

REPORT NUMBER: 301-MGA-2011-011

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

**NISSAN MOTOR COMPANY LTD
2011 NISSAN QUEST
NHTSA NUMBER: CB5203**

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



Test Date: August 19, 2011

Final Report Date: September 8, 2011

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**

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COTR, Rear Impact

9/8/2011
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Technical Report Documentation Page

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15. Supplementary Notes			
16. Abstract A rear impact was conducted on a 2011 Nissan Quest at MGA Research Corporation on August 19, 2011. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.8 km/h. The ambient temperature at the time of impact was 29 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 2011 Nissan Quest was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.8 km/h. The test was performed at MGA Research Corporation on August 19, 2011. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and five 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
- Right Overall 1000 fps
- Real Time Pan 30 fps

Two ballast Part 572E, 50th 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: 2011 Nissan Quest NHTSA No.: CB5203
Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

TEST VEHICLE INFORMATION

Manufacturer	Nissan Motor Company, LTD
Model	Quest
Body Style	Multi Passenger Vehicle
Major Options	None
NHTSA No.	CB5203
VIN	JN8AE2KP2B9004968
Color	Brilliant Silver
Delivery Date	7/26/2011
Odometer Reading (mile)	31
Dealer	Rosen Nissan
Transmission	Automatic
Final Drive	Front Wheel Drive
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Lateral

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Nissan Motor Company LTD
Date of Manufacture	12/10

GVWR (kg)	2639
GAWR Front (kg)	1262
GAWR Rear (kg)	1389

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Split Bench	
Number of Occupants	2	2	3	7
Capacity Wt. (VCW) (kg)				526
Number of Occupants x 68 kg.				476
Cargo Wt. (RCLW) (kg)				50

DATA SHEET NO. 1 (continued)**TEST VEHICLE SPECIFICATIONS**Test Vehicle: 2011 Nissan QuestNHTSA No.: CB5203Test Program: FMVSS 301 Fuel System IntegrityTest Date: 8/19/2011**DATA FROM VEHICLE'S TIRE PLACARD**

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	308	308
Cold Pressure (kPa)	240	240
Recommended Tire Size	P225/65R16	P225/65R16
Recommended Load Range	99T	99T
Tire Size on Vehicle	P225/65R16	P225/65R16
Tire Manufacturer	Bridgestone	Bridgestone
Location of Placard of Vehicle	Door Post	
Type of Spare Tire (full size/space saver)	Space Saver	

DATA SHEET NO. 2**PRE-TEST DATA**Test Vehicle: 2011 Nissan QuestNHTSA No.: CB5203Test Program: FMVSS 301 Fuel System IntegrityTest Date: 8/19/2011**WEIGHT OF TEST VEHICLE**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	553.8	447.2		582.4	498.1	
Right	kg	552.0	435.5		494.9	604.2	
Ratio	%	55.6	44.4		49.4	50.6	
Totals	kg	1105.8	882.7	1988.5	1077.3	1102.3	2179.6

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1988.5
Rated Cargo/Luggage Weight (RCLW)	kg	50
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTWT)	kg	2186.5

Vehicle Wheelbase	3000 mm
Vehicle Width	1970 mm
Weight of Ballast Secured in Rear Seat	54.4 kg
Method of Securing Ballast	Ratchet Straps
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	765	763	738	745
As Tested	mm	758	753	732	733

DATA SHEET NO. 2 (continued)**PRE-TEST DATA**

Test Vehicle: 2011 Nissan Quest NHTSA No.: CB5203
Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

FUEL SYSTEM DATA

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	75.7
Usable Capacity Figure Furnished by COTR	75.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	69.6 to 71.2
Actual Test Volume (entire fuel system filled)	70.4

Test Fluid Type	Stoddard Solvent
Test Fluid Kinematic Viscosity (centistokes)	2.1 cSt @ 20° C
Test Fluid Color	Purple
Type of Vehicle Fuel Pump	Electrical
Activate Electric Fuel Pump Operation with Ignition Switch ON, but Engine OFF	Yes

Comments (noticeable attributes of fuel system components, capacity, etc.)	None
--	------

DATA SHEET NO. 3
MOVING BARRIER DATA

Test Vehicle: 2011 Nissan Quest NHTSA No.: CB5203
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	401.4	279.6	
Right	kg	368.9	312.5	
Ratio	%	56.0	44.0	
Totals	kg	770.3	592.1	1362.4

