

# INSURANCE INSTITUTE FOR HIGHWAY SAFETY

December 13, 2010

The Honorable David Strickland  
Administrator  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue, SE  
Washington, DC 20590

**Request for Comments; 49 CFR Part 581 Bumper Standard, Petition for Rulemaking;  
Docket No. NHTSA-2009-0047**

Dear Administrator Strickland:

In July 2008, the Insurance Institute for Highway Safety (IIHS) filed a petition for rulemaking with the National Highway Traffic Safety Administration (NHTSA), asking the agency to amend Part 581 Bumper Standard to extend applicability to light trucks, vans, and multipurpose passenger vehicles. In June 2009, NHTSA published a notice requesting comments on the petition. IIHS recently released results of 10 mph front-into-rear crash tests of SUVs into cars and cars into SUVs (see attached *Status Report*).

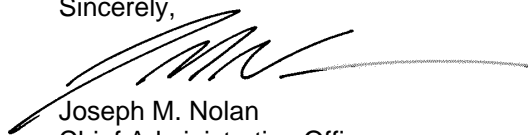
Our 2008 petition included results of 10 mph front-into-rear crash tests of SUVs into cars conducted in 2008, plus results of 10 mph front-into-rear tests of cars into SUVs and SUVs into cars from the same manufacturer conducted in 2004. All three test series showed the vulnerability of both vehicle types to unnecessary damage, primarily because the bumper heights of cars and SUVs do not align. Our most recent test series shows that little has changed since 2004 to reduce bumper mismatch. Consumers still have to pay thousands of dollars to repair unnecessary damage.

In our recent front-into-rear tests, the worst performing pair was the Toyota Corolla/RAV4. The Corolla sustained \$3,852 in damage when it struck the RAV4, and the RAV4 sustained \$6,015 in damage. There is no reason these two vehicles should sustain a total damage of \$9,867 in a 10 mph impact. The test of the Nissan Rogue striking the rear of the Nissan Sentra resulted in a total damage of \$7,444, and the Rogue was undrivable due to loss of engine coolant from a broken radiator. Vehicles should not need to be towed away after a 10 mph impact, and this outcome is a direct result of bumper mismatch.

In its June 2009 request for comments, NHTSA questioned whether applying the bumper standard to light trucks would compromise off-road utility. IIHS submitted a comparison of approach and departure angles versus bumper heights for 62 SUVs and pickups, showing no correlation between approach angle and front bumper height because many vehicles are equipped with air dams, valence panels, and other superficial trim below the bumper that limit the angle. There was only a slight correlation between departure angle and rear bumper height because, like for the front bumper, many vehicles have components such as exhaust pipes and trailer hitches below the bumper that limit departure angle.

IIHS urges the agency to expedite rulemaking to extend the applicability of the bumper standard to all light passenger vehicles. As indicated in our 2008 petition and subsequent comments, extending the standard to SUVs, vans, and pickups will reduce unnecessary property damage in low-speed collisions.

Sincerely,



Joseph M. Nolan  
Chief Administrative Officer  
Vice President, Vehicle Research

**Attachment**

Insurance Institute for Highway Safety. 2010. *Status Report 45(12)*. Arlington, VA.

# STATUS REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

Vol. 45, No. 12, Dec. 2, 2010

## BUMPER MISMATCH IS STILL A PROBLEM

when SUVs and cars collide in everyday fender-benders. Bumpers on cars are designed to match up with each other in collisions, but a long-standing gap in federal regulations exempts SUVs from the same rules. New Institute crash tests demonstrate the results: SUV bumpers that don't line up with those on cars can lead to huge repair bills in what should be minor collisions in stop-and-go traffic. That's not to mention



the hassle of needing a tow and waiting on the body shop.

“SUVs and cars share the road,” says Joe Nolan, the Institute’s chief administrative officer. “The problem is they don’t share the same bumper rules, and consumers end up paying the price.”

A federal standard requires that all cars have bumpers that protect within a zone of 16 to 20 inches from the ground. This means car bumpers line up reasonably well and are more likely to engage during low-speed collisions to absorb energy and prevent damage. No bumper requirements apply to SUVs, pickups, or minivans, so when these vehicles have bumpers they often are flimsier and higher off the ground than bumpers on cars. Plus, SUVs and pickups may not have bumpers at all.

In fender-benders with SUVs, cars often end up with excessive damage to hoods, engine cooling systems, fenders, bumper covers, and safety equipment like lights. SUVs don’t always come out unscathed either, often needing extensive work.

