REPORT NUMBER: 301-CAL-07-01

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

MAZDA MOTOR CORPORATION
2006 MAZDA RX-8
COUPE

NHTSA NUMBER: C65403

CALSPAN
TRANSPORTATION SCIENCES CENTER
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BUFFALO, NEW YORK 14225

June 20, 2007

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

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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 2006 Mazda RX-8 Coupe, meets the performance requirements of FMVSS No. 301 "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 1542.0 kg 2006 Mazda RX-8 Coupe was impacted from the rear by a 1357.5 kg moving barrier at a velocity of 79.2 kph (49.2 mph). The test was performed by Calspan Corporation on June 20, 2007.

The test vehicle was equipped with a 60 liter fuel tank which was filled to 94 percent usable capacity with stoddard fluid prior to impact. Additional ballast (27 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 587 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: 2006 Mazda RX-8 Coupe

Vehicle Body Color: Red NHTSA Number: C65403

Engine Data: 2-Rotor Rotary - CID; 1.3 Liters; - cc

Transmission: 6 Speed; - Manual; X Automatic; - Overdrive

Final Drive: X Rear Wheel Drive; - 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; X Stab Control - Traction Control X Anti-Theft

DEALER AND DELIVERY INFORMATION:

Date Received: 1/9/07 ; Odometer Reading 636 km

Selling Dealer: Lawrence Hall Mazda

Dealer Address: 1300 South Clack Abilene, TX 79605

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufacturer: Mazda Motor Corporation

Vehicle Build Date: 3/06

VIN:: JM1FE173460204276

GVWR: 1748 kg; GAWR: 844 kg FRONT; 907 kg REAR

DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:

Location of Tire Placard: B-Pillar Door

Type of Spare Tire: Vehicle does not have a spare tire; There is an emergency flat tire repair kit

	Front	Rear
Maximum Tire Pressure (sidewall - kPa)	350 kPa	350 kPa
Cold Pressure (tire placard - kPa) – test pressure	220 kPa	220 kPa
Recommended Tire Size (tire placard)	225/55R16	225/55R16
Vehicle Tire Size with load index & speed symbol	225/55R16 94V	225/55R16 94V
Tire Manufacturer	Dunlop	Dunlop
Tire Name	Sport D8	Sport D8
Treadwear, Traction, Temperature	200, A, A	200, A, A

VEHICLE CAPACITY DATA:

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

Number of Occupants: 2 Front; 2 Rear; 4 Total

Vehicle Capacity Weight (VCW) = 308.0 kg

No. of Occupants x 68.04 kg = 272.2 kg

Rated Cargo/Luggage Weight (RCLW) = 35.8 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 =	358.0	367.5	53.1	725.5
Rear =	324.5	317.0	46.9	641.5
			Total Delivered Weight (UDW) =	1367.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1367.0	kg
Rated Cargo/Luggage Weight (RCLW) =	35.8	kg
Weight of 2 p.572E Dummies @ 74 each =	148	kg
TARGET TEST WEIGHT =	1550.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 27.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	397.0	402.0	51.8	799.0
Rear =	370.0	373.0	48.2	743.0
			Total Vehicle Test Weight (ATW) =	1542.0

Weight of Ballast Secured in Vehicle[1] = 27 kg Ballast Type Lead shot

Method of securing Ballast: Shot bags were placed in rear seat fasten with the 3-point belt system

Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG[(2)]
AS DELIVERED:	715	718	765	708	1267.0
AS TESTED:	697	701	684	687	1301.0

Vehicle's Wheel Base: 2700 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: 1770 mm Location: Wheel well (rear)

Centerline offset for impact line: 354 mm

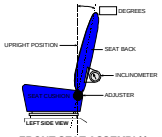
Filler neck side (left/right) left

DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2006 Mazda RX-8 Coupe NHTSA No. C65403

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

1. **Seat back angle for driver's seat:** 2.4 deg

Measurement instructions: Seat back was placed in the 11th detent from forward most (forward most = 1)

Seat back angle for passenger's seat: 2.4 deg

Measurement instructions: Seat back was placed in the 11th detent from forward most (forward most = 1)

2. **SEAT FORE AND AFT POSITIONING:**

Positioning of the driver's seat: Seat was placed in the 13th detent from the forward most position (forward most = 1)

Positioning of the passenger's seat: Seat was placed in the 13th detent from the forward most position (forward most = 1)

3. **FUEL TANK CAPACITY DATA:**

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 60 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 = 55.2 to 56.4 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 56 liters

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

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.

The fuel pump operates when the starter or engine is activated.

