

REPORT NUMBER: 301-MGA-2009-004

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

**FORD MOTOR COMPANY
2008 FORD E250 CARGO VAN
NHTSA NUMBER: C80206**

**PREPARED BY:
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BURLINGTON, WI 53105**



Test Date: April 15, 2009

Final Report Date: May 5, 2009

FINAL REPORT

**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
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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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Date: 2009.05.05 13:32:11 -04'00'

COTR, Rear Impact

5/5/2009
Date of Acceptance

Technical Report Documentation Page

1. Report No. 301-MGA-2009-004		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report for Fuel System Integrity Test of a 2008 Ford E250 Cargo Van NHTSA No.: C80206				5. Report Date April 24, 2009	
				6. Performing Organization Code MGA	
7. Author(s) Joe Fleck, Project Engineer				8. Performing Organization Report No. 301-MGA-2009-004	
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 4/15/09 to 5/5/09	
				14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes					
16. Abstract A rear impact was conducted on a 2008 Ford E250 Cargo Van at MGA Research Corporation on April 15, 2009. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 47.3 km/h. The ambient temperature at the time of impact was 21 degrees Celsius.					
17. Key Words Fuel System Integrity Test 2008 Ford E250 Cargo Van NHTSA No: C80206				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, 1200 New Jersey Avenue, SE Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 48	22. Price

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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 2008 Ford E250 Cargo Van was impacted by a Moving Barrier at a velocity of 47.3 km/h. The test was performed at MGA Research Corporation on April 15, 2009. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and six high-speed cameras were used to document the impact event. In addition, real-time video was taken of the gas cap closing and static rollover.

- Left Overall 1000 fps
- Right Overall 1000 fps
- Overhead 1000 fps
- Pit Front 1000 fps
- Pit Middle 1000 fps
- Pit Rear 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 during the event or during the 30 minutes after the impact. During the first ninety degrees of the roll Stoddard solvent leaked from what appears to be a fuel vent hose. This leakage stopped during the first five minutes of rotation and was measured to be twenty three grams. During the next rotation Stoddard began to leak again from the same location. This leakage stopped during the first five minutes of rotation and was measured to be fourteen grams. There was no additional Stoddard leakage during the final two segments of the static rollover test.

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: 2008 Ford E250 Cargo Van NHTSA No.: C80206
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/15/2009

TEST VEHICLE INFORMATION

Manufacturer	Ford Motor Company
Model	E250
Body Style	Cargo Van
Major Options	None
NHTSA No.	C80206
VIN	1FTNE24W58DA18693
Color	Oxford White
Delivery Date	3/23/09
Odometer Reading (mile)	707.6
Dealer	Ricart Ford
Transmission	Automatic
Final Drive	Rear Wheel
Number of Cylinders	8
Engine Displacement (L)	4.6
Engine Placement	Longitudinal

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Ford Motor Company
Date of Manufacture	09/07

GVWR (kg)	4037
GAWR Front (kg)	1724
GAWR Rear (kg)	2504

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket			
Number of Occupants	2			2
Capacity Wt. (VCW) (kg)				1437
Number of Occupants x 68 kg.				136
Cargo Wt. (RCLW) (kg)				1301

DATA SHEET NO. 1 (continued)
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2008 Ford E250 Cargo Van NHTSA No.: C80206
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/15/2009

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	550	550
Cold Pressure (kPa)	415	550
Recommended Tire Size	LT245/75R16E	LT245/75R16E
Recommended Load Range	120/116R	120/116R
Tire Size on Vehicle	LT245/75R16E	LT245/75R16E
Tire Manufacturer	Hankook	Hankook
Location of Placard of Vehicle	Driver's B-Pillar Mid	
Type of Spare Tire (full size/space saver)	Full Size	

DATA SHEET NO. 2

PRE-TEST DATA

Test Vehicle: 2008 Ford E250 Cargo Van
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80206
 Test Date: 4/15/2009

WEIGHT OF TEST VEHICLE

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	648.6	561.6		716.7	623.7	
Right	kg	688.6	547.9		758.0	624.6	
Ratio	%	54.7	45.3		54.2	45.8	
Totals	kg	1337.2	1109.5	2446.7	1474.7	1248.3	2723.0

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2446.7
Rated Cargo/Luggage Weight (RCLW)	kg	136
Weight of 2 P572B ATDs	kg	148
Calculated Vehicle Target Weight (TVTW)	kg	2730.7

Vehicle Wheelbase	3515
Vehicle Width	2002
Weight of Ballast Secured	136 kg
Method of Securing Ballast	Bolted to Floor
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	906	907	942	942
As Tested	mm	897	896	935	937

DATA SHEET NO. 2 (continued)

