REPORT NUMBER: 301-CAL-07-02

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

NISSAN MOTOR CO. LTD. 2007 NISSAN ALTIMA 4 - DOOR

NHTSA NUMBER: C75206

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



June 21, 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 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 th	e subject 2007 Nissan Altima	4 - door	in accordance with the	specifications of the
Office of Vehicle Safety Compliance T	Test Procedure No. TP-301R-	02 for the	determination of FMV	VSS 301 compliance.
Test failures identified were as follows:				•
The test vehicle appeared to comply with	h all requirements of FMVSS	301R-02 "	Fuel System Integrity -	- Rear Impact."
17. Key Words		18. Distri	bution Statement	
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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 2007 Nissan Altima 4 - door, 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).

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SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 1805 kg 2007 Nissan Altima 4 - door was impacted from the rear by an 1362.5 kg moving barrier at a velocity of 78.5 kph (48.8 mph). The test was performed by Calspan Corporation on June 21, 2007.

The test vehicle was equipped with a 75.5 liter fuel tank which was filled to 92 percent capacity with stoddard fluid prior to impact. Additional ballast (59 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 537 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

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SECTION 3

SUMMARY OF TEST RESULTS

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TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFOR Year/Make/Model/Bod		2007 Nissan Altima 4 - door				
Vehicle Body Color:	Pebble Beach	NHTSA Number:	C75206			
Engine Data:	4 Cylinders;	- CID; 2.5 I	Liters; - cc			
Transmission:	3 Speed; - Manual	x Automatic;	- Overdrive			
Final Drive:	- Rear Wheel Drive;	x Front Wheel	Drive; - Four Wheel Drive			
MAJOR TEST VEHICL	E OPTIONS:					
<u>x</u> AC; <u>x</u> P			Power Seats			
x_ABS;x_T DEALER AND DELIVE		ol <u>x</u> Traction Control <u>x</u>	Anu-Theit			
Date Received:	3/28/07 ;	Odometer Reading	278 km			
			278 KIII			
Selling Dealer:	2590	West Herr Nissan	NIV 14127			
Dealer Address:		Southwestern Blvd Orchard Park	, N 1 141 <i>21</i>			
Vehicle Manufacture	E'S CERTIFICATION LABEL:	Nissan Motor Co. LTD.				
Vehicle Build Da		02				
Venicie Bund Da		1N4CL21E37C161161				
			1000 kg REAR			
	E'S TIRE LABEL AND SIDEWA		kg KE/IK			
Location of Tire Pl		Driver Bottom Door S	ill			
Type of Spare Tire		Space Saver				
Type of Spare The		Front	Rear			
Maximum Tire Pressure ((sidewall - kPa)	240	240			
Cold Pressure (tire placare	`	240	240			
Recommended Tire Size	•	P215/60R16	P215/60R16			
Vehicle Tire Size with loa	•	P215/60R16 94T	P215/60R16 94T			
Tire Manufacturer	1 ,	Continental	Continental			
Tire Name		ContiProcontact	ContiProcontact			
Treadwear, Traction, Tem	nperature	400 AA A	400 AA A			
VEHICLE CAPACITY D	DATA:					
Type of Front Se	eats: - Ber	nch; x Bucket;	- Split Bench			
Number of Occu	ipants: 2 Fro	nt; 3 Rear;	5 Total			
Vehicle Capacity	y Weight (VCW) =	408 kg				
No. of Occupant	$ts \times 68.04 \text{ kg} =$	340.2 kg				
Rated Cargo/Lug	ggage Weight (RCLW) =	67.8 kg				

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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 =	466	469	58.8	935.0	
Rear =	332	323	41.2	655.0	
Total Delivered Weight (UDW) =					

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1590.0	kg
Rated Cargo/Luggage Weight (RCLW) =	67.8	kg
Weight of 2 p.572E Dummies @ 78 each =	156	kg
TARGET TEST WEIGHT =	1813.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 59.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	521	519	57.6	1040.0
Rear =	383	382	42.4	765.0
	1805.0			

