

August 19, 2003

Honorable Jeffrey Runge, M.D., Administrator
National Highway Traffic Safety Administration
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

PETITION

For more than thirty years, NHTSA has had the opportunity to prevent power window incidents inflicting death and injury by requiring manufacturers to install proper preventive mechanisms, but has neglected to do so. Since FMVSS 118 took effect on February 1, 1971, at least 33 children have been killed¹ and thousands more children and adults have been injured² by power windows. These tragedies could have been prevented had manufacturers been required to install fail-safe technology to ensure that occupants could not be trapped in rising windows. Such technology is now widely and voluntarily employed in the European market, even by the automakers that have vigorously opposed such requirements in the United States.

The Center for Auto Safety (CAS), Public Citizen, KIDS AND CARS (KAC), Consumer Federation of America (CFA), Advocates for Highway and Auto Safety, the Zoie Foundation, the Trauma Foundation, and Consumers for Auto Reliability and Safety (CARS) petition the National Highway Traffic Safety Administration (NHTSA) pursuant to 49 C.F.R. 552 to initiate rulemaking for the purpose of amending Federal Motor Vehicle Safety Standard 118 (FMVSS 118) to protect children from death and injury involving power-operated windows and roof panels.

Petitioners request that NHTSA propose modifying FMVSS 118 to require anti-trap mechanisms in all motor vehicles that would reverse the direction of power window operation when an obstruction is encountered. Petitioners also request that NHTSA propose requiring all manufacturers to install power window controls to prevent inadvertent engagement by occupants. We note that two separate rulemakings have remained open on these issues since 1996. We request immediate regulatory action by NHTSA to resolve these uncompleted rulemakings and thereby avoid further death and injury. Petitioners also support the petition filed earlier this year by the Zoie Foundation, which requested similar modification of the standard.

The case of power windows injuries requires special attention since the majority of the victims in these cases are children, particularly young children who typically are under the age of five.^{3, 4} The injuries that children receive tend to be more severe since they are more likely to involve head and neck injury than the injuries sustained by adults. In addition, it takes less force

to inflict injuries on a young child. In the past, NHTSA has chosen to be particularly careful in regulating equipment and vehicle components that represent a special risk of harm to children, especially since children are not as vigilant as adults in understanding and anticipating potential sources of death and injury.⁵

NHTSA has allowed this issue to linger for three decades without imposing stronger standards on automakers. No compelling reason exists that can justify further delay. More power window deaths have been recorded in the last two years than in any other two-year period since 1971.⁶ NHTSA should act immediately to insure that new motor vehicles incorporate the safeguards necessary to end this epidemic.

Development of FMVSS 118

Regulation of power windows was first proposed in separate Notices of Proposed Rulemaking (NPRM) issued on August 23, 1969.⁷ One of the notices addressed power window operation and proposed that automatic reverse switches be installed on all power windows as a failsafe mechanism to protect children.⁸ However, the agency responded to nearly unanimous opposition from the industry by dropping the auto-reverse sensor requirement from the final rule promulgated in 1970.⁹ The common thread of the manufacturers' comments argued that they were currently doing enough to protect children, not that the technology was unavailable or too costly.¹⁰ With respect to the issues of cost and feasibility, two component parts manufacturers, H.T. Golde GMBH & Company and Robert Bosch, commented that the technology was available and could be affordably produced. H.T. Golde wrote on Nov. 7, 1969: "... [T]here will be no difficulties at all to technically safeguard the operational requirements set forth. . ." with respect to 69-11b. Despite these assurances, the agency cited "engineering and economic problems of a substantial magnitude"¹¹ in its decision not to require anti-trap mechanisms.

FMVSS 118 took effect on February 1, 1971, and imposed minimum performance requirements for power-operated windows. Since that time, FMVSS 118 has been expanded to include power roof panels,¹² and extended to light trucks.¹³ However, the standard has been modified primarily at the behest of manufacturers wishing to increase occupant convenience rather than safety.¹⁴ The current standard has not been substantively modified since March 31, 1993.¹⁵

FMVSS 118 provides a standard for the operation of power windows, moon roofs, sunroofs, and other "power operated roof panels" in passenger vehicles.¹⁶ It prohibits the operation of any power window unless certain enumerated conditions are met. The key must either be in the ignition and be in an "approved" position,¹⁷ the window may be raised or lowered by means of direct manual force, the window may be closed by means of a locking system on the exterior of the vehicle,¹⁸ the window may be closed by a remote actuation device,¹⁹ the key has

been removed from the ignition but neither of the front doors to the vehicle have been opened, or the window was open no more than four millimeters and was in a static position prior to being closed. These safeguards have not adequately protected children located in or around vehicles not in operation. Children were still able to engage these switches, with resulting deaths and injuries.²⁰

Federal Motor Vehicle Safety Standard No. 118 Inaction

Power windows and sunroofs may deviate from the current regulatory requirements if they are equipped with an automatic reversing mechanism and meet the requirements of FMVSS 118 S5.²¹ Though this section of the standard provides requirements for how auto-reverse mechanisms are to function in vehicles equipped with such technology, it fails to require manufacturers to use auto-reverse technology in production. The standard also does not require manufacturers to take other, additional steps to prevent the inadvertent operation of power windows that may lead to injuries absent the use of auto-reverse technology. In response to a petition by Prospects Corporation, NHTSA issued a proposed rule on June 4, 1996, that amended FMVSS 118 to require auto-reversing windows and roof panels. Since that time, however, no action has been taken on this rulemaking.

FMVSS 118 also does not currently include a requirement to prevent power window switches from being inadvertently tripped. Although a large number of manufacturers worldwide have installed push/pull type switches to prevent such incidents, many continue to use the unsafe toggle or rocker type switches that can be activated by an occupant's elbow, knee, or other appendage with the potential for a moving window or panel to entrap an occupant as the tragic result. A rulemaking intended to remedy this problem was proposed by NHTSA on November 11, 1996, in response to a petition by Michael Garth Moore.²² Inexplicably, this rulemaking has also remained in limbo for more than seven years without further action. Even though a majority of manufacturers have decided to include such technology in their vehicles, other manufacturers have failed to incorporate these safety designs into their vehicles, and NHTSA has taken no action to require these fail-safe designs for all new vehicles.

