

**REPORT NUMBER: 301-MGA-2010-001**

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

**KIA MOTORS CORPORATION  
2010 KIA SOUL  
NHTSA NUMBER: CA0502**

**PREPARED BY:  
MGA RESEARCH CORPORATION  
5000 WARREN ROAD  
BURLINGTON, WI 53105**



**Test Date: July 8, 2010**

**Final Report Date: July 23, 2010**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
1200 NEW JERSEY AVENUE, S.E., NVS-220  
WASHINGTON, D.C. 20590**



### Technical Report Documentation Page

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16. Abstract A rear impact was conducted on a 2010 Kia Soul at MGA Research Corporation on July 8, 2010. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.3 km/h. The ambient temperature at the time of impact was 28 degrees Celsius.					
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## SECTION 1

### PURPOSE AND SUMMARY OF TEST

#### PURPOSE

This rear impact test is sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-C-00030. The purpose of this test is to reduce deaths and injuries occurring from fires that result from fuel spillage during and after motor vehicle crashes and resulting from ingestion of fuels during siphoning.

#### SUMMARY

A 2010 Kia Soul was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.3 km/h. The test was performed at MGA Research Corporation on July 8, 2010. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and four high-speed cameras were used to document the impact event.

- Left Rear Half            1000 fps
- Right Rear Half        1000 fps
- Overhead Overall       1000 fps
- Left Overall            1000 fps
- Real Time Pan           30 fps

Two ballast Part 572E, 50<sup>th</sup> percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

**SECTION 2  
DATA SHEETS**

**DATA SHEET NO. 1  
TEST VEHICLE SPECIFICATIONS**

Test Vehicle: 2010 Kia Soul NHTSA No.: CA0502  
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 7/8/2010

**TEST VEHICLE INFORMATION**

Manufacturer	KIA Motors Corporation
Model	Soul
Body Style	Passenger Car
Major Options	None
NHTSA No.	CA0502
VIN	KNDJT2A29A7085226
Color	Bright Silver
Delivery Date	6/17/2010
Odometer Reading (mile)	30
Dealer	Northtown Kia
Transmission	Manual
Final Drive	Front Wheel Drive
Number of Cylinders	4
Engine Displacement (L)	2.0
Engine Placement	Lateral

**DATA FROM VEHICLE'S CERTIFICATION LABEL**

Manufactured By	KIA Motor Corporation
Date of Manufacture	07/09

GVWR (kg)	1740
GAWR Front (kg)	980
GAWR Rear (kg)	970

**VEHICLE CAPACITY DATA**

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				385
Number of Occupants x 68 kg.				340
Cargo Wt. (RCLW) (kg)				45



**DATA SHEET NO. 2**

**PRE-TEST DATA**

Test Vehicle: 2010 Kia Soul

NHTSA No.: CA0502

Test Program: FMVSS 301 Fuel System Integrity

Test Date: 7/8/2010

**WEIGHT OF TEST VEHICLE**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	383.7	255.8		430.9	305.7	
Right	kg	397.4	248.6		440.0	295.3	
Ratio	%	60.8	39.2		59.2	40.8	
Totals	kg	781.1	504.4	1285.5	870.9	601.0	1471.9

**CALCULATION OF TARGET TEST WEIGHT (TTW)**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1285.5
Rated Cargo/Luggage Weight (RCLW)	kg	45
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTW)	kg	1478.5

Vehicle Wheelbase	2552 mm
Vehicle Width	1821 mm
Weight of Ballast Secured in Rear Seat	34.0 kg
Method of Securing Ballast	Ratchet Straps
Vehicle Components Removed for Weight Reduction	None

**VEHICLE ATTITUDES**

	Units	LF	RF	LR	RR
As Delivered	mm	689	687	702	701
As Tested	mm	673	672	683	682





**DATA SHEET NO. 4**

**POST-TEST DATA**

Test Vehicle: 2010 Kia Soul

NHTSA No.: CA0502

Test Program: FMVSS 301 Fuel System Integrity

Test Date: 7/8/2010

**IMPACT VELOCITY**

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.3
Actual Impact Velocity (Trap No. 2)	79.3
Average Impact Speed	79.3

