Status Report

Range of ratings

Small car ratings run the gamut in challenging small overlap front test

ALSO IN THIS ISSUE
Vol. 49, No. 6
July 30, 2014

- First ratings for Mazda 5 in full battery of IIHS tests
- Teen crashes decline since advent of graduated licensing
- Going up: States keep raising speed limits
The Mini Cooper Countryman is the only small car to earn a good rating among the latest group of 12 cars subjected to the Institute’s small overlap front crash test.

Two electric models and a hybrid also are in the mix, with varied results. The electric-powered Chevrolet Volt (with a gasoline engine “range extender”) earns an acceptable rating, while its battery-electric rival, the Nissan Leaf, earns a poor rating. The Ford C-Max Hybrid, a small four-door wagon, earns an acceptable rating. Another small four-door wagon, the gasoline-powered Mazda 5, is rated poor.

Five small cars, all 2014 models, earn an acceptable rating, two earn marginal and four earn poor ratings for occupant protection in a small overlap crash in the Institute’s latest round of evaluations. The Institute now has evaluated 32 small cars for small overlap front crash protection. Of them, 19 earn a good or acceptable rating and 13 earn marginal or poor.

Introduced in 2012, the small overlap test replicates what happens when the front corner of a vehicle collides with another vehicle or an object such as a tree or utility pole. In the test, 25 percent of a vehicle’s front end on the driver’s side strikes a rigid barrier at 40 mph (see Status Report, Aug. 14, 2012, at iihs.org).

The test is more difficult than either the head-on crashes conducted by the National Highway Traffic Safety Administration (safercar.gov) or the IIHS moderate overlap test. In the small overlap test, the main structures of the vehicle’s front-end crush zone are bypassed, making it hard for the vehicle to manage crash energy. The occupant compartment can collapse as a result.

“The Mini Cooper Countryman gave a solid performance,” says Joe Nolan, the Institute’s senior vice president for vehicle research. “The Countryman’s safety cage held up reasonably well. The safety belts and airbags worked together to control the test dummy’s movement, and injury measures indicate a low risk of any significant injuries in a real-world crash this severe.”

To earn the top rating of good, automakers need to focus on overall crash protection. That means an occupant compartment that resists intrusion, safety belts that prevent a driver from pitching too far forward and side curtain airbags that

Driver space wasn’t maintained well in the test of the Ford C-Max Hybrid due to intrusion into the occupant compartment and steering column movement. However, dummy injury measures were good in this electric model.

The Mini Cooper Countryman’s safety cage held up well, and the safety belts and airbags worked as they should to control the test dummy’s movement.
In the Fiat 500L, survival space for the driver was seriously compromised by intruding structure. Serious hip and leg injuries would be possible in a real-world crash.

### Small overlap front crash ratings for small cars

<table>
<thead>
<tr>
<th>Overall</th>
<th>Structure</th>
<th>Restraints &amp; kinematics</th>
<th>Dummy injury measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head &amp; neck</td>
<td>Chest</td>
<td>Hip &amp; thigh</td>
</tr>
<tr>
<td>Chevrolet Volt</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Mini Cooper Countryman</td>
<td>G</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Ford C-Max Hybrid</td>
<td>A</td>
<td>M</td>
<td>A</td>
</tr>
<tr>
<td>Mitsubishi Lancer</td>
<td>A</td>
<td>A</td>
<td>M</td>
</tr>
<tr>
<td>Scion FR-S</td>
<td>A</td>
<td>M</td>
<td>A</td>
</tr>
<tr>
<td>Subaru BRZ</td>
<td>A</td>
<td>M</td>
<td>A</td>
</tr>
<tr>
<td>Scion xB</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Hyundai Veloster</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Fiat 500L</td>
<td>P</td>
<td>P</td>
<td>A</td>
</tr>
<tr>
<td>Nissan Juke</td>
<td>P</td>
<td>P</td>
<td>M</td>
</tr>
<tr>
<td>Nissan Leaf</td>
<td>P</td>
<td>P</td>
<td>M</td>
</tr>
<tr>
<td>Mazda 5</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
</tbody>
</table>

Good (G) | Acceptable (A) | Marginal (M) | Poor (P)
Performance and protocol

Two eco-friendly models illustrate how performance can vary in the small overlap test. Driver space in the Volt was maintained reasonably well, and data taken from the dummy indicate a low risk of significant injuries. The Volt is rated acceptable. The story’s different for the Leaf. Significant intrusion left little survival space for the dummy, meaning likely knee and leg injuries. The Leaf is rated poor. The Volt has an optional forward collision warning system and qualifies for TOP SAFETY PICK+.