Human Cost of NHTSA Inaction

Petitioners' Data

Since the standard was extended to power roofs in all vehicles starting with model year 1993, Petitioners have collected information on 37 incidents involving power windows.²³ Twenty-three of these incidents resulted in child fatalities,²⁴ and fourteen involved injuries. These figures represent a mere fraction of the injuries actually attributable to power windows in

vehicles, and do not reflect every fatality which has occurred. As noted in NHTSA's 1997 study, more than 400 such injuries may occur in any year, and only a few of those will come to our attention.²⁵ We do not have any way to officially monitor what may be the best sources of information on the subject. Furthermore, since very few documented power window injuries occur as the result of motor vehicle collisions, NHTSA has not tracked or tabulated data associated with deaths or injuries in the Agency's two most comprehensive databases, the Fatality Analysis Reporting System and the National Automotive Sampling System.²⁶

NHTSA Data

In May of 1997, NHTSA published the results of a study completed in conjunction with the Consumer Product Safety Commission (CPSC) on power accessory related deaths and injuries. In that study, NHTSA estimated that approximately 499 people are treated each year in hospital emergency rooms for injuries that result from the use of power accessories.²⁷ An estimated 93 percent of those treated were injured by the power windows in their cars. In the vast majority of cases, the power windows were functioning as intended.²⁸ In addition, the NHTSA study recognizes the special risk to children in such cases. NHTSA estimates that approximately 32 percent of people injured by power windows are under the age of six and another 32-percent are between the ages of six and 15.²⁹ In addition, while only 10 cases were used for the study, with none of those cases involving fatalities, NHTSA recognized the fact that some of the estimated 499 Power Accessory related injuries that occur each year do result in fatalities: "NHTSA is aware of reported cases from other sources involving fatalities, particularly to children."³⁰

The Case for Immediate NHTSA Action

The Technology to Abate Deaths and Injuries is Available and Feasible

The first patent for a power window that stopped closing upon contact with an object obstructing window operation was granted in 1932 to Ralph McNutt.³¹ Since McNutt's patent nearly 70 years ago, at least 14 additional patents for auto-reverse mechanisms on power windows have been granted.³² Nevertheless, only a fraction of American vehicles are produced with auto-reverse sensing technology. However, many vehicles that are produced in the United States without auto-reverse technology have European counterparts that are being sold equipped with such "anti-trap" sensing technology.³³ The fact that these vehicles are being produced in Europe demonstrates that the technology is widely available and that equipping passenger vehicles with this injury-preventing design does not affect cost so significantly as to eliminate the availability of this safety option. In fact, recent estimates indicate that auto-reversing technology may cost as little as \$8.00 to \$12.00 per component.³⁴ Even if the entire cost was

passed on to the consumer, the cost will not exceed \$60 on a four-window vehicle with a sunroof. Petitioners believe that the lifesaving and injury prevention benefits of such technology would far outweigh the cost per vehicle for installing anti-trap sensors.

Related Safety Regulations Have Succeeded in Reducing Deaths and Injuries

The case of power window regulation parallels in many ways the Consumer Product Safety Commission's (CPSC) experience with garage doors. In 1991, the CPSC required automatic garage door manufacturers to install automatic reversing mechanisms on all new power garage doors due to the large number of children who were dying or sustaining brain damage when they became trapped under closing automatic garage doors.³⁵ However, the safety of garage door mechanisms did not improve significantly until 1993 when the CPSC upgraded the existing standard to require two types of automatic garage door reversing mechanisms.³⁶ Currently, all garage doors must be equipped with both "electronic eyes," which determine the presence of an obstruction prior to contact, and "pressure sensors," which automatically reverse the operation of the garage door when the leading edge of the door contacts an obstruction.

Prior to 1993, only pressure sensors were required on garage doors. A study conducted in 1997 demonstrated that garage doors built between 1974 and 1993 resulted in 85 documented cases of severe brain damage and death, even though the 1991 standard required auto-reverse mechanisms.³⁷ Furthermore, a field test of doors manufactured prior to the 1993 upgrade demonstrated that doors either failed to reverse or exerted excessive pressure that could cause skeletal or visceral injuries, despite the fact that doors manufactured after 1991 should not have malfunctioned in such a manner.³⁸ However, doors manufactured after the strengthening of the standard in 1993 experienced none of these safety problems.³⁹ In the case of the garage door manufacturing industry, an upgraded standard was necessary before the operation of the equipment reached acceptable levels of safety.

Simple Defects Can Turn Deadly Absent Fail-Safe Safety Designs and Operation

When a power window fails to operate as the standard specifies, children are placed at proven risk of injury since no fail-safe mechanism has been provided. This was the case with Defect Petition 87-022, which was upgraded to EA88-005 and ultimately became the subject of a recall, 87V-178. In this case, 1982-86 Jeep Wagoneers equipped with tailgate power windows were defective. The power tailgate window, designed to close by means of keyed operation on the exterior of the vehicle, was only supposed to operate while the operator was applying continuous pressure to the keyed mechanism. However, the window operated even without continuous pressure, and in several cases children operating the window were trapped even after they had ceased to apply pressure to the key. CAS documented three fatalities and three injuries associated with these vehicles, all of which involved child victims.⁴⁰

NHTSA's Failure to Act Will Result in Further Deaths and Injuries

While NHTSA has policed power window technology to some extent, strengthening the standard is clearly necessary in order to prevent the numerous injuries that power windows are causing. While the 1991 upgrade to include power roofs was an important step in improving the safety of power accessories, NHTSA has continually avoided or rejected the opportunity to require manufacturers to install auto-reversing technology.⁴¹ Currently, NHTSA has allowed rulemaking proposals that, with appropriate improvements, could effectively eliminate these deaths and injuries to languish for almost seven years without taking effect. During these seven years, 18 fatalities have been recorded due to power window entrapment, more than had been recorded in the previous 25 years of NHTSA regulation in this area -- a total of 15 deaths.⁴² Even absent this apparent rise in fatal incidents, the sheer number of injuries and deaths documented by the agency and by petitioners demonstrate the unarguable need for additional regulation in this area.⁴³

The increase in power windows casualties has tracked the increase in power window installations. In 1973, only 1.9 million new vehicles (19.2%) produced in North America had power windows. Automotive News Market Data Book (1974). By the 1994 model year (the latest year for which Automotive News publishes information), 68.1% (4.6 million passenger cars) and 55.3% (3.3 million light trucks) for a total of 7.9 million new vehicles produced in North America had power windows. Automotive News Market Data Book (1995).

