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## DEPARTMENT OF TRANSPORTATION

### Federal Motor Carrier Safety Administration

#### 49 CFR Part 393

[Docket No. FMCSA-99-6266]

RIN 2126-AA46

### Brake Performance Requirements for Commercial Motor Vehicles Inspected by Performance-Based Brake Testers

**AGENCY:** Federal Motor Carrier Safety Administration (FMCSA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FMCSA amends the Federal Motor Carrier Safety Regulations (FMCSRs) to establish pass/fail criteria for use with performance-based brake testers (PBBT), which measure the braking performance of commercial motor vehicles. A PBBT is a device that can assess vehicle braking capability through quantitative measure of individual wheel brake forces or overall vehicle brake performance in a controlled test. The specific types of PBBTs addressed in this rule are the roller dynamometer, breakaway torque tester, and flat-plate tester. Only those PBBTs that meet certain functional specifications, developed by FMCSA, can be used to enforce the FMCSRs. The final rule allows motor carriers and State and local enforcement officials to use PBBTs to determine compliance with existing brake performance requirements.

**DATES:** This final rule is effective on February 5, 2002.

**FOR FURTHER INFORMATION CONTACT:** Mr. Gary R. Woodford, (202) 366-2978, Office of Bus and Truck Standards and Operations, Federal Motor Carrier Safety Administration (MC-PSV), U.S. Department of Transportation, 400 Seventh Street, SW., Washington, DC 20590. Office hours are from 7:45 a.m. to 4:15 p.m., e.t., Monday through Friday, except Federal holidays.

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## **Background**

On August 9, 2000, the FMCSA published a notice of proposed rulemaking (NPRM) in the **Federal Register** (65 FR 48660), addressing brake performance requirements for commercial motor vehicles (CMVs) inspected by performance-based brake testers (PBBTs). The notice proposed to amend the FMCSRs by establishing pass/fail criteria for PBBTs, when used to measure CMV braking performance. A PBBT is a device that can assess vehicle braking capability through quantitative measure of individual wheel brake forces, or overall vehicle brake performance, in a controlled test. The specific types of PBBTs addressed in the notice were the roller dynamometer, breakaway torque tester, and flat-plate tester. Only those PBBTs which meet certain functional specifications developed by FMCSA and discussed below could be used to enforce the FMCSRs. The proposal would allow motor carriers and State and local enforcement officials to use PBBTs to determine compliance with §393.52.

The proposal represented the culmination of agency research that began in the early 1990s. Further information on the research, and on PBBT basic principles of operation, are available in the NPRM of August 9, 2000. The research included: (1) field evaluation tests, "Development, Evaluation, and Application of Performance-Based Brake Testing Technologies," February 1999, Report No. FHWA-MC-98-046, and (2) round-robin tests, "PBBT Round-Robin Testing," February 2000. (The term "round-robin" describes a series of tests in which a single "standard" is used to evaluate the consistency of various test apparatus. In the round-robin presented in this report, the "standard", a specific configuration of brake forces and wheel loads on a heavy-duty vehicle, was used to evaluate the candidate PBBTs and their operating protocols.)

## **PBBT Functional Specifications and MCSAP Funding Eligibility**

On August 9, 2000, the FMCSA also published in the **Federal Register** a notice of final determination (65 FR 48799) establishing functional specifications for PBBTs, "Guidelines for Development of Functional Specifications for Performance-Based Brake Testers Used to Inspect Commercial Motor Vehicles." Data gathered during the PBBT field evaluation research served as background for developing the specifications. The specifications are generic, and therefore applicable to a range of PBBT technologies. They include requirements for: (1) Functional performance, such as measurement accuracy with tolerances,

calibration, and operator interface, (2) physical characteristics including portability, (3) environmental resistance, (4) operator safety, (5) documentation, including operator and maintenance manuals; and (5) skill level and number of operator personnel required. The specifications also include quality assurance provisions or methodologies for verifying PBBT compliance with each of the functional specifications. The methodologies include analysis, test, demonstration, inspection, and certified vendor data. The intent of the specifications is to ensure a minimum level of PBBT accuracy and performance.

Under the PBBT functional specifications, a PBBT manufacturer self-certifies its PBBT to meet the functional specifications at the time of manufacture, and also states which specifications, if any, its PBBT does not meet. PBBTs that are certified to meet the functional specifications are eligible for funding under the Motor Carrier Safety Assistance Program (MCSAP). The MCSAP is a Federal program, administered by FMCSA, providing funds to States and U.S. territories in support of commercial motor vehicle safety. This means that States or territories may use MCSAP funding to purchase one of the certified PBBTs for use in commercial motor vehicle brake inspections. As part of the self-certification process, the PBBT manufacturer must sign a declaration, under penalty of perjury, that its PBBT meets the functional specifications at the time of manufacture. States are allowed to spend MCSAP funds for a PBBT only if the manufacturer has signed such a declaration and presented it to the State. Further information on self-certification and the functional specifications are available in the August 9, 2000 notice of final determination.

### **Current Brake Performance Requirements**

Currently, the requirements for CMV braking performance are specified in §393.52, Brake Performance. Sections 393.52(a)(1), (a)(2), and (a)(3) specify service brake system requirements for minimum braking force ( $BF_{Total}$ ) as a percentage of actual gross vehicle weight (GVW), minimum deceleration, and maximum stopping distance, respectively, all from a vehicle speed of 32.2 km/hr (20 mph). For service brake systems all three requirements must be met to achieve compliance with the regulation. The requirements apply to all CMVs or CMV combinations subject to the FMCSRs, under any loading condition.

However, there are practical difficulties in performing such tests at roadside inspection facilities, because of space limitations and CMVs with deceleration-sensitive cargo. Thus, Federal and State officials rarely enforce the current performance requirements. Instead, current inspections involve visual, "hands-on" examination of brake system components to identify unsafe vehicles, based on guidelines developed by the Commercial Vehicle Safety Alliance (CVSA). While successful and productive, this method does have limitations, such as the number of vehicles that can be inspected on a given day. PBBTs, on the other hand, have the advantage of being able to measure actual vehicle braking performance as well as the potential for increased CMV volume during roadside inspections.

