REPORT NUMBER: 301R-CAL-19-002

SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT

Honda of America MFG, INC.
2019 Acura RDX

NHTSA NUMBER: C20195300

PREPARED BY:
CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
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March 19, 2019

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Avenue, SE
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-16-D-00032.

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7. Author(s) Vince Paolini, Senior Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2019-002
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** DTNH22-16-D-00032
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance- Enforcement Mail Code: NVS-220 1200 New Jersey Avenue, SE Washington, D.C. 20590		***13. Type of Report and Period Covered*** Final Test Report March 15, 2019 - March 19, 2019 ***14. Sponsoring Agency Code*** NVS-220

15. Supplementary Notes

16. Abstract

A compliance test was conducted on a Acura RDX SUV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301R-02 for the determination of FMVSS 301R compliance. Test failures identified were as follows:

None - The test vehicle appeared to comply with all requirements of FMVSS 301R "Fuel System Integrity – Rear Impact."

17. Key Words Compliance Testing Safety Engineering FMVSS 301R	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division (TIS) (NPO-230) 1200 New Jersey Avenue, SE Washington, D.C. 20590 Telephone No. (202) 366-4946		
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SECTION 1

PURPOSE AND TEST PROCEDURE

This rear impact test is part of the FMVSS 301R Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-16-D-00032. The purpose of this test was to determine if the subject vehicle, a Acura RDX SUV, meets the performance requirements of FMVSS No. 301R "Fuel System Integrity – Rear Impact." The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-301R-02, dated January 17, 2007).

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 1,903 kg Acura RDX SUV was impacted from the rear by a 1357.0 kg moving barrier at a velocity of 79.56 kph (49.43 mph). The test was performed by Calspan Corporation on March 15, 2019.

The test vehicle was equipped with a 64.7 liter fuel tank which was filled to 93 percent capacity with stoddard fluid prior to impact. Additional ballast (38.5 kg) was secured on the vehicle's rear passenger seat. Two ballast Part 572E 50th percentile male Anthropomorphic Test Devices (ATD) were placed in the front occupant seating positions.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information can be found on page 3-7 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was no fuel system fluid spillage following the impact and including all portions of the static rollover test. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

SECTION 3

SUMMARY OF TEST RESULTS

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – Test Vehicle Specifications

Data Sheet No. 2 – Pre-Test Data

Data Sheet No. 3 – Moving Deformable Barrier (MDB) Data

Data Sheet No. 4 – High Speed Camera Locations and Data Summary

Data Sheet No. 5 – Post-Test Data

Data Sheet No. 6 – FMVSS No. 301 Static Rollover Test Data

DATA SHEET NO. 1
TEST VEHICLE SPECIFICATIONS

Test Vehicle: Acura RDX SUV
Test Program: FMVSS 301R Compliance Rear Impact Test
NHTSA No.: C20195300
Test Date: 3/15/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	C20195300
Model Year	2019
Make	Acura
Model	RDX
Body Style	SUV
Body Color	Gray
Odometer Reading (km/mi)	9 miles
Engine Displacement (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	10-Speed
Final Drive	Front Wheel Drive

Overdrive	Yes
Air Conditioning (AC)	Yes
All-Wheel Drive (AWD)	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADL)	Yes
Power Brakes	Yes
Power Seats	Yes
Power Steering	Yes
Power Windows	Yes
Stability Control (Auto-Leveling)	No
Sunroof/T-Top	Yes
Tilt Steering Wheel	Yes
Traction Control System (TCS)	Yes

DEALER AND DELIVERY INFORMATION FROM CERTIFICATION LABEL

Manufactured By	Honda of America MFG, INC.
Date of Manufacture	09/18
VIN	5J8TC1H39KL009663

GVWR (kg)	2170
GAWR Front (kg)	1170
GAWR Rear (kg)	1060

TIRE PLACARD & SIDEWALL INFORMATION

Tire Placard Location: Driver's Door Sill
Spare Tire Type: None

Measured Parameter	Front	Rear
Tire Manufacturer	Continental	Continental
Tire Name	Crosscontact LX Sport	Crosscontact LX Sport
Tire Type	All Season	All Season
Max. Tire Pressure (kPa)	350	350
Recommended Tire Size	235/55R19	235/55R19
Load Index/Speed Symbol	101H	101H
Recommended Cold Tire Pressure (kPa)	230	230
Tire Size on Vehicle	235/55R19	235/55R19
Treadwear/ Traction Grade/ Temperature Grade	480 / A / A	480 / A / A