PRE-TEST DATA

Test Vehicle: 2008 Ford E250 Cargo Van

NHTSA No.: C80206

Test Program: FMVSS 301 Fuel System Integrity

Test Date: 4/15/2009

FUEL SYSTEM DATA

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	132.5
Usable Capacity Figure Furnished by COTR	135.5
Usable Capacity of "Optional" Tank	
90-95% of Usable Capacity	121.9 to 124.5
Actual Test Volume (entire fuel system filled)	123.0

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: 2008 Ford E250 Cargo Van NHTSA No.: C80206
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 4/15/2009

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: 2008 Ford E250 Cargo Van

NHTSA No.: C80206

Test Program: FMVSS 301 Fuel System Integrity

Test Date: 4/15/2009

IMPACT VELOCITY

	Units: km/h
Required Impact Velocity	47.3 ± 0.8 km/h
Actual Impact Velocity (Trap No. 1)	47.3
Actual Impact Velocity (Trap No. 2)	47.3
Average Impact Speed	47.3

Temperature at Time of Impact (°C)	21
Test Time	4:13 pm

DATA SHEET NO. 5
STATIC ROLLOVER TEST DATA

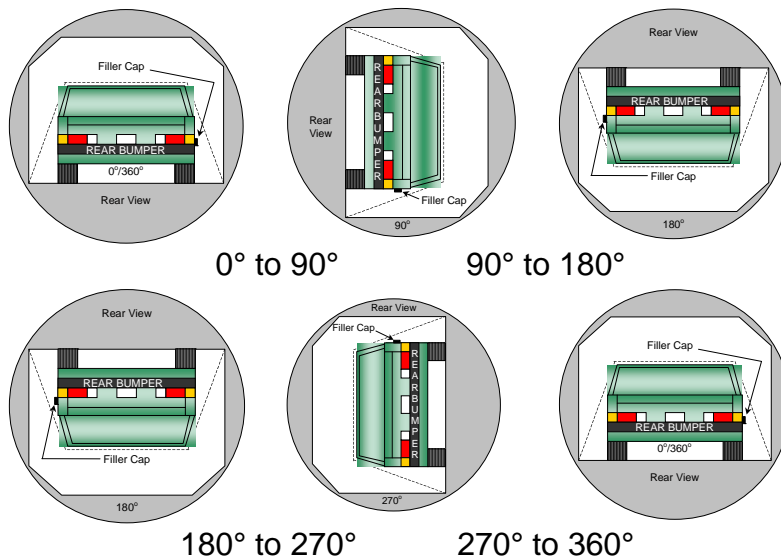
Test Vehicle: 2008 Ford E250 Cargo Van
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80206
Test Date: 4/15/2009

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: **Fuel System Vapor Line**

DATA SHEET NO. 5 (continued)

STATIC ROLLOVER TEST DATA

Test Vehicle: 2008 Ford E250 Cargo Van
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80206
 Test Date: 4/15/2009

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

0° TO 90° Rotation Time (sec) = 173 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	23	Fuel System Vapor Line
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) = 150 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	14	Fuel System Vapor Line
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) = 128 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) = 136 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

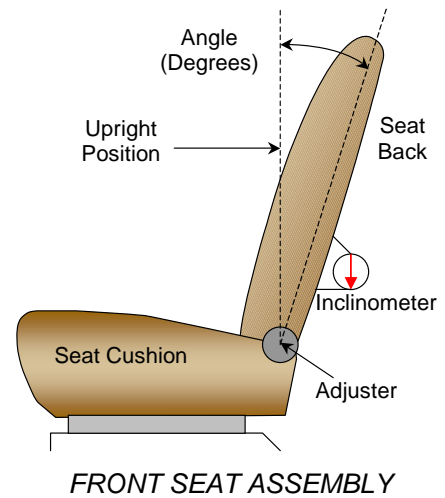
Test Vehicle: 2008 Ford E250 Cargo Van
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80206
Test Date: 4/15/2009

NORMAL DESIGN RIDING POSITION

With the seat in the mid fore-aft seat track position the angle of the driver's and front passenger's seat back when it is in the nominal riding position is set at 17 degrees.

Driver Seat Back Angle	17.3°
Passenger Seat Back Angle	16.8°



SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	17 detents	9 th detent, 1 st as 0
Passenger Seat	19 detents	9 th detent, 1 st as 0

D-RING ADJUSTMENT

The driver and passenger D-rings were placed in the 2nd position top as 0.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.

APPENDIX A
PHOTOGRAPHS

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MFD. BY FORD MOTOR CO. DATE: 09/07 GVWR: 8900LB/ 4037KG
 FRONT GAWR: 3800LB 1724KG REAR GAWR: 5520LB 2504KG
 WITH LT245/75R16E TIRES WITH LT245/75R16E TIRES
 16x7.0K RIMS 16x7.0K RIMS
 AT 415 kPa/ 60 PSI COLD AT 550 kPa/ 80 PSI COLD
 THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE
 SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
 VIN: 1FTNE24W58DA18693 TYPE: Truck



EXT PNT: YZ RC: 86 DSO:

WB	INT TR	TP/PS	R	AXLE	TR	SPR	8E416	F0578
138	AE		7	24	Q	NNRR	D05	T0658

 MADE IN U.S.A. ULC ▽ 5U5A-3520472-AA

A-1.

