



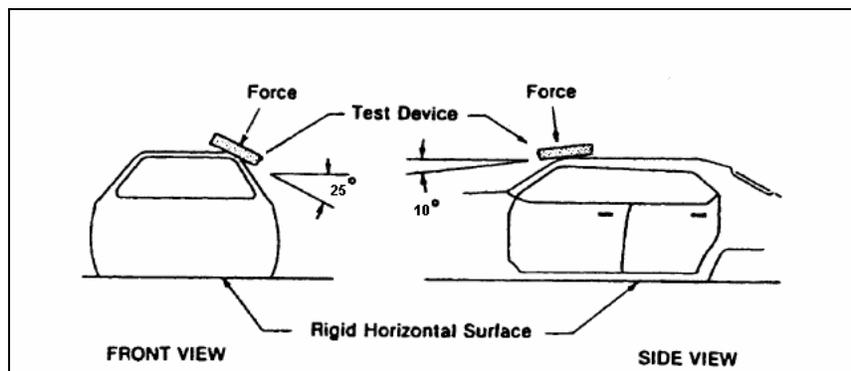
Industry Concealment of Tests Undermined Development of Meaningful Rollover Crash Roof Crush Resistance Standard in 1971

Newly released documents, now available on Public Citizen’s Web site, establish how General Motors withheld information from federal safety regulators 30 years ago, just as the government was working to establish the roof crush resistance safety standard that is still on the books. The company hid internal testing results showing vehicle design failures, arguing instead for a roof crush resistance standard that it knew did not require major improvements in the roof integrity of its 1970s vehicles. This standard — still on the books after 33 years — allows vehicles to be produced and sold to consumers with roofs that crush into the passenger survival space during a rollover, severely injuring or killing people inside the vehicle.

Auto Industry Conceals Truth, as Now Revealed by Internal Company Documents

On January 6, 1971, the National Highway Safety Bureau (NHSB, which later became the National Highway Traffic Safety Administration, or NHTSA) proposed a safety standard to “reduce deaths and injuries due to the intrusion of the roof into the passenger compartment in rollover” crashes. (See “Roof Intrusion Protection for Passenger Cars, Proposed Rule Making,” *Federal Register* 36, Jan 6, 1971, at 166.)

The agency’s initial proposal was a test of both front corners of a passenger vehicle roof. Both corners would be tested by lowering a 12-inch square platen, angled forward 10 degrees horizontally and 25 degrees laterally, successively onto each front corner, increasing the force until it equaled one-and-one-half the weight of the vehicle, or 5,000 lbs., whichever was less. To pass the test, the roof could not have more than 5 inches of intrusion into the passenger compartment.



Graphic for illustration purposes only, not from litigation papers.

On April 5, 1971, General Motors and the Automobile Manufacturers Association (AMA, now re-named the Alliance of Automobile Manufacturers) submitted comments arguing for important and weakening changes to the proposed test procedures. (*See* Comments of Automobile Manufacturers Association. “Roof Intrusion Protection for Passenger Cars, Proposed Rule Making,” Docket No. 2-6; Notice 4, April 5, 1971, *and* Comments of General Motors Corporation. “Roof Intrusion Protection for Passenger Cars, Proposed Rule Making,” Docket No. 2-6; Notice 4, April 5, 1971.)

In its comments, the auto industry sought to weaken the standard in several key ways. The first was to change the orientation and dramatically increase the size of the platen. GM argued, on page 3, that NHTSA’s proposal for a 12-inch by 12-inch platen was too small of an area of the roof to be appropriate for the test. GM urged NHTSA to substantially increase the size of the testing platen to at least 30 inches by 72 inches, to provide “a more realistic loading condition for evaluating roof strength.” On the eighth page of its comments, the AMA also recommended the use of a large platen. Moreover, both GM and the AMA suggested — on the 6th and 8th pages, respectively — that the forward horizontal orientation of the platen be reduced from ten degrees to five.

Second, the industry urged NHTSA to abandon testing of both sides of the roof consecutively and to limit the test to only one side of the roof. The AMA argued that testing both sides of the vehicle roof was unnecessary. On pages 10 and 11 of its comments, the AMA asserted that “in most cases roof structure damage is distributed to only one side of the roof in an actual rollover situation.” Moreover, the AMA continued, “since the upper car structure is symmetrical,” the AMA wrote, “it makes no difference which side of the roof is selected for testing.” On page 11 of its comments, the AMA further asserted that:

[I]t is very questionable whether repeatable or reliable results can be obtained by testing both sides of this same roof structure system. This follows from the fact that consistent material deformation in the vicinity of the second test cannot be assured after an initial destructive test on the first side.

GM endorsed and incorporated by reference the AMA comments. Its specific proposed revisions to the agency’s language of the standard suggested that NHTSA omit the testing of both sides from its test procedures. On page 10 of GM’s comments, “repeat the test on the other front corner of the roof of the vehicle,” has been crossed out.

