
STANDARDS

1 Introduction

Over the past few years the automotive industry has been actively pursuing the standardization of new automated driving technologies.

Automated driving involves a wide variety of different technical fields such as vehicle-mounted sensors for obtaining road information, road-to-vehicle communication and vehicle-to-vehicle communication, ergonomics that concerns recognition, judgment, and operation, and the vehicle control system. Consequently, examinations of automated driving by standardization organizations representing different fields have begun. These organizations include the ISO (International Organization for Standardization), the IEC (International Electrotechnical Commission), and the ITU (International Telecommunication Union).

In addition, other standardization organizations around the world, such as the SAE (Society of Automotive Engineers) and IEEE (Institute of Electrical and Electronics Engineers) in the United States, and the ETSI (European Telecommunications Standards Institute), CEN (European Committee for Standardization), and CENELEC (European Committee for Electrotechnical Standardization), in Europe are also taking proactive steps to address these issues. Clearly, the battle for global leadership over the standardization of automated driving technologies has risen to the fore.

Furthermore, the specialized operational guidelines (ISO Directives) that specify the rules for ISO development have been revised, with measures such as simplifying the attendant procedures to put more emphasis on rapid standards development adopted to shorten the time required.

2 International Standardization Activities Concerning Automated Driving

Standardization activities related to automated driving

at the ISO are being promoted by TC22 (Road vehicles) and TC204 (Intelligent transport systems). However, due to the fact that automated driving is so deeply intertwined with intelligent transport systems, TC204/WG3 (ITS database technology) and TC204/WG14 (Vehicle/roadway warning and control systems). In WG3 the standards for detailed road map data, dynamic information, and map database specifications for automated driving are being examined. In WG14 the standards for automatic parking systems, automated driving systems within a vehicle lane on a highway (longitudinal and lateral control), and lane changing systems are being examined. In both of these working groups Japan is relying on its position as chair to carry out these standardization activities based on Japan's excellent technical capabilities and proven record of development results.

Even though TC22 is lagging behind TC204, standardization activities related to automated driving have begun on various topics in SC31 (Data communication), SC32 (Electrical and electronic components and general system aspects), SC33 (Vehicle dynamics and chassis components), and SC39 (Ergonomics). SC31 is examining high-capacity data communication, SC32 is examining security engineering and functional safety when the vehicle reaches its performance limits, SC33 is examining automatic braking system performance evaluations, and SC 39 is examining the definitions of terms related to the evaluation indexes and the measurement methods concerning the driving ability and state of readiness of the driver to assume driving control during automated driving. In addition, TC22 has decided to establish the and ad hoc group on automated driving composed of the above sub committees (SCs), to pursue the standardization of automated driving.

