

b. Safety Problem

Crash data indicate that 9,303 out of 33,387 fatally injured occupants in motor vehicle crashes were ejected or partially ejected from their vehicles in the year 2000. Among these, 8,847 were light vehicle occupants, and the remaining 456 were occupants of large trucks, buses, and other vehicles. According to annualized national estimates derived from the 1991–2000 National Automotive Sampling System investigated cases, an average of approximately 8,464 light vehicle occupants are ejected and killed annually, and 1,272 of the 8,464 fatal ejections occur through a side or rear door. (The majority of the remaining fatal ejections occur through the side window glazing.) Based on the annualized national estimates, we estimate that approximately 1,330 light vehicle occupants were ejected through an open door and killed in the year 2000. An estimated 1,227 of the occupants went through a side door opening and the remainder went through a rear door opening. Approximately 47 percent and 18 percent of the 1,330 fatal ejections occurred in side and frontal crashes, respectively. The remaining 35 percent occurred in rollover and other crashes.

Currently, both FMVSS Nos. 208 and 214 specify that the vehicle doors are fully closed and latched, but not locked when tested. With respect to the lock position, this procedure simulates a worst-case crash condition for real-world crashes. By specifying a worst-case test condition, these requirements lead to stronger door latches, providing better occupant ejection safety protection.

c. Automatic Door Locks (ADLs)

Recently, many passenger vehicles have been equipped with ADLs. Four basic ADL designs currently exist: (1) Gear-based, (2) speed-based, (3) ignition-based, and (4) brake-based locking. Three of the designs are not sensitive to vehicle traveling speed. The following are general descriptions of these ADLs.

1. Gear-based ADLs: All vehicle doors will automatically lock when the vehicle transmission is shifted out of the “park” position when all doors are closed and the engine running.

2. Speed-based ADLs: All vehicle doors will automatically lock when:

- All doors are closed while the transmission is in any position other than “park” and the vehicle brake pedal is inactive, and
- The engine is running and the vehicle speed exceeds a pre-defined limit.

3. Ignition-based ADLs: All vehicle doors will automatically lock when the vehicle ignition is turned on (regardless of whether the door is open).

4. Brake-based ADLs: All vehicle doors will automatically lock when:

- All doors become closed while the transmission is in any position other than “park” and the brake pedal is active, and
- The engine is running, and the brake pedal becomes inactive.

An ADL-equipped vehicle will automatically lock the doors whenever the driver completes the said procedures during a trip. Judging from the above general descriptions, NHTSA believes that only ADLs equipped with speed-based locking can assure that the doors will lock continuously when the vehicle is moving above a certain speed. However, there are instances when an ADL could be broken, disabled, defeated or unlocked manually before and/or during a crash. The other three ADL systems cannot assure that the doors will lock continuously when the vehicle is moving. Also, the owner's manuals of some vehicles explain how the owner can disable and/or modify the ADLs.

2. Discussion

a. The Petition for Rulemaking

On October 19, 2001, GM submitted a petition for rulemaking (Docket No. NHTSA–02–11321–1) requesting that NHTSA initiate rulemaking to amend the test conditions of FMVSS Nos. 208 and 214 allowing vehicles equipped with ADLs to be tested with all doors locked. Currently, S8.1.7 and S16.2.4 of FMVSS No. 208 specify that in a frontal crash test, all vehicle doors are fully closed and latched but not locked. Similarly, S6.8 of FMVSS No. 214 specifies that in a side impact test, all doors, including any rear hatch or tailgate, are fully closed and latched but not locked. The petition for rulemaking indicates that GM has decided to equip all its future passenger cars and light trucks with ADLs that are programmed to lock while the vehicle is moving, and that the requested amendment would allow vehicles equipped with ADLs to be tested according to their designed condition. GM claims that this test condition would better reflect and predict field performance. In addition, GM claims that initiating such a rulemaking would encourage manufacturers to equip their vehicles with ADLs, and that this would result in better occupant protection.

b. Agency Analysis

Crash experience prior to the issuance of FMVSS Nos. 208 and 214 and

subsequent analyses of the crash data indicate that vehicle doors can open in crashes due to the failure of hinge/latch/lock assembly systems, and that this can result in occupant ejections. In promulgating FMVSS Nos. 208 and 214, NHTSA decided to specify test conditions simulating a worst-case condition observed in real crashes with respect to the door lock position. Therefore, the test conditions of both standards currently require that all vehicle doors are fully closed and latched but not locked in a dynamic impact test. The goal is to require the installation of better door hinge/latch assemblies, thus minimizing side/rear door ejections.

The agency recognizes that many late model year passenger cars and light trucks are equipped with ADLs. However, we have no data to indicate whether or not ADL-equipped vehicles have a reduced likelihood of opening in a real crash or to indicate consumer acceptance of ADLs. NHTSA is also concerned that there are many different ADL design concepts, and that there may be situations in which an ADL could be broken, disabled, or unlocked at the time of a crash. The test conditions currently specified in FMVSS Nos. 208 and 214 replicate these real world situations.

As noted previously, there are four basic ADL designs: (1) Gear-based, (2) speed-based, (3) ignition-based, and (4) brake-based. Three of these designs are not sensitive to the traveling velocity of the vehicle. Many ADL systems have a manual control button on the driver side as a convenience feature. Drivers can unlock the doors of ADL-equipped vehicles, and the door will not necessarily relock. For instance, drivers can stop some ADL-equipped vehicles, unlock the doors by pushing the button, and discharge occupants. In this particular case, the gear-based ADLs would not relock the doors unless the driver shifted the transmission back to and then out of the “park” position. In addition, the brake-based ADLs would not relock the doors if the vehicle accelerated before all doors were fully closed. Therefore, there is no guarantee that ADLs will assure that the doors will be locked continuously when the vehicle is moving. While the speed-based ADLs may have the most potential for reducing unlocked doors in the real world, there is no indication that all ADLs produced in the immediate future would be of this type. Therefore, based on the reasons above, we believe that the test conditions specified in FMVSS Nos. 208 and 214 are appropriate for ADL-equipped vehicles. Allowing ADL-equipped