

Special issue: Side impact crashworthiness

# STATUS REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

Vol. 38, No. 7, June 28, 2003



## Side impact

### How 12 small SUVs fared

For the first time, the Insurance Institute for Highway Safety has evaluated vehicles in side impact crash tests to provide consumer information. The best performers among the 12 small SUVs tested (2003 models) are the Subaru Forester and the Ford Escape with optional side airbags. In contrast, 7 other small SUVs earned the lowest rating of poor — the Escape without

optional side airbags, Toyota RAV4, Suzuki Grand Vitara/Vitara/Chevrolet Tracker, Land Rover Freelander, Mitsubishi Outlander, Saturn VUE, and Honda Element. The Jeep Wrangler and Honda CR-V are rated marginal, and the Hyundai Santa Fe is acceptable.

The Subaru Forester is the only one of the 12 small SUVs to earn a good rating in both the side impact crashworthiness evaluation and the Institute's frontal offset crash test.

The side impact test represents what happens when a passenger vehicle is struck in the side by a pickup truck or SUV at about 30 mph. The results of this test expand the Institute's program of crash tests for consumer information. For eight years the Institute has been providing comparative rankings of passenger vehicles based on performance in frontal offset crash tests at 40 mph. Now most new passenger vehicles are being designed to earn good ratings in this test.

"Our side impact test is severe," says Institute president Brian O'Neill. "Given the designs of today's vehicles, it's unlikely that people in real-world crashes as severe as this would emerge uninjured. But with good side impact protection, people should be able to survive crashes of this severity without serious injuries."

O'Neill adds that he expects this new crashworthiness evaluation program to influence consumers' car-buying choices. "This is what happened with our frontal crash test results, and now we expect consumers will use the new test results to help them choose vehicles with good occupant protection in both front and side impacts."

Because consumers pay attention to the Institute's crash test results, automakers are expected to upgrade their vehicles' side impact protection, just as they've upgraded the protection their vehicles offer in frontal crashes.

"Ideally, passenger vehicles should be good performers in both tests — a double good," O'Neill says.



The configuration of the Institute's side impact test is a 31 mph perpendicular impact into the driver side of a passenger vehicle. The moving deformable barrier that strikes the test vehicle weighs 3,300 pounds and has a front end shaped to simulate the typical front end of a pickup or SUV. In each side-struck vehicle are two instrumented dummies, one in the driver seat and one in the rear seat behind the driver. These dummies are the size of a short (5th percentile) woman or a 12-year-old child.

"This is the first consumer information test program in the United States to use a dummy that represents small females," O'Neill points out.



**Side impacts account for a  
growing share of deaths  
and risks increase  
when striking vehicle is a pickup or SUV**

Today's passenger vehicles are more crashworthy than they used to be, especially in frontal crashes. As occupant protection in frontal crashes improves, the relative importance of protecting people in side impacts increases. From the early 1980s until 2000, car driver death rates decreased from 164 to *(continues on p.8)*

**Forester is best and Outlander is worst:**

The side airbag in the Subaru Forester kept the injury measures recorded on the driver dummy relatively low. The dummy in the rear seat also recorded relatively low measures, although its head did hit the pillar behind the back door — an area required by federal standard to limit head impact forces. There was somewhat less intrusion into the Forester than into several of the other small SUVs the Institute tested.

The Ford Escape with optional side airbags also is rated good (see p.10). However, it was only a marginal performer in the Institute's frontal offset crash test.

In contrast, the Mitsubishi Outlander was the worst performer in the side impact test. There was more intrusion into the occupant compartment than in many of the other vehicles tested. The Outlander that was tested didn't have side airbags. The barrier struck the driver dummy's head, and injury measures recorded on the head as well as on the torso and pelvis were very high.

**How the small SUVs are evaluated:**

Each vehicle's overall side impact evaluation is based on (1) injury measures recorded on the two instrumented SID-IIs dummies, (2) assessment of head protection countermeasures, and (3) each vehicle's structural performance during the impact.

