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Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Simplifying child safety

IHS rates vehicles for LATCH ease of use

SPECIAL ISSUE:
LATCH RATINGS

Vol. 50, No. 5 | June 18, 2015





For the first time, IIHS has rated vehicles on how easy it is to install child restraints in them. The results aren't great.

In the Institute's first ease-of-use ratings for child restraint installation hardware, only 3 vehicles of more than 100 earn a good rating, while more than half are poor or marginal.

The new LATCH ratings will serve as a resource for families looking for a vehicle that makes it easy to transport their children safely. They also are intended to encourage vehicle manufacturers to pay attention to this equipment, which too often is treated as an afterthought.

Properly installed, age-appropriate child restraints provide considerably more protection for children in crashes than safety belts alone. However, observational studies have found that parents and caregivers often fail to secure them tightly or make other installation mistakes.

LATCH, which stands for Lower Anchors and Tethers for Children, is intended to make it easier to install a child seat properly. It works: Child restraints installed with LATCH, rather than with

vehicle safety belts, are more likely to be installed correctly, IIHS researchers found in a study of child seat inspection records from Safe Kids Worldwide (see *Status Report*, April 8, 2014, at iihs.org).

But in many vehicles, LATCH hardware could be better. That same study found that parents were more likely to have installed the seat correctly when the LATCH hardware met certain key ease-of-use criteria. The criteria were first identified in earlier research that IIHS conducted with the University of Michigan Transportation Research Institute (UMTRI). In that research, volunteers were observed installing child restraints using LATCH in a variety of vehicles (see *Status Report*, April 12, 2012, and Feb. 20, 2014).

"LATCH is meant to simplify child seat installations, but it doesn't always succeed," says Jessica Jermakian, an IIHS senior research scientist. "Parents often struggle to locate the anchors in the vehicle or

find it's difficult to attach the seats to them. We believe fixing these problems will make the task less frustrating for parents and increase the likelihood that children will ride in properly installed seats."

That belief is shared by the National Highway Traffic Safety Administration. The agency used the UMTRI/IIHS research as the basis for many changes it proposed this year to LATCH requirements. While IIHS supports such changes, they are likely several years away. In the meantime, the ratings will encourage automakers to make improvements more quickly.

Good LATCH defined

LATCH has been required in vehicles and on child restraints since 2002. In a vehicle, the lower anchors are located where the seatback meets the bottom seat cushion, an area known as the seat bight.

LATCH ease-of-use ratings

GOOD

BMW 5 series	Mercedes-Benz GL-Class	Volkswagen Passat
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ACCEPTABLE

Acura MDX	Ford Explorer	Kia Sorento
Buick Enclave	Ford Flex	Kia Soul
Chevrolet Cruze	Ford Focus	Lexus GX
Chevrolet Equinox	Ford Taurus	Mazda 3
Chevrolet Impala	GMC Terrain	Mazda CX-5
Chevrolet Malibu	GMC Yukon XL	Mercedes-Benz C-Class
Chevrolet Tahoe	Honda Civic	Mercedes-Benz E-Class
Chevrolet Traverse	Honda Odyssey	Mitsubishi Outlander Sport
Chrysler 300	Honda Pilot	Nissan Maxima (2014)
Chrysler Town & Country	Hyundai Santa Fe	Nissan Murano
Dodge Dart	Jeep Cherokee	Nissan Pathfinder
Dodge Durango	Jeep Compass	Nissan Versa
Dodge Grand Caravan	Kia Forte	Toyota Camry
Ford Edge	Kia Optima	Volvo S60
Ford Expedition	Kia Sedona	

MARGINAL

Acura RDX (2016)	GMC Acadia	Nissan Quest
Audi Q7	Honda Accord	Nissan Rogue
BMW 3 series	Honda CR-V	Nissan Sentra
BMW X3 (2016)	Hyundai Elantra	Subaru Forester
BMW X5	Hyundai Sonata	Subaru Impreza
Buick LaCrosse	Infiniti QX60	Subaru Outback
Cadillac SRX	Jeep Grand Cherokee	Subaru XV Crosstrek
Chevrolet Sonic	Jeep Wrangler	Toyota 4Runner
Chrysler 200	Lexus CT 200h	Toyota Avalon
Dodge Charger	Lexus NX	Toyota Corolla
Dodge Journey	Lexus RC	Toyota Highlander
Dodge Ram 1500	Lexus RX	Toyota Prius
Ford Escape	Mazda CX-9	Toyota RAV4
Ford F-150	Mini Cooper	Volvo V60
Ford Fusion	Nissan Frontier	Volvo XC60