This growth in power window sales suggest that other power options such as power sliding doors in minivans will have similar market share increases. Rather than wait for more deaths and injuries to mount as NHTSA has done with power windows, the agency should be proactive in the area of other power options and establish safety performance standards that protect children from entrapment and injury.

Petitioners Seek the Following Changes to FMVSS 118

Petitioners ask NHTSA to propose upgrading the standard to require manufacturers to install sensing technology that would reverse the operation of a power window in the event that an obstruction intervenes during the window's closing. In addition, petitioners request that NHTSA require the installation of power window switches that protect against inadvertent activation. Petitioners ask NHTSA to immediately initiate this new rulemaking proposal or, in the alternative, to reopen the two rulemaking actions on this subject that have been neglected since 1996.

Automatic Reversing Mechanism

Petitioners request that FMVSS 118 be modified to require an anti-trap system that would reverse power window and roof panel movement when encountering an obstruction. An effective anti-trap standard was adopted by the European Parliament and the Council of the European Union in February of 2000.⁴⁴ Since that time, no power window fatalities have been recorded in any vehicle meeting the European standard's criteria. Though voluntary, the European anti-trap standard is currently employed by nearly every automaker selling vehicles in Europe. However, many of these same manufacturers continue to omit such technology from vehicles produced and distributed in the United States.

In order to avoid further deaths and significantly decrease the likelihood of occupant injury, we petition the agency modify FMVSS 118 to require all manufacturers to install anti-trap systems developed in accordance with the European standard.⁴⁵ The requested action would further the agency's goals in the area of international harmonization, while ensuring that deadly power windows will no longer continue to be produced under the agency's watch. As a great majority of manufacturers currently employ such technology in counterpart vehicles distributed in Europe, these changes can be made with a minimal phase-in period, beginning with model year 2005.

Window Switches

Petitioners also ask that NHTSA propose modifying FMVSS 118 to ensure that power window switches cannot be inadvertently engaged by occupants. The agency proposed a countermeasure in its proposed rule of November 15, 1996, but the proposed 25 mm diameter ball for testing compliance was indicated by the agency to simulate only a knee or the flat tissue portions of limbs.⁴⁶ Comments were filed with NHTSA by one of the petitioners that questioned the exclusion of children's elbows from the agency's considerations.⁴⁷ Certain switch designs permitted by a 25 mm ball compliance test would still permit inadvertent switch engagement by a small child's elbow and, hence, would not ensure that children would not continue to be harmed by closing power windows and other panels in motor vehicles.

Accordingly, petitioners believe that the agency should move aggressively to abate power switch-related entrapments and consequent injuries, especially those involving small children, by effectively eliminating the use of toggle and rocker switches, as well as preventing the use of other designs that also could be easily and inadvertently engaged by children. In this regard, the agency should consider proposing the use of the pull-up/push-down switch designs already widely used by vehicle manufacturers, including both European and Asian manufacturers. As with its earlier heavy vehicle anti-lock brake regulatory decision,⁴⁸ the agency could effectively merge safety performance goals and requirements with design-specific characteristics of power switches to ensure that fail-safe countermeasures will be embraced by all manufacturers while still permitting some design flexibility. Pull-up/push-down switches, as just mentioned, are

currently required by a European Union directive in order to ensure that inadvertent switch activation is minimized.⁴⁹

Conclusion

In 1969, when NHTSA issued the first recommendations for a power window standard, including fail-safe reversing technology, automakers argued that requiring the key to be in the ignition before the power window could be operated would be sufficient to prevent further child strangulations. Thirty years later, we have learned that NHTSA's reliance on such assurances was misplaced, given that at least 33 children have been killed by power windows.⁵⁰ When it comes to child safety, we must rely on strong, effective regulation rather than on assurances.

Respectfully submitted,

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Janette Fennel
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Jack Gillis
Director of Public Affairs
Consumer Federation of America

Rosemary Shahan
President
Consumers for Auto Reliability and Safety

Britt Gates

The Zoie Foundation

Andrew McGuire
Executive Director
Trauma Foundation

¹ See Attachment A, “Power Window Fatalities Since February 1, 1971”

² See NHTSA *Technical Report: Injuries Associated with Specific Motor Vehicle Hazards: Radiators, Batteries, Power Windows, and Power Roofs*, July 1997. (400+ power window injuries recorded in one year.)

³ See Attachment L. Approximately 90% of the incidents that petitioners have recorded involve children under age 10 as victims.

⁴ In the past 10 years, at least 23 children have died due to the inadvertent operation of power windows. There are no reports of adult deaths due to power windows.

⁵ For example, after receiving the accounts of 11 child fatalities in vehicle trunks, NHTSA was Congressionally mandated to respond to the trunk entrapment problem. In response, the Agency appointed an advisory committee to address the issue of trunk entrapment. 64 Fed. Reg. 70673, Dec. 17, 1999. Ultimately, the work of the committee led to the Agency’s issuing a Notice of Proposed Rulemaking requiring manufacturers to install internal trunk release mechanisms. Congress has required NHTSA to be more attentive in the area of school bus safety. School bus manufacturers are required to meet additional vehicle safety standards not imposed on motor coaches due to the fact that school buses are designed to carry children.

⁶ See Attachment A.

⁷ 34 Fed. Reg. 13608-09, Aug. 23, 1969.

⁸ 34 Fed. Reg. 13609, Aug. 23, 1969.

