REPORT NUMBER: 301-CAL-08-06

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

SUZUKI MOTOR CORPORTATION
2008 SUZUKI SX4
4-DOOR SEDAN

NHTSA NUMBER: C80512

CALSPAN
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

September 9, 2008

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance (NVS-224)
1200 New Jersey Avenue, SE
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-06-C-00031. This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufactures' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

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16. Abstract Compliance tests were conducted on the subject 2008 Suzuki SX4 4-Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301R-02 for the determination of FMVSS 301 compliance. Test failures identified were as follows: None The test vehicle appeared to comply with all requirements of FMVSS 301R-02 "Fuel System Integrity – Rear Impact."			
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SECTION 1

PURPOSE AND TEST PROCEDURE

This rear impact test is part of the FMVSS 301 Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-C-00031. The purpose of this test was to determine if the subject vehicle, a 2008 Suzuki SX4 4-Door Sedan, meets the performance requirements of FMVSS No. 301R-02 "Fuel System Integrity – Rear Impact." The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-301R-02, dated January 17, 2007).

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 1421.0 kg 2008 Suzuki SX4 4-Door Sedan was impacted from the rear by a 1357.5 kg moving barrier at a velocity of 78.64 kph (48.86 mph). The test was performed by Calspan Corporation on September 9, 2008.

The test vehicle was equipped with a 41.9 liter fuel tank which was filled to 93 percent capacity with Stoddard fluid prior to impact. Additional ballast (23 kg) was secured in the vehicle cargo area. Two ballast Part 572E 50th percentile male Anthropomorphic Test Device (ATD) were placed in the front occupant seating positions and.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information are found on page 3-6 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was no fuel system fluid spillage following the impact or during any portion of the static rollover test. The average vehicle longitudinal crush was 731 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2008 Suzuki SX4 4-Door Sedan

Vehicle Body Color: Red NHTSA Number: C80512

Engine Data: 4 Cylinders; - CID; 2.0 Liters; - cc

Transmission: 5 Speed; X Manual; - Automatic; - Overdrive

Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive

MAJOR TEST VEHICLE OPTIONS:

X AC; X Pwr Steering; X Power Brakes; X Power Locks; - Power Seats

X ABS; X Tilt Wheel; - Stab Control - Traction Control - Anti-Theft

DEALER AND DELIVERY INFORMATION:

Date Received: June 4, 2008 ; Odometer Reading 27 km

Selling Dealer: Columbus Suzuki

Dealer Address: Groveport, OH 43125-9484

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufacturer: Suzuki Motor Corporation

Vehicle Build Date: 02/08

VIN:: JS2YC412785103602

GVWR: 1675 kg; GAWR: 940 kg FRONT; 860 kg REAR

DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:

Location of Tire Placard: Left Front Door Sill

Type of Spare Tire: T125/70D16

	Front	Rear
Maximum Tire Pressure (sidewall - kPa)	300	300
Cold Pressure (tire placard - kPa) – test pressure	230	230
Recommended Tire Size (tire placard)	P195/65R15	P195/65R15
Vehicle Tire Size with load index & speed symbol	P195/65R15 89H	P195/65R15 89H
Tire Manufacturer	Yokohama	Yokohama
Tire Name	Avid S33	Avid S33
Treadwear, Traction, Temperature	200, B, A	200, B, A

VEHICLE CAPACITY DATA:

Type of Front Seats: - Bench; X Bucket; - Split Bench

Number of Occupants: 2 Front; 3 Rear; 5 Total

Vehicle Capacity Weight (VCW) = 380.0 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 39.8 kg

DATA SHEET 2

PRE-TEST DATA

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	376	368	60.4	744.0
Rear =	239	248	39.6	487.0
	Total Delivered Weight (UDW) =			1231.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1231.0	kg
Rated Cargo/Luggage Weight (RCLW) =	39.8	kg
Weight of 2 p.572E Dummies @ 78 each =	156.0	kg
TARGET TEST WEIGHT =	1426.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 34.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	414	437	59.9	851.0
Rear =	294	276	40.1	570.0
	Total Vehicle Test Weight (ATW) =			1421.0

Weight of Ballast Secured in Vehicle[1] = 23 kg Ballast Type Lead Shot

Method of securing Ballast: Compartment

Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG[2]
AS DELIVERED:	714	718	725	727	990.2
AS TESTED:	698	698	706	709	1004.0

Vehicle's Wheel Base: 2503 mm

[1]Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

[2]Rearward of the front axle centerline.

