

# INSURANCE INSTITUTE FOR HIGHWAY SAFETY

## NEWS RELEASE

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### **FIRST RESULTS OF NEW CRASH TESTS: MOST CAR BUMPERS DON'T WORK IN LOW-SPEED CRASHES; 3 CARS SUSTAIN \$4,500 DAMAGE IN 6 MPH TEST WHILE OLD FORD ESCORT SUSTAINS LITTLE DAMAGE**

ARLINGTON, VA — Most bumpers on midsize cars do little to resist damage in the kinds of low-speed collisions that are common in commuter traffic and parking lots. The Insurance Institute for Highway Safety today is releasing the first results of new tests that assess how well bumpers protect vehicles from expensive damage in everyday fender-benders.

Only 3 midsize cars among 17 the Institute tested — the Mitsubishi Galant, Toyota Camry, and Mazda 6 — withstood 4 bumper tests with \$1,500 damage or less in each test. Some cars sustained more than \$4,500 damage in just 1 of the 4 tests, and 2 cars rang up more than \$9,000 total damage (see table of repair costs on p.2).

"Our tests measure how well bumpers protect cars from damage in everyday bumps," says Institute president Adrian Lund. "The whole purpose of bumpers is to keep damage away from headlights, hoods, and other parts that are expensive to repair, but this purpose was accomplished in only 2 of the 68 tests we conducted. In the rest, what we found is that bumpers aren't up to the job."

The new tests reflect the kinds of front and rear impacts that are common in the real world. Insurance claims of \$4,500 or less for damage in these crashes total more than \$6 billion each year.

**Old versus new bumper tests:** The Institute began conducting low-speed crash tests at 5 mph into a flat barrier in 1969. These tests led to the first federal bumper rules for cars, which required the bumpers to

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<b>Bumper performance in low-speed crash tests: VEHICLE REPAIR COSTS</b>					
	<b>Front full</b>	<b>Front corner</b>	<b>Rear full</b>	<b>Rear corner</b>	<b>TOTAL DAMAGE</b>
Mitsubishi Galant	\$929	\$1,138	\$1,048	\$1,162	<b>\$4,277</b>
Toyota Camry	\$936	\$1,467	\$1,480	\$1,028	<b>\$4,911</b>
Mazda 6	\$978	\$1,384	\$1,202	\$1,397	<b>\$4,961</b>
Ford Fusion	\$1,620	\$991	\$1,298	\$1,121	<b>\$5,030</b>
Volvo S40	\$2,252	\$1,306	\$802	\$1,240	<b>\$5,600</b>
Kia Optima	\$1,730	\$1,534	\$1,715	\$756	<b>\$5,735</b>
Saturn AURA	\$1,032	\$1,152	\$3,191	\$999	<b>\$6,374</b>
Nissan Altima	\$945	\$969	\$3,114	\$1,431	<b>\$6,459</b>
Chevrolet Malibu	\$1,268	\$1,610	\$2,542	\$1,226	<b>\$6,646</b>
Subaru Legacy	\$3,911	\$1,287	\$1,122	\$1,128	<b>\$7,448</b>
Chrysler Sebring	\$1,084	\$2,061	\$3,210	\$1,099	<b>\$7,454</b>
Hyundai Sonata	\$4,312	\$1,349	\$739	\$1,165	<b>\$7,565</b>
Honda Accord	\$3,469	\$1,169	\$2,767	\$605	<b>\$8,010</b>
Volkswagen Passat	\$4,594	\$1,544	\$982	\$1,139	<b>\$8,259</b>
Pontiac G6	\$4,588	\$1,183	\$1,638	\$1,510	<b>\$8,919</b>
Volkswagen Jetta	\$2,598	\$1,223	\$3,375	\$1,824	<b>\$9,020</b>
Nissan Maxima	\$4,535	\$1,732	\$1,787	\$997	<b>\$9,051</b>
<b>1981 Ford Escort</b>	<b>\$86</b>	<b>\$0</b>	<b>\$383</b>	<b>\$0</b>	<b>\$469</b>

Note: Sonata repair costs reflect reduced parts pricing, effective Jan. 2007

resist damage in impacts up to 5 mph. These requirements eventually were rolled back by the Reagan Administration in 1982. But recent research shows that some of the most costly low-speed crash damage occurs when vehicle bumpers slide under or over each other. This happens because the bumpers on colliding vehicles don't line up, and braking before the impact can lower the front end of a striking vehicle just before it hits the other vehicle. Under- and override often result in damage to vehicle grilles, headlights, hoods, and fenders.

