Annex B

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China Intelligent Vehicle Index

Test and Evaluation Protocol for Intelligent Driving Index

(Version 2026)

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Foreword

At present, the popularization of combined driver assistance systems is accelerating, and the frequency and scope of consumer use continue to expand. Their functional coverage has gradually expanded from highways to urban expressways and central urban areas. However, with the continuous expansion of driving scenarios, combined driver assistance systems still face many challenges in terms of functional performance, traffic efficiency, and driving human-likeness. This poses significant challenges to driving safety, system reliability and user experience, etc.

To scientifically evaluate the overall performance of combined driver assistance systems and promote improvements in system safety and functional upgrades, China Automotive Engineering Research Institute Co., Ltd. (hereinafter referred to as “CAERI”) has focused on typical high-frequency driving scenarios, edge-case driving, and accident scenarios. By integrating elements and characteristics from various road environments, including expressways, ring roads, and urban streets, CAERI has officially launched the comprehensively upgraded IVISTA China Intelligent Vehicle Index (Version 2026) - Test and Evaluation Protocol for Intelligent Driving Index. This protocol focuses on the advanced combined driver assistance system, covering two core modules: "continuous scenario passability" and "real traffic adaptability". It has built a full range of evaluation capabilities from closed proving grounds to public roads, as well as continuous multi-scenario sequences and real traffic flows.

Among them, the continuous scenario passability test sets up multiple test scenarios in a closed proving ground continuously, focusing on evaluating the system's smoothness, stability and trafficability in high-density and sequential scenarios. It is of great significance to identify the system's risk response capabilities and improve reliability and traffic efficiency under complex scenarios and continuous interactions. The real traffic adaptability test relies on inter-provincial highways, urban expressways and central urban areas to form a comprehensive test route to comprehensively test the system's scenario adaptability, driving human-likeness level, comfort and compliance with traffic regulations in real and changing traffic flows, providing a verification basis for the system's performance in actual use.

The purpose of this protocol is to provide consumers with an objective and reliable basis for car purchases and clear guidance for technological breakthroughs in the industry, thereby driving upgrades across the industrial chain and continuously empowering the high-quality development of the intelligent vehicle industry.

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Test and Evaluation Protocol for Intelligent Driving Index

1 Scope

This document specifies the test and evaluation methods of IVISTA China Intelligent Vehicle Index (Version 2026) - Intelligent Driving Index.

This document is applicable to M1 and N1 vehicles equipped with the advanced combined driver assistance system. It may be used as a reference for vehicles of other categories.

2 Normative References

The following normative documents contain provisions which, through reference in this text, constitute indispensable provisions of this document. Among them, for dated references, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB 1589-2016 Limits of Dimensions, Axle Load and Masses for Motor Vehicles, Trailers and Combination Vehicles

GB 5768.2-2022 Road Traffic Signs and Markings - Part 2: Road Traffic Signs

GB 5768.3-2025 Traffic Signs and Markings - Part 3: Traffic Markings

GB 5768.4-2017 Road Traffic Signs and Markings - Part 4: Work Zone

GB 5768.5-2017 Road Traffic Signs and Markings - Part 5: Speed Limit

GB 14886-2016 Specifications for Road Traffic Signal Setting and Installation

GB 14887-2011 Road Traffic Signal Lamps

GB/T 15089-2001 Classification of Power-driven Vehicles and Trailers

GB/T 20608-2006 Intelligent Transportation Systems - Adaptive Cruise Control Systems - Performance Requirements and Test Procedures

GB/T 24720-2009 Traffic Cones

GB/T 28650-2012 Road Safety Barrel

GB/T 34590-2022 Road Vehicles - Functional Safety (All Parts)

GB/T 39263-2020 Road Vehicles - Advanced Driver Assistance Systems - Terms and Definitions

GB/T 40429-2021 Taxonomy of Driving Automation for Vehicles

GB/T 43267-2023 Road Vehicles - Safety of the Intended Functionality

JTG H30-2015 Safety Work Rules for Highway Maintenance (Industry Standard of the People's Republic of China)

GB/T 41798-2022 Intelligent and Connected Vehicles - Track Testing Methods and Requirements for Automated Driving Functions

JGJ/T 188-2009 Technical Code of Temporary Building of Construction Site

ISO 21448 Road vehicles - Safety of the intended functionality

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ISO 34502 Road vehicles - Engineering framework and process of scenario-based safety evaluation

ECE R171 Uniform provisions concerning the approval of vehicles with regard to Driver Control Assistance Systems (DCAS)

ECE R157 Uniform provisions concerning the approval of vehicles with regards to Automated Lane Keeping System（ALKS）

3 Terms and Definitions

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

3.1

inertial frame

the inertial frame specified in ISO 8855:2011, in which the X axis points towards the front of the vehicle, the Y axis towards the left side of the driver and the Z axis upwards (right-hand coordinate system)

Viewed from the origin to the positive directions of X, Y and Z axes, the roll, pitch and yaw rotate clockwise around the X, Y and Z axes respectively. This frame is used for both left-hand and right-hand drive vehicles.

3.2

combined driver assistance system

a system composed of hardware and software, that can perform the lateral and longitudinal vehicle motion control subtasks of the DDT under its ODC in a sustained manner, and is capable of performing part of the OEDR subtask suitable for the performed lateral and longitudinal vehicle motion control subtasks

3.3

advanced combined driver assistance system

a combined driver assistance system that continuously controls the lateral and longitudinal motion of the vehicle according to its surrounding driving environment in highways, urban expressways and urban roads (or any combination thereof), and assists the driver in performing some dynamic driving tasks

3.4

lane-cruise manoeuvre function

a function of continuously performing lateral and longitudinal motion control for the vehicle based on its surroundings, supporting the driver in maintaining the vehicle's cruising within the visible lane boundaries

3.5

subject vehicle; SV

vehicle under test equipped with an advanced combined driver assistance system

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3.6

time to collision; TTC

the remaining time before a collision between two vehicles traveling on the same path, assuming that the relative velocity remains unchanged, calculated as per the following formula, provided that the relative velocity is not zero

The value may be estimated through dividing the clearance between the SV and TV by the relative velocity, as indicated in Formula (1). If the calculation condition is not met or the calculated TTC is negative, the collision is impossible under the above-mentioned assumed conditions.

$$\mathrm{TTC}=\frac{X_0(t)}{V_r(t)} \tag{1}$$

Where, TTC – time to collision, in s

$V_r(t)$ – relative velocity, in m/s

$X_0(t)$ – clearance, in m

3.7

operational design domain; ODD

external environmental conditions suitable for the functional operation of the driving automation system as determined during system design

Note: Typical external environmental conditions include roads, traffic, weather and lighting.

[SOURCE: GB/T 40429-2021, 2.11]

3.8

operational design condition; ODC

a generic term for various conditions suitable for the functional operation of the driving automation system as determined during system design, including ODD, vehicle status, driver status and other necessary conditions

[SOURCE: GB/T 40429-2021, 2.12]

3.9

continuous scenario passability test and evaluation

test and evaluation method for comprehensively evaluating the smoothness and trafficability of the advanced combined driver assistance system in multi-target, high-density and sequential scenarios by continuously arranging multiple typical and edge risk scenarios along a preset route in a closed proving ground

3.10

real traffic adaptability test and evaluation

a test method for evaluating the functional performance of the advanced combined driver assistance system in real, complex and changeable traffic flows by setting up a comprehensive

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route covering inter-provincial long-distance highways, urban ring expressways and central urban roads in a public road environment, focusing on scenario adaptability, driving human-likeness level, driving comfort and compliance with traffic regulations

3.11

vulnerable road user; VRU

vulnerable road users such as pedestrians, cyclists and electric bicycle riders

3.12

time headway; THW

distance between two vehicles traveling on the same path, expressed by time, calculated by dividing the clearance between two vehicles by the speed of the rear vehicle

4 Test Requirements

4.1 Requirements for test site and environment

4.1.1 Requirements for test site

For proving ground tests, the proving ground shall meet the following conditions:

a) The test road surface shall be dry without visible moisture, and its peak adhesion coefficient shall not be less than 0.7;

b) The test road shall be free of obvious pits, cracks and other defects;

c) A single test lane shall be 3.50 m~3.75 m wide, and lane boundary lines shall be white or yellow solid or dotted lines.

4.1.2 Requirements for test environment

4.1.2.1 Requirements for proving ground test environment

The proving ground environment shall meet the following requirements:

a) There is no severe weather environment such as rainfall, snowfall or dust, and the road surface is free of icing, accumulated water or snow;

b) Unless required by the test scenario, the test shall be conducted under uniform natural lighting conditions. The illuminance shall not be lower than 2000 lx, unless other lower illuminance limit is specified by the SV manufacturer;

c) The ambient temperature is between 0°C and 45°C;

d) The average wind speed shall not be more than 5 m/s, and maximum instantaneous wind speed not more than 10 m/s;

e) The traffic signs shall meet the requirements of GB 5768.2-2022 and GB 5768.5-2025.

4.1.2.2 Requirements for public road test environment

The public road test environment shall meet the following requirements:

a) The test shall be done in good weather;

b) It shall not be carried out in severe weather such as rainstorm, snow and dust.

4.2 Requirements for test equipment

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4.2.1 Target object

4.2.1.1 Target vehicle (TV)

The TV shall meet the following requirements:

a) The passenger vehicle TV shall be a mass-produced M1 passenger vehicle, or a soft target that has surface characteristic parameters representative of M1 passenger vehicles and that adapts to the sensor detection characteristics. See ISO19206-3 for specific requirements and Fig. 1 for the appearance diagram.



Fig. 1 Appearance of Soft Passenger Target Vehicle

b) The anti-collision buffer vehicle TV shall be a mass-produced anti-collision buffer vehicle, or a soft target that has surface characteristic parameters representative of the anti-collision buffer vehicle and that adapts to the sensor detection characteristics. Its external dimensions and technical parameters meet the requirements of GB1589-2016. Its appearance diagram is shown in Fig. 2, and its main dimensional requirements are shown in Table 1.



Fig. 2 Appearance of Anti-collision Buffer Target Vehicle

Table 1 Main Dimensions of Anti-collision Buffer Target Vehicle

Dimensions	Value (mm)
Total vehicle length	7000±50
Total vehicle width	2050±50
Total vehicle height	2850±50
Wheelbase	3850±50
Length of anti-collision cushion	1000±20
Width of anti-collision cushion	2050±50
Height of anti-collision cushion	1000±20

c) The light truck target vehicle shall be a mass-produced N2 cargo vehicle, or a soft target that has surface characteristic parameters representative of the N2 cargo vehicles and that adapts to the sensor detection characteristics. Its appearance diagram is shown in Fig. 3, and its main dimensional requirements are shown in Table 2.



Fig. 3 Appearance of Soft Light Truck Target

Table 2 Main Dimensions of Soft Light Truck Target

Dimensions	Value (mm)
Total vehicle length	6000±50
Total vehicle height	3140±50
Total vehicle width	2210±50
Compartment width	2060±50
Compartment length	4210±50
Compartment height	2200±50
Head height	2680±50
Head length	1690±30
Head width	1860±30
Wheelbase	3360±50
Tail board height	1600±20
Tail above the ground	400±20

d) The express tricycle target vehicle shall be a mass-produced express tricycle, or a soft target that has surface characteristic parameters representative of the express tricycle and that adapts to the sensor detection characteristics. Its appearance diagram is shown in Fig. 4, and its main dimensional requirements are shown in Table 3.



Fig. 4 Appearance of Soft Express Tricycle Target

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Table 3 Main Dimensions of Soft Express Tricycle Target

Dimensions	Value (mm)
Total length	2900±30
Total height (including base plate and vehicle front)	1750±50
Total vehicle height (by compartment)	1500±25
Total width	1000±25
Wheelbase	1950±25
Compartment height	1150±20

e) The highway anti-collision buffer vehicle target, light truck target and express tricycle target shall follow the relevant national standards once such standards are released.

4.2.1.2 Vulnerable road user

Vulnerable road user targets shall meet the following requirements:

a) The adult pedestrian target shall be a swingable soft target that has surface characteristic parameters representative of the adult pedestrian and that adapts to the sensor detection characteristics. See ISO 19206-2 for specific requirements and Fig. 5 for its appearance.



Fig. 5 Appearance of Adult Pedestrian Target

b) The pedestrian target with stroller shall be a soft target with swingable legs that has surface characteristic parameters representative of the pedestrian with stroller and that adapts to the sensor detection characteristics. Its appearance diagram is shown in Fig. 6, and its main dimension requirements are shown in Table 4.



Fig. 6 Appearance of Pedestrian Target with Stroller

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Table 4 Main Dimensions of Pedestrian Target with Stroller

Dimensions		Value (mm)
Adult size	Body height	1588±20
	Shoulder height	1286±20
	Shoulder width	355±20
Infant size	Body height	825±20
	Head height	165±10
	Shoulder width	184±20
Baby stroller size	Total height	1040±20
	Total width	590±20
	Total length	780±20
	Height of seat pan	535±20

c) The scooter target shall be a soft target that has surface characteristic parameters representative of the scooter and that adapts to the sensor detection characteristics. See ISO 19206-5 for specific requirements and Fig. 7 for its appearance diagram.



Fig. 7 Appearance of Scooter Target

d) For pedestrian targets with stroller, after relevant national standards are published, the requirements of those national standards will prevail.

4.2.1.3 Other soft targets

a) The technical parameters of traffic cone target shall meet the requirements of GB/T 24720-2009 and GB 5768.4-2017. For highway/urban expressway scenarios, the recommended size is 90 cm×45 cm; for urban road scenarios, the recommended size is 50 cm×35 cm. See Fig. 8 for the appearance of traffic cone target.

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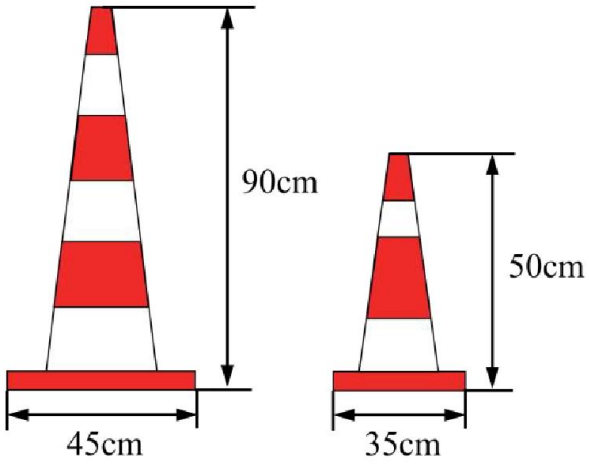


Fig. 8 Appearance of Traffic Cone Target

b) The recommended size of a single water-filled barrier is 145 cm×76 cm, and its appearance is as shown in Fig. 9.

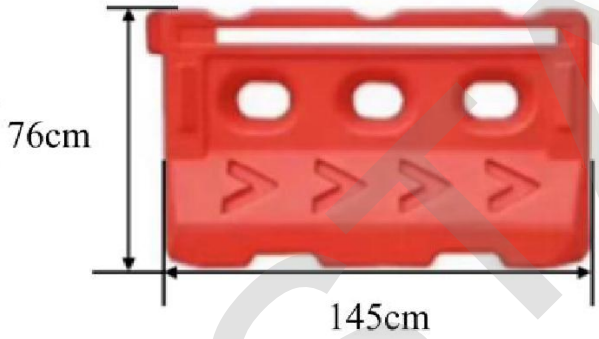


Fig. 9 Appearance of Water-filled Barrier

c) The corrugated carton is empty inside, and the packed target object shall be sealed with transparent adhesive tape. The main dimension requirements are shown in Table 5.

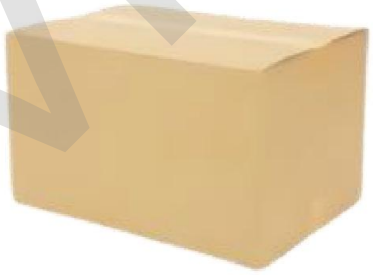


Fig. 10 Appearance of Corrugated Carton Target

Table 5 Main Dimensions of Corrugated Carton Target

Dimensions	Value (mm)
Total length	600
Total width	400
Total height	500

4.2.2 Test equipment

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4.2.2.1 Requirements for test data acquisition equipment in closed proving ground

a) The sampling and storage frequency for dynamic data shall not be less than 100 Hz, and GPS time shall be used for data synchronization between the SV and the targets ;

b) Except in tunnels, the accuracy requirements are as follows:

- Longitudinal speed accuracy not greater than 0.1 km/h;
- Lateral speed accuracy not greater than 0.05 m/s;
- Longitudinal acceleration accuracy not greater than 0.02 m/s^2;
- Lateral acceleration accuracy not greater than 0.02 m/s^2;
- Longitudinal position accuracy not greater than 0.02 m;
- Lateral position accuracy not greater than 0.02 m;

c) The installation and operation of the test equipment shall not affect the normal operation of the SV and the advanced combined driver assistance system.