Vehicle's Certification Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY TOTAL : 2 FRONT: 2 REAR: 0

The combined weight of occupants and cargo should never exceed : 1437 kg or 3169 lbs.

5USA-1532-AA (TLU)

TIRE	SIZE	COLD TIRE PRESSURE
FRONT	LT245/75R16E	415 KPA, 60 PSI
REAR	LT245/75R16E	550 KPA, 80 PSI
SPARE	LT245/75R16E	550 KPA, 80 PSI

SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION



A-2.

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



Post-Test Right Rear Close-up View of Vehicle

A-13.



Pre-Test Rear View of Vehicle

A-14.



Post-Test Rear View of Vehicle

A-15.



Pre-Test 3/4 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



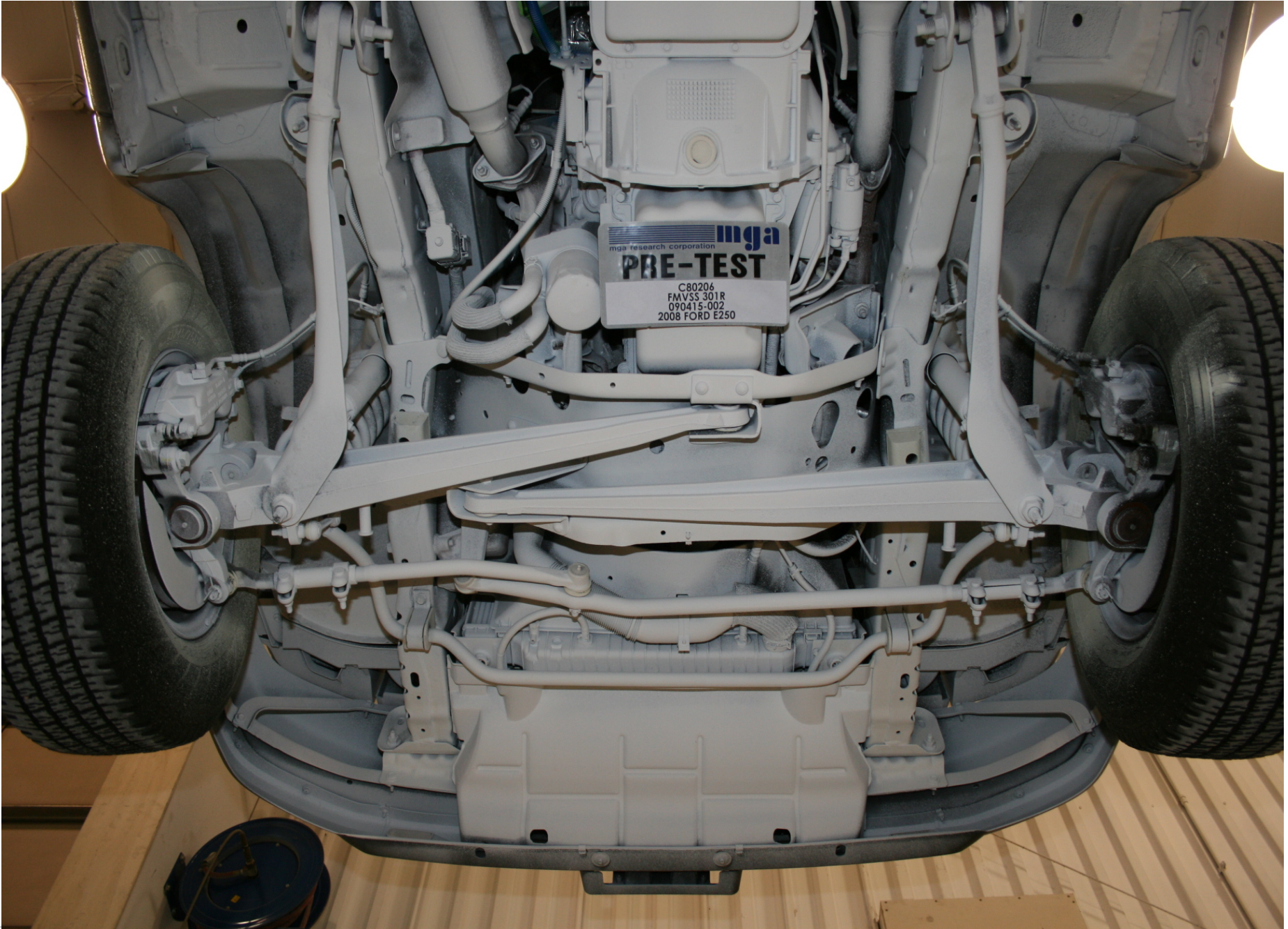
Post-Test $\frac{3}{4}$ Rear View From Right Side of Vehicle



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



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



A-21.