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 wheel hub was placed in the geometric center of the full range of driving positions

5. **SEAT BELT UPPER ANCHORAGE:**

Nominal design riding position: Not applicable

6. **COMMENTS:**

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2006 Mazda 2006 Coupe NHTSA No. C65403

MDB FACE MANUFACTURER AND SERIAL NUMBER:

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 Radial Rover P205/75R15

TIRE PRESSURE:

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

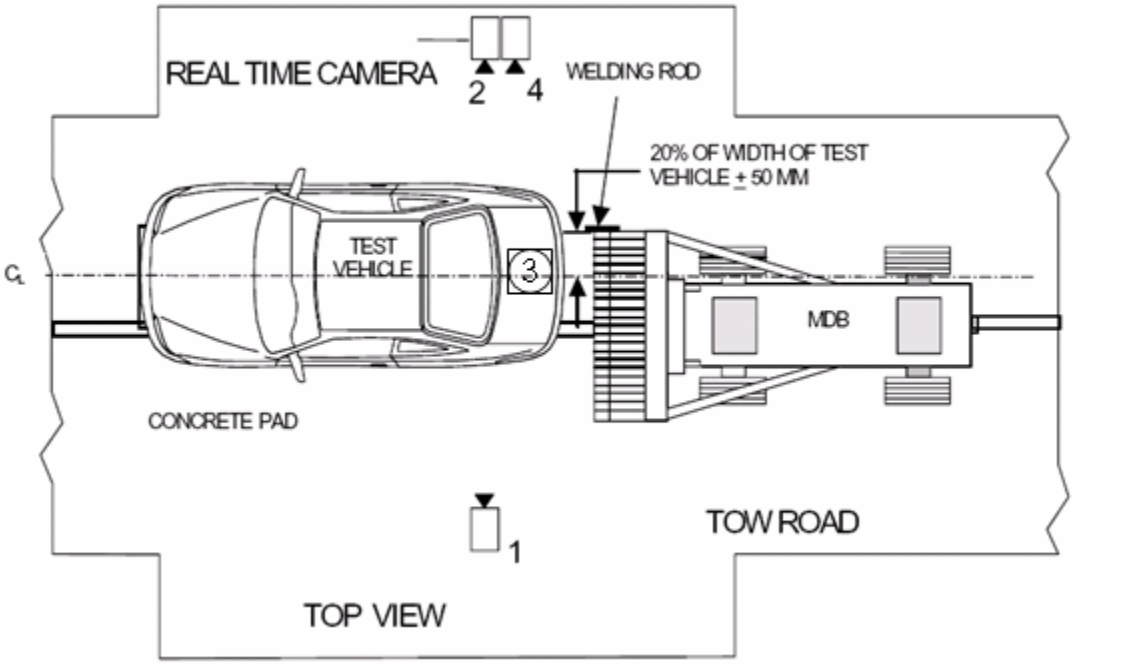
Brake Abort System? (Yes/No) Yes

Date of Last Calibration: 6/15/07

DATA SHEET 4

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2006 Mazda RX-8 Coupe NHTSA No. C65403



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	7676	1450	875	-18	24	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	30	390	4880	-90	14	1000
4	Right Side View	9226	1630	1470	-6.9	24	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.
X = (Impact Point)Film plane to monorail centerline
Y = (Impact Point)Film plane to impact location
Z = (Ground Level) Film plane to ground

DATA SHEET 5

POST-TEST DATA

Vehicle: 2006 Mazda RX-8 Coupe NHTSA No. C65403

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

ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:

Trap No. 1 = 792 km/h Trap No. 2 = 79.2 km/h

Average Impact Speed = 79.2 km/h

WELDING ROD IMPACT POINT:

-30 mm Vertical distance from target center (+ is above) Tolerance: ±50 mm

-10 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: 2006 Mazda 2006 Coupe NHTSA No. C65403

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK FAILURE
P1 (Left Front)	5 mm rearward	Moved rearward
P2 (Right Front)	6 mm rearward	Moved rearward

POST TEST ATD CONTACT DATA

LOCATION	Position 1 (Driver)	Position 2 (Passenger)
Head	Back of head with head restraint	Back of head with 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	4246	4421	4242
Post-Test	3510	3753	3885
Crush	736	668	357

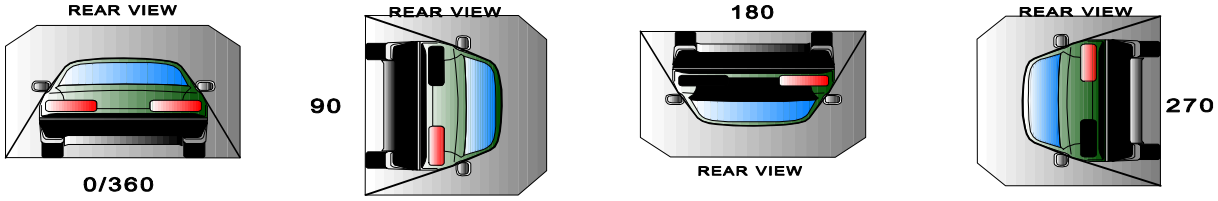
Vehicle Wheel Base:

	Left Side	Right Side
Pre-Test	2698	2703
Post-Test	2670	2702
Crush	28	1

DATA SHEET 6

FMVSS 301 ROLLOVER DATA

Vehicle: 2006 Mazda RX-8 Coupe NHTSA No.: C65403



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	15	seconds	5	minutes	6	minutes	15	seconds	7	minutes
90º - 180º	1	minutes	05	seconds	5	minutes	6	minutes	5	seconds	7	minutes
180º-270º	1	minutes	0	seconds	5	minutes	6	minutes	0	seconds	7	minutes
270º-360º	1	minutes	12	seconds	5	minutes	6	minutes	12	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

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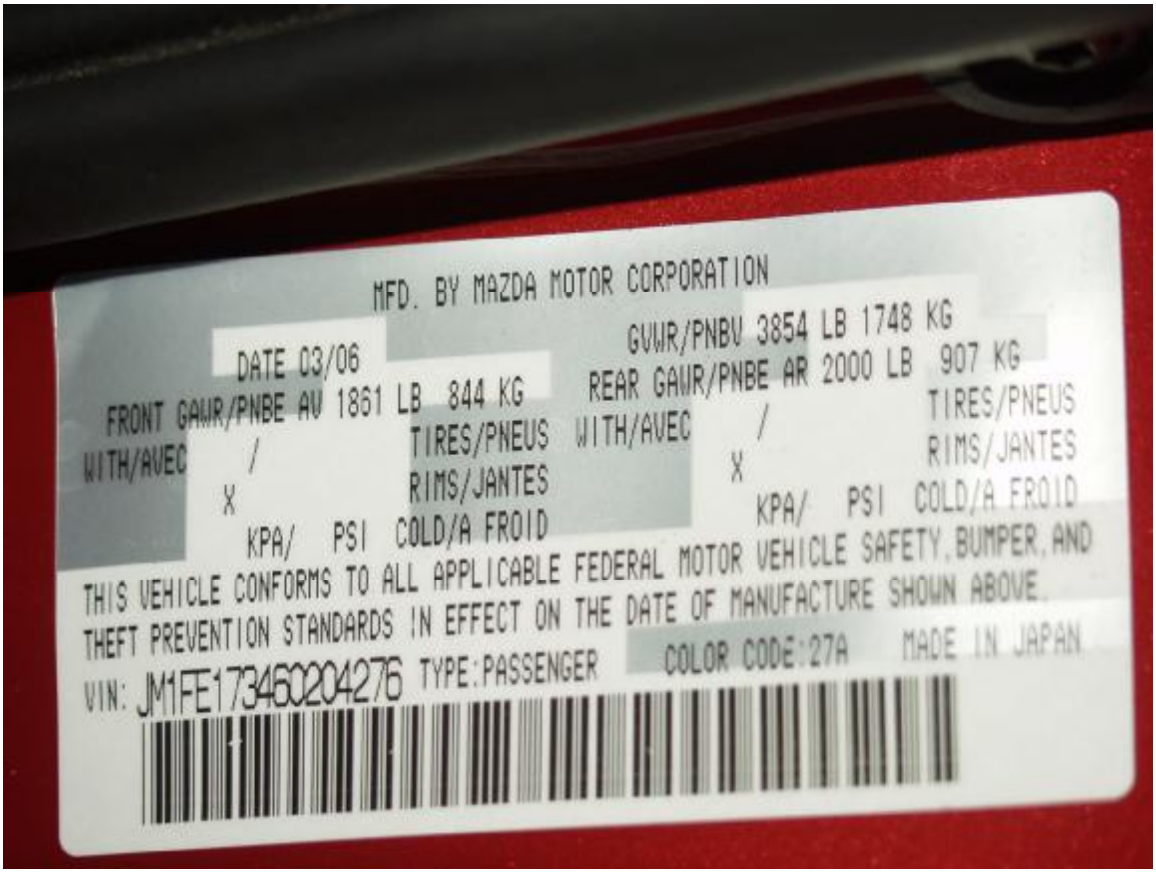

Figure A-1: Vehicle Certification Placard

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

Figure A-30: Post-Test Front Underbody View

Figure A-31: Pre-Test Mid Underbody View

Figure A-32: Post-Test Mid Underbody View

Figure A-33:Pre-Test Rear Underbody View

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