

# STATUS

# REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

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Audi A3  
Audi A4  
Audi Q5  
BMW 5 series  
Buick LaCrosse  
Buick Regal  
Cadillac CTS  
Cadillac SRX  
Chevrolet Cruze  
Chevrolet Equinox  
Chevrolet Malibu

Lincoln MKS  
Lincoln MKT  
Lincoln MKZ  
Mercedes C class  
Mercedes E class sedan  
Mercedes E class coupe  
Mercedes GLK  
Mitsubishi Lancer  
Nissan Cube  
Scion tC

Chrysler 200  
Dodge Avenger  
Dodge Journey  
Ford Explorer  
Ford Fiesta  
Ford Flex  
Ford Fusion  
Ford Taurus  
GMC Terrain  
Honda Civic  
Honda Element  
Hyundai Genesis  
Hyundai Santa Fe  
Hyundai Sonata  
Hyundai Tucson  
Infiniti M  
Jeep Grand Cherokee  
Jeep Patriot  
Kia Forte  
Kia Optima  
Kia Sorento  
Kia Soul  
Kia Sportage  
Lexus RX

Scion xB  
Subaru Forester  
Subaru Impreza  
Subaru Legacy  
Subaru Outback  
Subaru Tribeca  
Toyota Avalon  
Toyota Corolla  
Toyota Highlander  
Toyota Sienna  
Toyota Venza  
Volkswagen Jetta sedan  
Volkswagen Jetta SportWagen  
Volkswagen Golf  
Volkswagen GTI  
Volkswagen Tiguan  
Volkswagen Touareg  
Volvo C30  
Volvo S80  
Volvo XC60  
Volvo XC90

## 66 WINNERS FOR 2011

Forty cars, 25 SUVs, and a minivan earn **TOP SAFETY PICK** from the Institute for 2011. The award recognizes vehicles that do the best job of protecting people in front, side, rollover, and rear crashes

**TOP  
SAFETY  
PICK** 2011

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based on good ratings in Institute tests. Winners also must have electronic stability control, a crash avoidance feature that significantly reduces crash risk. The ratings help consumers pick vehicles that offer a higher level of protection than federal safety standards require.

Last year the Institute toughened criteria for *TOP SAFETY PICK* by adding a requirement that all qualifiers must earn a good rating for performance in a roof strength test to assess protection in a rollover crash (see *Status Report*, Nov. 18, 2009; on the web at [iihs.org](http://iihs.org)). The move sharply narrowed the initial field of 2010 winners. At the beginning of the 2010 model year, only 27 vehicles

Scion. Subaru is the only manufacturer with a winner in all the vehicle classes in which it competes. Subaru earns 5 awards for 2011.

"Safety is a priority among this crop of winners," Lund says. "From the start these manufacturers set out to design vehicles that would earn *TOP SAFETY PICK*, even though we've made it harder to win."

One of them is Ford. For 2011, the automaker is rolling out a new design for its popular Explorer midsize SUV, which until now had never earned *TOP SAFETY PICK*. Ford also upgraded the roofs of 2 other midsize SUVs, the Ford Flex and Lincoln MKT, along with the Ford Fusion and Lincoln MKZ, 2 midsize cars that missed the initial round of 2010

None of the small pickups the Institute has evaluated qualified for this year's award, and large pickups haven't yet been tested.

The Institute awarded the first *TOP SAFETY PICK* to 2006 models and then raised the bar the next year by requiring good rear test results and electronic stability control as either standard or optional equipment. With last year's addition of new criteria for roof crush the Institute's crash test ratings now cover all 4 of the most common kinds of crashes.

More than 12,000 people died in frontal crashes of passenger vehicles in 2009 in the United States, more than 6,000 died in side impacts, and more than 8,000 died in rollover crashes, many of which also involved a front or side impact. Rear-end crashes usually aren't fatal but result in a large proportion of injuries. Neck sprain or strain is the most commonly reported injury in two-thirds of insurance claims for injuries in all kinds of crashes.