Weight of Ballast Secured in Vehicle ¹ =	59	kg	Ballast Type	Lead shot bags

Method of securing Ballast:Compartment placement

Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG ²
AS DELIVERED:	754	748	746	746	1631
AS TESTED:	734	732	728	727	1598

Vehicle's Wheel Base: 2774 mm

VEHICLE PRE-TEST WIDTH AND IMPACT OFFSET MEASUREMENT:

Vehicle Width at Widest Point:	1810	mm	Location: Front fender over axle
Centerline offset for impact line:	362	mm	
Filler neck side (left/right)	Left		

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

²Rearward of the front axle centerline.

DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2007 Nissan Altima 4 - door NHTSA No. C75206

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. Seat back angle for driver's seat: 7 degrees Measurement instructions: 7 detents of mechanical adjustment Seat back angle for passenger's seat: 7 degrees Measurement instructions: 7 detents of mechanical adjustment **SEAT FORE AND AFT POSITIONING:** Positioning of the driver's seat: 0 to 24 detents – mechanical adjustment Placed in 10th detent starting from 0 according to set-up information Positioning of the passenger's seat: 0 to 24 detents - mechanical adjustment Placed in 12th detent starting from 0 according to set-up information **FUEL TANK CAPACITY DATA:** 3.1 A. "Usable Capacity" of the standard equipment fuel tank is 75.7 liters B. "Usable Capacity" of the optional equipment fuel tank is **NONE** liters C. "Usable Capacity" of the vehicle(s) used for certification 69.64 71.16 liters testing to requirements of FMVSS 301 = 3.2 Actual Amount of Stoddard solvent added to vehicle for test = 70.0 liters Stoddard Fluid: specific gravity: 0.764; kinematic viscosity: color: Red 0.96 centistokes; 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. With ignition turned "ON" 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: Telescoping column placed in mechanical middle with wheel tilt placed on Mechanical middle which is 3rd detent starting from 0 position. SEAT BELT UPPER ANCHORAGE: Nominal design riding position: 4 detents in anchorage system – placed in 0 detent which is top position

2.

4.

5.

6.

COMMENTS:

None

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MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2007 Nissan Altima 4 - door NHTSA No. C75206

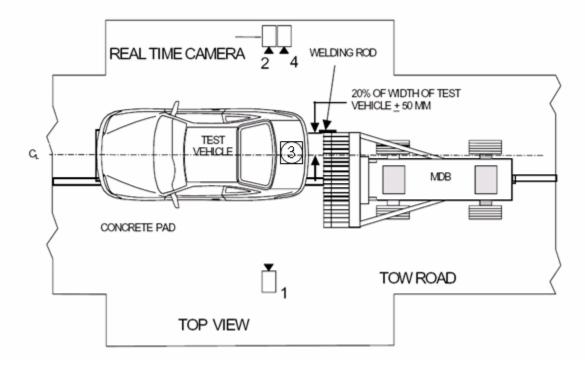
MDB FACE MANUFACTU	JRER AND S	ERIAL NUM	<u>IBER:</u>					
N/A								
MDB DETAILS:								
Overall Width of F	ramework Car	rriage		=	125	0	millimeters	
Overall Length of l	MDB (incl. ho	neycomb imp	pact face)	=	412	0	millimeters	
Wheelbase of Fram	Wheelbase of Framework Carriage			=	259	1	millimeters	
Tread of Framewor	Tread of Framework Carriage (Front & Rear)			=	187	5	millimeters	
C.G. Location Rear	rward of Front	Axle		=	113	9	millimeters	
MDB WEIGHT:								
Left Front	= _	357.0	kg	Left	Rear	=	323.0	kg
Right Front	= _	404.0	kg	Righ	t Rear	=	273.5	kg
TOTAL FRONT =	: <u> </u>	761.0	kg	TOT	AL REAR	=	596.5	kg
TOTAL MDB WE	IGHT =	1357.5	kg					
Tires (Mfr, line, siz	ze):							
TIRE PRESSURE:								
Left Front	= _	207	<u>k</u> Pa	Left	Rear	=	207	<u>k</u> Pa
Right Front	= _	207	kPa	Righ	t Rear	=	207	kPa
Brake Abort Syster	n? (Yes/No)		Yes					
Date of Last Calibr	ration:		6/15/0)7				