Tires (Mfr, line, size)	Kumho
Tire Pressure (kPa)	220
Brake Abort System (Yes/No)?	Yes
Date of Last Calibration	6/24/11

DATA SHEET NO. 4**POST-TEST DATA**

Test Vehicle: 2011 Nissan Quest NHTSA No.: CB5203
Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

IMPACT VELOCITY

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.8
Actual Impact Velocity (Trap No. 2)	79.8
Average Impact Speed	79.8

Temperature at Time of Impact (°C)	29
Test Time	11:41 am

WELDING ROD IMPACT POINT

	Units: mm
Vertical distance from target center (+ above target / - below target)	17 up
Horizontal distance from target center (+ to the right / - to the left)	7 Left

DATA SHEET NO. 5

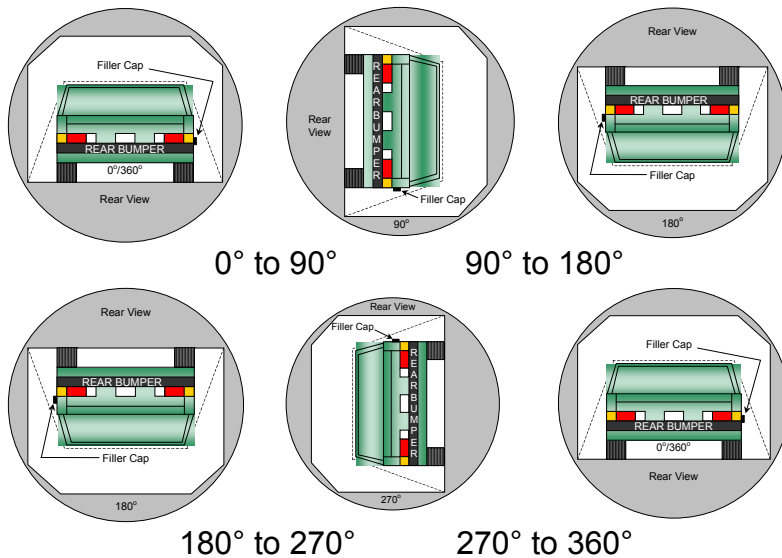
STATIC ROLLOVER TEST DATA

Test Vehicle: 2011 Nissan Quest NHTSA No.: CB5203
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

STODDARD SOLVENT SPILLAGE MEASUREMENT

- A. From impact until vehicle motion ceases: 0 g
 (Maximum Allowable = 28 grams)
- B. For the 5 minute period after motion ceases: 0 g
 (Maximum Allowable = 28 grams)
- C. For the following 25 minutes: 0 g
 (Maximum Allowable = 28 grams/minute)
- D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations: **Not Applicable**

DATA SHEET NO. 5 (continued)
STATIC ROLLOVER TEST DATA

Test Vehicle: 2011 Nissan Quest NHTSA No.: CB5203
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 8/19/2011

STODDARD SOLVENT SPILLAGE MEASUREMENT
Hold Time = 5 minutes at all intervals

0° TO 90° Rotation Time (sec) = 120 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

90° TO 180° Rotation Time (sec) = 116 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

180° TO 270° Rotation Time (sec) = 109 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

270° TO 360° Rotation Time (sec) = 115 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

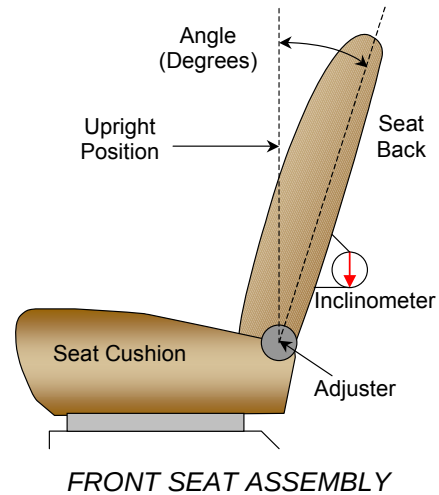
FORM 1
TEST VEHICLE INFORMATION

Test Vehicle: 2011 Nissan Quest
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: CB5203
Test Date: 8/19/2011

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 to the 10th step, forward most as 0.



Driver Seat Back Angle	10 th step, 1 st as 0
Passenger Seat Back Angle	10 th step, 1 st as 0

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	24 detents	10 th detent forward most, 1 st as 0
Passenger Seat	24 detents	10 th detent forward most, 1 st as 0

D-RING ADJUSTMENT

The driver and passenger D-rings were full up.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.

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MFD BY NISSAN MOTOR CO., LTD.