## Proposed PBBT Pass/Fail Criteria

In the NPRM of August 9, 2000, the FMCSA proposed brake performance criteria for use with PBBTs in determining CMV service brake system compliance with §393.52(a)(1) and (a)(2). These are the requirements for minimum braking force as a percentage of gross vehicle weight ( $BF_{Total}/GVW$ ) and minimum deceleration. The proposed PBBT criteria would not replace existing requirements, but would serve as an alternative whenever PBBTs were used for determining compliance with §393.52(a)(1) and (a)(2).

The specific PBBT performance criteria proposed by the agency were the same requirements for minimum  $BF_{Total}/GVW$  and minimum deceleration, that are already specified in the current regulation, §393.52(a)(1) and (a)(2). The regulation requires CMVs to meet all three of the performance measures shown. This would not change under the proposal. However, enforcement officials and motor carriers could use PBBTs to determine compliance with the requirements for minimum braking force as a percentage of gross vehicle weight,  $BF_{Total}/GVW$ , specified in §393.52(a)(1). Compliance with this requirement would also satisfy the minimum deceleration requirement specified in §393.52(a)(2), because of the simple mathematical relationship that exists between the two parameters ( $BF_{Total}/GVW = \text{deceleration/acceleration of gravity}$ ).

Therefore, those CMVs which achieve a maximum PBBT-measured  $BF_{Total}/GVW$  that is equal to or greater than the required braking force levels, would be considered in compliance with both the braking force and deceleration requirements specified in §393.52(a)(1) and (a)(2), respectively. Those CMVs that do not meet the braking force levels would be considered in non-compliance with both the braking force and deceleration requirements. The PBBT pass/fail criteria would apply to all CMVs or CMV combinations, and the agency proposed that it become effective 30 days after issuance of a final rule.

The agency also requested comments on: (1) The appropriateness of using criteria taken from the current regulation, since the latest amendments to those requirements were published 28 years earlier, (2) whether PBBT-measured  $BF_{Total}/GVW$  should be used to satisfy stopping distance requirements in addition to minimum deceleration, (3) whether the FMCSA should require a post-inspection PBBT measurement to certify correction of an earlier PBBT-measured braking deficiency, (4) PBBT standardized test procedures, and (5) PBBT operator training.

## Comments

FMCSA received comments to the proposal from the following 15 different organizations: American Trucking Associations, Inc. (ATA), ArvinMeritor, Inc. (ArvinMeritor), Beissbarth Automotive Service Equipment (Beissbarth), Bendix Commercial Vehicle Systems (Bendix), Commercial Vehicle Safety Alliance (CVSA), Electraulic, Inc. (Electraulic), Heavy Duty Brake Manufacturers Council (HDBMC), Hunter Engineering Company (Hunter), Iowa Department of Transportation (Iowa DOT), Motor Coach Industries, Inc. (MCI), National

Automobile Dealers Association (NADA), Radlinski & Associates, Inc. (Radlinski), Truck Manufacturers Association (TMA), TSD Holdings, Inc. (TSD), and Vipac Engineers and Scientists, Limited (Vipac). The commenters include: (1) Industry associations that represent truck dealers, truck and brake component manufacturers, and motor carriers, (2) State and local enforcement agencies; (3) brake tester manufacturers; (4) vehicle research and testing organizations; and (5) a motor coach manufacturer.

## General Support

The following 10 commenters expressed support for the proposal: ATA, ArvinMeritor, Bendix, CVSA, HDBMC, Iowa DOT, MCI, NADA, Radlinski, and TSD.

ATA stated that it supports the use of PBBTs for enforcement and endorses the proposal. CVSA also fully supports the voluntary use of PBBTs for enforcement, and stated that PBBTs are a good complement to roadside inspection methods and out-of-service criteria in use today. CVSA also commended the FMCSA for its extensive research and testing, and leadership in this rulemaking. Both ATA and Radlinski pointed out the potential for PBBTs to decrease the time involved in roadside brake inspections and make them less subjective. NADA commented on the advantages that PBBTs offer to State and local enforcement personnel over visual brake inspection methods. In supporting the proposal, ArvinMeritor stated that it believes FMCSA had approached the evaluation and implementation of PBBTs in a thorough and thoughtful manner.

Although Bendix and HDBMC commended FMCSA for its efforts, they also pointed out that agency research with PBBTs did not include vehicles with gross axle weight ratings (GAWRs) greater than 9,072 kg (20,000 pounds), such as special permit vehicles and heavy haulers. Both commenters expressed their interest in having FMCSA gather and report data on such vehicles.

In response, the FMCSA sees no need at this time to initiate research specifically for this purpose. The agency acknowledges that its PBBT research has focused on vehicles with GAWRs less than 9,072 kg (20,000 pounds). This is because they represent the majority of CMVs on the road today. The heavier vehicles, referred to by Bendix and HDBMC, comprise a very small portion of the CMV population. Moreover, the PBBT functional specifications, published in the August 9, 2000 notice of final determination, specify that brake testers be capable of operating with axles weighing up to 40,000 pounds. Therefore, the heavier vehicles will not be prohibited from being used on PBBTs. The FMCSA anticipates that as PBBT usage increases, data on such vehicles will become available.

Three other commenters, TMA, Hunter, and Vipac, although supportive of the use of PBBTs, did not support implementation of the proposal at the present time.

TMA requested the FMCSA to conduct further research and testing before proceeding with the proposed amendment. It stated that the FMCSA analysis is based on only two vehicles, used in the round-robin research, and that this

limited sample may not accurately represent how well PBBT brake force measurements correlate to actual stopping distance, given the wide variety of CMV configurations. TMA included test data on 16 different CMV configurations, showing that the vehicles met federal motor vehicle safety standard stopping distance requirements from 60 mph for new vehicles. TMA stated, however, that four of the vehicles did not pass the proposed brake force measurement of 0.435 ( $BF_{Total}/GVW$ ), when tested with a PBBT believed to meet the FMCSA functional specifications. Thus, TMA believes it would be detrimental to rush implementation of PBBT pass/fail criteria that may conflict with new vehicle brake performance requirements, or without understanding how this relates to in-service braking requirements.