Vehicles rated good for rollover crash protection have roofs more than twice as strong as the current federal standard requires. The Institute estimates that such roofs reduce the risk of serious and fatal injury in single-vehicle rollovers by about 50 percent compared with roofs meeting the minimum requirement.

**Quick strides in occupant protection:** When the first roof crush results were released in March 2009, only a third of the SUVs evaluated had good roofs. Since then about 113 vehicles have been tested, and the majority are rated good for roof strength (see *Status Report*, Aug. 21, 2010; on the web at [iihs.org](http://iihs.org)).

Hyundai is a case in point. The Tucson and the small SUV's twin, the Kia Sportage, earned a poor rating for roof strength in 2009, with the weakest roof among all of the small SUVs evaluated that year. A redesign helped the 2011 models secure a good rating and *TOP SAFETY PICK*. Hyundai also improved the roof on another SUV, the midsize Santa Fe, and redesigned the Sonata, a midsize car that had earned a marginal roof rating the first time around.

The outlook for side-impact protection has brightened, too, Lund notes. Many cars failed the side test the Institute began conducting in 2003, but now (*continues on p. 6*)



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MANUFACTURER HAS AT LEAST 1 WINNING MODEL  
FOR 2011, GIVING BUYERS PLENTY TO PICK FROM.**

qualified for the award, but the number grew to 58 as manufacturers reworked existing designs and introduced new models. Now another 10 vehicles join the winners' list for 2011. Two discontinued models drop off.

"In just a year, automakers have more than doubled the number of vehicles that meet the criteria for *TOP SAFETY PICK*," says Adrian Lund, the Institute's president. "That gives consumers shopping for a safer new car or SUV — from economy to luxury models — plenty of choices to consider in most dealer showrooms. In fact, every major automaker has at least one winning model this year."

**Front-runners:** Hyundai/Kia and Volkswagen/Audi each have 9 winners for 2011. Next in line with 8 awards apiece are General Motors, Ford/Lincoln, and Toyota/Lexus/

winners because they lacked the required roof strength. The all-new Ford Fiesta rounds out Ford's winners and is the only minicar to earn *TOP SAFETY PICK* this year.

General Motors' new Chevrolet Cruze broadens the number of award-winning options for consumers looking to buy a fuel-efficient small car. GM built the Cruze, which has 10 standard airbags, including ones for the knees, to outperform the government's minimum roof strength requirements and touts the achievement as a selling point.

The redesigned Volkswagen Touareg is the only large SUV to earn *TOP SAFETY PICK* for 2011. The Institute doesn't normally evaluate SUVs this large, but Volkswagen requested crash tests to demonstrate the Touareg's crashworthiness.