VEHICLE PRE-TEST WIDTH AND IMPACT OFFSET MEASUREMENT:

Vehicle Width at Widest Point: 1734 mm Location: Rear Wheel well

Centerline offset for impact line: 347 mm

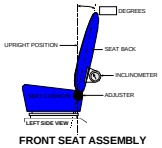
Filler neck side (left/right) Left

DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No. C80512

Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat: *

Measurement instructions: * Seat back was placed in the 4th detent with the forward most detent defined as 0

Seat back angle for passenger's seat: *

Measurement instructions: * Seat back was placed in the 4th detent with the forward most detent defined as 0

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Seat was placed in the 8th detent (mid-position) from a total of 15 detents

Positioning of the passenger's seat: Seat was placed in the 8th detent (mid-position) from a total of 15 detents

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 45.04 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 41.4 to 42.3 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 41.9 liters

Stoddard Fluid: specific gravity: 0.764 ; kinematic viscosity: 0.96 centistokes; color: Red

3.3 Is vehicle equipped with electric fuel pump? Yes- X ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

Turn the vehicle ignition key to the ON position

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Steering column placed in mid-position. Mid-position was 25 degrees from Horizontal.

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Upper anchorage was placed in the 1st detent from the uppermost detent (0 – full up; 4th detent – full down); Seat belt anchorage placed in detent 1

6. COMMENTS:

None

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No. C80512

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore A0608068

MDB DETAILS:

Overall Width of Framework Carriage	=	1250	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	4120	millimeters
Wheelbase of Framework Carriage	=	2591	millimeters
Tread of Framework Carriage (Front & Rear)	=	1875	millimeters
C.G. Location Rearward of Front Axle	=	1139	millimeters

MDB WEIGHT:

Left Front	=	357.0	kg	Left Rear	=	323.0	kg
Right Front	=	404.0	kg	Right Rear	=	273.5	kg
TOTAL FRONT =		761.0	kg	TOTAL REAR	=	596.5	kg
TOTAL MDB WEIGHT =		1357.5	kg				

Tires (Mfr, line, size): Dunlop A/T Radial Rover P205/75R15

TIRE PRESSURE:

Left Front	=	207	kPa	Left Rear	=	207	kPa
Right Front	=	207	kPa	Right Rear	=	207	kPa

