

2004 JEEP LIBERTY 4-DOOR MPV FRONTAL VEHICLE CRASH TESTS IN SUPPORT OF FMVSS 208 UPGRADE

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SEPTEMBER 9, 2004

FINAL REPORT

PREPARED FOR:

**U.S. DEPARTMENT OF TRANSPORTATION
VOLPE NATIONAL TRANSPORTATION SYSTEMS CENTER
OFFICE OF SAFETY AND SECURITY
55 BROADWAY
CAMBRIDGE, MA 02142**

IN COOPERATION WITH:

**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF APPLIED VEHICLE SAFETY RESEARCH
400 SEVENTH STREET, SW
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16. Abstract A 30 mph (48.27 km/h) frontal barrier impact test was conducted on a 2004 Jeep Liberty 4-Door MPV at Karco Engineering, LLC on 09/9/04. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity was 48.17 km/h. The ambient temperature at the barrier face at the time of impact was 34.4 degrees Celsius. The vehicle's maximum post-test static crush was 240 mm at the vehicle centerline. The test vehicle was equipped with 3-point continuous loop belt systems and second-generation supplemental airbags in both front outboard seating positions. The front seated dummies were unbelted. The center rear seat was equipped with a 3-point continuous loop belt system. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:																																										
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th rowspan="2">Threshold</th> <th colspan="2">Front ATDs</th> <th colspan="2">Rear ATDs</th> </tr> <tr> <th>Driver (H3 50%)</th> <th>Passenger (H3 50%)</th> <th>Center Rear (H3 50%)</th> <th></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>306.7</td> <td>523.2</td> <td>419.6</td> <td></td> </tr> <tr> <td>Max. Chest Accl. (3 msec Clip)</td> <td>G's</td> <td>60</td> <td>54.9</td> <td>66.6</td> <td>41.2</td> <td></td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>50% 10008</td> <td>-7662.0</td> <td>-7646.7</td> <td>-1539.4</td> <td></td> </tr> <tr> <td>Right femur Force</td> <td>Newton</td> <td>50% 10008</td> <td>-6578.2</td> <td>-8065.1</td> <td>-2388.6</td> <td></td> </tr> </tbody> </table>				Measurement Description	Units	Threshold	Front ATDs		Rear ATDs		Driver (H3 50%)	Passenger (H3 50%)	Center Rear (H3 50%)		Head Injury Criteria (HIC ₁₅)	N/A	700	306.7	523.2	419.6		Max. Chest Accl. (3 msec Clip)	G's	60	54.9	66.6	41.2		Left Femur Force	Newton	50% 10008	-7662.0	-7646.7	-1539.4		Right femur Force	Newton	50% 10008	-6578.2	-8065.1	-2388.6	
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SECTION 1

PURPOSE AND SUMMARY OF TEST R40401

1.1 PURPOSE

This 30 mph (48.27 km/h) frontal barrier impact test was conducted as a research study for frontal vehicle crash tests in support of the FMVSS 208 upgrade test program. It was sponsored by the Volpe National Transportation Systems Center (Volpe) in cooperation with the National Highway Traffic Safety Administration (NHTSA) under Contract DTRS57-04-D-30000. The purpose of this test program is to obtain vehicle crashworthiness and occupant restraint system performance data to evaluate and compare occupant responses with standard 50th percentile male dummies (unbelted tested at 30 mph) and the larger 95th percentile male dummies (belted tested at 35 mph) in the front outboard seating positions.

This 30 mph (48.27 km/h) frontal barrier impact test was conducted in accordance with The Laboratory Test Procedures for the Office of Vehicle Safety Compliance FMVSS 208 "Occupant Crash Protection" (TP208-10) and Office of Crashworthiness Standards New Car Assessment Program (NCAP) Frontal Impact testing.

1.2 SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2004 Jeep Liberty 4-Door MPV at a velocity of 48.17 km/h (29.94 mph). The test was performed at KARCO Engineering, LLC on September 9, 2004.

Two Part 572E 50th percentile male anthropomorphic test devices (ATDs or dummies), with THOR-LX legs, were placed in the driver and right-front passenger seating positions. These dummies were unbelted during the crash. A Part 572E 50th percentile male ATD was placed in the center-rear passenger seat and was restrained with the three point shoulder-lap belt harness.

The ATDs were fully instrumented with head (primary and redundant) and chest (primary and redundant) accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right and left femur load cells and THOR-LX legs. Load cells were placed on the ATDs (center-rear passenger) lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (H3 50%) ATD (Serial No. 043), with THOR-LX legs (Serial No. Right: 103 and Left: 104), right-front passenger (H3 50%) ATD (Serial No. 045), with THOR-LX legs (Serial No. Right: G109, Left: G110), and center-rear passenger (H3 50%) ATD (Serial No. 055), were calibrated prior to this test.

One hundred seventy two (172) channels of data were recorded using an on-board data acquisition system. Three (3) real-time, seven (7) high-speed digital video and thirteen (13) high-speed film cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Appendix A contains Pre- and Post-Test Photographs; Appendix B contains the vehicle and dummy response data traces; Appendix C contains the Load Cell Barrier information; Appendix D contains the Instrumentation Data Channel Assignments; and Appendix E contains the Dummy Calibration data.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the impact event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 240 mm. All four doors remained closed during impact and opened without the aid of tools. All doors were operable after the impact.

The Driver's (H3 50%) visible contact points were as follows: On impact the head contacted the airbag and sun-visor, the chest contacted the airbag, both knees contacted the knee bolster, both tibias contacted the knee bolster.

The right-front Passenger's (H3 50%) visible contact points were as follows: The head contacted the airbag and sun-visor, the chest contacted the airbag, both knees contacted the glove box and both tibias contacted the glove box.

The center-rear passenger's (H3 50%) visible contact points were as follows: The head (chin) contacted the chest, the chest had no contact. The left knee and tibia contacted the left-front seatback. The right knee and tibia contacted the right-front seatback.

Occupant injury data is contained in table below.

OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅	Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)
Driver (H3 50%)	306.7	54.9	-41.6	-7662.0	-6578.2	N/A
Passenger (H3 50%)	523.2	66.6	-12.0	-7646.7	-8065.1	N/A
Ct. Rear Pass. (H3 50%)	419.6	41.2	-37.8	-1539.4	-2388.6	304.5

SECTION 2
OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	48.17
Test Weight	kg	2025
Impact Angle	degrees	0
Average Rebound	mm	465
Maximum Static Crush	mm	240

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver (H3 50%) Side	Passenger (H3 50%) Side
Front Door opening	Remained closed, opened w/o tools	Remained closed, opened w/o tools
Rear Door Opening	Remained closed, opened w/o tools	Remained closed, opened w/o tools
Front Seat Track Shift (mm)	0	0
Front Seat Back Failure	No	No
Rear Seat Track Shift (mm)	0	0
Rear Seat Back Failure	No	No

HYBRID III DUMMY CONTACT INFORMATION

Description	Driver (H3 50%)	Passenger (H3 50%)	Center Rear (H3 50%)	
Dummy Type	50% Male	50% Male	50% Male	
Serial No	043	045	055	
Head	Airbag, Sun-Visor	Airbag, Sun-Visor	Chin to Chest	
Chest	Airbag	Airbag	None	
Left Knee	Bolster	Glove Box	Seatback	
Right Knee	Bolster	Glove Box	Seatback	
Left Tibia	Bolster	Glove Box	Seatback	
Right Tibia	Bolster	Glove Box	Seatback	

DATA SHEET NO. 1...(CONTINUED)**CRASH TEST SUMMARY**Test Vehicle: 2004 Jeep Liberty 4-Door MPVNHTSA No.: R40401Test Program: 2004 FMVSS 208 UpgradeTest Date: 9/9/04**FILM & VIDEO COVERAGE**

Real-Time Video	3
High-Speed 16mm Movie	13
High-Speed Video	7
Total	23

DATA CHANNELS

Driver (50%) ATD Sensors	63
Right Front Pass. (50%) ATD Sensors	63
Left Rear Pass. (50%) ATD Sensors	
Right. Rear Pass. (50%) ATD Sensors	
Ct. Rear Pass. (50%) ATD Sensors	26
Belt Assessment Sensors	3
Airbag Timing Sensors	4
Vehicle Structure Accelerometers	13
Rigid Barrier Load Cells	36
Total	208

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40401

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	R40401	Anti-Lock Brakes	Yes
Make	Jeep	All Wheel Drive	No
Model	Liberty	Power Steering	Yes
Body Style	4-Door Utility	Driver Front Airbag	Yes
VIN No.	1J4GK48K84W226063	Driver Side Airbag	No
Color	Blue	Driver Head Airbag	No
Delivery Date	5/2604	Driver Curtain Airbag	No
Odometer	24	Passenger Airbag	Yes
Dealer	Victorville-Chrysler-Jeep	Passenger Side Airbag	No
Transmission	4-Speed Automatic	Passenger Head Airbag	No
Final Drive	Rear	Passenger Curtain Airbag	No
Type/No. of Cylinders	V6	Pre-Tensioners	Yes
Engine Displacement (L)	3.7	Load Limiters	Yes
Engine Placement	Longitudinal	Bucket Seats	Yes
Roof Rack	Yes	Air Conditioner	Yes
Sunroof/T-Top	No	AM/FM Cassette	Yes
Tinted Glass	Yes	Tilt Steering	Yes
Traction Control	No	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	Yes
Rear Disc	Yes	Other	N/A
Does Owners Manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler Chrysler Corporation	GVWR (kg)	2427
		GAWR Front (kg)	1248
Date of Manufacture	1/04	GAWR Rear (kg)	1429

