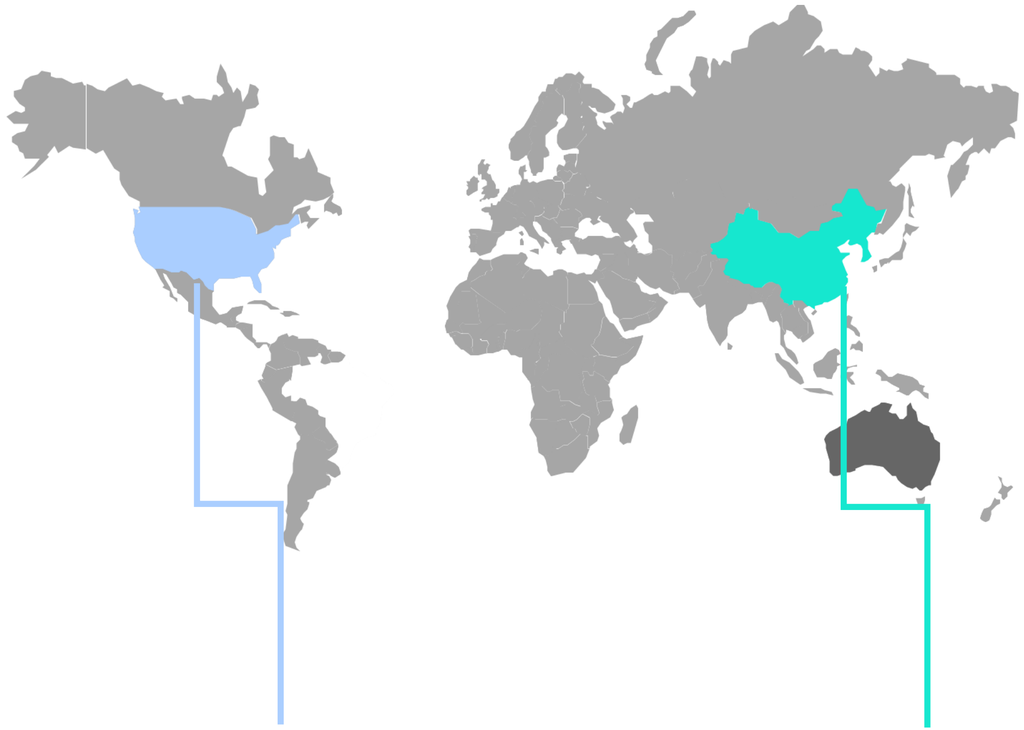
# BACKGROUND

# BACKGROUND

## Current EDR Regulations & Standards Around the World



CFR 563

Chinese Mandatory Standard
(in the process of approval)

## Main Concern

1.There are many traffic accidents and complicated situations in China.

2.With the rapid development of intelligent connected vehicles and new energy vehicles, higher requirements are put forward for vehicle safety protection measures. We want to propose requirements for EDR systems that are in line with China’ s current and future developments.