DATE: 12/10

GVWR/PNBV: 5818 LB

GAWR/PNBE FR: 2782 LB

WITH P225/65R16 TIRES

16X6 1/2JJ RIMS. AT 35PSI

COLD SINGLE

GAWR/PNBE RR: 3062 LB

WITH P225/65R16 TIRES

16X6 1/2JJ RIMS. AT 35PSI

COLD SINGLE

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

VIN: JN8AE2KP2B9004968

TYPE: MPV

COLOR	TRIM	TRANS
K23	K	REOF09B
AXLE	ENGINE	
GE48	VQ35 (DE)	3498CC

JN8AE2KP2B9004968

Vehicle's Certification Label



TIRE AND LOADING INFORMATION
RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

SEATING CAPACITY	TOTAL	7	FRONT AVANT	2
NOMBRE DE PLACES	TOTAL		REAR ARRIÈRE	5

The combined weight of occupants
 and cargo should never exceed **526 kg** or **1160 lbs.**

Le poids total des occupants et du chargement ne doit
 jamais dépasser **526 kg** ou **1160 lb.**

TIRE PNEU	SIZE DIMENSIONS	COLD TIRE PRESSURE PRESSION DES PNEUS À FROID
FRONT AVANT	P225/65R16 99T	240kPa , 35PSI
REAR ARRIÈRE	P225/65R16 99T	240kPa , 35PSI
SPARE DE SECOURS	T135/80D16 101M	420kPa , 60PSI

SEE OWNER'S
 MANUAL FOR
 ADDITIONAL
 INFORMATION

VOIR LE MANUEL
 DE L'USAGER
 POUR PLUS DE
 RENSEIGNEMENTS

4 1JA1A



Pre-Test Front View of Vehicle



Post-Test Front View of Vehicle



Pre-Test Left Side View of Vehicle



Post-Test Left Side View of Vehicle



Pre-Test Left Rear Close-up View of Vehicle



Post-Test Left Rear Close-up View of Vehicle



Pre-Test Right Side View of Vehicle



Post-Test Right Side View of Vehicle

A-11.



Pre-Test Right Rear Close-up View of Vehicle



Post-Test Right Rear Close-up View of Vehicle



Pre-Test Rear View of Vehicle

A-14.