(1) Injury measures are obtained from two SID-IIs dummies, one in the driver seat and the other in the rear seat behind the driver. These measures are used to determine the likelihood that a driver and/or passenger would have sustained serious injury to various body regions. Measures are recorded from the head, neck, chest, abdomen, pelvis, and leg. These injury measures, especially those from the head/neck and torso (chest and abdomen), are major components of each vehicle's overall evaluation.

(2) To supplement head injury measures, researchers evaluate the movements and contacts of the dummies' heads during the crash. This assessment is more important for seating positions without head protection airbags, which (assuming they perform as intended) should prevent injurious head contacts. Very high head injury measures

typically are recorded when the moving deformable barrier hits a dummy's head during impact. However, a "near miss" or a grazing contact also indicates a potential risk of serious injury in a real-world crash. This is because small differences in occupants' heights or in their seating positions compared with the test dummies could result in a hard contact and high risk of serious head injury. In the rear seat, the potential for serious injury is influenced by whether the seating position puts occupants' heads in proximity to areas designed with padding or something else to reduce impact forces versus areas with hard or unprotected structures.

Analysis of the movement and contact points of the dummies' heads during the crash test is used to assess this aspect of protection.

(3) Structural performance is based on measurements indicating the amount of intrusion into the occupant compartment around the B-pillar (between the doors). This assessment indicates how well a vehicle's side structure resisted intrusion into the driver and rear-seat passenger space. Some intrusion into the compartment is inevitable in serious side impacts. Any intrusion that does occur should be uniform both horizontally and vertically and shouldn't seriously compromise the driver and passenger space. Less intrusion helps assure that other occupants of sizes and in seating positions different from the dummies also would have lower injury risks.

These three factors determine each vehicle's overall side crashworthiness evaluation. The order in which the vehicles are listed (see facing page) depends on performance in the Institute's frontal offset crash test as well as the side impact test.





**CRASHWORTHINESS EVALUATIONS**

	<b>SIDE</b>	<b>FRONT</b>
SUBARU FORESTER	G	G
HYUNDAI SANTA FE	A	G
HONDA CR-V	M	G
FORD ESCAPE/MAZDA TRIBUTE with side airbags	G	M
ESCAPE/TRIBUTE without side airbags	P	M
JEEP WRANGLER	M	A
HONDA ELEMENT	P	G
SATURN VUE	P	G
MITSUBISHI OUTLANDER	P	G
LAND ROVER FREELANDER	P	A
SUZUKI GRAND VITARA/VITARA/CHEV. TRACKER	P	A
TOYOTA RAV4	P	A

GOOD **G** ACCEPTABLE **A** MARGINAL **M** POOR **P**

Order of vehicles reflects performance in front and side impact crash tests.

# Three main differences

Side impact tests conducted by the Institute versus the federal government:

1. Designs of the moving deformable barriers
2. Designs of the test dummies and what they measure
3. How the barriers move toward the vehicles being assessed



Since 1997 the federal New Car Assessment Program, which compares crashworthiness among new passenger vehicles, has included side impacts. In these tests, an impactor with a deformable front end representing the front of a car is used to strike the sides of the vehicles being assessed.

This moving deformable barrier was developed in the early 1980s, when cars represented most of the vehicles on the road. The height of the barrier's front end is below the heads of the dummies that meas-

ure injury risks in the side-struck vehicles. These federal tests don't assess the risks of head injury from impacts with vehicles like SUVs or pickups.

The changed vehicle mix and high risks to occupants of side-struck vehicles when the striking vehicles are SUVs or pickups led the Institute to modify the moving deformable barrier used in the federal test so the front end represents the geometry of a typical SUV or pickup. The result is a barrier that's higher off the ground, taller, and contoured.

The design of this barrier and choice of test speed (31 mph) reflect extensive developmental tests, including tests comparing the results from side impacts with barriers versus side impacts with SUVs and pickups.