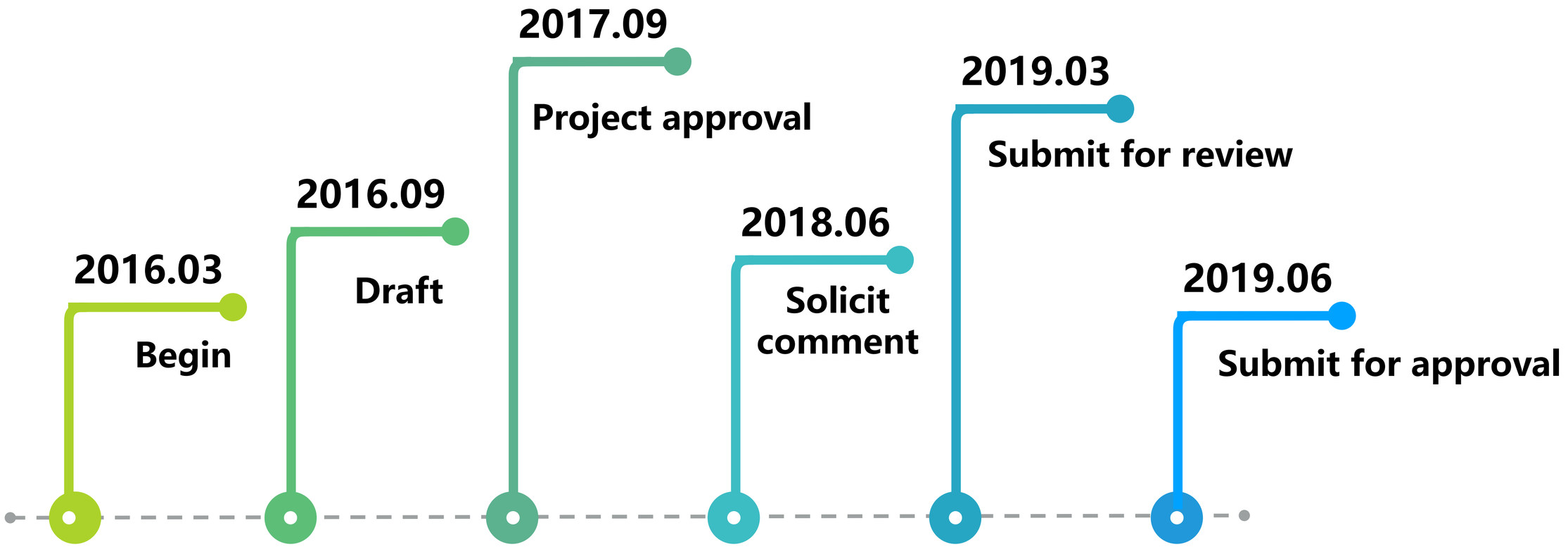
3.Support an implementation independent of the airbag system.

4.EDR system should be suitable for the status quo of domestic enterprises.

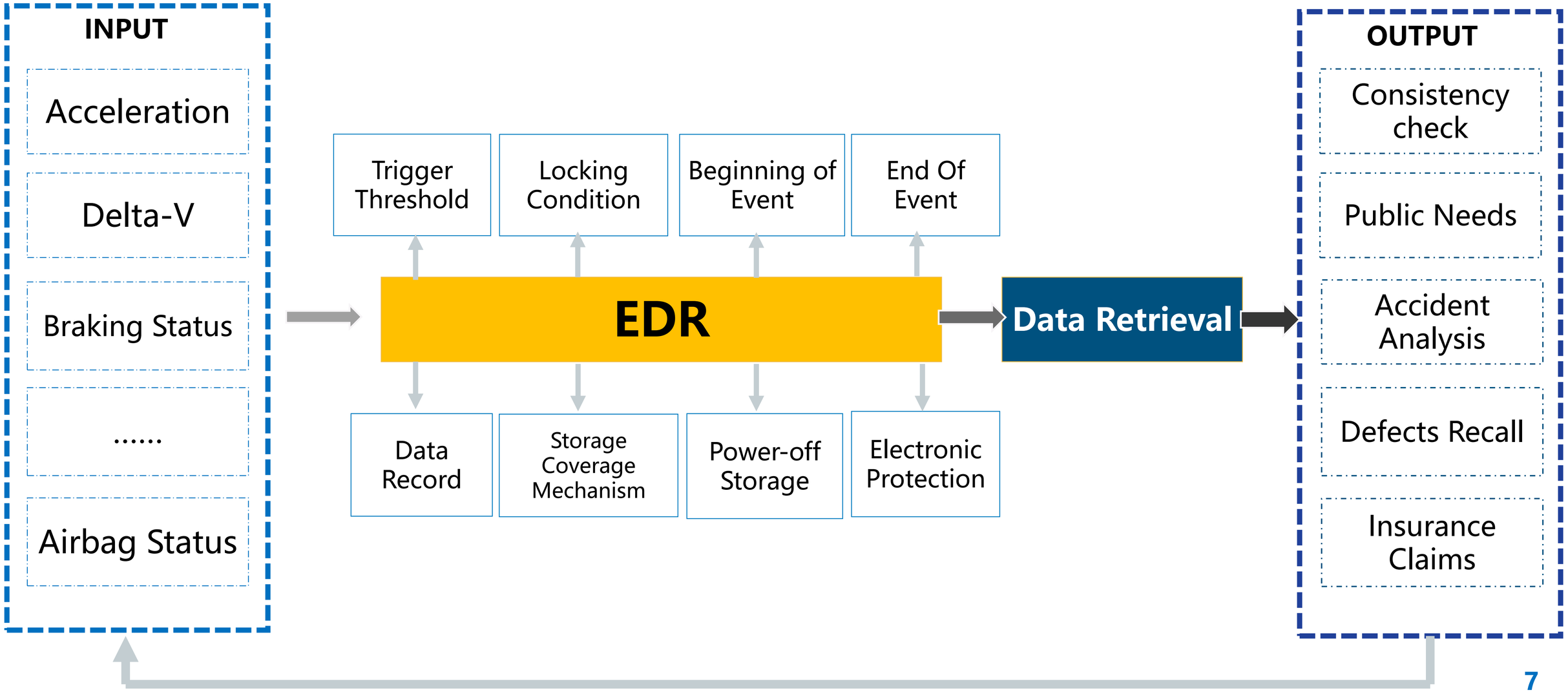
5.Unified data reading scheme is required.