In response to TMA, the FMCSA does not believe that further research is needed at the present time. Although the round-robin research did involve only two vehicles, the vehicles were considered representative of a majority of the CMV axle configurations on the road: (1) A two-axle flatbed straight truck and a (2) three-axle tractor, two-axle flatbed semi-trailer combination. In addition, a lack of correlation between vehicle stopping distance and maximum braking force, among the four vehicles that TMA refers to in its comment, does not necessarily mean there is a conflict between new vehicle and in-service requirements. As the agency pointed out in its proposal, these two parameters may not correlate, because maximum braking force is not sustained over an entire stop. In addition, there are other factors that can influence the relationship between stopping distance and braking force. A more direct comparison is that of maximum PBBT-measured braking force and maximum-measured braking force during an actual vehicle stop, which is what the FMCSA did in its round-robin research. Moreover, the agency has never claimed or intended that PBBT test results be used as a surrogate for determining compliance with 60 mph stopping distance requirements for new vehicles. The FMCSA is not aware of any data to correlate the results of low-speed brake performance tests and high-speed tests, such as those conducted by TMA. The agency finds that its research supports the use of PBBTs to assess the brake performance of CMVs, and that TMA's arguments do not warrant a delay in the issuance of this final rule.

Hunter, which manufactures flat-plate testers, asked that the FMCSA consider a different approach than the one proposed. It desires an approach that is not deceleration-based, and that takes better advantage of the individual capabilities of each brake tester type. Hunter stated that since the proposed pass/fail criteria are based on total vehicle brake force ( $BF_{Total}/GVW$ ), it does not account for braking capability at individual wheels. In other words, a strong brake on one wheel could make up for a weak brake on another wheel, when summing total brake forces. According to Hunter, this would overlook brake force imbalances that can cause vehicle instability while braking. Hunter asserts that side-to-side brake balance measurements are the most reliable method of determining brake performance. Using brake balance as the criterion, would allow vehicles to stop on Hunter's flat-plate tester at a lower deceleration, such as 0.3g, rather than 0.435g, for example, contained in the FMCSA proposal. According to Hunter, this higher deceleration stop proposed in the NPRM is difficult to achieve in some

cases, and leads to cargo shifting.

The FMCSA does not concur with Hunter's rationale. While brake balance is an important consideration in assessing overall brake performance, it does not necessarily indicate stopping distance capability. For example, stopping a vehicle with weak, well-balanced brakes at a deceleration of 0.3g does not necessarily mean that it will stop at the higher 0.435g deceleration proposed in the NPRM and required in the current regulation. The FMCSA believes that maximum braking force is a better surrogate than brake balance for assessing stopping distance capability of heavy vehicles during roadside inspection. Moreover, the agency's proposal required measurement of maximum brake force at each wheel, which in turn provides information on brake force imbalance for a given axle. Finally, as discussed in more detail later in the preamble, no other commenter indicated that the proposed brake force of 0.435,  $BF_{Total}/GVW$ , is too high for motor carriers to achieve.

Vipac only addressed the FMCSA round robin research referenced in the August 9, 2000 NPRM. Vipac commended the agency for its depth of research but recommended further work before implementing PBBT regulations. For the most part, the work that Vipac referred to involves roller dynamometer issues, including: (1) Over-predicting of brake force, (2) the need for improved algorithms by PBBT manufacturers (*i.e.*, the PBBT internal data processing methodology by which measured brake force is determined), (3) the effects of low roller speed on accuracy, and (4) vehicle-to-PBBT geometry during testing.

However, the FMCSA has already identified these four areas in its analysis of the round-robin research, and through additional research the agency has been working with PBBT manufacturers to resolve those issues. This work should be completed in 2002, and based on preliminary results, the FMCSA does not believe that a delay in moving forward with this rulemaking is warranted.

In its comments, Vipac also advocated as an alternative, a new technology, the on-board decelerometer, which measures deceleration rate during a vehicle stop. Vipac stated that this technology is less costly and more accurate than the PBBTs addressed in this rulemaking. As the FMCSA pointed out in its NPRM, a space convenient and large enough to perform a panic stop with a CMV can be difficult to find at roadside inspection facilities. Moreover, the technology referred to by Vipac is outside the scope of this rulemaking.

The two remaining commenters, Beissbarth and Electraulic, did not specifically address the proposal. Beissbarth stated that based on its experience, flat-plate and breakaway torque testers do not provide accurate results over time. However, Beissbarth provided no information to support this claim. Electraulic expressed interest in the PBBT program, but provided no other comments in response to the proposal.

Therefore, based on the strong support from a majority of commenters, the FMCSA is today establishing pass/fail criteria for use with PBBTs in determining CMV service brake system compliance with §393.52(a)(1) and (a)(2).

Appropriateness of Criteria

In the NPRM of August 9, 2000, the FMCSA asked for comments on whether the proposed PBBT pass/fail criteria are still appropriate in light of more recent brake system and brake testing technologies. The agency pointed out that the proposed criteria for  $BF_{Total}/GVW$  are the same as those in the current regulation, which has not been amended since 1972.

Five commenters addressed this issue. They are ATA, CVSA, HDBMC, Hunter, and Radlinski. All of the commenters expressed support for the proposed level of PBBT pass/fail criteria, with the exception of Hunter as already discussed. Both ATA and CVSA stated that using the same pass/fail criteria that are currently in §393.52 is appropriate, since those requirements were used in developing the current CVSA North American Uniform Out-of-Service Criteria. State and local enforcement personnel use these criteria today to determine whether a vehicle should be placed out-of-service for inadequate service brakes. ATA and CVSA also pointed out, however, that the agency should make it clear that the PBBT pass/fail criteria are minimums. The FMCSA agrees. CMVs which *meet or exceed* the PBBT pass/fail criteria would be considered in compliance with the brake force and deceleration requirements of §393.52(a)(1) and (a)(2).