The Institute first demonstrated this mismatch in 2004 in a series of SUV-car crash tests at 10 mph (see *Status Report*, Sept. 13, 2004, and July 1, 2008; on the web at [iihs.org](http://iihs.org)). The latest tests involved 7 pairs of 2010-11

models, each composed of a small car and small SUV from the same automaker.

“We picked vehicles from the same manufacturer because we think automakers should at the least pay attention to bumper compatibility across their own fleets,” Nolan explains. “The results show that many don’t.”

In the tests, an SUV going 10 mph struck the back of its paired car, which was stopped. Then the configuration was reversed, with the car striking the back of its paired SUV. Results of these low-speed impacts varied widely, from a total of \$850 damage to one vehicle to \$6,015 damage to another. In some cases, the crash damage included major leaks from broken radiators and cooling fans. If these collisions had happened in the real world, the motorists wouldn’t have been able to drive away. If they did, their vehicles could overheat, and the engines could be ruined.

**High cost of bumper mismatch:** If bumpers don’t match up, they’ll bypass each other when vehicles collide and the resulting crash energy will crumple the vehicle body. That’s what happened when the Nissan Rogue struck the back of the Nissan Sentra in the SUV-into-car test. The Rogue’s front bumper didn’t line up at (continues on p.6)



Nissan Sentra and Nissan Rogue



Ford Focus and Ford Escape

**DAMAGE REPAIR COSTS IN 10 MPH FRONT-INTO-REAR CRASH TESTS**

SUV INTO CAR	SUV damage	Car damage	Total damage
Honda CR-V into Honda Civic	\$1,721	\$1,274	\$2,995
Toyota RAV4 into Toyota Corolla	\$1,434	\$2,327	\$3,761
Hyundai Tucson into Kia Forte	\$850	\$3,223	\$4,073
Volkswagen Tiguan into Volkswagen Golf	\$2,329	\$2,058	\$4,387
Jeep Patriot into Dodge Caliber	\$1,415	\$3,095	\$4,510
Ford Escape into Ford Focus	\$1,470	\$3,386	\$4,856
Nissan Rogue into Nissan Sentra	\$2,884	\$4,560	\$7,444

CAR INTO SUV	Car damage	SUV damage	Total damage
Kia Forte into Hyundai Tucson	\$1,510	\$2,091	\$3,601
Dodge Caliber into Jeep Patriot	\$2,559	\$1,338	\$3,897
Honda Civic into Honda CR-V	\$4,921	\$1,053	\$5,974
Volkswagen Golf into Volkswagen Tiguan	\$4,555	\$1,872	\$6,427
Nissan Sentra into Nissan Rogue	\$5,114	\$1,428	\$6,542
Ford Focus into Ford Escape	\$5,203	\$2,208	\$7,411
Toyota Corolla into Toyota RAV4	\$3,852	\$6,015	\$9,867

Note: The Ford Escape and Focus, Hyundai Tucson, and Volkswagen Golf and Tiguan are 2011 models. All other cars and SUVs are 2010s. Repair costs reflect November 2010 parts and labor prices.



Ford Escape and Ford Focus



Toyota RAV4 and Toyota Corolla



# PRICEY REPAIRS WHEN BUMPERS DON'T LINE UP

The plastic covers on bumper systems obscure the mismatch problem by hiding the positions of bumper bars, which are the main energy-absorbing components. With the covers removed (left), it's obvious the bars on many SUVs and cars don't match up. When the Nissan Rogue struck the back of the Sentra in the 10 mph front-into-rear crash test, the Rogue's bumper overrode the

Sentra's, and the result was that \$7,444 in repairs were needed for the pair. Radiator damage made the Rogue undriveable afterward.

The bars on the Ford Escape and Focus overlapped less than 2 inches, not enough to spare the Focus \$3,386 in rear damage. Crash energy was concentrated above the Focus bumper and crushed its rear body and trunk lid. Better-aligned bumpers could prevent damage like this.



Ford Escape  
\$1,470 front damage



Nissan Sentra  
\$4,560 rear damage



Ford Focus  
\$3,386 rear damage

# MISMATCH IS A PROBLEM WHEN CARS HIT SUVs, TOO

The Focus's front bumper slid under the high-riding Escape in the car-into-SUV test, adding up to \$5,203 damage for the car and \$2,208 for the SUV. The Focus needed a new hood, bumper bar and cover, headlights, air-conditioning condenser, and fenders. Bumpers on the Toyota Corolla and RAV4 overlapped less than an inch, so they bypassed each other when the car struck the back of the SUV. The RAV4's rear-mounted spare tire crushed the Corolla's hood, grille, headlights, and air conditioner. Damage to the pair totaled \$9,867 — \$6,015 for the RAV4 alone. The RAV4 bumper is just a thin piece of sheet metal. It doesn't extend enough to engage with the Corolla or protect the SUV's tailgate and spare tire.



