

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

NEWS RELEASE

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1ST TIME INSTITUTE TESTS CONVERTIBLES: SAAB & VOLVO MODELS ARE TOP PERFORMERS; 3 ARE MARGINAL IN SIDE IMPACT TEST

ARLINGTON, VA — The Saab 9-3 and Volvo C70 earn the Insurance Institute for Highway Safety's *TOP SAFETY PICK* award for superior crash protection in the first tests the Institute has conducted of 10 midsize convertible models. The Saab and Volvo earn the top rating of good for protection in front, side, and rear crashes, and both models include standard electronic stability control (ESC), which research shows can help drivers avoid crashes. The lowest rated convertible model overall is the Pontiac G6 (see attached ratings). It's acceptable for frontal crash protection but only marginal for protection in side and rear impacts. While the Audi A4 and BMW 3 series earn good ratings in frontal offset tests, both are rated marginal for side impact protection and poor for protection in rear crashes.

The *TOP SAFETY PICK* designation is intended to make it easier for consumers to find top-rated vehicles without sorting through reams of crash test results. To earn this award, a vehicle must have good ratings in all 3 Institute crash tests. It also must have ESC. The Institute adds a requirement for convertibles, which must be equipped with rollbars designed to preserve occupants' headroom if a convertible rolls over. Both the 9-3 and C70 are equipped with standard pop-up rollbars behind the rear head restraints that deploy if sensors detect a serious crash.

"The performances of the 9-3 and C70 are impressive," says Institute president Adrian Lund. "These cars combine what convertible buyers should look for if they're shopping with safety in mind. The Saab and Volvo not only provide good protection in high-speed front and side crashes but also have good seat and head restraint designs for protecting against whiplash in rear crashes."

"We wanted to test convertibles because sales are increasing," Lund says. "We also wanted to evaluate a group of vehicles that automakers wouldn't expect us to test to see if crashworthiness improvements in mainstream cars also are being built into convertibles. For the most part we found that this is happening."

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Five models earn the highest rating of good for front and side crash protection. Seven of the 10 convertibles have standard side airbags designed to protect the heads of occupants in the front seats, and 8 have ESC as standard or optional equipment.

Absence of roof is inherent disadvantage: High-speed crashes are violent events, and the roof of a hardtop helps to keep people's heads and arms from flailing outside the vehicle. Roofs also provide protection if a vehicle rolls over. Data from real-world crashes indicate that the overall risk of death isn't higher in a convertible, but this doesn't mean there aren't any safety disadvantages.

The absence of a roof makes it a challenge to design a convertible for safety. The roof helps to maintain the rigidity of the structure around the occupant compartment and keep the compartment intact in a serious crash. The main structures of convertibles have to be strengthened to compensate for the support that's lost in removing the roof. The Institute's crash test results show that many modern convertibles compensate well. For example, the 9-3 convertible achieves the same good front, side, and rear crash test ratings as the 4-door sedan version.

Big price tag doesn't ensure a safer car: While the 2 *TOP SAFETY PICK* winners are relatively expensive, price doesn't necessarily predict good crash test ratings. Two of the least expensive models among the 10 the Institute tested are the Chrysler Sebring and Mitsubishi Eclipse, both of which recently were redesigned and earn good ratings in front and side crash tests.

"You could spend twice as much for an Audi A4 convertible, which is an older design based on the previous A4 sedan, but it's rated marginal in our side test," Lund says. Based on the Volkswagen Eos's performance, the Institute expects a redesigned A4 to perform better when it's released. VW and Audi are owned by the same parent company.

To reduce the risk if a convertible rolls over, it's important to have rollbars, which may be either fixed in place or deploy automatically if sensors detect the possibility of a rollover. Pop-up rollbars are standard on the 9-3, C70, Eos, 3 series, and A4 but unavailable on any of the domestic or Asian brands the Institute tested.