4.2.2.2 Requirements for public road test data acquisition equipment

a) The sampling and storage frequency of dynamic data shall not be less than 50 Hz;

b) The resolution of video acquisition equipment shall not be less than (1920×1080) pixels, and the video sampling frame rate shall not be less than 30 fps;

c) Except in tunnels, the accuracy requirements are as follows:

- The speed acquisition accuracy shall not exceed 0.1 km/h;
- The acceleration acquisition accuracy shall not be greater than 0.1 m/s^2;
- The lateral and longitudinal distance acquisition accuracy shall not be greater than 0.1 m;

d) The installation and operation of the test equipment shall not affect the normal operation of the SV and the advanced combined driver assistance system.

4.3 Requirements for SV

4.3.1 System initialization

The requirements for system initialization are as follows:

a) If necessary, the advanced combined driver assistance system may be initialized prior to the test, including the calibration of sensors such as radars and cameras;

b) Before the test, the SV manufacturer may include the test road information of the proving ground in its product map or is allowed to change the activation conditions of the advanced combined driver assistance system, but in either case, it is necessary to prove that all these methods will not change the safety of the advanced combined driver assistance system of the SV.

4.3.2 Vehicle status confirmation

Before the test, the state of SV shall meet the following requirements:

a) The SV shall be new with a traveled mileage of not more than 5000 km;

b) The SV shall meet the following HMI requirements:

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- The operation mode of the SV shall be convenient for manual activation and deactivation of the advanced combined driver assistance system;

- The system state prompt information shall be clearly visible.

c) The SV shall be equipped with original new tires designated by the vehicle manufacturer. The tire pressure shall be the standard cold tire pressure recommended by the vehicle manufacturer. If more than one value is recommended for tire pressure, the tire shall be inflated to the pressure with the lightest load;

d) The SV shall be refueled to not less than 90% of the fuel tank capacity, with other fluids such as oil and water (e.g. coolant, brake fluid and engine oil) added at least to the minimum indicated position. During the proving ground test, the fuel shall not be lower than 50% of the fuel tank capacity;

e) The active hood system of the SV, if equipped, shall be disabled before the test equipment is installed in the proving ground test;

f) The mass of the SV shall be between the curb weight of the vehicle plus the total mass of the driver and the test equipment (with the total mass of the driver and the test equipment not exceeding 200 ± 20 kg) and the maximum allowable total mass. No change shall be made to the state of the SV after the test starts.

g) For off-vehicle-chargeable new energy vehicles, the traction battery shall be fully charged according to 5.1 of GB/T 18385-2005. For non-off-vehicle-chargeable new energy vehicles, the test shall be prepared in their normal operation states. During the proving ground test, the SOC of the vehicle shall not be less than 50%.

4.3.3 Functional inspection

Before the test, it shall be checked whether the advanced combined driver assistance system functions, buttons, instruments and on-board central control screen of the SV work properly.

4.3.4 Function settings

The requirements for function settings are as follows:

a) During the test, if the time headway of the advanced combined driver assistance system of the SV is adjustable, it shall be set to the lowest level; if not, it shall be set in the default mode;

b) If the SV is provided with multiple driving modes, unless otherwise specified, it shall be set to the standard mode throughout the test;

c) If the SV has a lane change aggressiveness setting that is adjustable, unless otherwise specified, the lane change aggressiveness shall be set to the standard mode throughout the test. If the SV does not have a lane change aggressiveness setting or the setting cannot be adjusted, the lane change aggressiveness shall be set to the default mode of the SV throughout the test;

d) If the advanced combined driver assistance system of the SV supports the selection of speed offset or speed control mode, the speed offset shall be set to 0 km/h or 0 % throughout the test, or the speed control mode shall be set to comply with traffic regulations;

e) If the AEB, FCW, LDW and LDP functions of the SV are settable, they shall be set to the lowest level during the proving ground test;

f) If the AEB, FCW, LDW and LDP functions of the SV are settable, they shall be set

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to the lowest level during the public road test;

g) For night test, the requirements for light setting of SV are as follows:

- If the system may only be activated under the relevant AUTO lighting settings, the headlamp of the SV shall be adjusted to the AUTO setting;
- If the system may only be activated under low beam, the SV shall be set to low beam;
- If the system can only be activated under high beam, the SV shall be set to high beam;
- If the system can be activated under low beam, high beam, and/or related light AUTO settings, the SV shall be set to low beam.

4.4 Requirements for data processing and recording

4.4.1 Data record contents

4.4.1.1 Proving ground test

The record of the proving ground test process shall contain the following:

a) version information of the IVI system of the advanced combined driver assistance system of the SV;

b) control mode of the SV;

c) position information of the SV's geometric center or center of mass;

d) longitudinal and lateral speeds of SV;

e) longitudinal and lateral accelerations of SV;

f) in-vehicle conditions reflecting the driver and HMI status;

g) video reflecting the SV's running state;

h) position and motion data of the target.

4.4.1.2 Public road test

The record of the public road test process shall contain the following:

a) control mode of the SV;

b) video information on traffic conditions outside the SV;

c) information on lateral and longitudinal offset between the SV and the surrounding vehicles;

d) video and audio information of driver interaction state inside the SV (at least including the test operator's face, instrument panel, steering wheel, central control screen and pedal);

e) motion state information of the SV (at least including time, vehicle position, longitudinal and lateral speeds, and longitudinal and lateral acceleration).

4.4.2 Data processing requirements

The test data processing shall meet the following requirements:

a) The SV speed shall be GPS speed, and the original data shall be used, in km/h.

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b) The longitudinal acceleration and lateral acceleration data of the SV need to be filtered using a 12-order Butterworth filter with a cutoff frequency of 1.6 Hz.

4.4.3 Shooting requirements for test

The test shooting shall meet the requirements below:

a) Before the test equipment is installed, photos shall be taken of the SV at front left 45° and the vehicle nameplate;

b) After the test equipment is installed, photos shall be taken of the test equipment inside and outside the SV.

5 Test Method

5.1 Overview

5.1.1 The tests of the intelligent driving index include continuous scenario passability test and real traffic adaptability test.

5.2 Continuous scenario passability test

5.2.1 The continuous scenario passability test is carried out in a closed proving ground, including two test routes: highway/urban expressway continuous test scenario and urban continuous test scenario;

5.2.2 Provided that the test is valid, the continuous scenario passability test shall be carried out once for each test route;

5.2.3 In the continuous scenario passability test, the settings shall not be changed and the driver shall neither operate the accelerator and brake pedals nor perform manual assisted steering, unless otherwise specified. The driver shall place both hands on the steering wheel or apply certain torque in due course, so as to avoid the disabling of the advanced combined driver assistance system during the test;

5.2.4 See Annex A for the detailed rules of continuous scenario passability test.

Table 6 Overall Framework of Continuous Scenario Passability

S/N	Test and Evaluation Dimensions	Included scenarios	Number of Tests
1	Highway/urban expressway continuous test scenarios	Encountering accident vehicles in tunnel	1
		Detour in construction area	
		Encountering a broken-down vehicle on a curve (with pedestrians at the rear of the vehicle)	
		Passenger vehicle TV cut-in	
2	Urban continuous test scenarios	Passing through construction area in tunnel	1
		Turning left at the intersection and encountering multiple targets crossing	
		Encountering a fallen scooter on a straight road	
		Encountering broken-down vehicle on overpass	

5.3 Real traffic adaptability test

5.3.1 The real traffic adaptability test is carried out on the specified test route on public roads. When the SV activates the advanced combined driver assistance system function and

tests the specified test scenarios and conditions during driving, and no traffic accident occurs, it is considered that 1 corresponding test condition has been completed;

5.3.2 Provided that the test is valid, two tests are carried out on one test route of the real traffic adaptability test;

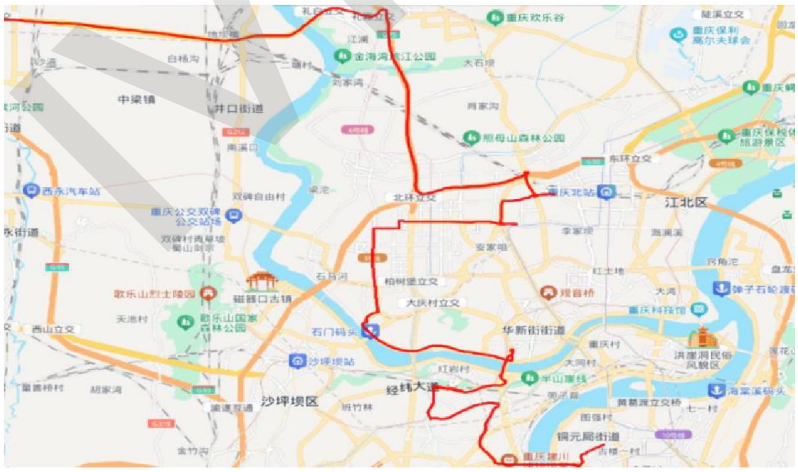
5.3.3 See Annex B for detailed rules of the real traffic adaptability test.

5.3.4 The real traffic adaptability test route is a test route including highways, urban expressways and urban roads. The route starts from Nanping West Road, Nan'an District, Chongqing City, and ends at Zhongdi Center, Jiuzhaigou Road, Chengdu City, Sichuan Province. The total distance is 516 km, as shown in Fig. 11.

5.3.5 Four rest and energy replenishment points have been established along the real traffic adaptability test route: CAERI (No. 9 Jinyu Avenue, Liangjiang New Area, Chongqing); Rongchangtao Service Area (Chongqing); Neijiang Toll Station (Neijiang); and Tianfu Service Area (Chengdu). Rest for at least 20 minutes at each rest and energy replenishment point.



(a) Overview of test route



(b) Test route - overview of Chongqing urban area



(c) Test route - overview of Chengdu urban area

Fig. 11 Test Routes

Table 7 Specific Route of Real Traffic Adaptability Test

Starting point	Waypoint	Rest and energy replenishment point/ending point
Nanping West Road, Nan'an District, Chongqing	1) Haixia Road, Nan'an District; 2) Egongyan Bridge; 3) Xiejiawan Main Street, Jiulongpo District; 4) Changjiang Second Road, Yuzhong District; 5) Daping Main Street, Yuzhong District; 6) Yuzhou Road (Xietaizi Primary School), Yuzhong District; 7) Huxie Road, Yuzhong District; 8) Hutouyan Tunnel, Yuzhong District; 9) Jiahua Bridge; 10) Beibin First Road, Jiangbei District; 11) Binshi Road, Jiangbei District; 12) Panxi Road, Jiangbei District; 13) Fuquan Road, Jiangbei District; 14) Fukang Road, Jiangbei District; 15) Xinnan Road, Jiangbei District; 16) Hongqihegou Flyover, Jiangbei District; 17) Xingai Avenue, Jiangbei District; 18) Xingai Avenue, Jiangbei District (U-turn); 19) West Section of Taishan Avenue, Jiangbei District; 20) Middle Section of Taishan Avenue, Jiangbei District; 21) Middle Section of Taishan Avenue, Jiangbei District (U-turn); 22) Min'an Avenue Flyover, Jiangbei District; 23) Inner Ring Urban Expressway; 24) North Ring Flyover; 25) Lanzhou-Haikou Expressway; 26) Lijia Flyover.	CAERI, Jinyu Avenue, Chongqing
CAERI, Jinyu Avenue, Chongqing	1) Libai Flyover; 2) Lijia Jialing River Bridge; 3) Dingxin Avenue; 4) Huilongba Flyover; 5) Wangjiaping Flyover; 6) Science City Toll Station; 7) Wangu Interchange; 8) G8515 Guang'an-Luzhou Expressway; 9) S0101 Third Ring highway; 10) Shuangfeng Interchange; 11) S7 Yongchuan-Luzhou Expressway; 12) Zhonghe Hub; 13) G8515 Guang'an-Luzhou Expressway; 14) Kaiyuan Interchange.	Chongqing Rongchangtao Service Area
Chongqing Rongchangtao Service Area	1) G85 Yinchuan-Kunming Expressway; 2) G76 Xiamen-Chengdu Expressway.	Neijiang Toll Station, Neijiang City
Neijiang Toll Station, Neijiang City	1) G76 Xiamen-Chengdu Expressway; 2) Yingjie Hub; 3) S40 Guang'an-Hongya Expressway; 4) Fujiabei Hub; 5) S4 Chengdu-Yibin-Zhaotong Expressway; 6) S3 Tianfu International Airport Expressway.	Chengdu Tianfu Service Area
Chengdu Tianfu Service Area	1) S3 Tianfu International Airport Expressway; 2) Bailuwan Hub Interchange; 3) G4202 Chengdu Ring Expressway; 4) G5013 Chengdu Toll Station; 5) Chengluo Avenue; 6) Shiling Flyover; 7) East Third Ring	Zhongdi Center, Jiuzhaigou

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Starting point	Waypoint	Rest and energy replenishment point/ending point
	Road Section IV; 8) East Third Ring Road Section V; 9) Minjiang Road; 10) Daliangshan Road; 11) Dongda Road; 12) Haijiaoshi Street; 13) Shuinianhe Road; 14) Second Ring Elevated Road; 15) Yongfeng Flyover; 16) Chuangye Road (U-turn); 17) Yongfeng Road; 18) South Section II of the First Ring Road; 19) Xinnan Road; 20) Hongxing Road Section IV; 21) Niuwangmiao Section of East Street; 22) East Section IV of the First Ring Road; 23) Yushuang Road; 24) Shuanghua Road; 25) Shuanglin Road; 26) Shuangqing Road; 27) Shuangcheng Second Road; 28) Shuangfu Second Road; 29) Yufeng First Road (U-turn); 30) Yufeng Second Road; 31) Yinghui Road (U-turn); 32) Jinxiu Avenue Section of Middle Ring Road; 33) Emeishan Road; 34) Jianjiang Road.	Road, Chengdu

6 Assessment Method

6.1 Overview

The full score for evaluation of the intelligent driving index is 100 points, including continuous scenario passability and real traffic adaptability. Among them, the full score for continuous scenario passability is 50 points and the full score for real traffic adaptability is 50 points. The final score of the intelligent driving index is calculated as follows:

Intelligent driving index score = continuous scenario passability score + real traffic adaptability score

Table 8 Intelligent Driving Index Test Score

Test and Evaluation Dimensions		Full score
Continuous scenario passability score	Specific test scenario score	36
	Trafficability score	14
Real traffic adaptability score	Traffic adaptability scenario score	36
	Intelligent anthropomorphism score	8
	Driving comfort score	6

6.2 Evaluation method for continuous scenario passability

6.2.1 The full score for continuous scenario passability is 50 points, including the specific test scenario score (full score: 36 points) and the trafficability score (full score: 14 points). The calculation method of the continuous scenario passability score is as follows:

Continuous scenario passability score = specific test scenario score + trafficability score - penalty;

6.2.2 The continuous scenario passability test includes two test routes in a closed proving ground. The specific test scenario score S_{ts} is calculated as follows:

$$S_{ts} = \sum_{i=1}^{8} \left(4.5 \times R_{st_i}\right) \quad (2)$$

Where, R_{st_i} is the scoring rate of the ith scenario.