Another difference between Institute and federal side impact tests involves the choice of test dummies. The Institute uses SID-IIs dummies, which are smaller than the dummy (SID) used in the federal government's test. SID-IIs is a newer design than SID, which was developed in the 1970s, and



### Federal side impact test

The front of the moving deformable barrier represents vehicle designs of the early 1980s. The barrier travels toward the test vehicle along a “crabbed,” or angular, path at a speed that simulates a two-vehicle intersection collision in which the striking vehicle is going 34 mph and the struck vehicle is going 17 mph.

The side impact test dummy (SID) represents an average-size male. Developed in the 1970s, SID principally is used to measure acceleration in the chest (rib cage and spine) during the test. It doesn’t measure chest compression. Nor is there any measure of injury risk in the abdomen or leg.



### Institute side impact test

The moving deformable barrier is higher off the ground and taller than in the federal test. The barrier’s front end represents the front of a pickup or SUV. It travels toward the test vehicle along a perpendicular path instead of “crabbed,” as in the federal test (a difference that has little effect on injury measures, according to developmental tests).

The Institute’s side impact test dummy, called SID-IIs, represents a small woman or a 12 year-old. The chest of SID-IIs measures compression as well as acceleration, and this test dummy records injury risk in the abdomen, pelvis, and leg.

it records more injury measures across more body regions.

SID-IIs represents a small (5th percentile) female or a 12 year-old. This choice of dummies reflects the fact that women are more likely than men to suffer serious head injuries in real-world side impacts (see Table 3, p.8). The head of the smaller SID-IIs driver dummy is in the window area where people’s heads are more vulnerable to being struck by the front end of a striking vehicle in a real-world side impact.



The design of the moving deformable barrier used in the Institute’s side impact crash test reflects extensive developmental testing. This research included a pair of tests, one in which the barrier hit the side of a Ford Focus (above left) and another in which a Ford Explorer (midsize SUV) hit the side of a Focus. Damage patterns were similar, indicating the barrier does a good job of representing the damage inflicted by SUVs and pickups in real-world crashes.

**Table 1 Driver deaths in cars 1-3 years old, per million cars registered, and percentage of deaths in front versus side impacts**

CRASH TYPE	IMPACT DIRECTION	CALENDAR YEARS					
		1980-81:		1990-91:		2000-01:	
		RATE	%	RATE	%	RATE	%
Car and another passenger vehicle	Front	36	61	22	53	12	43
	Side	18	31	18	43	15	51
	All	59	100	42	100	29	100
All car crashes	Front	86	52	62	53	41	46
	Side	42	26	37	32	32	37
	All	164	100	117	100	87	100

Source: Fatality Analysis Reporting System, National Highway Traffic Safety Administration

(continued from p.3) 87 per million cars registered. This represents a 47 percent decline. Most of this improvement was in frontal crashes, in which driver death rates decreased from 86 to 41 per million (52 percent decline). The improvement was much smaller in side impacts — the death rate decreased from 42 to 32 per million (24 percent decline). In crashes with another passenger vehicle, 51 percent of driver deaths in recent model cars during 2000-01 occurred in side impacts, up from 31 percent in 1980-81. During the same time, the proportion of deaths in frontal crashes declined from 61 percent to 43 percent.

These changes are attributable to two effects. There have been significant improvements in

**Table 2 Percent of driver deaths in 1-3-year-old passenger vehicles struck on the driver side by another passenger vehicle, by type of striking vehicle**

STRIKING VEHICLE	STRUCK VEHICLE	CALENDAR YEARS		
		1980-81	1990-91	2000-01
Car	Car	71%	61%	43%
SUV or pickup	Car	29%	39%	57%
Car	All passenger vehicles	70%	60%	43%
SUV or pickup	All passenger vehicles	30%	40%	57%

Source: Fatality Analysis Reporting System, National Highway Traffic Safety Administration



**Table 3 Distribution of serious and fatal injuries, by body region, to drivers of passenger vehicles struck on the driver side, calendar years 1997-2001**

BODY REGION	MALE	FEMALE	TOTAL
Head, face, or neck	29%	34%	31%
Thorax	66%	51%	61%
Abdomen	14%	13%	13%
Upper extremities	15%	18%	16%
Pelvis & lower extremities	33%	38%	35%
Spine	5%	2%	4%

Notes: Serious injuries are AIS (Abbreviated Injury Scale) 3 or greater. Drivers frequently suffer AIS 3+ injuries to multiple body regions.