Temperature at Time of Impact (°C)	28
Test Time	11:02 am

**WELDING ROD IMPACT POINT**

	Units: mm
Vertical distance from target center (+ above target / - below target)	3 up
Horizontal distance from target center (+ to the right / - to the left)	9 right





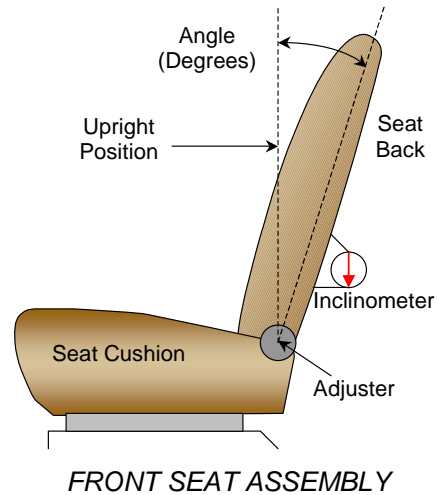
**FORM 1**  
**TEST VEHICLE INFORMATION**

Test Vehicle: 2010 Kia Soul  
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: CA0502  
Test Date: 7/8/2010

**NORMAL DESIGN RIDING POSITION**

With the seat in the mid fore-aft seat track position the angle of the driver's seat back when it is in the nominal riding position is set at a headrest post angle of 4.1 degrees.



Driver Seat Back Angle	5.1°
Passenger Seat Back Angle	4.8°

**SEAT FORE/AFT POSITIONING**

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	240 mm	120 mm
Passenger Seat	220 mm	110 mm

**D-RING ADJUSTMENT**

The driver and passenger D-rings were full up.

**STEERING COLUMN ADJUSTMENT**

The steering column was placed in the mid position.

**APPENDIX A**  
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A-1.

P205/55R16


**MANUFACTURED IN KOREA BY KIA MOTORS CORPORATION**

07/09	GVWR 3836 LB	PAIN	3D	TRIM WK
GAWR	TIRES	RIMS		COLD TIRE INFL
FRONT 2161 LB	P205/55R16	6.5JX16		33psi SINGLE
REAR 2138 LB	P205/55R16	6.5Jx16		33psi SINGLE

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.A. FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

**V.I.N KNDJT2A29A7085226**  
**MPV**

Vehicle's Certification Label

A-2.



# TIRE AND LOADING INFORMATION PNEUS ET CHARGE-INFORMATION

*SEATING CAPACITY	TOTAL 5	FRONT 2	REAR 3
NOMBRE DE SIÈGES	TOTAL 5	AVANT 2	ARRIÈRE 3

The combined weight of occupants and cargo should never exceed 385kg or 849lbs.  
 Le poids combiné des occupants et du chargement ne doit jamais excéder 385kg ou 849lb.

TIRE/ PNEU	SIZE / DIMENSION	COLD TIRE PRESSURE / PRESSION À FROID
FRONT/ AVANT	P205/55R16	230KPA, 33 PSI
REAR/ ARRIÈRE	P205/55R16	230KPA, 33 PSI
SPARE/ SECOURS	T125/80D15	420kPa, 60psi

**SEE OWNER'S  
MANUAL FOR  
ADDITIONAL  
INFORMATION**

**CONSULTER LE  
GUIDE DU  
PROPRIÉTAIRE  
POUR OBTENIR  
DES  
RENSEIGNEMENTS  
ADDITIONNELS**

**P205/55R16**



Vehicle's Tire Placard

A-3.



Pre-Test Front View of Vehicle



A-4.

Post-Test Front View of Vehicle

A-5.



Pre-Test Left Side View of Vehicle

A-6.



Post-Test Left Side View of Vehicle

A-7.



Pre-Test Left Rear Close-up View of Vehicle

A-8.



Post-Test Left Rear Close-up View of Vehicle

A-9.



Pre-Test Right Side View of Vehicle

A-10.



Post-Test Right Side View of Vehicle



Pre-Test Right Rear Close-up View of Vehicle

A-12.



Post-Test Right Rear Close-up View of Vehicle



Pre-Test Rear View of Vehicle



A-14.

Post-Test Rear View of Vehicle



A-15.