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Seat Type (Bench, Bucket, or Split Bench)	Bucket	Bench	-	
Capacity Weight (VCW) (kg)				380
DSC X 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				39.8

DATA SHEET NO. 2
PRE-TEST DATA

Test Vehicle: Acura RDX SUV
Test Program: FMVSS 301R Compliance Rear Impact Test
NHTSA No.: C20195300
Test Date: 3/15/2019

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	507	358		558	549	
Right	kg	514	335		381	415	
Ratio	%	60	40		49	51	
Totals	kg	1021	693	1714	939	964	1903

TARGET TEST WEIGHT CALCULATION (TTW)

Measured Parameter	Units	Value	
Total Unloaded Vehicle Weight (UVW)	kg	1714	(A)
Rated Cargo/Luggage Weight (RCLW)	kg	39.8	(B)
Weight of two P572E ATDS	kg	155.4	(C)
Target Vehicle Test Weight (TVTW)	kg	1909.2	(A+B+C)

GENERAL TEST VEHICLE DATA

Measured Parameter	Units	Value
Vehicle Wheelbase	mm	2748
Vehicle Length (at Centerline)	mm	4744
Vehicle Width (B-Pillar)	mm	1902
Weight of Ballast Secured in Cargo Area[1]	kg	38.5
Type of Ballast		Lead Shot
Method of Securing Ballast		Rear Passenger Foot well
Components Removed for Weight Reduction		None
Vehicle Width at Widest Point	mm	1903
Vehicle Width at Widest Point Location		C-Pillar
Centerline offset for impact line	mm	381
Filler neck side (left/right)		Left

[1] Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

TEST VEHICLE ATTITUDE AND CG

	Units	Left		Right		CG (aft of front axle)
		Front	Rear	Front	Rear	
As Delivered (UVW)	mm	823	823	834	838	1111
As Tested (ATW)	mm	804	803	818	820	1392

DATA SHEET NO. 2 (Continued)
PRE-TEST DATA

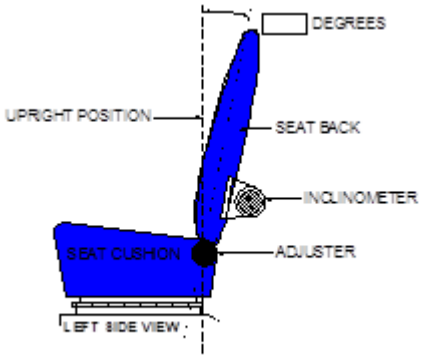
Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019

SEATING

Nominal Design Riding Position (for adjustable driver and passenger seat backs). *Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.*

Driver Seat Instructions: The driver seat back was positioned according to the Nominal Design Riding position listed in FORM 1.

Passenger Seat Instructions: The passenger seat back was positioned to the Nominal Design Riding position listed in FORM 1.



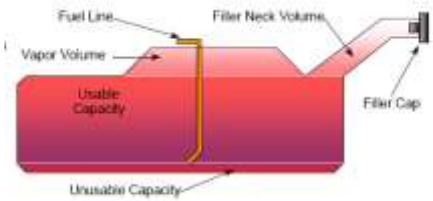
FRONT SEAT ASSEMBLY

Measured Parameter	Deg.
Driver Seat Back Angle	2.7
Passenger Seat Back Angle	2.7

SEAT FORE/AFT POSITIONING

Driver Seat: Was positioned according to the Nominal Design Riding position listed in FORM1.
Passenger Seat: Was positioned according to the Nominal Design Riding position listed in FORM1.