Post-Test Rear View of Vehicle



Pre-Test ¾ Frontal View From Right Side of Vehicle



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



Pre-Test ¾ Rear View From Right Side of Vehicle



Post-Test ¾ Rear View From Right Side of Vehicle



Pre-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle



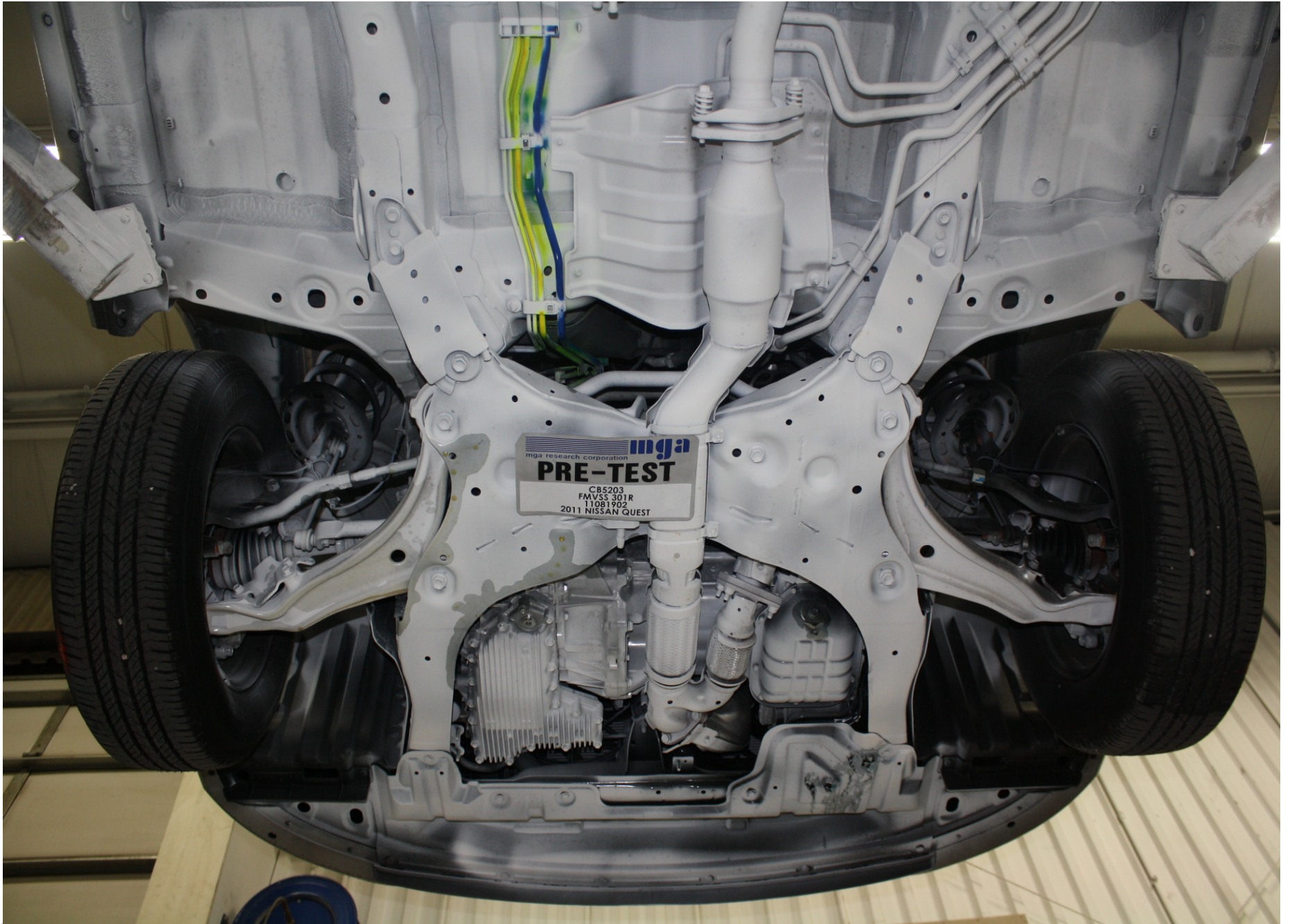
Post-Test ¾ Rear View From Left Side of Vehicle



Pre-Test Impact Point



Post-Test Impact Point



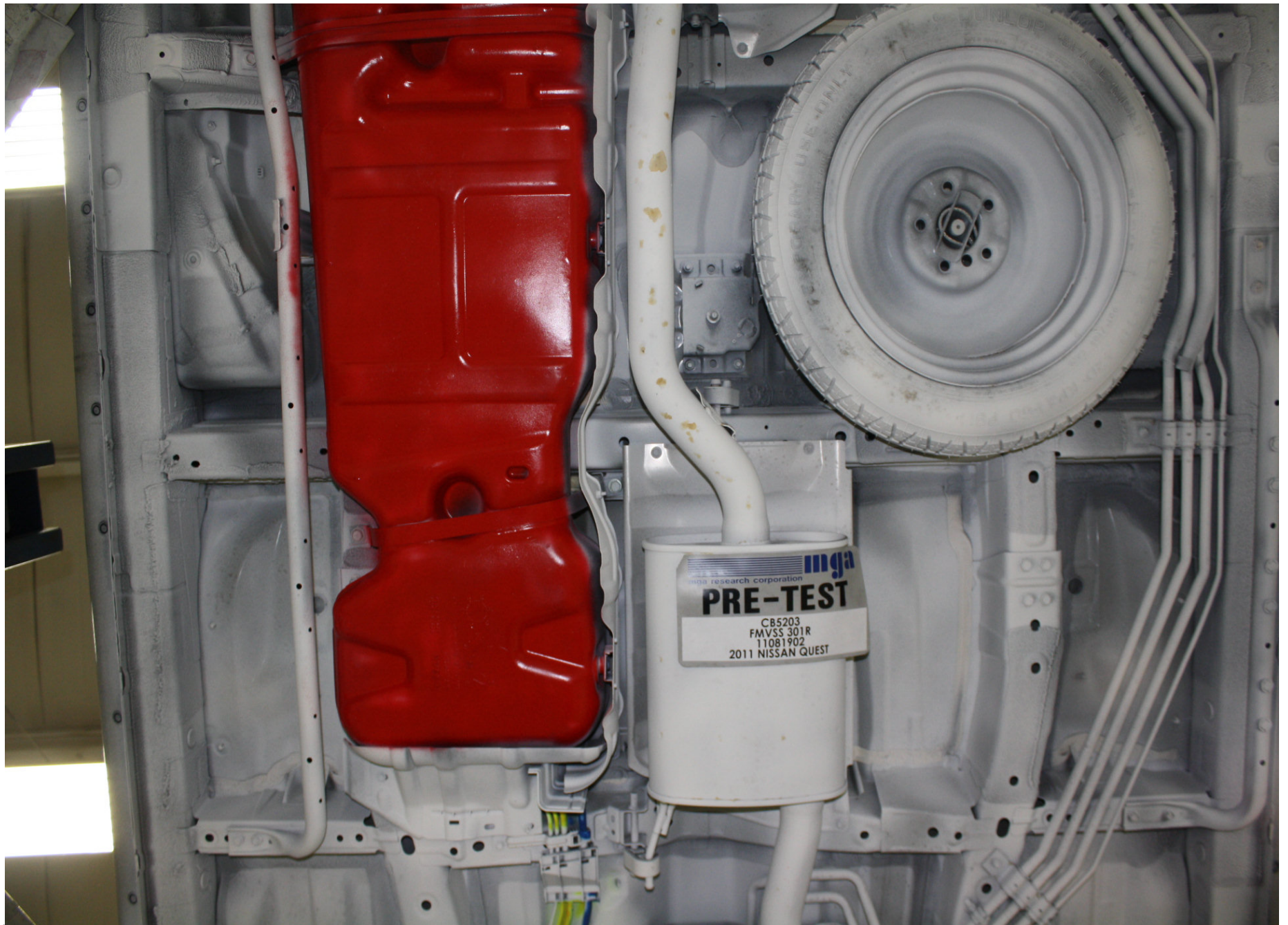
A-23.

