1971 Roof Strength Standard – 33-Year Old Standard Does Not Provide Basic Crashworthiness Protections for Occupants in Vehicles that Rollover

The auto industry and government have known about the deadly consequences of vehicle roof crush since 1960s, yet have never upgraded the 1971 standard nor extended it to vehicles weighing more than 6,000 lbs.

July 13, 1965	Both General Motors (GM) and Ford highlight the importance of roof strength in rollovers in testimony before Congress.
Apr. 13, 1966	GM Engineering Staff memo describes the company's plans to develop a dynamic roof strength drop test from 5 ½ feet.
Aug. 1, 1966	Ford test report describes dynamic roof crush "roof drop test."
Sept. 9, 1966	President signs National Traffic and Motor Vehicle Safety Act.
Oct. 11, 1967	Federal Highway Administration (FHA), the National Traffic Safety Bureau (NTSB) issues an Advanced Notice of Proposed Rulemaking (ANPRM) on 47 issues, including roof intrusion, seeking public comment.
Jan. 6, 1971	The National Highway Traffic Safety Administration (NHTSA, formerly NTSB), issues a Notice of Proposed Rulemaking on roof intrusion protection for passenger cars that would statically test both front sections of the roof on passenger vehicles.
1971	NHTSA issues Federal Motor Vehicle Safety Standard (FMVSS) 208 with optional dolly rollover test. Most companies use dolly test internally but do not publish results.
Apr. 1971	General Motors Corporation (GM) and the Automobile Manufacturers Association (which later became the Alliance of Automobile Manufacturers) argued in comments to the docket that testing both sides of the roof was unnecessary. It was later revealed in litigation many years later that GM had used NHTSA's two-section test on six of its production model vehicles and that only one vehicle tested had passed. GM nevertheless argued to NHTSA that only one side should be tested because the roof was "symmetrical," in addition to pushing for other changes to weaken the test. Moreover, GM withheld its testing results from the agency.
Dec. 8, 1971	NHTSA issues final rule establishing a roof crush standard for passenger cars to take effect in 1973. This standard, which today is virtually the same as in 1973, measures the result of pressure to only one side of a vehicle's roof.

Mar. 22, 1973	The Center for Auto Safety petitions NHTSA to apply federal motor vehicle safety standards, including the roof crush standard, to light trucks and multipurpose passenger vehicles with gross vehicle weight rating (GVWR) of 10,000 pounds or less.
Sept 1, 1973	Roof Crush Resistance standard, FMVSS No. 216, takes effect for passenger cars.
1974	NHTSA contracts with Minicars for development of a research safety vehicle that protects occupants in serious rollover crashes at 40 mph.
April 30, 1976	Engineer killed during accidental rollover at GM proving grounds during a tire evaluation test. GM institutes a new policy requiring roll cages on all test vehicles and all test drivers and test occupants to wear helmets.
Apr. 17, 1991	NHTSA issues a final rule, effective Sept. 1, 1993, extending the application of FMVSS 216, the existing car roof crush resistance standard to light trucks, vans, buses, and multipurpose passenger vehicles (MPVs) with GVWR of 6,000 lbs or less, specifically declining to extend the standard to light trucks, vans, buses and MPVs with a GVWR of up to 10,000 pounds.
Dec. 18, 1991	Intermodal Surface Transportation Efficiency Act (ISTEA) requires application of passenger car safety standards to light trucks, vans, buses, and MPVs with GVWR of 6,000 lbs or less. ISTEA also requires issuance of a standard to improve head impact protection from interior components (roof rails, pillars, and front headers) of passenger cars. ISTEA additionally directs NHTSA to commence a rulemaking proceeding on a standard to prevent rollover crashes.
Jan. 3, 1992	NHTSA issues an advanced notice of proposed rulemaking (ANPRM) to establish a rollover prevention standard, as required by ISTEA.
Sept 23, 1992	NHTSA releases *Planning Document for Rollover Prevention and Injury Mitigation* listing alternative actions agency could take to address rollover problem, including research into improved roof crush resistance to prevent head and spinal injury.
Jan. 22, 1993	NHTSA delays by one year, until Sept. 1, 1994, effective date for application of FMVSS 216, the roof crush standard to light trucks, vans, buses, and multipurpose passenger vehicles with gross vehicle weight rating of 6,000 pounds or less.