"It makes sense that a rollbar would help preserve some headroom, just as we hope a fixed roof would," Lund says. "But rollbars aren't the same as having a fixed roof. We don't yet know if convertibles with the bars have lower rollover death rates than convertibles without them.

Another innovation on some new convertibles is that the vinyl or cloth top is replaced by a multipiece hardtop that folds into the trunk. It's standard on the C70, Eos, 3 series, and G6. It's optional on the Chrysler Sebring. Folding hardtops aren't as rigid as fixed roofs so they wouldn't be expected to make a convertible more crashworthy than if the top were soft. Foldtops are for comfort, not safety.

"Of course, without a top all bets are off if you're not using a safety belt. Good test results don't mean convertibles are as protective as comparable hardtop cars," Lund points out.

Problems found in frontal tests: The structure of the Pontiac G6's occupant compartment held up well during the frontal test, but there was a problem with the driver seat. It came loose on one of its tracks and moved forward 4 inches on the left side. The dummy's head slid around the left side of the airbag and hit the instrument panel.

"We've rarely seen a dummy's head hit the instrument panel in our frontal test," Lund says. Overall the G6 is rated acceptable for frontal protection.

"Seats shouldn't come loose in crashes, so we can't rate the G6 good," Lund adds. Measures recorded on the dummy's head, neck, and chest indicate low risk of serious injury in these areas of the body, but the poorly controlled movement of the dummy during the impact may have contributed to high forces on its right leg.

The Institute conducted 2 frontal tests of the Mustang. In the first test, the driver door partially opened late in the crash. Even though this didn't significantly affect the driver dummy's movement during the impact, doors shouldn't open because in some crashes this could lead to partial or complete ejection of occupants.

Ford engineers found that the window glass in the down position pushed on the door latch during the crash. Structure was added in the door to prevent the glass from contacting the latch mechanism, and then the engineers asked the Institute to test the Mustang again. In the second test with the change, the door remained closed.

The Mustang is rated acceptable instead of good overall because the structure isn't good, and the dummy's head bottomed out the airbag. The resulting head acceleration was high. The head was struck by the windshield pillar.

Side impact protection is marginal in 3 cars: The Institute's side test represents what happens when the striking vehicle is a pickup or SUV. The BMW 3 series and Audi A4 equipped with standard side airbags and the G6 with side airbags as optional equipment earn the second lowest rating for side impact protection.

"The 3 series and Pontiac G6 are especially disappointing because they're new models," Lund says. "Other auto manufacturers have figured out how to provide good side impact protection for occupants of convertibles."

The G6 is equipped with optional side airbags designed to protect the torsos but not the heads of front-seat occupants. In the side test, the driver dummy's head struck the window-sill. This caused a high head acceleration. In a real-world crash of similar severity, a serious skull fracture and brain injuries would be possible. A taller person's head also might be struck by the hood of an oncoming SUV or pickup.

The 3 series is equipped with standard side airbags designed to protect front-seat occupants' heads as well as their torsos. However, injury measures recorded on the driver dummy indicate the possibility of rib fractures and internal organ injuries in real-world crashes of similar severity.

"None of the 10 convertibles provides side airbag protection for people riding in back seats. We didn't record high injury forces on any of the dummies in the back seats, but in a crash at a different speed or configuration the heads of back-seat passengers would be at risk without side airbags," Lund notes.

Rear crash protection is mostly poor: Significant differences also were apparent among the convertibles in the protection they afford in rear crashes. Only the Volvo and Saab are equipped with seat/head restraint designs that provide good protection against whiplash injury. The other 8 models are rated marginal or poor for rear crash protection.

"It isn't hard or expensive to design a seat to prevent neck injury in a rear-end crash," Lund says. "Some of these manufacturers like Audi, Ford, and Volkswagen already have seat designs elsewhere in their lines of vehicles that are rated good for whiplash prevention, but these automakers haven't put the good seat/head restraints in their convertibles."