⁹ 35 Fed. Reg. Fed. Reg. 11797, July 23, 1970. The Agency received comments in opposition to the auto-reverse proposal from the American Manufacturers’ Association (AMA), American Motor Company, Daimler Benz, Checker Motors Corporation, Chrysler Corporation, Ford Motor Company, General Motors, Kaiser Jeep Corporation, Renault, and Rover Limited. Only the Japanese Automobile Manufacturers’ Association (JAMA), the National Association of Motor Bus Owners (NAMBO), and Peugeot did not vigorously oppose the auto-reverse proposal.

¹⁰ In their comments to the Department Daimler Benz wrote:

We feel that the needs of safety . . . are satisfied by our present production vehicles. Our power windows work only as long as the ignition is turned on. . . Thus, children who should occupy the rear seat only, cannot operate those windows, unless the driver permits it, and thus cannot inadvertently injure themselves . . .

Rover commented: “We feel strongly that the measures which we already take to avoid danger to children . . . should be sufficient.”

The AMA, who was joined in its comments by Chrysler, Ford, and General Motors, stated: “We believe

that this method of power window control [key position] effectively precludes the primary hazard. . . [regarding] children closing windows on themselves or others.”

¹¹ 35 Fed. Reg. 11797, July 17, 1970.

¹² 58 Fed. Reg. 16785, Apr. 16, 1991.

¹³ 53 Fed. Reg. 23766-69, June 24, 1988.

¹⁴ See 39 Fed. Reg. 1517, Jan. 10, 1974: “It [General Motors] claims no safety benefit for the feature but states that it is a convenience item . . . ,” 47 Fed. Reg. 13845, April 1, 1982: “Such a provision would permit GM and other manufacturers to offer power window and partition systems that are more convenient to use than those currently allowed by the standard.” See also 53 Fed. Reg. 23766-69, June 24, 1988, and 56 Fed. Reg. 15290-95, April 16, 1991, which modified FMVSS 118 to allow for exterior key and remote-control window operating devices.

¹⁵ 58 Fed. Reg. 16785, Mar. 31, 1993.

¹⁶ 49 C.F.R. 571.118 S1.

¹⁷ The standard requires that the key be in any of the three following positions: (a) ON, (b) START, or (c) ACCESSORY. 49 C.F.R. 571.118 S4.

¹⁸ For example, the window may be closed by touching an external panel on the vehicle’s door or through turning the key to raise the window.

¹⁹ A remote actuation device may only function by continuous activation by the user at a distance of six meters or less in order to comply with the requirements set out in FMVSS 118 S4.

²⁰ A case in point is DP 87-022, involving 1982-86 Jeep Wagoneers (See Attachment B). The vehicles were the subject of six reported cases of injuries and fatalities, despite the fact that they were manufactured in accordance with the existing regulation.

²¹ A power window equipped with an automatic reverse sensor need only comply with the requirements of FMVSS 118 S5, in lieu of FMVSS 118 S4. Power windows or power sunroofs may be operable so long as while closing the power window would reverse before contacting a body part or before exerting a squeezing force of 100 Newtons or greater on a semi-rigid cylindrical pole and upon contact with an object, the window opens to one of three “acceptable positions”: (a) the position that the window panel was opened to before operation of the power window began, (b) to a position 125 millimeters greater than the window opening size when the reversing motion began, or (c) enough to allow the insertion of a rod that is 200 millimeters in diameter.

²² 61 Fed. Reg. 58504-07, November 11, 1996.

²³ See Attachment L for a summary of all fatalities and injuries petitioners have recorded.

A three year old boy in a 1994 Ford Taurus lost the tip of his finger when it became caught in the power window of the family vehicle (mother was operating window while vehicle was in motion). Philadelphia Inquirer, May 27, 1994. In December of 1995, a two-year old Plainfield, New Jersey girl died four days after her neck got caught in a power window; *Mishap Not New with Car Windows*, The Courier-News, Dec. 8, 1995. A four year old girl was killed by the power window of the family vehicle in LaCrosse, Wisconsin in October of 1997; National Library of Medicine MEDLINE Database, Vol. 13 #5, pp. 345-46. A two year old girl in Kokomo, Indiana suffocated to death from injuries sustained when her neck became trapped in the sunroof of a 1998 Dodge Neon; *Girl Dies in Freak Sunroof Accident*, Nando Times News, Oct. 11, 1998.

In addition, CAS has collected correspondence from consumers regarding this matter. See Attachments C-E. Joel Douglas of Bellingham, Washington wrote to us on June 16, 1998 to report that his hand was injured when his wife inadvertently shut the window while he had his fingers stuck in the opening. Gayle Walker sent us correspondence regarding an similar injury she sustained in April of 1998. On January 31, 1998, Steven Borden's fourteen month old son lost the tip of his left index finger in the power window of the family's 1997 Isuzu Rodeo.

The following nine complaints detailing injuries caused by power windows have been received by the Office of Defects Investigations since the standard was last upgraded: ODI #469549 (Mar. 20, 1994, driver of a 1989 Ford Thunderbird injured by power window); ODI #960044 (Mar. 8, 1995, injury due to power windows occurred in a 1994 Chrysler New Yorker); ODI #965153 (May 9, 1995, driver's hand injured in power window when he tried to force window down manually in a 1990 Buick Regal); ODI #967805 (June 16, 1995, occupant and dog's necks caught in power window of 1995 Ford Windstar by accidental operation); ODI # 980738 (Mar. 13, 1996, child injured by passenger side window in a 1991 Dodge Caravan); ODI #800484 (July 26, 1996, driver sustained injury to finger due to inadvertent operation of power window in 1995 Mitsubishi Galant; ODI # 524408 (Nov. 4, 1997; child in a 1993 Pontiac Trans Sport was injured when driver tried to stop power window operation by sticking hand in path of window); ODI #532577 (Mar. 6, 1998, child's head injured in window of a 1995 Chevrolet Sierra Pickup; ODI # 541408 (child's head smashed in the window of a 1997 Chevrolet Astro).

