

REPORT NUMBER: 301-MGA-2010-005

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

**NISSAN MOTOR COMPANY LTD
2010 NISSAN CUBE
NHTSA NUMBER: CA5201**

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



Test Date: July 9, 2010

Final Report Date: August 11, 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**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-C-00030.

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COTR, Rear Impact

8/11/2010
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Technical Report Documentation Page

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16. Abstract A rear impact was conducted on a 2010 Nissan Cube at MGA Research Corporation on July 9, 2010. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.0 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 Nissan Cube was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.0 km/h. The test was performed at MGA Research Corporation on July 9, 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
- 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 Stoddard Solvent leakage during the static rollover, see page 11 at the end of this report for further details.

SECTION 2
DATA SHEETS

DATA SHEET NO. 1
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2010 Nissan Cube NHTSA No.: CA5201
Test Program: FMVSS 301 Fuel System Integrity Test Date: 7/9/2010

TEST VEHICLE INFORMATION

Manufacturer	Nissan Motor Company LTD
Model	Cube
Body Style	Passenger Car
Major Options	None
NHTSA No.	CA5201
VIN	JN8AZ2KR1AT150625
Color	Chrome Silver
Delivery Date	6/17/2010
Odometer Reading (mile)	22
Dealer	West-Herr Nissan
Transmission	Automatic
Final Drive	Front Wheel Drive
Number of Cylinders	4
Engine Displacement (L)	1.8
Engine Placement	Lateral

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Nissan Motor Company LTD
Date of Manufacture	10/09

GVWR (kg)	1750
GAWR Front (kg)	900
GAWR Rear (kg)	860

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				390
Number of Occupants x 68 kg.				340
Cargo Wt. (RCLW) (kg)				50

DATA SHEET NO. 1 (continued)
TEST VEHICLE SPECIFICATIONS

Test Vehicle:	<u>2010 Nissan Cube</u>	NHTSA No.:	<u>CA5201</u>
Test Program:	<u>FMVSS 301 Fuel System Integrity</u>	Test Date:	<u>7/9/2010</u>

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	357	357
Cold Pressure (kPa)	230	230
Recommended Tire Size	P195/55R16	P195/55R16
Recommended Load Range	86V	86V
Tire Size on Vehicle	P195/55R16	P195/55R16
Tire Manufacturer	Toyo	Toyo
Location of Placard of Vehicle	Lower B-Pillar	
Type of Spare Tire (full size/space saver)	Space Saver	

DATA SHEET NO. 2**PRE-TEST DATA**Test Vehicle: 2010 Nissan CubeNHTSA No.: CA5201Test Program: FMVSS 301 Fuel System IntegrityTest Date: 7/9/2010**WEIGHT OF TEST VEHICLE**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	390.5	270.3		448.2	336.1	
Right	kg	384.7	264.9		414.1	303.0	
Ratio	%	59.1	40.8		57.4	42.6	
Totals	kg	775.2	535.2	1310.4	862.3	639.1	1501.4

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1310.4
Rated Cargo/Luggage Weight (RCLW)	Kg	50
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTWT)	kg	1508.4

Vehicle Wheelbase	2530 mm
Vehicle Width	1695 mm
Weight of Ballast Secured in Rear Seat	47.6 kg
Method of Securing Ballast	Ratchet Straps
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	677	678	673	680
As Tested	mm	660	668	651	654

DATA SHEET NO. 2 (continued)**PRE-TEST DATA**Test Vehicle: 2010 Nissan CubeNHTSA No.: CA5201Test Program: FMVSS 301 Fuel System IntegrityTest Date: 7/9/2010**FUEL SYSTEM DATA**

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	50.0
Usable Capacity Figure Furnished by COTR	50.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	46.0 to 47.0
Actual Test Volume (entire fuel system filled)	46.6

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
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DATA SHEET NO. 3
MOVING BARRIER DATA

Test Vehicle: 2010 Nissan Cube NHTSA No.: CA5201
Test Program: FMVSS 301 Fuel System Integrity Test Date: 7/9/2010

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	374.2	308.8	
Right	kg	389.5	291.2	
Ratio	%	56.0	44.0	
Totals	kg	763.7	600.0	1363.7

Tires (Mfr, line, size)	Yokohama
Tire Pressure (kPa)	207
Brake Abort System (Yes/No)?	Yes
Date of Last Calibration	8/6/2008

DATA SHEET NO. 4**POST-TEST DATA**Test Vehicle: 2010 Nissan CubeNHTSA No.: CA5201Test Program: FMVSS 301 Fuel System IntegrityTest Date: 7/9/2010**IMPACT VELOCITY**

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.0
Actual Impact Velocity (Trap No. 2)	79.0
Average Impact Speed	79.0

Temperature at Time of Impact (°C)	28
Test Time	9:11 am

WELDING ROD IMPACT POINT

	Units: mm
Vertical distance from target center (+ above target / - below target)	4 down
Horizontal distance from target center (+ to the right / - to the left)	8 left

DATA SHEET NO. 5

STATIC ROLLOVER TEST DATA

Test Vehicle: 2010 Nissan Cube

NHTSA No.: CA5201

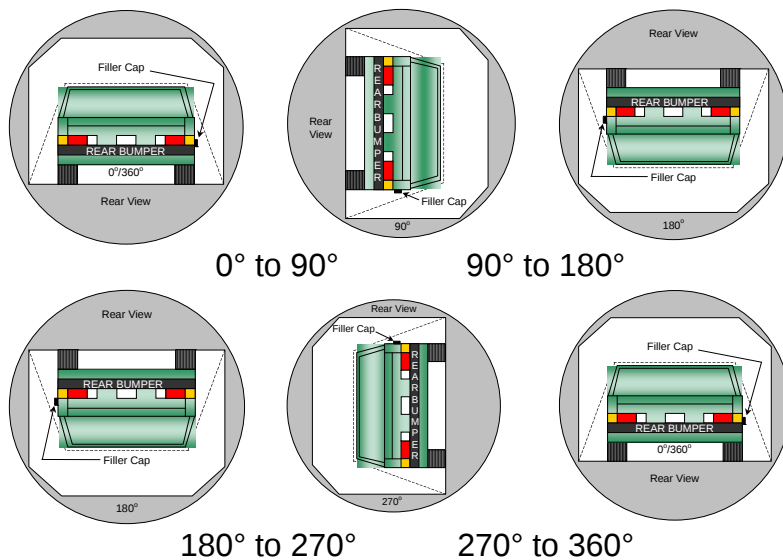
Test Program: FMVSS 301 Fuel System Integrity