The Institute's old flat-barrier tests were good indicators of bumper strength, but they didn't

assess over- or underide. Vehicles with comparatively good performances in these tests still sustained costly damage in real collisions. The Institute's new series of tests comes closer to matching the damage that occurs in real-world impacts. Each car is run into a barrier designed to mimic the design of a car bumper. The steel barrier's plastic absorber and flexible cover simulate typical cars' energy absorbers and plastic bumper covers.

The four tests include front and rear full-width impacts at 6 mph and front and rear corner impacts at 3 mph. The barrier is 18 inches off the ground in the full-width tests and 16 inches from ground in the corner impacts. These heights are designed to drive bumper improvements and lead to better protection from damage in a range of real-world crashes. In developmental tests, these configurations produced the kinds and amounts of damage that commonly occur in low-speed collisions.

"We don't want the automakers to change bumper heights just to get good performance in our tests," Lund explains. "We want car bumpers to resist damage in real crashes with other cars as well as with higher-riding SUVs and pickups, so we revamped our tests to reflect such crashes. In particular, we want to encourage automakers to use bumpers with energy-absorbing bars that extend farther into vehicle corners to reduce damage to headlights and other critical and costly equipment. We want car bumpers that are taller so they engage the bumpers on SUVs and pickups instead of underriding them."

**Bumpers still poorly designed:** Many bumpers aren't high enough or tall enough to take the hit in crashes between cars and SUVs or pickups. Even when bumpers line up with those on other vehicles reasonably well, many don't stay engaged with the other bumpers in collisions or can't absorb the energy of even a minor bump. This means expensive car body parts sustain most of the damage.

"The cars with the lowest repair bills after our new bumper tests still sustained much more damage than they should have in some of the tests," Lund says. "We got crumpled grilles and headlights plus buckled fenders in impacts at speeds equivalent to an average person walking fast."

The full-front test represents a common situation where a car hits the rear of another vehicle that has stopped in traffic. In this test, the bumpers on only four cars — the Galant, Camry, Mazda 6, and Saturn AURA — stayed engaged with the test barrier instead of going under or over it. The result was lower damage totals than other cars in the same test. Damage to 3 of these 4 cars

totaled less than \$1,000, and the AURA was the only car among the 17 tested to limit damage to the bumper itself in the full-front test without getting into the car body.

"This test should be easy if cars had well-designed bumpers because the energy of the crash can be spread across the whole front of the car. Instead some cars sustained more damage in this test than the other three," Lund points out. The Nissan Maxima, Pontiac G6, and Volkswagen Passat each sustained more than \$4,500 damage in the full-front test. Costly repairs were required to the cars' hoods, fenders, and headlights as well as air conditioning condensers.

"A big problem is that the Maxima, G6, and Passat underrode the barrier," Lund says. "Our research shows that this is also what happens in many real-world crashes. The bumper bar on the Passat, which is supposed to take the hit and absorb the energy in the crash test, wasn't even damaged. The car's grille, hood, fenders, and headlights were damaged instead."

Results were similar in the rear tests. Reducing the damage required the bumpers to engage the barrier and absorb the energy of the impact, but this mostly didn't happen. A relatively good performer in the full-rear test was the Hyundai Sonata. Its bumper did engage the barrier, and most of the damage was limited to the bumper (minor repair of the rear body panel also was required). Total damage came to \$739.

Good bumper performance requires not only engagement with the test barrier but also strength sufficient to absorb the energy of a low-speed crash. Hyundai engineers strengthened the Sonata's bumper after learning about the Institute's upcoming series of new tests.

In contrast to the Sonata, the bumpers on other cars did slide under the barrier, and damage was much worse. The Chrysler Sebring, Nissan Altima, Volkswagen Jetta, and AURA sustained more than \$3,000 damage apiece in the full-rear test.