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

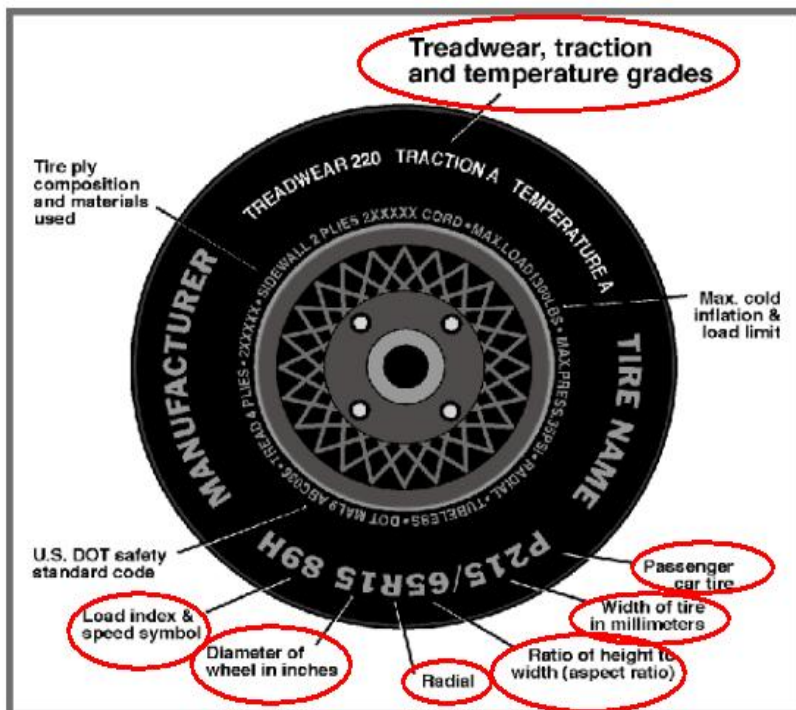
Measured Parameter	Front	Second Row	Third Row	Total
Type of Seats	Bucket	Split Bench		
Number of Occupants	2	3		5
Capacity Weight (VCW) (kg)				522
Cargo Weight (RCLW) (kg)				136

DATA SHEET NO. 2...(CONTINUED)
GENERAL TEST AND VEHICLE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	308	308
Cold Pressure (kpa)	227	227
Recommended Tire Size	P215/75R16	P215/75R16
Tire Size on Vehicle	P215/75R16	P215/75R16
Tire Manufacturer	Goodyear	Goodyear
Tread wear	340	340
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Plies Polyester Cord	2 Plies Polyester Cord
Tire Plies Body	N/A	N/A
Load Index/Speed Symbol	101S	101S
Tire Material	Polyester & Steel	Polyester & Steel
DOT Safety Code Right	M6Y4-EYER-2203	M6Y4-EYER-2203
DOT Safety Code Left	M6Y4-EYER-2203	M6Y4-EYER-2203

DATA SHEET NO. 2...(CONTINUED)
GENERAL TEST AND VEHICLE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	450	420		494	534	
Right	kg	448	395		491	506	
Ratio	%	52%	48%		49%	51%	
Totals	kg	898	815	1713	985	1040	2025

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1713
Weight of 2 P572 M ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	136
Calculated Vehicle Target Wt. (TVTW)	kg	2001

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	795	804	825	835	1272
As Tested	mm	885	894	921	942	1352

Vehicle Wheel Base (mm) 2650

Weight of Ballast Secured in cargo area (kg) N/A

Vehicle Components Removed Rear Light, Rear Bumper, Rear Glass, Rear Hatch
Spare Tire and Spare Tire Mount.

* Ballast weight does not include cameras, instrumentation and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L) 73.8

Usable Capacity Furnished by COTR (L) 67.9 to 69.4

Actual Test Volume with entire fuel System Filled (L) 68.6

Test Fluid Type: Stoddard Solvent

Kinematic Viscosity: as per ASTM Standard D484-71 Purple

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "On" & engine "OFF" Yes

Fuel System Particulars: Key operated with automatic shut-off when key is in 'OFF' position.

DATA SHEET NO. 3
POST TEST IMPACT DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No.1 Velocity (Primary)	km/h	55.51 to 57.12	48.17
Trap No. 1 Entry Distance	mm	<1524	1524
Trap No.1 Exit Distance	mm	<1524	305
Trap No.2 Velocity (Redun.)	km/h	55.51 to 57.12	48.12
Trap No.2 Entry Distance	mm	<1524	1524
Trap No.2 Exit Distance	mm	<1524	305

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4081	3994	-87
Center	mm	4214	3974	-240
Right Side	mm	4071	3934	-137

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	450
Center	mm	460
Right Side	mm	485
Average	mm	465

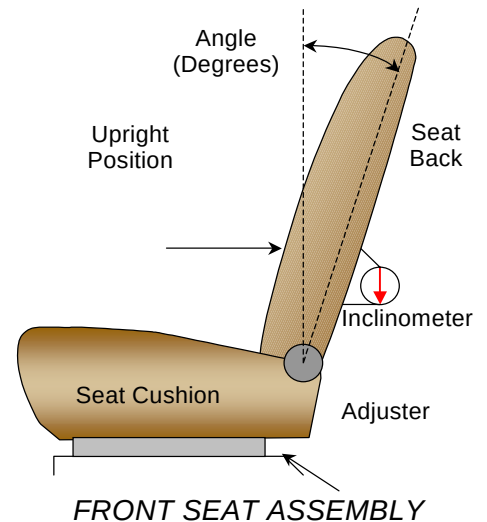
DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows:
A digital inclinometer is placed firmly against a flat surface of the seat back. The seat back angle is measured directly from the digital readout.



SEAT BACK ANGLES

	Deg.
Front Driver	23.5
Front Passenger	23.5
Center Rear Passenger	23.0

SEAT FORE/AFT POSITIONS

The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for both the driver and passenger.

SEAT FORE/AFT POSITIONING

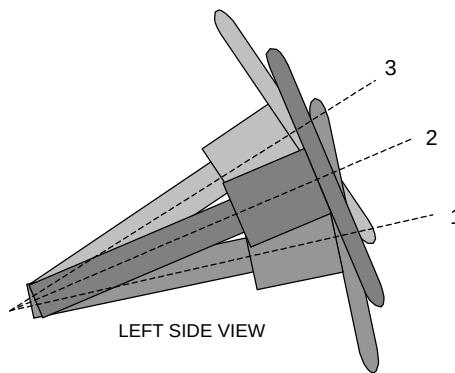
	Total Fore/Aft Travel	Placed in Position #
Front Driver	18 Detents	10 th Detent
Front Passenger	18 Detents	10 th Detent
Ct. Rear Pass. (2 nd Row)	1	1

DATA SHEET NO. 4...(CONTINUED)**TEST VEHICLE INFORMATION**Test Vehicle: 2004 Jeep Liberty 4-Door MPVNHTSA No.: R40401Test Program: 2004 FMVSS 208 UpgradeTest Date: 9/9/04**SEAT BELT UPPER ANCHORAGE****SEAT BELT UPPER ANCHORAGE**

	Total # of Positions	Placed in Position #
Front Driver	N/A	N/A
Front Pass.	N/A	N/A
Center Rear Pass.	1	1

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.

*STEERING COLUMN ASSEMBLY***STEERING COLUMN POSITIONS**

	Degrees
Lowermost position No. 1	22.0
Geometric center position No. 2	25.0
Uppermost position No. 3	28.0

Steering column placed in mid position.

DATA SHEET NO. 4...(CONTINUED)
TEST VEHICLE INFORMATION

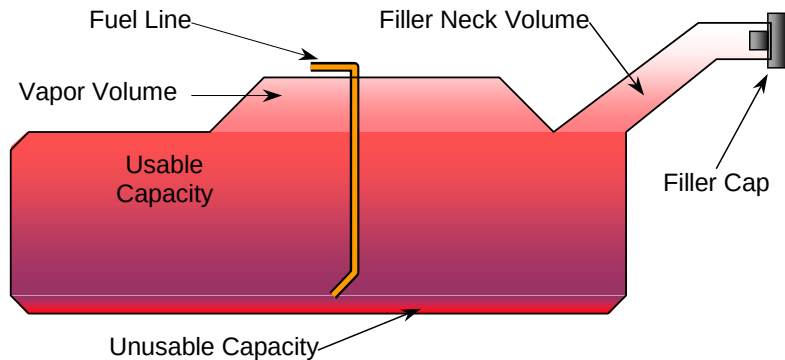
Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	73.8
Usable Capacity of "Optional" Tank	N/A
Usable Capacity used for FMVSS 301	67.9 to 69.4
Actual Amount of Solvent used	68.6

The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the left rear seat forward of the rear axle.

