



Anticipating Your Fleet's Brake Maintenance Needs

*How PBBT's Improve Brake Inspection Processes
and Reduce Vehicle Downtimes*

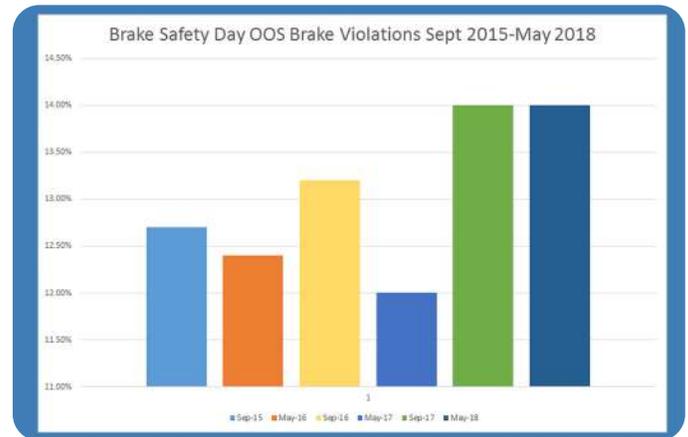
Featuring Commentary from Indiana State Police
& Research Studies from CVSA



The Problem with Brakes

Brakes are one of the most critical components of a transit vehicle. However, brake violations are one of the biggest reasons commercial vehicles are placed out-of-service. With changing designs of passenger carrier vehicles and aerodynamic accessories, it has become harder to perform visual inspections. Due to the continued problems with brakes, many organizations are finding ways to give transit operators more resources to improve their commercial motor vehicle safety. It is imperative that transit operators are informed about the latest out-of-service criteria.

The Commercial Vehicle Safety Alliance (CVSA) publishes the North American Standard Out-of-Service Criteria Handbook every year which covers the 8 levels of inspection, and includes brake testing procedures. The CVSA website and the inspection program book both cover the pass-fail criteria for each type of inspection in detail¹. CVSA hosts a Brake Safety Day program and training events throughout the year to keep agencies up to date with inspection expectations.



As demonstrated above, the percentage of vehicles placed OOS during CVSA's Brake Safety Days has been gradually increasing since 2015, demonstrating the need for improved brake inspection processes.⁴

On September 7, 2017, CVSA held an unannounced Brake Safety Day across North America. After the inspections, 63% of vehicles placed out-of-service were for brake violations². From the total vehicles inspected, more than 1 in 8 vehicles inspected were placed out-of-service for brake violations³.

The most recent CVSA Brake Safety Day on April 25, 2018 resulted in 1,595 vehicles being placed out-of-service for brake-related violations. This is an increase to 1 in 7 vehicles being placed out of service for brake violations³.

It's important for your brake systems to uphold to federal regulations in order to keep vehicles on the road and reduce out-of-service downtimes. More importantly, in a court of law it's important for your brake maintenance practices to uphold. If they are substandard and not compliant with DOT regulations, your brake maintenance practices are not defensible in a court of law.

1: "Inspections," <http://cvsa.org/inspections/inspections/inspections/out-of-service-criteria/>
2: "CVSA Releases Results from Brake Safety Day," <http://cvsa.org/news-entry/sept-2017-brake-safety-day-results/>
3: "Nearly 1,600 Commercial Motor Vehicles with Critical Brake Violations Were Removed from Roadways During CVSA's Unannounced Brake Safety Day" <https://cvsa.org/news-entry/2018-unannounced-brake-safety-day-results/>
4: "Brake Safety Campaign Results", <https://cvsa.org/program/programs/operation-airbrake/brake-safety-campaign-results/>



What Your Internal Brake Testing Procedures Should Cover

North American Standard Level I inspections include examination of the entire brake system from the air system all the way through the foundation brakes. We spoke to CVSA's Director of Safety Programs, Will Schaefer, about the inspection process and what conditions inspectors are testing. "Brakes are checked for violations, including air leaks, damaged or worn components and pushrod stroke out-of-adjustment conditions," Mr. Schaefer said. Additionally, U.S. Federal Motor Carrier Safety Regulations (FMCSR) require a minimum braking efficiency of 52.8 percent for passenger carrier vehicles with a GVWR of 10,000 pounds or less and 43.5 percent for all other passenger carrier vehicles. ²

Visual inspections are the standard for roadside inspections, since they are required as part of a Level I inspection. However, they do come with challenges. Mr. Schaefer added, "One of the limitations of current brake inspection procedures is that brake adjustment cannot easily be measured at roadside on air disc brakes. While most brakes are S-cam drum brakes, more and more vehicles are being equipped with air disc brakes."