# DEVELOPMENT PROCESS & STANDARD FRAMEWORK

# DEVELOPMENT PROCESS

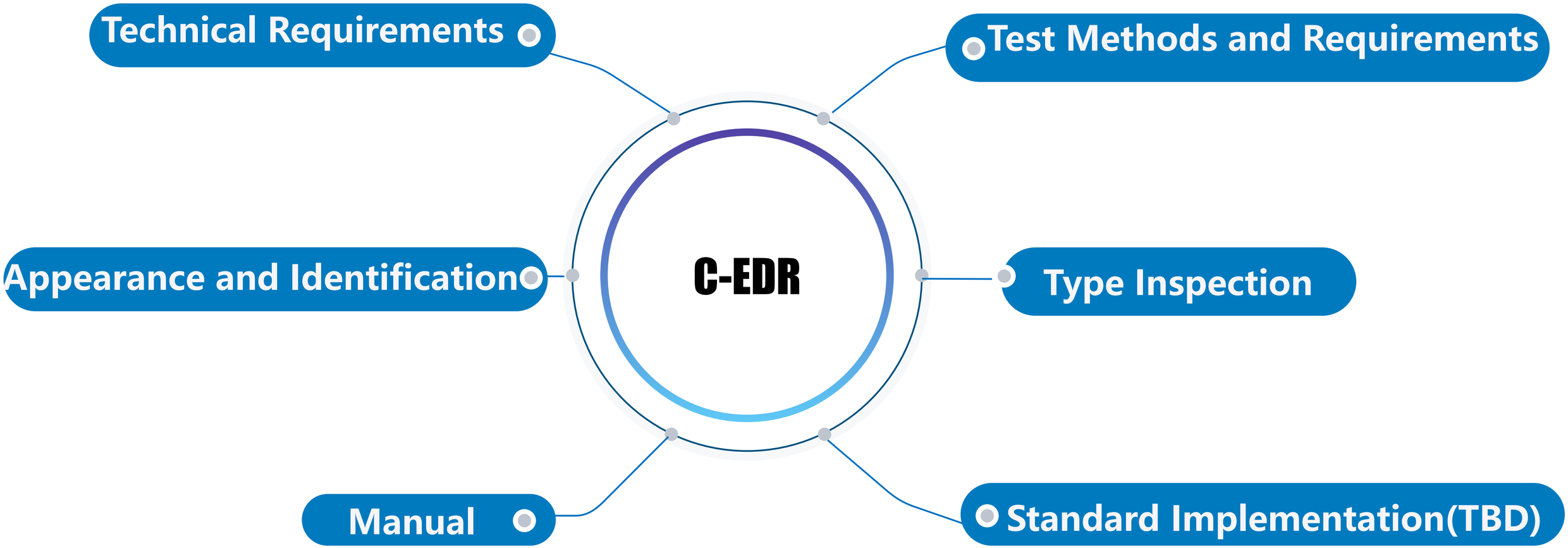


# FRAMEWORK OF EDR STANDARD

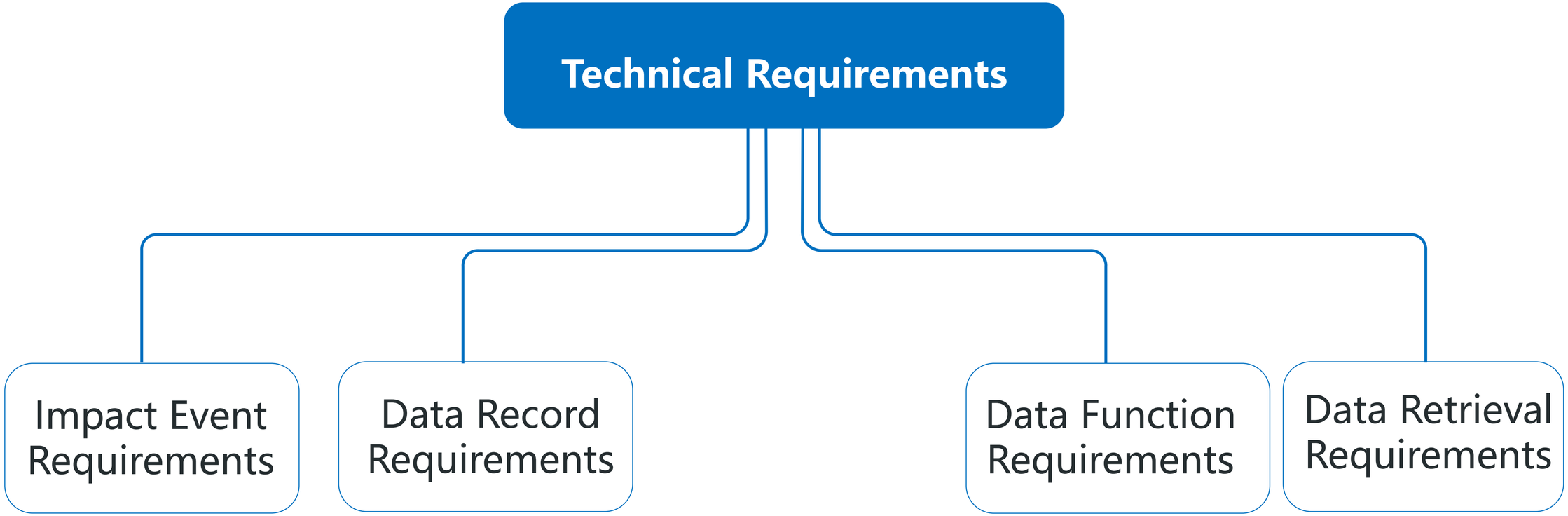


# STANDARD CONTENT

# STRUCTURE OF EDR STANDARD



# TECHNICAL  RERUIREMENTS



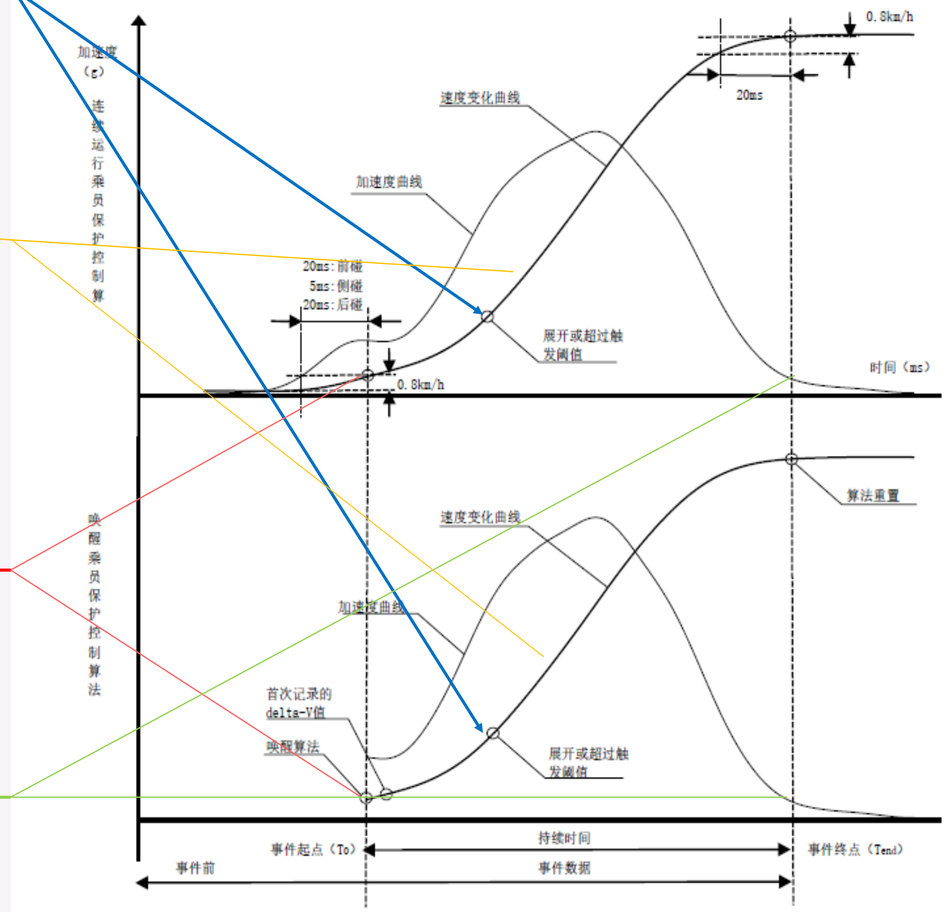
# IMPACT EVENT REQUIREMENTS

**Trigger Threshold**

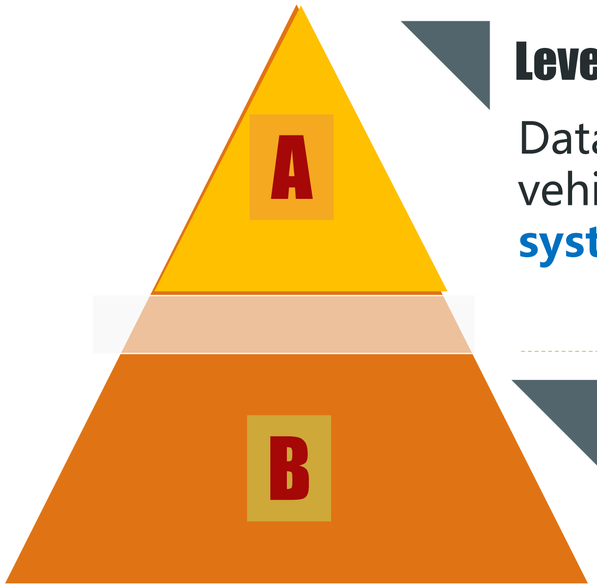
**Locking Condition**

**Beginning of Event**

**End of Impact Event**



# DATA RECORD REQUIREMENTS




## Level A (17)

Data that shall be recorded when vehicles are **equipped with EDR system**.

## Level B (43)

Relevant data that should be recorded when **vehicles with EDR system** are **equipped with relevant devices** or **have relevant functions.**

**A**

**Level A Data Element**

- Lateral delta-V
- Maximum Recorded Lateral delta-V