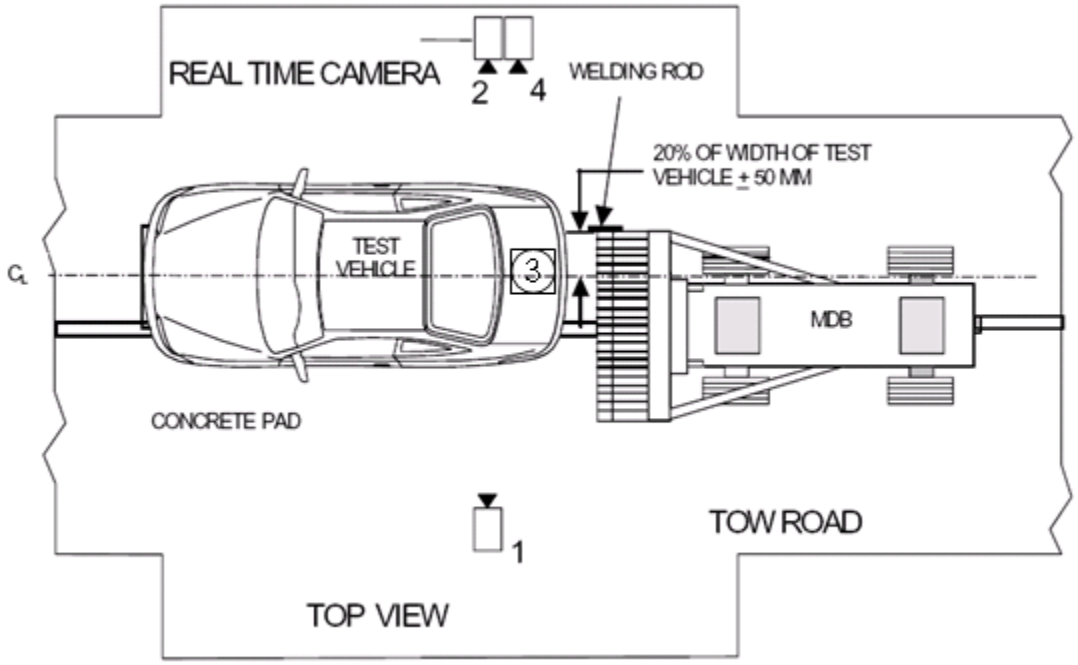
Brake Abort System? (Yes/No) Yes

Date of Last Calibration: 6/15/07

DATA SHEET 4

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No. C80512



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	1850	-7620	1015	-2.1	28	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	0	-100	4880	-90.0	20	1000
4	Right Side View	1990	-7671	1010	-1.0	28	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.

X = (Impact Point) + Forward
Y = (Impact Point) + To Right
Z = (Ground Level) + Down

DATA SHEET 5

POST-TEST DATA

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No. C80512

REQUIRED IMPACT VELOCITY RANGE:: 78.5 to 80.1 km/h

ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:

Trap No. 1 = 78.70 km/h Trap No. 2 = 78.57 km/h

Average Impact Speed = 78.64 km/h

WELDING ROD IMPACT POINT:

-9 mm Vertical distance from target center (+ is above) Tolerance: ±40 mm

-13 mm Horizontal distance from target center (+ is right) Tolerance: ±50 mm

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. Front impact until vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

B. For 5 minute period after vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

C. For next 25 minutes -

Actual = 0 g/minute Maximum Allowable = 28 g/minute

D. Provide Spillage Details:

None

DATA SHEET 5

POST-TEST DATA (Continued)

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No. C80512

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK MOVEMENT
P1 (Left Front)	0	Seat back reclined rearward
P2 (Right Front)	0	Seat back reclined rearward

POST TEST ATD CONTACT DATA

LOCATION	Position 1 (Driver)	Position 2 (Passenger)
Head	Head restraint	Head Restraint
Chest	None	None
Abdomen	None	None
Left Knee	None	None
Right Knee	None	None

VEHICLE DIMENSIONS:

Vehicle length:

	Left Side	Centerline	Right Side
Pre-Test	4362	4490	4361
Post-Test	3541	3627	3852
Crush	821	863	509

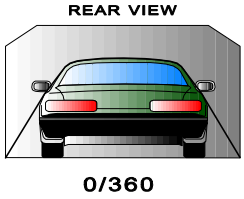
Vehicle Wheel Base:

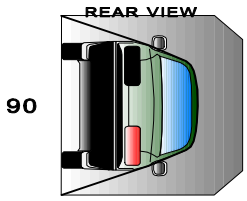
	Left Side	Right Side
Pre-Test	2503	2502
Post-Test	2487	2500
Crush	16	2

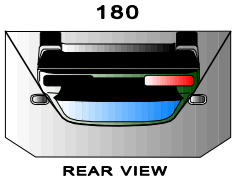
DATA SHEET 6

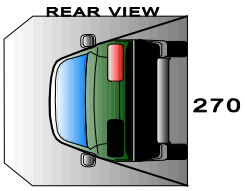
FMVSS 301 ROLLOVER DATA

Vehicle: 2008 Suzuki SX4 4-Door Sedan NHTSA No.: C80512









I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0º - 90º	1	minutes	05	seconds	5	minutes	6	minutes	5	seconds	7	minutes
90º - 180º	1	minutes	02	seconds	5	minutes	6	minutes	2	seconds	7	minutes
180º-270º	1	minutes	01	seconds	5	minutes	6	minutes	1	seconds	7	minutes
270º-360º	1	minutes	09	seconds	5	minutes	6	minutes	9	seconds	7	minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0º - 90º	0	0	0	N/A
90º - 180º	0	0	0	N/A
180º-270º	0	0	0	N/A
270º-360º	0	0	0	N/A

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0º - 90º	None
90º - 180º	None
180º-270º	None
270º-360º	None

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure A-1: Vehicle Certification Placard