Source: National Automotive Sampling System/Crashworthiness Data System, National Highway Traffic Safety Administration

frontal crash protection. For example, frontal airbags are standard in new vehicles, the structural designs of vehicles are better than they used to be, and safety belt use rates are higher. At the same time, growing sales of SUVs and pickups have exacerbated height mismatches among passenger vehicles, thereby increasing the risks to occupants of many vehicles struck in the side.

Seventy-one percent of the driver deaths in cars struck on the driver side by other passenger vehicles during 1980-81 occurred when the other vehicle was a car. Twenty-nine percent occurred when the striking vehicle was a pickup or SUV. By 2000-01 these percentages had almost reversed — 57 percent of the driver deaths in cars struck on the driver side by another passenger vehicle involved striking SUVs or pickups, while 43 percent involved striking cars.

The risks to people in a side-struck vehicle greatly increase if the striking vehicle rides higher off the ground than the struck vehicle. Thus, the risks are much higher when an SUV strikes the side of a car than when the striking vehicle is another car.



## 2003 passenger vehicle models with side airbags

Thirty-four percent of 50,000 respondents to a J.D. Power survey said they “definitely want” side airbags, up from 18 percent in 1997 (2002 Feature Contenting Report). Another J.D. Power survey reveals side airbags at the top of the list of 19 vehicle features respondents said they want. More and more automakers are offering side airbags as standard or optional equipment. Still, reported sales of optional side airbags are low.

	Seating position(s)	Type of side airbag	Standard or optional
<b>ACURA</b>			
3.2 CL	Front	Torso only	Std.
3.2 TL	Front	Torso only	Std.
3.5 RL	Front	Torso only	Std.
MDX	Front	Torso only	Std.
RSX	Front	Torso only	Std.
<b>AUDI</b>			
A4 exc. Cabriolet	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
	Rear	Torso	Opt.
A4 Cabriolet	Front	Torso/head combination	Std.
A6/S6	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
	Rear	Torso	Opt.
A8/S8	Front & rear	Curtain/torso	Std.
Allroad	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
	Rear	Torso	Opt.
TT	Front	Torso/head combination	Std.
<b>BENTLEY</b>			
Arnage	Front & rear	Torso	Std.
	Front & rear	Curtain	Opt.
<b>BMW</b>			
3 series/M3	Front	Inflatable tube/torso	Std.
	exc. convertible	Rear	Torso only
3 series/M3 convertible	Front	Torso only	Std.
	Rear	Torso only	Opt.
5 series exc. s.w.	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
	Rear	Torso	Opt.
5 series s.w.	Front	Inflatable tube/torso	Std.
	Rear	Torso only	Opt.
M5	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
	Rear	Torso	Opt.
7 series	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
	Rear	Torso	Opt.
X5	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
	Rear	Torso	Opt.
Z series	Front	Torso only	Std.
Mini Cooper	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
<b>BUICK</b>			
Century	Driver only	Torso/head combination	Opt.
LeSabre	Front	Torso only	Opt.
Park Avenue	Front	Torso only	Std.
Regal	Driver only	Torso/head combination	Opt.
Rendezvous	Driver	Torso/head combination	Opt.
	Front passenger	Torso only	Opt.
<b>CADILLAC</b>			
CTS	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
DeVille	Front	Torso only	Std.
	Rear	Torso only	Opt.
Escalade	Front	Torso only	Std.
Seville	Driver	Torso/head combination	Std.
	Front passenger	Torso only	Std.