When testing hybrid or electric models, IIHS follows special safety protocols. Post crash, technicians check for high voltage and high temperature, which could lead to a potentially fatal electrical shock and/or fire. No one can touch the car until given the all-clear. Technicians wear safety gear, including eye protection, rubber boots and rubber gloves. They’re tethered at the waist to a long pole, which can be used to pull them away from the vehicle in an emergency. No issues with the batteries or electric systems were seen in the Volt and Leaf tests.
provide enough forward coverage to cushion a head at risk of hitting the dashboard or window frame or things outside the vehicle. Collapsing structures can knock front airbags and seats out of position, exacerbating the problem.

“Collapse of the occupant compartment is the downfall for four small cars in this group, including the Fiat 500L, Mazda 5, Nissan Juke and Nissan Leaf,” Nolan explains. “A sturdy occupant compartment allows the restraint systems to do their job, absorbing energy and controlling occupant motion.”

In the Fiat 500L, a four-door variant of the much smaller Fiat 500 coupe, intruding structure seriously compromised the driver’s survival space, knocking the steering wheel back and to the right of the driver. That put the front airbag out of position so the dummy’s head slid off the left side and hit the A-pillar. Although sensors in the head indicate the impact wasn’t severe, contact with hard surfaces shouldn’t occur. In addition, injury measures taken from the dummy indicate serious injury to the driver’s left hip would be likely, and injuries to both lower legs would be possible in a real-world crash of this severity. The Fiat 500L (and 500) earns a poor rating for small overlap front crash protection.

**First results for Mazda 5**

The Mazda 5 shares the distinction with two other cars of being the worst-performing models the Institute has evaluated in the small overlap test. The other two are the 2014 Kia Forte, a small car, and the 2012 Prius v, a midsize hybrid.

“When we tested the Mazda 5 we saw a host of structural and restraint system problems. Parts of the occupant compartment essentially buckled, allowing way too much intrusion,” Nolan says.

Injury measures taken from the dummy indicate a high risk of injuries to the left thigh and left lower leg in a real-world crash this severe. The steering wheel moved to the right, and the dummy’s head barely contacted the front airbag before sliding off the left side. The safety belt allowed the dummy’s head and torso to move too far forward, so the head made contact with the left side of the dashboard. The side curtain airbag didn’t deploy at all, exposing the head to contacts with side structure and outside objects. Plus, the driver door unlatched during the test, something that shouldn’t happen and puts occupants at risk of being ejected from the vehicle.

The Mazda 5 also is distinct in that it is the only vehicle in this group to earn a marginal rating in one of the Institute’s other four evaluations — moderate overlap front, side, rollover and rear. The Mazda 5 earns a marginal rating in the side impact test. That also makes it the only 2014-model car the Institute has evaluated to earn anything less than acceptable in the side test. The Institute has been evaluating models for side impact protection since 2003.

**Mazda 5 ratings in IIHS tests**

<table>
<thead>
<tr>
<th>Test</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small overlap front</td>
<td>P</td>
</tr>
<tr>
<td>Moderate overlap front</td>
<td>G</td>
</tr>
<tr>
<td>Side</td>
<td>M</td>
</tr>
<tr>
<td>Roof strength</td>
<td>G</td>
</tr>
<tr>
<td>Head restraints &amp; seats</td>
<td>A</td>
</tr>
</tbody>
</table>

This is the first time the Institute has published ratings for the Mazda 5 in the full battery of tests. The small wagon struggled in the small overlap front and side tests. The Mazda 5 is the only 2014 model car evaluated to earn anything less than acceptable in the side test. The Institute has been evaluating models for side impact protection since 2003.

**Award winners**

The Volt, which has a basic-rated optional forward collision warning system, is the only car in this test group to earn a 2014 TOP SAFETY PICK+ award. The C-Max Hybrid, Countryman, Mitsubishi Lancer, and the Scion FR-S and its twin the Subaru BRZ qualify for TOP SAFETY PICK, the Institute’s second-highest award. These models miss the “plus” award because they don’t have an available front crash prevention system.