Pre-Test ¾ Frontal View From Right Side of Vehicle



A-16.

Post-Test  $\frac{3}{4}$  Frontal View From Right Side of Vehicle



Pre-Test ¾ Rear View From Right Side of Vehicle



Post-Test  $\frac{3}{4}$  Rear View From Right Side of Vehicle



Pre-Test ¾ Rear View From Left Side of Vehicle



A-20.

Post-Test ¾ Rear View From Left Side of Vehicle

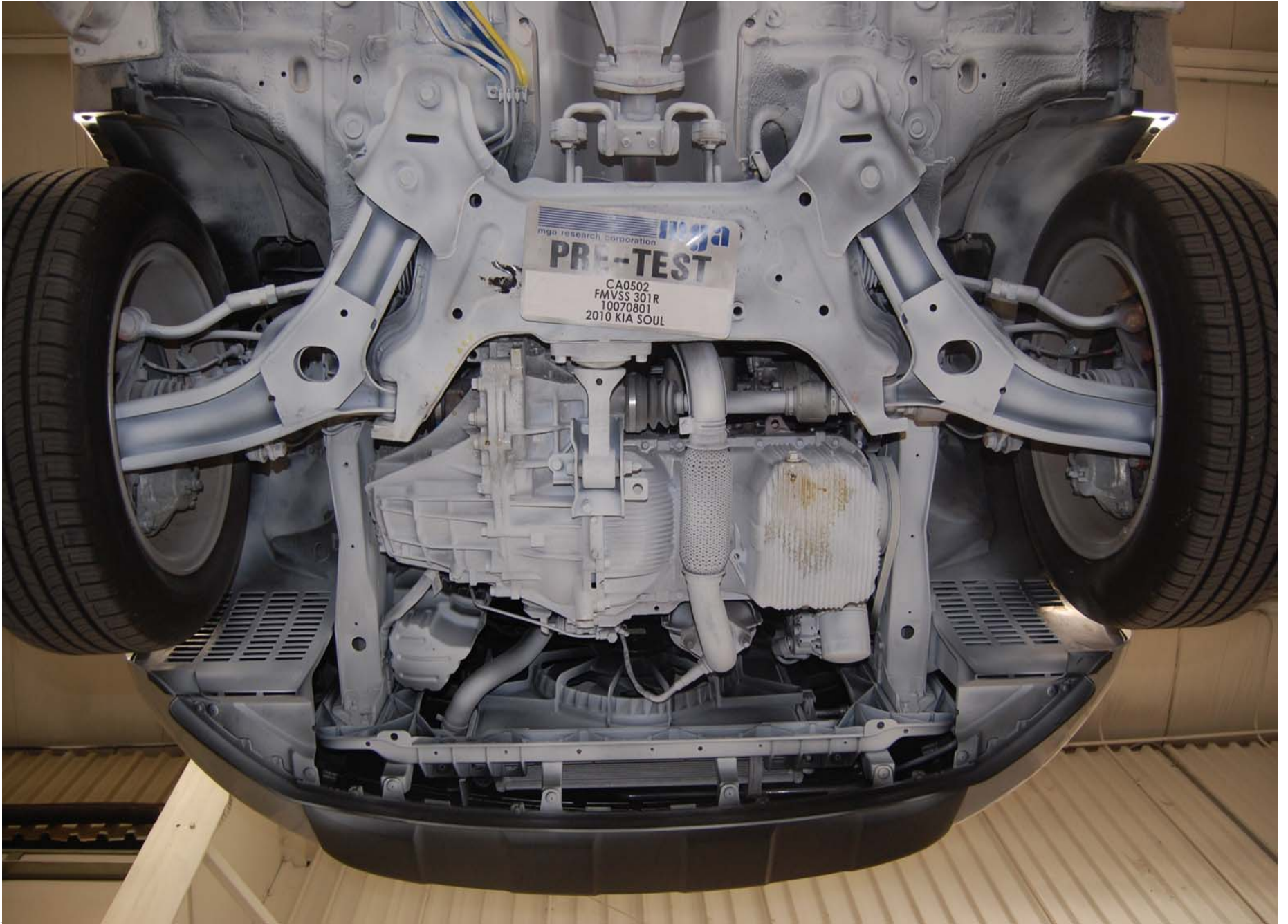
A-21.