	Seating position(s)	Type of side airbag	Standard or optional
<b>CHEVROLET</b>			
Avalanche	Front	Torso only	Opt.
Cavalier	Front	Torso only	Opt.
Impala	Driver only	Torso/head combination	Opt.
Monte Carlo	Driver only	Torso/head combination	Opt.
SSR	Front	Torso/head combination	Std.
Suburban	Front	Torso only	Opt.
Tahoe/TrailBlazer	Front	Torso only	Opt.
TrailBlazer EXT	Front	Torso only	Opt.
Venture	Driver	Torso/head combination	Opt.
	Front passenger	Torso only	opt.
<b>CHRYSLER</b>			
300M/Concorde	Front	Torso/head combination	Opt.
PT Cruiser	Front	Torso/head combination	Opt.
Sebring 4dr	Front & rear	Curtain	Opt.
Town & Country	Front	Torso/head combination	Opt.
Voyager	Front	Torso/head combination	Opt.
<b>DODGE</b>			
Caravan	Front	Torso/head combination	Opt.
Durango	Front & rear	Curtain	Opt.
Grand Caravan	Front	Torso/head combination	Opt.
Intrepid/Neon	Front	Torso/head combination	Opt.
Ram pickup	Front & rear	Curtain	Opt.
Stratus	Front & rear	Curtain	Opt.
<b>FORD</b>			
Crown Victoria	Front	Torso/head combination	Opt.
Escape	Front	Torso/head combination	Opt.
Expedition	Front & rear	Curtain	Opt.
Explorer 4dr	Front & rear	Curtain	Opt.
Explorer Sport Trac	Front & rear	Curtain	Opt.
Focus/Taurus	Front	Torso/head combination	Opt.
Thunderbird	Front	Torso/head combination	Std.
Windstar	Front	Torso/head combination	Opt.
<b>GMC</b>			
Envoy/Envoy XL	Front	Torso only	Opt.
Yukon/Yukon XL	Front	Torso only	Opt.
<b>HONDA</b>			
Accord	Front & rear	Curtain/torso	Opt.
Civic	Front	Torso only	Opt.
Civic Hybrid	Front	Torso only	Std.
CR-V/Element	Front	Torso only	Opt.
Odyssey	Front	Torso only	Std.
Pilot	Front	Torso only	Std.
<b>HYUNDAI</b>			
Accent	Front	Torso/head combination	Opt.
Elantra	Front	Torso/head combination	Std.
Santa Fe	Front	Torso/head combination	Std.
Sonata/XG350	Front	Torso/head combination	Std.
Tiburon	Front	Torso/head combination	Std.
<b>INFINITI</b>			
FX-series	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
G35/M45/Q45	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
I35/QX4	Front	Torso/head combination	Std.

(continues on p. 11)

## FORD ESCAPE WITH SIDE AIRBAGS: GOOD



### Key aspect of side impact protection: protect people's heads

Almost 10,000 passenger vehicle occupants die each year in side impacts, and head injuries are a leading cause. Side airbags designed specifically to protect the head can reduce such deaths and the even more numerous nonfatal head injuries that occur in side impacts.

Both of the small SUVs with good overall ratings in the Institute's side impact test (see p.5) are equipped with side airbags designed to protect the heads of front-seat occupants. These are standard on the Subaru Forester and optional on the Ford Escape. The Hyundai Santa Fe, which also has standard side airbags with head protection, earned an acceptable rating. In contrast, none of the seven small SUVs with poor ratings is equipped with standard side airbags designed to protect the head. And none of the small SUVs the Institute tested has side airbags to protect the heads of people in rear seats.

Note about side airbags in tested vehicles: Saturn does offer optional inflatable curtains, which cover front and rear seating positions. However, when side airbags are optional the Institute tests vehicles without this option. If a manufacturer selling optional side airbags requests the Institute to conduct an additional test of a vehicle with this option and agrees to reimburse the cost of the vehicle, a second test is conducted. General Motors didn't request such a test for the VUE, but Ford did request the Institute to test an Escape with optional side airbags. The Honda CR-V and Element plus the Mitsubishi Outlander have optional side airbags to protect the thorax, but neither of these manufacturers requested a second test with this option.

