REPORT NUMBER: 301-MGA-2008-001

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

BAYERISCHE MOTOREN WERKE AG
2007 BMW X3 3.0SI
NHTSA NUMBER: C70506

PREPARED BY:
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BURLINGTON, WI 53105

Test Date: January 28, 2008

Final Report Date: February 21, 2008

FINAL REPORT

PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
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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, Side Impact

2/21/08
Date of Acceptance

Technical Report Documentation Page

1. Report No. 301-MGA-2008-001	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report for Fuel System Integrity Test of a 2007 BMW X3 3.0SI NHTSA No.: C70506		*5. Report Date* February 21, 2008 *6. Performing Organization Code* MGA	
7. Author(s) Ben Fischer, Project Engineer		*8. Performing Organization Report No.* 301-MGA-2008-001	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-06-C-00030	
12. Sponsoring Agency Name and Address 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		*13. Type of Report and Period Covered* Final Report 1/28/08 – 2/21/08 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract A rear impact was conducted on a 2007 BMW X3 3.0SI at MGA Research Corporation on January 28, 2008. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.5 km/h. The ambient temperature at the time of impact was 4 degrees Celsius.			
17. Key Words Fuel System Integrity Test 2007 BMW X3 3.0SI NHTSA No: C70506		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Admin., Technical Information Services, (NPO-411) 1200 New Jersey Ave., S.E. Washington, D.C. 20590 Email: tis@nhtsa.dot.gov Fax: 202-493-2833	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 57	22. Price

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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 2007 BMW X3 3.0SI was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.5 km/h. The test was performed at MGA Research Corporation on January 28, 2008. 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
- Left Overall 1000 fps
- Right Rear Half 1000 fps
- Right Overall 1000 fps
- Overhead Overall 1000 fps
- Real Time Pan 24 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: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

TEST VEHICLE INFORMATION

Manufacturer	BMW
Model	X3 3.0SI
Body Style	4 DR MPV
Major Options	Dynamic Stability Control
NHTSA No.	C70506
VIN	WBXPC93497WF22356
Color	Jet Black
Delivery Date	11/30/2007
Odometer Reading (mile)	267
Dealer	BMW of Permian Basin
Transmission	Automatic Overdrive
Final Drive	All wheel drive
Number of Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Longitudinal

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Bayerische Motoren Werke AG
Date of Manufacture	04/07

GVWR (kg)	2315
GAWR Front (kg)	1150
GAWR Rear (kg)	1260

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				470
Number of Occupants x 68 kg.				340.2
Cargo Wt. (RCLW) (kg)				129.8

DATA SHEET NO. 1 (continued)

TEST VEHICLE SPECIFICATIONS

Test Vehicle:	2007 BMW X3 3.0SI	NHTSA No.:	C70506
Test Program:	FMVSS 301 Fuel System Integrity	Test Date:	1/28/2008

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	235/55R17	235/55R17
Recommended Load Range	99H	99H
Tire Size on Vehicle	235/55R17	235/55R17
Tire Manufacturer	Pirelli	Pirelli
Location of Placard of Vehicle	Driver Door Sill, Lower Rear Corner	
Type of Spare Tire (full size/space saver)	Space Saver	

DATA SHEET NO. 2

PRE-TEST DATA

Test Vehicle: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

WEIGHT OF TEST VEHICLE

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	457.2	464.5		521.6	533.4	
Right	kg	472.2	461.8		541.6	528.0	
Ratio	%	50.1	49.9		50.0	50.0	
Totals	kg	929.4	926.3	1855.7	1063.2	1061.4	2124.6

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1855.7
Rated Cargo/Luggage Weight (RCLW)	kg	129.7
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTW)	kg	2133.4

Vehicle Wheelbase	2791 mm
Weight of Ballast secured in cargo area	99.8 kg
Method of Securing Ballast	On rear seat with ratchet straps
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	787	789	778	785
As Tested	mm	767	768	763	764

DATA SHEET NO. 2 (continued)

PRE-TEST DATA

Test Vehicle: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

FUEL SYSTEM DATA

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	67.0
Usable Capacity Figure Furnished by COTR	67.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	61.6 to 63.0
Actual Test Volume (entire fuel system filled)	62.6