6.2.3 The scoring method for specific test scenarios is shown in Table 9-10;

Table 9 Scoring of Specific Test Scenarios 1

Test Route	Specific Test Scenario	Full score	Scoring Rules
Route 1: highway/urban expressway continuous test scenarios	Encountering traffic accidents in tunnel	4.5	(1) **Scoring rate 100 %:** The SV autonomously passes through the test scenario; (2) **Scoring rate 90 %:** The SV brakes to stop, the driver turns on the turn signal lamp, and the vehicle autonomously passes through the test scenario; (3) **Scoring rate 70 %:** ① After the SV avoids collision by AEB braking, the driver controls the vehicle to pass through the test scenario; ② The SV brakes and stops. If the driver fails to continue driving within 15 s after turning on the turn signal, the driver controls the vehicle to pass through the test scenario; (4) **Scoring rate 15 %:** The SV is involved in a collision, and a warning is issued before the collision occurs; (5) **Scoring rate 0 %:** The SV is involved in a collision, and no warning was issued before the collision.
	Detour in construction area	4.5	
	Encountering a broken-down vehicle on a curve (with pedestrians at the rear of the vehicle)	4.5	
	Passenger vehicle TV cut-in	4.5	
Route 2: urban continuous test scenarios	Passing through construction area in tunnel	4.5	
	Turning left at the intersection and encountering multiple targets crossing	4.5	
	Encountering a fallen scooter on a straight road	4.5	
	Encountering broken-down vehicle on overpass	4.5	

Note 1: For scores in Tiers (1) through (3), in cases where an AEB-triggered stop occurs, if no warning is issued before the SV triggers AEB, 10% will be deducted from the score;

Note 2: For scores in Tiers (1) through (3), in cases where no AEB-triggered stop occurs, and a warning is issued before the SV brakes to stop, 10% will be deducted from the score;

Table 10 Scoring of Specific Test Scenarios 2

S/N	Scoring Rules	Scoring rate R_{st}	
		Without warning prompt	With warning prompt
(1)	The SV autonomously passes through the test scenario;	100 %	90 %
(2)	The SV brakes to stop, the driver turns on the turn signal lamp, and the vehicle autonomously passes through the test scenario;	90 %	80 %
(3)	① After the SV avoids collision by AEB braking, the driver controls the vehicle to pass through the test scenario;	60 %	70 %
	② The SV brakes and stops. If the driver fails to continue driving within 15 s after turning on the turn signal, the driver controls the vehicle to pass through the test scenario;	70 %	60 %
(4)	The SV is involved in a collision, and a warning is issued before the collision occurs;	15 %	
(5)	The SV is involved in a collision, and no warning was issued before the collision.	0	

6.2.4 The full score for trafficability is 7 points for each of Route 1 and Route 2;

Table 11 Trafficability Score

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Test Route	Full score
Route 1: highway/urban expressway continuous test scenarios	7
Route 2: urban continuous test scenarios	7

6.2.5 The scoring method for trafficability is as follows:

a) Record the passing time t_{SV} of the SV from the starting point to the ending point of the test, with the average time taken by 20 experienced drivers to pass through Route 1 and Route 2 respectively as the reference time;

b) The difference range between the passing time of SV and the reference time is compared to correspond to different trafficability scoring rates, as shown in the following table;

Table 12 Trafficability Scoring

Test Route	Passing time t_{SVn}	Scoring rate of trafficability R_{tn}
Route 1	$t_{SV1} \leq$3 min and 25 s	100 %
	3 min 25 s < $t_{SV1} \leq$ 3 min 55 s	80 %
	3 min 55 s < $t_{SV1} \leq$ 4 min 25 s	60 %
	4 min 25 s < $t_{SV1} \leq$ 4 min 55 s	40 %
	t_{SV1} > 4 min 55 s	20 %
Route 2	$t_{SV2} \leq$ 5 min and 44 s	100 %
	5 min 44 s < $t_{SV2} \leq$ 6 min 14 s	80 %
	6 min 14 s < $t_{SV2} \leq$ 6 min 44 s	60 %
	6 min 44 s < $t_{SV2} \leq$ 7 min 14 s	40 %
	t_{SV2} > 7 min 14 s	20 %

Among them, R_{t1} and R_{t2} are the scoring rates of Route 1 and Route 2 respectively, t_{SV1} is the SV's passing time of Route 1, and t_{SV2} is the SV's passing time of Route 2. If a collision occurs in a specific test scenario on Route 1, R_{t1} is 0; if a collision occurs in a specific test scenario on Route 2, R_{t2} is 0.

c) The trafficability score (S_{dt}) is calculated as follows:

$$S_{dt} = 7 \times R_{t1} + 7 \times R_{t2} \quad (3)$$

6.2.6 Throughout the continuous scenario passability test, if the SV encounters any of the following conditions, the corresponding points will be deducted from the continuous scenario passability score as a penalty. The final total penalty shall not exceed 10 points at most, as shown in the table below.

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Table 13 Penalty Items for Continuous Scenario Passability Test

Penalty Items		Deducted Points
Compliance with traffic regulations	Lane change without the turn signal on (except for emergency scenarios)	0.5
	Riding over a solid line	0.5
Decision planning	Driving on the wrong route	0.5
	Driving into the wrong lane	0.5
Smooth driving	Unintended braking in non-scenario road sections	0.5
	When the vehicle passes through the test scenario, the absolute value of longitudinal acceleration is ≥ 4 m/s^2	0.5

Note 1: A maximum of 3 points may be deducted for each penalty item;

Note 2: Except when responding to applicable road facilities and signs, the system must not automatically change lanes at solid lines; doing so will result in penalty points. In cases where there are other force majeure factors that make it necessary to change lanes at solid lines, the system shall prompt the tester to take control. No points will be deducted if the tester controls lane change after the tester judges that the surrounding traffic environment is safe.

6.3 Evaluation Method of Real Traffic Adaptability

6.3.1 The full score of real traffic adaptability is 50 points, including the traffic adaptability scenario score (full score: 36 points), intelligent anthropomorphism score (full score: 8 points) and driving comfort score (full score: 6 points). The calculation method of the real traffic adaptability score is as follows:

Real traffic adaptability score = traffic adaptability scenario score + intelligent anthropomorphism score + driving comfort score - penalty score

6.3.2 The scoring method for traffic adaptability scenarios is shown in the following table:

Table 14 Scoring for Traffic Adaptability Scenario

S/N	Scenario		Test condition	Full score
1	Highway	Within a road section	Stop-and-go traffic	2
2			Tunnel passing	2
3		At a ramp	Highway off-ramp	2
4			Route selection in ramp	2
5			Passing through a sharp curve in ramp	2
6			Highway on-ramp	2
7	Urban expressway	Urban expressway	Passing through ramp entrance/exit	2
8	City road	Within a road section	Stop-and-go traffic	2
9			Passing through a sharp curve	2
10			Main and auxiliary road switching	2
11		At intersections	Lane selection	2

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S/N	Scenario		Test condition	Full score
12			Intersection passing - before the SV enters the intersection	2
13			Intersection passing - when the SV stops at an intersection	2
14			Intersection passing - when the SV passes through an intersection	2
15			Roundabout passing - SV enters the roundabout	2
16			Roundabout passing - SV running in the roundabout	2
17			Roundabout passing - SV leaving the roundabout	2
18			U-turn	2

6.3.3 For the traffic adaptability scenario score, the SV's performance in each actual completion of driving tasks is divided into 4 levels for scoring (see Annex C for detailed rules on evaluation under specific test conditions):

a) Tier 1: The SV completes all driving tasks with the Level 2 driver assistance system, and no warning prompt is issued during the process. The scoring rate R_{as} of the corresponding test condition is 100%;

b) Tier 2: The SV completes all driving tasks with the Level 2 or Level 1 driver assistance system, and gives a warning prompt during this process. The scoring rate R_{as} of corresponding test conditions is 90%;

c) Tier 3: The SV completes part of the driving tasks with the Level 2 or Level 1 driver assistance system, and the driver controls the vehicle to pass through the corresponding road section. The scoring rate R_{as} under the corresponding test condition is (70%-X);

d) Tier 4: The SV fails to complete the driving task, and the driver controls the vehicle to pass through the corresponding road section. The scoring rate R_{as} under the corresponding test condition is (30%-X);

Note 1: X is the presence or absence of warning prompts and the deduction percentage corresponding to different situations when the driver controls the vehicle.

Note 2: If the SV is involved in a traffic accident, the scoring rate of this condition is 0%.

Table 15 Score Deductions for Driver-controlled Vehicles under Various Scenarios with or without Warning Prompts

		Percentage of deduction X		
		Emergency hazard	Violation of traffic regulations	Traffic efficiency
With/Without warning prompt	With	20 %	20 %	10 %
	Without	30 %	30 %	20 %

6.3.4 The calculation method of traffic adaptability scenario score S_{as} is as follows:

$$S_{as} = \sum_{i=1}^{18} \left(2 \times R_{as_i}\right) \quad (4)$$

Where, S_{as_i} is the scoring rate of the i^{th} scenario.

For a specific test condition, if it is encountered multiple times on a public road, the results of the multiple tests will be scored separately, and the average value of the scores of the multiple test conditions (accurate to 2 decimal places) will be taken as the final score of the condition.

6.3.5 The full score of intelligent anthropomorphism is 8 points, and the evaluation method is as follows:

a) Record the passing time t_{SVn} and t_{RVn} of the SV and the RV from the test starting point to the test ending point at the same time, respectively. After the test is completed, calculate the absolute value $\Delta t_n=|t_{SVn}-t_{RVn}|$ of the time difference between them, n=1, 2;

b) Record Δt_n of 2 tests respectively, and take the average of Δt_n to obtain $\overline{\Delta t}$; take the average of the two reference passing times to obtain $\overline{\Delta t_{RV}}$; calculate the deviation $\sigma = \overline{\Delta t}/\overline{\Delta t_{RV}}$ between the average passing time of SV and that of the RV.

The scoring rate of intelligent anthropomorphism based on σ is shown in the following table.

Table 16 Scoring Rate of Intelligent Anthropomorphism

Passing time deviation σ	Scoring Rate R_{ip} of Intelligent Anthropomorphism
σ ≤ 5 %	100 %
5 % < σ ≤ 10 %	80 %
10 % < σ ≤ 15 %	40 %
Σ > 15 %	0

6.3.6 The calculation method of the intelligent anthropomorphism score S_{ip} is as follows:

$$S_{ip} = 8 \times R_{ip} \quad (5)$$

6.3.7 The full score for driving comfort is 6 points, and it is evaluated by the longitudinal acceleration and lateral acceleration of the SV during driving on the selected road section. The evaluation method is shown in the following table:

Table 17 Evaluation Methods for Driving Comfort

Indicator	Scenario	Road Section Name	Deducted Points	Full score
Longitudinal acceleration	Go straight	Panxi Road, Chongqing	**(1) Tier I: deduct 0.2 points** 2.5 m/s^2 ≤ absolute value of longitudinal acceleration < 4 m/s^2 **(2) Tier II: deduct 0.5 points** Absolute value of longitudinal acceleration ≥ 4 m/s^2	3
		Chengdu-Chongqing Expressway: Jinyunshan Tunnel Exit - Yunwushan Tunnel Entrance		
		Chengdu-Yibin Expressway: Fujiabei Hub - Qingfeng Hub		
		Shuanglin Road, Xinhua Avenue, Chengdu		

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Indicator	Scenario	Road Section Name	Deducted Points	Full score
	Turn at intersection	Intersection of Yuzhou Road and Huxie Road, Yuzhong District, Chongqing		
		Intersection of Fukang Road and Xinnan Road, Liangjiang New Area, Chongqing		
		Intersection of Jianjiang Road and Jiuzhaigou Road, Chengdu		
Lateral acceleration	Go straight	Panxi Road, Chongqing	**(1) Tier I: deduct 0.2 points** ① For going straight scenario: 1 m/s^2 ≤ absolute value of lateral acceleration < 3 m/s^2 ② For the scenario of turn at intersection: 3 m/s^2 ≤ absolute value of lateral acceleration < 5 m/s^2 **(2) Tier II: deduct 0.5 points** ① For going straight scenario: absolute value of lateral acceleration ≥ 3 m/s^2 ② For the scenario of turn at intersection: absolute value of lateral acceleration ≥ 5 m/s^2	3
		Chengdu-Chongqing Expressway: Jinyunshan Tunnel Exit - Yunwushan Tunnel Entrance		
		Chengdu-Yibin Expressway: Fujiabei Hub - Qingfeng Hub		
		Shuanglin Road, Xinhua Avenue, Chengdu		
	Turn at intersection	Intersection of Yuzhou Road and Huxie Road, Yuzhong District, Chongqing		
		Intersection of Fukang Road and Xinnan Road, Liangjiang New Area, Chongqing		
		Intersection of Jianjiang Road and Jiuzhaigou Road, Chengdu		

Note 1: Only the longitudinal acceleration during normal driving is evaluated (excluding braking, parking and starting to ensure safety);

Note 2: Only the lateral acceleration during normal driving is evaluated (excluding braking to ensure safety, etc.);

Note 3: The maximum deduction for longitudinal acceleration and lateral acceleration is 3 points each.

6.3.8 The driving comfort score S_{dc} is calculated as follows:

$$S_{dc} = (3 - 0.2 \times n_1 - 0.5 \times n_2) + (3 - 0.2 \times n_3 - 0.5 \times n_4) \quad (6)$$

Among them, n_1 and n_3 are the cumulative number of times the longitudinal acceleration index and lateral acceleration index reach the first-level deduction threshold in the selected test road section, respectively, and n_2 and n_4 are the cumulative number of times the longitudinal acceleration index and lateral acceleration index reach the second-level deduction threshold in the selected test road section.

6.3.9 Throughout the real traffic adaptability test, if the SV has any of the following conditions, the corresponding score will be deducted from the real traffic adaptability score as a penalty. The final total penalty shall not exceed 10 points at most, as shown in the following table:

Table 18 Penalty Items for Real Traffic Adaptability Test

Penalty Items			Deducted Points
Highway/urban expressway/urban road	All scenario road sections	Exceeding the road speed limit	0.5
		Lane change without the turn signal on	0.5
		Riding over a solid line	0.5
		Driving continuously on the dotted line for more than 8 s (except force majeure)	0.5
		Unintended braking or steering	1
		Changing two or more lanes in a single maneuver	1
		Driving on the wrong route	0.5
		Driving into the wrong lane	0.5
	Non-specified scenario road sections	Total number of controls (2~5)	0.5
		Total number of controls (6 ~ 9)	1.5
		Total number of controls (10 and above)	2.5
Highway/urban expressway	Within a road section	With the road clear, the SV runs below the minimum speed limit for more than 30 s in the road section	0.5
Urban road	Within a road section	Entering the bus lane	1
		Entering the non-motor vehicle lane	1
	At intersections	Running a red light	1.5

Note 1: If the SV triggers the same penalty item multiple times on the same road section or at the same position of the public road, only one penalty will be imposed;

Note 2: A maximum of 3 points will be deducted for each penalty item;

Note 3: For the bus lanes that are not open for vehicles other than buses all the time, the SV is not allowed to enter at any time; for bus lanes that are not open for vehicles other than buses during rush hours, the time period specified by the local transportation department shall prevail;

Note 4: For non-motor vehicle lanes that are not open at all times, the SV is not allowed to enter at any time; for sections with "non-motor vehicle shared lane" signs, the SV is allowed to pass according to regulations on the premise of giving way to non-motor vehicles and giving priority to protecting the right of way for non-motor vehicles;

Note 5: Except when responding to applicable road facilities and signs, the system must not automatically change lanes at solid lines; doing so will result in penalty points. In cases where there are other force majeure factors that make it necessary to change lanes at solid lines, the system shall prompt the tester to take control. No points will be deducted if the tester controls lane change after the tester judges that the surrounding traffic environment is safe;

Note 6: If complying with Note 5 is not possible due to a risk of imminent collision, follow the applicable road traffic regulations;

Note 7: Within the test section in non-specified scenarios, in order to ensure driving

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safety, the tester shall control the vehicle in time if there is a risk of collision or violation of traffic regulations. Total number of controls refers to the total number of vehicle controls by the tester during the public road test.

6.3.10 If the system sends a confirmation request for speed limit change, the test personnel shall confirm within 2 s after the system sends the request.

6.4 Comprehensive grade evaluation

6.4.1 The overall rating of intelligent driving index is divided into five levels: Good + (G+), Good (G), Acceptable (A), Marginal (M) and Poor (P). The specific rating methods are shown in Table 19.

a) The overall rating is Good+ (G+): scoring rate of the intelligent driving index test ≥ 90%;

b) The overall rating is Good (G): 90 % > scoring rate of the intelligent driving index test ≥ 80%;

c) The overall rating is Acceptable (A): 80 % > scoring rate of the intelligent driving index test ≥ 65%;

d) The overall rating is Marginal (M): 65 % > scoring rate of the intelligent driving index test ≥ 50%;

e) The overall rating is Poor (P): the scoring rate of the intelligent driving index test < 50%.

When the scoring rate of intelligent safety in complex scenarios is less than 85%, the evaluation level of intelligent driving shall not be higher than A. The scoring rate is the test score divided by the total score, rounded to one decimal place.

Table 19 Overall Evaluation of Intelligent Driving Index

Intelligent Driving Index Rating	Score Range	Description
Good+ (G+)	Scoring rate ≥ 90 %	When the scoring rate in complex scenarios is less than 85 %, the evaluation level of intelligent driving shall not be higher than A.
Good (G)	90 % > scoring rate ≥ 80 %	
Acceptable (A)	80 % > scoring rate ≥ 65 %	
Marginal (M)	65 % > scoring rate ≥ 50 %	
Poor (P)	Scoring rate < 50 %	

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Annex A

(Normative)

Detailed Rules for Continuous Scenario Passability Test

A.1 Overview

The continuous scenario passability test is the industry's first "closed proving ground continuous scenario test and evaluation method". This evaluation method is based on the "collaborative multi-target control system" developed by CAERI and supports C-V2X communication technology, which can achieve accurate control and continuously reproduce occasional risk scenarios in real traffic environments, thereby greatly broadening the functional test boundary of the driver assistance system. The primary evaluation focus of this method is the traffic fluency and passing efficiency of the advanced combined driver assistance system when dealing with continuous complex scenarios with multiple targets. It not only tests the system's capability to deal with risk scenarios, but also comprehensively measures the perception decision optimization, control accuracy and overall stability under continuous risk scenarios.

A.2 Test implementation method

For the highway/urban expressway continuous test scenario, the SV activates the advanced combined driver assistance system function at the starting point of the test according to Fig. A.1 and runs stably along the test road at an initial cruise speed of 100 km/h.

For the urban continuous test scenarios, the SV activates the advanced combined driver assistance system function at the starting point of the test according to Fig. A.7 and runs stably along the test road at an initial cruise speed of 60 km/h.

A.3 Conditions for end of test

The test ends when any of the following conditions occurs:

a) The SV does not collide with any TV or target, and runs to the ending point of the test;

b) The SV collides with any TV or target.