CAS has collected information on two non-fatal incidents and three fatal incidents of power window related injuries reported by the manufacturer. Chevrolet Motor Division reported the injury of a child in a 1992 Chevrolet Lumina in April of 1994 when she reached out of the vehicle to check the mail and was pinned between the power window and the door frame. Oldsmobile Motor Division reported a child getting caught between the power window and vehicle frame under the same circumstances in a 1993 Oldsmobile Supreme in April of 1993. See Attachment F, *Materials Supplied by Power Accessories Expert Jack Martens*. And Ford disclosed three incidents associated with power windows in the case of *Johnson v. Ford*, 988 F.2d 573 (5th Cir. 1993). (Natalie Adkins in June of 1995, 1993 Ford Tempo; Mike Gross in October of 1996, 1993 Ford Tempo; and Larry Smith in July of 1996, 1992 Ford Tempo.)

Attorneys have reported the following incidents of power window related injuries to power window expert Jack Martens. A two and a half year old boy was strangled to death by the accidental operation of a power window in a 1990 Mercury Topaz in Alabama (reported by attorneys Cole Portis and Beasley Wilson, Birmingham, AL). A child was injured by the inadvertent operation of the power window in a 1990 Mercury Topaz in Alaska (reported by attorney Robert Libby). A three year old child suffered a severed arm, when it got caught in the power window in a 1988 Ford Taurus (case filed in Los Angeles County Court). A man lost his finger in the window of his 1995 BMW in Connecticut (reported by attorney A. Piazza). A child was severely injured when her neck was caught in the window of a 1992 Cadillac Seville (reported by attorney Donna Taylor).

Finally, the following three court cases have been filed since the standard was last upgraded. *Gatlin v. Ford*, CV-97-609 Lauderdale County Court, AL (three year old boy was strangled to death by the power window in a 1993 Mercury Topaz); *Householder v. Chrysler*, #22686 Perry County, OH 1992 (three year old strangled to death by power window on a 1987 Plymouth Voyager *Holum v. General Motors*, 221 Wis. 2d 222 1998 (four year old girl strangled to death by power window in a 1993 Chevrolet Silverado Pickup).

²⁴ See Attachment A.

²⁵ NHTSA, *Technical Report: Injuries Associated with Specific Motor Vehicle Hazards: Radiators, Batteries, Power Windows, and Power Roofs*, July 1997, 25.

²⁶ "To be included in FARS, a crash must involve a motor vehicle travelling on a traffic way customarily open to the public, and result in the death of a person (either an occupant of a vehicle or a non-motorist) within 30 days of the crash." See <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/FARS.html>. "NASS collects crash data to help government scientists and engineers analyze motor vehicle crashes and injuries. NASS collects detailed data on a representative, random sample of hundreds of thousands of minor, serious and fatal crashes involving passenger cars, pickup trucks, vans, large trucks, motorcycles, and pedestrians." <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/NASS.html>. Therefore, if no collision is involved, NHTSA does not have a readily searchable database available to determine the breadth and depth of the problem.

²⁷ NHTSA, *Technical Report: Injuries Associated with Specific Motor Vehicle Hazards: Radiators, Batteries, Power Windows, and Power Roofs*, July 1997, p. 25.

²⁸ NHTSA estimates that approximately 465 injuries per year that are treated in the emergency room are attributable to power windows. *Id.* 437 of these injuries occur when the power window is closed and clamps down on a hand, finger, or wrist. *Id.* at 26. In other words, approximately 94% of power window related injuries occur when the window is being operated as intended.

²⁹ Approximately three hundred and sixteen children (64% of those injured) are the victims of power window related injuries. *Id.* at 28.

³⁰ *Id.*

³¹ Patent 1,864,048 (June 21, 1932).

³² In 1959, Robert Russell of Eaton Manufacturing obtained the first patent for a window that would not just stop but would actually reverse upon contact. Patent 2,881,378 (April 7, 1959). Additional patent include: Patent 3,174,743 (Mar. 23, 1965), Patent 3,513,374 (Sept. 5, 1968), Patent 3,465,476 (Sept. 9, 1969), Patent 3,471,969 (Oct. 14, 1969), Patent 3,624,473 (Nov. 30, 1971), Patent 3,689,814 (Sept. 5, 1972), Patent 3,675,101 (July 4, 1972), Patent 3,702,960 (Nov. 14, 1972), and Patent 3,733,532 (May 15, 1973). Additionally the following automobile manufacturers have obtained for patents on various auto-reversing technology for vehicle windows: Daimler-Benz, Patent 2,911,212 (Nov. 3, 1959); Nippon Denso, Patent 3,689,814 (Mar. 21, 1972); General Motors, Patents 3,581,174 (May 25, 1971) and 3,644,811 (Feb. 22, 1972); and Toyota, 3,830,018 (Aug. 20, 1974).

³³ See Attachment G, *Systems for Car Doors and Seats*, 14.

³⁴ Confirmed by the Brose Group. See also Attachment H, Nartron Corp. letter confirming a \$12.50 cost per component.

³⁵ 15 U.S.C.A. §2056 describes both the pre-1993 and post-1993 requirements. 15 U.S.C.A. §2056 (1999). See also 16 C.F.R. §1211 spelling out the regulatory mandate.

³⁶ 15 U.S.C.A. §2056 (1999).

³⁷ Kriel, Robert L. et al. *Automatic Garage Door Openers: Hazards for Children*, Pediatrics, Oct. 1996, p. 1.

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ See Attachment B, CAS petition to the Agency and Press Release documenting the incidents involving the affected Jeep vehicles.

⁴¹ On April 6, 1990, NHTSA published a notice of proposed rulemaking to extend the standard to include power sunroofs and to require the installation of auto-reverse sensing technology. 55 Fed. Reg. 12871-74 (Apr. 6, 1990). In 1991, NHTSA did incorporate power sunroofs into FMVSS 118. 56 Fed. Ref 16782-85 (Mar. 31, 1993). The final rule published in 1993 failed to incorporate the auto-reverse requirement. 58 Fed. Reg. 16782-85 (Mar. 31, 1993). Furthermore, NHTSA rejected a similar petition in November of 1996 though it granted a requirement for manufacturers to adequately shield switches. As noted above, the granted petition has not been promulgated in the form of a final rule, and has been inactive for almost seven years. 61 Fed. Reg. 58504-07 (Nov. 15, 1996).

