standards for passenger cars, including ABS standards. (59 FR 281, January 4, 1994.) Vehicles included in this evaluation effort are passenger cars, light trucks, and multi-purpose vehicles (MPV's).

Given that NHTSA is reviewing the need for antilock systems separately, the agency has decided not to include requirements addressing ABS performance in this final rule to establish FMVSS No. 135. The previously proposed section on ABS will be reserved until all the issues in the research program have been evaluated. At that time, the agency will consider how best to proceed with requirements applicable to ABS on light vehicles and may initiate a separate rulemaking for that purpose.

## II. Summary of Comments on the July 1991 SNPRM (Notice 5)

Over 30 commenters responded to the July 1991 SNPRM. Commenters included vehicle manufacturers, brake manufacturers, international organizations, safety advocacy groups, and individuals. The commenters addressed a wide range of topics, including adhesion utilization, the various effectiveness requirements, equipment requirements such as the failure warning indicators, and test conditions such as the road test surface, lockup conditions, burnish procedures, and the instrumentation.

Advocates for Highway and Auto Safety (Advocates) and the Center for Auto Safety (CAS) generally opposed the supplemental proposal, believing that the proposed FMVSS No. 135 was less stringent than FMVSS No. 105 and the previous harmonization proposals. Advocates and CAS opposed several specific proposals in the 1991 SNPRM, including the increase in certain stopping distances, eliminating automatic brake warning indicators, specifying certain aspects of the new adhesion utilization test, eliminating the pre-burnish test, changing the burnish testing procedure and the fade and recovery sequence, allowing momentary wheel lockup, and introducing peak friction coefficient (PFC) values as a substitute for skid numbers in defining the adequacy of testing surfaces.

In contrast, the former Motor Vehicle Manufacturers Association (MVMA),<sup>1</sup> General Motors (GM), Ford, Chrysler,

and manufacturers from Europe and Japan have strongly supported harmonized safety standards in general and a harmonized passenger car brake standard in particular. For instance, GM stated that the payoff for successfully harmonizing brake regulations is significant. When the U.S. and European regulations are commonized, it is most probable that this uniform set of requirements will be recognized and accepted throughout all vehicle importing and exporting countries. This will enable manufacturers to build vehicles with standardized brake systems acceptable throughout the world, thereby providing significant cost savings to vehicle buyers. It continued that harmonization of brake regulations will also represent an important milestone in the ongoing efforts to commonize motor vehicle safety regulations, and thereby dismantle one of the most significant non-tariff barriers to international motor vehicle trade.

Notwithstanding their general support for harmonization, vehicle manufacturers expressed concern about what they perceive as the increased stringency of portions of FMVSS No. 135 in relation to FMVSS No. 105.

# **III. NHTSA Decision**

## A. Overview

After reviewing the comments, NHTSA has decided to establish FMVSS No. 135, with respect to hydraulic brake systems on passenger cars. The new standard includes equipment requirements, dynamic road test requirements, system failure requirements, and parking brake requirements, as well as test conditions and procedures related to these requirements. With respect to the equipment requirements, FMVSS No. 135 includes provisions addressing the brake lining wear indicator, an ABS disabling switch, reservoir labeling, and a brake system warning indicator. With respect to the test conditions, FMVSS No. 135 includes provisions addressing the ambient temperature, the road test surface, instrumentation, and the initial brake temperature. With respect to the dynamic road tests, FMVSS No. 135 includes provisions addressing permissible wheel lockup, the test sequence, burnish, the wheel lock sequence test, the torque wheel test, the cold effectiveness test, the high speed effectiveness test, the hot performance test, and the fade and recovery test. FMVSS No. 135 also includes requirements for a static parking brake test and several types of system failure tests, including stops with the engine

off, ABS functional failure, proportional valve functional failure, hydraulic circuit failure, and power assist failure.

The following discussion follows the order set forth in the regulatory text for FMVSS No. 135 to facilitate the reader's understanding of the issues.

### B. Application

In each previous proposal, NHTSA proposed that FMVSS No. 135 would apply to passenger cars. Kelsey-Hayes asked whether this definition included all purpose vehicles, mini-vans, and light trucks.

NHTSA notes that 49 CFR 571.3 defines passenger car, multipurpose passenger vehicle, and truck. All purpose vehicles and mini-vans ordinarily come within the definition of multipurpose passenger vehicle. At this time, FMVSS No. 135 will apply only to passenger cars and not to multipurpose passenger vehicles or trucks, although application to other types of vehicles may be considered at a later date.

#### C. Definitions

In the 1991 SNPRM (Notice 5), NHTSA proposed definitions for certain terms, including directly controlled wheel and antilock brake system.

Bendix and Mercedes Benz requested a clarification of the definition of an ABS "directly controlled wheel." Bendix recommended that the definition include a select average or drive shaft sensor control of an axle, which it believed would provide sufficient accuracy to control individual wheel slip, thereby avoiding adhesion utilization testing. GM commented that the definition in the 1991 SNPRM would prohibit a type of ABS control known as "select low" that uses a single, centrally located sensor on the rear axle to partially control the systems operation.

Given that NHTSA is considering whether to equip vehicles with ABS in a separate rulemaking, the agency has decided that it is not necessary at this time to define "directly controlled wheel." Accordingly, this term is not included in the definition section of the regulatory text. The agency may revisit this issue if the agency decides to propose requirements for antilock brakes on passenger cars. The agency has included a new definition for "antilock brake system."

The GRRF and Fiat requested that the definition of initial brake temperature be based on the temperature of the hottest service brake rather than the average of both brakes on an axle, claiming that there should be little difference in the "cold" temperature across each axle.

<sup>&</sup>lt;sup>1</sup> The MVMA became the American Automobile Manufacturers Association in early 1993. This notice will refer to the group by its former name, MVMA. The membership of the new group is slightly different than that of the MVMA, and to refer to the group by its new name would lead to imprecision in indicating which manufacturers were represented by its comments.