Pre-Test Underbody View 1

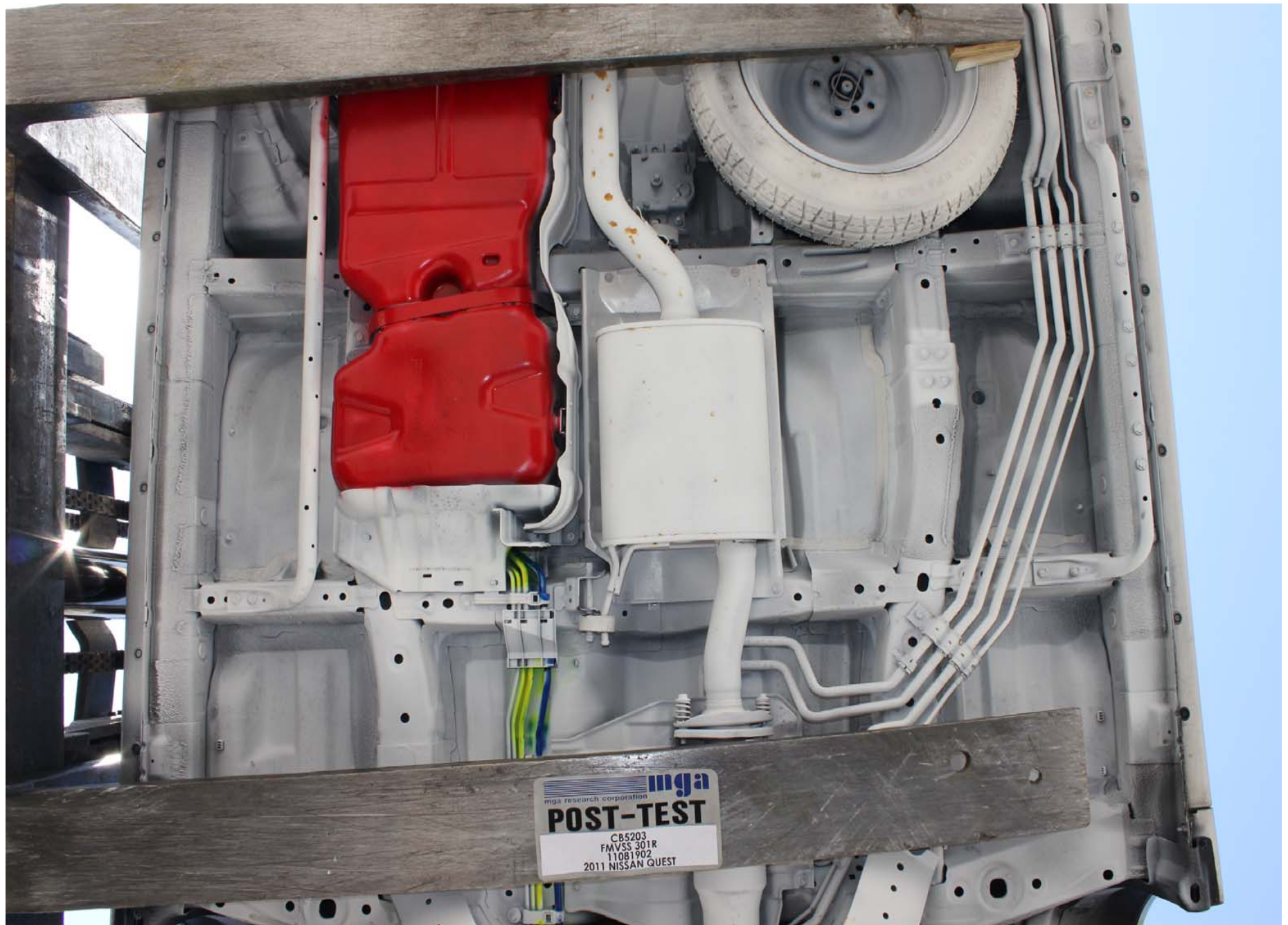


A-24.