⁴² See Attachment A.

⁴³ See *supra* n. 16.

⁴⁴ Directive 2000/4/EC of the European Parliament and of the Council, Official Journal L 87/22, Apr. 28, 2000.

Excerpts from 74/60/EEC, Directive 2000/4/EC, Annex I

(f) The following items are inserted:

2.10. "Power-operated windows" means windows which are closed by power supply of the vehicle.

2.11. "Power-operated roof-panel systems" means movable panels in the vehicle roof which are closed by power supply of the vehicle by either a sliding or tilting motion, and which do not include convertible top systems.

2.12. "Power-operated partition systems" means systems which divide a passenger car compartment into at least two sections and which are closed using the power supply of the vehicle.

2.13. "Opening" is the maximum unobstructed aperture between the upper edge or the leading edge, depending on the closing direction, of a power-operated window or partition or roof panel and the vehicle structure which forms the boundary of the window, partition or roof panel, when viewed from the interior of the vehicle or, in the case of partition system, from the rear part of the passenger compartment.

To measure an opening, a cylindrical test rod shall (without exerting force) be placed through it normally perpendicular to the window, roof panel or partition as shown in Figure 1, from the interior of the vehicle or, as applicable, from the rear part of passenger compartment.'

(j) The following items are inserted:

5.8. Power-operated Windows, Roof-panel Systems and Partition Systems

5.8.1. The requirements below apply to power-operated windows/roof-panel systems/partition systems to minimise the possibility of injuries caused by accidental or improper operation.

5.8.2. Normal Operating Requirements

Except as provided in Item 5.8.3, power-operated windows/roof-panel systems/partition systems may be closed under one or more of the following conditions:

5.8.2.1. when the ignition key is inserted in the ignition control in any position of use;

5.8.2.2. by muscular force unassisted by power supply of the vehicle;

5.8.2.3. on continuous activation by a locking system on the outside of the vehicle;

5.8.2.4. during the interval of time between the moment the ignition has been switched from "on" to "off" and/or the key has been removed and the moment that neither of the two front doors has been opened sufficiently to permit egress of occupants;

5.8.2.5. when the closing movement of a power-operated window, roof panel or partition starts at an opening not exceeding 4 mm;

5.8.2.6. when the power-operated window of a vehicle's door without an upper door

frame closes automatically whenever the pertinent door is closed. In this case the maximum opening, as defined in Item 2.13, prior to window closing, shall not exceed 12 mm.

5.8.2.7. Remote closing shall be allowed by continuous activation of a remote actuation device, provided one of the following conditions is fulfilled:

5.8.2.7.1. the remote actuation device shall be incapable of closing the power-operated window/roof panel/partition from a distance of more than 11 metres from the vehicle;

5.8.2.7.2. the remote actuation device shall be incapable of closing the power-operated window/roof panel/partition:

- if the actuation device and the vehicle are separated by an opaque surface
and

- if from the distance between the remote actuation device and the vehicle is more than 6 metres.

5.8.2.8. One-touch closing shall be permitted only for the power-operated window of the driver's door and the roof panel, and only during the time when the ignition key is in the engine running position.

5.8.3. Auto-reversing Requirements

5.8.3.1. None of the requirements in Item 5.8.2. shall apply if a power-operated window/roof panel system/partition is fitted with an auto-reversing device.

5.8.3.1.1. This device shall reverse the window/roof panel/partition before it exerts a pinch force of more than 100 N within the opening of 200 mm to 4 mm above the top edge of a power-operated window/partition or in front of the leading edge of a sliding roof panel and at the trailing edge of a tilting roof panel.

5.8.3.1.2. After such an auto-reversal, the window or roof panel or partition shall open to one of the following positions:

5.8.3.1.2.1. a position that permits a semi-rigid cylindrical rod of a diameter of 200 mm to be placed through the opening at the same contact point(s) used to determine the reversing behaviour in Item 5.8.3.1.1;

5.8.3.1.2.2. a position that represents at least the initial position before closing was initiated;

5.8.3.1.2.3. a position at least 50 mm more open than the position at the time when reversing was initiated;

5.8.3.1.2.4. in the case of tilting motion of a roof panel, the maximum angular opening.

5.8.3.1.3. To check power-operated windows/roof-panel systems/partition systems with reversing devices, a measuring instrument/test rod shall be placed through the opening from the inside of the vehicle or, in the case of a partition system, from the rear part of the passenger compartment in such a way that the cylindrical surface of the rod contacts any part of the vehicle structure which forms the boundary of the window/roof-panel aperture/partition. The force deflection ratio of the measuring instrument shall be not more than 10 N/mm. The position of the test rods (normally located perpendicular to the window/roof panel/-partition) are illustrated in Appendix 3, Figure 1.

5.8.4. Switch Location and Operation

5.8.4.1. Switches of power-operated windows/roof panels/partitions shall be located or

operated in such a way to minimise the risk of accidental closing. The switches shall require continuous actuation for closing except in the case of Items 5.8.2.6, 5.8.2.8. or 5.8.3.

5.8.4.2. All rear-window, roof-panel and partition switches intended for use by occupants in the rear of the vehicle shall be capable of being switched off by a driver-controlled switch which is located forward of a vertical transverse plane passing through the R Points of the front seats. The driver controlled switch is not required if a rear window, roof panel or partition is equipped with an auto-reversing device. If, however, the driver-controlled switch is present, it shall not be able to override the auto-reversing device.

The driver-controlled switch shall be located so as to minimise any accidental manipulating. It shall be identified by the symbol shown in Appendix 4.

5.8.5. Protection Devices

All protection devices which are used to prevent damage to the power source in the case of an overload or stalling shall be capable of resetting automatically while the switch controlling the window/roof panel/partition is activated.