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HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2007 Nissan Altima 4 - door

NHTSA No. <u>C75206</u>



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			_
1	Left Side View	7676	1450	868	-1.8	50	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	0	436		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) + Forward

Y = (Impact Point) + To Right

Z = (Ground Level) + Down

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POST-TEST DATA

Vehicle: _2007 Nissan Altima <u>4 - door</u>	NHTSA No. <u>C75206</u>
REQUIRED IMPACT VELOCITY RANGE:: 78.5 to 80.1 km/h	
ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:	
Trap No. 1 = $\frac{78.5}{\text{km/h}}$ Km/h Trap No. 2 = $\frac{78.5}{\text{km/h}}$	
Average Impact Speed = 78.5 km/h	
WELDING ROD IMPACT POINT:	
Vertical distance from target center (+ is above) Tolerance: ±50 mm	
0 Horizontal distance from target center (+ is right) Tolerance: ±50 mm	
STODDARD SOLVENT SPILLAGE MEASUREMENT:	
A. Front impact until vehicle motion ceases -	
$Actual = \underline{\qquad \qquad} g \qquad Maximum \ Allowable = 28 \ g$	
B. For 5 minute period after vehicle motion ceases -	
$Actual = \underline{\qquad \qquad} g Maximum \ Allowable = 28 \ g$	
C. For next 25 minutes -	
Actual = g/minute Maximum Allowable = 28 g/minute	
D. Provide Spillage Details:	
None	

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POST-TEST DATA (Continued)

Vehicle: 2007 Nissan Altima 4 - door NHTSA No. C75206

POST TEST SEAT DATA

LOCATION SEAT MOVEMENT (mm)		SEAT BACK FAILURE		
P1 (Left Front)	0	Seat reclined backwards		
P2 (Right Front)	0	Seat reclined backwards		

POST TEST ATD CONTACT DATA

LOCATION	Position 1 (Driver)	Position 2 (Passenger)		
Head	Back of head to head rest	Back of head to head rest		
Chest	N/A	N/A		
Abdomen	N/A	N/A		
Left Knee N/A		N/A		
Right Knee	N/A	N/A		

VEHICLE DIMENSIONS:

Vehicle length:

	Left Side	Centerline	Right Side
Pre-Test	4780	4811	4780
Post-Test	N/A	4274	4526
Crush	N/A	537	254

Vehicle Wheel Base:

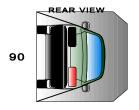
	Left Side	Right Side
Pre-Test	2774	2774
Post-Test	2756	2749
Crush	18	25

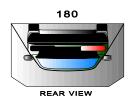
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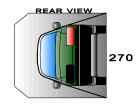
FMVSS 301 ROLLOVER DATA

Vehicle: 2007 Nissan Altima 4 - door









NHTSA No.: <u>C75206</u>

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage		Rotation (spec. 1				SS 301 Time		Total '	Time			Whole Interval
0° - 90°	1	minutes	09	seconds	5	minutes	6	minutes	9	seconds	7	minutes
90° - 180°	1	minutes	01	seconds	5	minutes	6	minutes	1	seconds	7	minutes
180°-270°	0	minutes	59	seconds	5	minutes	5	minutes	59	seconds	6	minutes
270°-360°	1	minutes	08	seconds	5	minutes	6	minutes	8	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)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180°-270°	0	0	0	N/A
270°-360°	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
0° - 90°	None
90° - 180°	None
180°-270°	None
270°-360°	None

