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FALL NEWSLETTER

ROLLOVER RESISTANCE RATINGS FOR CAR, LIGHT TRUCK, AND SUV BUYERS NEED IMPROVEMENT

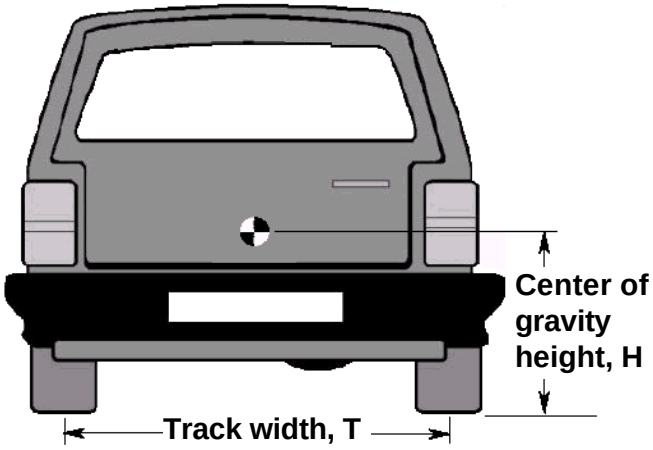
[Excerpted from NAS and NHTSA - Docket No. NHTSA-2001-9663; Notice 2]

Motor vehicle rollovers involving cars, vans, pickup trucks, and sport utility vehicles result in about 10,000 deaths and 27,000 serious injuries in the United States each year. Rollover accounts for nearly one-third of light-vehicle occupant deaths, even though it occurs in fewer than one in 10 crashes involving light vehicles.

The U.S. government began rating vehicle resistance to rollover in 2001 as a way to inform consumers about vehicle performance. These rollover ratings are based on a measure of a vehicle's "top-heaviness," called the Static Stability Factor. Automobile manufacturers and some consumer groups expressed concern about the decision by the National Highway Traffic Safety Administration to base the five-star rating system on the Static Stability Factor alone, without any consideration of how vehicles handle when they are in motion.

A new report by the National Academies' National Research Council finds that the Static Stability Factor is a useful indicator of a vehicle's propensity to roll over, but that U.S. government ratings for new cars, light trucks, and sport utility vehicles do not adequately reflect differences in rollover resistance shown by available crash data. The five-star system should be revised to allow better discrimination among vehicles and incorporate results from road tests that measure vehicle control and handling characteristics. Moreover, the limited procedures used by NHTSA to develop the ratings and evaluate consumers' ability to understand them raise questions about the system's effectiveness.

The Static Stability Factor is a number generated by dividing a vehicle's track width, or distance between wheels from side to side, by twice its center-of-gravity height -- essentially a measure of how top-heavy the vehicle is.



Static Stability Factor

$$SSF = \frac{T}{2H}$$

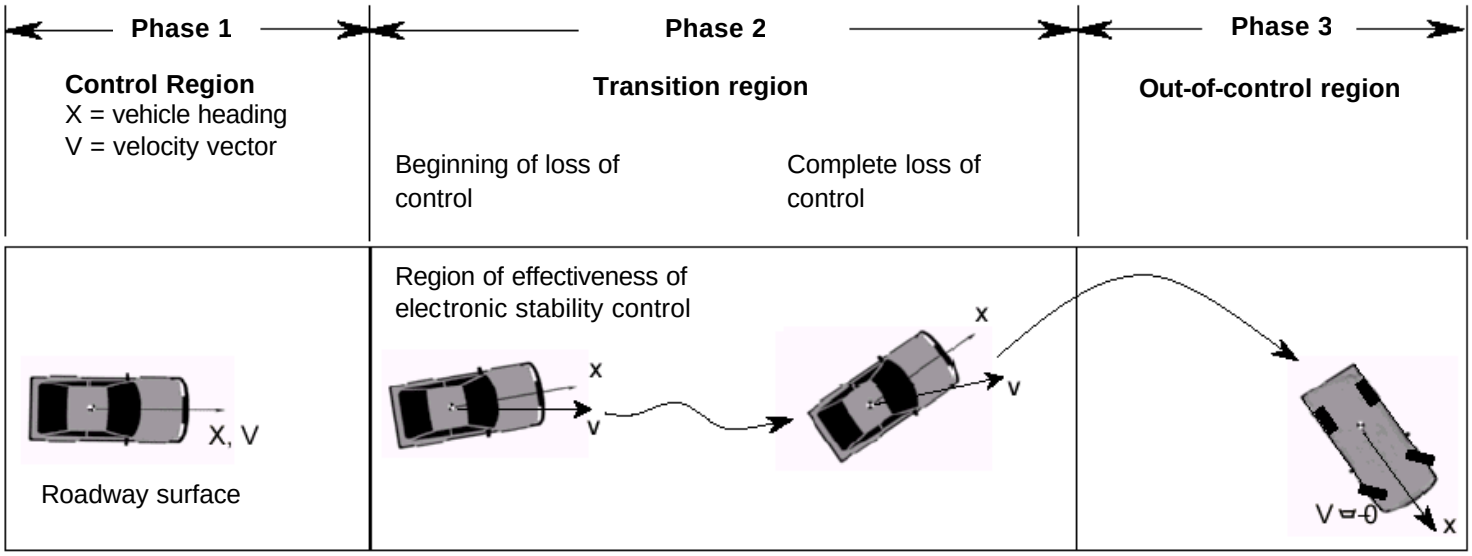
A five-star rating indicates the highest Static Stability Factor, and a one-star rating the lowest. In a single-vehicle crash, a vehicle with a rating of five stars has a less than 10 percent risk of rollover; four stars, between 10 percent and 20 percent; three stars, between 20 percent and 30 percent; two stars, between 30 percent and 40 percent; and one star, greater than 40 percent. According to the agency's analyses of 220,000 actual single-vehicle crashes, taller, narrower vehicles such as sport utility vehicles are more likely than lower, wider vehicles such as passenger cars to roll over. In general, sport utility vehicles receive between one and three stars for rollover resistance; pickup trucks, between one and four stars; vans, two or three stars; and passenger cars, four or five stars.