A.4 Test validity requirements

To ensure the validity of the test, the test requirements are as follows:

a) For the highway/urban expressway continuous test scenario, the SV accelerates to the initial test speed within 9 s from the starting point of the test, and activates the function and runs stably for at least 2 s;

b) For the urban continuous test scenario, the SV accelerates to the initial test speed within 3.5 s from the starting point of the test, and activates the function and runs stably for at least 2 s;

c) The SV shall be kept at the specified speed ±1 km/h, and its distance from the lane center line shall not exceed ±0.1 m;

d) The placement position error between the stationary TV and the target shall not exceed ±0.2 m;

e) The speed error between the moving TV and the target shall not exceed ±1 km/h.

A.5 High-speed/urban expressway continuous test scenarios

The highway/urban expressway continuous test scenario is set up at the Sino-German Intelligent Connected Vehicle (Sichuan) Demonstration Base. The test route includes 4 scenarios: ① encountering accident vehicles in tunnel, ② detour in construction area, ③ encountering a broken-down vehicle on a curve (with pedestrians at the rear of the vehicle) and ④ passenger vehicle TV cut-in. The test route is shown as the blue route in Fig. A.1. The specific positions of the starting and ending points shall be subject to the indication signs set in the proving ground. In addition, slow-moving passenger vehicles are set up as interfering vehicles on the highway/urban expressway test route, and their driving paths are shown as the orange route in Fig. A.1.

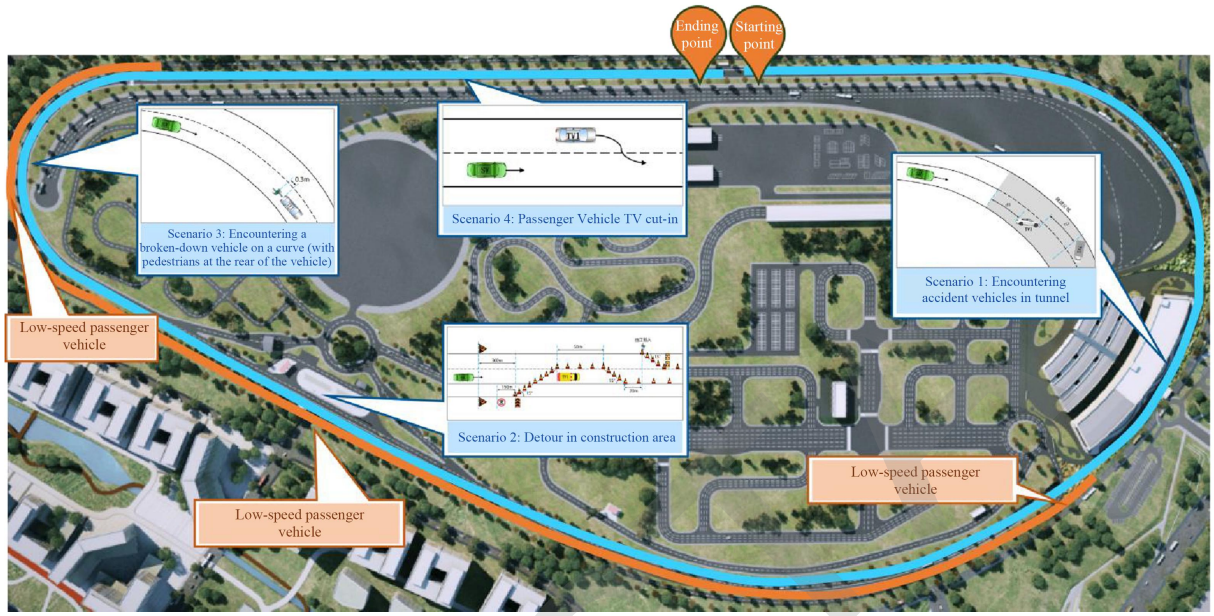


Fig. A.1 Route of Highway/Urban Expressway Continuous Test Scenarios

A.5.1 Encountering accident vehicles in a tunnel

Under daytime conditions, the test road shall be a curve with at least one-way two lanes. There is a tunnel ahead of the test road. The curvature radius of the curve in the tunnel is 250 m, and the lane markings are dotted lines. The illumination intensity in the middle section of the tunnel does not exceed 50 lx. There is TV1, a stationary rollover oblique passenger vehicle TV on the right lane in the tunnel. The distance between the rearmost end of TV1 and the tunnel entrance is d1 = 30 m, and the included angle between the longitudinal center line of TV1 and the tangent line of the lane marking where TV1 is located is 45°. There is a stationary oblique light truck target vehicle TV2 in the left lane of the tunnel. The distance between the rearmost end of TV2 and the frontmost end of TV1 is d2=100 m, and the angle between the longitudinal center line of TV2 and the tangent line to the lane marking where TV2 is located is 30°. TV1 and TV2 may have C-V2X connectivity and communication capabilities. The scenario is shown in Fig. A.2.

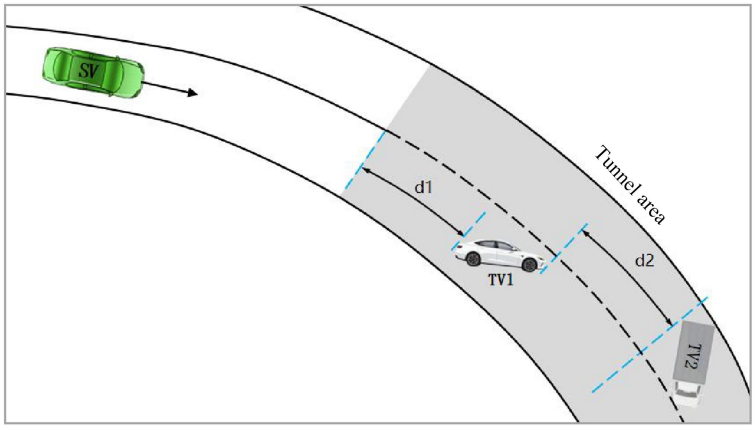


Fig. A.2 Test Scenario of Encountering Accident Vehicles in Tunnel

A.5.2 Detour in construction area

Under daytime conditions, the test road shall be a long straight road with at least one-way two lanes, with dotted lane markings and an emergency lane. There are construction signs, speed limit signs, linear guidance signs and construction dummies in front of the test road. A traffic cone road closure area is set up in front of the road flush with the linear guidance sign. A stationary anti-collision barrel buffer vehicle TV and anti-collision barrels are placed in the road closure area. The layout of the TV, target and road facilities in the scenario of detour in construction area is shown in Fig. A.3.

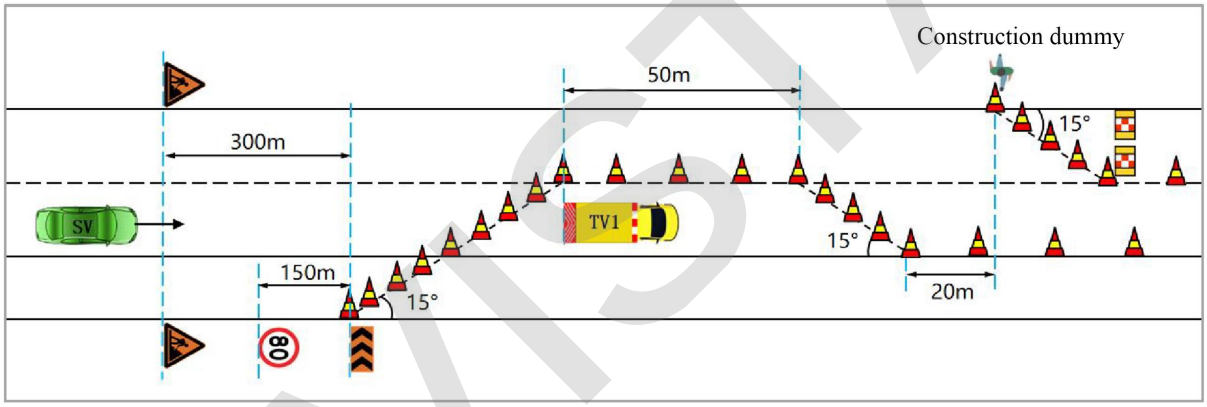


Fig. A.3 Scenario of Detour in Construction Area

A.5.3 Encountering a broken-down vehicle on a curve (with pedestrian at the rear of the vehicle)

Under daytime conditions, the test road shall be a curve with at least one-way two lanes, with dotted lane markings and a curvature radius of 125 m. There is a stationary passenger vehicle TV1 in the middle of the right lane of the test road, and there is a stationary adult dummy target 0.3 m behind TV1. The lateral centerline of the dummy target coincides with the centerline of the lane. TV1 and adult dummy target may have C-V2X connectivity and communication capabilities. This scenario is shown in Fig. A.4.

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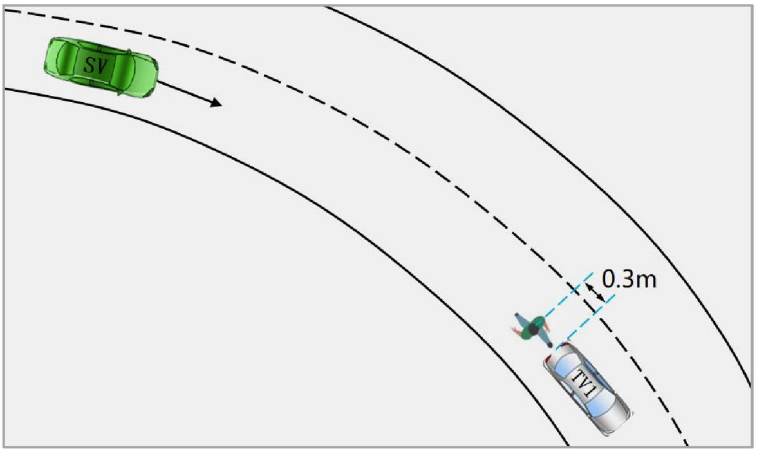


Fig. A.4 Scenario of Encountering a Broken-down Vehicle on a Curve (with Pedestrian at the Rear of the Vehicle)

A.5.4 Passenger vehicle TV cut-in

Under daytime conditions, the test road shall be a long straight road with at least one-way two lanes, with dotted lane markings. The passenger vehicle TV1 runs at a constant speed of 60 km/h in the left adjacent lane ahead of the test road. When the SV approaches TV1 to a given test distance (TTC between SV and TV = 2.0 s), TV1 cuts in from an adjacent lane along the lane changing trajectory to the front of the SV. This scenario is shown in Fig. A.5.

The TV cut-in trajectory consists of 6 curved sections and 1 straight section, as shown in Fig. A.6 and Table A.1.

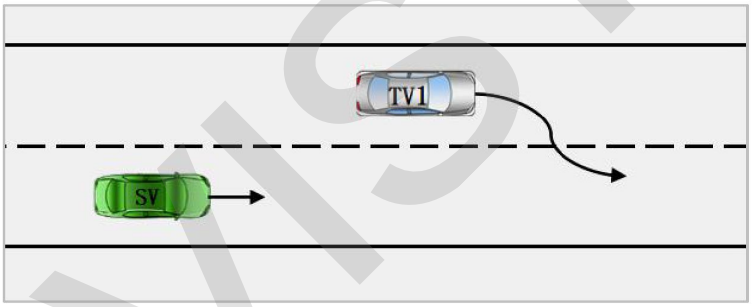


Fig. A.5 Passenger Vehicle TV Cut-in Scenario

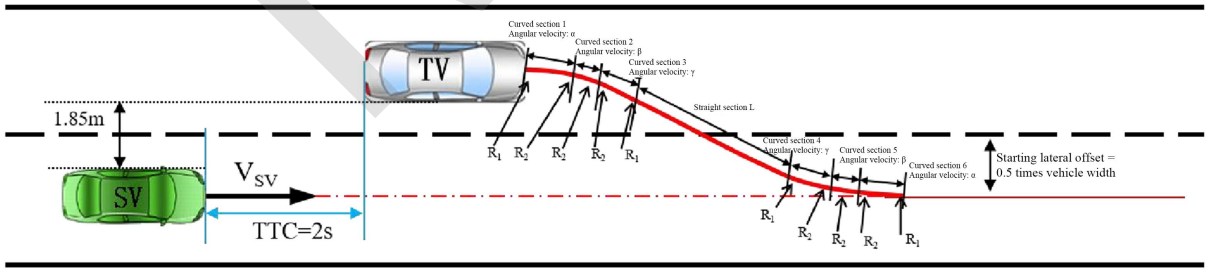


Fig. A.6 Passenger Vehicle TV Cut-in Trajectory

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Table A.1 Parameters of TV Cut-in Trajectory

Curved Section 1	Starting radius R1 (m)	1500
	Ending radius R2 (m)	280
	Angle α (°)	0.8
Curved Section 2	Arc section radius R2 (m)	280
	Angle β (°)	3.2
Curved Section 3	Staringt radius R2 (m)	280
	Ending radius R1 (m)	1500
	Angle γ (°)	0.8
Straight Section L	Straight section length L (m)	16.4
Curved Section 4	Starting radius R2 (m)	1500
	Ending radius R1 (m)	280
	Angle γ (°)	0.8
Curved Section 5	Arc section radius R2 (m)	280
	Angle β (°)	3.2
Curved Section 6	Starting radius R1 (m)	280
	Ending radius R2 (m)	1500
	Angle α (°)	0.9

A.5.5 Interfering vehicle (IV)

The interfering vehicle is a passenger vehicle, with its initial position at 50 m downstream of the tunnel exit in Scenario 1 (encountering accident vehicles in tunnel) and its ending position at the starting point of the straight road in Scenario 4 (passenger vehicle TV cut-in). The specific path is shown as the orange route in Fig. A.1.

The interfering vehicle is initially stationary in the right lane. When the SV drives to 20 m away from the tunnel exit, the interfering vehicle starts and shall accelerate to 60 km/h within 4 s, and maintain this speed steadily throughout the subsequent journey, as shown in Fig. A.7.

When the interfering vehicle passes through Scenario 2 (detour in construction area), it bypasses the traffic cone and passes through the construction area. During this process, the TTC between the interfering vehicle and the traffic cone in its lane shall be within 2.0 s~3.0 s, as shown in Fig. A.8.

When the interfering vehicle passes through Scenario 3 (encountering a broken-down vehicle on a curve (with pedestrians at the rear of the vehicle)), the interfering vehicle shall bypass the stationary passenger vehicle (with pedestrians at the rear of the vehicle), and its TTC with the pedestrian at the rear during detour shall be within 2.0 s~3.0 s, as shown in Fig. A.9.

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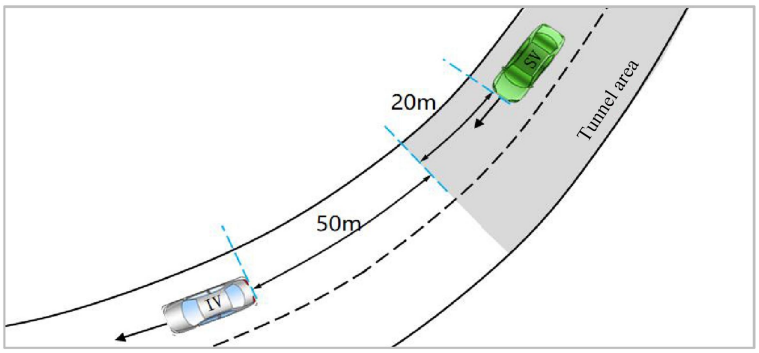


Fig. A.7 Initial Position of Interfering Vehicle

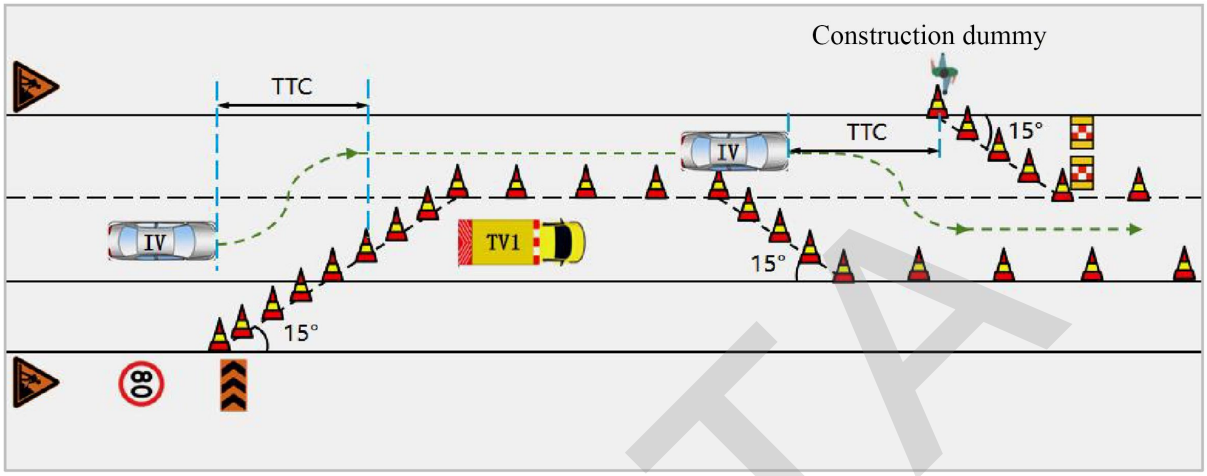


Fig. A.8 Interfering Vehicle in Scenario 2: Detour in Construction Area

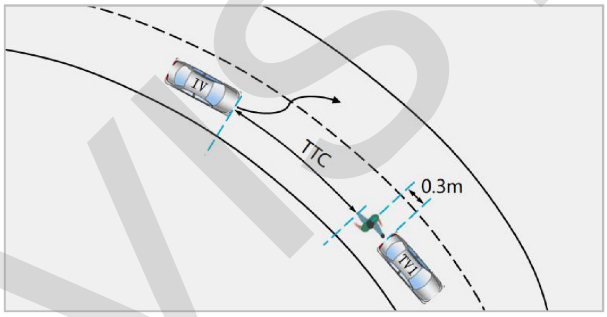


Fig. A.9 Interfering Vehicle in Scenario 3: Encountering a Broken-down Vehicle on a Curve (with Pedestrian at the Rear of the Vehicle)

A.6 Urban continuous test scenarios

The urban continuous test scenario is set at the Sino-German Intelligent Connected Vehicle (Sichuan) Demonstration Base. The test route includes 4 scenarios: ① passing through a construction area in a tunnel, ② turning left at the intersection and encountering multiple targets crossing, ③ encountering a fallen scooter on a straight road and ④ encountering broken-down vehicle on an overpass. The test route is shown in Fig. A.10. The specific starting and ending points of the test shall be subject to the starting and ending point signs set in the proving ground.