"The bumpers on the Altima and Sebring didn't stay engaged with the barrier at all. The bumper bars on these two cars escaped unscathed," Lund says, "which means they didn't do what they're supposed to do. They didn't absorb any of the crash energy. Making sure bumper bars line up better to engage other bumpers in crashes is the first step toward preventing damage in the kinds of low-speed collisions our tests represent."

**All parts don't cost the same:** The total cost to fix damage after a minor bump is influenced by more than the extent of the damage. Another issue is that the price of the same part — a fender, hood, or other part — varies from vehicle to vehicle. For example, the Toyota Camry needed a lot of repairs after the full-rear test, including repair of fenders and body panels. The trunk floor and unibody structure had to be straightened out. However, the total cost of these repairs was a relatively low \$1,480, in part because Camry parts don't cost as much as those on some other cars.

Besides the cost of damage in low-speed collisions, there's the aggravation. Most people want to avoid having to get repair estimates, arrange for repairs, and then do without their cars while they're in the shop.

"Much of this could be avoided if car bumpers were better at doing their job of resisting damage," Lund says. "But instead we have to put up with so much damage that it can take days or weeks to fix."

**Styling influences performance:** The performances of three cars show how front-end styling can influence the amount and cost of damage that occurs in low-speed crashes. The AURA, G6, and Malibu are all General Motors cars built on the same platform. So they're similar cars, but the cost of repairing them isn't the same. The G6's front end slopes more, and its front bumper bar is lower than those on the other two cars. The result was that the G6's bumper didn't stay engaged with the barrier during the full-width test. Instead it slid down and under the barrier. Damage including a crumpled hood, buckled fenders, broken headlights, and a bent air conditioning condenser cost four times as much to

fix as damage to the Malibu or AURA. On top of this, the G6's front unibody had to be straightened out. The bill for all of this topped \$4,500.

Lund explains that automakers "don't have to sacrifice car style for function. There's empty space under the covers of the bumpers on all three of these cars that could be used to put in energy-absorbing materials. Engineers also could make bumper bars taller and extend them farther out to the corners of the car without changing the front-end styling."

**Corners left unprotected:** The bars that are part of most bumper systems often fail to extend far enough into vehicle corners. The result is a failure to protect vital and costly parts such as lights and fenders.

"Headlight assemblies on all 17 cars were damaged in the corner impacts," Lund points out. "The lights essentially served as the bumpers on these cars because the bumpers themselves didn't provide any protection. There's no excuse for this. Safety equipment like headlights shouldn't be damaged in impacts at a mere 3 mph."

The width of the bumper bars was a factor in rear-corner tests too. While the Honda Accord sustained about \$600 damage in this test, damage to the Mazda 6 totaled twice as much. The difference was that the Accord's bumper bar is nearly 80 percent as wide as the car, while the Mazda 6's is only 58 percent as wide.

**Vintage Ford shows how:** Bumpers used to do a better job of resisting damage in minor impacts. Under federal requirements that were in effect until 1982, car bumpers had to keep damage away from vehicle safety equipment and sheet metal parts in collisions at speeds up to 5 mph. Even damage to the bumpers themselves was limited. But since 1982 the test speed under the federal standard has been cut in half. It's now 2.5 mph, and unlimited damage is allowed to vehicles' bumper systems.

To demonstrate how this rollback has affected bumper performance, the Institute got a 1981 Ford Escort, which met the old requirements, and put it through

a new battery of front and rear bumper tests. Comparison of this car's performance with those of new cars is dramatic.

For one thing, the bumpers on the Escort extend out from the car body to help keep the headlights, grille, and sheet metal away from the energy of impacts. Behind the bumper bar, the Escort has components that work like shock absorbers to dissipate the energy of an impact before it can damage the car body — and these components can absorb energy again in subsequent collisions, while the crushable energy absorbers that are components of most modern car bumpers can't. They have to be replaced after each minor impact.

"The Escort aced the 3 mph corner tests with zero damage," Lund says. "In the full-front test at 6 mph, the \$86 worth of damage was limited to the bumper itself. There was more damage in the full-rear test but still only \$383. This is much lower than for the 17 new cars we tested. The best performer among the new cars sustained 10 times as much damage as the Escort in the same 4 tests."

**End 7-page news release on midsize car bumper performance**

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