Pre-Test Underbody View 1



A-22.

Post-Test Underbody View 1



A-23.

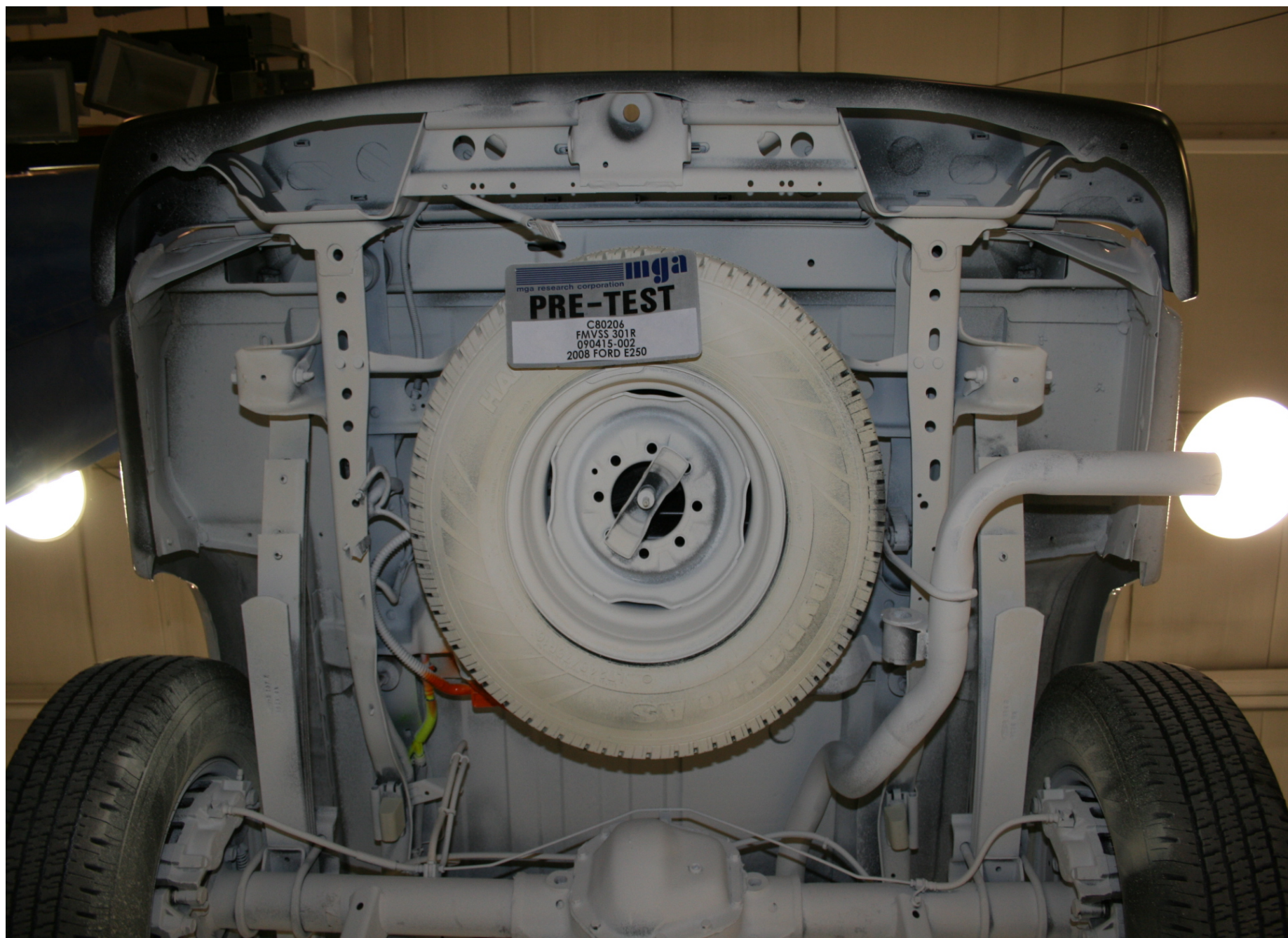
Pre-Test Underbody View 2

A-24.



Post-Test Underbody View 2

A-25.



Pre-Test Underbody View 3

A-26.



Post-Test Underbody View 3

A-27.



Static Rollover at 90 Degrees



Static Rollover at 180 Degrees

A-29.



Static Rollover at 270 Degrees

A-30.



Static Rollover at 360 Degrees

A-31.



Fuel System Vapor Line Leak