## WITHOUT SIDE AIRBAGS: POOR



(continued from p. 9)

	Seating position(s)	Type of side airbag	Standard or optional
<b>ISUZU</b>			
Ascender	Front	Torso only	Std.
<b>JAGUAR</b>			
S-Type	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
XJ-Series	Front	Torso only	Std.
XK-Series	Front	Torso/head combination	Std.
X-Type	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
<b>JEEP</b>			
Grand Cherokee	Front & rear	Curtain	Opt.
Liberty	Front & rear	Curtain	Opt.
<b>KIA</b>			
Optima	Front	Torso/head combination	Std.
Sorento	Front & rear	Curtain	Std.
<b>LAND ROVER</b>			
Range Rover	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
<b>LEXUS</b>			
ES 300	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
GS 300	Front	Curtain/torso	Std.
GS 430	Front	Curtain/torso	Std.
GX 470	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
IS 300	Front	Curtain/torso	Std.
LS 430	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
LX 470	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
RX 300	Front	Torso only	Std.
SC 430	Front	Torso only	Std.
<b>LINCOLN</b>			
Aviator	Front & rear	Curtain	Std.
LS	Front	Torso/head combination	Std.
Navigator	Front & rear	Curtain	Std.
Town Car	Front	Torso/head combination	Std.
<b>MASERATI</b>			
Coupe / Spyder	Front	Torso only	Std.
<b>MAYBACH</b>			
57/62	Front & rear	Curtain/torso	Std.
<b>MAZDA</b>			
6	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
MPV	Front	Torso/head combination	Opt.
Protegé	Front	Torso/head combination	Opt.
Tribute	Front	Torso/head combination	Opt.
<b>MERCEDES-BENZ</b>			
C class	Front & rear	Curtain/torso	Std.
CL class	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
CLK class exc. conv.	Front & rear	Curtain/torso	Std.
CLK class conv.	Front	Torso only	Std.
E/M/S class	Front & rear	Curtain/torso	Std.
SL class	Front	Torso/head combination	Std.
SLK class	Front	Torso only	Std.
<b>MERCURY</b>			
Grand Marquis	Front	Torso/head combination	Std.
Mountaineer	Front & rear	Curtain	Opt.
Sable	Front	Torso/head combination	Opt.
<b>MINI</b>			
Cooper	Front	Inflatable tube/torso	Std.
	Rear	Inflatable tube	Std.
<b>MITSUBISHI</b>			
Eclipse/Lancer	Front	Torso only	Opt.
Galant	Front	Torso only	Opt.
Montero	Front	Torso only	Std.
Outlander	Front	Torso only	Opt.

	Seating position(s)	Type of side airbag	Standard or optional
<b>NISSAN</b>			
350Z	Front	Curtain/torso	Opt.
Altima	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
Maxima/Sentra	Front	Torso/head combination	Opt.
Murano	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
Pathfinder	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
Xterra	Front	Curtain	Opt.
	Rear	Curtain	Opt.
<b>OLDSMOBILE</b>			
Aurora	Front	Torso only	Std.
Bravada	Front	Torso only	Opt.
Silhouette	Driver	Torso/head combination	Std.
	Front passenger	Torso only	Std.
<b>PONTIAC</b>			
Aztek/Montana	Driver	Torso/head combination	Opt.
	Front passenger	Torso only	Opt.
Bonneville	Front	Torso only	Std.
Vibe	Front	Torso only	Opt.
<b>PORSCHE</b>			
911/Boxster	Front	Torso only	Std.
Cayenne	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
<b>SAAB</b>			
9-3 exc. convertible	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
9-3 convertible	Front	Torso/head combination	Std.
9-5	Front	Torso/head combination	Std.
<b>SATURN</b>			
ION/VUE	Front & rear	Curtain	Opt.
L series	Front & rear	Curtain	Std.
<b>SUBARU</b>			
Forester	Front	Torso/head combination	Std.
Impreza	Front	Torso only	Opt.
Legacy/Outback	Front	Torso only	Opt.
<b>TOYOTA</b>			
4Runner	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
Avalon	Front	Torso only	Std.
Camry	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
Camry Solara	Front	Torso only	Opt.
Celica	Front	Torso only	Opt.
Corolla	Front	Torso only	Opt.
Echo	Front	Torso only	Opt.
Highlander	Front	Torso only	Opt.
Land Cruiser	Front	Curtain/torso	Opt.
	Rear	Curtain	Opt.
Matrix	Front	Torso only	Opt.
Prius	Front	Torso only	Opt.
Sequoia	Front	Curtain/torso	Opt.
Sienna	Front	Torso only	Opt.
<b>VOLKSWAGEN</b>			
Golf	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
Jetta	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
New Beetle	Front	Torso only	Std.
Passat	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
Touareg	Front & rear	Curtain	Std.
<b>VOLVO</b>			
C70	Front	Torso/head combination	Std.
S40/S60/S80	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
V40/V70	Front	Curtain/torso	Std.
	Rear	Curtain	Std.
XC90	Front	Curtain/torso	Std.
	Rear	Curtain	Std.