3 Automated Driving Standardization activities in JSAE

As previously mentioned, standardization related to

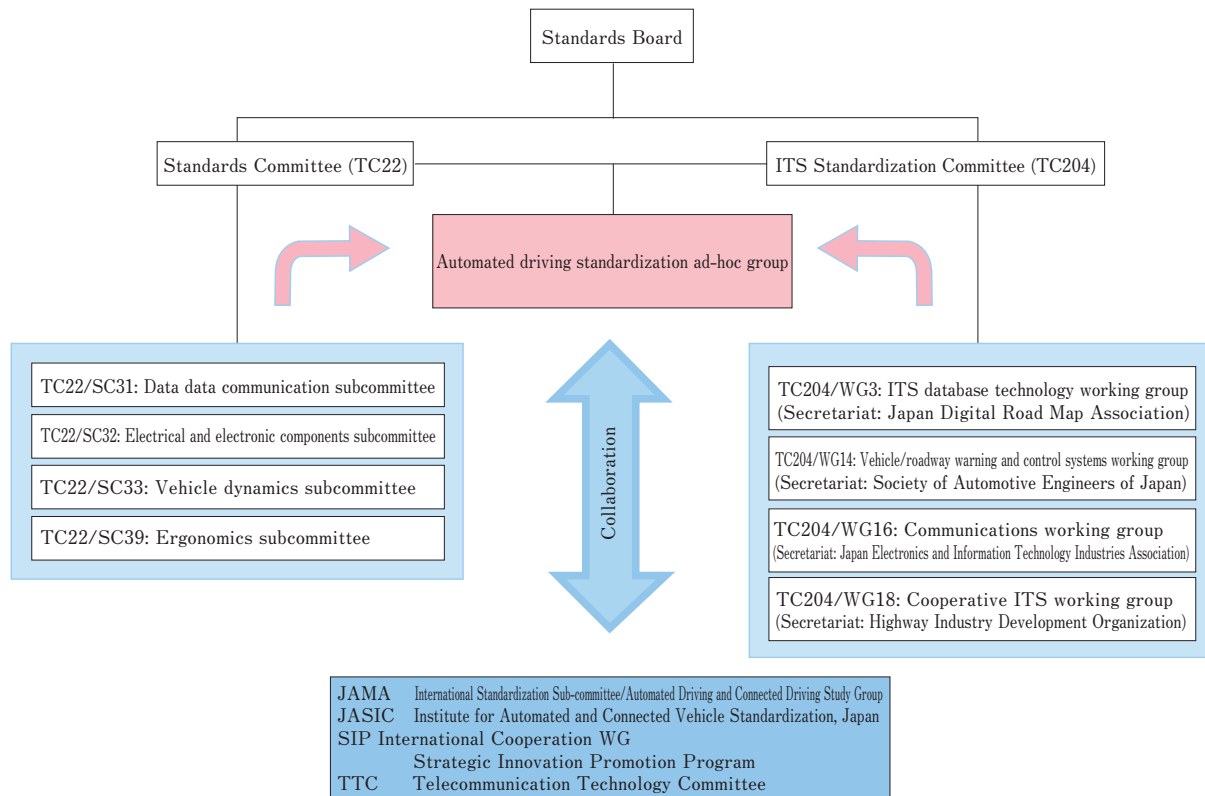


Fig. 1 Automated driving standardization activities in JSAE

automated driving requires the fusion of a wide range of technical fields, and standardization topics related to both TC22 and TC204 are expected to be proposed and developed in the future. In response, the Society of Automotive Engineers of Japan established the automated driving standardization ad-hoc group shown in Figure 1 in 2015.

The ad-hoc group began in 2014 as a liaison committee made up of experts and the chairs of Japanese domestic committees mirroring the TC22 and TC204 ISO activities concerning automated driving. It has since been upgraded to an ad-hoc group that formulates standardization strategies and tactics for Japan. In addition to reflecting the needs of the automotive industry in international standards, this panel is also building a collaborative framework between the International Standardization Sub-committee/Automated Driving and Connected Driving Study Group (of the Japan Automobile Manufacturers Association), the Institute for Automated and Connected Vehicle Standardization, Japan (see note) (of JASIC: Japan Automobile Standards Internationalization Center), the SIP/International Cooperation WG, and the ITU-T Japanese domestic deliberative organization (of

the Telecommunication Technology Committee). This recognizes that international standardization activities other than those at ISO and collaboration with UNECE/WP 29 standardization activities are also necessary.

(Note) Institute for Automated and Connected Vehicle Standardization, Japan: Established in May 2016 by JASIC as a place for inter-disciplinary information sharing and strategy examination for the creation of international rules (Regulations and standards).

4 Collaboration between Regulations and Standards

Standards serve the function of complementing regulations. It is desirable for regulations to be based on already published standards as a means of setting parameters such as reference values, testing methods, and inspection methods. However, for automated driving, working on standards and regulations concurrently is being examined in light of the need to create international rules as early as possible due to the already intense competition to develop the technology. If enforceable regulations are developed first, it is conceivable that standards still under consideration may have to be reworked. To