Pre-Test Impact Point

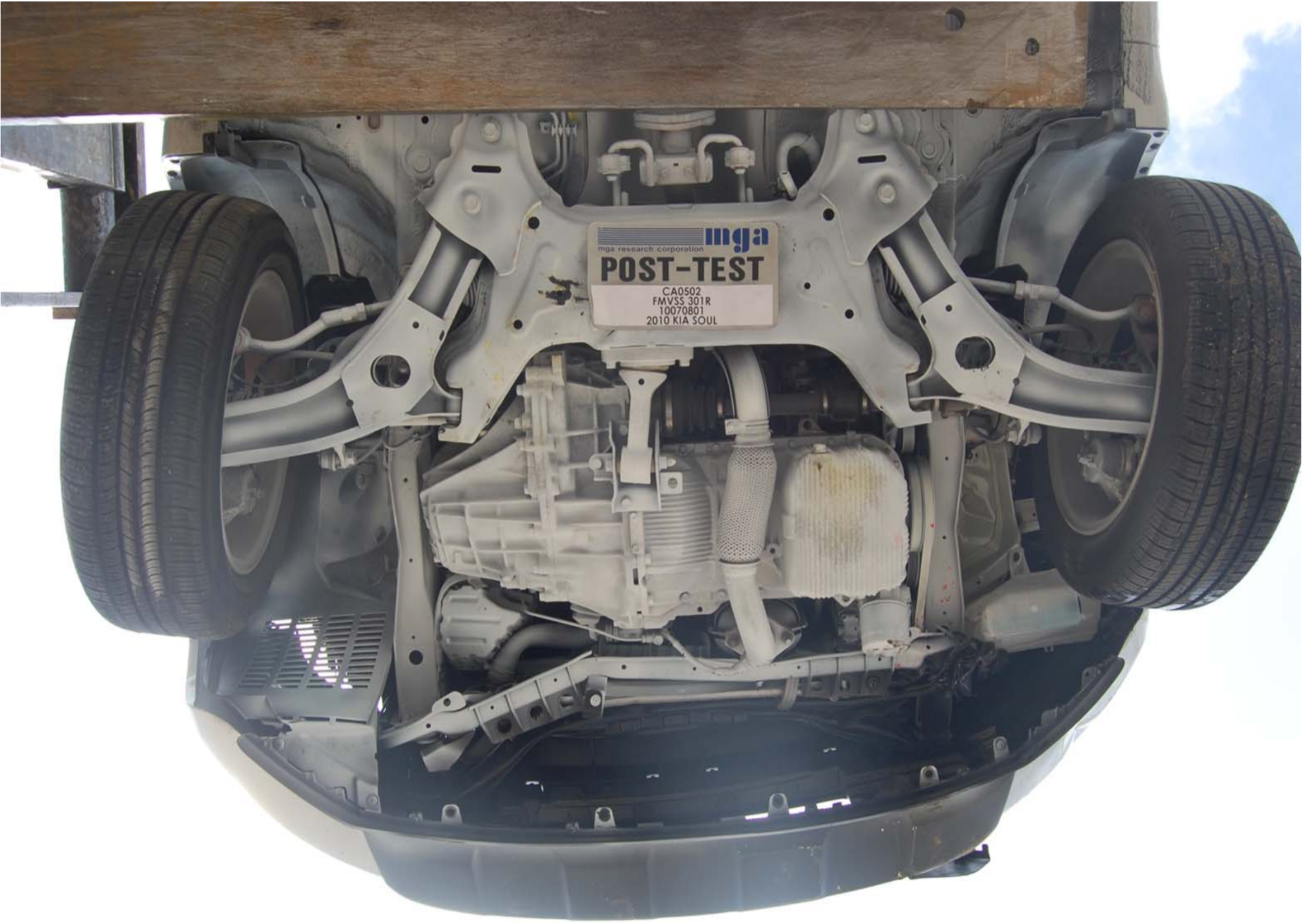


Post-Test Impact Point



A-23.