Relationship Between NHTSA's Rollover Resistance Star Ratings and SSF Values

Star	SSF	Comments
★	1.03 or less	
★★	1.04-1.12	Typical SSF values for SUVs
★★★	1.13-1.24	
★★★★	1.25-1.44	Typical SSF values for passenger cars
★★★★★	1.45 or more	

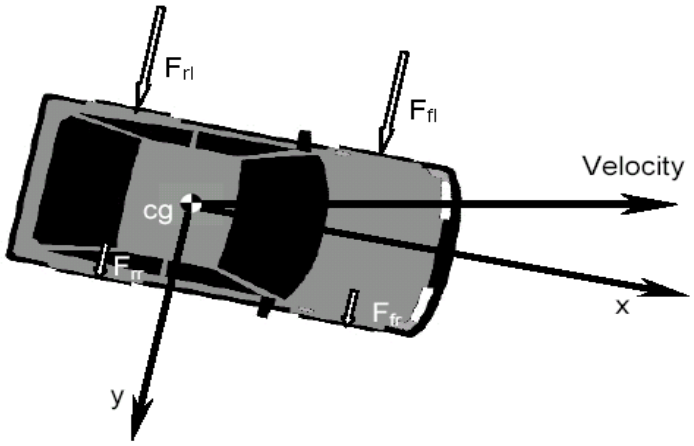
But the choice of only five broad categories for the rating system does not take advantage of what available crash data show about differences among vehicles, making the system less helpful than it could be for consumers, the report says. For example, the rating categories are so broad that two vehicles given the same star rating may have significantly different rollover tendencies. A rating system with more categories, or a numerical score, could provide more help to consumers who want to choose the safest vehicle within each vehicle class.

Based on NHTSA's recent research to evaluate rollover test maneuvers, the National Academy of Sciences' study of rollover ratings, comments to the July 3, 2000 notice, extensive consultations with experts from the vehicle industry, consumer groups and academia, and NHTSA's previous research in 1997-8, the agency has chosen the J-turn and the Fishhook Maneuver as dynamic rollover tests. They are the limit maneuver tests that NHTSA found to have the highest levels of objectivity, repeatability and discriminatory capability.



Phases of a rollover crash

Vehicles will be tested in two load conditions using the J-turn at up to 60 mph and the Fishhook Maneuver at up to 50 mph. Both maneuvers will be conducted with an automated steering controller, and the reverse steer of the Fishhook Maneuver will be timed to coincide with the maximum roll angle to create an objective "worst case" for all vehicles regardless of differences in resonant roll frequency. The light load condition will be the weight of the test driver and instruments, approximating a vehicle with a driver and one front seat passenger. The heavy load condition will add additional 175-lb manikins in all rear seat positions.



Note: xy axis = vehicle coordinate axis; F_{fl} = lateral force on the front left tire; F_{fr} = lateral force on the front right tire; F_{rl} = lateral force on the rear left tire; F_{rr} = lateral force on the rear right tire.

Lateral forces leading to rollover; plan view with steered wheels to the front.

The National Academy of Sciences recommended that dynamic maneuver tests be used to supplement rather than replace Static Stability Factor (the basis of our present rollover resistance ratings) in consumer information on rollover resistance. This notice proposes two alternatives for consumer information ratings on vehicle rollover resistance that include both dynamic maneuver test results and Static Stability Factor. The first alternative is to include the dynamic test results as vehicle variables along with SSF in a statistical model of rollover risk. This is conceptually similar to the present ratings in which a statistical model is used to distinguish between the effects of vehicle variables and demographic and road use variables recorded for state crash data on a large number of single vehicle crashes. The National Academy of Sciences demonstrated the tight confidence limits that can be achieved using a logistic regression model for this purpose. Such a model would be used to predict the rollover rate in single vehicle crashes for a vehicle considering both its dynamic maneuver test performance and its Static Stability Factor for an average driver population (as a common basis of comparison).

--- Excerpted from NAS & NHTSA 10/02 ---