



Inspecting CMVs with Automated Driving Systems

September 2019

Who is CVSA?



The Commercial Vehicle Safety Alliance (CVSA) is a nonprofit association comprised of local, state, provincial, territorial and federal commercial motor vehicle safety officials and industry representatives. The Alliance aims to achieve uniformity, compatibility and reciprocity of commercial motor vehicle inspections and enforcement activities by certified inspectors dedicated to driver and vehicle safety.

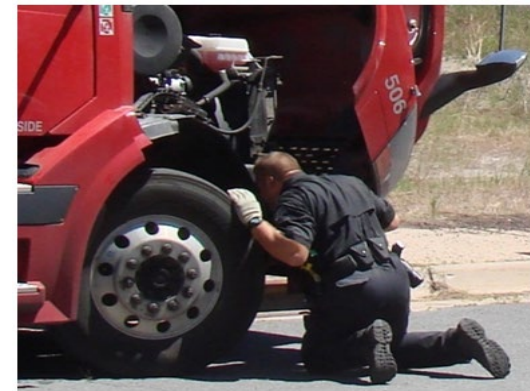
NAS Inspection Program Today



Overview

- 13,000+ CVSA-certified Inspectors
 - 800,000+ Law Enforcement Personnel
- Over 1,400 Fixed Facilities
- Mobile Patrols
- 4 Million Roadside* Inspections Annually

*Roadside = vehicle, driver or both;
fixed facility, traffic enforcement stop,
ports of entry, points-of-
origin/destination combined



NAS Inspection Process

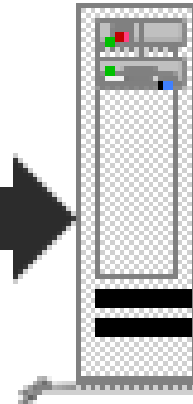
Location



Inspection Level

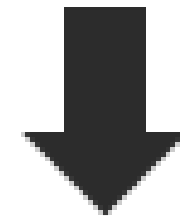


Data Upload



*Motor Carrier
Management
Information
System (MCMIS)*

Data Processing



NAS Inspection Levels



- Level I – Driver/Vehicle Inspection
- Level II – Walk-Around Driver/Vehicle Inspection
- Level III – Driver Only Inspection
- Level IV – Special Studies Inspection
- Level V – Vehicle Only Inspection
- Level VI – Select Radiological Activities Inspection
- Level VII – Jurisdictional Mandated Inspection
- Level VIII – Electronic Inspection



- Crash Data and Investigation Standards
- Driver-Traffic Enforcement
- Enforcement and Industry Modernization
- Hazardous Materials
- Information Systems
- Passenger Carrier
- Policy and Regulatory Affairs
- Size and Weight
- Training
- Vehicle

- In April 2016, the CVSA Enforcement and Industry Modernization (EIM) committee held its first meeting, after being created by CVSA Board to address emerging vehicle technologies and latest in enforcement tools

A brief history...

- Summer 2016 – 120 mile highway demonstration of OTTO self-driving truck in Colorado helped bring new questions to the table.



- April 2017, EIM committee approved an electronic Level VIII inspection
- In September 2018 CVSA EIM committee appointed an Automated Commercial Motor Vehicle working group of regional jurisdictions, associates and federal participants to develop first phase concept of inspection of a vehicle with an automated driving system.

Automated CMV Working Group



- Representation
 - 5 enforcement member region representatives
 - CVSA associates
 - CVSA local agencies
 - Federal Partners
- FMCSA support contract providing technical support from MaineWay, Cambridge Systematics.
- Meeting monthly
- Conducting interviews among companies in the automated truck space
- Phase 1 inspection approaches to be considered at CVSA Annual Conference Sept. 23-26

Inspection Procedures



Inspection Procedure
North American Standard Level I

For Levels II, III, IV and V, omit steps that do not apply.
For more detailed information, see the written procedures contained in the CVSA Operations Manual.

1 Choose the Inspection Site

- Select a safe location, it should be paved, level, away from yet visible to traffic and able to support the weight of the vehicle.
- Avoid hills, curves, soft shoulders and construction sites.

2 Approach the Vehicle

- Observe the driver.
- Adhere to inspector safety policies.
- Be alert for leaks and unsecured cargo.

3 Greet and Prepare Driver

- Identify yourself.
- Ensure the driver understands and is able to respond to inquiries and directions.
- Place chock blocks on the driver's side.
- Explain the inspection procedure.
- Ensure engine is off.
- Check seat belt usage and condition.
- Observe the driver's overall condition for illness, fatigue or other signs of impairment.
- Check for illegal presence of alcohol, drugs, weapons or other contraband.

4 Interview Driver

- Ask the driver for starting location, final destination, load description, time traveled, most recent stop and fueling location(s).
- Ask the driver what other jobs he/she has worked in the past week.