Ford Focus  
\$5,203 front damage



Toyota RAV4  
\$6,015 rear damage

## **PUBLIC SEEKS SAFER ROADS BUT STILL TAKES RISKS**

Drivers are concerned about the dangers of the road but haven't given up habits like speeding and cellphone use that they acknowledge are risky, a new poll by the AAA Foundation for Traffic Safety shows.

The telephone survey of 2,000 US residents age 16 and older, conducted in the spring for the foundation's third annual Traffic Safety Culture Index ([aaafoundation.org](http://aaafoundation.org)), found most people view highway safety as an important priority and look unfavorably on drinking and driving, drowsy driving, red light running, speeding in residential areas, and using cellphones behind the wheel. But many people admit to doing some of those things anyway.

While motor vehicle crashes remain the leading cause of death for people ages 3-34, fatalities have fallen to their lowest levels since 1950, thanks in large part to safer vehicles. Still, 52 percent of motorists say driving feels less safe today than it did 5 years ago. Of those who say that, more than half cite cellphones, texting, or general distraction as one of the reasons. Other common explanations include aggressive or impatient drivers and increased traffic.

But when it comes to things like cellphone use and speeding, there's a disconnect between the large majorities that condemn the behaviors and the substantial minorities who say they've engaged in them. These groups clearly overlap, although it's unclear to what extent. Only in the case of alcohol-impaired driving do few drivers admit to driving recently while close to or over the limit.

**Cellphones:** Of respondents who reported driving in the past 30 days, 92 percent said it was unacceptable to text or email while driving. At the same time, 24 percent reported texting or emailing at least once in the prior month. That's more than admitted to it in a 2009 Institute survey in which 13 percent of drivers reported some texting and 6 percent reported emailing (see *Status Report*, Feb. 27, 2010; on the web at [iihs.org](http://iihs.org)).





When it comes to talking on cellphones, nearly two-thirds of people surveyed by the AAA Foundation said their own safety is very seriously threatened by drivers on the phone. But more than two-thirds said they had talked on the phone at least once while driving in the previous month. Of those who reported doing so, most said they don't use a hands-free device.

**Safety belt use:** Eighty-six percent of drivers said it's unacceptable not to use a safety belt. But nearly 1 in 4 reported having driven without one in the past month. Nearly 1 in 10 reported doing this fairly often or regularly. Forty-nine percent of passenger vehicle drivers killed in 2009 were unbelted.

**Alcohol:** Virtually all drivers said it's unacceptable for people to drive if they believe they've had

### **ACTIONS BY OTHERS THAT DRIVERS SEE AS THREATS TO THEIR SAFETY**

	Very serious	Somewhat serious	Minor threat	Not a threat
Text messaging or emailing	88%	8%	2%	2%
Driving after drinking alcohol	87%	9%	2%	1%
Driving when too sleepy	70%	22%	7%	0%
Talking on cellphones	62%	25%	10%	2%
Driving aggressively	58%	30%	8%	3%
Speeding	50%	31%	13%	4%

### **RISKY THINGS THAT DRIVERS ADMIT TO DOING WITHIN PAST 30 DAYS**

	Never	Just once	Rarely	Often	Regularly
Drove without using safety belt	76%	4%	11%	4%	5%
Read or sent text message while driving	76%	3%	14%	4%	2%
Drove when it was hard to keep eyes open	73%	9%	15%	2%	1%
Drove through light that just turned red	66%	10%	20%	3%	1%
Drove 15 mph over speed limit on freeway	53%	5%	24%	10%	7%
Talked on cellphone while driving	31%	10%	26%	18%	16%

Source: AAA Foundation for Traffic Safety's 2010 Traffic Safety Culture Index

**Speeding:** The public appears to recognize that excessive speed, which plays a role in about one-third of fatal crashes, is dangerous. Two-thirds of drivers in the survey said it's not acceptable to drive more than 15 mph over the speed limit on a freeway, but 46 percent reported doing it in the past 30 days.