Post-Test Underbody View 1



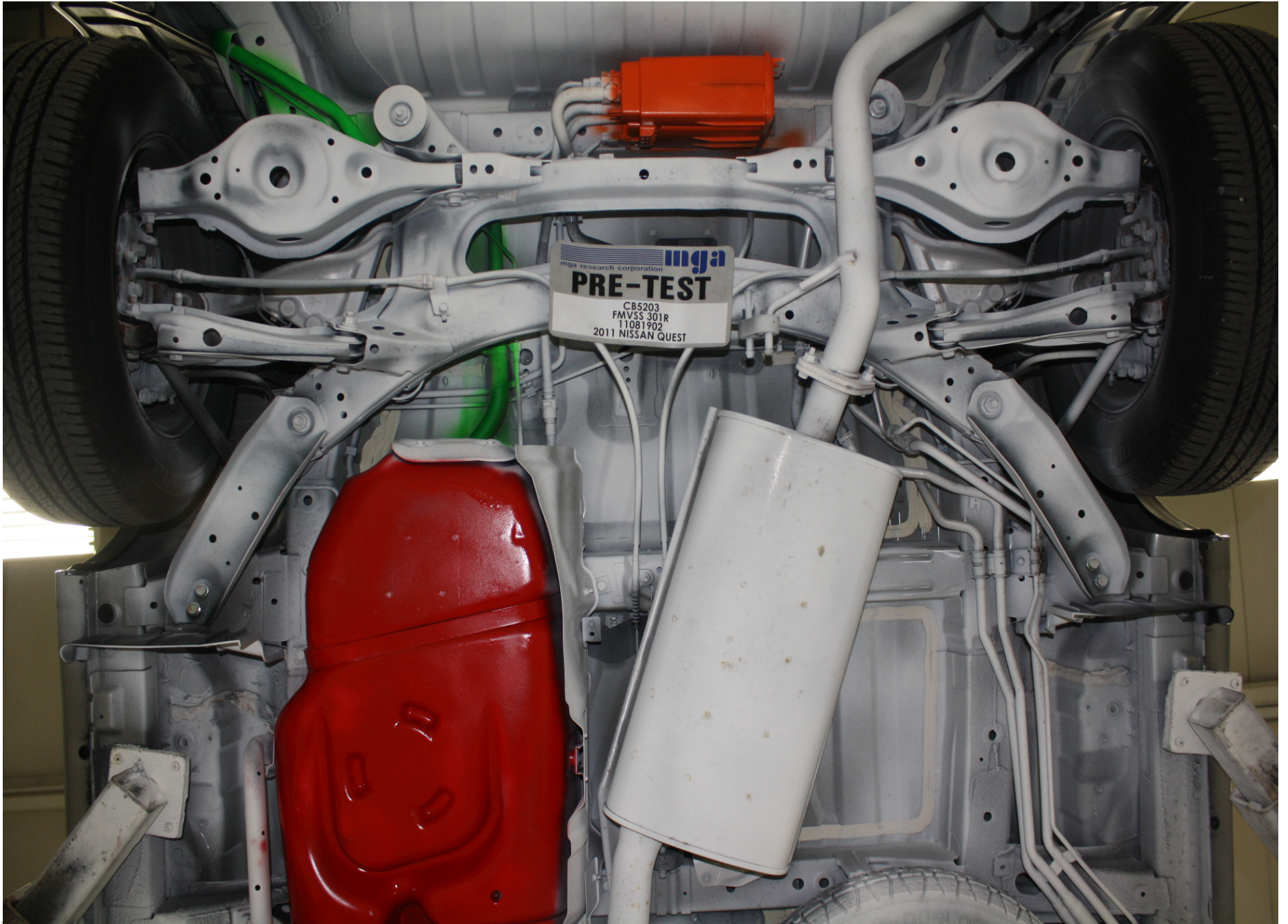
Pre-Test Underbody View 2



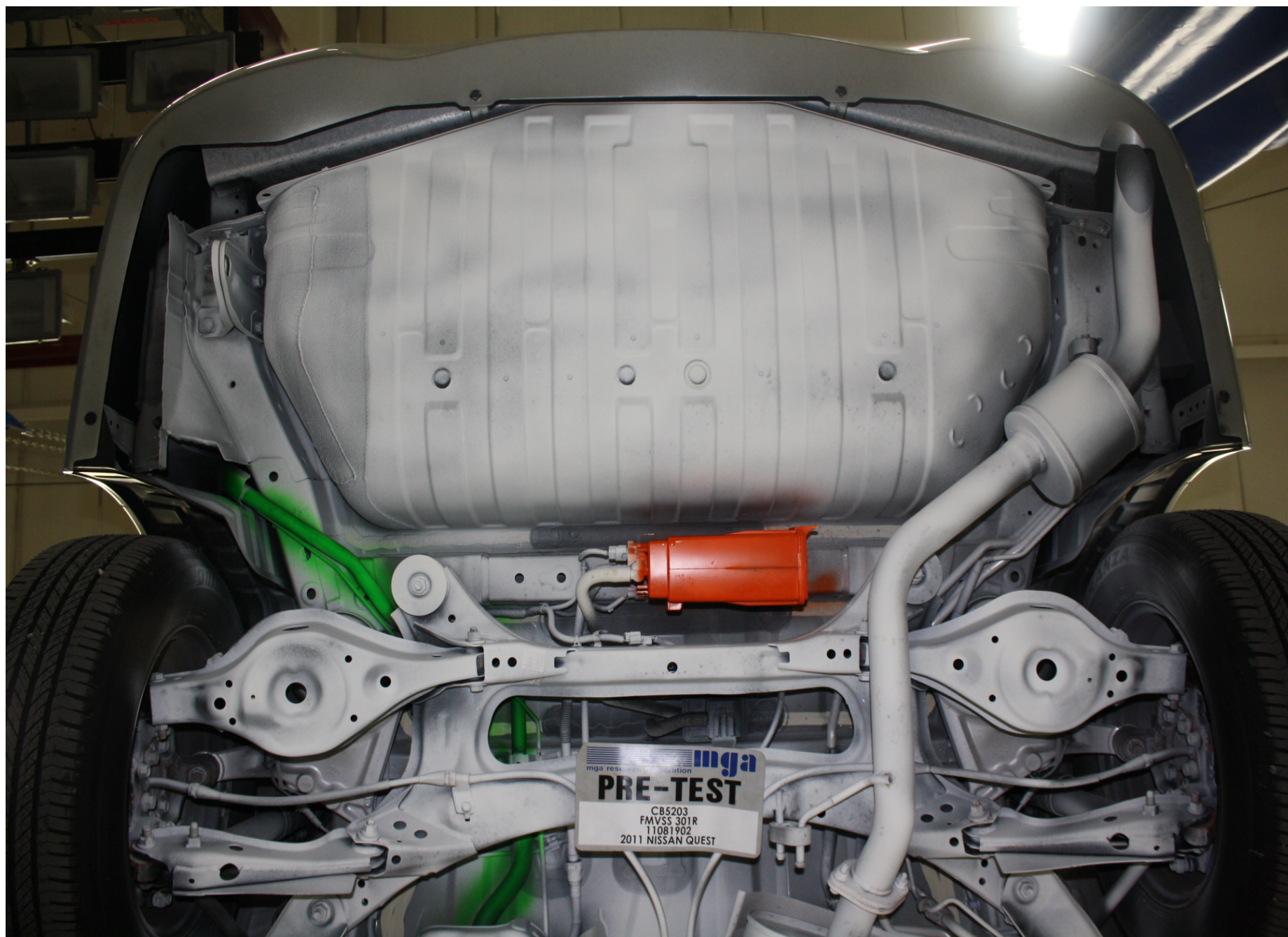
Post-Test Underbody View 2



Pre-Test Underbody View 3



Post-Test Underbody View 3



Pre-Test Underbody View 4



Post-Test Underbody View 4



Pre-Test Front View of MDB



Post-Test Front View of MDB



Pre-Test 3/4 Right Side View of MDB