5 Collect the Driver's Documents

- Collect Medical Examiner's Certificate and Skill Performance Evaluation (SPE) Certificate (if applicable).
- Collect driver's license or commercial driver's license (CDL) and record of duty status.

6 Check Record of Duty Status

- Check hours of service verification.
- If driver claims to be exempt, check that driver meets all criteria for said exemption(s).
- Check accuracy of record.

7 Review Driver's Daily Vehicle Inspection Report (if Applicable)

- Review the required vehicle inspection report to verify that listed safety defects have been repaired.

8 Review Periodic Inspection Report(s)

- Ensure vehicle has passed the required inspection and has the required documents and decals.

9 Prepare Driver for Vehicle Inspection

- Explain the vehicle inspection procedure.
- Advise the driver of the use of hand signals.
- Check the chock blocks, have the driver put the vehicle transmission in neutral, release all the brakes, ensure the air pressure is at maximum, turn engine off and ensure the key is in the "on" position.
- Instruct the driver to remain at the controls.

10 Inspect Front of Tractor

- Check headlights, turn signals (do not use four-way flashers to check turn signals) and all other required lamps for improper color, operation, mounting and visibility.
- Check windshield wipers and washers for proper operation.
- Check the function of the horn.

11 Inspect Left Front Side of Tractor

- Check front wheel, rim, hub and tire.

12 Check Shipping Papers

- Collect shipping papers, markings, labels and placards.
- Check for any leaking material or unsecured cargo.

13 Check for the Presence of Hazardous Materials/Dangerous Goods

- Check shipping papers, markings, labels and placards.
- Check for any leaking material or unsecured cargo.

14 Identify the Carrier

- Identify the carrier by using vehicle identification, vehicle registration, insurance, operating authority and driver interview.

15 Examine Driver's License or CDL

- Check the driver's license or CDL expiration date, class, endorsements, restrictions and status.

16 Check Medical Examiner's Certificate and Skill Performance Evaluation (SPE) Certificate (if Applicable)

- Check certificate(s) date (may be valid for up to 24 months).
- Check corrective lens requirement.
- Check hearing aid requirement.
- Check physical limitations.

17 Check Record of Duty Status

- Check hours of service verification.
- If driver claims to be exempt, check that driver meets all criteria for said exemption(s).

www.cvsa.org
© 2017 Commercial Vehicle Safety Alliance All rights reserved.

Inspection Procedure
North American Standard Passenger Carrier Vehicle

For Levels II and V, omit steps that do not apply.
For more detailed information, see the written procedures contained in the CVSA Operations Manual.

1 Inspection Preparation (Team Leader)

- Select vehicle and direct it to the inspection location.
- Gather preliminary information from the vehicle for the inspection report, including the license plate number and state/province/territory and country, company name as shown on the vehicle, company number, appropriate DOT, PUC/PSC number, appropriate state, and the time the inspection identifies, etc., and the time the inspection began. Verify the company operator, not the tour company or leasing company, the tour company or leasing company.
- Note: Communication is paramount between the inspector(s) and the driver.

2 Greet and Prepare the Driver and Passengers (Team Leader)

- Identify yourself.
- Explain the inspection procedure.
- Ensure engine is off.
- Check seat belt usage and condition.
- Observe the driver's overall condition for illness, fatigue or other signs of impairment.
- If passengers are present, explain the purpose of the inspection and how it will be conducted.

3 Collect Driver's Documents (Team Leader)

- Collect commercial driver's license (CDL) and record of duty status.
- Collect Medical Examiner's Certificate and Skill Performance Evaluation (SPE) Certificate (if applicable).
- Collect periodic inspection certificates, CVP.
- Collect supporting documents: bills of lading, receipts, other documents used to verify record of duty status, trip information, tour itinerary, trip envelope and charter order.

4 Interview the Driver (Team Leader)

- Ask the driver for starting location, final destination, load description, time traveled, most recent stop and fueling location(s).
- Ask the driver what other jobs he/she has worked in the past week (many drivers are part time).
- Check for presence of hazardous materials/dangerous goods.

5 Identify the Carrier (Team Leader)

- Identify carrier by using vehicle identification, vehicle registration, insurance and driver interview.
- Check interline agreements/operating authority.

6 Examine Commercial Driver's License (Team Leader)

- Check the expiration date, class, endorsements, restrictions and status.

7 Check Medical Examiner's Certificate and Skills Performance Evaluation (SPE) Certificate (if Applicable) (Team Leader)

- Check certificate(s) date, which may be valid for up to 24 months.
- Check corrective lens requirement.
- Check hearing aid requirement.
- Check physical limitations.
- Note: The medical qualifications may be contained in the driver's license. Proper class indicates adequate medical requirements.

8 Check Record of Duty Status (Team Leader)

- Check hours of service verification.
- Check accuracy of record.