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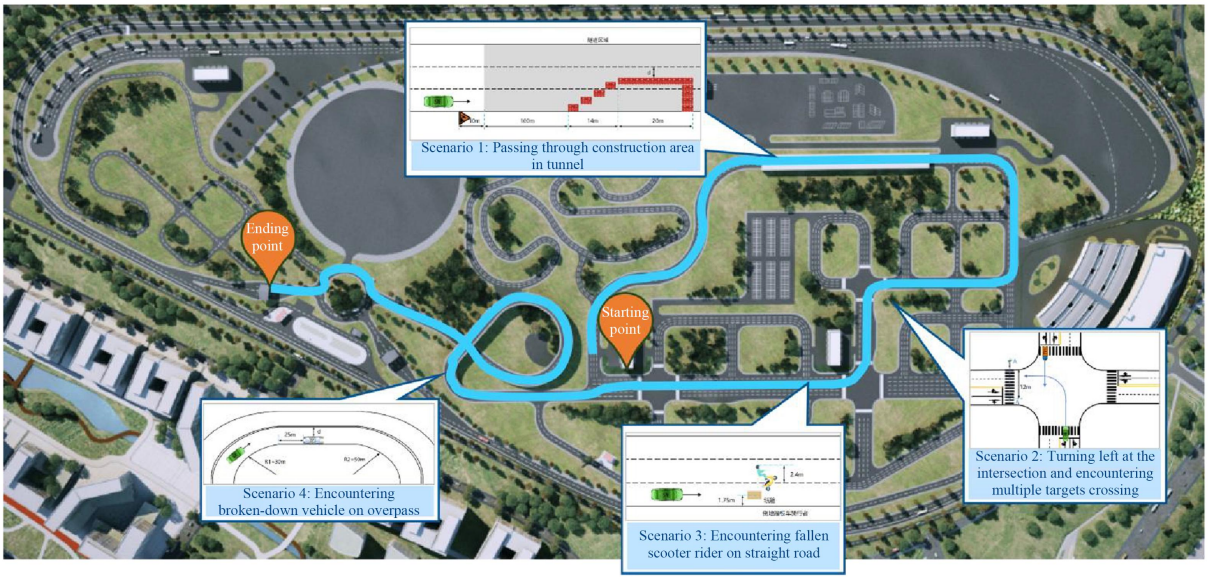


Fig. A.10 Urban Continuous Test Scenario Route

A.6.1 Passing through a construction area in a tunnel

Under daytime conditions, the test road is at least a straight tunnel with at least one-way two lanes (the leftmost lane is the reverse lane), with dotted lane markings. The illumination intensity in the middle section of the tunnel does not exceed 50 lx. A construction sign is set 10 m outside the tunnel, and a construction area with water-filled barriers blocking the road is set 110 m behind the construction sign. The distance between the water-filled barriers in the middle lane and the left lane marking is d=1.8 m. The layout of the targets and road facilities in the scenario (passing through construction area in tunnel) is shown in Fig. A.11.

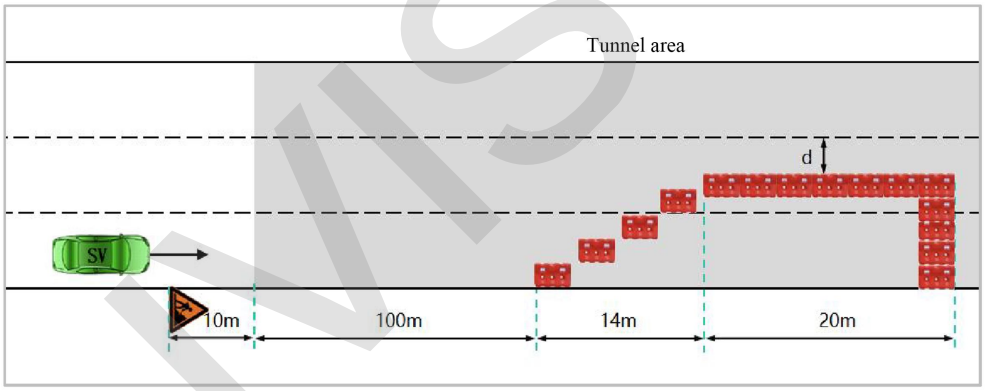


Fig. A.11 Scenario of Passing through Construction Area in Tunnel

A.6.2 Turning left at the intersection and encountering multiple targets crossing

Under daytime conditions, the test road is an intersection with at least two-way four lanes and a turning radius of not less than 15 m. There are no signals, or signals remain off at the intersection. The SV cruises on the straight road section, approaches an intersection and turns left. When turning, there is an express tricycle target vehicle (at a speed of 20 km/h) going straight in the opposite direction; after passing the tricycle target, the SV approaches the pedestrian target with a stroller crossing from the nearside (at a speed of 5 km/h). There is a risk of frontal collision between the express tricycle target vehicle and the pedestrian target with a stroller with the SV's front. This scenario is shown in Fig. A.12.

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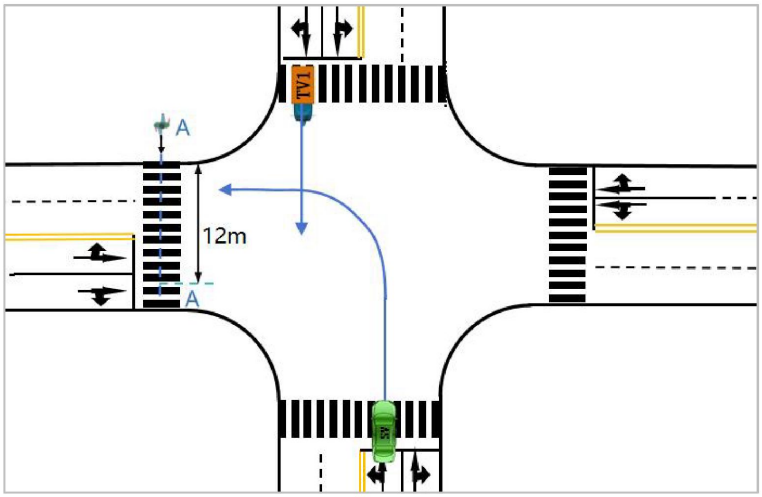


Fig. A.12 Scenario of Turning Left at the Intersection and Encountering Multiple Targets Crossing

A.6.3 Encountering a fallen scooter on a straight road

Under daytime conditions, the test road is a straight road with at least one-way three lanes and dotted lane markings. There are fallen scooter targets and corrugated cartons in the middle and right lanes ahead of the test road respectively. This scenario is shown in Fig. A.13.

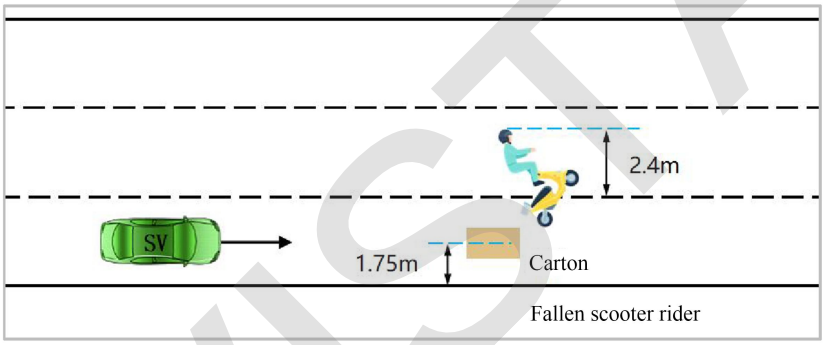


Fig. A.13 Scenario of Encountering a Fallen Scooter on a Straight Road

A.6.4 Encountering broken-down vehicle on overpass

Under daytime conditions, the test road shall be at least a two-way dual-lane overpass road with curves and straight roads, with the middle lane marking being a double solid line. There is a stationary passenger vehicle TV1 in the straight area ahead of the test road, and the distance between the leftmost end of TV1 and the left lane marking is d=2.6 m. The radius of curvature R1 of the curve behind TV1 is 30 m, and the radius of curvature R2 of the curve in front of TV1 is 50 m. This scenario is shown in Fig. A.14.

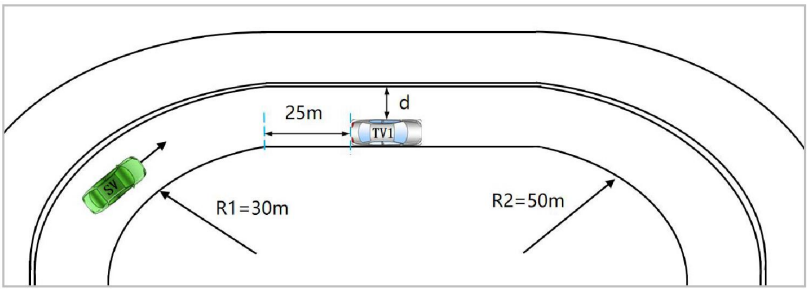


Fig. A.14 Scenario of Encountering Broken-down Vehicle on Overpass

Annex B

(Normative)

Detailed Rules of Real Traffic Adaptability Test

B.1 Overview

The real traffic adaptability test is a full-element coverage public road test for users' actual driving scenarios, which examines the comprehensive performance of the combined driver assistance system functions in inter-provincial long-distance highways, urban ring expressways and central urban roads. Its core inspection dimensions focus on the adaptability of the advanced combined driver assistance system to different driving scenarios, its capability to comply with traffic rules, the anthropomorphic level of driving style and driving comfort.

B.2 Specific test scenario

The specific test scenarios included in the real traffic adaptability test route are shown in Table B.1.

Table B.1 List of Specific Scenarios of Real Traffic Adaptability Test

S/N	Scenario		
1	Highway	Within a road section	Stop-and-go traffic
2			Tunnel passing
3		At a ramp	Highway off-ramp
4			Route selection in ramp
5			Passing through a sharp curve in ramp
6			Highway on-ramp
7	Urban expressway	Urban expressway	Passing through ramp entrance/exit
8	Urban road	Within a road section	Stop-and-go traffic
9			Passing through a sharp curve
10			Main and auxiliary road switching
11		At intersections	Lane selection
12			Passing through an intersection
13			Passing through a roundabout
14			U-turn

Note 1: The real traffic adaptability test route is a route including highways, urban expressways and urban roads, and two tests are carried out;

Note 2: Starting time of public road test:

Departure time from Nanping West Road, Nan'an District, Chongqing (off-peak period): 10:50～11:10, 12:50～13:10, of which the departure time from Chengdu Tianfu Service Area (rest and energy replenishment point) (peak period): 15:50～16:10;

Departure time from Jiuzhaigou Road, Chenghua District, Chengdu (peak period): 8:50～10:10, of which the departure time from CAERI (rest and energy replenishment point)

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(off-peak period): 12:50～14:10.

Note 3: If the SV gives a driver control warning or degradation warning, the tester shall promptly take control of the vehicle within 2 s.

B.2.1 Specific scenarios of expressways

B.2.1.1 Stop-and-go traffic

(1) Scenario description

The SV activates the advanced combined driver assistance system function, runs along the specified route, and gradually enters the congested section ahead, as shown in Fig. B.1.

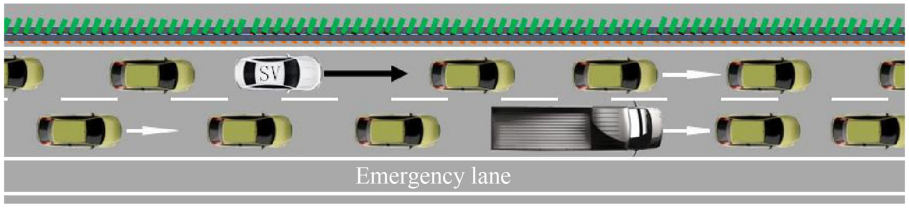


Fig. B.1 Stop-and-Go Traffic Scenario

(2) Test location

a) North Ring Interchange - Lijia section of G75 Lanzhou-Haikou Expressway, Chongqing

Note: The sections above are about 6.3 km long and contain at least two lanes, with a dotted middle lane marking.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected congested section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through congested road sections;

c) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV completes the stop-and-go traffic test.

(4) Conditions for end of test

a) The SV leaves the specified route within the specified time period;

b) The SV has a traffic accident;

c) The EPB of the SV is activated when the test is conducted under a single stop-and-go traffic condition;

d) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

In a single stop-and-go traffic test, if the EPB of the SV is activated, the result of this stop-and-go traffic test shall not be included in the score.

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B.2.1.2 Tunnel passing

(1) Scenario description

The SV activates the advanced combined driver assistance system function, runs on the road according to the specified route, and gradually runs into the tunnel ahead, as shown in Fig. B.2.

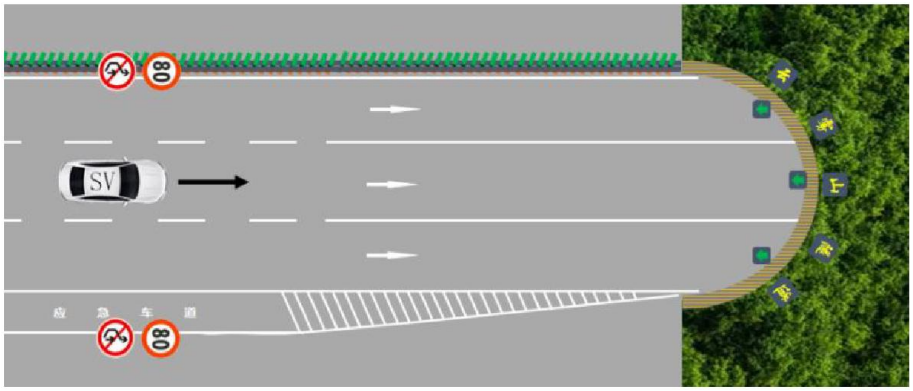


Fig. B.2 Schematic Diagram of Tunnel Passing Scenario

(2) Test location

a) Jinyunshan Tunnel of G5013 Chongqing-Chengdu Expressway (about 2690 m long), without lane reduction inside;

b) Yunwushan Tunnel of G5013 Chongqing-Chengdu Expressway (about 3335 m long), without lane reduction inside;

c) Yulongshan Tunnel of S0101 Chongqing Third Ring Expressway (about 2800 m long), without lane reduction inside;

d) Satellite Lake Tunnel of S7 Yongchuan-Luzhou Expressway (about 3268 m long), without lane reduction inside.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected tunnel;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the tunnels above, respectively;

c) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through a tunnel.

(4) Conditions for end of test

a) The tail of the SV completely leaves the tunnel;

b) Where a danger happens during the test, the tester controls the vehicle to ensure driving safety;

c) The SV has a traffic accident.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

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During the test, there is no construction or traffic accident that leads to jammed lanes in the tunnel.

B.2.1.3 Highway off-ramp

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs on the road according to the specified route. It exits from the main road of the highway to the deceleration lane ahead based on navigation information, so as to enter the ramp, as shown in Fig. B.3.