Other challenges include testing deceleration and stopping distance as well as measuring adequate brake force. Getting accurate adjustment data, especially on disc brakes can prove near impossible when relying solely on visual inspections. So, technician's performing routine, preventative maintenance need other tools to fully assess their fleet's needs and improve their overall maintenance program. This is where Performance Based Brake Testers (PBBTs) come in.

A PBBT can be used on a wide variety of brake systems including disc and drum brakes. They also allow testing on air, hydraulic, or electric brake types making a PBBT an incredibly versatile tool in a technician's arsenal.

CFR 393.52 provides for 3 methods of determining brake performance.

- Measuring application and brake distance from 20 mph
- Deceleration in feet per second
- Brake force as a percentage of gross vehicle weight²

The first 2 methods are less practical with solely visual inspections as they require the vehicle be in motion, which has inherent risks to technicians performing the test and requires a larger space. PBBTs offer an advantage of being able to confirm a minimum performance requirement for both disc and drum brakes while also testing the overall vehicle braking capability through a stopping performance test in which deceleration and stopping distance data is obtained for accurate analysis.¹ Additionally, using a PBBT is the only method to measure braking forces since there is no way to obtain that data visually, making it the most practical option to test vehicles roadside or in repair shops.



A portable PBBT unit used for deployment outside of a fixed maintenance location. Unit pictured is VIS-Check portable unit.

1: "CVSA PBBT Brochure," <http://www.vischeck.net/wp-content/uploads/2015/03/CVSA-PBBT-brochure.pdf>

2: "FMCSA Part 393: Brake Performance,"

https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&ty=HTML&h=L&mc=true&=PART&n=pt49.5.393#se49.5.393_152



What Internal Brake Inspections Should Include

A successful brake testing process should not only handle repairs and damage, but focus on overall brake system performance as well. PBBTs, quickly detect brake related deficiencies throughout the vehicle. The resulting report produces quantitative data which transit agencies can use to analyze:

- Whether the choice of brake lining is appropriate and cost-effective for your fleets' needs;
- The origin of uneven brake lining wear problems;
- The potential sources of tire wear problems;
- The origin and nature of air valve or other air system problems;
- The origin of stability problems during braking;
- An objective response to driver complaints regarding the vehicle's braking performance;
- Whether a vehicle involved in an accident had adequate braking capability; and,
- Whether the vehicle meets the minimum DOT regulated brake performance standards per CFR 393.52¹⁺²

With this data, an agency can identify problems and trends within the fleet and then create a preventative maintenance plan tailored to its specific vehicle and brake performance needs. Additionally, your maintenance team now has documentation of each vehicle's initial benchmark data and inspection history giving them a roadmap for tracking the brake performance over its entire lifespan.



Vehicles can be inspected before being placed into service for the day, lowering the number of on-route downtimes.

“For jurisdictions using PBBTs, there is the added advantage of being able to test the performance of each wheel end and also place vehicles out of service if they do not meet the minimum required vehicle braking efficiency set by the U.S. Federal Motor Carrier Safety Administration in the U.S. and the North American Standard Out-Of-Service Criteria in participating Canadian jurisdictions,” Mr. Schaefer said.

Using a PBBT to routinely inspect your fleet vehicles will also allow for easier and earlier detection of unseen issues, reducing breakdowns and delays before vehicles are out on their routes. Other testers, like brake performance meters, do the majority of testing while vehicles are on the road, meaning daily checks aren't performed until the vehicle is already out for the day. With a PBBT, vehicles can be inspected *before* being placed into service saving time, hassle and rider frustrations.

1: “CVSA PBBT Brochure,” <http://www.vischeck.net/wp-content/uploads/2015/03/CVSA-PBBT-brochure.pdf>

2: “FMCSA Part 393: Brake Performance,”

https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&ty=HTML&h=L&mc=true&=PART&n=pt49.5.393#se49.5.393_152



Improving Your Agency's Brake Inspection Procedures

The main reason that agencies decide to invest in a PBBT is for safety. The safety of vehicles while on the road as well as the safety of technicians performing the inspections is pinnacle.