The third critical item suggested by industry to weaken the standard was that, during a test, all vehicle glass should be intact, and all windows in a closed position. General Motors, on page five of its comments, inserted language stating that “[a]ll fixed glass shall be installed and moveable glass shall be in its closed position.” The AMA recommended the same language on the 8th page of its comments. The trade group argued that “the status of the glass is defined to assure adequate control of potential test variables.” Of course, test parameter “definition” could be equally assured by a standard that omitted glass in the windows for the purposes of the test.

NHTSA Issues Critically Flawed Roof Crush Standard

Internal documents demonstrate that GM was well aware that its vehicles had severe roof strength problems. Yet the company withheld pertinent information from NHTSA in its comments. In a General Motors meeting on May 13, 1966, GM Director of Automotive Safety Engineering confessed that “We are presently in trouble with the “A” or Number 1 (front roof-supporting) pillar. (See Report No. PG-21773, Lundstrom, L. C. Inter-Organization Letter, 1969 GM Safety Design Goals – Body Design – No. 1 Pillar. Detroit, General Motors, May 16, 1966, at 7.)

After publication of NHTSA’s proposed roof crush standard, GM conducted roof crush resistance tests on six of its own vehicle models. The tests were done in accordance with NHTSA’s proposal. Five of the six GM vehicles failed the test. GM’s test report, dated March 5, 1971, concluded that “all the bodies tested failed to meet the requirements of the proposed roof intrusion requirements (Docket 2-6 Notice 4) except the X-27 body that passed. (See Timinsky, P.J. *Product Test Report* No. 111037. Detroit, General Motors, Mar. 5, 1971.)

In its comments to NHTSA, GM failed to mention these testing results. GM’s comments instead undermined the effectiveness of the roof crush test and standard.

All three of the key industry suggestions highlighted in the previous section play a significant role in weakening the test. To address the first, increasing the size of the platen reduces the amount of force per square inch applied to a test vehicle’s roof. And reducing the angle of the platen from ten to five degrees reduces the force applied to the front corner roof pillars. Yet rollover crashes combine both lateral and downward forces in a manner more similar to NHTSA’s initial proposal, meaning that industry’s suggested changes moved the test farther away from the crash impacts in real-world rollover crashes.

GM was likely aware of these implications — in 1966, it had internally recommended a roof crush drop test in which the impact surface was at a far sharper angle, relative to the front horizontal orientation of the vehicle roof — the opposite of its recommendations to NHTSA in 1971. (See Lundstrom, L. C. Inter-Organization Letter. Subject: Design Goals for Safety. Detroit, General Motors, April 19, 1966, at 5.)

Secondly, while both GM and the AMA argued against testing both sides of the roof due to the roof’s alleged symmetry, the dynamics of real-world rollover crashes are far from symmetrical in their impacts on the roof. A consecutive test for both corners is critical because the initial impact on the roof in a rollover crash substantially degrades the integrity of the roof structure, meaning that the “second impact” is far more devastating than the first, and usually at a more lateral angle than the initial impact.

In fact, real-world rollover injuries show that people seated beneath the corner of the “second impact” on the roof are the ones most often killed or severely injured. While the first impact can be glancing, the second impact occurs after the initial integrity of the roof has been severely degraded by the crash. Therefore, the strength of the roof’s second corner – in a consecutive test scenario – is fundamental to preventing deadly roof collapse.

Third, the industry’s argument that defining test parameters should lead NHTSA to allow windshields and windows to remain intact for the test has led to a dangerous over-reliance by manufacturers on the strength of window bonding to pass the test. Yet in a real-world rollover crash, the glass breaks after the initial (first corner) impact. *When the windshield shatters at first impact, roof strength can decrease by as much as one-third.* Testing only one side of a vehicle’s roof with the glass intact allows the measure of roof integrity to be enhanced by the initial influence of the glass, a protection that real-world rollover victims are stripped of in an actual crash.

At least as early as 1966, GM also knew of the influence that windows have in improving roof strength ratings. “Retention of the windshield is advantageous in the event of a roll-over due to the added strength,” noted C. W. Gadd of GM Research Laboratories, to colleagues at an internal meeting in 1966. (Report No. PG-21773; Lundstrom, L. C. Inter-Organization Letter. Subject: 1969 GM Safety Design Goals – Body Design – No. 1 Pillar. Detroit, General Motors, May 16, 1966, at 9.)

Without the benefit of the industry’s crash test information showing a massive failure to meet the proposed test, NHTSA published its roof crush resistance standard, Motor Vehicle Safety Standard 216, in December of 1971. The final standard reflects, almost without change, the modifications to the rule that had been suggested by GM and the AMA. (See “Part 571 — Motor Vehicle Safety Standards,” *Federal Register* 36, Dec. 8, 1971, at 23299-23300.)

The standard, which remains in effect today, requires the use of a flat platen 30 inches by 72 inches in dimensions, positioned at a forward angle of five degrees below the horizontal — exactly as GM requested. The rule requires that all vehicle glass be installed and all glass windows closed. In addition, it requires that only one side of the vehicle roof be tested. The death toll from roof crush alone now totals some 7,000 people a year— meaning that tens of thousands, if not hundreds of thousands, of people have unnecessarily died over the past three decades from this flimsy standard, and the lack of protection that it offers occupants in an actual rollover crash.