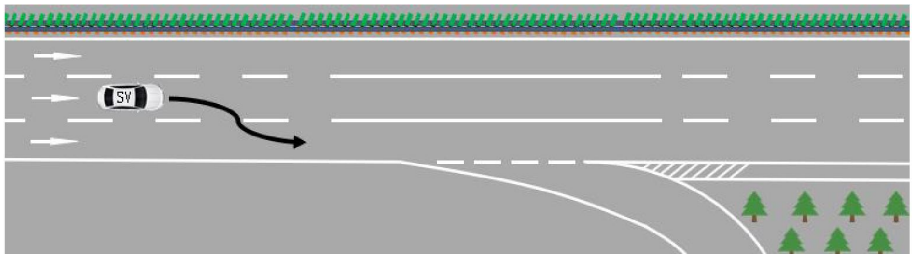


Fig. B.3 Schematic Diagram of Highway Off-ramp Scenario

(2) Test location

a) G50 Shanghai-Chongqing Expressway - North Ring Interchange;

b) G75 Lanzhou-Haikou Expressway - Lijia Interchange;

c) G5013 Chongqing-Chengdu Expressway - Wangu Interchange (to S0101 Chongqing Third Ring Expressway) section;

d) S0101 Chongqing Third Ring Expressway - Shuangfeng Interchange (to S7 Yongchuan-Luzhou Expressway) section;

e) G8515 Guang'an-Luzhou Expressway - Kaiyuan Interchange (to G85 Yinchuan-Kunming Expressway) section;

f) G76 Xiamen-Chengdu Expressway - Yingjie Hub (to S40 Guang'an-Hongya Expressway) section;

g) S40 Guang'an-Hongya Expressway - Fujiabei Hub (to S4 Chengdu Yibin-Zhaotong Expressway) section;

h) S4 Chengdu Yibin-Zhaotong Expressway - Fujiabei Hub (to S40 Guang'an-Hongya Expressway) section;

i) S40 Guang'an-Hongya Expressway - Yingjie Hub (to G76 Xiamen-Chengdu Expressway);

j) G85 Yinchuan-Kunming Expressway - Kaiyuan Interchange (to G8515 Guang'an-Luzhou Expressway) section;

k) S7 Yongchuan-Luzhou Expressway - Shuangfeng Interchange (to S0101 Chongqing Third Ring Expressway) section;

l) S0101 Chongqing Third Ring Expressway - Wangu Interchange (to G5013 Chongqing-Chengdu Expressway) section.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as

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per the test route requirements to ensure that the SV runs along the path that passes through the selected highway off-ramp scenario;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the highway off-ramp section;

c) The test starts when the THW between the SV and the ramp exit is 120 s, at which point recording of valid test data begins;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through a highway off-ramp section.

(4) Conditions for end of test

a) All running wheels of the SV roll into the ramp;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety;

d) The SV fails to exit from the highway to the ramp in time, resulting in any running wheel crossing a solid line, the SV rolling into the diversion line area, or the SV failing to merge into the ramp upon reaching the ramp exit.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction or traffic accident that leads to jammed lanes in front of the ramp.

B.2.1.4 Route selection in ramp

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs on the ramp according to the specified route. As there is a diversion on the ramp ahead, the SV needs to select the correct route to continue running based on navigation information, as shown in Fig. B.4.

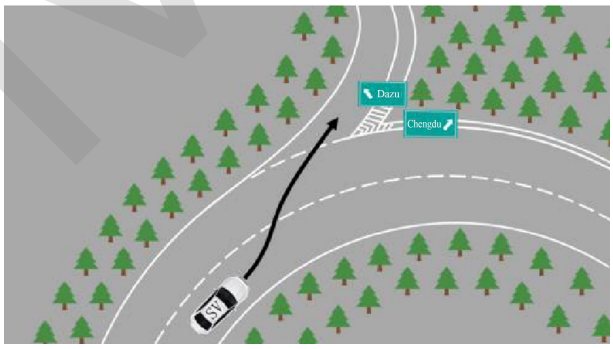


Fig. B.4 Schematic Diagram of Route Selection within the Ramp

(2) Test location

a) G5013 Chongqing-Chengdu Expressway - G8515 Guang'an-Luzhou Expressway via Wangu Interchange (to Dazu) section, with internal diversion ramp in Wangu Interchange;

b) S0101 Chongqing Third Ring Expressway - S7 Yongchuan-Luzhou Expressway via

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Shuangfeng Interchange (to Satellite Lake Tunnel) section, with internal diversion ramp in Shuangfeng Interchange;

c) G8515 Guang'an-Luzhou Expressway - G85 Yinchuan-Kunming Expressway via Kaiyuan Interchange (to Longchang City) section, with internal diversion ramp in Kaiyuan Interchange;

d) G76 Xiamen-Chengdu Expressway - S40 Guang'an-Hongya Expressway via Yingjie Hub (to Beidou Town) section, with internal diversion ramp in Yingjie Hub;

e) S40 Guang'an-Hongya Expressway - S4 Chengdu-Yibin-Zhaotong Expressway via Fujiabei Hub (to Chengdu Tianfu International Airport) Internal diversion ramp in Fujiabei Hub.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the Y-shaped section inside the ramp based on navigation information;

c) Recording of valid test data begins when the SV starts to exit the ramp from the highway;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV passes through this scenario.

(4) Conditions for end of test

a) The SV runs to the correct ramp based on navigation information, and all of its running wheels roll into the correct ramp;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety;

d) The SV fails to run into the correct ramp, any of the SV's running wheels crosses a solid line, or the SV runs into the diversion area.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction or traffic accident that leads to jammed lanes in front of the diverging point of the ramp.

B.2.1.5 Passing through a sharp curve in ramp

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs on the ramp according to the specified route. Ahead on the ramp, there is a large-curvature curve, and the SV passes through the sharp curve based on navigation information, as shown in Fig. B.5.

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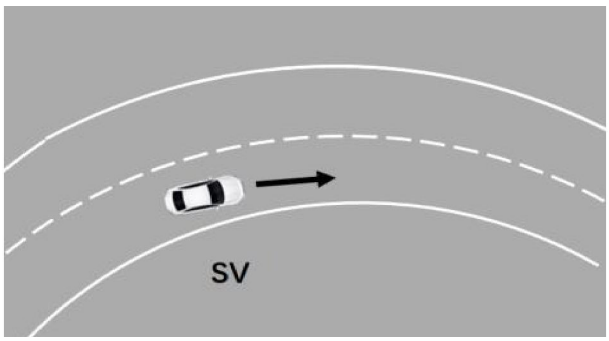


Fig. B.5 Schematic Diagram of Scenario of Passing through the Sharp Curve in Ramp

(2) Test location

a) Wangu Interchange (Chongqing - Chengdu);

b) Zhonghe Hub (Chongqing - Chengdu);

c) Kaiyuan Interchange (Chongqing - Chengdu).

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the section that passes through the sharp curve in the selected ramp;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the sharp curve in the ramp;

c) Recording of valid test data begins when the SV starts to exit the ramp from the highway;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV passes through the sharp curve in ramp;

(4) Conditions for end of test

a) All running wheels of the SV roll into the main road of the highway;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety;

d) Any running wheel of the SV drives over the solid line in the ramp during the test.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction or traffic accident that leads to jammed lanes in the ramp curve.

B.2.1.6 Highway on-ramp

(1) Scenario description

The SV activates its advanced combined driver assistance system function, runs on the road according to the specified route, and merges into the main lane of the highway from the ramp based on navigation information, as shown in Fig. B.6.

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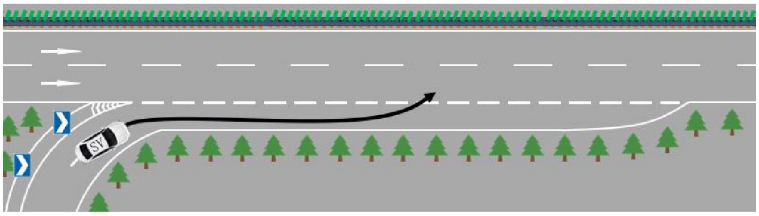


Fig. B.6 Schematic Diagram of Highway On-ramp Scenario

(2) Test location

a) North Ring Interchange - G75 Lanzhou-Haikou Expressway;

b) Wangu Interchange - G8515 Guang'an-Luzhou Expressway (to Dazu) section;

c) Shuangfeng Interchange - S7 Yongchuan-Luzhou Expressway (to Satellite Lake Tunnel) section;

d) Kaiyuan Interchange - G85 Yinchuan-Kunming Expressway (to Longchang City) section;

e) Yingjie Hub - S40 Guang'an-Hongya Expressway (to Beidou Town) section;

f) Fujiabei Hub - S4 Chengdu-Yibin-Zhaotong Expressway (to Chengdu Tianfu International Airport) section;

g) Fujiabei Hub - S40 Guang'an-Hongya Expressway (to Beidou Town) section;

h) Yingjie Hub - G76 Xiamen-Chengdu Expressway (to Longchang City) section;

i) Kaiyuan Interchange - G8515 Guang'an-Luzhou Expressway (to Anfu Town) section;

j) Shuangfeng Interchange - G8515 Guang'an-Luzhou Expressway (to Dazu) section;

k) Wangu Interchange - G5013 Chongqing-Chengdu Expressway (to Science City Toll Station)

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the section that passes through the selected highway on-ramp section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the highway on-ramp section;

c) The test starts when the THW between the SV and the acceleration lane end is 60 s, at which point recording of valid test data begins;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through a highway on-ramp section.

(4) Conditions for end of test

a) All running wheels of the SV roll into the main road of the highway;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety;

d) The SV fails to merge into the main road from the ramp timely, causing any of its

running wheels to cross a solid line or roll into the diversion line area/emergency lane.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction or traffic accident that leads to jammed lanes in front of the ramp exit.

B.2.2 Specific scenario of urban expressway

B.2.2.1 Passing through ramp entrance/exit

(1) Scenario description

The SV activates its advanced combined driver assistance system function, runs along the specified route. The SV runs from an urban road to the ramp entrance of urban expressway or from the ramp exit of urban expressway back to the urban road, as shown in Fig. B.7.

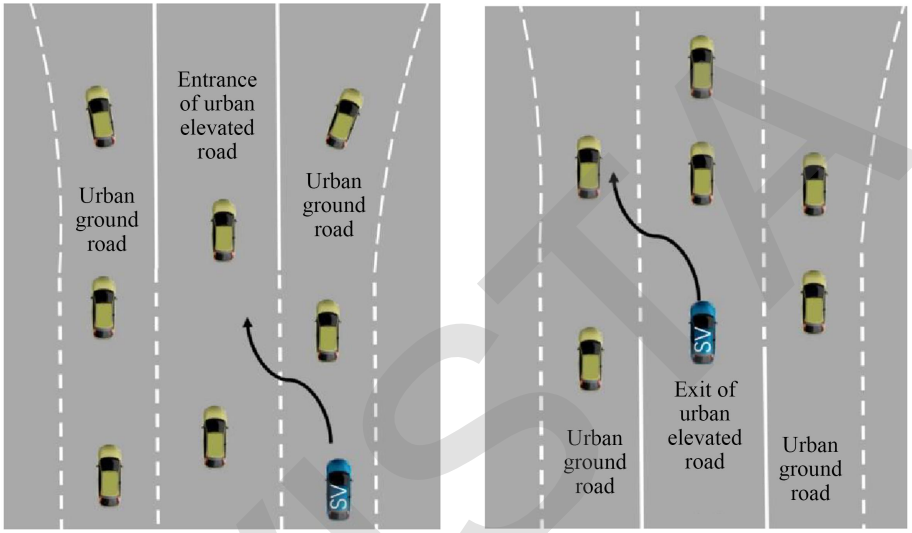


Fig. B.7 Schematic Diagram of Entrance/Exit Passing Scenario

(2) Test location

a) Shuinianhe Road of Shudu Avenue to Shuangqiaozi Flyover Entrance in Chengdu;

b) Chengdu Second Ring Elevated Road Entrance to East Fourth Section of Second Ring Road;

c) Chengdu Second Ring Elevated Road Ramp Exit (Chuangye Road).

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected ramp entrance/exit section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system and gradually runs from the urban road to the ramp entrance of urban expressway or from the ramp exit of urban expressway back to the urban road;

c) The test starts 60 s before the SV enters the ramp entrance of urban elevated road or 60 s before the SV exits the ramp exit of the urban elevated road, at which point recording of

valid test data begins;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the ramp entrance/exit.

(4) Conditions for end of test

a) 60 s after the rear of the SV completely enters the ramp entrance of the urban elevated road or 60 s after the rear of the SV completely leaves the ramp exit of the urban elevated road;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety;

d) The SV fails to merge into or drive out of the ramp in time, resulting in any wheel of the vehicle crossing the solid line or entering the diversion area in front of the ramp.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction or traffic accident that leads to jammed lanes at the entrance/exit of the ramp.

B.2.3 Specific scenarios of urban roads

B.2.3.1 Stop-and-go traffic

(1) Scenario description

The SV activates the advanced combined driver assistance system function, runs along the specified route, and gradually enters the congested section ahead, as shown in Fig. B.8.

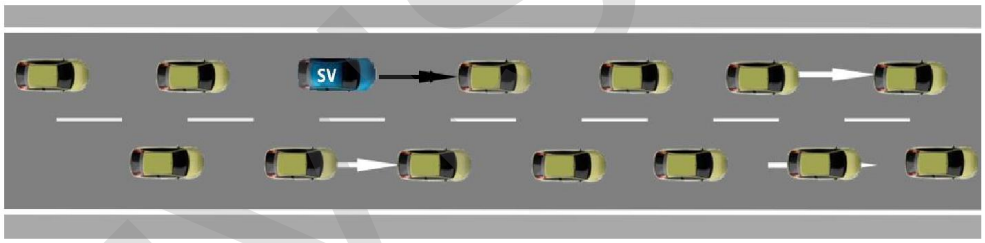


Fig. B.8 Stop-and-Go Traffic Scenario

(2) Test location

a) Jiangnan Interchange, Nan'an District, Chongqing;

b) Changjiang Second Road, Yuzhong District, Chongqing;

c) Dapingzheng Street, Yuzhong District, Chongqing;

d) Huxie Road, Yuzhong District, Chongqing;

e) Niuwangmiao Section, East Street, Chengdu;

f) Chengdu Second Ring Elevated Road.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through

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the selected congested section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through congested road sections;

c) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV completes the stop-and-go traffic test.

(4) Conditions for end of test

a) The SV runs out of the specified route;

b) The SV has a traffic accident;

c) The EPB of the SV is activated when the test is conducted under a single stop-and-go traffic condition;

d) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

In a single stop-and-go traffic test, if the EPB of the SV is activated, the result of this stop-and-go traffic test shall not be included in the score.

B.2.3.2 Passing through a sharp curve

(1) Scenario description

The SV activates its advanced combined driver assistance system function, runs along the specified route, and runs into a sharp curve on the city road, as shown in Fig. B.9.

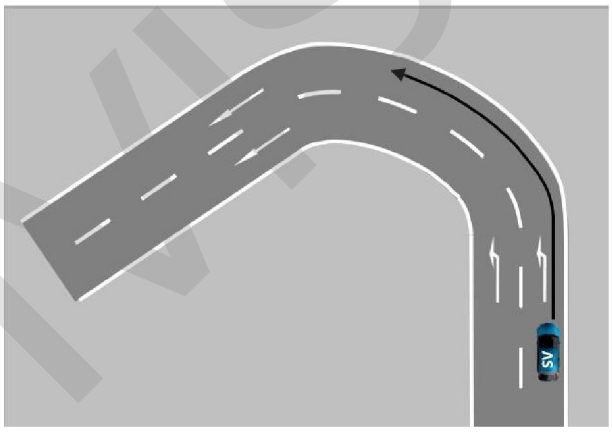


Fig. B.9 Schematic Diagram of Sharp Curve Passing Scenario

(2) Test location

a) Xingzhu Road, Liangjiang New Area, Chongqing;

b) Yongfeng Interchange in Chengdu.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected sharp-curve section;

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b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the sharp-curve section;

c) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV completes the test in the scenario of passing through a sharp curve.

(4) Conditions for end of test

a) The SV runs out of the specified route;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety.

(6) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction, road closure or traffic accident that leads to jammed lanes in the sharp curve.

B.2.3.3 Main and auxiliary road switching

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs along the specified route. Based on navigation information, it moves from the main road of an urban road to an auxiliary road or vice versa ahead, as shown in Fig. B.10.

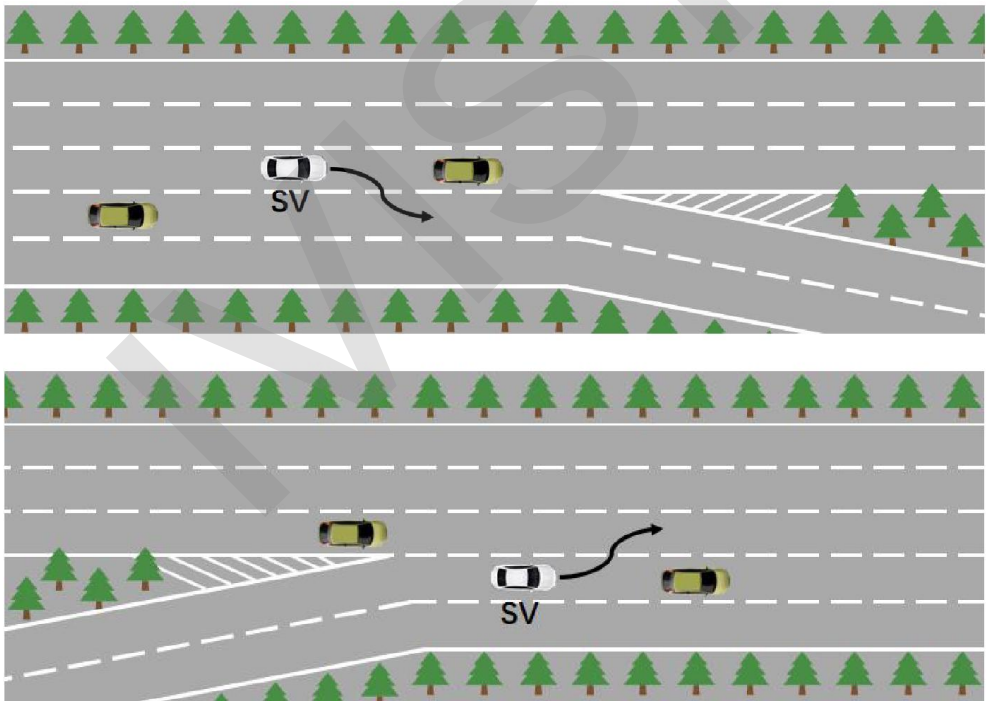


Fig. B.10 Schematic Diagram of Main and Auxiliary Road Switching Scenario

(2) Test location

a) Fifth Section of Chengdu East Third Ring Road - Minjiang Road;

b) Auxiliary Road of Chengluo Avenue in Chengdu - Main Road of Chengluo Avenue.