9 Review Vehicle Inspection Reports (Team Leader)

- Check driver's daily vehicle inspection report (if applicable).
- Review the vehicle inspection report to verify that listed safety defects have been certified as corrected.

www.cvsa.org
© 2017 Commercial Vehicle Safety Alliance All rights reserved.

Inspection Procedure
Antilock Brake System (ABS) - U.S. Field Reference

Performing antilock brake system (ABS) inspections, whether on a single unit or combination vehicle, requires determining applicability of regulations using the dates of vehicle manufacture, confirming whether the ABS malfunction lamp is on, and the procedures for inspecting ABS on all vehicles and combinations in the United States. When required ABS malfunction lamps do not function or remain on, please refer to the Antilock Brake System (ABS) Inspection Bulletin for additional information on how to record and assign violations.

START HERE

- Is the truck/tractor manufactured before March 1, 1997, or truck/bus before March 1, 1987?
 - YES: ABS malfunction lamp on dash must cycle on then off when key is turned on.
 - NO: CONTINUE FOR TOWED UNITS

CONTINUE FOR TOWED UNITS

- Is the power unit manufactured before March 1, 2007?
 - NO: CONTINUE FOR TOWED UNITS
 - YES: Is the trailer/ably manufactured before April 1, 2007?
 - NO: Trailer-mounted ABS malfunction lamp must cycle on then off when power is applied. Have the driver apply service brake and hold. If the trailer light doesn't cycle, disconnect and reconnect electrical power to trailer (this ensures ABS circuit is interrupted for trailers receiving full-time power). ABS malfunction lamp on trailer must cycle when power is restored.
 - YES: Is the trailer/ably manufactured before April 1, 2007?
 - NO: No ABS required on power unit. Continue for towed units.
 - YES: Is trailer/ably manufactured before April 1, 2007?
 - NO: No ABS required on towed unit. *See Note
 - YES: Trailer-mounted ABS malfunction lamp must cycle on then off when power is applied. If the trailer ABS malfunction lamp doesn't cycle with the key on, disconnect and reconnect electrical power to trailer (this ensures ABS circuit is interrupted for trailers receiving full-time power). ABS malfunction lamp on trailer must cycle when power is restored.

NOTE: If multiple units on a vehicle exempt from ABS requirements must have functional ABS until ABS malfunction lamp cycles on then off upon service brake application.

www.cvsa.org
© 2017 Commercial Vehicle Safety Alliance All rights reserved.

Inspection Procedure
Antilock Brake System (ABS) - Canadian Field Reference

Performing antilock brake system (ABS) inspections, whether on a single unit or combination vehicle, requires determining applicability of regulations using the dates of vehicle manufacture, confirming whether the ABS malfunction lamp is on, and the procedures for inspecting ABS on all vehicles and combinations in Canada. When required ABS malfunction lamps do not function or remain on, please refer to the Antilock Brake System (ABS) Inspection Bulletin for additional information on how to record and assign violations.

START HERE

- Is truck, bus or truck/tractor manufactured before April 1, 2007?
 - YES: No ABS required on power unit. Continue for towed units.
 - NO: ABS malfunction lamp on dash must cycle on then off when key is turned on.

CONTINUE FOR TOWED UNITS

- Is the power unit manufactured before March 1, 2007?
 - NO: CONTINUE FOR TOWED UNITS
 - YES: Is the trailer/ably manufactured before April 1, 2007?
 - NO: Trailer-mounted ABS malfunction lamp must cycle on then off when power is applied. Have the driver apply service brake and hold. If the trailer light doesn't cycle, disconnect and reconnect electrical power to trailer (this ensures ABS circuit is interrupted for trailers receiving full-time power). ABS malfunction lamp on trailer must cycle when power is restored.
 - YES: Is the trailer/ably manufactured before April 1, 2007?
 - NO: No ABS required on power unit. Continue for towed units.
 - YES: Is trailer/ably manufactured before April 1, 2007?
 - NO: No ABS required on towed unit. *See Note
 - YES: Trailer-mounted ABS malfunction lamp must cycle on then off when power is applied. If the trailer ABS malfunction lamp doesn't cycle with the key on, disconnect and reconnect electrical power to trailer (this ensures ABS circuit is interrupted for trailers receiving full-time power). ABS malfunction lamp on trailer must cycle when power is restored.

NOTE: If multiple units on a vehicle exempt from ABS requirements must have functional ABS until ABS malfunction lamp cycles on then off upon service brake application.

www.cvsa.org
© 2017 Commercial Vehicle Safety Alliance All rights reserved.