Test Date: 7/9/2010

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: 2010 Nissan Cube

NHTSA No.: CA5201

Test Program: FMVSS 301 Fuel System Integrity

Test Date: 7/9/2010

STODDARD SOLVENT SPILLAGE MEASUREMENT

Hold Time = 5 minutes at all intervals

0° TO 90° Rotation Time (sec) = 117 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	358	
Sixth minute from onset of rotation	68	
Seventh minute from onset of rotation	78	
Eight minute if required	68	

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

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

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

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

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

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

** Due to Stoddard Solvent leakage the static rollover was not completed

FORM 1
TEST VEHICLE INFORMATION

Test Vehicle: 2010 Nissan Cube
Test Program: FMVSS 301 Fuel System Integrity

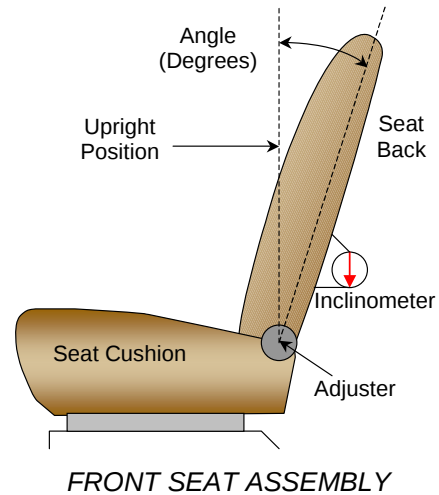
NHTSA No.: CA5201
Test Date: 7/9/2010

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:

Driver: Per Form 1 Appendix 3A, 1035 mm

Passenger: Per Form 1 Appendix 3A, 1065 mm



Driver Seat Back Angle	-3.9° at headrest post = 1035 mm
Passenger Seat Back Angle	-1.8° at headrest post = 1065 mm

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	260 mm	130 mm
Passenger Seat	240 mm	120 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.

LABORATORY NOTICE OF APPARENT TEST FAILURE TO OVSC

FMVSS NO. 301R TEST DATE:	July 9, 2010
LABORATORY:	MGA Research Corporation
CONTRACT NO.:	DTNH22-06-C-00030
DELIVERY ORDER NO.:	Modification 007
LABORATORY PROJECT ENGINEER'S NAME:	Joe Fleck
TEST SPECIMEN DESCRIPTION:	2010 Nissan Cube
VEHICLE NHTSA NO.:	CA5201
VIN:	JN8AZ2KR1AT150625
MFR:	Nissan Motor Co.
APPARENT TEST FAILURE DESCRIPTION:	The test vehicle was subjected to a 301R Fuel System Integrity test. During the 301 Static Rollover portion of the test Stoddard spillage was collected and measured. From the onset of rotation at 0 degrees for the first five minutes a total of 358 grams of Stoddard was collected.
FMVSS REQUIREMENT, PARAGRAPH(S) :	FMVSS 571.301 S5.6: Fuel Spillage in any rollover test, from the onset of rotational motion, shall not exceed a total of 142 g for the first 5 minutes of testing at each successive 90° increment.
NOTIFICATION TO NHTSA (COTR):	Ed Chan
DATE:	7/09/2010
BY:	Joe Fleck
REMARKS:	A photo of the vehicle certification label is attached.



2010 Nissan Cube Certification Placard

APPENDIX A
PHOTOGRAPHS

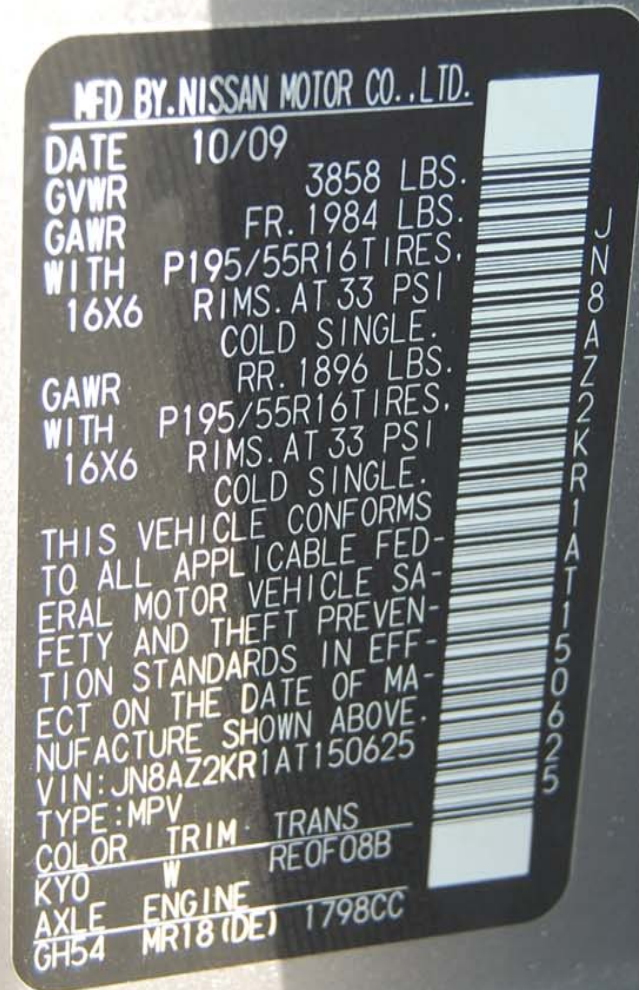
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Vehicle's Certification Label



TIRE AND LOADING INFORMATION
RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

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

The combined weight of occupants and cargo should never exceed **390 kg** or **860 lbs.**
Le poids total des occupants et du chargement ne doit jamais dépasser **390 kg** ou **860 lb.**

TIRE PNEU	SIZE DIMENSIONS	COLD TIRE PRESSURE PRESSION DES PNEUS À FROID
FRONT AVANT	P195/55R16 86V	230kPa , 33PSI
REAR ARRIÈRE	P195/55R16 86V	230kPa , 33PSI
SPARE DE SECOURS	T125/70D15	420kPa , 60PSI

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION.
VOIR LE MANUEL DE L'USAGER POUR PLUS DE RENSEIGNEMENTS

ZB 1FC1B



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

A-7.



