



American Association of
Motor Vehicle Administrators

JURISDICTIONAL GUIDELINES FOR THE SAFE TESTING AND DEPLOYMENT OF HIGHLY AUTOMATED VEHICLES



**VEHICLE STANDING COMMITTEE
AUTONOMOUS VEHICLES BEST PRACTICES WORKING GROUP**

Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles *contains voluntary recommendations for jurisdictions that choose to regulate testing and deployment of Highly Automated Vehicles (HAVs). It addresses how automated vehicle technology will directly impact vehicle registration and titling programs; driver training, testing and licensing programs; enforcement of traffic law; and first response to traffic related incidents.*

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Introduction

In recent years, manufacturers and other technology companies began testing HAVs on public roadways, prompting the need for jurisdictions to explore ways to regulate this emerging technology to ensure safety of the motoring public. Jurisdictional implementation of the recommendations in the guidelines will facilitate a consistent regulatory framework that balances current public safety with the advancement of vehicle innovations, establishing the potential to reduce crashes, fatalities, injuries, and property damage.

A successful path to the safe testing and deployment of HAVs must include appropriate government oversight developed in coordination with strong stakeholder engagement formed through partnerships with the many entities engaged in or affected by these rapidly developing technologies.

Chapter 1 – Introduction

The Autonomous Vehicles Best Practices Working Group (AVWG) examined the potential impacts of HAV testing and deployment on jurisdictions, and began developing guidelines that will facilitate a consistent regulatory framework that balances current public safety with the advancement of vehicle innovations, all with the intention of reducing crashes, fatalities, injuries and property damage.

The full report addresses the four key areas below, and offers guidelines related to testing vehicles and deployed vehicles as they relate to key areas, as well as the benefits and challenges to guideline implementation.

- Administrative Considerations
- Vehicle Credentialing Considerations
- Driver Licensing Consideration
- Law Enforcement Considerations

Although critical to the testing and deployment of HAVs, there are several topics outside of the scope of this report. A full list can be found in Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles, p. 7.

Chapter 2 – Automated Vehicle Classification, Terms, Acronyms, and Technologies

This chapter provides an explanation of the common terms used to identify and differentiate HAVs of varying capabilities (at the time this report was published). It's important to note for the purposes of these guidelines that vehicles are classified within a six-level system—from Level 0 indicating No Driving Automation to Level 5 indicating Full Driving Automation. Most of the guidelines in this document address Level 3, 4 and 5 automation, which are referred to as Highly Automated Vehicles in this report. Additionally, this report doesn't define the specific technologies or proprietary terms used by manufacturers, but it does provide definitions of industry jargon and acronyms to help jurisdictions understand the guidelines, the HAV industry and its technology.

Various resources, such as www.mycardoeswhat.org, provide information and videos of specific vehicle technologies.

Chapter 3 – Administrative Considerations

A lead agency should be identified within each jurisdiction to address HAV testing and deployment within its borders and establish a jurisdictional HAV committee containing key representatives from government, regulator and industry organizations and authorities. The committee should develop strategies and recommendations for the jurisdiction, examine current laws and regulations, share information about the industry as technology continues to advance and revisit its recommendations as necessary.

Several national associations are engaged and working together on HAVs and are available for additional support to jurisdictional government officials, including AAMVA, The Council of State Governments (CSG), the National Conference of State Legislatures (NCSL), the Governors Highway Safety Association (GHSA), the National Governors Association (NGA), the American Association of State Highway and Transportation Officials (AASHTO,) and the International Chiefs of Police (IACP).

Chapter 4 – Vehicle Credentialing

This chapter addresses how automated vehicle technology will directly impact vehicle permitting for testing, registration, titling programs, license plates, financial responsibility and vehicle safety standards.

Chapter 4.1 – Application and Permit for Manufacturers or Other Entities to Test Vehicles on Public Roadways

Some jurisdictions may opt to require a permit for testing HAVs. Manufacturers and other entities testing vehicles with Level 3, 4 and 5 automated technology should apply for, and be issued, vehicle specific test permits. The application process should provide sufficient background for jurisdictions and law enforcement to know who, how, where and what testing is being conducted.

A complete list of recommended information to collect during the HAV testing application process is offered in Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles, pp. 16-17.

Chapter 4.2 – Vehicle Registration

This chapter lists recommendations for jurisdictions regarding registering HAVs, including establishing uniform language, indicating key components of automated capabilities and recognizing documents from other jurisdictions.

Vehicle registration credentials and records are basic tools that enable identification of a vehicle and its owner. As testing and deployment of HAVs expand, the need for owner and vehicle information is necessary to distinguish these vehicles in mixed-fleet operations.

Chapter 4.3 – Titling and Branding for New and Aftermarket Highly Automated Vehicles

Titling and branding is a subject jurisdictions should be considering. Jurisdictions should record and maintain the vehicle's information, either through their titling process or by recording vital information in the registration record. Additionally, titles for vehicles with added aftermarket components enabling HAV functionality should be branded as "highly automated vehicle."