# STATUS REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

NON-PROFIT ORG.  
U.S. POSTAGE  
PAID  
PERMIT NO. 252  
ARLINGTON, VA

## Special issue

1005 N. Glebe Rd., Arlington, VA 22201

Phone 703/247-1500 Fax 247-1588

Internet: [www.highwaysafety.org](http://www.highwaysafety.org)

Vol. 38, No. 7, June 28, 2003

This special issue focuses on side impact crashworthiness evaluations of small SUVs. Recent special issues have focused on the following subjects:

Vehicle incompatibility	38:5 (2003)
Highway safety as a priority	37:10 (2002)
Automated enforcement	37:5 (2002)
Motorcycle deaths	37:1 (2002)
Elderly drivers	36:8 (2001)
What works & doesn't work	36:5 (2001)
Vehicle improvements	36:3 (2001)
Side impact protection	36:1 (2001)
State traffic safety laws	35:10 (2000)
Driver death rates	35:7 (2000)



The Jeep Wrangler was only a marginal performer in the Institute's side impact crash test, but this is a better rating than 7 other small SUVs earned (see p.5).

Contents may be republished with attribution.  
1 0018-988X

If you want to join the *Status Report* mail list, remove your name from it, or change your address, email [StatusReport@iihs.org](mailto:StatusReport@iihs.org). Or call or write the Institute.

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization dedicated to reducing the losses — deaths, injuries, and property damage — from crashes on the nation's highways. The Institute is wholly supported by automobile insurers:

21st Century Insurance  
Alfa Insurance  
Allstate Insurance Group  
American Express Property and Casualty  
American Family Mutual Insurance  
American National Property and Casualty  
Amica Mutual Insurance Company  
Auto Club Group  
Auto Club South Insurance Company  
Bituminous Insurance Companies  
California Insurance Group  
California State Automobile Association  
Chubb Group of Insurance Companies  
Cotton States  
Country Insurance & Financial Services  
Erie Insurance Group

Farmers Insurance Group of Companies  
Farmers Mutual of Nebraska  
Frankenmuth  
The GEICO Group  
General Casualty Insurance Companies  
GMAC Insurance Group  
Grange Insurance  
Harleysville Insurance Companies  
The Hartford  
Idaho Farm Bureau  
Iowa Farm Bureau  
Liberty Mutual Insurance Group  
Merastar  
Mercury General Group  
MetLife Auto & Home  
Middlesex Mutual  
Montgomery Insurance Companies  
MSI Insurance Companies  
Mutual of Enumclaw  
National Grange Mutual  
Nationwide Insurance  
North Carolina Farm Bureau  
Oklahoma Farm Bureau

Oregon Mutual Group  
OrionAuto  
Palisades Insurance  
Pekin Insurance  
PEMCO Insurance Companies  
Preserver Group  
The Progressive Corporation  
Prudential Financial  
Response Insurance  
Rockingham Group  
Royal & SunAlliance  
SAFECO Property & Casualty  
SECURA  
Shelter Insurance Companies  
Sampo Japan Insurance Company of America  
South Carolina Farm Bureau  
State Auto Insurance Companies  
State Farm Insurance Companies  
Tokio Marine  
USAA  
Virginia Farm Bureau  
Virginia Mutual Insurance Company  
Zurich North America