Critical Vehicle Inspection Items



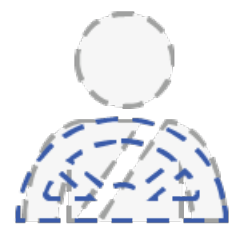
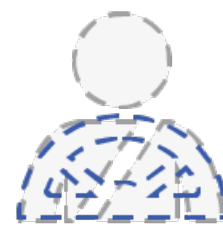
- Brake Systems
- Cargo Securement
- Coupling Devices
- Driveline/Driveshaft
- Exhaust Systems
- Frames
- Fuel Systems
- Lighting Devices
 - Turn Signals, Brake/Tail/Headlamps, Lamps on Projecting Loads
- Steering Mechanisms
- Suspensions
- Tires
- Van and Open-Top Trailer Bodies
- Wheels, Rims and Hubs
- Buses, Motorcoaches, Passenger Vans or Other Passenger Carrying Vehicles
 - Windshield Wipers and Emergency Exits and/or Electrical Cables/Systems in Engine/Battery Compartments/Seating

SAE J3016 Levels of Automation



SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation



0

No Automation

Zero autonomy; the driver performs all driving tasks.

1

Driver Assistance

Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

2

Partial Automation

Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

3

Conditional Automation

Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

4

High Automation

The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

5

Full Automation

The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Critical Vehicle Inspection Items



- Brake Systems

Whether an automated driving system is a critical inspection item suddenly depends heavily on what level of automation is at hand!

Is there still a driver onboard? Is there a remote driver?

- Turn signals, Brake/Tail/Headlamps, Lamps on Projecting Loads

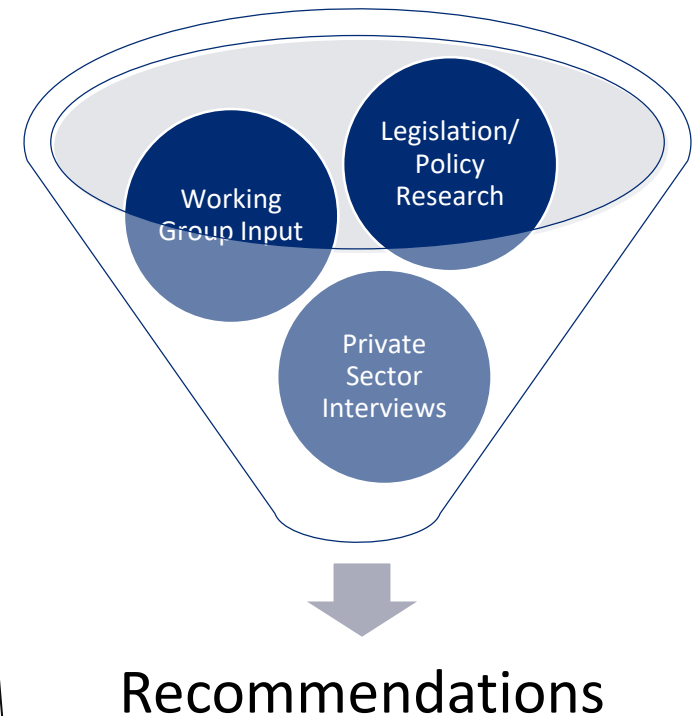
Other Passenger Carrying Vehicles

- Windshield Wipers and Emergency Exits and/or Electrical Cables/Systems in Engine/Battery Compartments/Seating

Preview of Phase I Recommendations to CVSA EIM Committee Sept.25 (not yet finalized)



- **Process:**
 - Researched current and planned ADS deployments and technology, policy, and legislation
 - Reviewed existing enforcement procedures
 - Interviewed industry stakeholders
- **Recommendations**
 - Keep it simple – don't make enforcement personnel become engineers
 - SAE Level 1-3 – Require an ADS malfunction indicator
 - SAE Level 4-5 – Require vehicle to report electronically that it has passed an origin/destination (terminal) inspection while en-route. Limit roadside inspections
- **Next Steps**
 - Accept Working Group recommendations and advance within CVSA
 - Will eventually necessitate NHTSA/FMCSA involvement



Meanwhile, possible components of the inspection methodologies needed for automated vehicles may already be in our vocabulary:

- Smart Roadside Initiative
- Wireless Roadside Inspection
- Dedicated Short Range Communications (DSRC) and 5.9 GHz
- Universal Electronic Vehicle ID
- Updated MMUCC (future edition)
- CVSA Level VIII inspection concept

- Location, including GPS coordinates,
- Electronic validation of who is operating the vehicle;
- Appropriate driver's license class and endorsement(s)
- License status,
- Valid medical examiner's certificate,
- Skill Performance Evaluation (SPE) Certificate;
- Current driver's record of duty status;
- Hours of service compliance;
- DOT or NSC number,
- Power unit registration;
- Operating Authority;
- Unified Carrier Registration (UCR) compliance;
- Federal Out-of-Service Orders.



Will Schaefer, Director of Safety Programs

Email: WilliamS@cvsa.org

Phone: (301) 830-6154