Radlinski stated that the PBBT pass/fail criteria are appropriate for vehicles with good brakes. In support of its claim Radlinski provided data on 81 different vehicles that it had tested using a Radlinski PBBT. All of the vehicles were proving ground-tested for stopping capability, inspected, and found to have defect-free brakes. The PBBT test data show that all of the vehicles passed the criterion ( $BF_{Total}/GVW = 0.435$ ) by a significant margin. However, Radlinski also pointed out that a vehicle with adequate brakes might fail the test, if the coefficient of friction (COF) between the test surface and tire falls substantially below 0.6. This could occur when the tire is wet and may not have enough friction to develop the required brake force. The COF of 0.6 between the PBBT test surface and tire is the minimum under dry conditions specified in the FMCSA final PBBT functional specifications of August 9, 2000. Radlinski stated that the FMCSA should consider establishing an absolute lower COF in order for a test to be considered valid, and suggested 0.55. Although COF is outside the scope of this rulemaking, the FMCSA appreciates Radlinski's comments, and will consider this issue for further action.

As discussed earlier, Hunter advocates a  $BF_{Total}/GVW$  that is lower than 0.435, such as 0.3. However, for the reasons already given above, the FMCSA believes Hunter has not provided sufficient rationale to assure adequate safety using lower PBBT pass/fail criteria.

Based on these comments, the FMCSA has adopted the PBBT pass/fail criteria in today's final rule.

### Stopping Distance Requirements

In its proposal of August 9, 2000, the FMCSA proposed retaining the stopping distance requirement from 32.2 km/hr (20 mph) specified in §393.52(a)(3), because it believed that a satisfactory PBBT-measured braking force would not necessarily ensure compliance with the stopping distance requirement. The

agency pointed out that PBBT-measured maximum braking force can not be used to compute corresponding stopping distance because maximum braking force is typically not sustained over the entire stop. In addition, the distance traveled during brake application and brake force buildup varies with vehicle type, being negligible for many light vehicles and greatest for combinations of commercial vehicles. However, the FMCSA asked for comments on whether the correlation between PBBT-measured braking forces and stopping distance requirements is close enough to use PBBTs to safely satisfy all three requirements, which are in §393.52(a)(1), (a)(2), and (a)(3)-minimum  $BF_{Total}/GVW$ , minimum deceleration, and maximum stopping distance, respectively.

The following four commenters responded to this issue: Radlinski, ATA, ArvinMeritor, and Hunter. Radlinski stated that it is impossible to precisely relate maximum braking force to stopping distance without knowing brake application time. Similarly, ATA cited the impossibility of accurately relating stopping distance and braking force, because of brake application time and other variables. ArvinMeritor stated that PBBTs should only be implemented to evaluate braking force, and not stopping distance, until the trucking industry and enforcement authorities have gained more experience with their use. ArvinMeritor did not address any of the technical issues governing the relationship between stopping distance and maximum braking force. Hunter stated that stopping distance can be calculated as accurately as deceleration when brake force, friction, and weight are known, assuming balanced brakes and constant brake force. However, as referenced above, brake force may not be constant during a CMV stop. Moreover, it cannot be assumed that the vehicle brakes are balanced, due to variations in the condition of the brakes and road friction. Therefore, Hunter's assertion is not correct. In light of these comments, the FMCSA has decided to adopt the stopping distance requirements as set out in the NPRM.

#### Post-Inspection PBBT Measurement

Under the August 9, 2000 proposal, those CMVs which do not meet the specified PBBT-measured braking forces would be considered out of compliance with both the braking force and deceleration requirements of §393.52(a)(1) and (a)(2). After fixing the problem, the motor carrier would certify the correction on the roadside inspection report and return it to the issuing agency, as outlined in §396.9, Inspection of Motor Vehicles in Operation. This would be the same way that violations found under current inspection methods are handled. Under this approach, the FMCSA would not require a post-inspection PBBT measurement, as long as the involved motor carrier certifies correction of the deficiency consistent with §396.9. However, the agency requested comments on whether a post-inspection PBBT measurement should be required and under what conditions.

The five commenters that addressed this issue, NADA, ATA, ArvinMeritor, Radlinski, and CVSA, did not believe the agency should require a post-inspection

PBBT measurement. NADA suggested that it should be optional, while ArvinMeritor stated that such a requirement would not be an effective use of PBBT resources. Both ATA and ArvinMeritor supported the FMCSA proposal, stating that this approach is consistent with current roadside inspection follow up requirements in §396.9. Radlinski, however, stated that provision should be made to allow other methods for checking a repaired vehicle, such as inspection by a certified brake inspector. However, Radlinski provided no rationale to justify such a requirement. The agency notes that motor carriers are free to use whatever means they choose to verify post-inspection repairs on their vehicles. CVSA stated that generally, its member jurisdictions do not require post-inspections to determine whether defects have been corrected. It has established an international goal of verifying the repairs on 15 percent of out-of-service violations, and referred the FMCSA to its Operations Manual for guidance on this subject. However, the FMCSA proposal for not requiring a post-inspection PBBT measurement is in the context of an out-of-compliance violation, not an out-of-service violation. In light of these comments, the agency continues to believe that there should be no requirement for a post-inspection PBBT measurement, and today's final rule contains no such requirement.

In the NPRM of August 9, 2000, the FMCSA also indicated that if the proposal were adopted, it intends to work with its partners and customers to develop a list of likely brake system components or causes responsible for low PBBT measurements. The agency believes that such guidance would be helpful to motor carriers and enforcement officials in identifying and correcting inadequate braking conditions.

ATA, CVSA, and NADA expressed support for this initiative. ATA indicated that such a diagnostic tool is necessary to facilitate timely repairs, and offered to serve on a developmental task force. It also indicated that brake manufacturers should be involved because of new braking technologies. CVSA recommended that FMCSA consider providing federal funds to jurisdictions interested in purchasing PBBTs for developing guidance in identifying the inadequate braking conditions. NADA stated that PBBT manufacturers should be required to develop and make available diagnostic and repair strategies for CMVs that fail PBBT tests.