**Red light running:** Ninety-three percent of drivers said it's unacceptable to go through a red light if it's possible to stop safely, but one-third reported having done so. Almost a quarter of drivers reported doing so more than once in the past 30 days. Nearly 700 people were killed in crashes that involved red light running in 2009.

**Drowsy driving:** Ninety-six percent of drivers said it's unacceptable for people to drive when they are "so tired that they have a hard time keeping their eyes open." However, more than a quarter of drivers said they've done it at least once during the past 30 days, and 18 percent said they've done it multiple times.

too much to drink, with 93 percent calling it completely unacceptable. Eighty-three percent said they would lose some respect for a friend if they found out the friend had done so.

About 11 percent of drivers said that on at least one occasion in the past year they had driven when they thought their blood alcohol concentration was close to or possibly over the legal limit. Of those, 15 percent said it happened within the past month. The percentage of fatally injured drivers with blood alcohol concentrations of 0.08 percent or higher has held steady at about one-third since the mid-1990s.

**Highway safety:** When asked to rank the importance of 3 public health issues — flu, food contamination, and highway safety — half of all respondents said reducing the number of people who die in motor vehicle crashes should be the highest priority. However, most people said they would oppose a 10-cent per gallon gas tax to pay for improvements to the most dangerous roads.



## **STRONGER ROOFS HELP TO REDUCE ROLLOVER INJURIES**

New research by the National Highway Traffic Safety Administration backs up the Institute's findings about the importance of roof strength in protecting vehicle occupants in rollover crashes.

The study compares the results of roof strength tests of various vehicle models with real-world rollover crashes and finds a direct correlation between the test results and the number of centimeters a vehicle's roof is pushed into the occupant area in an actual crash. Previous research by the agency showed a direct relationship between the amount of roof crush and the severity of injuries to the head, neck, and face. Taken together, the two studies confirm Institute research that shows injury risk in real-world rollovers goes down as roof strength measured in the laboratory goes up (see *Status Report*, March 24, 2009; on the web at [ihs.org](http://ihs.org)).

Roof strength is measured by pushing a metal plate into the roof of a stationary vehicle. How much force the roof can withstand before it caves in 5 inches relative to the vehicle's weight is the strength-to-weight ratio.

The new study compared 38 roof strength test results to 931 real-world rollovers of similar vehicles. After controlling for the number of times the car flipped, whether the roof hit anything besides the ground, and whether other vehicles were involved, the researchers found that a 1-unit increase in strength-to-weight ratio translated into a 5.9-centimeter (2.3-inch) decrease in roof crush.

Currently, federal rules require a roof-to-strength ratio of only 1.5 for vehicles with gross weight ratings up to 6,000 pounds (a gross weight rating is the vehicle's weight when it has a full load of passengers and cargo).

Last year, the National Highway Traffic Safety Administration announced it was doubling that requirement and mandating a ratio of 1.5 for vehicles with ratings from 6,000 to 10,000 pounds. The standards will be phased in beginning in 2012. The agency says 135 lives will be saved each year by the change. The Institute believes this is an underestimate because it excludes unbelted occupants and others at risk of ejection, who also are likely to benefit (see *Status Report*, June 11, 2009; on the web at [ihs.org](http://ihs.org)). Vehicles must have a roof strength-to-weight ratio of at least 4 in Institute tests to earn *TOP SAFETY PICK*.

"Roof strength testing and real-world roof intrusion in rollovers" by R. Austin is available at [nhtsa.gov](http://nhtsa.gov).

(continued from p. 2) all with the Sentra's rear bumper, and the resulting \$4,560 rear damage tally for the Sentra was the highest among all the cars in this test. The impact crumpled the car's bumper cover, trunk lid, and rear body. The Rogue ended up with a crushed and leaking radiator that kept the SUV from being driven after the test.

Bumper height mismatch contributed to pricey damage when the Ford Escape struck the rear of the Ford Focus. Their bumpers overlapped less than 2 inches, not enough to protect the Focus's rear body and trunk lid from \$3,386 in repairs.

The mismatch problem with the Ford pair was even worse when the Focus struck the back of the Escape. The front bumper on the car underrode the high-riding Escape's rear bumper, which at 25 inches off the ground is the tallest among all the small SUVs evaluated this time around. Damage to the Focus came to \$5,203 and included replacing most of the sheet metal plus many parts in front of the engine.