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APPENDIX A

PHOTOGRAPHS

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Figure A-1: Vehicle Certification Placard

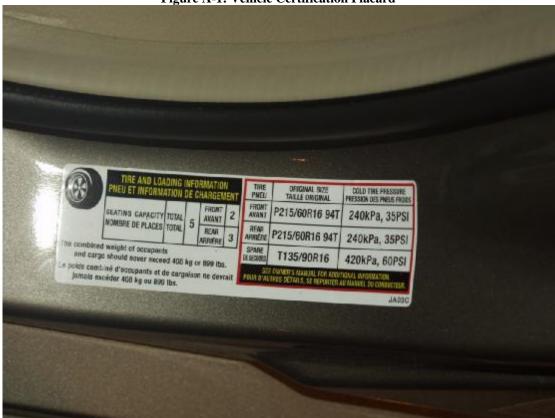


Figure A-2: Vehicle Tire Placard

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Figure A-3: Pre-Test Front View



Figure A-4: Post-Test Front View

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Figure A-5: Pre-Test Left Side View



Figure A-6: Post-Test Left Side View

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Figure A-7: Pre-Test Right Side View



Figure A-8: Post-Test Right Side View

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



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

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



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

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



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

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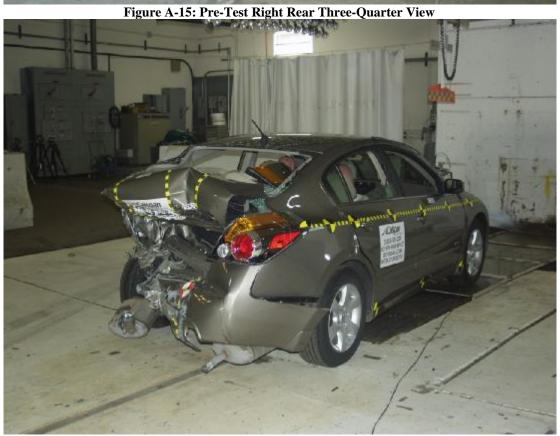


Figure A-16: Pre-Test Right Rear Three-Quarter View

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Figure A-17: Pre-Test Rear View



Figure A-18: Post-Test Rear View

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Figure A-19: Pre-Test MDB Front View



Figure A-20: Post-Test MDB Front View

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



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

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



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

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Figure A-25: Pre-Test MDB Top View



Figure A-26: Post-Test MDB Top View

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



Figure A-28: Post-Test Impact Target View

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Figure A-29: Pre-Test Front Underbody View



Figure A-30: Post-Test Front Underbody View

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Figure A-31: Pre-Test Mid Underbody View



Figure A-32: Post-Test Mid Underbody View

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Figure A-33:Pre-Test Rear Underbody View



Figure A-34: Post-Test Rear Underbody View

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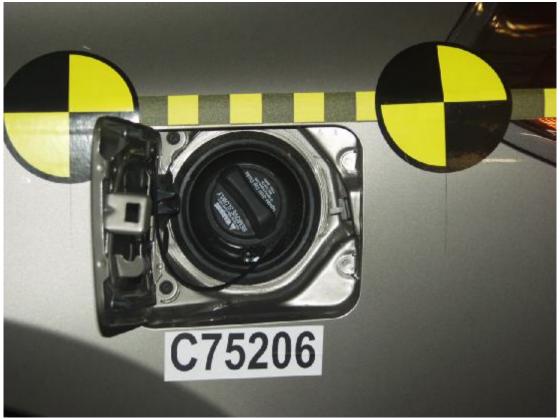


Figure A-35: Pre-Test Fuel Filler Cap View



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

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Figure A-37: Impact View

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Figure A-38: Rollover 90° View



Figure A-39: Rollover 180° View

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Figure A-40: Rollover 270° View



Figure A-41: Rollover 360° View

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