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

A-10.



Post-Test Right Side View of Vehicle



Pre-Test Right Rear Close-up View of Vehicle



Post-Test Right Rear Close-up View of Vehicle



Pre-Test Rear View of Vehicle



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



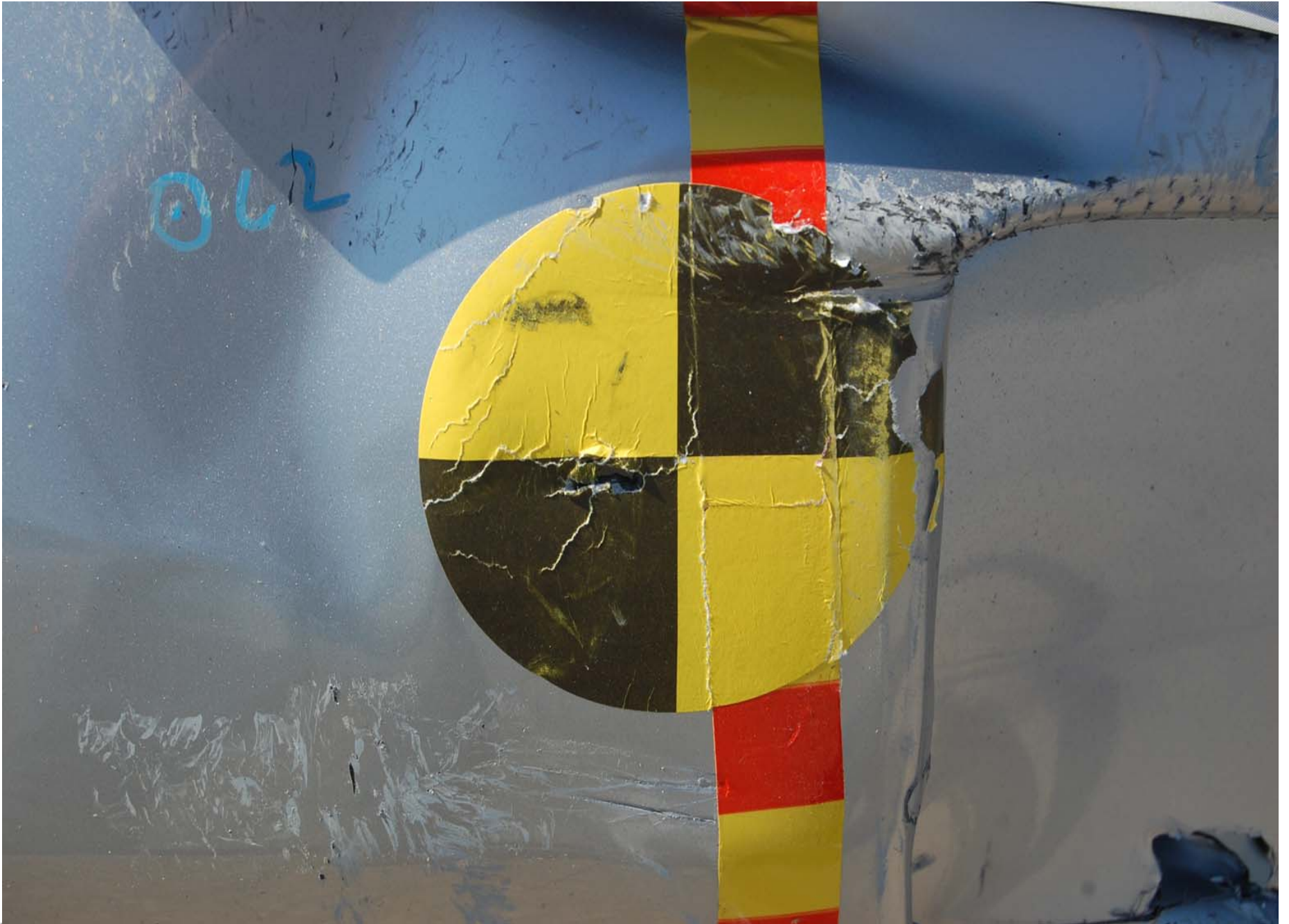
Pre-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle



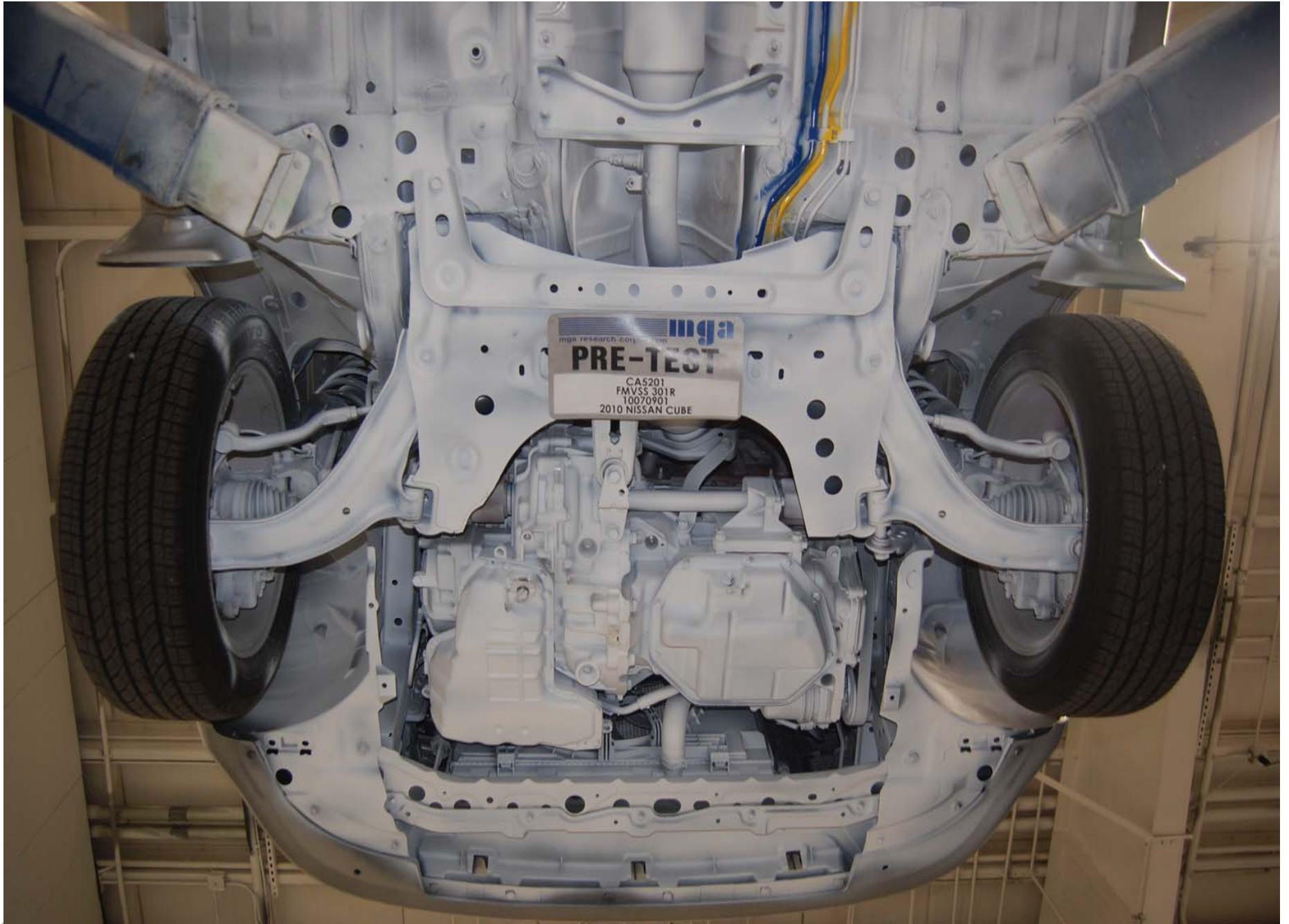
Post-Test ¾ Rear View From Left Side of Vehicle