The FMCSA notes that it has no authority to require PBBT manufacturers or others to provide the diagnostic information necessary to assist commercial motor vehicle operators in identifying and correcting braking deficiencies that result in low PBBT measurements. However, the FMCSA plans to seek the voluntary involvement of a cross-section of its partners and customers to help in developing this information. Through ongoing research, the agency has identified issues that will need to be addressed. The agency anticipates that this preliminary work can serve as the basis for the remaining effort.

#### Vehicle Applicability

In its August 2000 notice, the FMCSA proposed that PBBT pass/fail criteria be applicable to all CMVs and CMV combinations, consistent with current brake

performance requirements in §393.52. The agency believed that because PBBTs have the capability to measure brake force on both light and heavy vehicles, their benefits should be made available to a wide range of CMVs. However, the agency requested comments on whether it is appropriate to provide such criteria for light CMVs (GVWR or GVW of 4,536 kg (10,000 pounds) or less), since they represent a relatively small portion of all CMVs, and are therefore, less likely to undergo roadside brake inspections than are heavy CMVs (GVWR or GVW greater than 4,536 kg (10,000 pounds)).

However, in a separate rulemaking published on January 11, 2001, the agency proposed making the safety regulations applicable to CMVs designed or used to transport between 9 and 15 passengers. These CMVs would typically be less than 10,000 pounds. Therefore, if the agency were to adopt PBBT rules applicable to vehicles less than 10,000 pounds, those requirements would cover small passenger-carrying vehicles, and light vehicles used to transport hazardous materials in a quantity requiring placards. As an alternative, the FMCSA stated that PBBT pass/fail criteria could be limited to heavy CMVs. Persons submitting comments were requested to provide supporting data.

The following six commenters provided limited information: Hunter, ATA, CVSA, ArvinMeritor, Radlinski, and HDBMC. Hunter, ATA, and CVSA support the proposal to provide PBBT pass/fail criteria for all CMVs. Hunter stated that there is no reason not to include the light vehicles in providing PBBT pass/fail criteria. ATA stated that PBBTs provide a better opportunity to inspect the brakes on light vehicles, since they are more enclosed and less accessible for visual inspection than the brakes on heavy CMVs. However, both ATA and CVSA believe that the States should have the option of using PBBTs on light vehicles, but not be required to do so. This is consistent with the agency's proposal, since the use of PBBTs would be an alternative method of determining compliance with the brake performance requirements of §393.52. ArvinMeritor also supports the use of PBBTs on light vehicles, but recommended that FMCSA research the appropriateness of the pass/fail criteria. Likewise, Radlinski stated that further data is needed on the appropriateness of the criteria for light vehicles, and for that reason it does not support PBBT use on light vehicles at this time. HDBMC simply stated that it has no data on light vehicles. None of the six commenters provided any supporting data.

After further consideration, the FMCSA has decided not to include PBBT pass/fail criteria for light vehicles at the present time. In making this decision, the agency notes that ArvinMeritor and Radlinski provided no rationale for questioning the appropriateness of the pass/fail criteria for light vehicles. Nevertheless, the FMCSA recognizes that the CMV industry has minimal experience with the use of PBBTs on light vehicles. In addition, the agency's PBBT research did not include light vehicles. By providing pass/fail criteria for heavy vehicles only, today's final rule makes PBBT use possible on the vast majority of CMVs that undergo roadside inspection. Applying this final rule only to heavy vehicles will also provide the agency with an opportunity to further investigate the use of PBBTs on light vehicles. Therefore, today's final rule is applicable to those CMVs and CMV combinations that have a GVWR or GVW

greater than 4,536 kg (10,000 pounds).

## Test Procedures and Training

In its proposal of August 9, 2000, the FMCSA indicated that if the proposal were adopted, it anticipated working with partners and customers to develop PBBT standard test procedures and operator training. The agency believes these are necessary to minimize or eliminate any influence that a particular PBBT operator, vehicle configuration, or PBBT type might otherwise have on test results. State and local officials would use the test procedures and operator training to help ensure uniform PBBT test results across the enforcement community. For both the test procedures and training the FMCSA requested comments on what specific issues need to be addressed, and with which partners and customers the agency should work. The FMCSA also requested comments on whether each State should take responsibility for training its enforcement officials on proper PBBT operation, after the training material is developed.

Eight commenters responded. They are ArvinMeritor, ATA, Bendix, CVSA, HDBMC, MCI, NADA, and Radlinski, all of which concurred with the need for standard PBBT test procedures, operator training, or both. Test procedure and training issues that commenters cited include brake lining temperature, wet weather limitations, vehicle weighing procedures, marginal brakes, interpretation of test results, bad test and allowance for retest, driver rights, test duration, test report format, and PBBT calibration and maintenance. ATA and Radlinski commented that a vehicle found to have an out-of-compliance PBBT measurement should be allowed the opportunity for a retest at the time of the inspection. ATA pointed out that this is similar to current procedures where a motor carrier can also inspect its vehicle at the time a violation is found. ArvinMeritor cited the need for precautionary warnings and procedures (1) to assure the safety of test personnel and vehicle operators, and (2) to minimize risk of damage to inter-axle differential (IAD) components on the test vehicle. The IAD, which may be locked or unlocked by the driver, serves to compensate for small differences in tire rolling radii between the fore and aft driving axles of a tandem axle. ArvinMeritor also stated that automatic traction control devices (ATC), which are incorporated as a feature of antilock brake systems, must be disabled when a single axle of a tandem axle vehicle is tested on a roller dynamometer PBBT. The function of the ATC is to provide traction when it senses that one wheel is slipping or spinning. If the ATC is not disabled, the vehicle will tend to drive off the rollers and thereby pose a safety hazard during the test. Likewise, the IAD on a tandem axle must be unlocked before testing to avoid (1) having the vehicle drive off the PBBT rollers, or (2) damage to IAD components. Other factors that may contribute to IAD damage are test duration, PBBT roller speed, and whether tandem axles are tested simultaneously or individually. Collectively, the commenters recommended that the FMCSA work with CVSA, ATA and its Technology Maintenance Council, HDBMC, PBBT manufacturers, brake manufacturers, and motor carriers to address these issues.