5.8.6. Handbook Instructions

5.8.6.1. The owners manual of the vehicle shall contain clear instructions relating to the power-operated window/roof panel/partition, including:

5.8.6.1.1. explanation of possible consequences (entrapment),

5.8.6.1.2. use of the driver-controlled switch,

5.8.6.1.3. a "WARNING" message indicating the dangers, particularly to children in the case of improper use/activation of the power-operated windows/roof-panel systems/partition systems. This information should indicate the responsibilities of the driver, including instructions for other occupants and the recommendation to leave the vehicle only if the key is removed from the ignition lock,

5.8.6.1.4. a "WARNING" message indicating that special care should be taken when using remote closing systems (see Item 5.8.2.7), for example to actuate it only when the operator has a clear view of the vehicle to be sure that nobody can be trapped by power-operated windows/roof-panel/partition equipment'.

⁴⁵ A suggested modification that would comply with the European standard follows:

S4. *Operating requirements.* Except as provided in S5, power operated window, partition, or roof panel systems may be closed only in the following circumstances:

[maintain current wording of items (a) through (g), but add the following restrictions . . .]

AND IF the power operated window, partition, or roof panel systems meets the following requirements –

- (1) while closing, the window, partition or roof panel system must reverse direction before contacting, or before exerting a squeezing force of 100 newtons that has a force-deflection ratio described in S4 (3), and that is placed through the window, partition or roof panel system opening at any location, in the manner described in S4 (3); and
- (2) upon such reversal, the window, partition or roof panel system must open to one of the following positions, at the manufacturer's option:

- (2.1) a position that is at least as open as the position at the time closing was initiated;
 - (2.2) a position that is not less than 50 mm more open than the position at the time the window reversed direction; or
 - (2.3) a position that permits a semi-rigid cylindrical rod of diameter 200mm to be placed through the opening at the same contact point(s) as the rod described in S4(1);
 - (2.4) in the case of tilting motion of a roof panel, the maximum angular opening.
- (3) To check power-operated windows/roof panel systems/partition systems with reversing devices, a measuring instrument shall be placed through the opening from the inside of the vehicle or, in the case of a partition system, from the rear part of the passenger compartment. The force deflection ratio of the measuring instrument shall be 10 N/mm. The position of the test rods are normally located perpendicular to the window/roof panel/partition.

⁴⁶ 61 FR 58504, 58506.

⁴⁷ Comments of Advocates for Highway and Auto Safety, January 7, 1997, in response to the proposed rulemaking of Docket No. NHTSA-96-117, 61 Fed. Reg. 58504 *et seq.* (November 15, 1996).

⁴⁸ See 49 C.F.R. 571.121 *passim*.

⁴⁹ Directive 2000/4/EC of the European Parliament and of the Council, Official Journal L 87/22, Apr. 28, 2000.

Excerpts from 74/60/EEC, Directive 2000/4/EC, Annex I

(f) The following items are inserted:

2.10. "Power-operated windows" means windows which are closed by power supply of the vehicle.

2.11. "Power-operated roof-panel systems" means movable panels in the vehicle roof which are closed by power supply of the vehicle by either a sliding or tilting motion, and which do not include convertible top systems.

2.12. "Power-operated partition systems" means systems which divide a passenger car compartment into at least two sections and which are closed using the power supply of the vehicle.

2.13. "Opening" is the maximum unobstructed aperture between the upper edge or the leading edge, depending on the closing direction, of a power-operated window or partition or roof panel and the vehicle structure which forms the boundary of the window, partition or roof panel, when viewed from the interior of the vehicle or, in the case of partition system, from the rear part of the passenger compartment. To measure an opening, a cylindrical test rod shall (without exerting force) be placed through it normally perpendicular to the window, roof panel or partition as shown in Figure 1, from the interior of the vehicle or, as applicable, from the rear part of passenger compartment.'

The following items are inserted:

5.8. Power-operated Windows, Roof-panel Systems and Partition Systems

5.8.1. The requirements below apply to power-operated windows/roof-panel systems/partition systems to minimise the possibility of injuries caused by accidental or improper operation.

5.8.2. Normal Operating Requirements

Except as provided in Item 5.8.3, power-operated windows/roof-panel systems/partition systems may be closed under one or more of the following conditions:

5.8.2.1. when the ignition key is inserted in the ignition control in any position of use;

5.8.2.2. by muscular force unassisted by power supply of the vehicle;

- 5.8.2.3. on continuous activation by a locking system on the outside of the vehicle;
- 5.8.2.4. during the interval of time between the moment the ignition has been switched from "on" to "off" and/or the key has been removed and the moment that neither of the two front doors has been opened sufficiently to permit egress of occupants;
- 5.8.2.5. when the closing movement of a power-operated window, roof panel or partition starts at an opening not exceeding 4 mm;
- 5.8.2.6. when the power-operated window of a vehicle's door without an upper door frame closes automatically whenever the pertinent door is closed. In this case the maximum opening, as defined in Item 2.13, prior to window closing, shall not exceed 12 mm.
- 5.8.2.7. Remote closing shall be allowed by continuous activation of a remote actuation device, provided one of the following conditions is fulfilled:
 - 5.8.2.7.1. the remote actuation device shall be incapable of closing the power-operated window/roof panel/partition from a distance of more than 11 metres from the vehicle;
 - 5.8.2.7.2. the remote actuation device shall be incapable of closing the power-operated window/roof panel/partition:
 - if the actuation device and the vehicle are separated by an opaque surface
 - and
 - if from the distance between the remote actuation device and the vehicle is more than 6 metres.
- 5.8.2.8. One-touch closing shall be permitted only for the power-operated window of the driver's door and the roof panel, and only during the time when the ignition key is in the engine running position.