To qualify for TOP SAFETY PICK+, a vehicle must earn a good or acceptable rating for small overlap protection, a good rating in the Institute’s other four tests, and a basic, advanced or superior rating for front crash prevention. To qualify for TOP SAFETY PICK, a vehicle must earn a good or acceptable rating for small overlap protection and a good rating in the other four tests.

“Consumers in the market for a small car now have six models to consider on our list of 2014 TOP SAFETY PICK+ award winners, and an additional 13 that earn TOP SAFETY PICK,” Nolan says. “Consumers trading the inherent safety of a larger vehicle for the convenience or fuel economy of a small car should focus their search on these vehicles with state-of-the-art safety designs.”

“Electric vehicles have a unique challenge in the small overlap test because of their heavy batteries. The Volt performed reasonably well, earning an acceptable rating, while the Leaf struggled,” Nolan says.

Driver space in the Volt was maintained reasonably well in the test, and injury measures taken from the dummy indicate a low risk of any significant injuries to a person in a similar crash. In the Leaf, the dummy had a different experience. The Leaf chalked up as much as 16 inches of intrusion in the lower occupant compartment and 14 inches in the upper occupant compartment. The instrument panel, parking brake pedal and steering column were all pushed back toward the driver. Injuries to the left knee and left lower leg would be likely in a crash of this severity, and injuries to the left thigh would be possible.

**Volt and Leaf electrics**

Back in 2011, the Volt and Leaf were the first mainstream plug-in electric models to undergo IIHS crash test evaluations. The 2011 models earned top ratings in the moderate overlap front, side, head restraint and roof-strength evaluations (see Status Report, April 26, 2011). That’s still the case with the 2014 versions of both cars.
U.S. teenagers are crashing less often, both per capita and per mile driven, since the advent of graduated driver licensing (GDL) in the mid-1990s, a new IIHS study confirms. A separate study published recently in Injury Prevention makes the connection with GDL more explicit, finding that graduated licensing reduces both the amount of driving done by teenagers and the likelihood that they will crash when they do drive.

Teen crash rates per mile driven still far exceed those of older drivers, but the studies are the latest to suggest that changes in licensing policies during the past two decades are working.

"Since 1996, when the nation's first graduated licensing system went into effect in Florida, there has been a steady, steep decline in teenagers' per capita crash rates," says Anne McCartt, IIHS senior vice president for research and lead author of the Institute's study. "We found the steepest reduction among 16 year-olds, who are most likely to be affected by graduated licensing."

A 2007 IIHS study found that between 1996 and 2005, per capita fatal and non-fatal crash rates dropped sharply for 16 year-olds and also fell for 17 and 18 year-olds (see Status Report, June 15, 2007). The new study extends the time period and includes more recent data about travel patterns. Institute researchers used data from government crash databases, the Census Bureau and the 1995-96, 2001-02, and 2008 National Household Travel Surveys to calculate rates of fatal crashes and police-reported crashes for drivers ages 16-19 and drivers ages 30-59. They found that per mile driven, rates of fatal crashes and police-reported crashes were much higher for teenagers than for the 30-59-year-old group during 2008 and much higher for 16-17 year-olds than for older teenagers. Lower per capita rates of fatal and police-reported crashes for 16 year-olds compared with older teenagers and adults stem from the fact that younger teenagers are less likely to be licensed and may drive less when they are.

The per capita rates of fatal and police-reported crashes among teens fell steadily from 1996 to 2012. While the largest declines were among younger teens — for example, 16 year-olds went from 33 fatal crash involvements per 100,000 people in 1996 to 9 in 2012 — all teens had much larger declines than the 30-59 year-olds, for whom fatal crashes per 100,000 people also fell, from 20 to 13. Teen drivers' crash rates per mile driven also dropped substantially and, in general, more steeply than those of the adult drivers.

The proportion of younger teen drivers' fatal crashes at night and with two or more teenage passengers also declined from 1996 to 2012. That is consistent with restrictions on night driving and young passengers that are part of GDL systems in almost all states. Previous Institute research has found that stronger restrictions on night driving are associated with larger reductions in fatal crash rates, as are laws that limit teen passengers (see Status Report, May 31, 2012, at iihs.org). The proportion of fatally injured teen-age drivers with positive blood alcohol concentrations also decreased, while it changed little for middle-age drivers.