Only one commenter, MCI, addressed the issue of which entity should take responsibility for PBBT operator training. MCI stated that the FMCSA should ensure through rulemaking that each state takes responsibility for training its enforcement officials on proper PBBT operation for the various vehicle configurations.

The FMCSA appreciates these comments. As with the vehicle repair information, the agency plans to engage a cross-section of its partners and customers to help develop PBBT standard test procedures and operator training. Through ongoing research the FMCSA has identified issues that will need to be addressed. The agency anticipates that this preliminary work can serve as a starting point for the remaining effort. With regard to the MCI comment on training, the FMCSA has no authority to require states to take responsibility for PBBT operator training. However, the agency anticipates that as the training materials are developed, an appropriate level of federal and state responsibility will be reached.

#### Effective Date

In the NPRM of August 9, 2000, the FMCSA proposed that use of PBBTs for enforcement become effective 30 days after issuance of a final rule. The agency stated that a longer time period would not be necessary, since PBBT use would be optional. Having the pass/fail criteria become effective soon after issuance of a final rule would permit States that have PBBTs to begin using them to inspect CMVs, and provide incentive for other States and localities to acquire the new technology and realize its benefits. However, the agency requested comments on whether a longer time period is warranted, and if so, what it should be.

The following six commenters provided information on the proposed effective date: ATA, ArvinMeritor, CVSA, MCI, NADA, and Radlinski. Radlinski supports the 30-day requirement, since the use of PBBTs for enforcement is not mandatory. ATA also supports the 30-day time period, but with the caveat that those jurisdictions first using PBBTs have time to establish standard test procedures and operator training. ArvinMeritor recommended a 90-day time period to provide industry time to respond to the issues raised by commenters. However, ArvinMeritor added that the effective date should also reflect adequate time for the FMCSA to finalize or resolve PBBT standard test procedures, operator training, and other issues necessary for successful implementation. CVSA, MCI, and NADA did not recommend a specific time period, but did stress the importance of adequately addressing such issues prior to PBBT implementation. CVSA stated that, in light of the new PBBT pass/fail criteria, time is also needed to modify the CVSA North American Uniform Out-of-Service Criteria, and software used by field inspection personnel.

After considering this information, the FMCSA has decided to make the PBBT pass/fail criteria effective 180 days after publication of this final rule. Although use of PBBTs for enforcement is optional, the agency notes that five of the six commenters emphasized the need for having in place standard test procedures, operator training, and vehicle repair guidelines prior to PBBT implementation.

The FMCSA agrees that these issues must be adequately addressed to ensure confidence in PBBT test results among those States and localities using them. Lack of confidence would detrimentally affect PBBT implementation. Only two commenters cited specific timeframes, 30 and 90 days. The agency believes that neither of these would be adequate in light of the full range of issues raised by commenters, including those by ArvinMeritor on ATC and IAD. The FMCSA plans to engage a cross-section of its partners and customers to help develop the necessary PBBT test procedures, operator training, and vehicle repair guidelines. The agency believes that partner and customer participation, coupled with the agency's preliminary research, will allow the issues to be adequately addressed within 180 days of issuance of the final rule.

### Braking Stability, Emergency Brake, and Parking Brake

In the NPRM of August 9, 2000, the FMCSA did not propose PBBT pass/fail criteria for determining CMV braking stability, emergency brake, or parking brake performance. However, the agency did request comments in each of these areas.

Braking stability performance, specified in §393.52(c), requires the vehicle to remain within a 3.7 meter (12 foot) wide lane during a 32.2 km/hr (20 mph) stop. The FMCSA stated in the NPRM that PBBTs could be used to determine braking stability by comparing PBBT-measured braking forces from one side of the vehicle to the other for a given axle. When the difference between those braking forces exceeds a certain value, vehicles would be deemed out of compliance. The agency stated that it might propose such PBBT pass/fail criteria in the future, but requested comments on the feasibility of such an approach. It also asked whether the criteria should be confined to steering axles only, since steering capability is critical to controlling the yaw motion of a vehicle. Yaw motion is vehicle rotation about its vertical axis.

The six commenters that responded do not support PBBT pass/fail criteria for determining CMV braking stability. They are ATA, ArvinMeritor, CVSA, HDBMC, Radlinski, and TMA. ATA stated that based on a 1986 National Highway Traffic Safety Administration (NHTSA) study, ("A Demonstration of the Safety Benefits of Front Brakes on Heavy Trucks," December 1986, DOT HS 807 061) brake force imbalance across a heavy truck steer axle must be relatively high to impede steering capability. Further, all new trucks have power steering, according to ATA, and this helps drivers manage any steering pull due to side-to-side brake imbalance. For other axles, ATA, ArvinMeritor, and HDBMC cited the requirement for antilock brake systems (ABS) on CMVs, which mitigate any control loss due to brake imbalance. ArvinMeritor added that the number of non-ABS equipped vehicles would diminish over time through attrition. In addition, ArvinMeritor and HDBMC stated that side-to-side brake forces measured at the inherently slow PBBT test speeds may not indicate true performance at higher vehicle speeds, although neither commenter provided supporting data. ATA, CVSA, Radlinski, and TMA support further research. CVSA cited the lack of information on how much side-to-side brake imbalance should be allowed.

Radlinski stated that further research is needed to support the safety need for such a requirement.

The FMCSA agrees with commenters on the need for further research on how much side-to-side brake force imbalance should be allowed, as well as PBBT capabilities. Safety need must also be assessed in light of the requirement for ABS on new vehicles. The agency is currently conducting research in this area, and will assess whether to move forward with such a proposal once this work is completed.