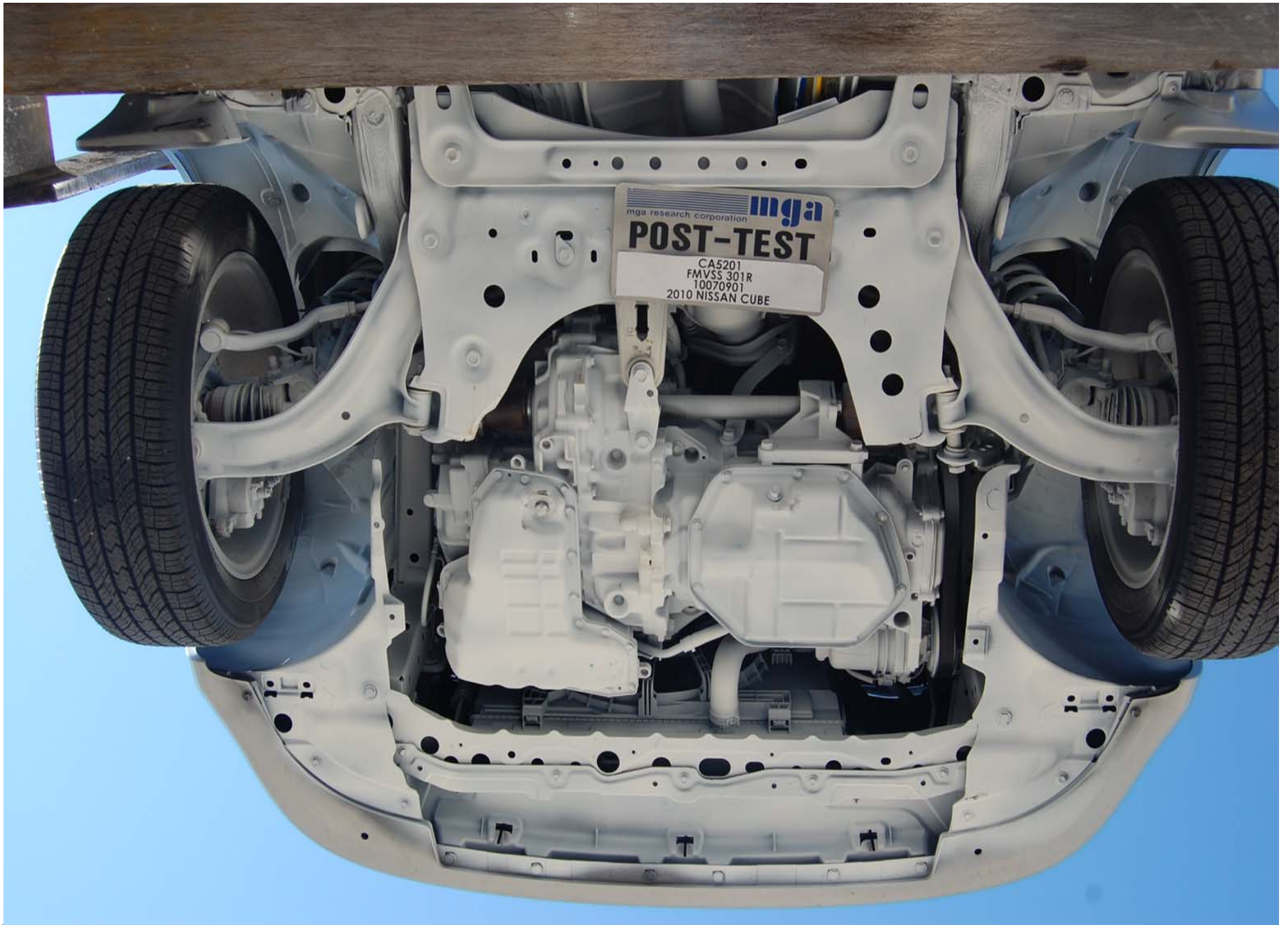
Pre-Test Impact Point



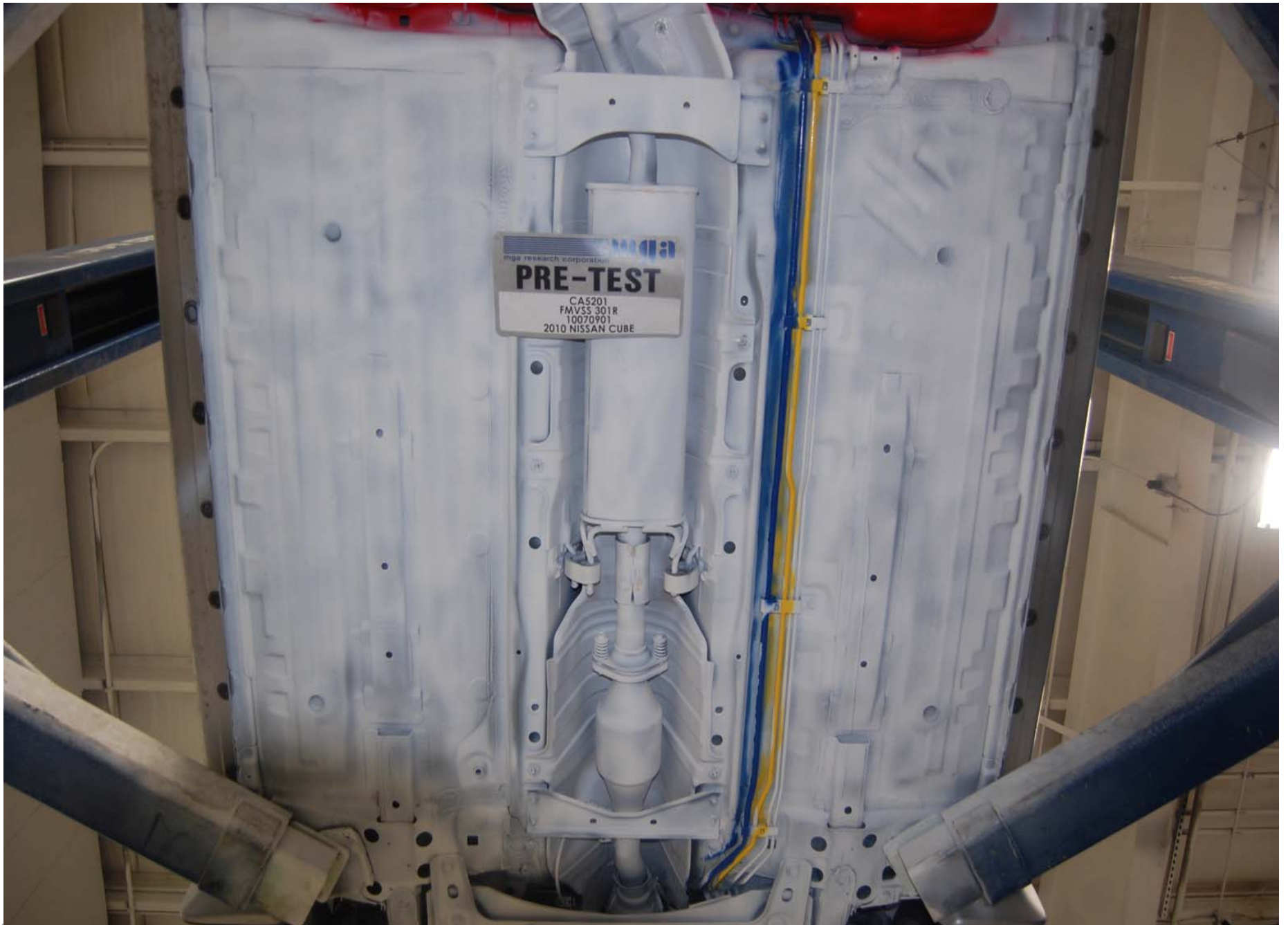
Post-Test Impact Point



Pre-Test Underbody View 1



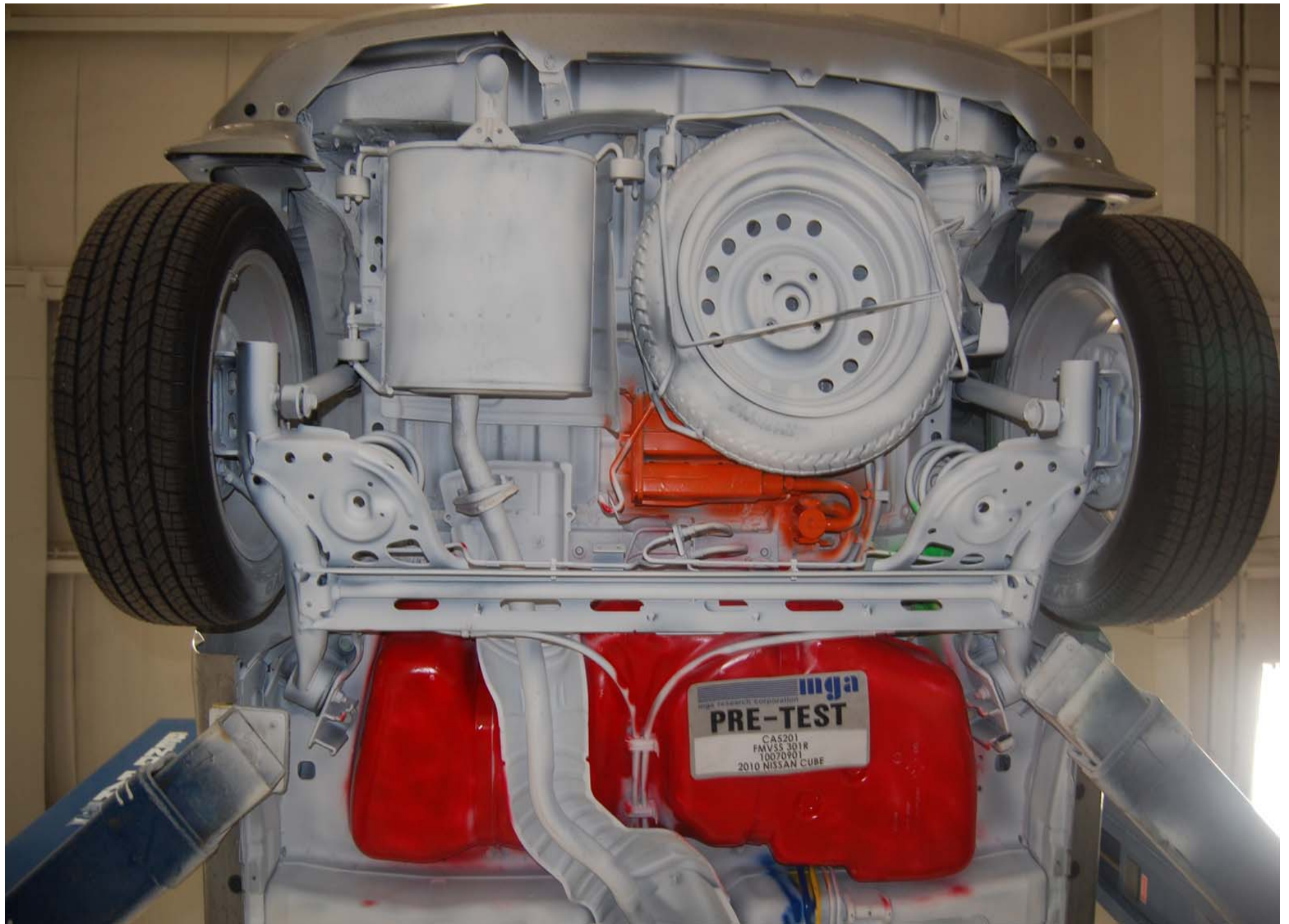