5.8.3. Auto-reversing Requirements

- 5.8.3.1. None of the requirements in Item 5.8.2. shall apply if a power-operated window/roof panel system/partition is fitted with an auto-reversing device.
 - 5.8.3.1.1. This device shall reverse the window/roof panel/partition before it exerts a pinch force of more than 100 N within the opening of 200 mm to 4 mm above the top edge of a power-operated window/partition or in front of the leading edge of a sliding roof panel and at the trailing edge of a tilting roof panel.
 - 5.8.3.1.2. After such an auto-reversal, the window or roof panel or partition shall open to one of the following positions:
 - 5.8.3.1.2.1. a position that permits a semi-rigid cylindrical rod of a diameter of 200 mm to be placed through the opening at the same contact point(s) used to determine the reversing behaviour in Item 5.8.3.1.1;
 - 5.8.3.1.2.2. a position that represents at least the initial position before closing was initiated;
 - 5.8.3.1.2.3. a position at least 50 mm more open than the position at the time when reversing was initiated;
 - 5.8.3.1.2.4. in the case of tilting motion of a roof panel, the maximum angular opening.
 - 5.8.3.1.3. To check power-operated windows/roof-panel systems/partition systems with reversing devices, a measuring instrument/test rod shall be placed through the opening from the inside of the vehicle or, in the case of a partition system, from the rear part of the passenger compartment in such a way that the cylindrical surface of the rod contacts any part of the vehicle structure which forms the boundary of the window/roof-panel aperture/partition. The force deflection ratio of the measuring instrument shall be not more than 10 N/mm. The position of the test rods (normally located perpendicular to the window/roof panel/-partition) are illustrated in Appendix 3, Figure 1.

5.8.4. Switch Location and Operation

- 5.8.4.1. Switches of power-operated windows/roof panels/partitions shall be located or operated in such a way to minimise the risk of accidental closing. The switches shall require continuous actuation for closing except in the case of Items 5.8.2.6, 5.8.2.8. or 5.8.3.
- 5.8.4.2. All rear-window, roof-panel and partition switches intended for use by occupants in the rear of the vehicle shall be capable of being switched off by a driver-controlled switch which is located forward of a vertical transverse

plane passing through the R Points of the front seats. The driver controlled switch is not required if a rear window, roof panel or partition is equipped with an auto-reversing device. If, however, the driver-controlled switch is present, it shall not be able to override the auto-reversing device. The driver-controlled switch shall be located so as to minimise any accidental manipulating. It shall be identified by the symbol shown in Appendix 4.

5.8.5. Protection Devices

All protection devices which are used to prevent damage to the power source in the case of an overload or stalling shall be capable of resetting automatically while the switch controlling the window/roof panel/partition is activated.

5.8.6. Handbook Instructions

5.8.6.1. The owners manual of the vehicle shall contain clear instructions relating to the power-operated window/roof panel/partition, including:

5.8.6.1.1. explanation of possible consequences (entrapment),

5.8.6.1.2. use of the driver-controlled switch,

5.8.6.1.3. a "WARNING" message indicating the dangers, particularly to children in the case of improper use/activation of the power-operated windows/roof-panel systems/partition systems. This information should indicate the responsibilities of the driver, including instructions for other occupants and the recommendation to leave the vehicle only if the key is removed from the ignition lock,

5.8.6.1.4. a "WARNING" message indicating that special care should be taken when using remote closing systems (see Item 5.8.2.7), for example to actuate it only when the operator has a clear view of the vehicle to be sure that nobody can be trapped by power-operated windows/roof-panel/partition equipment'.

⁵⁰ In addition to the incidents cited earlier, petitioners have documented numerous incidents that occurred between February of 1971, when the standard first went into effect, and the 1993 modification. See below and Attachment L.

CAS has collected the following consumer letters reporting incidents of power window related injuries and fatalities involving children. A letter from Arnold W. Marque was sent to CAS in October of 1989, indicating that the writer's five year old granddaughter sustained injuries to her neck when her head became inadvertently trapped in the 1986 Ford Taurus's power window. Sue Tuemler reported the amputation of a passenger's finger by a power window in her mother's Chrysler. See Attachment I-J.

Three children died and three were injured by the power tailgate windows found in their families' Jeep Wagoneers and Cherokees. See Attachment B, *CAS Materials related the Jeep Wagoneer Investigation*, Nov. 17, 1987.

Power Window expert Tom Flannagan has collected the information on the following six incidents related to injuries and fatalities suffered by children since 1971. In 1980, an eight years old girl was injured in a 1971 Ford Torino and sustained brain damage and hypoxia as a result. In 1981, a child between the ages of four and six died from tailgate injuries sustained in a 1971 Ford Torino. In 1991, a five years old girl and her eight years old sister were injured in the family's 1991 Ford Taurus. That same year, a four year old boy was nearly strangled by the power window in a 1988 Pontiac Bonneville. See Attachment K.

Power Window expert Jack Martens has collected information on the following four incidents related to injuries and fatalities suffered by children related to power windows since 1971. A child was fatally injured by the power window in a 1984 Ford Thunderbird in May of 1988. In 1989, a child was fatally injured by the power window in a Oldsmobile Delta. A twenty-two month old baby lost his finger in the power window of a 1982 Pontiac Bonneville in 1990. That same year another child was injured by the same means in a 1986 Cadillac DeVille. In 1992, a child suffered injury when his finger got caught in the power window of a 1992 GMC Jimmy. See Attachment F.

The following ODI complaints specifically mention injury or fatality to children in motor vehicles due to the operation of power windows. ODI #148708, Oct. 21, 1987 (child hung by neck and injured in 1981 Jeep Grand Wagoneer). ODI #349210, Nov. 9, 1989 (three year old child injured in power window of 1989 Ford Thunderbird). ODI #439116, Apr. 29, 1992 (two year old child nearly strangled by power window in 1986 Oldsmobile 98). ODI

#437252, Aug. 15, 1992 (two children injured by leaning out of the power tailgate window of a 1991 Lincoln Continental).

In addition, the following court cases contain accounts of the following incidents regarding power windows and children. *Kuehn v. Ford*, Wis. Cir. Ct. Milwaukee County, No. 94CV003051, 1994 (boy put in a coma by injuries sustained in family's minivan). *Goldberg v. GM*, Baltimore County Cir. Ct., File No. 92560, 1977 (three year old died from injuries received when rear window closed on child's neck).

Two incidents of fatalities were reported by the Association of Trial Lawyers of America (ATLA). See Attachment M for White Plains incident and Anchorage Alaska incident.

Finally, the CPSC tracked seven fatalities due to inadvertent power window operation in its *Special Report: Structural Entrapment Hazards to Infants and Children*, Sept. 1983, 6. No specific information was provided by the commission, and these cases may overlap those previously cited.