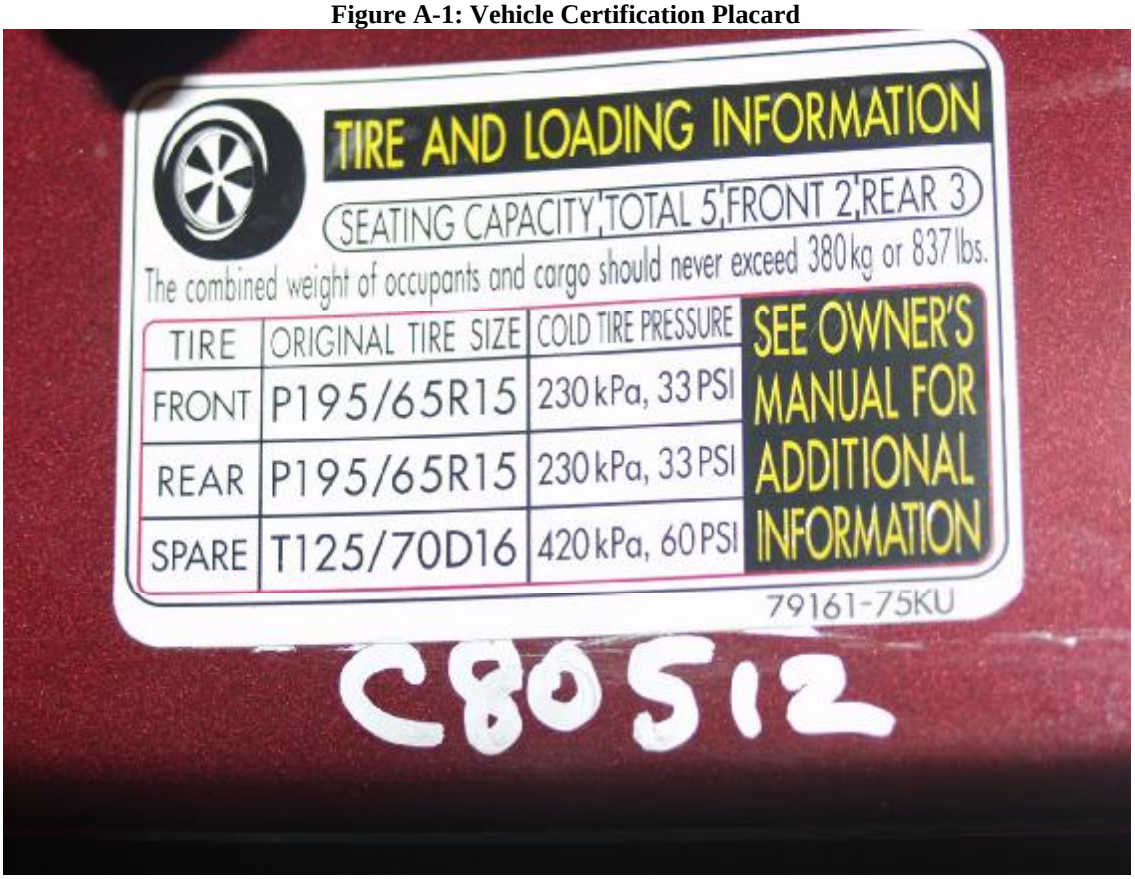


Figure A-2: Vehicle Tire Placard

Figure A-3: Pre-Test Front View

Figure A-4: Post-Test Front View

Figure A-5: Pre-Test Left Side View

Figure A-6: Post-Test Left Side View

Figure A-7: Pre-Test Right Side View

Figure A-8: Post-Test Right Side View

Figure A-9: Pre-Test Left Front Three-Quarter View

Figure A-10: Post-Test Left Front Three-Quarter View

Figure A-11: Pre-Test Right Front Three-Quarter View

Figure A-12: Post-Test Right Front Three-Quarter View

Figure A-13: Pre-Test Left Rear Three-Quarter View

Figure A-14: Post-Test Left Rear Three-Quarter View

Figure A-15: Pre-Test Right Rear Three-Quarter View

Figure A-16: Pre-Test Right Rear Three-Quarter View

Figure A-17: Pre-Test Rear View

Figure A-18: Post-Test Rear View

Figure A-19: Pre-Test MDB Front View

Figure A-20: Post-Test MDB Front View

Figure A-21: Pre-Test MDB Left Side View