Post-Test Underbody View 1



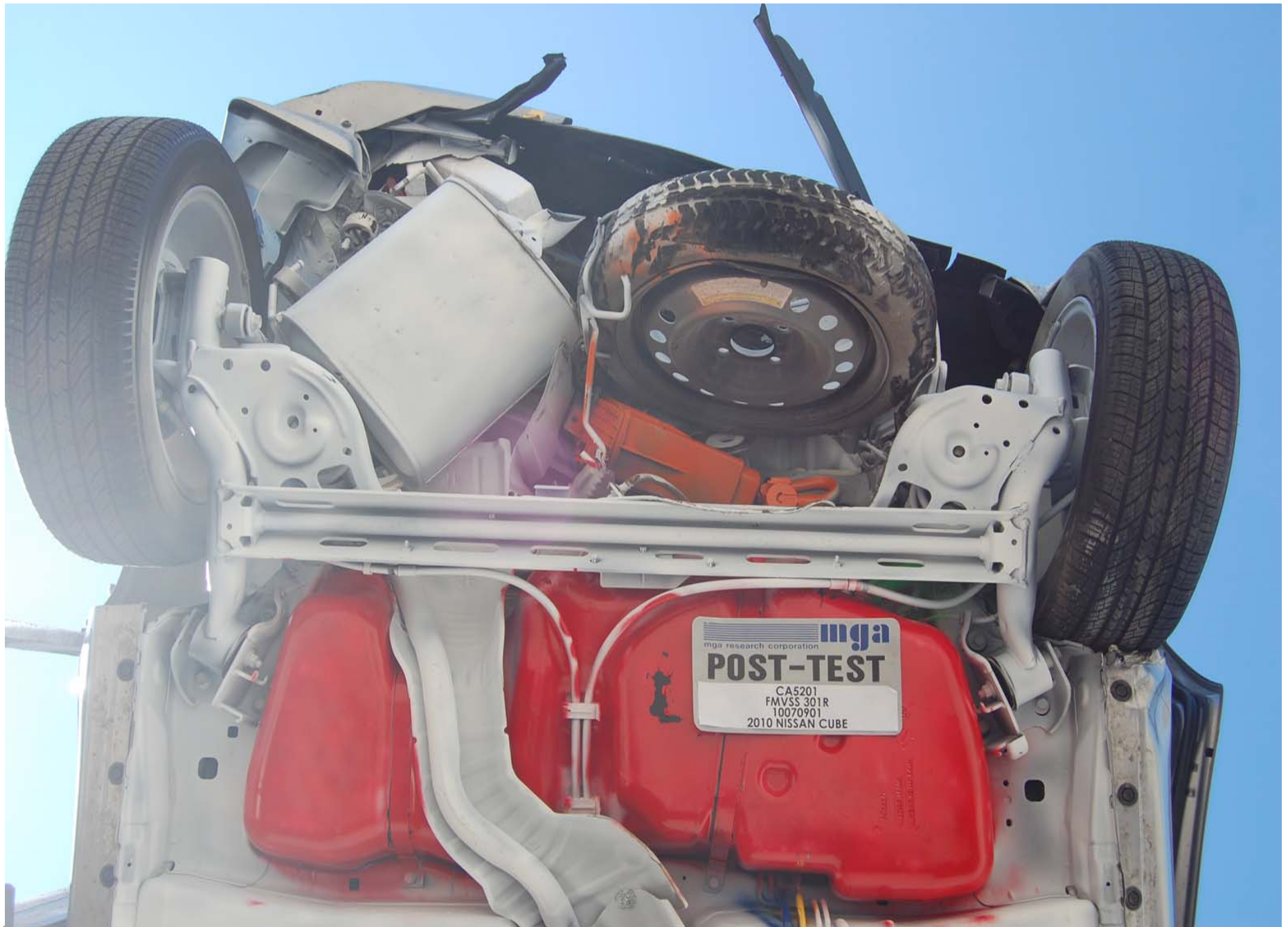
Pre-Test Underbody View 2



Post-Test Underbody View 2



Pre-Test Underbody View 3



Post-Test Underbody View 3



Pre-Test Front View of MDB



