

## Safety Considerations for Companies Operating 15-Passenger Vans



Many companies and organizations own and operate 15-passenger vans. Other organizations, including schools, colleges, vanpools, and churches, occasionally rent vans to transport groups of employees or others to functions and events.

According to a 2001 study by the National Highway Traffic Safety Administration (NHTSA), 15-passenger vans differ from most light truck vehicles in that they have a large payload capacity and the occupants sit higher up in the vehicle. The 2001 Report noted that, when loaded, these vehicles have a much worse rollover propensity than when unloaded.

A June, 2004, NHTSA Technical Report provides an in-depth analysis of crashes involving 15-passenger vans to assess the effect of occupancy level on the risk of rollover.

### The Data

The 2004 report presents statistics on fatal crashes involving 15-passenger vans from 1990

to 2002 using data from NHTSA's Fatality Analysis Reporting System (FARS). Data from fatal crashes show that between 1990 and 2002, there were 1,576 15-passenger vans involved in fatal crashes, which resulted in 1,111 fatalities to occupants of such vans. Of the 1,576 vans involved in fatal crashes, 657 vans were in fatal, single vehicle crashes, and 349 rolled over. In 450 of these vans there was at least one fatality, which totals 684 occupant fatalities in single-vehicle crashes.

### Seatbelts Drastically Reduce Fatalities

A large proportion of the fatally injured van occupants were not wearing seat belts, and only 14 percent of the fatally injured occupants were properly restrained. Also, 92 percent of the belted occupants survived. About 61 percent of the occupants killed in single-vehicle crashes were ejected from the van. Proper restraining greatly reduces the chances of ejection from the van. The rate of ejection for unrestrained occupants is about 72 percent as compared to 18 percent for restrained occupants.

### Rollover Propensity Increases With Load

Analysis of data from NHTSA's State Data System reveals that the rate of rollover observed for 15-passenger vans that are loaded above half their designed seating capacity is 2.2 times the rate observed for vans loaded to or below half their capacity. This disparity is the widest among all vehicle categories. A large proportion of these high-occupancy rollovers are observed to take place on high-speed roads.

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The odds of a rollover for a 15-passenger van loaded to its designed seating capacity, is more than five times the odds of a rollover when the driver is the only occupant in the van. This compares to ratios of close to 2.0 for SUVs and Minivans, 1.6 for pickup trucks and 1.2 for passenger cars. This disparity in the risk of rollover between lightly loaded and fully loaded scenarios is the most significant conclusion in the 2004 NHTSA report.

### **Rollover Propensity Increases With Speed and Road Type**

Speed and curved road geometry were determined to be statistically significant factors affecting rollover outcome. The odds of a rollover in high-speed roads (50+ m.p.h.) are about five times the odds in a low-speed road (under 50 m.p.h.). The odds of a rollover on curved roads increase by two times as compared to straight roads.

### **Handling Characteristics**

The NHTSA study shows that loading these vehicles to their rated capacity (GVW) has an adverse affect on the rollover propensity due to the increase in center-of-gravity height. Loading these vans with passengers and their cargo moves the center of gravity rearward, which increases the vertical load on the rear tires. This situation is made even worse when users place cargo on the roof of the vans.

Some vehicle manufacturers compound the problem by extending the rear passenger compartment well behind the vehicle's rear wheels. When the vans are fully loaded there is a seat with four passengers behind the rear axle. This tends to make the back end of the vehicle heavy enough so that if there is a sudden swerve, the rear end can swing out.

These factors combine to create serious stability problems, particularly when drivers make sudden and severe steering actions in response to unexpected traffic situations, or when they inadvertently drop wheels off the roadway and attempt to recover.

NHTSA research makes it very clear that the handling characteristics between a lightly loaded 15-passenger van and a van that is fully loaded are significantly different. The handling characteristics of these vehicles changes during extreme maneuvers, depending on the load, and a fully loaded van is inherently less stable than an unloaded one.

Wheelchair lifts and raised roofs make the situation even worse by adding additional weight to one side of the chassis and raising the center of gravity. Vans with wheelchair lifts should be equipped with heavy-duty suspensions, anti-sway bars if available, and heavy-duty tires. Wheelchairs themselves, particularly battery powered ones, add to the total weight carried by the vehicle and should be considered when calculating the gross vehicle weight.

### **Controls**

- Carefully adhere to strict driver qualification and hiring standards, including previous driving history and reference checks.
- Enforce a policy that all occupants of these vehicles wear seat belts.
- Do not load these vehicles to their full capacity.
- Employ experienced drivers who have successfully completed classroom and on-road training in the operating and handling characteristics of 15-passenger vans.
- Do not drive 15-passenger vans, regardless of load, more than 55 miles per hour.
- Maintain tire pressures as recommended by the vehicle manufacturer for the load the vehicle will carry. Check tire pressures daily.
- Require occupants to sit as far forward of the center line of the vehicle as possible.
- Do not load luggage or other items on the roof.
- Maintain a minimum of 4 seconds following distance between the van and traffic in front.
- Complete pre- and post-trip vehicle inspections prior to each operating shift.

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- Complete preventative vehicle maintenance according to the manufacturer's recommendations.
  - Ensure that drivers are well rested.
  - Ensure that drivers are not distracted while driving. This may include forbidding cell-phone use, eating, etc., while driving.
  - Adjust mirrors to eliminate blind spots to the sides and rear of the vehicle.

### **Dynamic Stability Control Using Technology**

Some manufacturers have either eliminated the production and sale of 15 passenger vans or have completely redesigned them, including adding in-vehicle technology that improves vehicle stability. NHTSA has tested one van equipped with Electronic Stability Control (ESC). The results of this study (June, 2004) show that the installation of ESC on fully loaded 15 passenger

vans may have important safety benefits in some, but not necessarily all, driving maneuvers. NHTSA intends to perform further testing on the effectiveness of ESC in these vehicles.

### **References**

- "The Rollover Propensity of Fifteen-Passenger Vans," NHTSA Research Note, April 2001.
- "Analysis of Crashes Involving 15 Passenger Vans," NHTSA Technical Report, May, 2004, DOT HS 809 735.
- "Testing the Effects of Tire Pressure Monitoring System Minimum Activation Pressure on the Handling and Rollover Resistance of a 15 Passenger Van," NHTSA Technical Report, June, 2004, DOT HS 809 701.
- "Testing the Dynamic Rollover Resistance of Two Fifteen Passenger Vans With Multiple Load Configurations," NHTSA Technical Report, June, 2004, DOT HS 809 704.