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 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 dummies, assessment of head protection countermeasures, and the vehicle's structural performance during the impact. Injury measures obtained from the 2 dummies, one in the driver seat and the other in the back seat behind the driver, are used to determine the likelihood that a driver and/or passenger in a similar real-world crash would sustain serious injury to various parts of the body. The movements and contacts of the dummies' heads during the test also are evaluated. Structural performance is based on measurements indicating the amount of B-pillar intrusion into the occupant compartment.

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 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 cannot be positioned to protect many people.

**End 5-page news release on crashworthiness ratings of convertibles
Attachment: front, side, & rear crashworthiness evaluations of 10 cars
VNR on 5/31/2007 at 10:30-11 am EDT (C) AMC 3/Trans. 3 (dl3760H)
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For more information go to www.iihs.org

Midsize convertibles		FRONT EVALUATION	SIDE EVALUATION	REAR CRASH PROTECTION	ELECTRONIC STABILITY CONTROL
	SAAB 9-3 WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front and side: 2004-07 models rear: 2006-07 models	G	G	G	standard
	VOLVO C70 WITH FRONT DOOR-MOUNTED HEAD CURTAIN AND FRONT SEAT-MOUNTED TORSO AIRBAGS front, side, and rear: 2006-07	G	G	G	standard
	MITSUBISHI ECLIPSE WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front, side, and rear: 2007 models	G	G	M	unavailable
	VOLKSWAGEN EOS WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front, side, and rear: 2007 models	G	G	M	standard
	CHRYSLER SEBRING WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front, side, and rear: 2008 models	G	G	P	optional
	TOYOTA CAMRY SOLARA WITH FRONT SEAT-MOUNTED TORSO AIRBAGS front, side, and rear: 2004-07 models	G	A	P	optional
	FORD MUSTANG WITH OPTIONAL FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front: 2007 models (mfg. after May 2007) side: 2007 models (mfg. after January 2007) rear: 2005-07 models	A	G	P	unavailable
	BMW 3 SERIES WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front and rear: 2007 models side: 2007 models (mfg. after April 2007)	G	M	P	standard
	AUDI A4 CABRIOLET WITH FRONT SEAT-MOUNTED COMBINATION HEAD AND TORSO AIRBAGS front: 2007 models side and rear: 2003-07 models	G	M	P	standard
	PONTIAC G6 WITH OPTIONAL FRONT SEAT-MOUNTED TORSO AIRBAGS front and rear: 2006-07 models side: 2007 models (mfg. after January 2007)	A	M	M	optional

Rollbars are standard equipment on the 9-3, C70, Eos, 3 series, and A4 but unavailable on the Eclipse, Sebring, Solara, Mustang, or G6.

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

ORDER OF VEHICLES REFLECTS RATINGS IN FRONT, SIDE, AND REAR TESTS FOR DETAILED EVALUATIONS OF PASSENGER VEHICLES, GO TO WWW.IIHS.ORG

FRONTAL RATINGS are based on performance in a 40 mph frontal offset crash test into a deformable barrier. **CAUTION:** Frontal ratings cannot be compared across vehicle type and weight categories because the kinetic energy involved in the frontal test depends on the speed and weight of the test vehicle, and the crash is more severe for heavier vehicles. Given equivalent frontal ratings for heavier and lighter vehicles, the heavier vehicle typically will offer better protection in real-world crashes.

SIDE RATINGS are based on performance in a crash test in which the side of the vehicle is struck by a moving deformable barrier with a front end that represents the front of a typical SUV or pickup. The moving barrier strikes the vehicle at 31 mph in a perpendicular impact. **NOTE:** Side ratings can be compared across vehicle type and weight categories while frontal ratings cannot.

REAR CRASH PROTECTION RATINGS are based on a two-step evaluation. In the first step restraint geometry is rated. Seats with good or acceptable geometric ratings then are subjected to a dynamic test. Seats with head restraints rated marginal or poor, based on geometry, aren't tested because they cannot protect taller occupants.