	Total Travel	Test Position
Driver Seat	221	110
Passenger Seat	203	101



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY DATA

Measured Parameter	Reference	Liters
Fuel System Capacity (Standard Tank)	Owner's Manual	64.7
COTR Usable Capacity (Standard Tank)	Form No. 1	64.7
Test Volume Range	92-94% of Usable Capacity	59.5 – 60.8
Actual Test Volume (Solvent Used)	93% of Usable Capacity	60.1

FUEL SYSTEM DATA

Measured Parameter	Value
Test Fluid Type	Stoddard Solvent
Test Fluid Specific Gravity	0.764
Test Fluid Kinematic Viscosity (centistokes)	0.96
Test Fluid Color	Purple
Electric Fuel Pump?	Yes
Can Activate Electric Fuel Pump with Ignition Switch On but Engine Off?	Yes

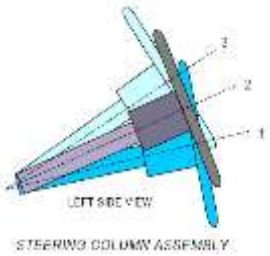
Fuel Pump Comments : None

DATA SHEET NO. 2 (Continued)
PRE-TEST DATA

Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.



Operational Instructions: Tilit wheel was positioned to mid-range at 23.4 degrees and 21.5 mm.

SEAT BELT UPPER ANCHORAGE

Nominal design riding position

Operational Instructions: Anchorages were set to uppermost position.

COMMENTS: None

DATA SHEET NO. 3
MOVING DEFORMABLE BARRIER (MDB) DATA

Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019

MDB Face Manufacturer: Plascore MDB Face Serial No. A0119067

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length of MDB (incl. honeycomb impactor face)	4120
Wheelbase of Framework Carriage	2591
Tread of Framework Carriage (Front & Rear)	1880
CG Location of Front Axle	1136

MDB WEIGHTS

	Units	Front	Rear	Total
Left	kg	358.0	322.0	680.0
Right	kg	404.0	273.0	677.0
Ratio	%	56.2%	43.8%	100.0%
Totals	kg	762.0	595.0	1357.0