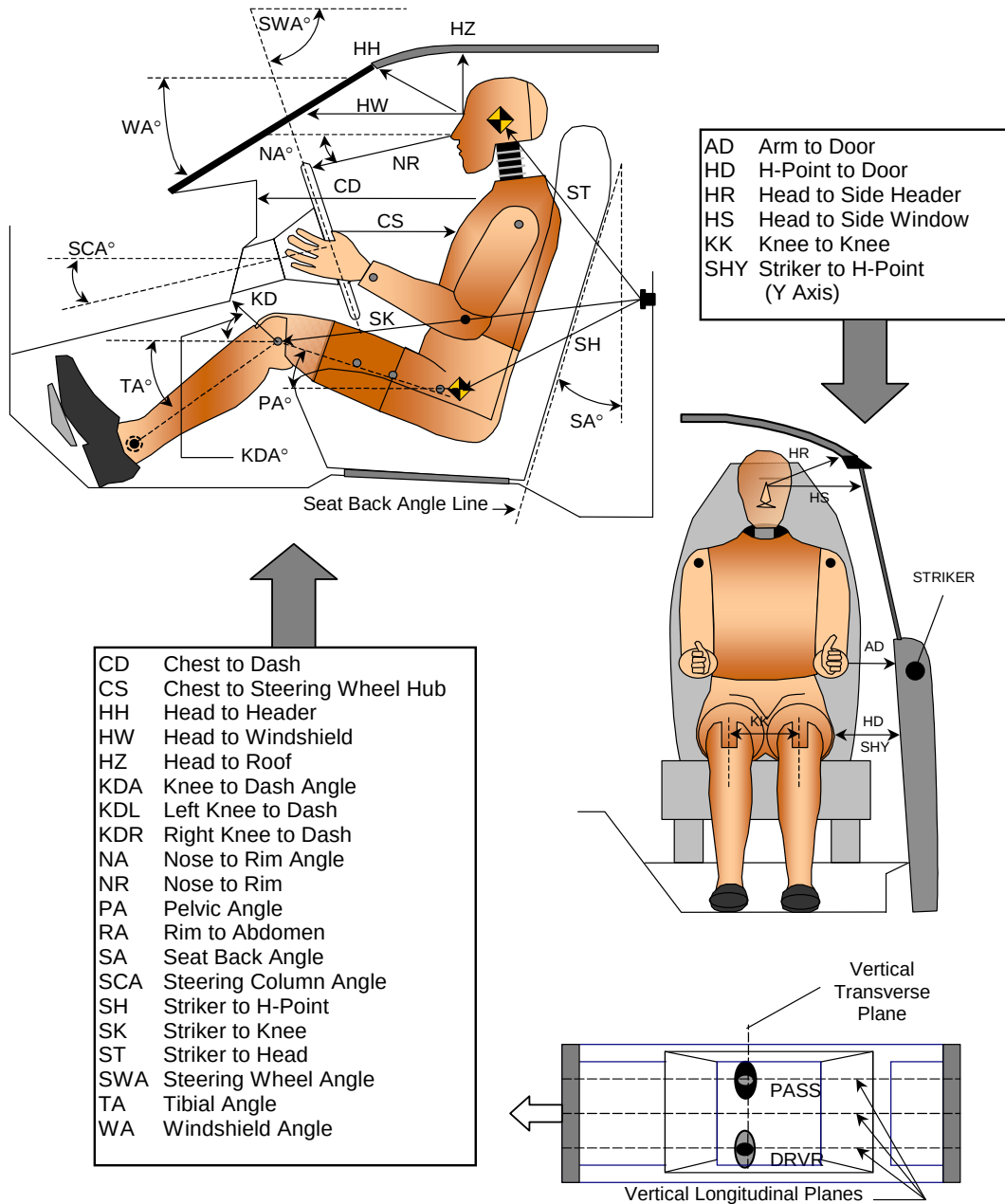


VEHICLE FUEL TANK ASSEMBLY

DATA SHEET NO. 5 **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 5...(CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

TEST DUMMY POSITION MEASUREMENTS - FRONT SEAT DUMMIES

Code	Measurement Description	Driver (H3 50%)		Passenger (H3 50%)	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
WA	Windshield Angle		38.0		
SWA	Steering Wheel Angle		65.0		
SCA	Steering Column Angle		25.0		
SA	Seat Back Angle		23.5		23.5
HZ	Head to Roof (Z)	235	90.0	205	90.0
HH	Head to Header	445		395	
HW	Head to Windshield	612		550	
HR	Head to Side Header (Y)	262		245	
NR	Nose to Rim	438	16.0		
CD	Chest to Dash	530		553	
CS	Chest to Steering Hub	298			
RA	Rim to Abdomen	195			
KDL	Left Knee to Dash	122	10.0	133	
KDR	Right Knee to Dash	140		120	2.0
PA	Pelvic Angle		24.8		24.4
TA	Tibia Angle		50.0		47.0
KK	Knee to Knee (Y)	282		278	
SK	Striker to Outboard Knee	610	8.0	615	5.0
ST	Striker to Head	620	84.0	630	81.0
SH	Striker to H-Point	213	13.0	220	13.0
SHY	Striker to H-Point (Y)	185		188	
HS	Head to Side Window	300		287	
HD	H-Point to Door (Y)	178		185	
AD	Arm to Door (Y)	102		25	

DATA SHEET NO. 5...(CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

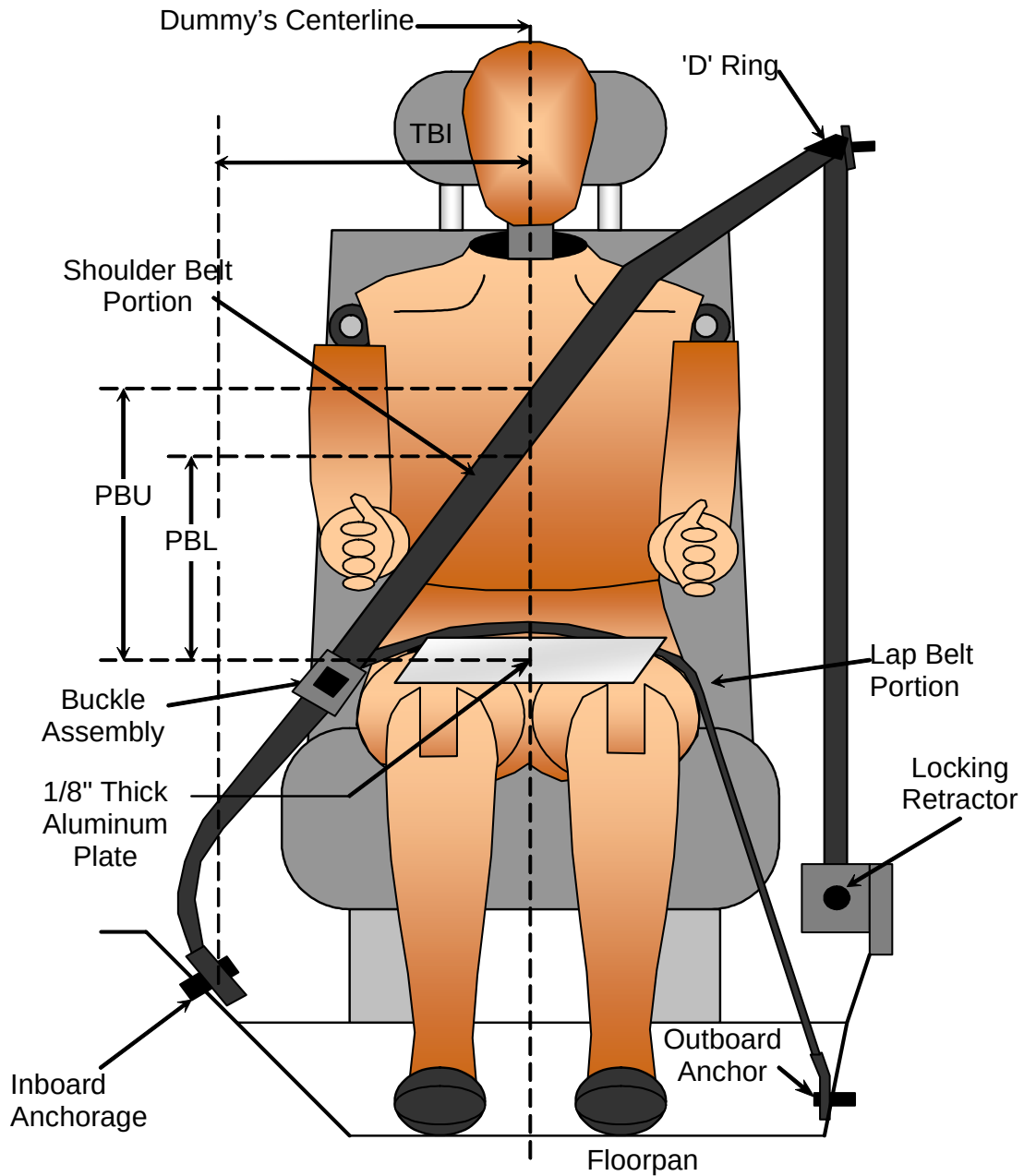
TEST DUMMY POSITION MEASUREMENTS - REAR SEAT DUMMIES

Code	Measurement Description	Center Rear Pass (H3 50%)		Right Rear Pass (H3 50%)	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
HZ	Head to Roof (Z)	300			
HR	Head To Side Header	615			
NR	Nose to Seat Back	595	20.5		
CD	Chest to Seat Back	475			
KDL	Left Knee to Seat Back	140	11.0		
KDR	Right Knee to Seat Back	160			
PA	Pelvic Angle		24.8		
TA	Tibia Angle		89.0		
KK	Knee to Knee (Y)	275			
SK	Striker to Outboard Knee	640	1.5		
ST	Striker to Head	420	78.2		
SH	Striker to H-Point	320	42.8		
SHY	Striker to H-Point (Y)	620			
HS	Head to Side Window	720			
HD	H-Point to Door (Y)	510			
AD	Arm To Door (Y)	410			
SA	Seat Back Angle		20.1		

DATA SHEET NO. 6
SEATBELT ASSESSMENT TEST DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04



DATA SHEET NO. 6...(CONTINUED)
SEATBELT ASSESSMENT TEST DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

SEAT BELT POSITIONING MEASUREMENTS; FRONT DUMMIES

Measurement Description	Units	Driver (H3 50%)	Passenger (H3 50%)
TBI -Dummy C/L to Lap/Shoulder Belt Intersect	mm	N/A	N/A
PBU - Top Surface of reference to belt upper edge	mm	N/A	N/A
PBL - Top Surface of reference to belt lower edge	mm	N/A	N/A
Lap Belt Tension	Newton	N/A	N/A
Shoulder Belt Tension	N/A	N/A	N/A
Retractor Reel to "D" ring	mm	N/A	N/A
Shoulder Belt length as measured on ATD	mm	N/A	N/A
Lap Belt length as measured on ATD	mm	N/A	N/A
Remainder of belt on reel	mm	N/A	N/A
Total belt length for continuous webbing systems	mm	N/A	N/A

SHOULDER BELT SPOOL-OFF; FRONT DUMMIES

Measurement Description	Units	Driver (H3 50%)	Passenger (H3 50%)
As determined mechanically	mm	N/A	N/A
As determined electronically	mm	N/A	N/A

SEAT BELT POSITIONING MEASUREMENTS; REAR DUMMIES

Measurement Description	Units	Center (H3 50%)	Right (H3 50%)
TBI -Dummy C/L to Lap/Shoulder Belt Intersect	mm	200	
PBU - Top Surface of reference to belt upper edge	mm	315	
PBL - Top Surface of reference to belt lower edge	mm	240	
Lap Belt Tension	Newton	10	
Shoulder Belt Tension	N/A	Retractor	
Retractor Reel to "D" ring	mm	N/A	
Shoulder Belt length as measured on ATD	mm	960	
Lap Belt length as measured on ATD	mm	785	
Remainder of belt on reel	mm	650	
Total belt length for continuous webbing systems	mm	2395	

SHOULDER BELT SPOOL-OFF; REAR DUMMIES

Measurement Description	Units	Center	Right
As determined mechanically	mm	160.0	
As determined electronically	mm	304.5	

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

INSERT PAGES 18 THRU 28 FROM E.T SHOP DATA

INSERT PAGES 18 THRU 28 FROM E.T SHOP DATA

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DATA SHEET NO. 9...(CONTINUED)
DUMMY III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40401

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

* Data channel failed.