One risk factor not addressed by GDL is speeding. The authors found that more than a third of teens' fatal crashes involved speeding, compared with less than a fifth for 30-59-year-old drivers. The percentage of fatal crashes in which drivers were speeding increased 7 percent for 16 year-olds and held more or less steady for the other ages.

In the second study, researchers found that teens are in fewer crashes when exposed to GDL, in part because they drive
Injury Prevention

published online by

among adolescents” by M. Zhu et al. was pub-

miles driven and fatal crash rates per miles driven

association of graduated driver licensing with

and E.R. Teoh, email publications@iihs.org. “The

graduated licensing programs” by A.T. McCartt

strengthened GDL.

versely affected as states have implemented and

evidence that teens older than 17 have been ad-

able. Intermediate restrictions also limit the hours

supervision, and an adult may not always be avail-

er phase that requires permit holders to drive with

restrictions, since they might not have as

crash rates to go up for older teens not under

Several other states have unsuccessfully tried to raise speed limits this year. Florida Gov. Rick Scott in May vetted a bill that would have lifted speed limits on portions of interstate throughout the state to as fast as 75 mph. In Maryland, a bill would have raised limits to 70 mph on interstates. Other states that considered similar moves include Massachusetts, Mississippi, Missouri, New York, Oklahoma and Wisconsin.

During the 2013 state legislative season, six states (Illinois, Maine, New Hampshire, Ohio, Pennsylvania and Utah) either raised maximum speed limits or expanded the maximum speed limit to cover more roads.

Driving faster may put motorists at their destinations a bit sooner, but that doesn’t mean the journey will be a safe one. More than 10,000 deaths — about a third of all crash fatalities — occurred in speed-related crashes during 2012. High speeds make a crash more likely because they increase the distance needed to stop a vehicle. Collisions also become more deadly because crash energy increases exponentially as speeds go up. Research shows that raising speed limits leads to more deaths (see Status Report, Nov. 22, 2003).

The National Highway Traffic Safety Administration in a May report estimates that crashes involving a speeding vehicle traveling over the posted limit or too fast for conditions cost the nation $59 billion in 2010, an average of $191 for every person in the U.S.

Going up: States keep raising speed limits

Loosening speed limits on U.S. freeways and interstates appears to be in vogue among some state lawmakers regardless of the safety costs. This year, four states have raised posted limits to as high as 80 mph or extended maximum limits to more roads. In all, 38 states have speed limits of 70 mph or higher on some portion of their roads.

Idaho and Wyoming raised the maximum speed limit from 75 to 80 mph on interstates, effective July 1 in both states. In Utah, the current maximum posted speed limit is 80 mph. Last year the state increased the number of interstate segments posted at 80 mph and decided this spring to allow other DOT-approved freeways to be posted in excess of 75 mph, effective in May. Georgia raised limits on urban interstates to 70 mph, up from 65 mph.

Several other states have unsuccessfully tried to raise speed limits this year. Florida Gov. Rick Scott in May vetted a bill that would have lifted speed limits on portions of interstates throughout the state to as fast as 75 mph. In Maryland, a bill would have raised limits to 70 mph on interstates. Other states that considered similar moves include Massachusetts, Mississippi, Missouri, New York, Oklahoma and Wisconsin.

During the 2013 state legislative season, six states (Illinois, Maine, New Hampshire, Ohio, Pennsylvania and Utah) either raised maximum speed limits or expanded the maximum speed limit to cover more roads.

Driving faster may put motorists at their destinations a bit sooner, but that doesn’t mean the journey will be a safe one. More than 10,000 deaths — about a third of all crash fatalities — occurred in speed-related crashes during 2012. High speeds make a crash more likely because they increase the distance needed to stop a vehicle. Collisions also become more deadly because crash energy increases exponentially as speeds go up. Research shows that raising speed limits leads to more deaths (see Status Report, Nov. 22, 2003).

The National Highway Traffic Safety Administration in a May report estimates that crashes involving a speeding vehicle traveling over the posted limit or too fast for conditions cost the nation $59 billion in 2010, an average of $191 for every person in the U.S.