When the Toyota Corolla hit the rear of the Toyota RAV4 in the car-into-SUV test, damage amounted to nearly \$10,000 for the pair — the highest combined test damage among all of the vehicle pairs the Institute evaluated. The RAV4 accounted for about \$6,000 of the bill.

"The RAV4's so-called bumper is really just a stamped piece of sheet metal supporting the bumper cover," Nolan explains. "So instead of engaging a strong bumper, the striking Corolla hit the spare tire mounted on the RAV4's tailgate. The spare isn't designed to absorb crash energy, so it damaged the Corolla's hood, grille, headlights, air conditioner, and radiator support and crushed the RAV4's tailgate and rear body panels."

**Compatible bumpers:** Bumpers on Honda's CR-V and Civic were the most compatible in the test in which an SUV strikes the rear of a car, and at \$2,995 the pair had the lowest combined estimated damage in this crash test. The Civic's \$1,274 damage was the lowest among the cars. The CR-V is one of only 3 SUVs whose front bumpers overlapped half of the rear bumpers on the cars they hit.



“The CR-V’s front bumper overlapped the Civic’s rear bumper by more than 2 inches. That may not sound like much, but it’s enough to allow the bumpers to do what they’re supposed to do,” Nolan says.

When the Kia Forte struck the back of the Hyundai Tucson, their bumpers matched up well enough to keep the Forte from underriding the SUV, limiting damage to a combined \$3,601 for both vehicles. The Forte’s \$1,510 repair estimate was the lowest among cars in the car-into-SUV test.

The Tucson-Forte pair’s bumpers also did a good job of lining up in the SUV-into-

“This is a good example of why bumpers not only need to match up, they also need to be strong,” Nolan points out.

When the Dodge Caliber struck the rear of the Jeep Patriot (both Chrysler products), their bumpers had less than half an inch of overlap. Normally this would mean the car’s bumper would slide under the SUV. That didn’t happen in this case because the Caliber has vertical extenders on both frame rails that prevented underride. The Caliber was the only car without hood damage.

“Repair costs are influenced by many factors,” Nolan says. “In the Caliber’s case,

comments on the petition but hasn’t moved forward with a rulemaking or a low-speed compliance test for bumpers.

Regulators have long said that requiring light trucks to have bumpers would compromise off-road maneuverability and make it hard to use these kinds of vehicles at loading ramps. The Institute counters that very few SUVs and pickups are used off road. In addition, bumpers aren’t the limiting factor in most vehicles’ approach and departure angles. Instead air dams, bumper covers, exhaust pipes, and other trim mounted lower than the bumpers get in the way.



Honda Civic and Honda CR-V



Hyundai Tucson and Kia Forte

## MATCHING BUMPERS HELP LIMIT DAMAGE

The bumper bars on this pair of Hondas lined up. This is the main reason these vehicles sustained less damage in the SUV-into-car test than the 6 other pairs. The Civic’s \$1,274 in estimated rear damage when hit by the CR-V was the lowest among cars in this test. The vehicles’ bumpers overlapped by more than 2 inches, enough so the bumpers engaged, and the energy-absorbing system did its job. The Kia Forte’s front bumper lined up with the rear bumper of the Hyundai Tucson in the car-into-SUV test, keeping the front of the Forte from underriding the SUV and limiting damage to a combined \$3,601 for both vehicles. The Tucson needed \$2,091 in repairs, while damage to the Forte totaled \$1,510 — the least expensive repair bill for front damage among all the cars tested.



Honda Civic  
\$1,274 rear damage



Hyundai Tucson  
\$2,091 rear damage

car test. The Tucson’s \$850 damage estimate was better than the other SUVs, and it was the only SUV that didn’t have a damaged air-conditioning condenser.

Despite bumpers that aligned, results for the Forte weren’t as good. The Forte had more than \$3,000 rear damage because its bumper broke during impact. The car’s rear body panel also was damaged.

tall frame rails helped compensate for minimal bumper overlap.”

**Regulate SUV bumpers:** The Institute in July 2008 petitioned the National Highway Traffic Safety Administration to regulate bumpers on SUVs and pickups, the same as cars, and require them to match up in a way that shields both vehicles from costly damage. The agency in June 2009 agreed to seek

“Of the 7 car-SUV pairs we tested, we can’t point to a single one as a model of compatibility because combined damage estimates run into thousands of dollars for even the best performers,” Nolan says. “In the real world that money comes straight out of consumers’ wallets through deductibles and insurance premiums. Regulating SUV bumpers would ease the burden.”



# STATUS REPORT

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FOR HIGHWAY SAFETY

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