DATA SHEET NO. 9...(CONTINUED)
DUMMY III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40401

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

DATA SHEET NO. 9...(CONTINUED)
DUMMY III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40401

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

DATA SHEET NO. 10
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

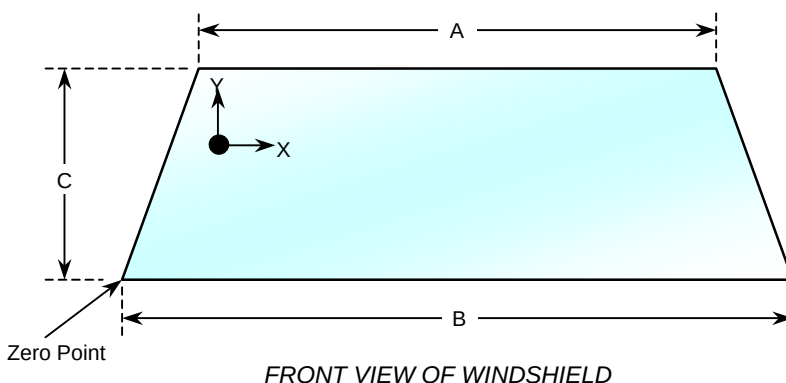
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive and plastic molding covers.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles that are equipped with occupant passive restraints.

Temperature of windshield molding during test: 34.4 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test(mm)	Post-Test(mm)	% of Retention
Left Side	1962	1962	100%
Right Side	1962	1962	100%
Total	3924	3924	100%



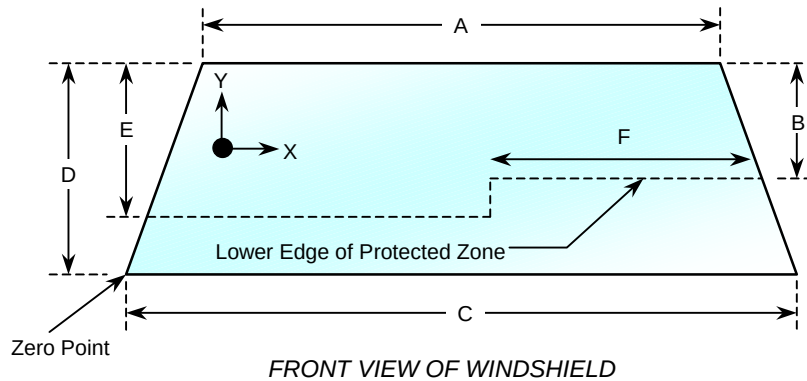
WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1200	0
B	mm	1500	14
C-Left	mm	612	20
C-Right	mm	612	20

DATA SHEET NO. 11 **WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04



WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1200
B	mm	420
C	mm	1500
D	mm	612
E	mm	450
F	mm	494

AREA OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one that is normally in contact with the windshield.

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

DATA SHEET NO. 12
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV NHTSA No.: R40401
Test Program: 2004 FMVSS 208 Upgrade Test Date: 9/9/04

Test Time: 3:16 PM Temperature: 34.4 Deg. C.

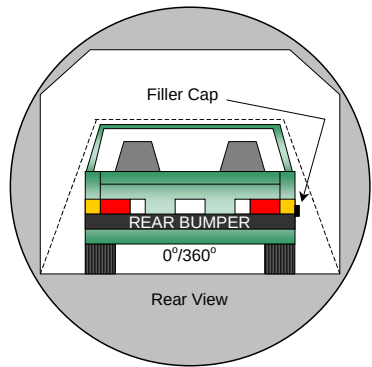
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5-minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)
- D. Spillage Location Details: No leakage occurred

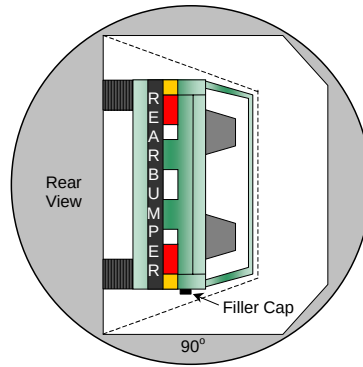
DATA SHEET NO. 13
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

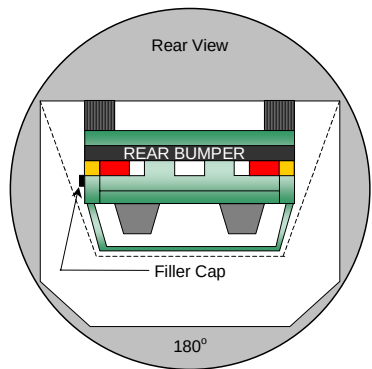
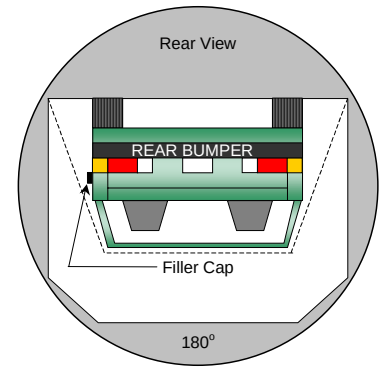
NHTSA No.: R40401
Test Date: 9/9/04



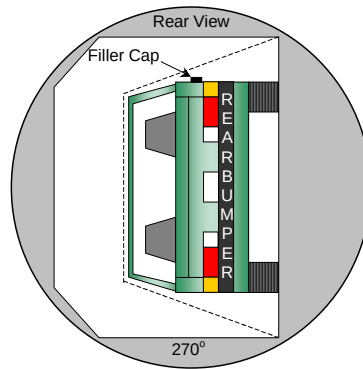
0° to 90°



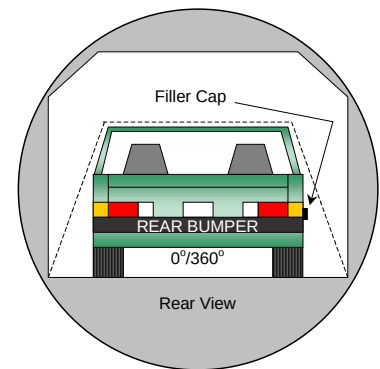
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

DATA SHEET NO. 13...(CONTINUED)
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	82	300	382
90° to 180°	81	300	381
180° to 270°	83	300	383
270° to 360°	77	300	377

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

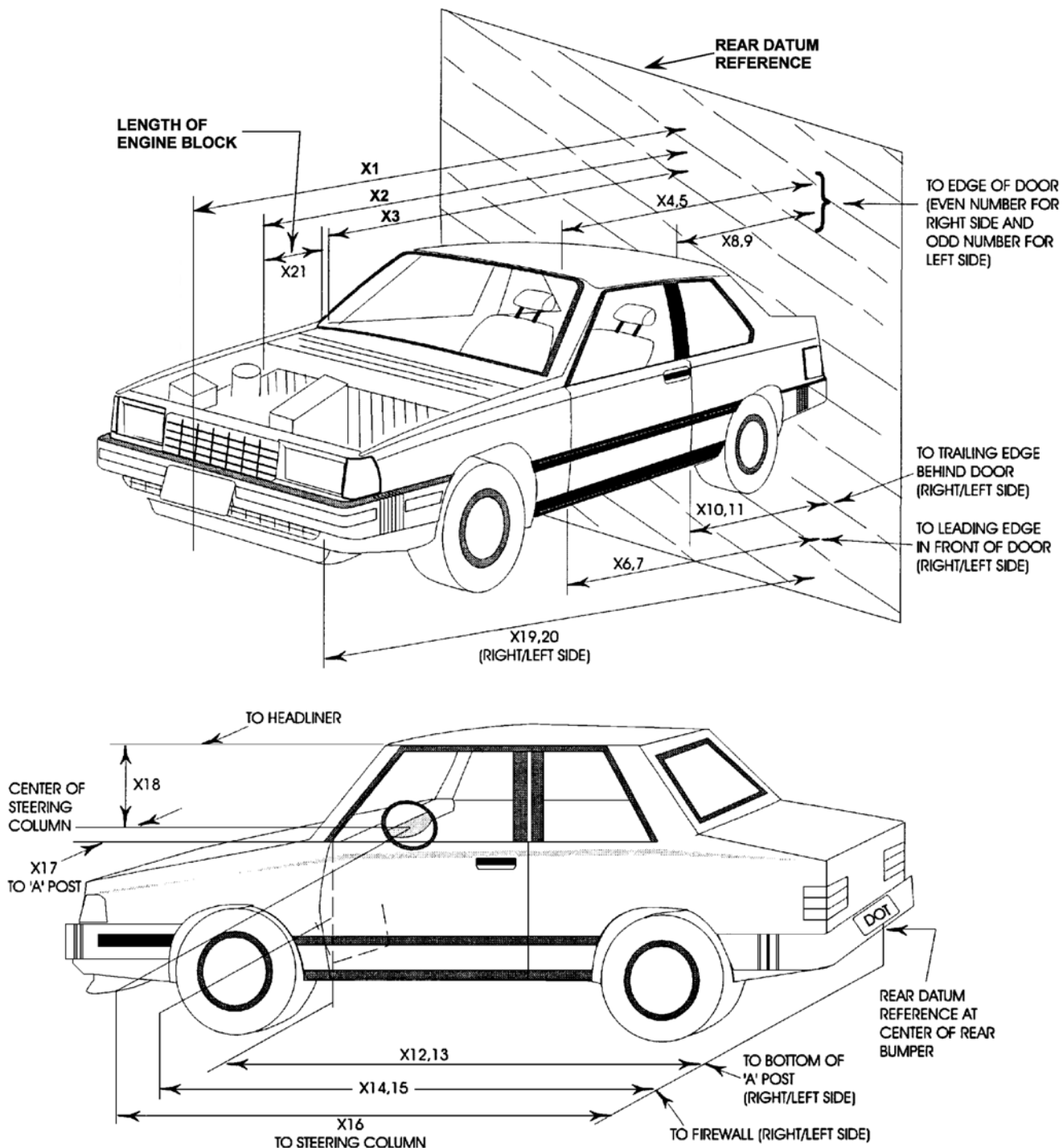
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 14
VEHICLE MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04