Figure A-22: Post-Test MDB Left Side View

Figure A-23: Pre-Test MDB Right Side View

Figure A-24: Post-Test MDB Right Side View

Figure A-25: Pre-Test MDB Top View

Figure A-26: Post-Test MDB Top View

Figure A-27: Pre-Test Overhead Vehicle and MDB View

Figure A-28: Post-Test Impact Target View

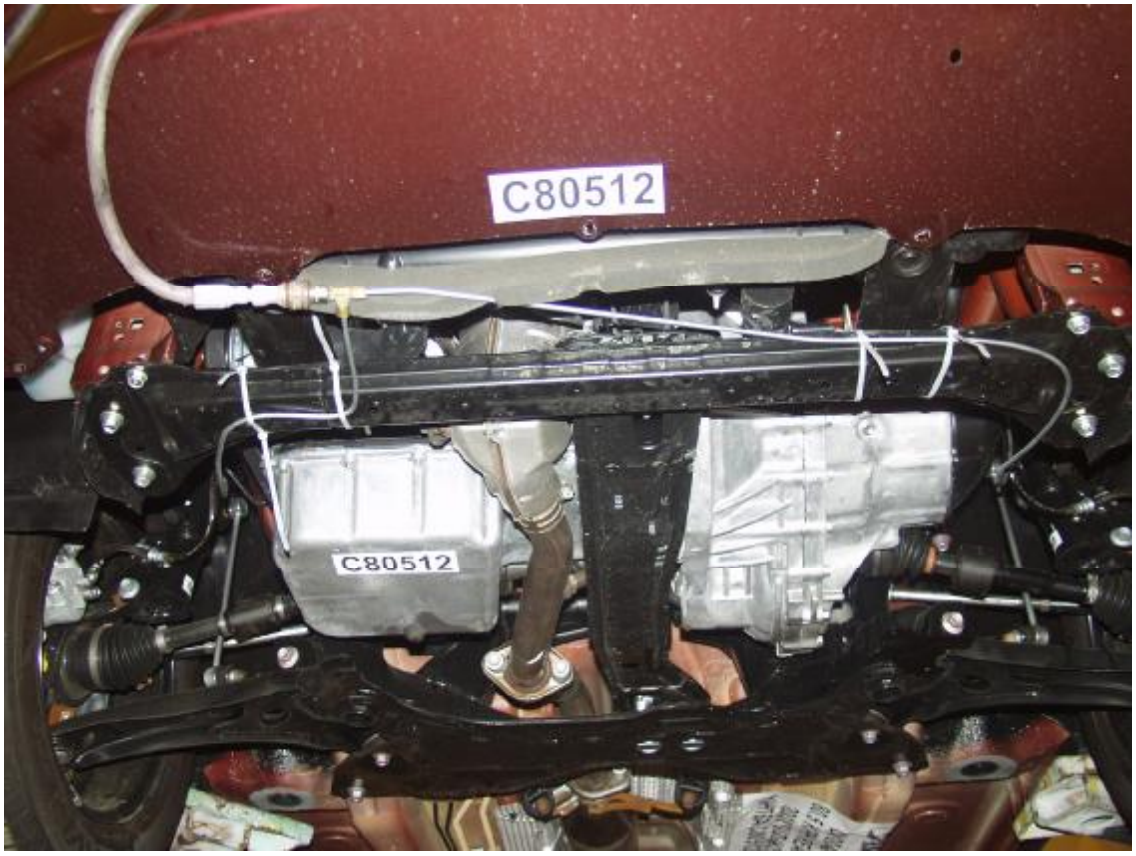


Figure A-29: Pre-Test Front Underbody View

Photograph Not Available

Figure A-30: Post-Test Front Underbody View

Figure A-31: Pre-Test Mid Underbody View

Photograph Not Available

Figure A-32: Post-Test Mid Underbody View

Figure A-33:Pre-Test Rear Underbody View

Photograph Not Available

Figure A-34: Post-Test Rear Underbody View

Figure A-35: Pre-Test Fuel Filler Cap View

Figure A-36: Post-Test Fuel Filler Cap View

Figure A-37: Impact View

Figure A-38: Rollover 90° View

Figure A-39: Rollover 180° View

Figure A-40: Rollover 270° View

Figure A-41: Rollover 360° View