In the case of emergency brake system performance, requirements are specified in §393.52(b). If there is leakage of the medium that actuates the brakes, i.e., air, fluid, or vacuum, the emergency brake system must still be able to stop the vehicle within a specified distance. In not proposing PBBT pass/fail criteria for the emergency brake system, the FMCSA stated that it would not be practical for enforcement at roadside inspection facilities. This is because an air, fluid, or vacuum leak would have to be created to simulate a single failure in the service brake system. The agency believed that this approach would not be appropriate or practical in light of the time involved and necessary modifications to an otherwise normally functioning brake system. However, the FMCSA requested comments on whether it should explore ways to test the emergency brake system in conjunction with PBBTs.

The seven commenters that responded, ATA, ArvinMeritor, CVSA, HDBMC, Bendix, Radlinski, and TMA, all concurred with the agency's rationale and decision to not propose PBBT pass/fail criteria for the emergency brake system.

In the case of parking brakes, the requirements are specified in §393.41 of the FMCSRs. It specifies that most CMVs, manufactured on or after March 7, 1990, must be equipped with a parking brake system that can hold the vehicle or vehicle combination under any loading condition, as required by Federal Motor Vehicle Safety Standard (FMVSS) No. 121, Air Brake Systems. FMVSS No. 121 requires each new vehicle to meet a static drawbar pull test, or grade-holding test, at the option of the vehicle manufacturer. In the case of the grade holding test, the vehicle must remain stationary on a 20 percent grade with all parking brakes applied. Although the FMCSA did not propose PBBT criteria for parking brakes, it stated that it was considering one approach that it may propose in the future. That approach would require a PBBT measured braking force for the parking brake system to be at least equal to that which is necessary for the vehicle to remain stationary on a 20 percent grade. The agency asked whether it should propose such criteria for the parking brake system, and whether it would be appropriate to require a parking brake force equivalent to that required of a new vehicle.

The seven commenters that responded, ATA, ArvinMeritor, CVSA, HDBMC, Bendix, Radlinski, and TMA, do not support PBBT requirements for the parking brake system. ATA indicated that using PBBTs to test CMV parking brakes would not be an efficient use of time at roadside inspection facilities. It stated that unlike the service brake system, the parking brake does not present an imminent hazard. ATA and CVSA both indicated that focusing PBBT resources on service brakes would be a better use of time. HDBMC, Bendix, and Radlinski questioned

the stringency of such a requirement. HDBMC stated that the grade-holding requirement of 20 percent for new vehicles was not intended as an in-use requirement. It commented that most vehicles are parked on grades of six percent or less. Radlinski recommended a 12 percent grade-holding requirement rather than 20 percent. It stated that used vehicles should be allowed some drop in performance. ArvinMeritor, Bendix, and TMA indicated that the agency should collect more research data on this issue before proceeding.

FMCSA agrees that research would be needed before it proceeds with any proposal for parking brake PBBT pass/fail criteria. If the agency were to look further at tying any required parking brake force to grade-holding capability, it would first have to decide whether the 20 percent requirement for new vehicles is appropriate, given the wear that CMV components and linkages experience through normal usage. The safety need for such a requirement would also have to be explored. The FMCSA has concluded that for the near future it is more appropriate to focus PBBT resources on CMV service brakes. After increased deployment of this new technology, the agency can further explore other potential applications.

## **Rulemaking Analyses and Notices**

Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

The FMCSA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866, or significant within the meaning of Department of Transportation regulatory policies and procedures. This rule establishes PBBT pass/fail criteria for use in determining the braking performance of CMVs. The rule does not require motor carriers to purchase PBBTs, or to use the technology. The rule allows the use of the technology to improve the ability of motor carriers and enforcement personnel to assess the braking capability of CMVs. State and local enforcement officials can now issue vehicle citations based on PBBT test results. Without these enforcement criteria, PBBTs would continue to be used only for screening of CMVs at roadside inspection facilities. States and localities that choose to use PBBTs for enforcement purposes will have to purchase the devices. This action does not mandate such expenditures, however, since this final rule is an optional method for determining compliance with the braking regulations. Further, the FMCSA anticipates that MCSAP funding will continue to be available to States for purchasing PBBTs. Since this final rule does not require the purchase or use of PBBTs, or establish new brake performance standards that would necessitate changes in CMV design or maintenance, FMCSA has determined that it is not necessary to prepare a cost-benefit analysis.

Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (5 U.S.C. 601-612), we have

evaluated the effects of this rule on small entities. The final rule establishes PBBT pass/fail criteria for use in determining the braking performance of CMVs. However, it does not impose any new requirements beyond those of the existing rule, 49 CFR 393.52. It simply allows States and motor carriers to use PBBTs to determine compliance with certain provisions of 49 CFR 393.52. Actual performance criteria remain the same. Motor carriers are not required to purchase or use PBBTs. Accordingly, the FMCSA certifies that this action does not have a significant economic impact on a substantial number of small entities.

#### Executive Order 13132 (Federalism)

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 13132, dated August 4, 1999, and it has been determined that this final rule does not have a substantial direct effect on, or sufficient federalism implications for, States. The rule does not limit the policymaking discretion of States, nor does it preempt any State law or regulation. States that choose to use PBBTs will have to buy them, but such equipment would be an eligible expense under MCSAP.

#### Executive Order 12372 (Intergovernmental Review)

Catalog of Federal Domestic Assistance Program Number 20.217, Motor Carrier Safety. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities do not apply to this program.

#### Unfunded Mandates Reform Act of 1995

This rule does not impose an unfunded Federal mandate, as defined by the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1532 *et seq.*), which will result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more in any one year.

#### Paperwork Reduction Act

The FMCSA has determined that this final rule is exempt from the requirements of the Paperwork Reduction Act of 1995 [44 U.S.C. 3501 *et seq.*]. There is a certification requirement that is imposed on six PBBT manufacturers, as discussed in the final functional specifications notice published in the **Federal Register** on August 9, 2000 (65 FR 48799). However, OMB clearance is not required because there are less than 10 public entities affected by this certification requirement. See 5 CFR 1320.3 (c). In addition, there is no new paperwork requirement on the part of the States, because they are only required to complete the same paperwork they currently prepare, when requesting funds for the purchase of PBBTs from the FMCSA. Accordingly, the agency has determined that the certification requirement does not constitute a collection of

information covered by the Paperwork Reduction Act.