- Time to Maximum Recorded delta-V
- Clipping Flag
- Vehicle Velocity
- Service brake, on or off
- Acceleration pedal position%
- Revolution per minute
- Driver seatbelt status
- Power-on cycle at event
- Power-on cycle at retrieving
- Complete status of event data record
- Time interval from this event to the last event
- VIN
- ECU hardware number that records EDR data
- ECU software number that records EDR data
- ECU serial number that records EDR data

# DATA RECORD REQUIREMENTS

**B**

Level B Data Element

**Working status and event status**

- Longitudinal acceleration
- Lateral acceleration
- Lateral delta-V
- Maximum Recorded Lateral delta-V
- Square of Maximum Recorded Resultant delta-V
- Time to Maximum Recorded delta-V lateral
- Time to Maximum Recorded delta-V, Resultant
- Tend
- Pre-event synchronization timing time
- Yaw Angle Velocity
- Steering Angle
- Steering Lamp Status
- Gear Position
- Engine Throttle Position
- Brake Pedal Position
- Parking System Status
- Occupant Protection System Warning Status
- Tire Pressure Monitoring System Warning Status
- Braking System Warning Status

**Restraint system**

- Driver's seat belt pretensioner Deployment time
- Driver's front airbag Deployment time (phase I)
- 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
- 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

**Active system**

- Cruise Control system status
- Adaptive Cruise Control system status
- Anti-brake system status
- AEB status
- Electronic stability control system status
- Traction control system status

**Time**

- Year
- Month
- Day
- 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.

