that a test load of 8,900 Newtons (2,000 pounds), as proposed for Load Test Two, be applied to all back doors. Toyota further suggested that since the NPRM made no reference to doors equipped with more than one latch/ striker set, the specified load be divided by the number of latch/striker sets fitted to a single door, and that the load so divided be applied simultaneously to each latch/striker set. Advocates for Highway and Auto Safety (Advocates) suggested that a load of 11,000 Newtons (2,500 pounds) be applied in all tests. Mazda (North America), Inc. (Mazda) believed that NHTSA simply proposed the same test loads as presently specified in Standard No. 206 and, along with Rockwell, suggested that the test loads for back doors be based on real world test data.

In 1989, NHTSA published a study entitled An Evaluation of Door Locks and Roof Crush Resistance of Passenger Cars—FMVSS Nos. 206 and 216 (1989 study). That study, based on actual crash data, showed that the requirements of Standard No. 206 are responsible for a 15 percent reduction in side door ejections in rollover accidents. Real world crash data also showed that latches that met the 11,000 (2,500 pounds) and 8,900 Newton (2,000 pounds) loads in the longitudinal and transverse directions respectively were effective in preventing door openings while latches that did not meet those test requirements were not effective in preventing door openings. NHTSA believes, therefore, that the extension of the requirements of Standard No. 206 to back doors as proposed, including the test loads proposed in the NPRM, would be effective in preventing back door openings and occupant ejection through that route.

Based on the real world crash data discussed above, NHTSA has also concluded that the appropriate test load for Load Test Three is 8,900 Newtons (2,000 pounds). In most production back door latch designs, the latch would fail only if the striker disengages. This is seldom likely when loads are applied in the third direction perpendicular to the directions of Load Tests One and Two. In this test, the striker is usually pressing against the side of the fork bolt and the latch casing. If properly designed, a latch should be able to sustain a large force in this third direction. The results of the agency's back door latch tests showed that most latches tested can sustain a load of 8,900 Newtons (2,000 pounds).

NHTSA does not agree with Toyota's suggestion that the specified test load should be divided by the number of latches fitted to a single door. Real

world crash data show that latch failures are the dominant cause of door openings and that they are seldom loaded symmetrically. Since side door latches that individually meet the requirements of Standard No. 206 have significantly reduced side door openings in crashes and have saved an estimated 400 lives per year, NHTSA has decided that the proposed requirements should be applied to each back door latch tested. However, this final rule does specify separate requirements for the primary and auxiliary latches, as discussed in III(b)(5) below.

(2) Directions of Load Tests One and Two

AAMA commented that the proposed load test directions of Load Tests One and Two need clarification. AAMA argued that while side door latches and hinges are typically mounted in body and door planes that intersect at approximately 90° to each other, back door latches and hinges may be at angles other than 90°. Nissan stated that NHTSA's proposed definition of "hinge face plate" does not adequately describe certain hinge systems. Specifically, Nissan stated that in some vehicle back doors, when closed, their hinges are positioned such that the faces do not bear load perpendicular to the mounting surfaces. Nissan further stated that some hinge systems may not even have an actual "face." Thus, for a more objective test procedure, Nissan suggested applying Load Test One at the intersection of a line along the longitudinal vertical plane that passes through the center points of 2 hinges and the plane passing through 2 hinges and the latch. Load Test Two would then be applied along the longitudinal vertical plane in a direction perpendicular to Load Test One. AAMA stated that the addition of a definition of "latch face" is necessary to determine the surfaces to which the test loads must be perpendicular or parallel. Nissan stated that it interprets the term "face plate" to mean the area of the hinge that is mounted to the body and to the door and that acts as the load-bearing surface that supports the weight of the door.

NHTSA believes that Nissan's suggested loading directions will not, in many cases, be consistent with the loading directions of the hinges in actual crashes and that a new set of test devices other than those called for in J934 might be necessary to conduct Nissan's tests. NHTSA believes that its 3 orthogonal tests will cover all loading directions experienced in real world tests, irrespective of the configuration or orientation of the back doors. The agency continues to believe that the hinge tests should be conducted in accordance with SAE J934 and that Load Tests One and Two correspond to the longitudinal and transverse loads, respectively, as called for in SAE J934. The third direction is orthogonal to the other two. The agency believes, therefore, that the proposed test procedures are appropriate.

NHTSA acknowledges that the NPRM did not contain definitions of "face plate" and "latch face." The NPRM did, however, refer in proposed Load Test One to SAE J839 where details of load directions are given. NHTSA believes that SAE J839 provides sufficient explanation of those terms and that no further definition is necessary in this rule.

## (3) Load Test Three

Toyota, AAMA, and Rockwell Automotive (Rockwell) opposed Load Test Three for doors that open upward. These commenters stated, without explaining the basis for their position, that Load Test Three is unnecessary, and that NHTSA has not demonstrated any benefits that support the need for the test. Rockwell commented that a third load test is not the most effective means of reducing occupant ejections. That commenter suggested instead that a systems approach be taken in which the vehicle body together with the door system, taken as a whole, should be required to pass load tests. Conversely, the Insurance Institute for Highway Safety (IIHS) and Advocates both supported Load Test Three and urged that a load of 11,000 Newtons (2,500 pounds) be applied. IIHS suggested that Load Test Three be applied to all doors, including side doors.

NHTSĂ does not agree with Toyota, AAMA, and Rockwell that Load Ťest Three is not necessary. NHTSA notes that there are many design differences between side doors and back doors with regard to their mounting locations and orientations. Except for cargo-type doors and side-swing station wagon doors, most back doors open either in the rearward (longitudinal) or upward (vertical) directions. Those directions correspond generally to the longitudinal and transverse loading directions of side doors. As opposed to side doors, however, latch/hinge failure can occur in upward or rearward-opening back doors due to force in the third direction orthogonal to those directions. For example, in the event of a rear side impact, the back door latches and hinges are subject to a large force perpendicular to the upward and rearward-opening directions. Agency tests showed that the back doors of