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



Pre-Test 3/4 Left Side View of MDB



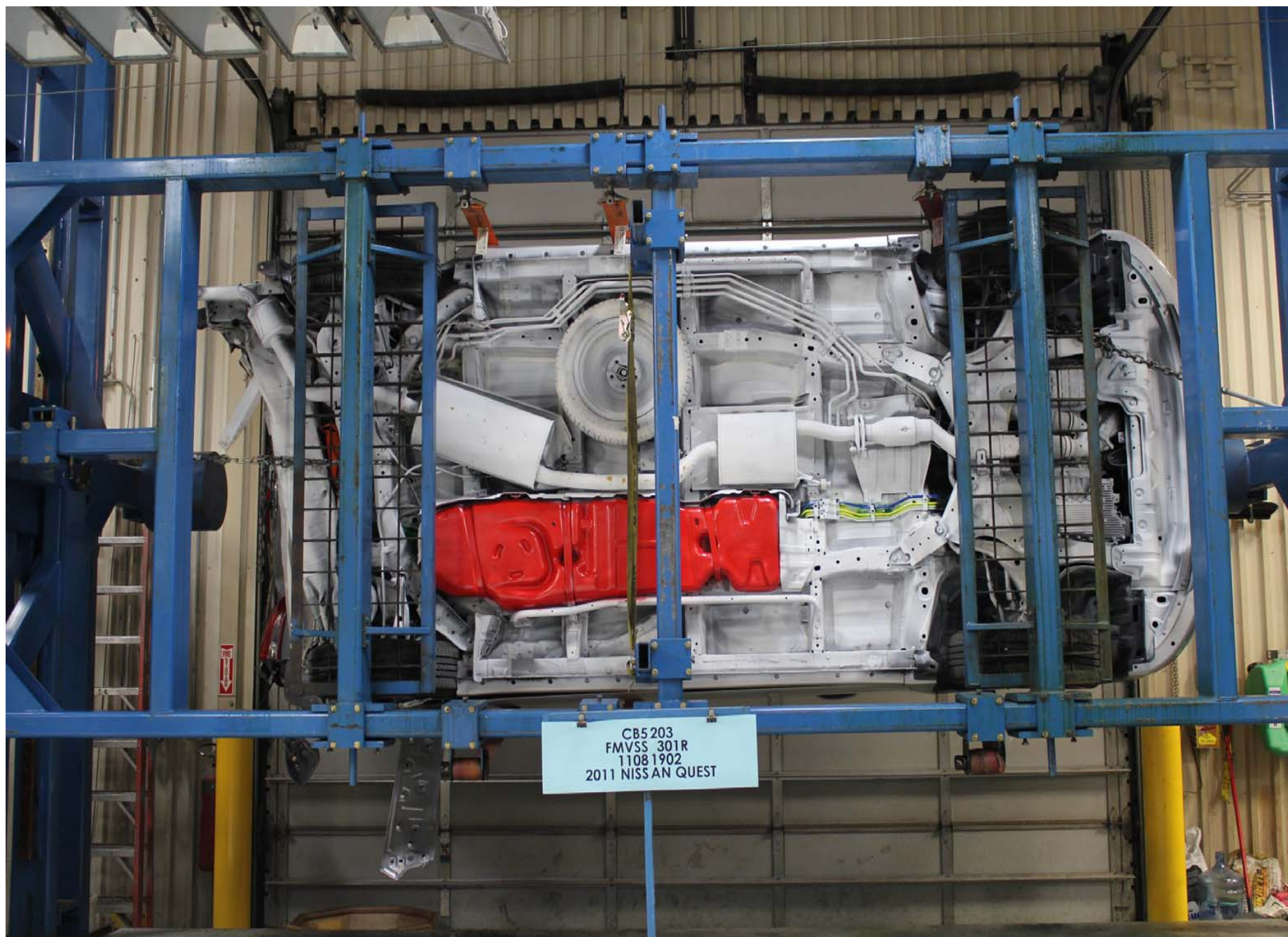
Post-Test $\frac{3}{4}$ Left Side View of MDB



Pre-Test Top View of MDB



Post-Test Top View of MDB



Static Rollover at 90 Degrees



Static Rollover at 180 Degrees



Static Rollover at 270 Degrees



Static Rollover at 360 Degrees