POOR

Chevrolet Silverado 1500	Lexus ES	Toyota Tundra
Ford Fiesta	Mazda 6	Volkswagen Jetta
GMC Sierra 1500	Nissan Altima	
Hyundai Accent	Toyota Sienna	

Attachments at the bottom of the child restraint connect to these. The top tether connects the top of the child seat to an anchor located on the vehicle's rear shelf, seatback, floor, cargo area or ceiling.

Child restraints can be installed with lower anchors or safety belts. A top tether should be used with every forward-facing child restraint, whether it is secured using belts or using the lower anchors.

In the new ratings system, vehicle LATCH hardware is rated good if it meets the following criteria:

- ▶ The lower anchors are no more than 3/4 inch deep in the seat bight.
- ▶ The lower anchors are easy to maneuver around. This is defined as having a clearance angle greater than 54 degrees.
- ▶ The force required to attach a standardized tool to the lower anchors is less than 40 pounds. (The tool represents » *page 6*

Sample LATCH ratings: a map of each vehicle

This information is provided for each vehicle rated for LATCH ease of use at iihs.org/ratings.

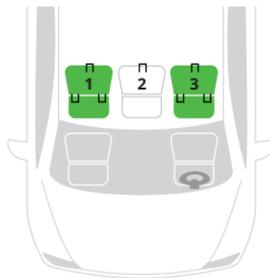
2015 Volkswagen Passat

TDI SE, leather seats

G

This vehicle has 2 rear seating positions with complete LATCH hardware.

It has 1 additional seating position with a tether anchor only.



Details by seating position

1 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

- ✓ not too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

2 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

none available

3 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

- ✓ not too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

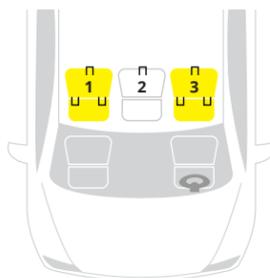
2015 Kia Optima

LX, cloth seats

A

This vehicle has 2 rear seating positions with complete LATCH hardware.

It has 1 additional seating position with a tether anchor only.



Details by seating position

1 Tether anchor

- ✓ easy-to-find location
- ✓ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

2 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

none available

3 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

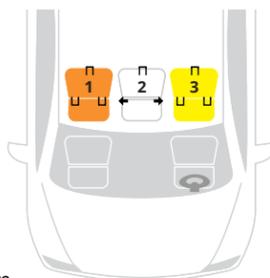
2015 Ford Escape

SE, cloth seats

M

This vehicle has 2 rear seating positions with complete LATCH hardware.

It has 1 additional seating position with a tether anchor and the ability to borrow lower anchors from the other seating positions.



Details by seating position

1 Tether anchor

- ✓ easy-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✗ difficult to maneuver around anchors

2 Tether anchor

- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Lower anchors

Can be borrowed from 1 and 3

3 Tether anchor

- ✓ easy-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

2015 Toyota Sienna

LE, cloth seats

P

This vehicle has 4 rear seating positions with complete LATCH hardware.



Details by seating position

1 Tether anchor

- ✗ hard-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

3 Tether anchor

- ✗ hard-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✗ too much force needed to attach
- ✓ easy to maneuver around anchors

4 Tether anchor

- ✗ hard-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✓ not too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

5 Tether anchor

- ✗ hard-to-find location
- ✗ other hardware could be confused for anchor

Lower anchors

- ✗ too deep in seat
- ✓ not too much force needed to attach
- ✓ easy to maneuver around anchors

- G** Good
- A** Acceptable
- M** Marginal
- P** Poor
- Seating positions that rely on borrowed lower anchors or have only a tether anchor available are not rated.
- No hardware available

- Tether anchor
- Lower anchors
- ← Lower anchor(s) can be borrowed from adjacent position(s)



BMW X3

How lower anchors are evaluated: An IHS engineer uses a specialized tool (above) to measure the depth and required force of a lower anchor. Another tool (below right) is used to measure the anchor's clearance angle. The Ford Edge is an example of a vehicle with anchors that are at the surface and clearly visible. In contrast, the Acura RDX's anchors are too deep within the seat.