(3) Test implementation method

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a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected main and auxiliary road switching section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to pass through the main and auxiliary road switching section;

c) The test starts when the THW between the SV and the auxiliary road entrance or main road entrance is 120 s, at which point recording of valid test data begins;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the main and auxiliary road switching section.

(4) Conditions for end of test

a) When the SV enters the auxiliary road from the main road, all running wheels enter the auxiliary road;

b) When the SV enters the main road from the auxiliary road, all running wheels enter the main road;

c) The SV has a traffic accident;

d) The ongoing test of the SV is interrupted by the tester controlling the vehicle to ensure driving safety;

e) The SV fails to enter the auxiliary road from the main road timely, resulting in that the SV has not yet run into the auxiliary road while any of its running wheels has crossed a solid line or rolled into the diversion line area/auxiliary road exit;

f) The SV fails to enter the main road from the auxiliary road timely, resulting in that the SV has not yet run into the main road while any of its running wheels has crossed a solid line or rolled into the diversion line area/main road entrance;

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction, road closure or traffic accident that leads to jammed lanes in the main and auxiliary road switching section.

B.2.3.4 Lane selection

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs along the specified route. The SV selects the correct lane on the Y-shaped or X-shaped road ahead according to the navigation information, as shown in Fig. B.11 and Fig. B.12.

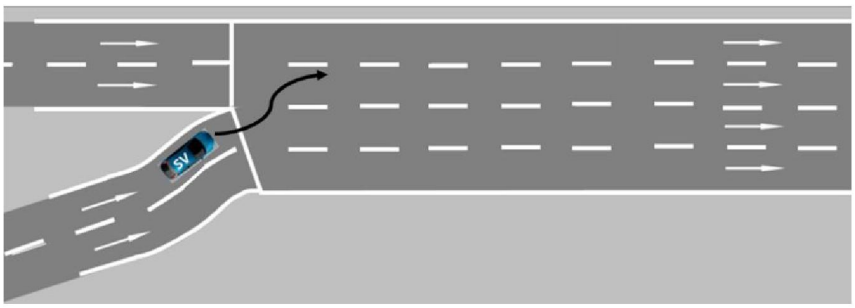


Fig. B.11 Schematic Diagram of Lane Selection (Y-shaped) Scenario

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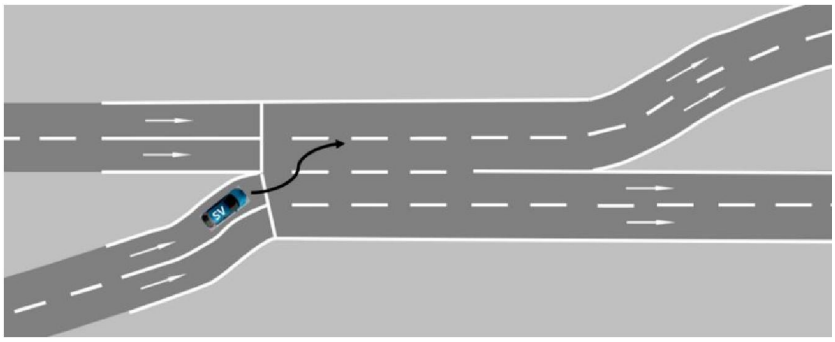


Fig. B.12 Schematic Diagram of Lane Selection (X-shaped) Scenario

(2) Test location

a) Jingwei Avenue and Hutouyan Tunnel (X-shaped) in Yuzhong District, Chongqing;

b) Xiejiawan Interchange and Xiejiawan Main Street, Jiulongpo District, Chongqing (Y-shaped);

c) Changjiang Second Road and Yuanjiagang Interchange (X-shaped) in Yuzhong District, Chongqing;

d) Yusong Road Interchange and Xinnan Road (X-shaped) in Liangjiang New Area, Chongqing;

e) Xingai Avenue and its auxiliary road (Y-shaped) in Liangjiang New Area, Chongqing.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected lane selection section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to gradually approach the lane selection section;

c) The test starts 30 s before the SV arrives at the corresponding road section for lane selection, at which point recording of valid test data begins;

d) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the lane selection section.

(4) Conditions for end of test

a) The SV selects the lane in the specified direction of the test route according to the navigation information;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety;

d) The ongoing test of the SV is interrupted by the tester taking over the vehicle when the SV fails to select the lane in the specified direction of the test route according to the navigation information.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

VISTA

During the test, there is no construction, road closure or traffic accident that leads to jammed lanes in the lane selection section.

B.2.3.5 Passing through an intersection

(1) Scenario description

The SV activates the advanced combined driver assistance system function and runs along the specified route. The SV passes through the intersection according to the navigation information. The test scenario is shown in Fig. B.13 ~ Fig. B.15. This scenario includes 3 subdivided scenarios: before the SV enters the intersection, when the SV stops at the intersection and when the SV passes through the intersection.

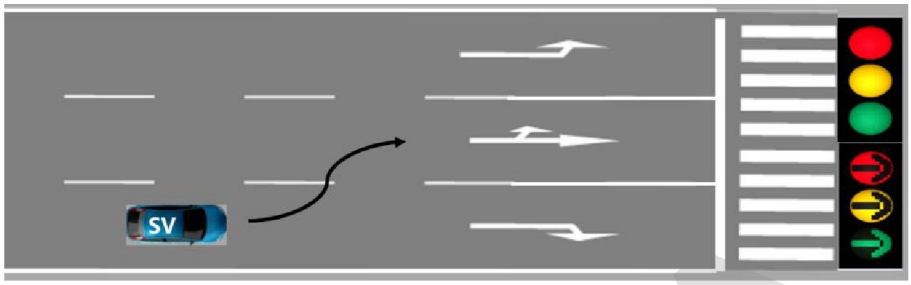


Fig. B.13 Schematic Diagram of Scenario before the SV Enters the Intersection

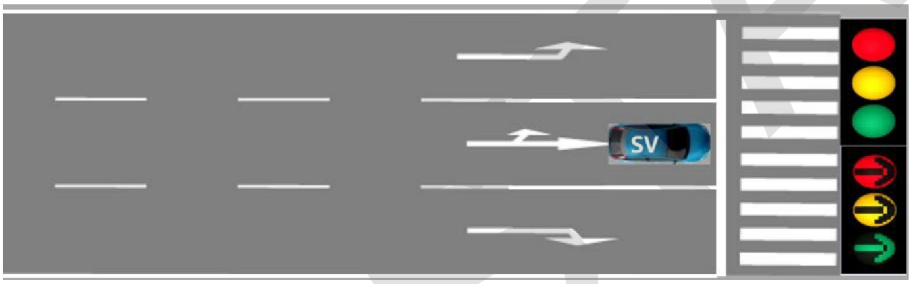


Fig. B.14 Scenario When the SV Stops at the Intersection

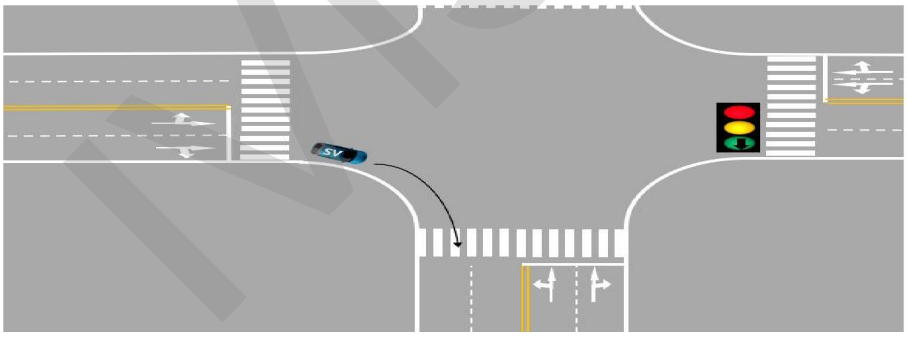


Fig. B.15 Scenario When the SV Passes Through the Intersection

(2) Test location

a) Intersection of Yuzhou Road and Huxie Road, Yuzhong District, Chongqing;

b) Intersection of Fuquan Road and Fukang Road, Liangjiang New Area, Chongqing;

c) Intersection of Fukang Road and Xinnan Road, Liangjiang New Area, Chongqing;

d) Intersection of Panxi Road and Fuquan Road, Liangjiang New Area, Chongqing;

e) Intersection of Huxie Road and Heyun Road, Yuzhong District, Chongqing;

f) Intersection of East Street East Section and Guyapo Road, Chengdu;

g) Intersection of East Section of East Street and East Fourth Section of Second Ring Road (under the Second Ring Elevated Road), Chengdu;

h) Intersection of East Street East Section and Haijiaoshi Street, Chengdu;

i) Intersection of South Section Two of First Ring Road and Xinnan Road, Chengdu;

j) Intersection of Section Four of Hongxing Road and Niuwangmiao Section of East Street, Chengdu;

k) Intersection of East Third Section of First Ring Road and Shuangqiao Road, Chengdu;

l) Intersection of Shuangqiao Road and Shuanghua Road, Chengdu;

m) Intersection of Emeishan Road and Jianjiang Road, Chengdu;

n) Intersection of Jianjiang Road and Jiuzhaigou Road, Chengdu

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected intersection section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to gradually approach the intersection;

c) The test starts 30 s before the SV arrives at the stop line at the intersection in the driving direction, at which point recording of valid test data begins;

d) The SV passes through the specified intersection safely according to traffic rules;

e) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the intersection.

(4) Conditions for end of test

a) The SV enters the corresponding lane and passes through the intersection according to the navigation information, and completes the driving task corresponding to the scenario of passing through the intersection;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety;

d) The ongoing test of the SV is interrupted by the tester taking over the vehicle when the SV fails to enter the corresponding lane according to the navigation information.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction, road closure or traffic accident that leads to jammed lanes at the intersection.

Note 1: If there is a waiting area at the intersection and the SV is in the leading position, the SV shall run to the forefront of the extension of the waiting area after entering the waiting area on the premise of meeting traffic rules.

Note 2: If there is a waiting area at the intersection, the SV can accurately identify the

waiting area and send out a confirmation request for entering the waiting area, and the driver shall confirm the request within 2 s.

B.2.3.6 Passing through a roundabout

(1) Scenario description

The SV activates its advanced combined driver assistance system function and runs along the specified route. The SV passes through the roundabout according to the navigation information. The test scenario is shown in Fig. B.16 ~ Fig. B.18. This scenario includes 3 subdivided scenarios: when the SV enters the roundabout, when the SV runs inside the roundabout and when the SV leaves the roundabout.

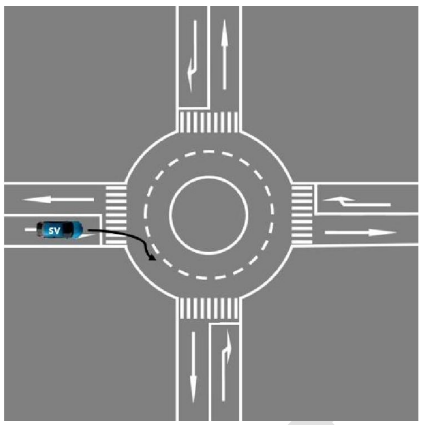


Fig. B.16 Schematic Diagram for Scenario of SV Entering the Roundabout

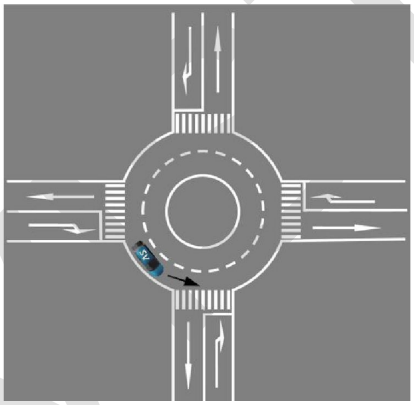


Fig. B.17 Schematic Diagram for Scenario of SV Running inside the Roundabout

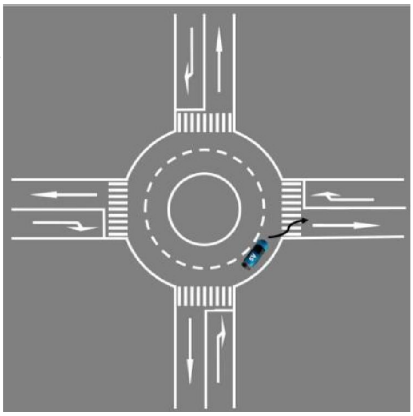


Fig. B.18 Schematic Diagram for Scenario of SV Leaving the Roundabout

(2) Test location

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a) The roundabout at the intersection of Xingai Avenue and Hongqihegou Flyover in Liangjiang New Area, Chongqing, set as Test Route 2;

b) The roundabout at the intersection of Min'an Avenue and Min'an Flyover in Liangjiang New Area, Chongqing, set as Test Route 2;

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected roundabout section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to gradually approach the roundabout;

c) The test starts 20 s before the SV arrives at the roundabout entrance, at which point recording of valid test data begins;

d) The SV enters the roundabout and runs inside it safely according to traffic rules and leaves the roundabout from the corresponding exit according to the navigation information;

e) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the intersection.

(4) Conditions for end of test

a) The SV selects the corresponding intersection according to the navigation information, and its rear wheels leave the roundabout area;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety;

d) The ongoing test of the SV is interrupted by the tester taking over the vehicle when the SV fails to leave the roundabout from the exit according to the navigation information.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

During the test, there is no construction, road closure or traffic accident that leads to jammed lanes in the roundabout scenario.

B.2.3.7 U-turn

(1) Scenario description

The SV activates the advanced combined driver assistance system function and runs along the specified route. The SV makes a U-turn according to the navigation information, as shown in Fig. B.19.

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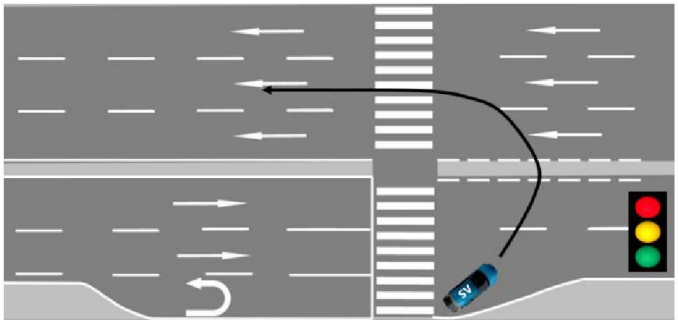


Fig. B.19 Schematic Diagram of SV U-turn Scenario

(2) Test location

a) The intersection of Taishan Avenue and Hengshui Road in Liangjiang New Area, Chongqing, set as Test Route 2;

b) Xingai Avenue in Liangjiang New Area (Zhengda Deshan Middle School), Chongqing, set as Test Route 2;

c) Chengdu Chuangye Road (Torch Building), set as Test Route 3;

d) Yufeng First Road (Huaiyin Road) in Chengdu, set as Test Route 3;

e) Yinghui Road (Tashan Road) in Chengdu, set as Test Route 3.

(3) Test implementation method

a) The tester sets the starting and ending points of the on-board navigation system as per the test route requirements to ensure that the SV runs along the path that passes through the selected U-turn section;

b) The SV activates its advanced combined driver assistance system function and runs along the path planned by the on-board navigation system to gradually approach the U-turn;

c) The test starts 20 s before the SV arrives at the U-turn intersection, at which point recording of valid test data begins;

d) The SV completes the U-turn driving task safely according to traffic rules and navigation information;

e) The fulfillment status and data of the driving task by the SV shall be recorded each time the SV runs through the U-turn section.

(4) Conditions for end of test

a) The SV completes the U-turn driving task safely according to traffic rules and navigation information;

b) The SV has a traffic accident;

c) The ongoing test of the SV is interrupted by the tester taking over the vehicle to ensure driving safety;

d) The ongoing test of the SV is interrupted by the tester taking over the vehicle when the SV fails to complete the U-turn driving task according to traffic rules and navigation information.

(5) Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

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During the test, there is no construction, road closure or traffic accident that leads to jammed lanes in the U-turn scenario.

B.2.4 Intelligent anthropomorphism test

This test is to evaluate, based on the performance of experienced excellent human drivers, the overall intelligence level of the SV on real roads and with the advanced combined driver assistance system function activated.