Post-Test Front View of MDB



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



Post-Test ¾ Right Side View of MDB

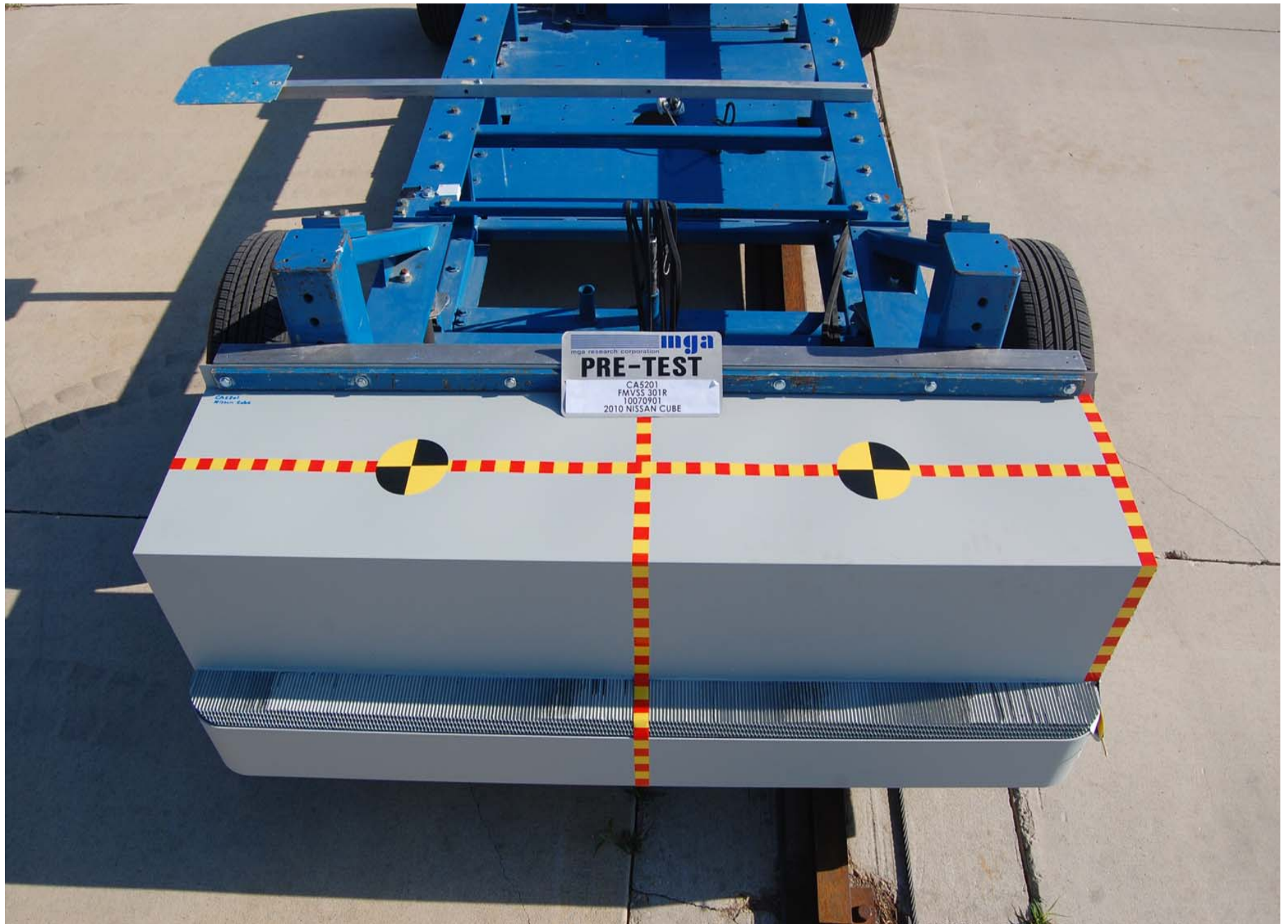


Pre-Test 3/4 Left Side View of MDB

A-34.