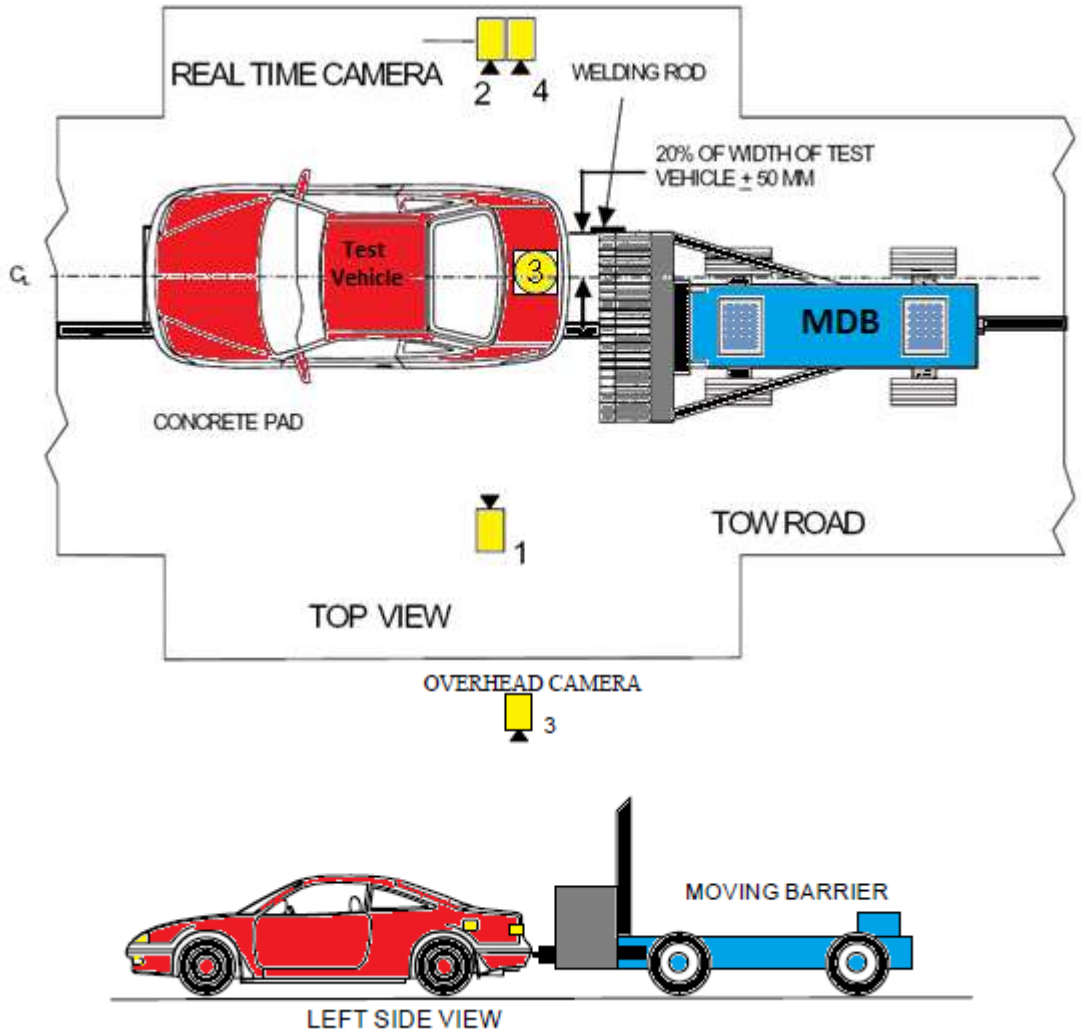
MDB TIRE SIZE & PRESSURES

	Units	Requirement	Left Front	Right Front	Left Rear	Right Rear
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

Brake Abort System? (Yes/No): Yes Date of Last MDB Calibration: May 15, 2010

DATA SHEET NO. 4
HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019



No.	Camera View	Coordinates (mm)			Angle (Deg)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	1870	-10467	-1445	-1.1	24	1000
2	Real-Time Camera						60
3	Overhead View	960	0	-9370	90	12.5	1000
4	Right Side View	1822	9242	-1246	-1.0	24	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.
X = (Impact Point) + Forward
Y = (Impact Point) + To Right
Z = (Ground Level) + Down

DATA SHEET NO. 5
POST-TEST DATA

Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019

VIN: 5J8TC1H39KL009663

REQUIRED IMPACT VELOCITY RANGE: 78.5 to 80.1 km/h

ACTUAL IMPACT VELOCITY (WITHIN 1.5 M OF IMPACT PLANE)

Measurement Description	Units	Speed
Trap No. 1	km/h	79.56
Trap No. 2	km/h	79.60

WELDING ROD IMPACT POINT

Measurement Description	Tolerance	Units	Value
Vertical distance from target center (+ is above)	±40 mm	mm	+5
Horizontal distance from target center (+ is right)	±50 mm	mm	-3

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. From impact until vehicle motion ceases:
(Maximum allowable is 28 grams) 0 grams

B. For the 5-minute period after motion ceases:
(Maximum allowable is 28 grams) 0 grams

C. For the next 25 minutes:
(Maximum allowable is 28 grams/minute) 0 grams

D. Spillage Details: No Spillage Occurred

DATA SHEET NO. 5
POST-TEST DATA (Continued)

Test Vehicle:	Acura RDX SUV	NHTSA No.:	C20195300
Test Program:	FMVSS 301R Compliance Rear Impact Test	Test Date:	3/15/2019

DOOR OPENING AND SEAT TRACK INFORMATION

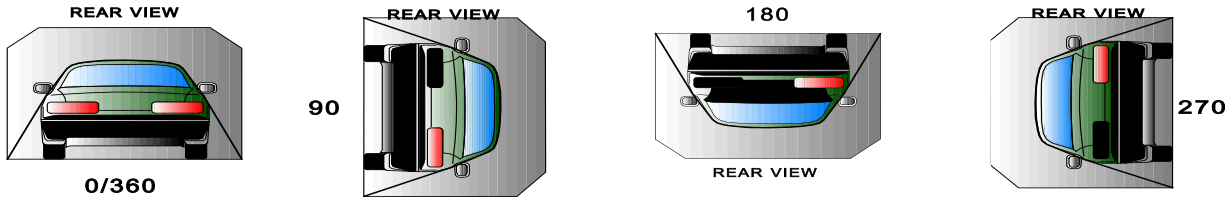
Description	Driver	Passenger
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Jammed Shut	Closed & Operational
Seat Track Shift (mm)	0	0
Seat Back Failure	Reclined	Reclined
Glazing Damage	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	Rear Windshield Shattered