DATA SHEET NO. 14...(CONTINUED)
VEHICLE MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length of vehicle at centerline	mm	4214	3974	-240
2	RSOV to front of engine	mm	3649	3599	-50
3	RSOV to firewall centerline	mm	3134	3154	20
4	RSOV to leading edge of right door	mm	2826	2827	1
5	RSOV to leading edge of left door	mm	2870	2880	10
6	RSOV to lower leading edge of right door	mm	2826	2827	1
7	RSOV to lower leading edge of left door	mm	2834	2840	6
8	RSOV to upper trailing edge of right door	mm	1833	1833	0
9	RSOV to upper trailing edge of left door	mm	1852	1858	6
10	RSOV to lower trailing edge of right door	mm	1841	1842	1
11	RSOV to lower trailing edge of left door	mm	1852	1858	6
12	RSOV to bottom of right 'A' pillar	mm	2820	2809	-11
13	RSOV to bottom of left 'A' pillar	mm	2822	2831	9
14	RSOV to firewall on right side	mm	3162	3164	2
15	RSOV to firewall on left side	mm	3168	3184	16
16	RSOV to steering column hub	mm	2400	2475	75
17	Center of steering column to left 'A' pillar	mm	340	350	10
18	Center of steering column to headlining	mm	490	500	10
19	RSOV to right side of front bumper	mm	4071	3934	-137
20	RSOV to left side of front bumper	mm	4081	3994	-87
21	Length of engine block	mm	585	585	0
RD	RSOV to right side of dash panel	mm	2636	2644	8
CD	RSOV to center of dash panel	mm	2554	2570	16
LD	RSOV to left side of dash panel	mm	2643	2658	15

All measurements in millimeters

DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

VEHICLE STRUCTURAL MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length	mm	4214	3974	-240
2	Total width	mm	1765	1765	0
3	Bumper top height	mm	698	760	62
4	Bumper bottom height	mm	330	380	50
5	Longitudinal member top height	mm	730	725	-5
6	Longitudinal member bottom height	mm	340	401	61
7	Distance between longitudinal members	mm	1000	825	-175
8	Longitudinal member width	mm	75	68	0
9	Engine top height	mm	930	960	30
10	Engine bottom height	mm	360	294	-66
11	Engine and gear box width	mm	1000	1000	0
12	Front bumper to engine distance	mm	565	387	-178
13	Front shock absorber fixing width	mm	900	810	-90
14	Bonnet leading edge height	mm	915	1150	235
15	Front shock absorber fixing width	mm	1000	810	-190
16	Front bumper to front axle distance	mm	750	720	-30
17	Front axle to 'A' pillar distance	mm	661	617	-44
18	'A' pillar to 'B' pillar distance	mm	1035	1035	0
19	'B' pillar to rear axle distance	mm	1000	1006	6
20	'B' pillar to 'C' pillar distance	mm	870	870	0
21	Roof sill bottom height	mm	1520	1516	-4
22	Roof sill top height	mm	1690	1690	0
23	Floor sill bottom height	mm	270	300	30
24	Floor sill top height	mm	460	450	-10

All measurements are in millimeters

DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

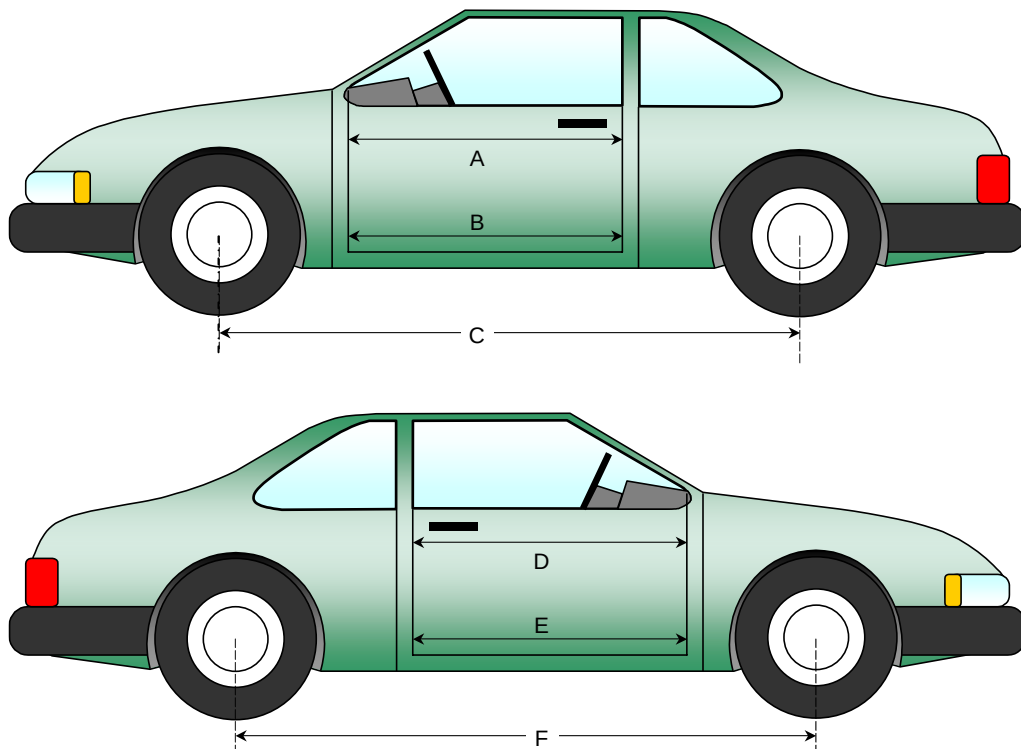
NHTSA No.: R40401
 Test Date: 9/9/04

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
A	Left Side Upper	mm	936	932	-4
B	Left Side Lower	mm	896	894	-2
D	Right Side Upper	mm	935	926	-9
E	Right Side Lower	mm	900	893	-7

WHEELBASE MEASUREMENT TABLE

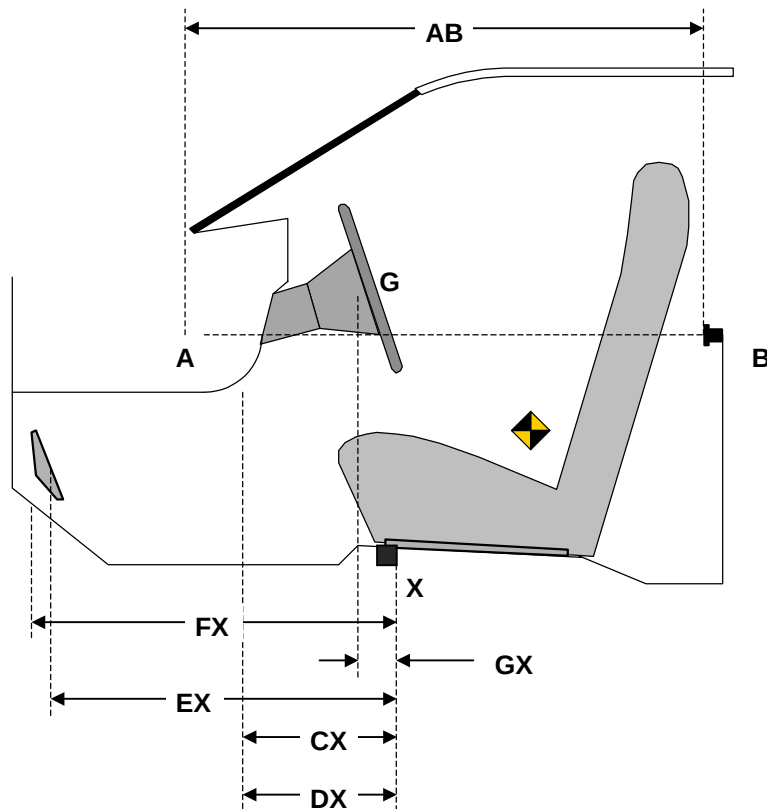
Item	Description	Units	Pre-Test	Post-Test	Diff.
C	Left Side Wheel Base	mm	2650	2665	15
F	Right Side Wheel Base	mm	2650	2665	15



DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04



DRIVER COMPARTMENT INTRUSION TABLE

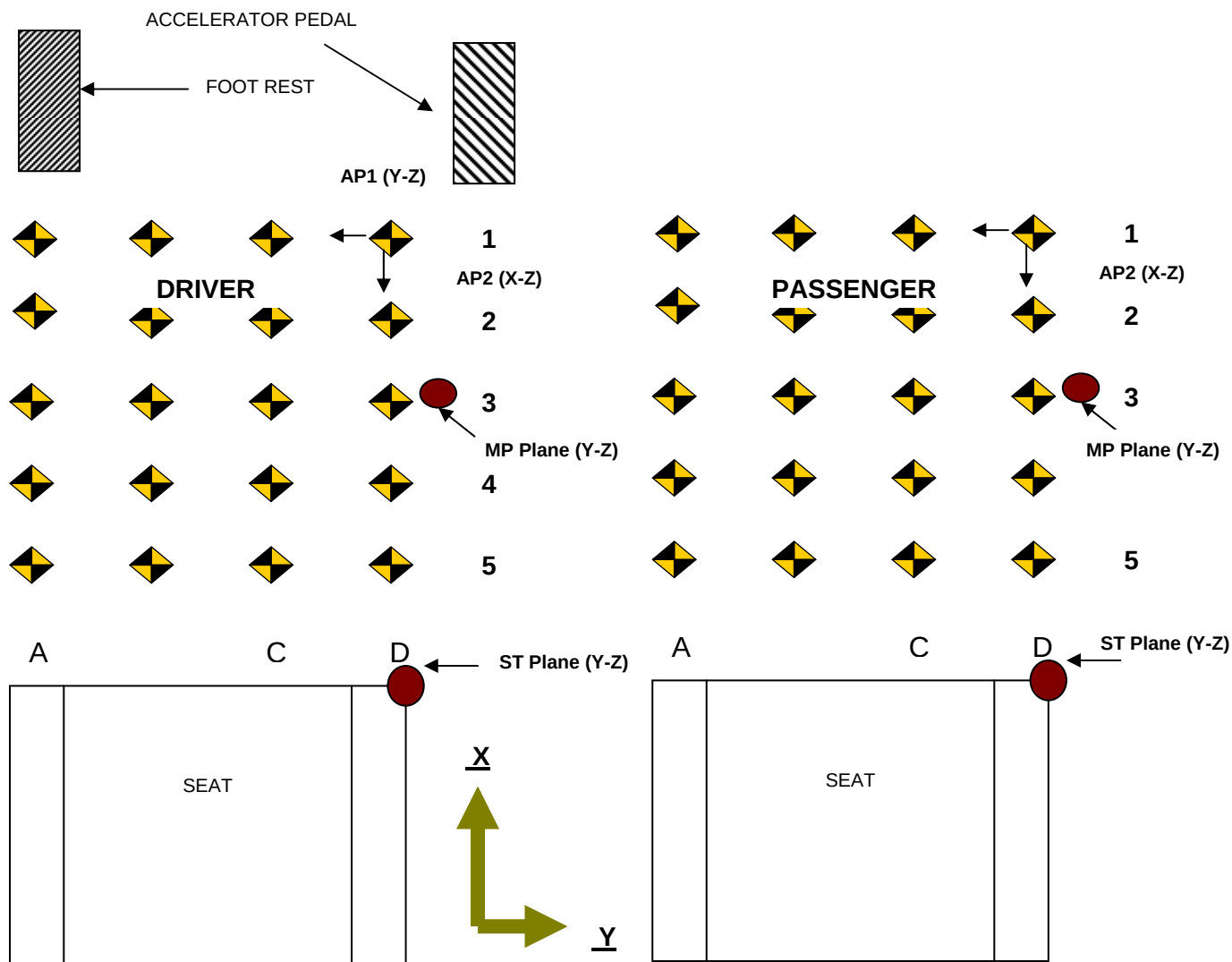
Item	Description	Units	Pre-Test	Post-Test	Diff.
AB	Door Opening (Inside window jam)	mm	936	932	-4
CX	Left Knee Bolster to X	mm	305	346	41
DX	Right Knee Bolster to X	mm	381	335	-46
EX	Brake Pedal to X	mm	516	535	19
FX	Foot Rest to X	mm	660	525	-135
GX	Center of Steering Wheel Hub to X	mm	110	105	-5

X = Left Front Seat Outboard Anchor Bolt Head

DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04



AP1: Y-Z Plane passing through D1

AP2: X-Z Plane passing through D1

AP3: X-Y plane passing through D1

MP: Y-Z plane, halfway between the ST plane and AP1 plane

CF Plane: X-Z plane passes through center of footrest.

BP Plane: X-Z plane passes through center of brake pedal

TP Plane: Y-Z plane, intersection of BP Plane and the intersection of the toe pan and floorboard

Column A: intersection of vehicle and CF plane

Column D: Intersection of vehicle and AP2 plane

Row 1: intersection of the vehicle and the AP3 Plane

Row 3: intersection of the vehicle and TP plane

Row 5: intersection of the vehicle and MP plane

Row 2: evenly spaced between row 1 and 3

Row 4: evenly spaced between row 3 and 5

DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

All measurements are in mm.

DRIVER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	699	751	740	716	679	749	747	727	-21	-2	7	11
2	633	669	656	647	625	676	662	660	-8	8	8	13
3	557	565	556	550	556	574	566	564	-1	9	11	14
4	499	492	485	475	498	495	492	489	-1	4	7	15
5	416	408	396	388	415	415	408	401	-2	7	12	13

DRIVER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	15	113	224	313	-11	79	180	276	-27	-34	-44	-37
2	2	106	218	314	-11	80	186	285	-12	-26	-32	-29
3	-5	98	211	311	-6	76	187	288	-1	-22	-25	-23
4	-10	91	203	306	-27	77	191	290	-17	-14	-12	-15
5	-20	88	202	304	-33	71	187	290	-13	-18	-15	-13

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-125	-82	-75	-85	-127	-100	-89	-87	-2	-18	-14	-1
2	-60	-10	-14	-14	-64	-21	-27	-24	-4	-11	-13	-10
3	7	50	43	41	6	42	36	31	-2	-8	-7	-10
4	67	65	61	56	55	58	54	44	-12	-7	-6	-12
5	66	66	60	58	55	63	55	49	-10	-3	-5	-9

DATA SHEET NO. 14...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

All measurements in mm

PASSENGER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	677	709	701	694	681	711	701	694	4	2	0	1
2	607	616	618	620	612	621	620	623	5	5	3	3
3	514	512	508	508	522	521	518	511	8	9	10	4
4	545	440	438	431	451	448	440	439	6	9	2	8
5	355	349	347	340	366	359	353	344	11	10	6	4

PASSENGER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-265	-181	-72	46.5	-254	-189	-64	52	11	-8	8	5
2	285	-189	-72	50	-279	-181	-66	51	6	8	6	1
3	-288	-193	-78	35	-279	-188	-71	33	8	5	7	-1
4	-295	-195	-78	31	-280	-196	-78	34	15	-2	0	3
5	-303	-200	-82	27.3	-296	-197	-83	28	7	3	-1	0

PASSENGER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-63	-27	-20	-15	-86	-51	-44	-42	-23	-25	-25	-26
2	14	29	33	42	-7	8	14	25	-21	-21	-20	-18
3	45	69	74	68	25	54	57	51	-19	-15	-17	-18
4	53	69	72	66	35	56	58	51	-17	-13	-14	-15
5	63	67	67	34	55	58	57	50	-8	-10	-10	-14

DATA SHEET NO. 15
CAMERA LOCATIONS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

VEHICLE CAMERA MEASUREMENT TABLE

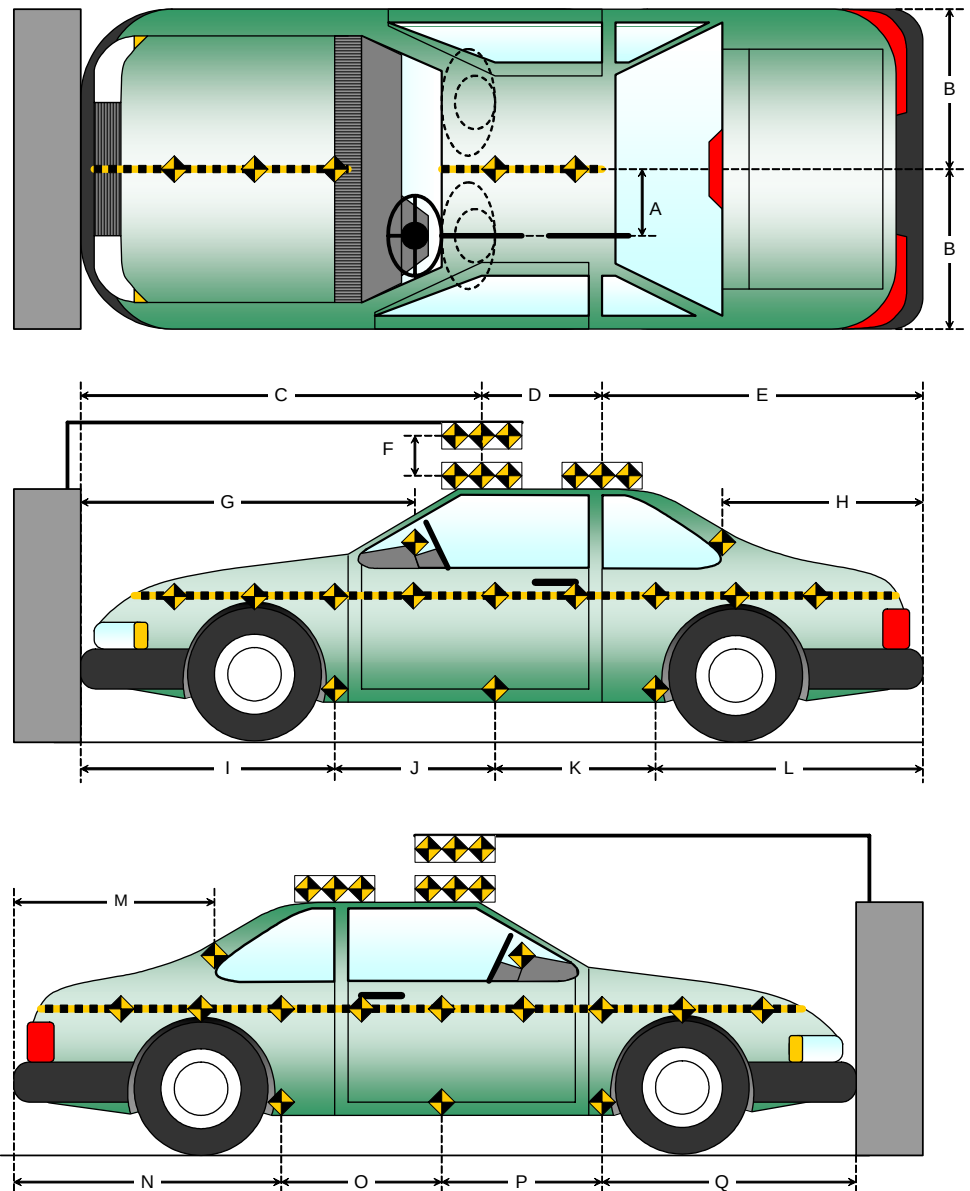
No.	Camera		Location (mm)			Angle (deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
	View	Type	X	Y	Z				
1	Left Side (Panning)	Real Time	-12192	-6096	-1651	-10	N/A	Zoom	30
1B	Left Side (Still)	Real Time	-1219	-8585	-1372	0	8188	Zoom	30
1C	Right Side (Still)	Real Time	-1067	7976	-991	0	7620	Zoom	30
2	Overall Left Side	16mm	-2489	-8280	-1143	-4	7834	13	1010
2B	Overall Left Side	Video	-1883	-7671	-1143	-2	7228	10	1000
3	Left Side View	Video	-1677	-7773	-1270	-4	7338	50	1000
3B	Left Side View	16mm	-2134	-8230	-1449	-4	7773	35	1040
4B	Driver & Interior	Video	-5360	-10846	-4648	-13	11310	Zoom	1000
5	Steering Column (Bottom)	16mm	-2134	-8230	-2997	-16	7921	19	1020
6	Steering Column (Top)	16mm	-2134	-8230	-3404	-20	8009	19	1010
7	Left Rear Dummy On-Board	Video	-2819	-635	-1626	-25	668	4.2	1000
8	Overall Right Side	16mm	-2083	8230	-1270	-6	7776	13	1010
9	Right Side View	Video	-1577	10871	-1575	-4	10433	105	1000
9B	Right Passenger View	16mm	-1677	10871	-1575	-4	10428	80	965
10	Right Side View	16mm	-2083	8230	-1575	-4	7774	35	965
11	Passenger & Interior View	16mm	-6781	9144	-2997	-9	9933	50	890
11B	Passenger & Interior View	Video	-6477	9068	-2946	-9	9722	Zoom	1000
12	Right Rear Dummy On-Board	Video	-2819	635	-1626	-25	668	5.7	1000
13	Passenger Front View	16mm	610	432	-2667	-40	N/A	13	890
14	Driver Front View	16mm	610	-432	-2667	-40	N/A	13	1155
15	Windshield View	16mm	-610	0	-5944	-90	N/A	13	1005
16	Pit View of Engine	16mm	-914	0	1499	90	N/A	9	890
17	Pit View of Fuel Tank	16mm	-2438	0	1499	90	N/A	6	730