✓ not too deep in seat

Ford Edge



✗ too deep in seat

Acura RDX



Honda CR-V

How tether anchors compare: Tether anchors in a sedan are typically located on the rear deck, as they are in the Volkswagen Passat. The tether anchors in the BMW X5 are located in the middle of the seatback. In both vehicles, they are easy to find. The X5 has clear labels near the tether anchors, so no other hardware, such as cargo hooks, could be mistaken for them. The Toyota Sienna is an example of a vehicle with poorly located tether anchors. They are at the very bottom of the seatback, near a lot of potentially confusing hardware.



- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

Volkswagen Passat



- ✓ easy-to-find location
- ✓ no other hardware could be confused for anchor

BMW X5



- ✗ hard-to-find location
- ✗ other hardware could be confused for anchor

Toyota Sienna



Honda Odyssey

Tether anchors should be easy to find on the rear deck in sedans or the top 85 percent of the seatback in minivans and SUVs. In the above photo, the tether anchor is hard to find because it is too close to the bottom of the seat. Some vehicles have hardware such as cargo hooks that could be confused for the anchor. In that case, the tether anchor should be clearly labeled.

« from page 3 a lower connector of a child seat, though the actual force required when installing a seat varies depending on the specific connector.)

- ▶ Tether anchors are on the vehicle's rear deck or on the top 85 percent of the seatback. They shouldn't be at the very bottom of the seatback, under the seat, on the ceiling or on the floor.
- ▶ The area where the tether anchor is found doesn't have any other hardware that could be confused for the

tether anchor. If other hardware is present, then the tether anchor must have a clear label located within 3 inches of it.

Under existing federal regulations, most vehicles must have at least two rear seating positions with full LATCH hardware and a third with at least a tether anchor. The IIHS ratings are based on the best two LATCH positions available in the vehicle's second row.

To earn a good rating, two LATCH positions must meet all five criteria, and a third

tether anchor also must be easy to use. For an acceptable rating, two LATCH positions must each meet at least 2 of the 3 requirements for lower anchors and at least 1 of the 2 tether anchor requirements. If either position meets neither of the tether anchor requirements or meets only one of the lower anchor requirements, then the vehicle is marginal. If even fewer criteria are met, the vehicle is poor.

The ratings measure ease of use only. A correct installation in a vehicle with poor LATCH is just as safe as a correct installation in a vehicle with good LATCH. However, achieving that correct installation in the poor-rated vehicle is more difficult.

The same is true for an installation with a safety belt: If it's done correctly — including attaching the tether in the case of a forward-facing restraint — the child will be just as safe as with an installation using lower anchors. However, doing it correctly can be challenging.

How they did

Of 102 current models that IIHS has rated for LATCH, the three good ones are the BMW 5 series, a large luxury car; the Mercedes-Benz GL-Class, a large luxury SUV; and the Volkswagen Passat, a midsize car. Of the rest, 44 are acceptable, 45 are marginal, and 10 are poor.

The poor-rated models run the gamut of vehicle types from minicars to large pickup trucks. Most glaring is the Toyota Sienna. As a minivan, it's commonly bought to ferry children.

In all of the rated vehicles, the most common problem is lower anchors that are too deep within the seat bight. Nearly three-quarters of LATCH-equipped seating positions — including 3 of 4 LATCH positions in the Sienna — had this problem.

Part of the reason for the excessive depth is aesthetics: Automakers prefer to have the metal bars hidden from view. In sedans, another reason has to do with the way the cars are constructed. Usually, the only hard structure to attach the anchors to is the body of the sedan, which is located deep under the seat. This problem can be fixed, but it's not necessarily simple.

The online ratings information (see iihs.org/ratings) helps consumers understand exactly why a vehicle gets the rating it does. A diagram for each vehicle shows

the location of all LATCH-equipped seating positions and which criteria those positions meet and which they miss. The location of extra tether anchors, for use with restraints attached with safety belts, also is shown.