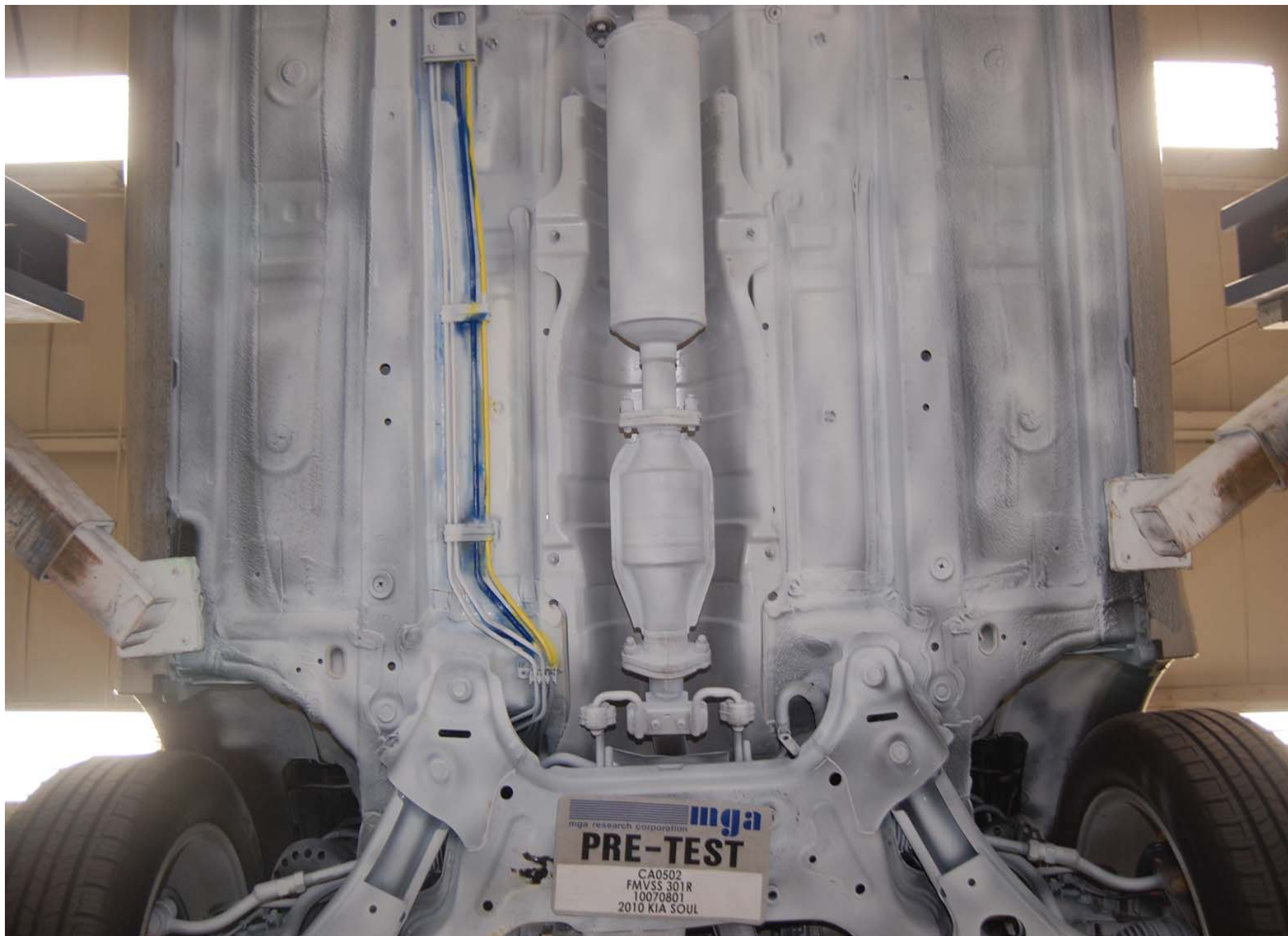
Pre-Test Underbody View 1



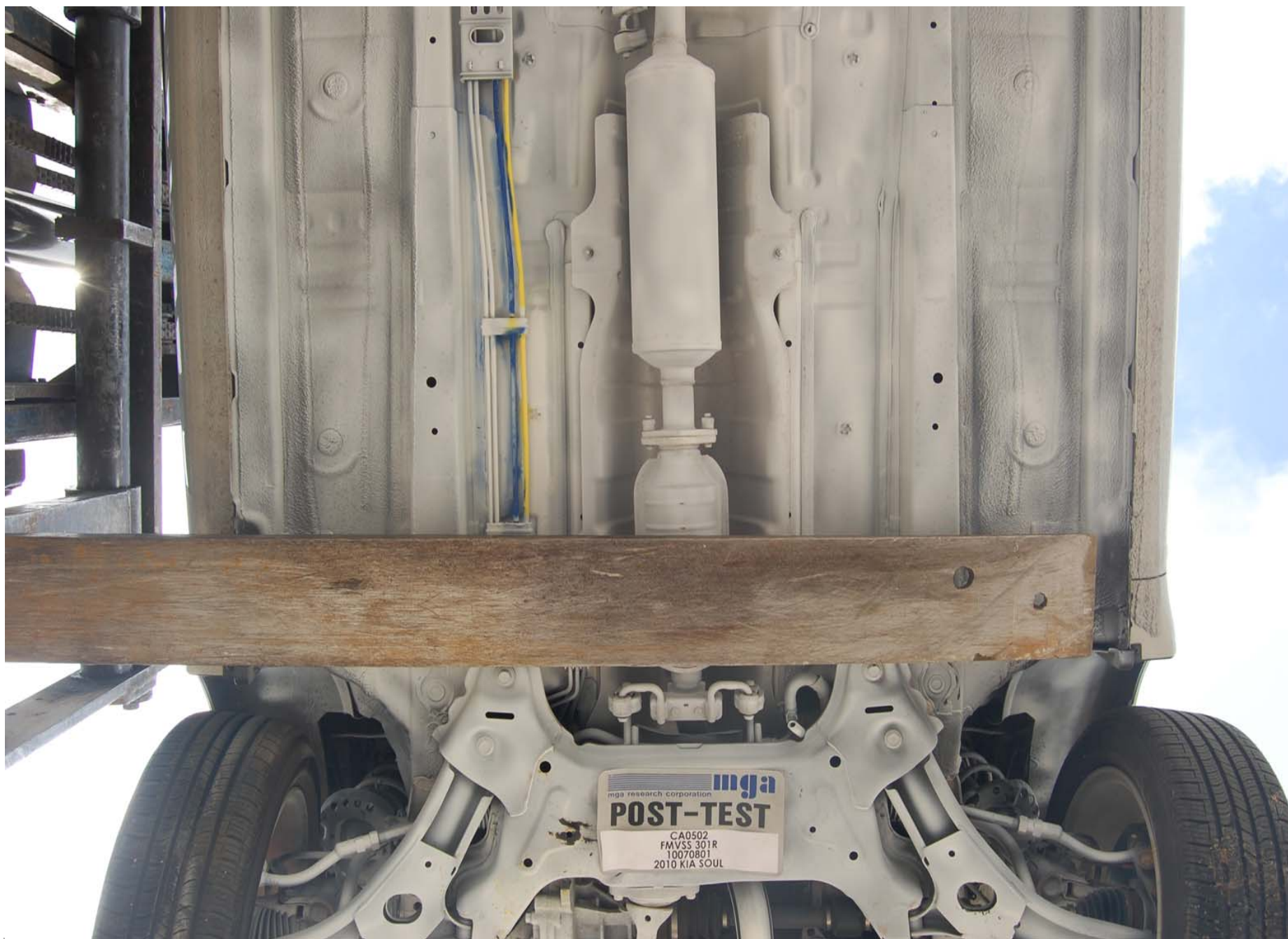
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Post-Test Underbody View 1

A-25.



Pre-Test Underbody View 2



Post-Test Underbody View 2

A-27.



Pre-Test Underbody View 3

A-28.



Post-Test Underbody View 3

A-29.



Pre-Test Front View of MDB

A-30.



Post-Test Front View of MDB

A-31.



Pre-Test  $\frac{3}{4}$  Right Side View of MDB

A-32.



Post-Test ¾ Right Side View of MDB

A-33.



Pre-Test ¾ Left Side View of MDB

A-34.