DATA SHEET NO. 16 **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

All Dimensions in (mm)	
Item	Value
A	396
B	800
C	2180
D	610
E	1440
F	155
G	1635
H	985
I	1318
J	746
K	706
L	1453
M	972
N	1475
O	714
P	702
Q	1384



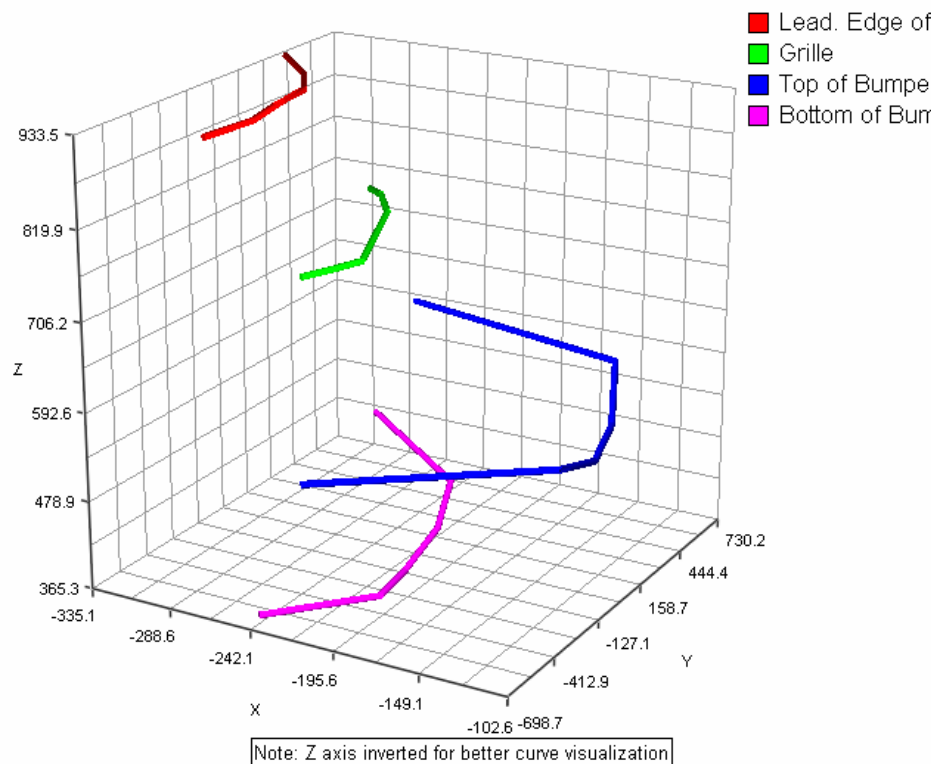
DATA SHEET NO. 17
TEST VEHICLE FRONTAL PROFILE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

Pre-Test Measurements in mm.							
		Vehicle Left			Vehicle Right		
		C1	C2	C3	C4	C5	C6
Leading edge of Hood							
	X	-293	-283	-284	-289	-306	-335
	Y	-421	-253	-83	91	264	433
	Z	-919	-926	-933	-930	-928	-928
Grille							
	X	-244	-236	-232	-250	-264	-280
	Y	-374	-269	-155	179	288	394
	Z	-762	-764	-762	-780	-785	-776
Top of Bumper							
	X	-213	-103	-108	-120	-141	-285
	Y	-699	-399	-112	152	433	730
	Z	-565	-596	-563	-566	-602	-583
Bottom of Bumper							
	X	-241	-200	-212	-220	-234	-309
	Y	-662	-391	-119	174	419	716
	Z	-379	-384	-365	-374	-396	-415

Test Vehicle Pre-Crash Frontal Profile (Jeep Liberty)



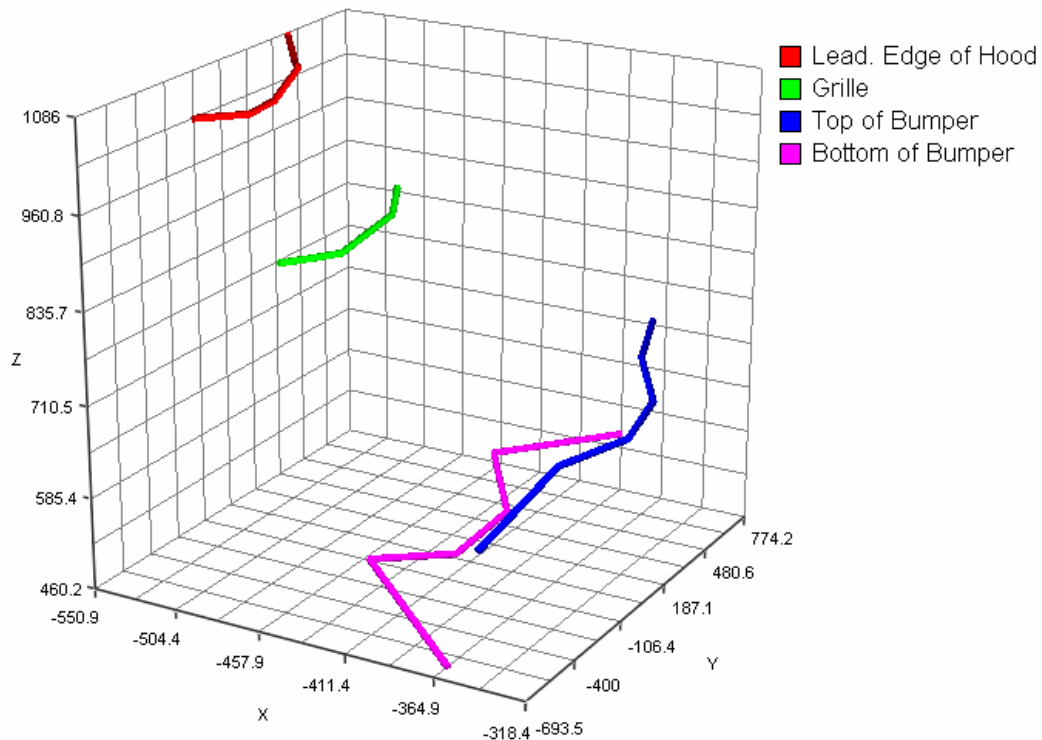
DATA SHEET NO. 17...(CONTINUED)
TEST VEHICLE FRONTAL PROFILE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

Post Test Measurements in mm.							
		Vehicle Left			Vehicle Right		
		C1	C2	C3	C4	C5	C6
Leading edge of Hood	X	-516	-503	-507	-511	-529	-551
	Y	-429	-261	-90	89	252	423
	Z	-1070	-1063	-1061	-1085	-1069	-1086
Grille	X	-476	-468	-463	-467	-475	-485
	Y	-380	-275	-161	171	285	387
	Z	-895	-892	-887	-897	-916	-900
Top of Bumper	X	-343	-331	-318	-326	-353	-372
	Y	-694	-368	-86	176	450	774
	Z	-639	-704	-703	-710	-718	-716
Bottom of Bumper	X	-364	-431	-408	-406	-434	-386
	Y	-621	-354	-83	211	449	751
	Z	-460	-518	-494	-508	-539	-548

Test Vehicle Post-Crash Frontal Profile (Jeep Liberty)