Chapter 4.4 – License Plates

It is recommended that jurisdictions not require a special license plate for HAVs however, if a jurisdiction chooses to do so, the plates should be designed in accordance with the AAMVA License Plate Standard. Any jurisdiction that adopts a license plate design specifically for HAVs should design the plates for optimal legibility to the human eye and automated license plate readers (ALPRs).

Chapter 4.5 – Highly Automated Vehicle Information on the Manufacturer’s Certificate of Origin and Manufacturer’s Statement of Origin

Because MCO, MSO or NVIS documents are used by the vast majority of jurisdictions for titling and registering new motor vehicles, these guidelines recommend that jurisdictions not initiate a process for titling test vehicles if the jurisdiction does not already require this protocol.

Chapter 4.6 – Financial Responsibility

Jurisdictions should ensure adequate insurance is in place to protect both the occupants of an HAV and other road users. Motor vehicle regulators should monitor legal trends to ensure minimum requirements and limits stay relevant and appropriate.

Chapter 4.7 – Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS)

Jurisdictions should consider requiring manufacturers or other entities testing HAVs to certify the vehicles comply with all applicable FMVSS or CMVSS – minimum safety performance requirements or are exempt from the regulations. This will ensure HAVs tested on public roadways and sold to consumers meet minimum federal safety standards.

As technology and vehicle designs evolve, it will be important for FMVSS and CMVSS to keep pace. Jurisdictions need to partner with federal agencies to assist and support the common goal of encouraging technological innovation while increasing safety and mobility.

Chapter 5 – Driver Licensing Considerations

This chapter provides recommendations related to how automated vehicle technology will directly impact driver training, driver testing and licensing programs.

Chapter 5.1 – Driver and Passenger Roles Defined

All stakeholders should use common terminology and definitions for HAVs to ensure effective communication. To that end, they should use the SAE International definitions as provided in Chapter 2 of *Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles*—e.g., using “passenger” to indicate a user who has no role in the operation of the vehicle.

Chapter 5.2 – Driver License Requirements for Testing by Manufacturers and Other Entities

This section offers guidelines to help jurisdictions manage testing of HAVs (Level 3, 4 and 5) by manufacturers and other related entities, including who can operate them, who can be a passenger, what laws should be enacted, what training should be required, equipment requirements and terminology.

Jurisdictions will need to take the appropriate steps to ensure that their motor vehicle laws allow for the testing of Level 3, 4, and 5 vehicles, and for Level 4 and 5 vehicles by someone who is not a driver.

Chapter 5.3 – Driver Training for Consumers of Deployed Vehicles

As HAVs are deployed and become available to the public, drivers will need proper training. Consumers who are properly educated on the HAV functions, limitations, and capabilities of their vehicle, including how to engage and disengage the system functions,

risks of misuse, and how to deal with emergency situations related to the HAV, will support the safe deployment of HAVs.

Chapter 5.4 – HAV Driver Training for Motor Vehicle Agency Examiners, Driver Education Programs, and Private Instructors

With the rapid development of vehicle technology, it is critical for driver license examiners, driver education programs and instructors to keep up with the advancements. Likewise, the driver license testing process should be updated regularly to include new technologies as they are deployed.

Chapter 5.5 – Driver License Skills Testing with Automated Vehicle Technologies

Jurisdictions should determine which technologies in vehicles may be used during driver license testing – for both convenience technologies (e.g., parking assist

National organizations that play a key role in the development of curricula and teacher/instructor training include the American Automobile Association (AAA), American Driver and Traffic Safety Association (ADTSEA) and the Driving School Association of the Americas (DSAA).

features or auto-cruise control) that do not require a driver license applicant to demonstrate a required skill set and safety critical technologies (e.g., backup or other cameras, alerts, etc.) that can be engaged for testing.

Chapter 5.6 – Endorsements and Restrictions for Deployed Vehicles

Vehicles with Level 4 and 5 functionality are expected to enhance the mobility of those unable to drive or be licensed because of physical disability, age or some other condition. However, the full implication of the technology is not yet known. While laws and regulations should be reviewed, driver license endorsements or restrictions are not recommended at this time.

A complete explanation of recommendations regarding skills testing can be found in Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles, pp. 29-31.

Chapter 6 – Law Enforcement Considerations

This chapter addresses how automated vehicle technology will directly impact enforcement of traffic laws and first response to traffic related incidents.

Chapter 6.1 – Crash and Incident Reporting

Crash reporting should occur whenever there are crashes or incidents between HAVs and other vehicles, persons, animals or objects, whether or not the HAV is responsible. Reports, including recorded data and analysis, should be required by manufacturers, law enforcement and other entities.

Chapter 6.2 – Criminal Activity

Automated vehicles have the potential to improve driving safety and make mobility more efficient. However, they will also create greater possibilities for dual use applications and ways for a vehicle to be used to further criminal enterprises.