In some cases, center seating positions don't have their own lower anchors, but auto manufacturers allow anchors to be "borrowed" from adjacent positions. The rating diagrams show when such borrowing is allowed by the vehicle manufacturer. (Some child restraint manufacturers advise against using borrowed anchors; consumers should check the child restraint instruction manual.)

"Even if you're not in the market for a new vehicle, our ratings can be a helpful source of information about a vehicle you already own," Jermakian says. "We're essentially providing you with a map of where child seats can be installed most easily in your vehicle, including the specific hardware available for each seating position."

It's important to note that seating configurations and LATCH hardware can vary depending on the trim level or type of seats. The rating details indicate which specific vehicle was measured. Generally, ratings are provided for the configuration believed to be most popular.

Good+ to reward greater flexibility

The Institute plans to award extra credit to vehicles with good-rated LATCH that also provide parents with additional LATCH options beyond the two required seating positions. In particular, the "good+" rating would encourage the availability of LATCH in the second-row center position, the safest place for children to travel. Currently, no vehicles qualify for good+.

A two-row vehicle that meets the criteria for a good rating and also has acceptable or good LATCH in the center will be rated good+. The center LATCH position may use either dedicated anchors or borrowed anchors. Borrowing is sometimes a more feasible option because of limited space in the rear seat or because of the location of safety belts or other hardware.

A three-row vehicle must have one additional full LATCH position and tether anchors in all rear seating positions to earn good+. If the vehicle has a second-row center seating position, it must have the ability to use LATCH there as well. ■

Making sense of LATCH: answers to common questions

If my car has a bad LATCH rating, does that mean I should avoid using LATCH?

Not necessarily. LATCH hardware with a poor rating provides the same protection as hardware with a good rating; it's just harder to use. A correct installation using the vehicle safety belt also is just as safe. In other words, use whichever method is easiest for you to achieve a good, tight installation. A tight installation means that when you push and pull on the seat where the safety belt or LATCH webbing passes through, it won't move more than 1 inch in any direction. If you have doubts, have a certified child seat technician look at your installation. Use the child seat inspection station locator at safercar.gov.

I heard LATCH has a weight limit. Should I switch my child to a booster after he reaches that weight?

LATCH does have a weight limit, based on the combined weight of the restraint and the child, but, as long as your child hasn't reached the overall weight limit for the seat, you can continue to use it with the vehicle safety belt. Don't rush to switch your child to a booster; a harness-equipped restraint provides better protection.

Restraints manufactured since February 2014 have a label that specifies the maximum weight of the child for LATCH installations. If you don't have such a label, check the manuals of both the vehicle and the car seat.

When installing the seat using the vehicle safety belt, you'll need to take the extra step of locking the belt, which can be tricky. Consult your child restraint and vehicle manuals for instructions. Be sure to continue using the top tether. You need that with any forward-facing restraint, regardless of whether you're using lower anchors or the safety belt.

I understand it's safest for a child to ride in the center rear, but what if there is no LATCH in that position?

A properly restrained child is very safe in any rear seat. Beyond that, the second-row center position is the safest position because it's far from the hard surfaces of the vehicle interior and from the striking vehicle in a side

crash. If there is no LATCH in that position, you can use the safety belt. Again, don't forget to lock the belt and remember to use the top tether with a forward-facing restraint.

Some vehicles that don't have dedicated lower anchors in the center allow you to borrow the anchors from the outboard



positions. If you do this, remember that you can't use an anchor to hold more than one seat at a time. You would have to use the vehicle belts to attach child restraints in the outboard positions. Some child restraint manufacturers advise against borrowing, so be sure to check your child seat manual on this point as well.

I've seen some booster seats with LATCH attachments. Is it important to use LATCH with a booster?

Booster seats don't need to be attached to the vehicle, but there are some that can be connected to the lower anchors. With or without LATCH, a booster provides significant safety benefits over the vehicle belt alone after a child outgrows a forward-facing restraint.

The most commonly cited reason for using LATCH with boosters is to prevent an unoccupied seat from becoming a projectile in a crash. Some boosters can only be secured using LATCH when they are unoccupied and need to be disconnected before a child is seated. Check the booster manual for the specifics on your particular seat. ■

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Vol. 50, No. 5

June 18, 2015

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