June 23, 1994	NHTSA terminates rulemaking on rollover prevention and stability standard. In the notice of termination, the agency promises that it will instead address factors involved in preventing rollover casualties, including roof strength requirements.
May 6, 1996	R. Ben Hogan, Smith and Alspaugh, PC, a law firm, petition NHTSA for rulemaking, and request that the agency require "roll cages" as standard equipment on passenger cars.
Jan. 8, 1997	NHTSA grants petition requesting rulemaking to require "roll cages."
Apr. 27, 1999	FMVSS 216, the roof crush standard procedure clarified for placement of the test device to accommodate certain vehicles that have raised and/or highly sloped roofs. This change in the standard did not address or upgrade underlying roof crush testing and strength requirements.
Sept, 2000	In wake of the exposé of Firestone tire/Ford Explorer rollover fatalities, NHTSA Administrator states that agency needs to improve roof crush safety standard for rollover protection in testimony before Congress.
Oct. 22, 2001	NHTSA publishes notice and request for comments on roof crush resistance, describing agency roof crush research and testing as a part of its rollover protection program over the past 30 years.
2002	Herbst, B., Forrest, S., Meyer, S., Hock, D. publish their "Alternative Roof Crush Resistance Testing with Production and Reinforced Roof Structures,"[1] that discusses the feasibility of a dynamic roof crush test, stating that "[t]he automotive industry and researchers have used drop testing for years to evaluate roof strength. In the late 1960s's, SAE developed a standardized procedure to perform full vehicle inverted drop testing. Many domestic and import auto manufacturers have utilized the inverted drop test technique as far back as the 1960s and 1970s to evaluate roof strength.
April 2002	NHTSA publishes its report *Characteristics of Fatal Rollover Crashes*[2] and notes that rollover crashes are more likely to be fatal than other crashes.
Sept. 17, 2002	NHTSA Administrator Dr. Jeffrey Runge states that roof crush intrusion potentially contributes to serious or fatal injury in 26 percent of rollover crashes.[3]
Feb. 26, 2003	Senate Commerce Committee holds a well-publicized hearing on SUV safety where Senators, auto industry representatives, the administrator of NHTSA and spokespeople from consumer safety groups speak about the problems of roof crush in SUV rollovers.

March 3, 2003	*Detroit News* series "Deadly Driving" highlights the failure of NHTSA to upgrade its roof strength standard and cites NHTSA data indicating that 1,400 deaths and 2,300 serious injuries could be prevented if the standard were more rigorous.
July 15, 2003	National Transportation Safety Board (NTSB) concludes roof crush contributed to severity of driver injuries and diminished passenger survivable space in Henrietta, Texas crash of 15-passenger van that killed four occupants and seriously injured eight others.
July 2003	NHTSA issues *Motor Vehicle Traffic Crash Injury and Fatality Estimates: 2002 Annual Report*, finding that rollover crashes accounted for 82 percent of the total fatality increase between 2001 and 2002. The report also reveals that in 2002, 10,666 occupants were killed in rollovers – one-third of all occupant highway deaths.
July, 2003	NHTSA estimates that 1,339 serious or fatal injuries caused by roof crush intrusion are suffered by belted occupants each year. NHTSA lists a proposed rule to upgrade roof crush resistance as a possible 2004 action, and final rule as a possible 2005 action, in *Vehicle Safety Rulemaking Priorities and Supporting Research 2003-2006*, with little description of a rule's possible contents. No proposal for rulemaking or an upgraded standard has yet been issued as of March 2005.
Nov. 25, 2003	S.1978 reported out of Senate Commerce, Science and Transportation Committee containing a mandate for NHTSA to issue a dynamic roof crush standard and upgrade of rollover crashworthiness in vehicles up to 10,000 pounds.
2003 - Jan. 2004	Safety researchers at Xprts, Inc., conduct roof crush dynamic tests using the Jordan Rollover System (JRS) on Chevrolet Blazers, Chevrolet Suburbans and Ford Explorers. During the JRS tests, the roadway surface moves forward along a track, contacting the roof of the vehicle as it rotates on the spit. The test surface impacts both *sides of the roof a single time*, imitating the first roll of a vehicle in a rollover crash. The results show that while the current static test measures only the weakness of the roof, dynamic tests measure occupant injury, safety belt performance, window glazing, side impact air bags, seatback strength, and door locks and latches, as well as roof strength.

Feb. 12, 2004 — Senate passes S.1072, the Highway Funding Bill, which includes safety provisions from S.1978 that would:

- Require NHTSA to issue a rollover crashworthiness standard by June 30, 2006, for passenger vehicles under 10,000 lbs that will consider the prescription of a dynamic roof strength standard that realistically duplicates actual forces;
- Require NHTSA consideration of improved seat structure and safety belt design (including seat belt pretensioners), side impact head protection airbags, and roof injury protection measures.

Endnotes

[1] Herbst, B., Forrest, S., Meyer, S., Hock, D., "Alternative Roof Crush Resistance Testing with Production and Reinforced Roof Structures", SAE 2002-01-2076

[2] NCSA, *Characteristics of Rollover Crashes*, DOT HS 809 438, (Apr. 2002), at 14 and 20; *See also* "Registration Data for 1975-2001

[3] Runge, Jeffrey. Speech to the 3rd Motor Vehicle Safety Symposium, United Nations University, Tokyo, Japan, September 17, 2002. < http://www.nhtsa.dot.gov/nhtsa/announce/speeches/020917Runge/UNU%20speech.doc>