Post-Test  $\frac{3}{4}$  Left Side View of MDB



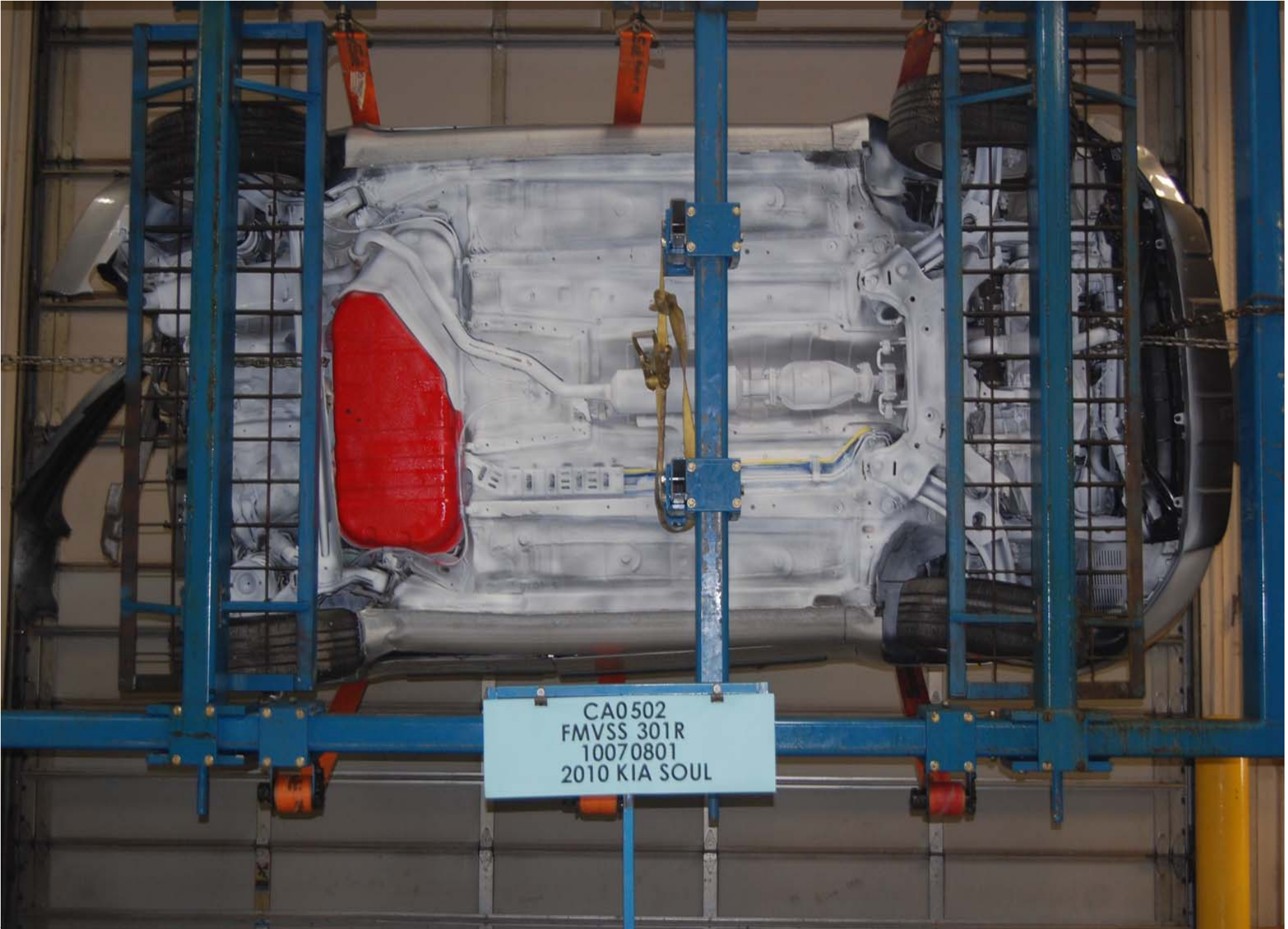
A-35.

Static Rollover at 90 Degrees



A-36.

Static Rollover at 180 Degrees



A-37.

Static Rollover at 270 Degrees

A-38.



Static Rollover at 360 Degrees