Note: Z axis was inverted for better curve visualization

DATA SHEET NO. 17...(CONTINUED)
TEST VEHICLE FRONTAL PROFILE DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

Change (Post - Pre) Test Measurements in mm.							
		Vehicle Left			Vehicle Right		
		C1	C2	C3	C4	C5	C6
Leading edge of Hood							
	X	-223	-220	-223	-222	-223	-216
	Y	-9	-9	-7	-2	-12	-10
	Z	-152	-137	-128	-155	-140	-158
Grille							
	X	-231	-232	-231	-217	-211	-204
	Y	-6	-7	-6	-8	-3	-7
	Z	-133	-128	-125	-117	-131	-124
Top of Bumper							
	X	-130	-228	-210	-206	-212	-87
	Y	5	32	27	25	18	44
	Z	-74	-107	-140	-145	-116	-133
Bottom of Bumper							
	X	-123	-231	-196	-186	-200	-77
	Y	41	37	36	37	30	35
	Z	-81	-135	-129	-133	-143	-133

DATA SHEET NO. 18
POST-TEST AIRBAG DATA

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04

POST-TEST AIRBAG DATA

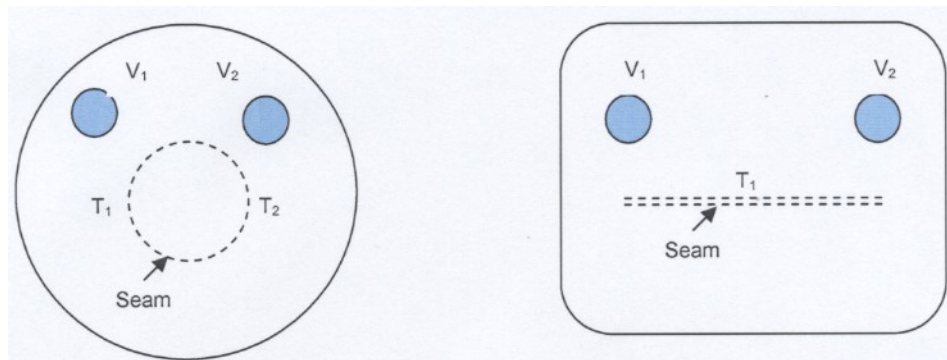
	DRIVER	PASSENGER
No. of vent holes	2	2
Size of vent holes (mm ²)	495	1981
Total vent area (mm ²)	990	3962

Deflated airbag length and width dimensions or, if round, diameter (mm)		
Length	460	550
Width	690	780
Depth or Diameter	360	400

Tethering information		
Is the airbag tethered?	Yes	No
Record length of tether (mm)	370	N/A

Airbag manufacturing information		
Manufacturer	TRW	TRW
Part No.	TCEDT0094K0784	TCOPTOG84721221
Gas Generator	31XK007R12288	V508/30352155A

The following sketch shows the airbag with location of the vent holes (v1 and v2), along with the tethers attachment points (T1 and T2). The tethers are sewed to the both bag and the steering wheel end.

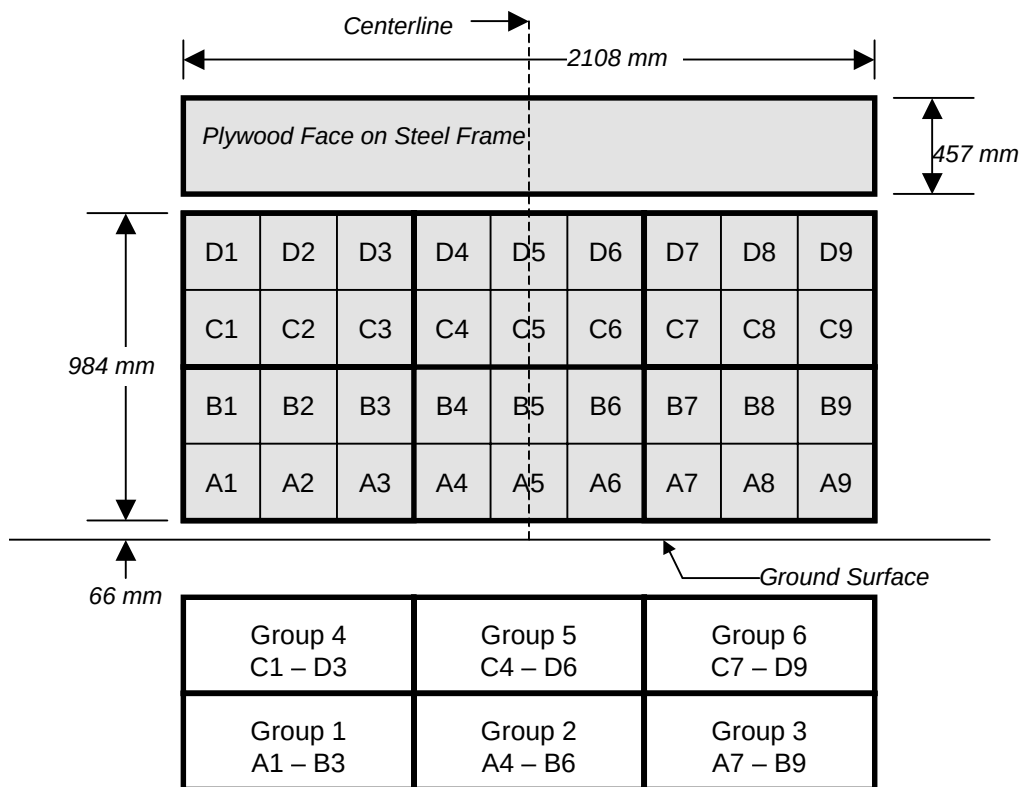


DATA SHEET NO. 19
FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
 Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
 Test Date: 9/9/04

36 Load Cell Rigid Barrier (NHTSA Standard)
Load Cell Locations on Fixed Barrier



6 Groups of 6 Load Cells Each

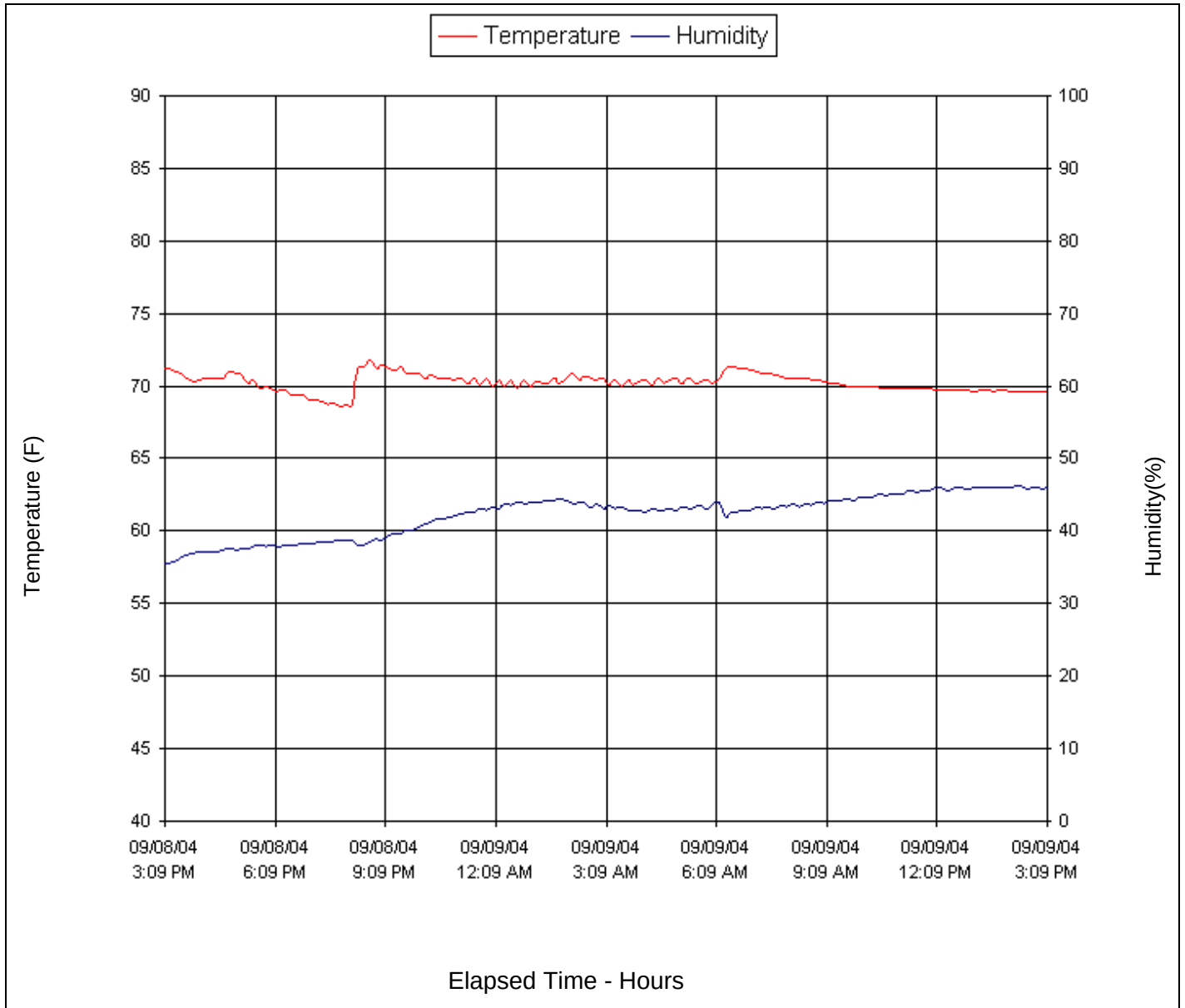
The Data is presented in Appendix C with the following requirements:

- 1.) Data from 36 individual load cells
- 2.) Sum data from 6 groupings shown above (6 cells/group)
- 3.) Total or sum of all 36 individual load cells
- 4.) Sum of all 36 individual load cells vs. vehicle dynamic crush

DATA SHEET NO. 20
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2004 Jeep Liberty 4-Door MPV
Test Program: 2004 FMVSS 208 Upgrade

NHTSA No.: R40401
Test Date: 9/9/04



APPENDIX A
PHOTOGRAPHS

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LOAD CELL BARRIER DATA TRACES

APPENDIX D

INSTRUMENTATION AND DATA CHANNEL ASSIGNMENTS

APPENDIX E

DUMMY CALIBRATION DATA TRACES AND TABLES