## 2011 TOP SAFETY PICK WINNERS

### LARGE CARS

BUICK LACROSSE, REGAL

BMW 5 SERIES

CADILLAC CTS

FORD TAURUS

HYUNDAI GENESIS

INFINITI M

LINCOLN MKS

MERCEDES E CLASS,  
E CLASS COUPE

TOYOTA AVALON

VOLVO S80

SUBARU LEGACY,  
OUTBACK

VOLKSWAGEN JETTA,  
JETTA SPORTWAGEN

VOLVO C30

### SMALL CARS

CHEVROLET CRUZE

HONDA CIVIC

KIA FORTE, SOUL

MITSUBISHI LANCER

NISSAN CUBE

SCION TC, XB

SUBARU IMPREZA

TOYOTA COROLLA

VOLKSWAGEN GOLF, GTI

### MIDSIZE CARS

AUDI A3, A4

CHEVROLET MALIBU

CHRYSLER 200

DODGE AVENGER

FORD FUSION

HYUNDAI SONATA

KIA OPTIMA

LINCOLN MKZ

MERCEDES C CLASS

### MINICAR

FORD FIESTA

### MINIVAN

TOYOTA SIENNA

### LARGE SUV

VOLKSWAGEN TOUAREG

### MIDSIZE SUVs

AUDI Q5

CADILLAC SRX

CHEVROLET EQUINOX

DODGE JOURNEY

FORD EXPLORER, FLEX

GMC TERRAIN

HYUNDAI SANTA FE

JEEP GRAND CHEROKEE

KIA SORENTO

LEXUS RX

LINCOLN MKT

MERCEDES GLK

SUBARU TRIBECA

TOYOTA HIGHLANDER,  
VENZA

VOLVO XC60, XC90

### SMALL SUVs

HONDA ELEMENT

HYUNDAI TUCSON

JEEP PATRIOT

KIA SPORTAGE

SUBARU FORESTER

VOLKSWAGEN TIGUAN

## WHAT IT TAKES TO WIN

1. **GOOD FRONTAL CRASHWORTHINESS**, based on 40 mph frontal offset crash test

2. **GOOD SIDE CRASHWORTHINESS**, based on crash test in which a vehicle's side is struck by barrier going 31 mph

3. **GOOD ROLLOVER CRASHWORTHINESS**, based on test of roof strength in relation to vehicle weight

4. **GOOD REAR CRASHWORTHINESS**, based on head restraint geometry and test of seat/head restraint

5. **ELECTRONIC STABILITY CONTROL**, which can prevent crashes by helping drivers maintain control when vehicles might spin out

## **REAL-WORLD DATA CONFIRM RESULTS OF SIDE CRASH TESTS**

Drivers of vehicles that do poorly in the Institute's side-impact crash tests are 3 times as likely to die in a real-world left-side crash than drivers of vehicles that perform well, a new analysis finds. The study includes only passenger vehicles with side airbags, demonstrating that airbags, while crucial, are far from the whole story in side crash protection.

"This was our first look at how our ratings correlate with actual crash data since we started side tests in 2003, and the numbers confirm that these are meaningful ratings," says Institute chief research officer David Zubry. "Vehicles with good side ratings provide occupants with far more protection than vehicles that do poorly in our test."

Studies of frontal crashes have shown similar results: Drivers of vehicles with good ratings in the Institute's frontal offset crash tests are much less likely to die in frontal crashes (see *Status Report*, Feb. 7, 2004, and March 29, 2006; on the web at [iihs.org](http://iihs.org)).

Side-impact crashes accounted for 27 percent of passenger vehicle occupant deaths in the United States in 2009. Such crashes can be particularly deadly because the sides of vehicles have relatively little space to absorb energy and shield occupants.

The ultimate goal of the Institute's testing program is to encourage automakers to produce safer vehicles. Knowing that consumers consult the ratings before buying, manufacturers design cars and trucks with the Institute's tests in mind. As a result, 78 percent of current vehicle designs that have been tested have good side ratings, compared with only about a third of vehicles tested in the program's first two years.

Such improvement is important to the extent it predicts performance in a real-world crash. To gauge how well the test does that, the Institute looked at federal data on side crashes from 2000 to 2009. Only crashes involving Institute-rated vehicles with standard side airbags to protect both the head and torso were included in the analysis.

By limiting the study to vehicles with side airbags, the researchers were able to bring other factors such as structure into sharper focus. Previous research has shown the importance of side airbags (see *Status Report*, Oct. 7, 2006; on the web at [iihs.org](http://iihs.org)), and no vehicle without head-protecting side airbags has ever earned a good rating from the Institute.





Researchers first compared outcomes of left-side crashes according to the Institute's side ratings. They found that drivers of vehicles rated good survived such crashes much more often than drivers of vehicles rated poor. Vehicles rated marginal — one step above poor — at first appeared to do a slightly better job of protecting people in real-world crashes than vehicles rated acceptable.

A deeper analysis helped explain this initially puzzling fact. Each vehicle's rating takes into account injury measures for a crash test dummy in the back seat, as well

"We knew that our ratings would encourage manufacturers to add head-protecting side airbags, which would save lives," Zuby says. "It's great to see that other aspects of our evaluation, such as encouraging strong side structures, resulted in so much additional protection."