Maximum posted daytime speed limits on rural interstates

Meanwhile, at least one locality is intent on lowering speed limits this year. In New York City, Mayor Bill de Blasio in June won approval from state lawmakers in Albany to lower the default speed limit to 25 mph from 30 mph with an eye toward making city streets safer for pedestrians. The bill awaits Gov. Andrew Cuomo’s expected signature before heading to the New York City Council for approval.

July 30, 2014 | 7
Range of ratings for small cars in small overlap front test ➔ 2
First ratings for Mazda 5 in full battery of IIHS tests ➔ 5
Teen crashes decline with advent of graduated licensing ➔ 6
States keep raising limits on freeways and interstates ➔ 7

Vol. 49, No. 6
July 30, 2014

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 roads.

The Highway Loss Data Institute shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

Both organizations are wholly supported by the following auto insurers and funding associations:

MEMBER GROUPS
Acceptance Insurance
ACE Private Risk Services
Affirmative Insurance
Alfa Alliance Insurance Corporation
Alfa Insurance
Allstate Insurance Group
American Family Mutual Insurance
American National Family of Companies
Amherst Auto & Home
Amica Mutual Insurance Company
Auto Club Enterprises
Auto Club Group
Auto-Owners Insurance
Avinia Insurance
Bankers Insurance Group
Bituminous Insurance Companies
California Casualty Group
Capital Insurance Group
Chubb & Son
Colorado Farm Bureau Mutual Insurance Company
Commonwealth Mutual Insurance Company of America
Concord Group Insurance Companies
Cotton States Insurance
COUNTRY Financial
CSAA Insurance Group
CSE Insurance Group
Direct General Corporation
Erie Insurance Group
Esurance
Farm Bureau Financial Services
Farm Bureau Insurance of Michigan
Farm Bureau Mutual Insurance Company of Idaho
Farmers Insurance Group of Companies
Farmers Mutual Hail Insurance Company of Iowa
Farmers Mutual of Nebraska
Florida Farm Bureau Insurance Companies
Frankenmuth Insurance
Freestone Insurance Company
Gainco Insurance
GEICO Corporation
The General Insurance
Georgia Farm Bureau Mutual Insurance Company
Goodville Mutual Casualty Company
Grange Insurance
Hallmark Insurance Company
Hanover Insurance Group
The Hartford
Haulers Insurance Company, Inc.
Horace Mann Insurance Companies
ICW Group
Imperial Fire & Casualty Insurance Company
Indiana Farmers Mutual Insurance Company
Infinity Property & Casualty
Kemper Preferred
Kentucky Farm Bureau Insurance
Liberty Mutual Insurance Company
Louisiana Farm Bureau Mutual Insurance Company
Maryland-Automobile Insurance Fund
Mercury Insurance Group
MetLife Auto & Home
Michigan Millers Mutual Insurance Company
MiddleOak
Mississippi Farm Bureau Casualty Insurance Company
MMG Insurance
Mutual of Enumclaw Insurance Company
Nationwide
New Jersey Manufacturers Insurance Group
Nodak Mutual Insurance Company
Norfolk & Dedham Group
North Carolina Farm Bureau Mutual Insurance Company
Northern Neck Insurance Company
Ohio Mutual Insurance Group
Old American County Mutual Fire Insurance
Old American Indemnity Company
Oregon Mutual Insurance
Pekin Insurance
PEMCO Insurance
Plymouth Rock Assurance
Progressive Corporation
QBE Group
The Responsive Auto Insurance Company
Rockingham Group
Safe Auto Insurance Company
Safeco Insurance
Safeguard Insurance
Shelter Insurance
Sompo Japan Insurance Company of America
South Carolina Farm Bureau Mutual Insurance Company
Southern Farm Bureau Casualty Insurance Company
State Auto Insurance Companies
State Farm Insurance Companies
Tennessee Farmers Mutual Insurance Company
Texas Farm Bureau Insurance Companies
Tower Group Companies
The Travelers Companies
United Educators
USAA
Utica National Insurance Group
Virginia Farm Bureau Mutual Insurance Company
West Bend Mutual Insurance Company
Western National Insurance Group
Westfield Insurance
XL Group plc
Zurich North America

FUNDING ASSOCIATIONS
American Insurance Association
National Association of Mutual Insurance Companies
Property Casualty Insurers Association of America