#### National Environmental Policy Act

The Federal Motor Carrier Safety Administration (FMCSA) is a new administration within the Department of Transportation (DOT). We are striving to meet all of the statutory and executive branch requirements on rulemaking. The FMCSA is currently developing an agency order that will comply with all statutory and regulatory policies under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*). We expect the draft FMCSA Order to appear in the **Federal Register** for public comment in the near future. The framework of the FMCSA Order is consistent with and reflects the procedures for considering environmental impacts under DOT Order 5610.1C. The FMCSA analyzed this proposal under the NEPA and DOT Order 5610.1C. Since the proposal is intended to put into place a means of measuring brake performance at roadside, but has no effect on brake standards, we believe it would be among the type of regulations that would be categorically excluded from any environmental assessment.

#### Executive Order 12988 (Civil Justice Reform)

This action meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

#### Executive Order 13045 (Protection of Children)

We have analyzed this action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This rule is not an economically significant rule and does not concern an environmental risk to health or safety that may disproportionately affect children.

#### Executive Order 12630 (Taking of Private Property)

This rule will not effect a taking of private property or otherwise have taking implications under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights.

#### Executive Order 13211 (Energy Effects)

We have analyzed this action under Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, or Use. We have determined that it is not a "significant energy action" under that order because it is not economically significant and is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

## List of Subjects in 49 CFR Part 393

Motor carriers, Motor vehicle equipment.

In consideration of the foregoing, the FMCSA amends title 49, Code of Federal Regulations, chapter III, as follows:

### **PART 393-[AMENDED]**

1. Revise the authority citation for part 393 to read as follows:

**Authority:** 49 U.S.C. 322, 31136, and 31502; Section 1041(b) of Pub. L. 102-240, 105 Stat. 1914, 1993 (1991); and 49 CFR 1.73.

2. Amend §393.52 by revising paragraph (a)(3), by adding paragraph (a)(4), and by revising paragraph (d) to read as follows:

#### **§393.52 Brake performance.**

(a) \* \* \*

(3) Stopping from 20 miles per hour in a distance, measured from the point at which movement of the service brake pedal or control begins, that is not greater than the distance specified in the table in paragraph (d) of this section; or, for motor vehicles or motor vehicle combinations that have a GVWR or GVW greater than 4,536 kg (10,000 pounds),

(4) Developing only the braking force specified in paragraph (a)(1) of this section and the stopping distance specified in paragraph (a)(3) of this section, if braking force is measured by a performance-based brake tester which meets the requirements of functional specifications for performance-based brake testers for commercial motor vehicles, where braking force is the sum of the braking force at each wheel of the vehicle or vehicle combination as a percentage of gross vehicle or combination weight.

\* \* \* \* \*

(d) Vehicle brake performance table:

Type of motor vehicle	Service brake systems			Emergency brake systems
	Braking force as a percentage of gross vehicle or combination weight	Deceleration in feet per second per second	Application and braking distance in feet from initial speed at 20 mph	Application and braking distance in feet from initial speed of 20 mph
A. Passenger-carrying vehicles:				
(1) Vehicles with a seating capacity of 10 persons	65.2	21	20	54

or less, including driver, and built on a passenger car chassis				
(2) Vehicles with a seating capacity of more than 10 persons, including driver, and built on a passenger car chassis; vehicles built on a truck or bus chassis and having a manufacturer's GVWR of 10,000 pounds or less	52.8	17	25	66
(3) All other passenger-carrying vehicles	43.5	14	35	85
B. Property-carrying vehicles:				
(1) Single unit vehicles having a manufacturer's GVWR of 10,000 pounds or less	52.8	17	25	66
(2) Single unit vehicles having a manufacturer's GVWR of more than 10,000 pounds, except truck tractors. Combinations of a 2-axle towing vehicle and trailer having a GVWR of 3,000 pounds or less. All combinations of 2 or less vehicles in drive-away or tow-away operation	53.5	14	35	85
(3) All other property-carrying vehicles and combinations of property-carrying vehicles	43.5	14	40	90

Notes: (a) There is a definite mathematical relationship between the figures in columns 2 and 3. If the decelerations set forth in column 3 are divided by 32.2 feet per-second per-second, the figures in column 2 will be obtained. (For example, 21 divided by 32.2 equals 65.2 percent.) Column 2 is included in the tabulation because certain brake testing devices utilize this factor. (b) The decelerations specified in column 3 are an indication of the effectiveness of the basic brakes, and as measured in practical brake testing are the maximum decelerations attained at some time during the stop. These decelerations as measured in brake tests cannot be used to compute the values in column 4 because the deceleration is not sustained at the same rate over the entire period of the stop. The deceleration increases from zero to a maximum during a period of brake system application and brake-force buildup. Also, other factors may cause the deceleration to decrease after reaching a maximum. The added distance that results because maximum deceleration is not sustained is included in the figures in column 4 but is not indicated by the usual brake-testing devices for checking deceleration. (c) The distances in column 4 and the decelerations in column 3 are not directly related. "Brake-system application and braking distance in feet" (column 4) is a definite measure of the overall effectiveness of the braking system, being the distance traveled between the point at which the driver starts to move the braking controls and the point at which the vehicle comes to rest. It includes distance traveled while the brakes are being applied and distance traveled while the brakes are retarding the vehicle. (d) The distance traveled during the period of brake-system application and brake-force buildup varies with vehicle type, being negligible for many passenger cars and greatest for combinations of commercial vehicles. This fact accounts for the variation from 20 to 40 feet in the values in column 4 for the various classes of vehicles. (e) The terms "GVWR" and "GVW" refer to the manufacturer's gross vehicle weight rating and the actual gross vehicle weight, respectively.

\*COM019\*

Issued on: August 2, 2002.

**Joseph M. Clapp,**

*Administrator.*

[FR Doc. 02-20248 Filed 8-8-02; 8:45 am]

**BILLING CODE 4910-EX-P**

[REFERENCES] 5CFR1320, 49CFR1

[CITATIONS] 49CFR393