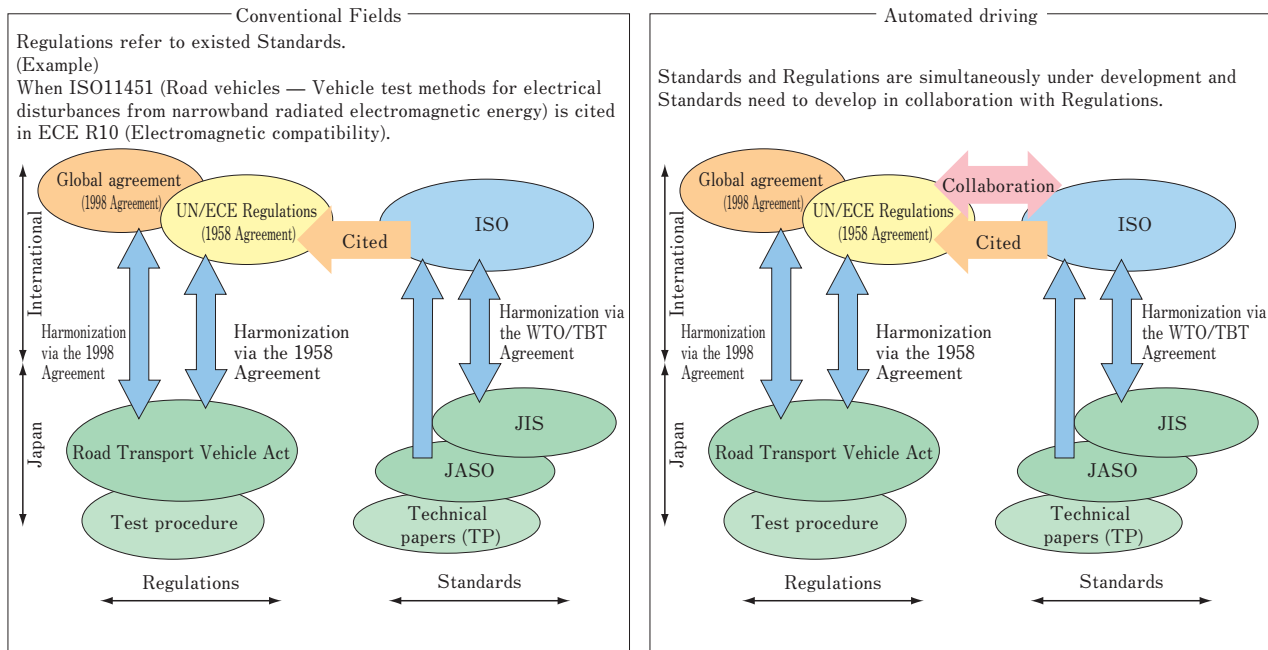


Fig. 2 Coordination between Regulations and Standards Activities

prevent this, an international strategy that commands a bird's-eye view of both standards and regulations is essential, and this makes coordination between standards and regulation activities critical (Fig. 2).

The automated driving standardization ad-hoc group in JSAE also serves as a venue to share international trends in regulations and standards based on the TC22 and TC204 standardization examination framework. The Automated Driving and Connected Driving Study Group (of the Japan Automobile Manufacturers Association) and the Institute for Automated and Connected Vehicle Standardization, Japan will collaborate to create a strategy that can lead the international activities based on the future image of automated driving envisioned by Japan.

5 Future Activities

Although TC204 is currently taking the lead in the international standardization activities for automated driving, the international chair of TC22 has expressed the opinion that this role should be played by TC22. With international standardization organizations other than the ISO, such as the IEC and ITU-T entering the fray, standardization activities are projected to be actively pursued by a variety of organizations and countries.

Under these circumstances, it must have its domestic committees and organizations collaborate under the automated driving standardization ad-hoc group to under-

stand the overall picture of standardization and promote the examination of a roadmap.

Japan must contribute to promote the standardization of various items related to automated driving with the efforts to harmonize the standardization topics of JAMA, as well as coordination between the activities of the Institute for Automated and Connected Vehicle Standardization, Japan and the SIP International Cooperation WG.

6 JASO Standards Published in 2016

This section introduces the standard numbers, names, and scopes of JASO (Japan Automotive Standards Organization) standards and JASO technical papers published or revised in March 2017.

Newly published JASO standards

[E: Motors and engines]

E408: Automotive parts - Engine EGR cooler - Heat dissipation test methods

Scope: This standard specifies the methods of testing the heat dissipation performance of the water-cooled oil cooler for automatic transmission oil and the engine oil used in automotive water-cooled engines.

[M: Material and surface processing]

M362: Automotive diesel engine oils - Fuel consumption test methods

Scope: This standard specifies the fuel consumption

test methods for evaluating the fuel efficiency of the diesel engine oil used in four-stroke automobile diesel engines.

JASO revisions

[C: Chassis parts]

C305-1: Automotive Parts - Non Lead Wheel Balance Weights - Part 1: Clip Type

C305-2: Automotive Parts - Non Lead Wheel Balance Weights - Part 2: Adhesive Type

Scope: These standards specify the lead free wheel balance weights (hereinafter referred to as balance weights) for the clip-type and adhesive-type balance weights used on automobiles. However, they do not apply to the wheels used on two-wheeled vehicles, industrial vehicles, construction vehicles, and agricultural machinery.

C466: Road Vehicles - Brake Stopping Distance Test Procedure

Scope: This standard specifies the measurement method for the stopping distance when the brakes are applied in an automobile. However, it does not apply to two-wheeled vehicles.