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

DATA SHEET NO. 3

MOVING BARRIER DATA

Test Vehicle: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	400.1	282.6	
Right	kg	370.2	311.0	
Ratio	%	56.5	43.5	
Totals	kg	770.3	593.6	1363.9

Tires (Mfr, line, size)	Yukohoma
Tire Pressure (kPa)	207
Brake Abort System (Yes/No)?	Yes
Date of Last Calibration	11/29/2006

DATA SHEET NO. 4

POST-TEST DATA

Test Vehicle: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

IMPACT VELOCITY

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.5
Actual Impact Velocity (Trap No. 2)	79.5
Average Impact Speed	79.5

Temperature at Time of Impact (°C)	4
Test Time	10:28 am

WELDING ROD IMPACT POINT

	Units: mm
Vertical distance from target center (+ above target / - below target)	10 mm above
Horizontal distance from target center (+ to the right / - to the left)	11 mm to the left

DATA SHEET NO. 5

STATIC ROLLOVER TEST DATA

Test Vehicle:	2007 BMW X3 3.0SI	NHTSA No.:	C70506
Test Program:	FMVSS 301 Fuel System Integrity	Test Date:	1/28/2008

STODDARD SOLVENT SPILLAGE MEASUREMENT

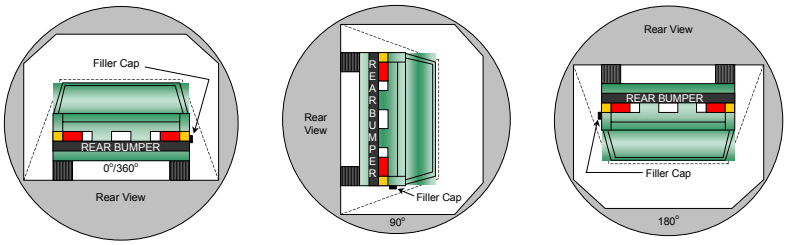
A. From impact until vehicle motion ceases: 0 g
(Maximum Allowable = 28 grams)

B. For the 5 minute period after motion ceases: 0 g
(Maximum Allowable = 28 grams)

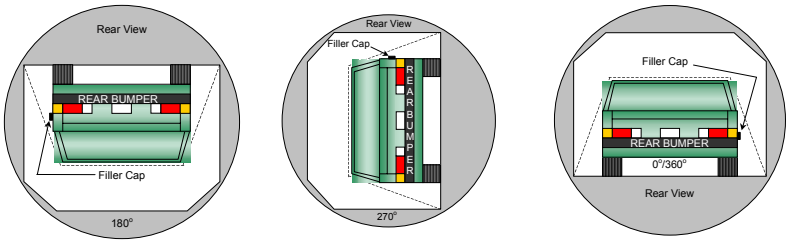
C. For the following 25 minutes: 0 g
(Maximum Allowable = 28 grams/minute)

D. Spillage: **None**

FMVSS 301 STATIC ROLLOVER DATA



0° to 90° 90° to 180°



180° to 270° 270° to 360°

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: 2007 BMW X3 3.0SI NHTSA No.: C70506
Test Program: FMVSS 301 Fuel System Integrity Test Date: 1/28/2008

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

0° TO 90° Rotation Time (sec) = 119 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) = 114 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) = 108 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) = 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	

FORM 1

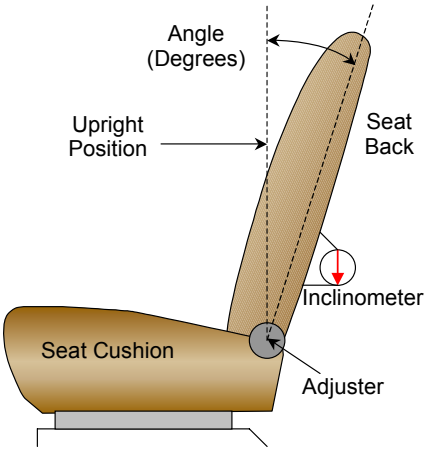
TEST VEHICLE INFORMATION

Test Vehicle:	2007 BMW X3 3.0SI	NHTSA No.:	C70506
Test Program:	FMVSS 301 Fuel System Integrity	Test Date:	1/28/2008

NORMAL DESIGN RIDING POSITION

For both driver and passenger seat backs:

The seat back angle is measured relative to the rockers sill. Remove the seat back panel and position the inclinometer as shown in the drawing, 13 inches above the back pivot point on the rear outboard seat frame. Avoid taking measurements on the reinforcement plates.