DATA SHEET NO. 6
FMVSS NO. 301 STATIC ROLLOVER TEST DATA

Test Vehicle: Acura RDX SUV NHTSA No.: C20195300
Test Program: FMVSS 301R Compliance Rear Impact Test Test Date: 3/15/2019



Rear View

ROLLOVER SOLVENT COLLECTION TIME TABLE

Test Phase	Rotation Time (spec. 1 -3 min)		Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	7	5	6	7	7
90° to 180°	1	5	5	6	5	7
180° to 270°	1	7	5	6	7	7
270° to 360°	1	8	5	6	8	7

FMVSS 301 REQUIREMENTS TABLE (Maximum allowable solvent spillage)

First 5 Minutes (grams)	6th Minute (grams)	7th Minute (grams)	8th Minute (grams)
142	28	28	28

ACTUAL TEST VEHICLE STODDARD SOLVENT SPILLAGE TABLE

Test Phase	First 5 Minutes (grams)	6th Minute (grams)	7th Minute (grams)	8th Minute (grams)
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER STODDARD SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure A-1: Vehicle Certification Placard

Figure A-2: Vehicle Tire Placard

Figure A-3: Pre-Test Front View

Figure A-4: Post-Test Front View

Figure A-5: Pre-Test Left Side View

Figure A-6: Post-Test Left Side View

Figure A-7: Pre-Test Right Side View

Figure A-8: Post-Test Right Side View

Figure A-9: Pre-Test Left Front 3/4 View

Figure A-10: Post-Test Left Front 3/4 View

Figure A-11: Pre-Test Right Front 3/4 View

Figure A-12: Post-Test Right Front 3/4 View

Figure A-13: Pre-Test Left Rear 3/4 View

Figure A-14: Post-Test Left Rear 3/4 View

Figure A-15: Pre-Test Right Rear 3/4 View

Figure A-16: Post-Test Right Rear 3/4 View

Figure A-17: Pre-Test Rear View

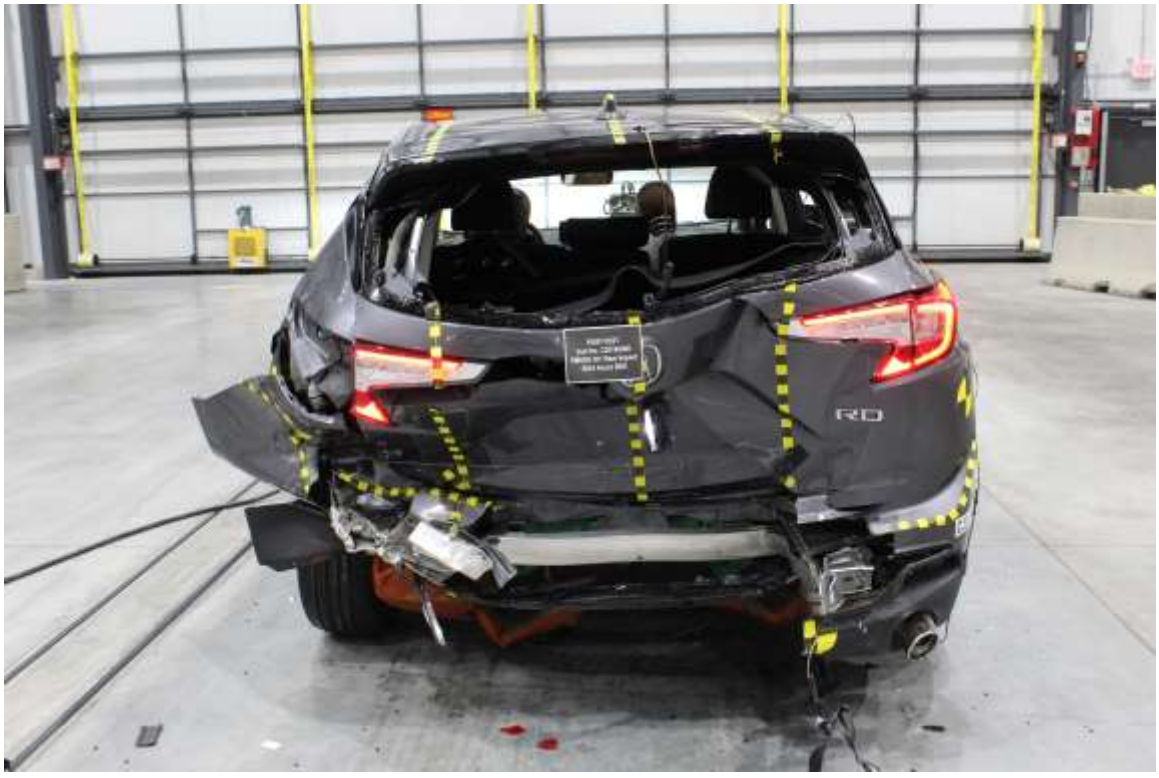


Figure A-18: Post-Test Rear View

Figure A-19: Pre-Test MDB Front View

Figure A-20: Post-Test MDB Front View

Figure A-21: Pre-Test MDB Left Side View

Figure A-22: Post-Test MDB Left Side View