C704: Road Vehicles - Steering Effort Test Procedures during Low-speed Turning

Scope: This standard specifies two test methods for evaluating the steering effort when the automobile is turned, from the time the steering wheel begins to be turned while the vehicle is traveling straight forward at low speed until the vehicle completes the turn and the steering wheel is returned to its original position. However, it does not apply to two-wheeled vehicles and special-use vehicles.

[D: Electrical equipment]

D609: Automotive Parts - Current Capacity of Low tension Cables

Scope: This standard specifies the method of determining the allowable current, the reduction coefficient of the allowable current due to cable bundling, and the method of determining the overcurrent limit for the low-voltage cables used in automobiles.

D612-3: Automotive Parts - Fuses - Part 3: Blade-type Electric Fuses

Scope: This standard specifies the details of automotive blade-type fuses with a rated voltage of 32

V or 58 V, a breaking capacity of 1000 A, and a rated current of 100 A or less.

D802: Terminology of Air Conditioners for Automobiles

Scope: This standard specifies the meanings of the major terms used in automotive air-conditioning equipment.

[F: Mechanical elements]

F102: Automotive Parts - Hexagon Nuts

Scope: This standard specifies the details of steel hexagon nuts (hereinafter referred to as nuts) used for automobiles, however it is not applicable to nuts that require weldability, heat resistance to temperatures above 300°C, or cold resistance to temperatures lower than -50°C.

[M: Material and surface processing]

M312: Testing Method of Plastic Parts for Automobiles

Scope: This standard specifies the test method for the general properties of plastic molded parts used for automobiles.

M355: Automotive Diesel Engine Oils

Scope: This standard specifies the quality of the lubricating oils used in four-stroke automobile diesel engines.

[Z: Others]

Z115: Automotive Parts - Test Method for Air Conditioner Condenser Dissipation Performance

Z116: Automotive Parts - Test Method for Air Conditioner Evaporator Cooling Performance

Z120: Automotive Parts - Test Method for Air Conditioner Subcooling-Condenser Dissipation Performance

Scope: These standards specify the methods for testing the heat dissipation performance of condensers using HFC-134a and HFO-1234yf refrigerants that are used in automobile vapor-compression type air conditioners, as well as testing the cooling performance of the evaporators and the heat dissipation performance of the subcooling condensers (condensers with a supercooling area).

Newly Published JASO Technical Papers

TP17001: Road Vehicles - Deviation Guidance to Ensure Compliance with the MISRA-C Software Development Guidelines for the C Programming Language

Scope: This technical paper specifies the guidelines that describe the processes for identifying those items allowed to deviate from, and the process of verifying proper compliance with, JASO-TP 01002 (MISRA guidelines) for strictly compliant operation.

JASO Technical Paper Revisions

TP01002: Road Vehicles – Guidelines for the C Programming Language for Automobiles (2nd Edition) – Allowable Deviation from Guidelines and MISRA Compliance

Scope: MISRA C: 2004 was the basis of this Technical Paper, but there were no deviation stipulations in the past, so deviation guidelines examined by JAMA were included to ensure compliance with MISRA. However, in 2016 MISRA officially published the MISRA C: 2004 Permits, leading to the replacement and revision of the standard.

7 JIS Established in 2016

This section introduces the standard numbers, names, and applicable scopes of JIS (Japanese Industrial Standards) standards published (established or revised) in up to the end of March 2017.

Newly Published JIS

D 1024-1: Test Methods for Noise Emitted by Acceler-

ating Road Vehicles – Part 1: M and N Categories

Scope: This standard specifies the engineering method for measuring the noise generated by vehicles in categories M and N in a normal urban driving environment, it excludes vehicles in category L.

D 1024-2: Test Methods for Noise Emitted by Accelerating Road Vehicles – Part 2: L Category

Scope: This standard specifies the engineering method for measuring the noise generated by two-wheeled vehicles under normal urban traffic conditions.

JIS Revisions

D 1614: Radiator for automobiles - Test method of heat dissipation

Scope: This standard specifies the testing method for the heat dissipation of a radiator for engine coolant intended to be used in water-cooled automobile engines.

D 6605: Road vehicles - Pneumatic braking connections between motor vehicles and towed vehicles

Scope: This standard specifies the hose coupling to be used for connecting the piping of the air brake of a truck tractor and the piping of the air brake of the trailer.