## 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 $T_0$ and after $T_0$ to (150±10) ms** should be recorded.

# DATA RETRIEVAL REQUIREMENTS

## 1 Unified data retrieval connector

GB/T 34589-2017 “Road Vehicles diagnostic connector”

## 2 Unified data retrieval protocol

√ Use diagnostic service 0x22 “ReadDatabyIdentifier “ in ISO 14229 “Road Vehicles unified diagnostic service " to retrieve EDR data.

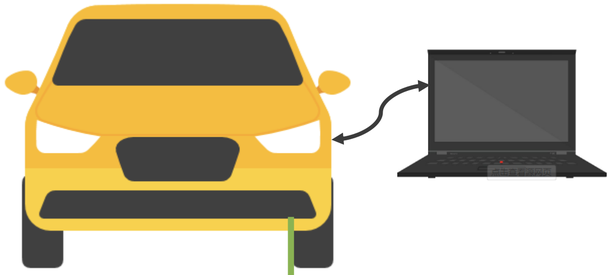
√ compatible with CAN bus and k-line.

√ Compatible with functional addressing and physical addressing

√ Compatible with 11-bit and 29-bit CANID

## 3 Unified data retrieval ID

**0xFA13, 0xFA14 and 0xFA15**
Where,
**0xFA13** for the most recent event,
**0xFA14** for the second event from the bottom,
**0xFA15** for the third event from the bottom.