FRONT SEAT ASSEMBLY

Driver Seat Back Angle	25°
Passenger Seat Back Angle	25°

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	290 mm	145 mm
Passenger Seat	290 mm	145 mm

D-RING ADJUSTMENT

The driver and passenger D-rings were fixed.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

A-1.

Vehicle's Certification Label

A-2.

Vehicle's Tire Placard

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 Closeup View of Vehicle

Post-Test Left Rear Closeup View of Vehicle

Pre-Test Right Side View of Vehicle

Post-Test Right Side 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 ¾ Frontal View From Right Side of Vehicle

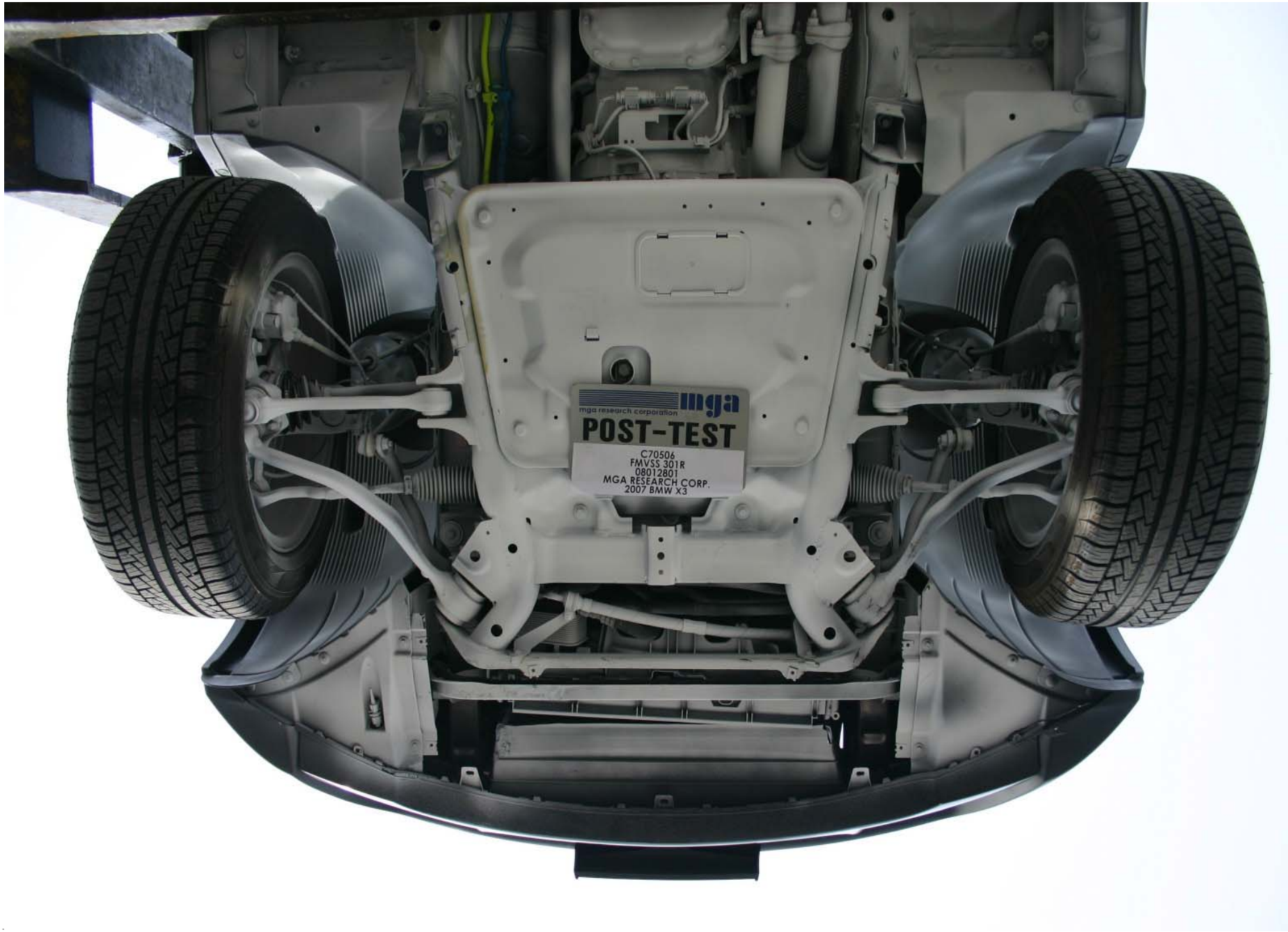
Pre-Test ¾ Rear View From Left Side of Vehicle