A PBBT pinpoints wheel-end problems before the visual inspection. Not only are you taking out the factor of human error during the inspection, but you are defending your inspection procedures with documentation. There is no opinion or wondering if the results are accurate because technicians have a consistent, objective process for testing. Additionally, a PBBT reduces the risk of injury to technicians performing potentially dangerous under vehicle inspections.

Additionally, PBBTs will save time, making your department more efficient. The automated brake testing process reduces the amount of time needed to inspect each vehicle and gives technicians a guide for to where to look for the problem brake component. A PBBT streamlines the inspection process for technicians and maintenance providers, enabling them to concentrate on defects and repairs instead of the lengthy process of performing visual inspections.

All of these advantages culminate in cost savings across the entire maintenance process including: decreased vehicle down times from identifying issues sooner, reduced fuel costs and tire consumption by revealing brake inefficiencies, and streamlined inspection time creates labor savings that can be allocated to other priorities.



Vehicles can be inspected in a smaller spaces including indoors allowing testing during any weather or climate.

Adding a PBBT to your agency is the perfect solution to improve your brake inspection procedures while ensuring your vehicles are compliant with CVSA and DOT guidelines with ease. In 2008, CVSA approved PBBTs for out-of-service authority during roadside inspections.¹

As for adding a PBBT to your maintenance facility, Mr. Schaefer said, "We are certainly supportive of the use [of PBBTs] as you can see brake conditions you wouldn't be able to find with visual inspections."

As previously cited, CVSA hosts many Brake Safety Day events, and many of the jurisdictions use their PBBTs. "All jurisdictions actively using PBBTs are using them during brake safety campaigns," Mr. Schaefer said. "They add another check to use during brake inspections." As of this white paper's publication, 13 CVSA jurisdictions are using PBBTs.



Case Study: State of Indiana

The state of Indiana invested in the VIS-Check, a PBBT that tests brakes to CVSA requirements. VIS spoke with Kim Judge, Motor Carrier Inspector Administrator for Indiana State Police.



The State of Indiana's VIS-Check

Q: What are the benefits of using a PBBT for your agency?

A: Indiana is currently utilizing both portable and permanent mounted VIS machines. The portable units have allowed us to deploy the machines within metropolitan and rural areas, and high crash areas. This allows us to monitor the local vehicles for braking performance in these areas for continued safety measures. The PBBT machine provides us with results that indicate brake failures so that we can direct our attention to those areas.

Q: Why did your agency decide to invest in the VIS-Check?

A: Having the portable units provides us with flexibility of another enforcement tool for inspecting vehicles roadside. It also provides us with additional means of identifying brake issues along with our current inspection procedures, things that cannot be detected otherwise. The ability to transport the portable machine and deploy in remote areas has been a great benefit to us, along with the ability to perform a test on vehicles involved in accidents, during the post crash inspection that otherwise we wouldn't have been able to check the braking performance.

Q: How does the VIS-Check help your agency's inspections versus performing a visual inspection?

A: While using both permanent and portable VIS machines on a variety of commercial motor vehicles and heavy duty vehicles, it allows us to check the individual axle braking forces. These particular vehicles traveling the highways need to be in better condition than normal due to the amount of weight they are carrying. We have found that during a roadside inspection, sometimes inspecting the braking system alone isn't enough to comprehend the actual performance of that brake. The additional enforcement tool for inspecting vehicles provides us with another way of identifying possible brake issues or in poor mechanical condition that is not visible.

Q: What are the biggest issues your agency looks for in vehicles during a brake inspection?

A: With the variety of commercial motor vehicles that we inspect on a daily basis, the issues we encounter most often are trying to identify out of adjustment brakes, brake system defects and antilock braking systems (ABS) violations. Our goal is to reduce the number of crashes caused by faulty braking systems by conducting more roadside inspections and PBBT inspections to aid in identifying these violations and removing vehicles with critical brake violations from the roadways. When there's poor maintenance of the braking system it can reduce the braking efficiency and increase the stopping distance.

ABOUT VIS

For more than 20 years, VIS has been the frontrunner for wheel-end safety equipment, including the VIS-Check, for enforcement. The VIS-Check tests to CVSA and DOT standards, so results can be upheld in a court of law.

To learn more about the VIS-Check, call VIS at 866-847-8721 or visit Vischeck.net.