A key difference between the Institute's side crash test and one the government runs is the Institute's SUV-like barrier. The National Highway Traffic Safety Administration uses a lower barrier designed when the majority of vehicles on the road were cars.

## **VEHICLES THAT EARN GOOD SIDE RATINGS PROVIDE OCCUPANTS WITH FAR MORE PROTECTION THAN VEHICLES THAT DO POORLY IN THE INSTITUTE'S TEST.**

as one in the driver's seat. In contrast, the analysis of real-world crashes could consider only driver death risk because a federal database used for the study doesn't keep track of all uninjured passengers.

So the researchers recalculated the ratings without the passenger dummy measures. Using these driver-only ratings, and after controlling for age, gender, and vehicle type and weight, a driver of a vehicle rated marginal is 49 percent less likely to die in a left-side crash than a driver of a vehicle rated poor. A driver of a vehicle rated acceptable is 64 percent less likely to die. Drivers of vehicles with good driver-only ratings are 70 percent less likely to die in a driver-side crash compared with those rated poor.

In the Institute test, a vehicle is hit on the driver side by a deformable barrier weighing 3,300 pounds and traveling at 31 mph. The barrier's height and shape are designed like the front of a typical SUV or pickup.

Ratings are based on injury measures recorded on dummies, head protection, and vehicle intrusion during crash tests. In addition to looking at overall driver protection, researchers also looked at these components individually. They found that a vehicle's structure rating was by far the best predictor of fatality risk.

Another important distinction is the type of dummy used. Until recently, both dummies used in the government's side barrier test represented average-size men, while the Institute's side test has always used dummies representing small women or 12-year-old children.

The choice of a small female dummy was a first for any consumer information test. The decision was based on the fact that women are more likely than men to suffer serious head injuries in real-world side impacts. Shorter drivers have a greater chance of having their heads come into contact with the front end of the striking vehicle in a left-side crash (see *Status Report*, June 28, 2003; on the web at [iihs.org](http://iihs.org)).

The government recently started using the small female dummy in the back seat for its side barrier test, though a midsize male dummy still is used in front. The government also is using the female dummy for a new side test that involves crashing a vehicle into a pole.

For a copy of "IIHS side crash test ratings and occupant death risk in real-world crashes" by E.R. Teoh, write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington, VA 22201, or email [publications@iihs.org](mailto:publications@iihs.org).



## WHEEGO WHIP IS NO MATCH FOR BARRIER IN SIDE CRASH TEST

The Wheego Whip may be eco-friendly, but it's not crashworthy. The Whip is a low-speed vehicle, a class of tiny golf-cart-like vehicles showing up more often on public roads. Unlike passenger vehicles, they aren't required to have airbags or other safety features beyond safety belts since

they are meant for low-risk driving. Practically every state allows them on certain roads, mostly with 35 mph or lower speed limits. The Institute has been monitoring the trend and recently evaluated a 2010 electric Wheego Whip in a 31 mph side-impact crash test. The results show why low-speed vehicles shouldn't share the road with regular traffic. The Whip is the second low-speed vehicle to be evaluated in the test, which is the most demanding one the Institute runs. This past spring the Institute conducted a side test of a GEM e2 electric vehicle (see *Status Report*, May 20, 2010; on the web at [lihs.org](http://lihs.org)) with similar results. For both the Wheego and GEM, dummies recorded data suggesting severe or fatal injuries to a real driver, including skull fractures and/or brain injuries because the barrier hit the dummies' heads. Wheego says it soon will bring to market the full-speed LiFe, an electric two-seater that will meet federal safety rules for regular passenger vehicles.

(continued from p. 2) most vehicles ace the test thanks to stronger side structures and standard side airbags that protect the head and torso. It's an important improvement because new Institute research shows that the risk of dying in a crash is sharply lower for people in vehicles that earn good ratings in the Institute's side test (see story p. 4).