Figure A-23: Pre-Test MDB Right Side View

Figure A-24: Post-Test MDB Right Side View

Figure A-25: Pre-Test MDB Top View

Figure A-26: Post-Test MDB Top View

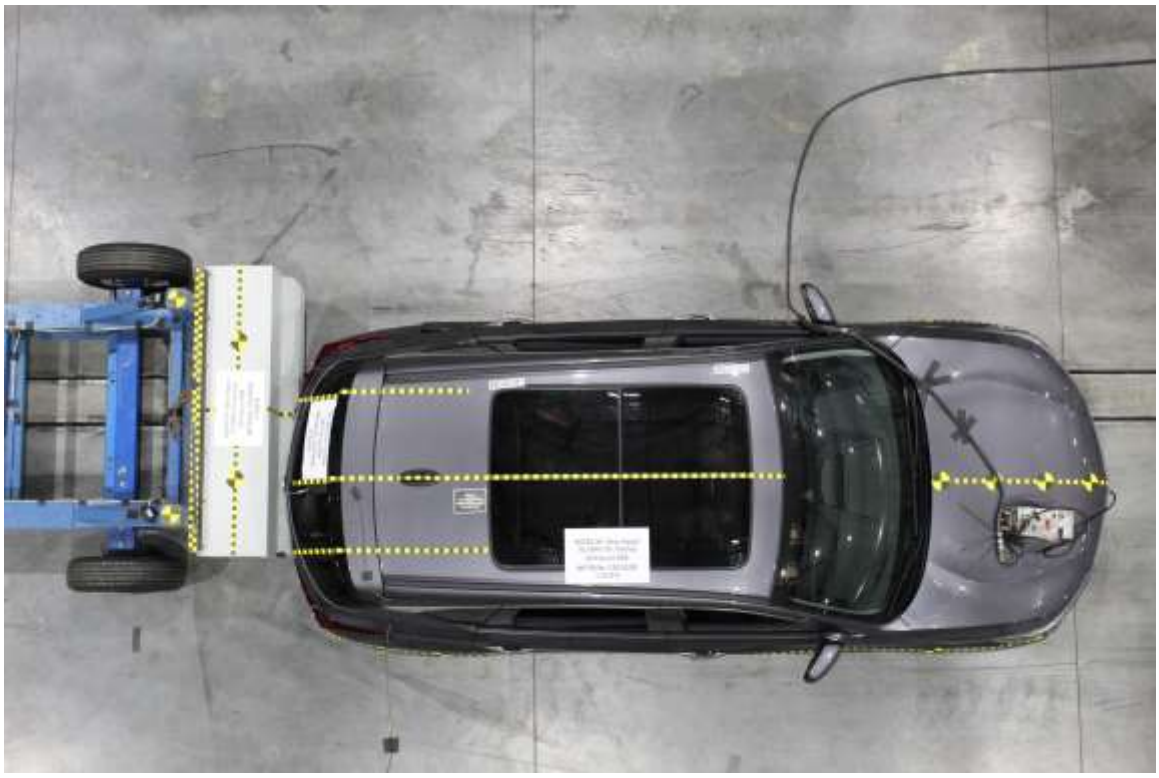


Figure A-27: Pre-Test Overhead Vehicle and MDB View

Figure A-28: Post-Test Impact Target View

Figure A-29: Pre-Test Front Underbody View

Figure A-30: Post-Test Front Underbody View

Figure A-31: Pre-Test Mid Underbody View

Figure A-32: Post-Test Mid Underbody View

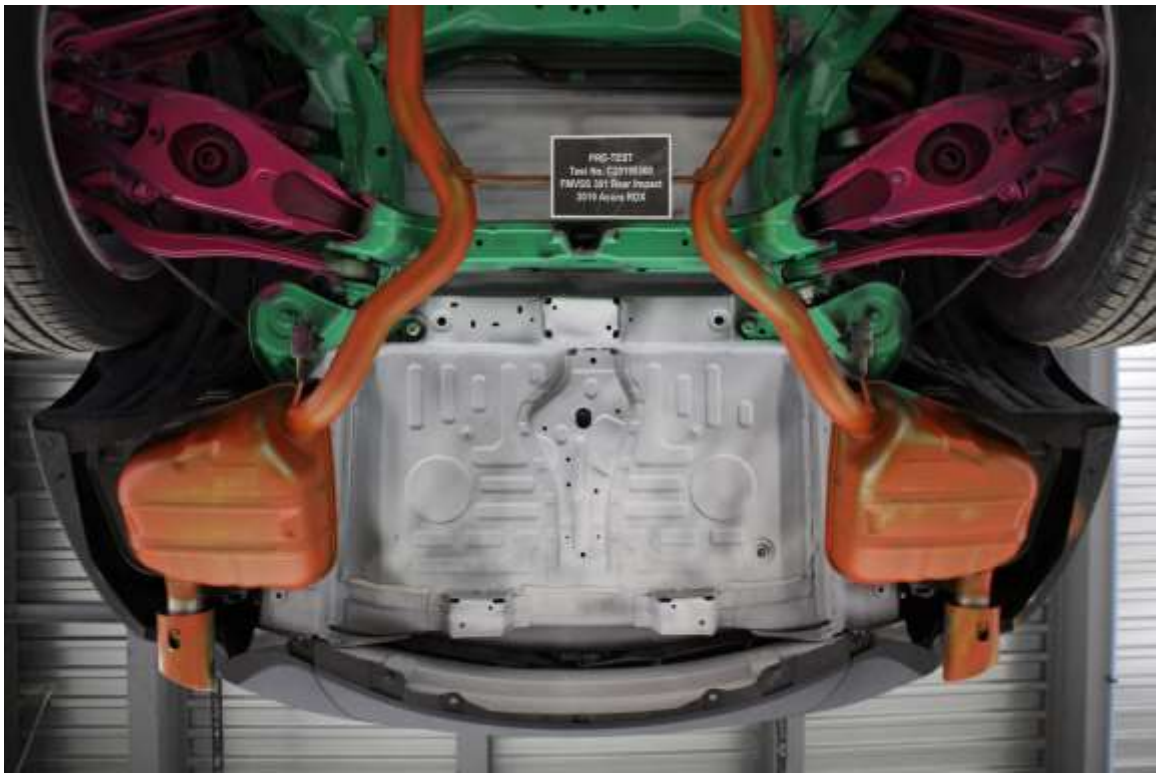


Figure A-33: Pre-Test Rear Underbody View

Figure A-34: Post-Test Rear Underbody View

Figure A-35: Pre-Test Fuel Filler Cap View

Figure A-36: Post-Test Fuel Filler Cap View

Figure A-37: Impact View

Figure A-38: Speed Trap View*

Figure A-39: Rollover 90° View

Figure A-40: Rollover 180° View

Figure A-41: Rollover 270° View

Figure A-42: Rollover 360° View