Post-Test ¾ Rear View From Left Side of Vehicle

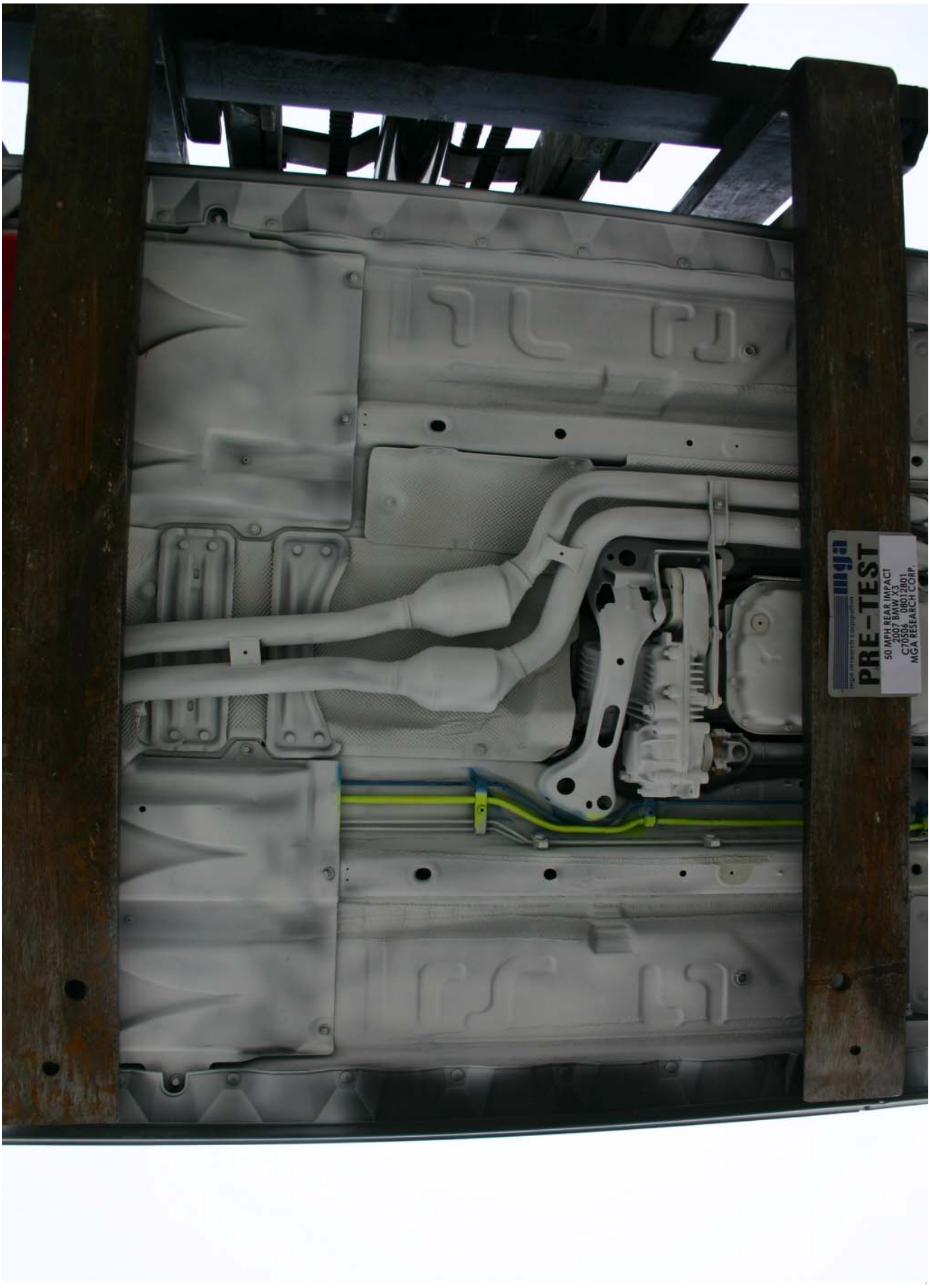
Pre-Test Impact Point

Post-Test Impact Point

Pre-Test Underbody View 1