B.2.4.1 Test implementation method

The implementation method of intelligent anthropomorphism test is as follows:

a) For each test route, two test experts officially certified by IVISTA drive the reference vehicle (RV) as drivers from the starting point to the ending point of the test route, and the two test experts together complete one test of the route;

b) The SV driver activates the advanced combined driver assistance system function of the SV, starts from the same starting point as the RV at the same time, and drives the SV along the same specified route to the same ending point of the test route;

c) Four rest and energy replenishment points are set up in the test route, namely: ① CAERI (No. 9 Jinyu Avenue, Liangjiang New Area, Chongqing); ② Rongchangtao Service Area (Chongqing); ③ Neijiang Toll Station (Neijiang); ④ Tianfu Service Area (Chengdu). The test route is divided into 5 test sections. For each test section, the SV and the RV depart at the same time from the same starting point;

d) Record the passing time t_{SVi} and t_{RVi} (i=1, 2, 3, 4, 5) of SV and reference vehicle RV from the starting point to the ending point of 5 test sections respectively. The sum of the passing time t_{SV} and t_{RV} of SV and RV in 5 test sections is the passing time t_{SV} and t_{RV} respectively.

B.2.4.2 Conditions for end of test

a) Both the SV and the RV reach the same ending point of the test route;

b) A traffic accident occurs.

B.2.4.3 Test validity requirements

To ensure test validity, the following shall be guaranteed throughout the test:

a) Test experts strictly abide by the traffic rules and drive from the starting point to the ending point of the test route;

b) In the same test, the driving routes of SV and RV are identical.

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Annex C

(Normative)

Evaluation Rules for Real Traffic Adaptability Test

Evaluation Rules for Specific Scenarios of Real Traffic Adaptability Test

C.1 Highway/urban expressway

C.1.1 Stop-and-go traffic

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, it automatically follows the vehicle ahead in its original lane to stop and go on a congested section and pass through the specified congested section. During this process, the SV does not send out degradation warning or warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, it automatically follows the vehicle ahead in its original lane to stop and go on a congested section and pass through the specified congested section. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV cannot automatically follow the vehicle ahead in its original lane to stop and go on a congested section, and the driver controls the vehicle to pass through the stop-and-go traffic section;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task, that is, it cannot automatically follow the vehicle ahead in its lane throughout the congested section, and the driver controls the vehicle to pass through the congested stop-and-go traffic section.

Note: Functional degradation only refers to the downgrade from Level 2 to Level 1 or 0 driving automation, excluding function switching within Level 2 driving automation and prompts, such as the SV reminding the driver to focus on driving.

C.1.2 Tunnel passing

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated, that is, the SV enters the tunnel entrance and exits after passing through the tunnel. The system continuously exercises lateral and longitudinal control over the SV. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated, that is, the SV enters the tunnel entrance and exits after passing through the tunnel. The system continuously exercises lateral and longitudinal control over the SV. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated, that is, the SV may automatically complete some driving tasks in the tunnel passing phase (entering, passing through and leaving the tunnel), and the driver controls the vehicle to pass through the tunnel;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task, that is, when the SV cannot automatically complete all driving tasks in the tunnel passing phase (entering, passing through and leaving the tunnel), the driver controls the vehicle to pass

through the tunnel.

C.1.3 Highway off-ramp

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and can completely change its lane from the main road of the highway to the ramp. When the SV starts to change its lane or when the system prompts the driver to confirm the lane change, the wheels do not cross a solid line or diversion line, and the THW between its front and the ramp exit is not less than 5 s. In this process, the SV does not send out a degradation warning or warning prompt.

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and can completely change its lane from the main road of the highway to the ramp. When the SV starts to change its lane or when the system prompts the driver to confirm the lane change, the wheels do not cross a solid line or diversion line, and the THW between its front and the ramp exit is not less than 5 s. In this process, the SV sends out a degradation warning or warning prompt.

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete part of the driving tasks of highway off-ramp (leaving main road, merging into ramp and entering ramp); the driver controls the vehicle to exit from highway to ramp;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of highway off-ramp (leaving main road, merging into ramp and entering ramp), and the driver controls the vehicle to exit from highway to ramp.

C.1.4 Route selection in ramp

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV can enter the correct path in the ramp based on navigation information. When the SV starts lane change or when the system prompts the driver to confirm lane change, the THW between the front of the SV and the starting point of the diversion area is not less than 5 s. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV can enter the correct path in the ramp based on navigation information. When the SV starts lane change or when the system prompts the driver to confirm lane change, the THW between the front of the SV and the starting point of the diversion area is not less than 5 s. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70% - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may automatically complete part of the driving tasks of route selection in ramp (approaching to the target path, running along the target path at the ramp bifurcation point and entering the target path), and the driver operates the SV to drive into the correct ramp guided by navigation information;

d) Tier 4 (scoring rate 30% - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of route selection in ramp (approaching to the target path, running along the target path at the ramp bifurcation point and entering the target path), and the driver operates to drive into the correct ramp guided by

navigation information.

C.1.5 Passing through a sharp curve in ramp

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV may pass through a sharp curve in the ramp based on navigation information. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may pass through a sharp curve in the ramp based on navigation information. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV cannot automatically complete the driving task throughout the sharp curve section in the ramp, and the driver controls the vehicle to pass through the sharp curve in the ramp;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete the driving task throughout the sharp curve section in the ramp, and the driver controls the SV to normally pass through the sharp curve in the ramp.

C.1.6 Highway on-ramp

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, completely merge into the highway main road from the ramp. When the SV starts to change its lane or when the system prompts the driver to confirm lane change, the wheels do not cross a solid line or diversion line, and the THW between its front and the end of the acceleration lane is not less than 5 s. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, completely merge into the highway main road from the ramp. When the SV starts to change its lane or when the system prompts the driver to confirm lane change, the wheels do not cross a solid line or diversion line, and the THW between its front and the end of the acceleration lane is not less than 5 s. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete part of the driving tasks of highway on-ramp (leaving the ramp, merging into the main road and entering the main road), and the driver controls the SV to merge into the highway main road;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of highway on-ramp (leaving the ramp, merging into the main road and entering the main road), and the driver controls the SV to merge into the highway main road.

C.1.7 Passing through ramp entrance/exit

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2

driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may enter the ramp entrance of urban expressway from the urban road or leave the ramp exit of urban expressway to the urban road. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may enter the ramp entrance of urban expressway from the urban road or leave the ramp exit of urban expressway to the urban road. During this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete part of the driving tasks of entering the ramp entrance of urban expressway from the urban road (leaving the main road, merging into the ramp and entering the ramp) or leaving the ramp exit of urban expressway to the urban road (leaving the ramp, merging into the main road and entering the main road), and the driver controls the vehicle to pass through ramp entrance/exit;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of entering the ramp entrance of urban expressway from the urban road (leaving the main road, merging into the ramp and entering the ramp) or leaving the ramp exit of urban expressway to the urban road (leaving the ramp, merging into the main road and entering the main road), and the driver controls the vehicle to pass through the ramp entrance/exit.

C.2 Urban road

C.2.1 Stop-and-go traffic

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, it automatically follows the vehicle ahead in its original lane to stop and go on a congested section and pass through the specified congested section. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, it automatically follows the vehicle ahead in its original lane to stop and go on a congested section and pass through the specified congested section. During this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV cannot automatically follow the vehicle ahead in its original lane to stop and go on a congested section, and the driver controls the vehicle to pass through the stop-and-go traffic section;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task, that is, it cannot automatically follow the vehicle ahead in its lane throughout the congested section, and the driver controls the vehicle to pass through the congested stop-and-go traffic section.

C.2.2 Passing through a sharp curve

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV may pass through a sharp curve based on navigation information. In this process, the SV does not send out a degradation warning or

a warning prompt, and any running wheel does not cross the lane marking;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may pass through a sharp curve based on navigation information. In this process, the SV sends out a degradation warning or a warning prompt, and any running wheel does not cross the lane marking;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may pass through some sharp curves based on navigation information, but cannot automatically complete the driving task in the whole process. The driver controls the vehicle to pass through the sharp curve section.

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete the driving task throughout the whole process, and the driver controls the vehicle to pass through the sharp curve in the ramp.

C.2.3 Main and auxiliary road switching

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may enter the auxiliary road from the main road or enter the main road from the auxiliary road on an urban road. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may enter the auxiliary road from the main road or enter the main road from the auxiliary road on an urban road. During this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete part of the driving tasks of entering the auxiliary road from the main road (leaving the main road, merging into the auxiliary road, entering the side road) or entering the main road from the auxiliary road (leaving the auxiliary road, merging into the main road and entering the main road) on an urban road. The driver controls the vehicle to switch between the main road and the auxiliary road;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of entering the auxiliary road from the main road (leaving the main road, merging into the auxiliary road and entering the auxiliary road) or entering the main road from the auxiliary road on an urban road (leaving the auxiliary road, merging into the main road and entering the main road). The driver controls the vehicle to switch between the main road and the auxiliary road.

C.2.4 Lane selection

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and select the corresponding lane based on navigation indication information. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding

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vehicles in its original lane and adjacent lanes, and select the corresponding lane based on navigation indication information. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes part of the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete part of the driving task of corresponding driving lane selection (approaching to the target path, running along the target path at the ramp bifurcation point and entering the target path). The driver controls the SV to select the correct lane.

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of lane selection (approaching to the target path, running along the target path at the ramp bifurcation point and entering the target path), and the driver controls the SV to select the correct lane throughout the whole process.

C.2.5 Passing through an intersection

The scenario of vehicle passing through an intersection can be divided into three stages: before the SV enters the intersection, when the SV stops at the intersection and when the SV passes through the intersection.

A. Before the SV enters the intersection

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and change to the corresponding lane indicated by the navigation system before reaching the solid line of the intersection lane. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and change to the corresponding lane indicated by the navigation system before reaching the solid line of the intersection lane. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and may automatically complete the driving tasks when running to the corresponding lane indicated by the navigation system (changing lane before the solid line at the intersection and completing lane change into the corresponding lane). The SV is controlled by the driver to complete the driving task before entering the intersection.

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks when running to the corresponding lane indicated by the navigation system (changing lanes before the solid line at the intersection and entering the corresponding lane after completing lane change), but runs into the corresponding lane indicated by the navigation system under the control of the driver.

B. When the SV stops at the intersection

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, accurately identify red traffic lights in the driving direction and automatically decelerate to stop. In this process, the SV does not send

out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, accurately identify red traffic lights in the driving direction and automatically decelerate to stop. During this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, automatically complete the driving tasks of identifying red traffic lights (if there is no interfering vehicle ahead) in the driving direction and automatically decelerate to stop. The driver controls the SV to stop at the lane stop line at the intersection.

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of identifying the red traffic lights in the driving direction (if there are no interfering vehicles ahead) and automatically decelerating to stop. The driver controls the SV to stop at the lane stop line at the intersection.

Note 1: If the outer edge of the SV exceeds the stop line after the SV comes to a standstill, it shall be scored at Level 3 or 4 depending on the driving task completed by the SV.

C. When the SV passes through the intersection

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated, i.e. the SV is able to identify surrounding vehicles in its own lane and adjacent lanes. In this process, the SV does not send out a degradation warning or a warning prompt. There are three traffic conditions:

① Case 1: going straight/turning left/turning right - no right-turn dedicated lane + no waiting area

- The SV can accurately identify green traffic lights in the driving direction and start timely;
- When there is no right-turn dedicated traffic light, the SV can accurately and safely pass through the right-turn lane according to traffic rules.

② Case 2: turning right - with right-turn dedicated lane

- When there is no traffic light on the right-turn dedicated lane, the SV can accurately and safely pass through the right-turn lane according to traffic rules;
- When there are traffic lights on the right-turn dedicated lane, the SV can accurately identify the green traffic lights in the driving direction and start timely.

③ Case 3: going straight/turning left - with waiting area

- The SV can accurately identify the waiting area and enter it according to traffic regulations, and can accurately identify green traffic lights in the driving direction and start timely.

b) Tier 2 (scoring rate 90%): The SV completes the driving task with the Level 2 or Level 1 driver assistance system activated. The SV is able to identify surrounding vehicles in its original lane and adjacent lanes. In this process, the SV sends out a degradation warning or warning prompt, including three traffic conditions as above.

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c) Tier 3 (scoring rate 70 % - X): The SV completes the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, automatically complete the driving tasks of identifying traffic lights in the driving direction and responding (if there is no interfering vehicle ahead), or automatically complete the driving tasks of accurately identifying the waiting area and entering the waiting area according to traffic regulations. The SV enters the waiting area or passes through an intersection under the control of the driver.

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task, i.e. the SV cannot automatically complete all driving tasks of identifying traffic lights in the driving direction and responding (if there is no interfering vehicle ahead), or the SV cannot automatically complete all driving tasks of accurately identifying the waiting area and entering it according to traffic regulations. The driver controls the SV to enter the waiting area or pass through an intersection.

Note 2: When the SV is located at the leading position with its Level 2 driver assistance system activated, it can accurately identify green traffic lights and start within 3 s, and the score for Level 1 or Level 2 shall be obtained;

Note 3: When the SV is not located in the leading position with its Level 2 driver assistance system activated, if the SV follows the vehicle ahead to start within 3 s after the vehicle ahead starts, the score for Level 1 or Level 2 shall be obtained;

Note 4: When the SV is located at the leading position with its Level 2 driver assistance system activated and can accurately identify green traffic lights, but starts after more than 3 s, the score for Level 4 shall be obtained;

Note 5: When the SV is not located in the leading position with its Level 2 driver assistance system activated, if the SV follows the vehicle ahead to start after the vehicle ahead starts for more than 3 s, the score for Level 4 shall be obtained.

C.2.6 Passing through a roundabout

The scenario of SV passing through a roundabout may be divided into three stages: entering the roundabout, running inside the roundabout and leaving the roundabout.

A. Entering the roundabout

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and accurately enter the roundabout based on traffic lights (if any). In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and accurately enter the roundabout based on traffic lights (if any). In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may automatically complete the driving tasks of entering the roundabout (accurately identifying and responding to traffic light indications (if any) and entering the roundabout entrance), and the driver controls the vehicle to enter the roundabout;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of entering the

roundabout (accurately identifying and responding to traffic light indications (if any) and entering the roundabout entrance), and the driver controls the vehicle to enter the roundabout.

B. Running inside the roundabout

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and run within the roundabout according to traffic rules. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, and run within the roundabout according to traffic rules. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may automatically complete the driving tasks of running in the roundabout (accurately identifying and responding to traffic light indications (if any), running in the roundabout lane and changing lanes in the roundabout), and the driver controls the SV to run in the roundabout;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of running in the roundabout (accurately identifying and responding to traffic light indications (if any), running in the roundabout lane and changing lanes in the roundabout), and the driver controls the SV to run in the roundabout.

C. Leaving the roundabout

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, correctly follow traffic lights (if any), and select the corresponding roundabout exit based on navigation indication information. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles in its original lane and adjacent lanes, correctly follow traffic lights (if any), and select the corresponding roundabout exit based on navigation indication information. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may automatically complete the driving tasks of leaving and changing lanes (correctly identifying and responding to traffic lights (if any) and leaving the roundabout from the correct exit), and the driver controls the SV to leave the roundabout;

d) Tier 4 (scoring rate 30 %-X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of leaving and changing lanes (correctly identifying and responding to traffic lights (if any) and leaving the roundabout from the correct exit), and the driver controls the SV to leave the roundabout.

C.2.7 U-turn

a) Tier 1 (scoring rate 100 %): The SV completes the driving task with its Level 2 driver assistance system activated. Specifically, the SV is able to identify surrounding

vehicles and correctly perform U-turn driving tasks (entering the U-turn lane, executing the U-turn process and entering the target lane) according to traffic lights (if any) and traffic rules, and avoid targets or target vehicles with collision risks. In this process, the SV does not send out a degradation warning or a warning prompt;

b) Tier 2 (scoring rate 90 %): The SV completes the driving task with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV is able to identify surrounding vehicles and correctly perform U-turn driving tasks (entering the U-turn lane, executing the U-turn process and entering the target lane) according to traffic lights (if any) and traffic rules, and avoid targets or target vehicles with collision risks. In this process, the SV sends out a degradation warning or a warning prompt;

c) Tier 3 (scoring rate 70 % - X): The SV completes the driving tasks with its Level 2 or Level 1 driver assistance system activated. Specifically, the SV may automatically complete the driving tasks of making a U-turn (entering the U-turn lane, executing the U-turn process and entering the target lane), and the driver controls the vehicle to safely complete the U-turn driving task;

d) Tier 4 (scoring rate 30 % - X): The SV fails to complete the driving task. Specifically, the SV cannot automatically complete all driving tasks of making a U-turn (entering the U-turn lane, executing the U-turn process and entering the target lane), but the driver controls the vehicle to safely complete the U-turn driving task.

Note 1: The SV shall not seriously affect the normal passage of vehicles going straight in the opposite direction during the U-turn. "Seriously affect" means that 3 or more vehicles in the opposite direction cannot pass normally.

Note 2: When the normal passage of vehicles going straight in the opposite direction is seriously affected for more than 20 s, the tester shall control the vehicle and continue the test. Refer to Tier 3 or Tier 4 for the score of this scenario.

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