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



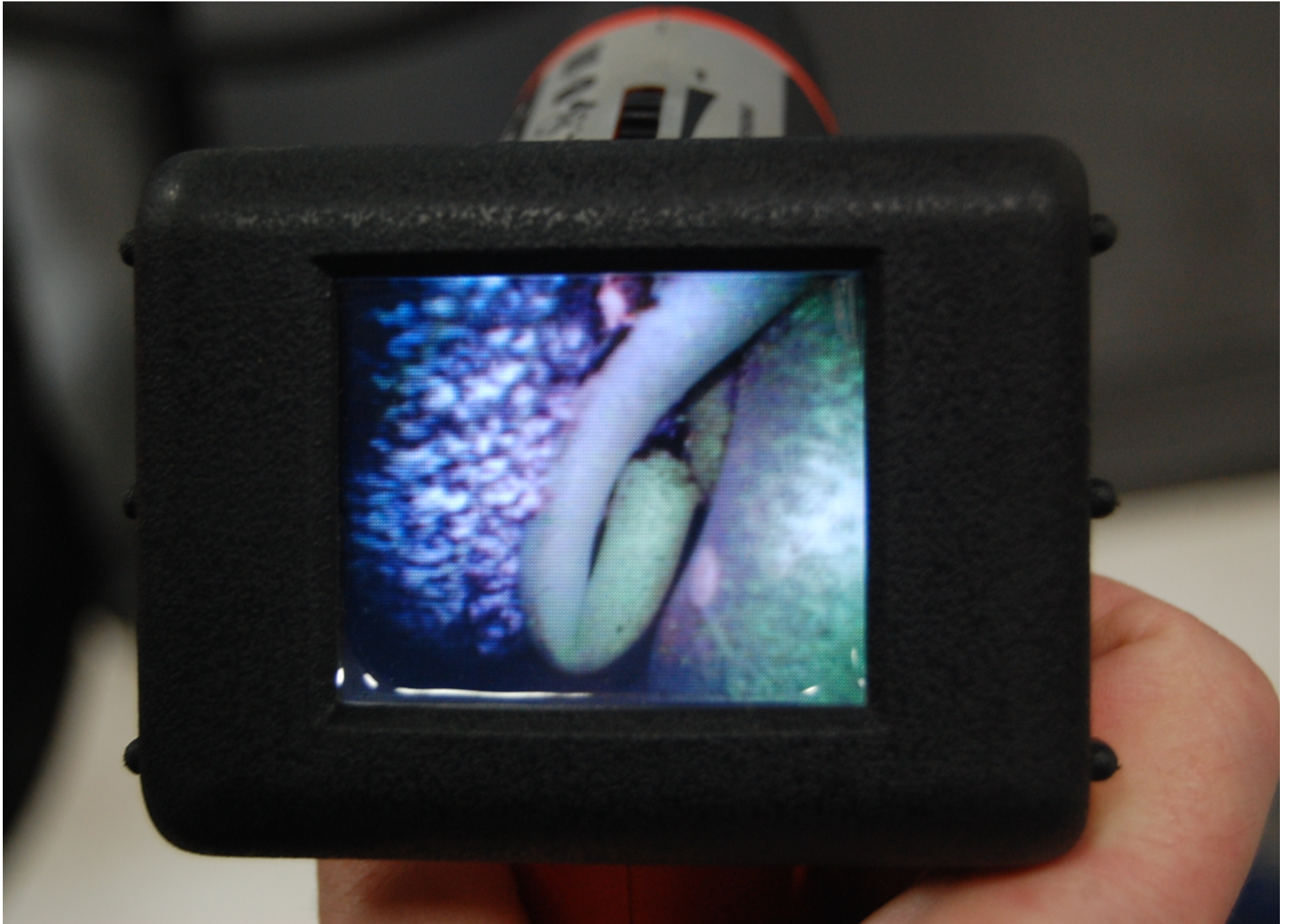
Rotation 90° Clockwise

A-39.

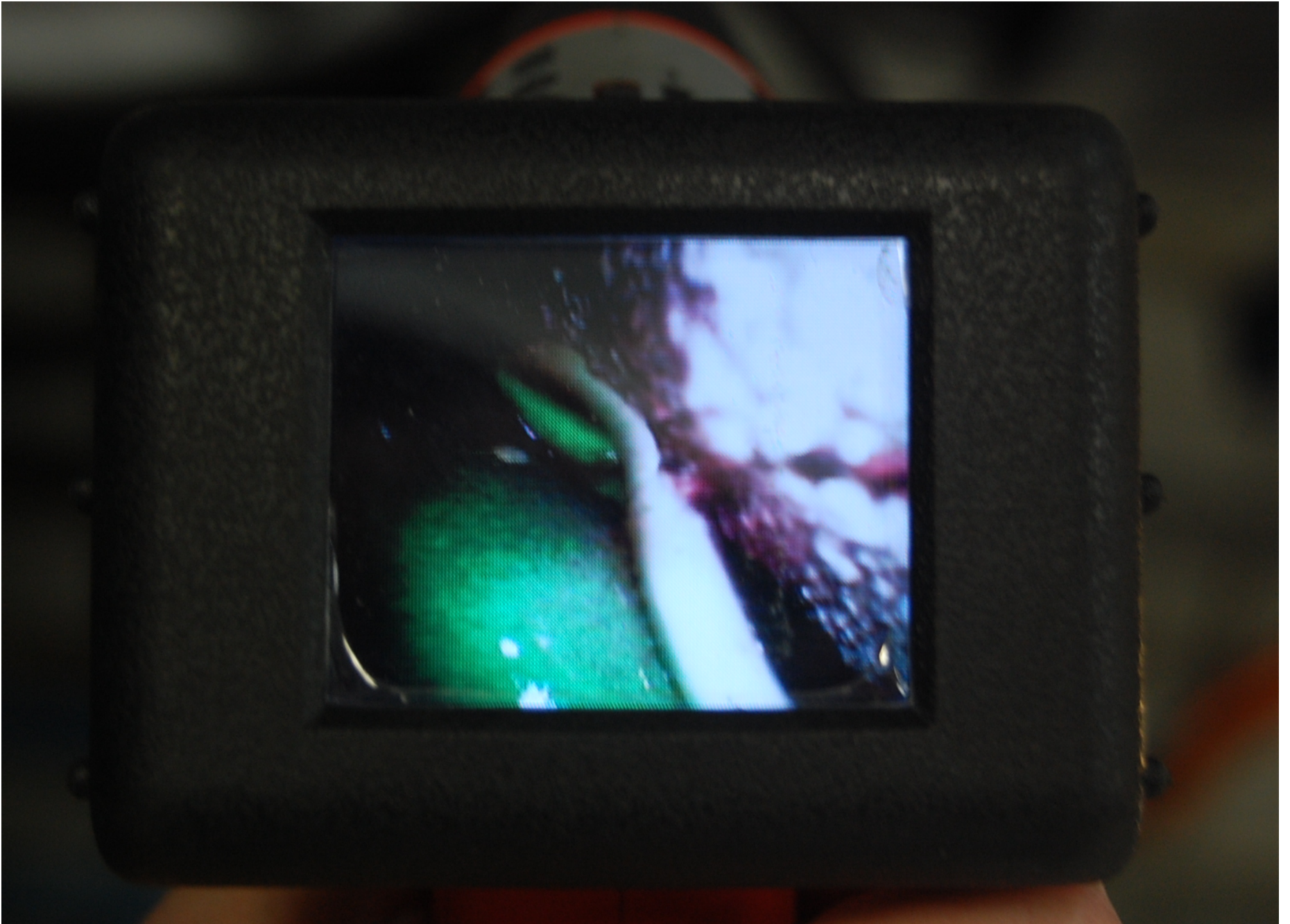


Leak Point at 0°

A-40.



Leak Point at 90°



Leak Point Post Inspection