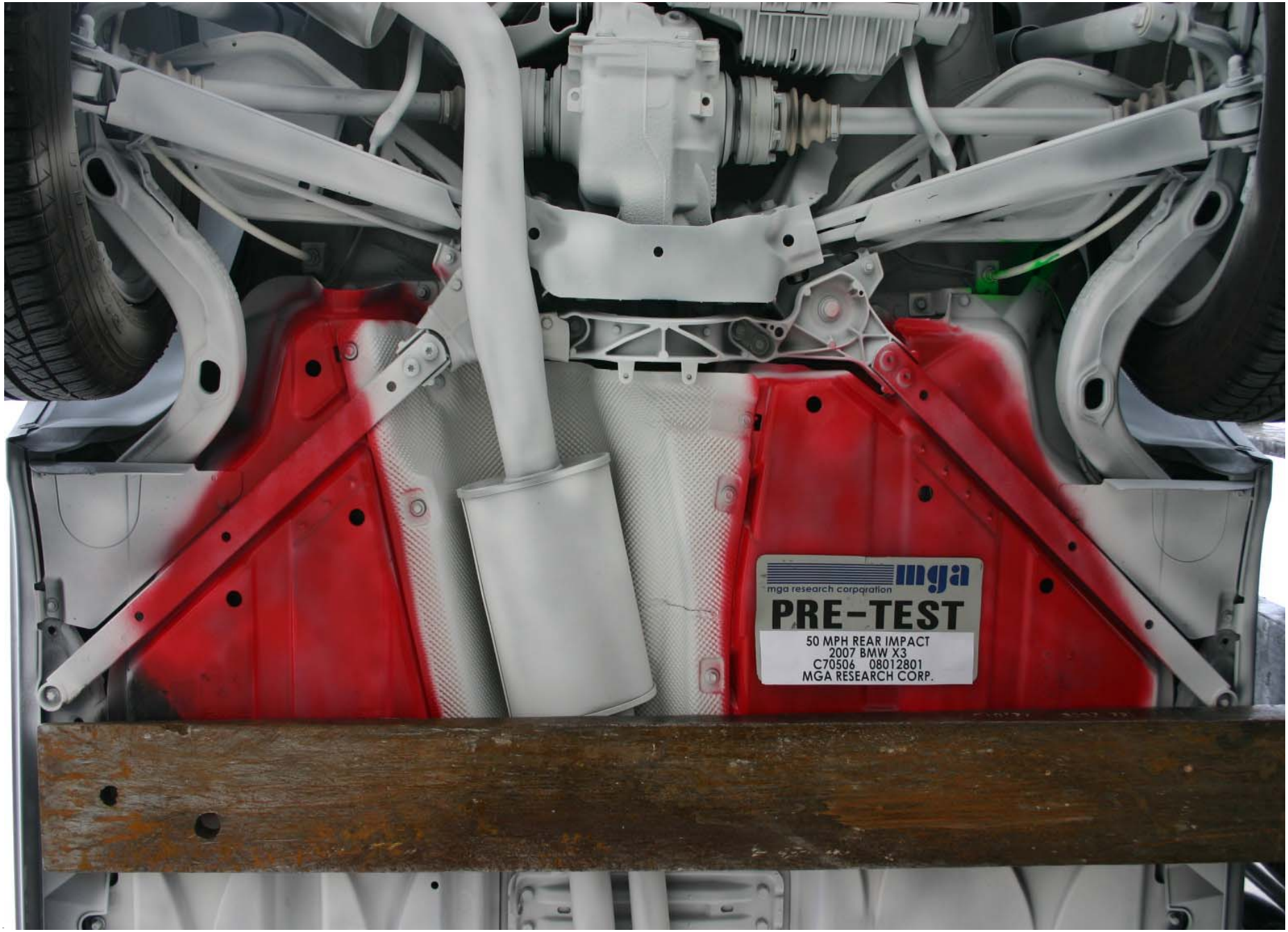


Post-Test Underbody View 1

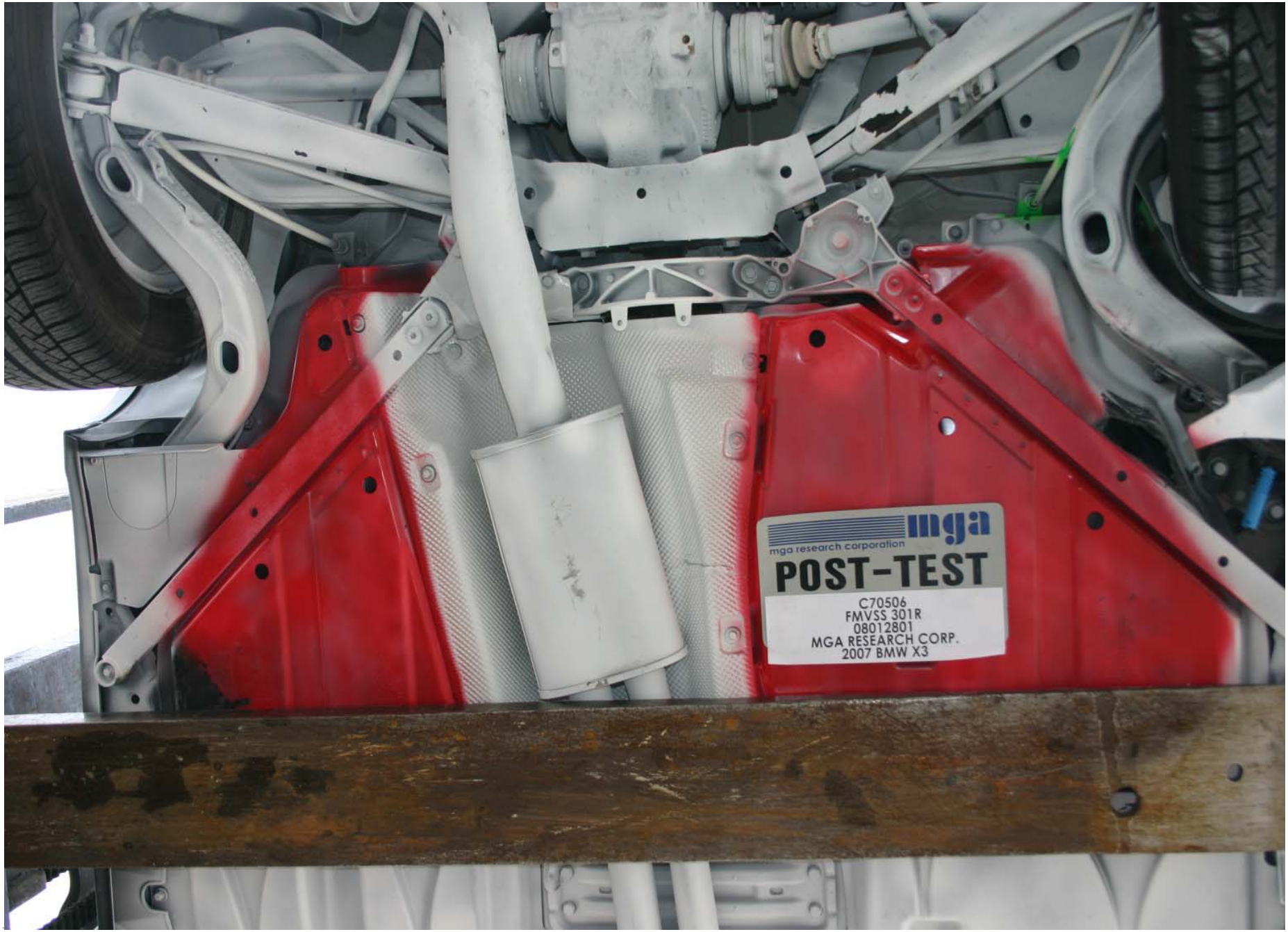


Pre-Test Underbody View 2

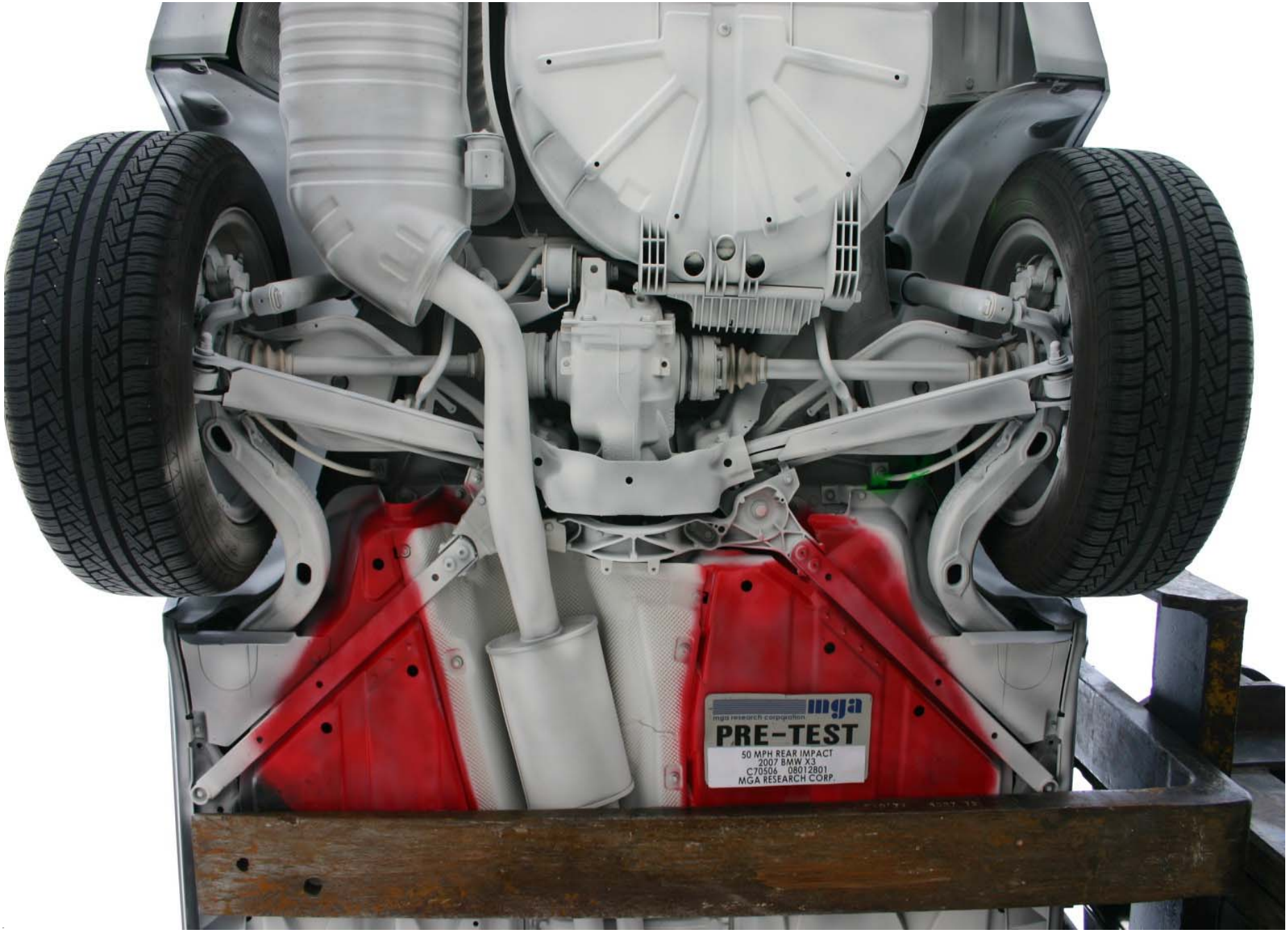