Chrysler added torso airbags to the redesigned Jeep Grand Cherokee to bolster side crash protection and earn a good side rating. The previous design relied on head curtain airbags to cushion occupants in side crashes and only rated marginal for side protection.

Safety equipment is increasingly standard. Ninety-two percent of 2011 model cars, 94 percent of SUVs, and 56 percent of pickups have standard head and torso side airbags. Electronic stability control is standard on 92 percent of cars, 100 percent of SUVs, and 72 percent of pickups.

"Automakers deserve credit for quickly rising to meet the more-challenging criteria for *TOP SAFETY PICK*," Lund says. "Several already have requested tests for new models due to ship early next year, so we expect to add even more winners to the 2011 list."

The Institute groups *TOP SAFETY PICK* winners according to vehicle type and size. Lund advises consumers to keep in mind that size and weight influence crashworthiness. Larger, heavier vehicles generally afford better occupant protection in serious crashes than smaller, lighter ones. Even with a *TOP SAFETY PICK*, a small car isn't as crashworthy as a bigger one.

**How vehicles are evaluated:** The Institute's frontal crashworthiness evaluations are based on results of 40 mph frontal offset crash tests. Each vehicle's overall evaluation is based on measurements of intrusion into the occupant compartment, injury measures recorded on a 50th percentile male Hybrid III dummy in the driver seat, and analysis of slow-motion film to assess how well the restraint system controlled dummy movement during the test.

Side evaluations are based on performance in a crash test in which the side of a vehicle is struck by a barrier moving at 31 mph. The barrier represents the front end of a pickup or SUV. Ratings reflect injury measures recorded on 2 instrumented SID-IIIs dum-

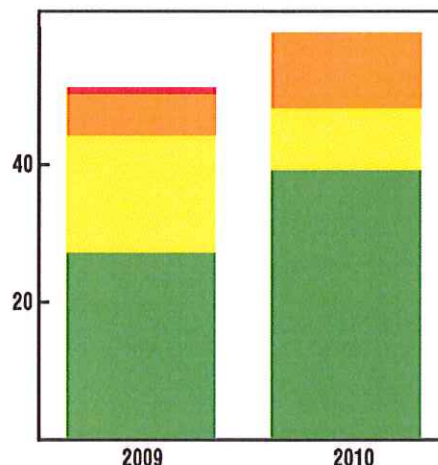
mies representing a 5th percentile woman, assessment of head protection countermeasures, and the vehicle's structural performance during the impact.

In the roof strength test, a metal plate is pushed against 1 side of a roof at a displacement rate of 0.2 inch per second. To earn a good rating for

rollover protection, the roof must withstand a force of 4 times the vehicle's weight before reaching 5 inches of crush. This is called a strength-to-weight ratio.

Rear crash protection is rated according to a 2-step procedure. Starting points for the ratings are measurements of head restraint geometry — the height of a restraint and its horizontal distance behind the back of the head of an average-size man. Seat/head restraints with good or acceptable geometry

#### OVERALL ROOF STRENGTH RATINGS IMPROVEMENTS, 2009 - 2010



#### HYUNDAI TUCSON AND KIA SPORTAGE IMPROVE

Thanks to a redesign, the Hyundai Tucson (left) and its twin, the Kia Sportage, now earn a good rating for roof strength. That wasn't always the case. When the Institute released its first batch of roof test results in March 2009, the Sportage was cited as having the weakest roof among all of the small SUVs evaluated.

are tested dynamically using a dummy that measures forces on the neck. This test simulates a collision in which a stationary vehicle is struck in the rear at 20 mph. Seats without good or acceptable geometry are rated poor overall because they can't be positioned to protect many people.

Go to [iihs.org](http://iihs.org) to view more crash test ratings and information on vehicles that earn **TOP SAFETY PICK**.



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PEMCO Insurance  
Progressive Corporation  
Rockingham Group  
Safeco Insurance  
Samsung Fire & Marine Insurance Company  
SECURA Insurance  
Sentry Insurance  
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