

factors. The braking-in-a-curve test is placed early in the sequence so re-running the required straight line tests need not be done if the vehicle does not pass the braking-in-a-curve test. In addition, placing the braking-in-a-curve test early in the sequence avoids performing the braking-in-a-curve test with tires that may have developed flat spots on non-ABS controlled wheels during other tests. Although these flat spots will not appear if all wheels of a vehicle are controlled by ABS, there is no requirement that vehicles be so equipped. NHTSA must assume that compliance testing may encompass vehicles that do not have ABS controlling all their wheels. However, placing the braking-in-a-curve test near the beginning of the test sequence when the vehicle has to be tested in a loaded-to-GVWR and lightly-loaded condition, requires that the vehicle be loaded, tested in the curve, unloaded, tested in the curve and then loaded again for straight line tests. Compared to tractors, where the loading and unloading involves attaching or uncoupling a trailer, the loading and unloading of vehicles is more time consuming, particularly for buses where weights have to be placed in each seating position.

Our decision to require the braking-in-a-curve test for single unit vehicles only in the lightly loaded condition eliminates the need for loading and unloading for the braking-in-a-curve test. However, as some of the commenters observed, other changes to test sequences could reduce test burdens without compromising safety. Changing the FMVSS No. 105 test sequence to perform the braking-in-a-curve after the lightly-loaded parking brake test would reduce the unloading/loading and loading/unloading cycles in the entire test sequence from four to two. Changing the test sequence for single unit vehicles in FMVSS No. 121 so that the braking-in-a-curve test is performed after the loaded-to-GVWR parking brake tests would reduce the unloading/loading and loading/unloading cycles from three to one. As these changes to the test sequences would reduce test burdens and not compromise safety, this final rule revises the test sequences in FMVSS No. 105 so the braking-in-a-curve test is performed after the lightly loaded parking brake test and incorporates a test sequence for single unit vehicles in FMVSS No. 121 specifying that the braking-in-a-curve test is performed after the loaded-to-GVWR parking brake tests.

One commenter, Mitsubishi, submitted data to support its argument

that NHTSA's proposed specifications for the brake application used in the FMVSS No. 105 braking-in-a-curve test were too stringent. As indicated above, the company argued that our proposal that a brake pedal force of 150 lbs. be achieved within 0.2 second from the initial application of force would be impractical. Data from testing performed by Mitsubishi using test drivers in single unit trucks indicated that a pedal force of 150 lbs. was achieved in 0.2 seconds or less in only three out of ten stops. Mitsubishi suggested that a 0.5 second application time is more practicable.

NHTSA agrees that it is difficult to reach the required application pressure within 0.2 second with a test driver. However, the agency believes that a 0.5 second application time is too slow. The Mitsubishi data show that the application time for the ten stops ranged from 0.18 to 0.31 second. The data also show that the 150 lbs. threshold was exceeded significantly in every case within 0.5 second of the initial application. Our review of the Mitsubishi data indicates that a test driver is able to reach 150 lbs. of force within 0.3 second of the initial application. Accordingly, this final rule specifies that a full brake application for the braking-in-a-curve test consists of an application where 150 lbs. of force is applied to the brake control within 0.3 seconds of the initial application of force to the brake control.

Finally, NHTSA is making a number of changes to the regulatory text to resolve errors and clarify the new requirements. As proposed in the NPRM, S5.1.7 of FMVSS No. 105 stated that the braking-in-a-curve test must be conducted at lightly-loaded vehicle weight plus up to 500 lbs. to allow for a test driver and instrumentation. However, S4 of FMVSS No. 105 already included a definition of lightly-loaded vehicle weight (for vehicles over 10,000 lbs. GVWR) with an allowance for 500 lbs. for the test driver and instrumentation. As the definition of "lightly-loaded" already includes an allowance for the test driver and instrumentation, this final rule deletes the redundant language in S5.1.7. DaimlerChrysler's comments indicated that the agency inadvertently deleted S7.8 from the list of test procedures and sequences in FMVSS No. 105, and inadvertently added S7.11 to the list. NHTSA agrees and is correcting the errors in the final rule. To address other errors noted by DaimlerChrysler, the final rule inserts the phrase "except for vehicles with a GVWR greater than 10,000 lbs." in S7.5(b), the words "shall" and "control" in S7, and in

S5.7.(b) modifies the table or test speeds for each category of vehicle for the second effectiveness test.

The agency is making other minor technical or clarifying changes based on its own review. The first sentence of S6.1.1 referencing lightly-loaded braking tests is also amended to include a reference to the braking-in-a-curve test for vehicles over 10,000 lbs. GVWR and S6.1.2, which identifies how the 500 lbs. of weight allowed for the test driver and instrumentation is to be placed in the vehicle, is also modified from the language of the proposal. The text of S6.9.2(a), which specifies the test surface for stopping distance tests in FMVSS No. 105, is also being revised to clarify that this specification does not include the stability and control while braking test in S6.9.2(b). S7 is revised in the final rule to accommodate the insertion of the stability and control test in S7.5(a), and references to S7.5 in the test procedure and sequence are being changed to S7.5(b). The final rule also deletes the proposed language of S5.3.6.2(a) of FMVSS No. 121—indicating that the vehicle is to be loaded to its GVWR in proportion to its GAWRs—as this specification is already included in S6.1.1 under S6, Road Test Conditions.

In limiting the modifications to its original proposal to those items described above, the agency is rejecting a number of changes suggested by the commenters. Advocates stated that the characteristics of the roadway specified for the braking-in-a-curve test do not approach worst-case operating conditions and that few vehicles properly equipped with ABS would fail the proposed braking-in-a-curve test. NHTSA disagrees that the braking-in-a-curve course is not demanding, since disabling the ABS on single-unit trucks and buses would likely result in these vehicles departing the lane during a full effort brake application. The agency believes that the proposed test configuration is sufficiently rigorous to evaluate the safety performance of ABS.

DaimlerChrysler requested that compliance with the braking-in-a-curve test be determined on the basis of whether any tire point-of-road contact leaves the test lane rather than any part of the vehicle leaving the roadway. The company argued that the latter measure is unclear and should not be applied to vehicles with large rear overhangs. NHTSA believes that the measure of compliance is clear as it stands and well understood to mean that in the plan view (view from the top looking down), no part of the vehicle shall pass outside of the 12-foot lane during the stop. As currently specified in the FMVSS No.