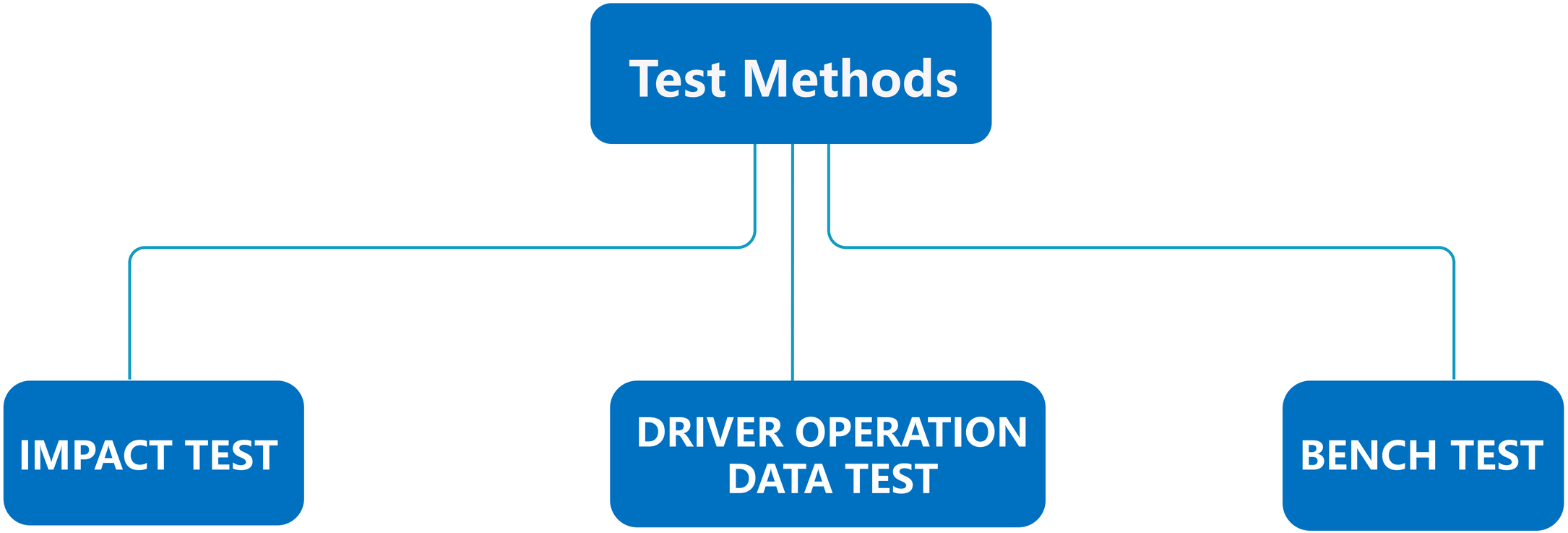


## 4 Unified data arrangement

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 | A | 8 | 1 | 26 | 26 | 0-25 | E=N-150 | $FF_{16}$ | $FE_{16}$ |
| | | | Maximum recorded longitudinal delta-V | km/h | A | 8 | 1 | 1 | 1 | 26 | E=N-150 | $FF_{16}$ | $FE_{16}$ |
| | | | Time to maximum recorded delta-V, longitudinal | ms | A | 7 | 1 | 1 | 1 | 27 | E=N*2.5 | $FF_{16}$ | $FE_{16}$ |
| | | | Clipping flag | ms | A | 16 | 2 | 1 | 2 | 28-29 | E=N 1st byte: longitidinal acceleration clipping flag; 2nd byte: lateral acceleration | $FFFF_{16}$ | $FFFE_{16}$ |
| 0xFA13 | 0xFA14 | 0xFA15 | | | | | | | | | | | |

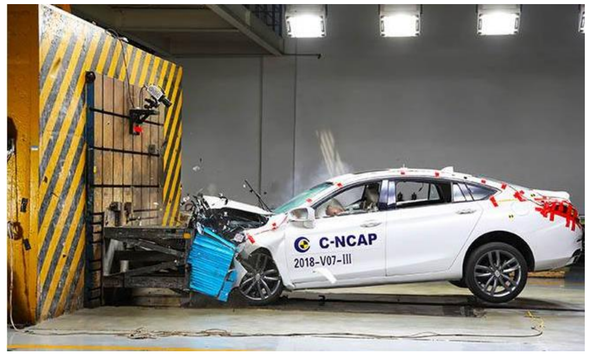
# TEST METHODS

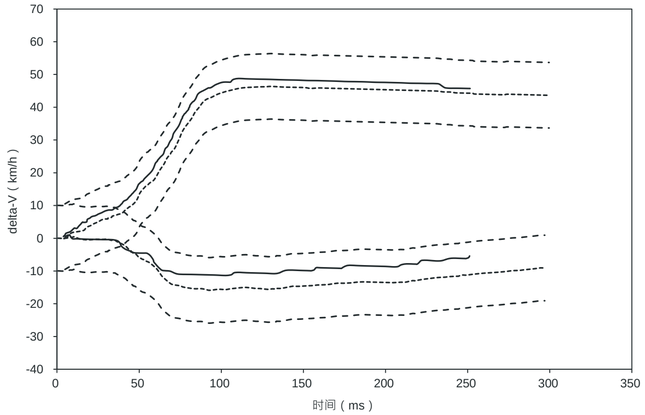


# TEST METHODS

## Impact Test

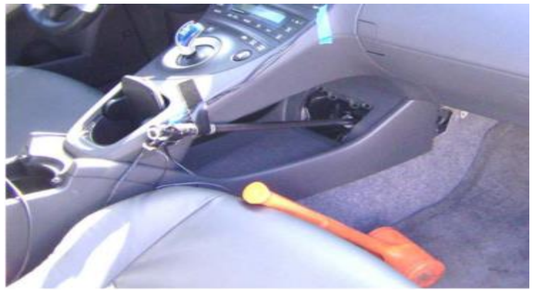
Add acceleration and airbag deployment time measurement to the existing mandatory impact test, and compare the results measured in the laboratory and recorded by to verify the accuracy of dynamic data after collision.