Large amounts of data are captured by automated vehicles' event data recorders (EDRs). EDR information can aid in crash investigations by revealing pre- and post-crash causative factors and actions.

Chapter 6.3 – Distracted Driving

The reduction or elimination of visual, manual and cognitive distractions are a powerful argument in favor of HAVs. However, jurisdictions should evaluate their distracted driving laws and regulations to determine at what level they continue to apply, and ensure law enforcement is familiar with the appropriate levels of automation.

The impact of distractions on driving is determined not just by the type of distraction but also the frequency and duration of the task. Some research has shown that drivers underestimate the overall risk of various tasks.

Chapter 6.4 – Enforcement of Permit Conditions

If jurisdictions establish a permitting process (see *Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles*, Chapter 4.1), the process should include provisions for suspension or revocation of any permit to test on public roads should permit holders violate permit conditions.

The jurisdictions should also consider the imposition of penalties if the testing entity continues to operate or test in violation of that suspension or revocation order.

Chapter 6.5 – Establishing Operational Responsibility and Law Enforcement Implications

Because jurisdictions typically only have legal authority to regulate vehicle operation by humans, it may be difficult to enforce traffic laws and establish legal responsibility when Level 3 to 5 vehicles are involved in crashes on public roads. Jurisdictions need to clearly establish enforcement actions and responsibility guidelines.

Chapter 6.6 – First Responder Safety

Due to the potential for unique operational characteristics of HAVs, responders to these crashes may be placed at risk if they are not trained to identify automated vehicles and handle the hazards they may encounter, including silent operation, self-initiated or remote ignition, high voltage and unexpected movement.

Accurate identification of HAVs at crash scenes may prevent unnecessary injuries or deaths of emergency personnel who respond to crash scenes and to the public at large involved in or near crash scenes.

Chapter 6.7 – Law Enforcement and First Responder Training

Detailed training and education for law enforcement and first responders regarding HAVs is critical. Jurisdictions should work with manufacturers' consumer training programs to make them available to first responders at no cost to agencies.

Chapter 6.8 – Vehicle Response to Emergency Vehicles, Manual Traffic Controls, and Atypical Road Conditions

HAVs operated on public roads, both during testing and deployment, must be able to recognize and properly respond to all temporary traffic controls and atypical hazards.

Chapter 6.9 – System Misuse and Abuse

The nature of automated vehicle technology has wide-ranging implications regarding use, misuse and abuse. Both the vehicle behavior and the driver–

Examples of abuse of automated vehicle technology range from criminal transportation, such as drug running, to cybersecurity breaches or terrorism.

vehicle interface should be recorded by the vehicle to identify the actions of the vehicle and the actions (or lack thereof) by the driver. This recording mechanism should include GPS and time information to allow investigators to ascertain what occurred, where and when.

Chapter 6.10 – Vehicle Identification

The ability to identify an HAV easily is a safety issue for law enforcement and first responders. Vehicle labeling, or permanent marking of automated vehicles, both inside and outside by the original equipment manufacturer (OEM), would improve conspicuity from multiple vantage points.

Chapter 6.11 – Adherence to Traffic Laws

There are always exigent circumstances, and HAVs should be able to navigate them accordingly, but it is critical for HAVs to adhere to traffic laws and speed limits.

The Transportation Research Board (TRB) has undertaken a project to assist jurisdictions with updating their motor vehicle codes as HAV technology evolves. See TRB project (NCHRP20-102(07) Implications of Automation for Motor Vehicle Codes for more information.

Chapter 7 – Next Steps

Because HAV technology is rapidly evolving, the AVWG intends to:

- Continue to work closely with government entities, as well as industry and research stakeholders
- Maintain close contact with national associations supporting transportation agencies
- Follow up on recommendations with manufacturers and NHTSA

- Attend and present at conferences, seminars and other forums focused on technology and public policy
- Assist jurisdictions to understand HAV technology and implement recommended guidelines
- Assist the AAMVA Test Maintenance Subcommittee in updating its model driver manuals, knowledge tests and skills tests
- Assist the AAMVA IDEC Board in updating its driver license examiner training materials
- Periodically update *Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles*, including to address commercial HAVs and HAV fleet ownership, safety inspections, MVA staff training and other topics as they arise

Appendices A and B of Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles provide summaries of recommended jurisdictional and manufacturer guidelines.

Conclusion

A successful path to the safe testing and deployment of HAVs must include appropriate government oversight developed in coordination with strong stakeholder engagement. These organizations and partnerships should address the far-reaching impact of swiftly evolving automated vehicle technology and continue to address its safety and policy implications.

About AAMVA Autonomous Vehicle Working Group (AVWG)

The Autonomous Vehicle Working Group was formed to examine the potential impacts of highly automated vehicle (HAV) testing and deployment on motor vehicle and law enforcement communities and to develop appropriate guidance. Its membership includes representatives from DMVs, public safety organizations, law enforcement, and other government officials.

**safe drivers
safe vehicles
secure identities
saving lives!**



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