Post-Test Underbody View 2



Pre-Test Underbody View 3



Post-Test Underbody View 3



Pre-Test Underbody View 4

Post-Test Underbody View 4

Pre-Test Underbody View 5

Post-Test Underbody View 5

Pre-Test Front View of MDB

Post-Test Front View of MDB

Pre-Test ¾ Right Side View of MDB

Post-Test ¾ Right Side View of MDB

Pre-Test ¾ Left Side View of MDB

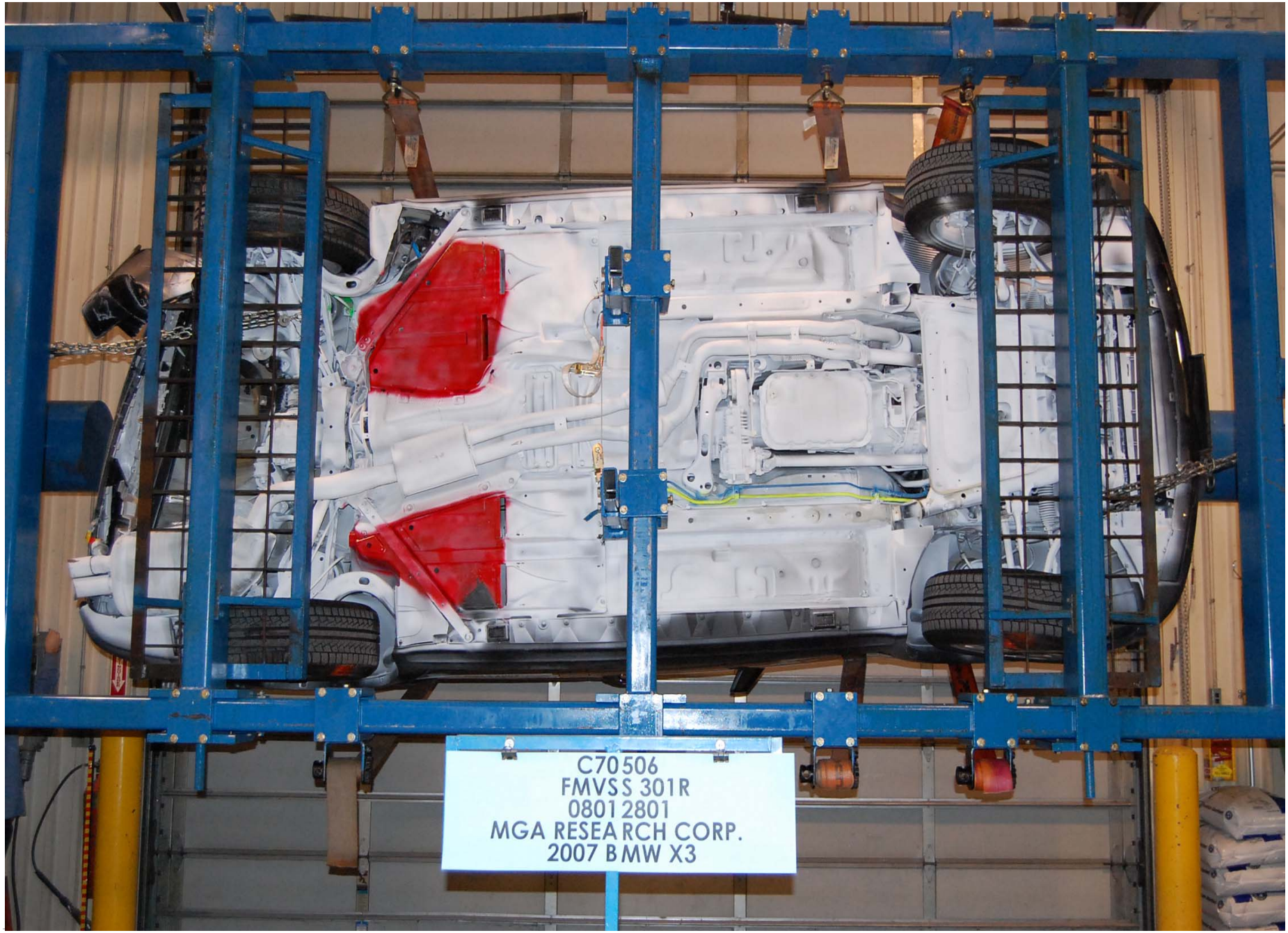
Post-Test ¾ Left Side View of MDB

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