## Driving Operation Data Test

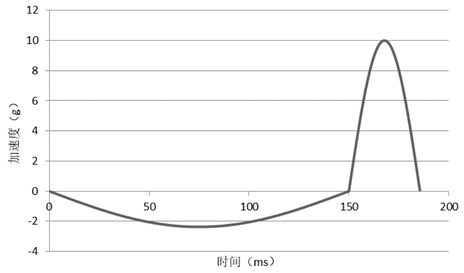
Enable the vehicle to reach the trigger in any way:
-- hit  the vehicle
-- fix the vehicle with the pallet, and hit the pallet
-- physically trigger the EDR
-- input trigger signal to the EDR

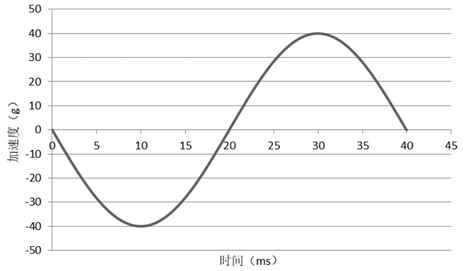


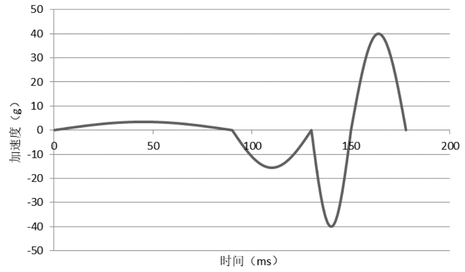
# TEST METHODS

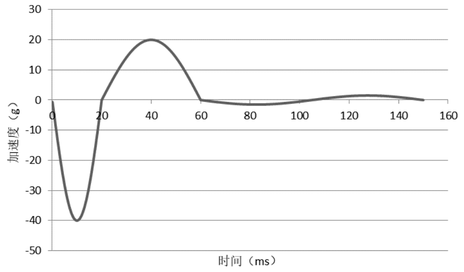
## Bench Test

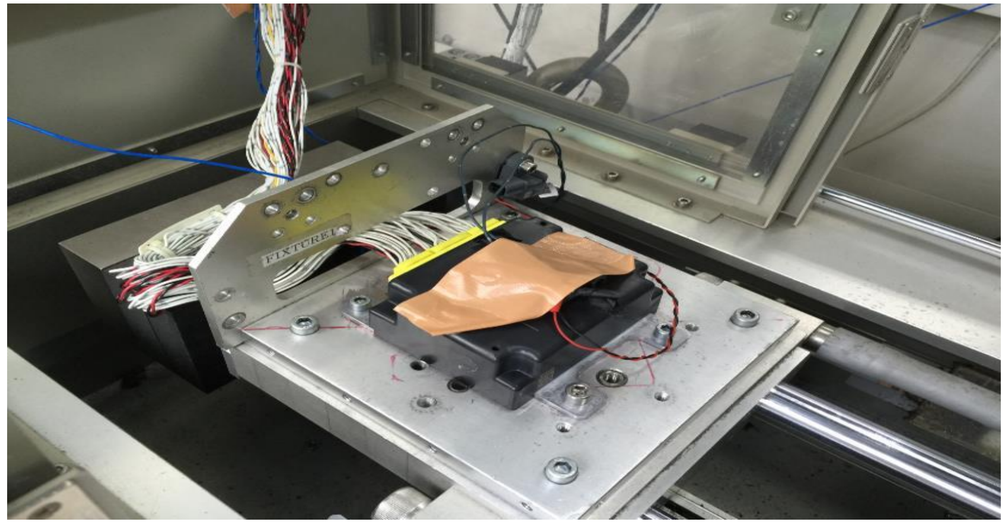
The impulse waveform of acceleration is applied to the EDR controller by the shock testing machine to verify the EDR trigger, storage times, coverage mechanism and power off storage requirements.



# Summary

1.This standard is expected to enter into force gradually in China.

2.China would like to contribute our EDR standard development experience to the WP.29 for future development of EDR regulation if it will be developed under 1958 agreement.

3.And China also suggests to adopt this standard into the Compendium of Candidate GTR, if a GTR for EDR is going to be developed by WP.29.

4.China is looking forward to participating the working group for EDR issues. And Chinese delegates would like to further elaborate the details in the IWG level.

For specific discussion please contact Ms. Wu Hanbing by email: wuhanbing@catarc.ac.cn

# THANK YOU!