

REPORT NUMBER TR-P32011-11-NC

**SIDE AIRBAG OCCUPANT RISK PROGRAM
OCCUPANT OUT-OF-POSITION TESTS**

**TOYOTA MOTOR CORPORATION
2012 LEXUS ES350
4-DOOR SEDAN**

NHTSA NUMBER: MC5115TWG2

**PREPARED BY:
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APRIL 4, 2012

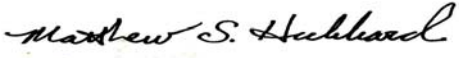
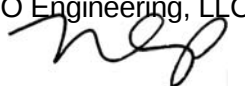
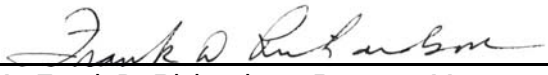
FINAL REPORT

PREPARED FOR:

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This final test report was prepared for the U.S. Department of Transportation, Alpha Technology Associate, Inc., in response to Contract Number DTNH22-06-D-00027.

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Date of Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF TEST MC5115TWG2

1.1 PURPOSE

This occupant out-of-position static side airbag deployment test is part of the Technical Working Group Occupant Injury Risk from Deploying Side Airbags Testing Program sponsored by Alpha Technology Associate, Inc. under Contract No. DTNH22-06-D-00027. The purpose of this test was to obtain occupant injury data for a side airbag deployment.

The occupant out-of-position side airbag test was conducted in accordance with the Technical Working Group Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

1.2 SUMMARY

The effects of a roof mounted curtain airbag and a torso airbag deployment in a 2012 Lexus ES350 4-Door Sedan with an out-of-position SID IIs 5th percentile adult female dummy were evaluated. The test was performed at KARCO Engineering LLC on April 4, 2012. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Three high-speed digital cameras and one real time camera were used to document the airbag deployment. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

A SID IIs 5th percentile adult female anthropomorphic test device (ATD) was placed in the right front passenger seating position facing forward according to the dummy placement instructions (3.3.5.2) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The SID IIs 5th percentile adult female ATD was instrumented with head tri-axial accelerometers, and upper neck transducers.

Nine (9) channels of data were recorded using an on-board data acquisition system. Appendix A contains Photographs. Appendix B contains dummy response data traces. Appendix C contains the Instrumentation Data Channel assignments. Appendix D contains Sid IIs calibration sheets.

The front passenger side door remained closed during the deployment and was operable after the deployment.

The SID IIs 5th percentile adult female dummy's visible contact points were as follows: The curtain airbag contacted the ATD's head and the torso airbag contacted the ATD's back.

OUT OF POSITION OCCUPANT DATA SUMMARY

ATD Position	HIC ₁₅
Passenger	10.6

Orientation of the SID IIs 5th percentile adult female dummy was in the forward facing position leaning against the front passenger door. The dummy's head centerline was aligned with the deploying trajectory of the curtain airbag. This orientation complies with section 3.3.5.2 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2
Test Program: TWG 3.3.5.2 Test Date: 04/04/12

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2

Test Program: TWG 3.3.5.2 Test Date: 04/04/12

TEST DUMMY INFORMATION

Description	Passenger Seat Forward Facing
Dummy Type / Serial No.	SID IIs / 294
Head Contact	Yes
Chest Contact	None
Abdomen Contact	Yes
Pelvis	None
Left Knee Contact	None
Right Knee Contact	None

VIDEO COVERAGE

High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

SID IIs ATD Sensors	9
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	9

DATA SHEET NO. 2**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2Test Program: TWG 3.3.5.2 Test Date: 04/04/12**TEST VEHICLE INFORMATION**

Make	Lexus
Model	ES350
Body Style	4-Door Sedan
NHTSA No.	MC5115TWG2
VIN	JTHBK1EG2C2480046
Color	Deep Sea Mica
Delivery Date	December 26, 2011
Odometer (km./mi.)	14 / 9
Dealer	Longo Lexus
Transmission	Automatic
Final Drive	Front
Type/Number Cylinders	V6
Engine Displacement (L)	3.5
Engine Placement	Transverse

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Side Curtain Airbag	Yes
Pass. Front Airbag	Yes
Pass. Side Airbag	Yes
Pass. Curtain Airbag	Yes
Power Brakes	Yes
Power Steering	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
Tilt Steering Wheel	Yes
Power Windows	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation	GVWR (kg)	2122
Date of Manufacture	October-11	GAWR Front (kg)	1210
		GAWR Rear (kg)	1070

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	210	210
Recommend Tire Size	P215/55R17	P215/55R17
Tire Size on Vehicle	P215/55R17	P215/55R17
Tire Manufacturer	Michelin	Michelin

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				407

* Vehicle had undergone New Car Assessment Program Testing
on January 11, 2012

DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2

Test Program: TWG 3.3.5.2 Test Date: 04/04/12

NOMINAL DESIGN RIDING POSITION

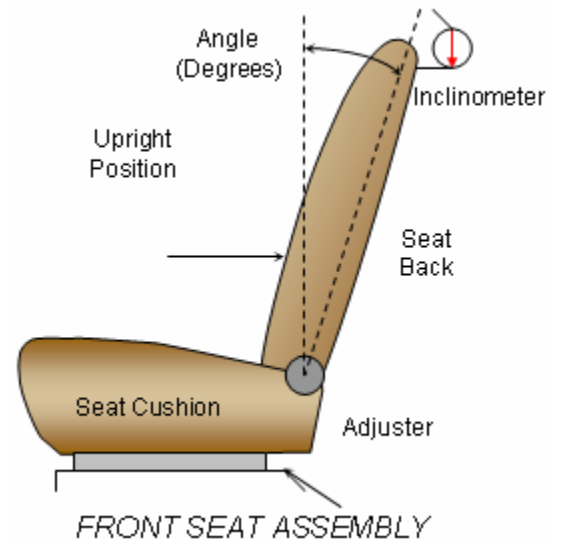
The passenger seat back is positioned to section 3.3.5.2 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the headrest post.

SEAT BACK ANGLES

Position	Deg.
Passenger w/ Dummy	5.2

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 the passenger seat.



SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Passenger Seat	260mm	145mm

DATA SHEET NO. 4

DUMMY POSITIONING INFORMATION

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2
 Test Program: TWG 3.3.5.2 Test Date: 04/04/12

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	SID IIs 5th percentile female	
		Length (mm)	Angle (°)
SA	Seat Back Angle		5.2
AMW	Side Airbag Module Width (Torso / Curtain)	35 / 30	
ABW	Side Airbag Width (Torso / Curtain)	400 / 400	
AML	Side Airbag Module Length (Torso / Curtain)	130 / 300	
ABL	Side Airbag Length (Torso / Curtain)	415 / 1770	
AN	Top of Airbag Module to Head/Neck Junction	199	
HD	Head CG to Door Panel/ Window	142	
HSC	Head to Seat Back Centerline	150	
HB	Head to B-Pillar (first contact)	167	
HZ	Head to Roof (Z)	69	
HHD	Head to Header	306	
ND	Nose to Dash	615	
NS	Nose to Seat Back	229	
NR	Nose to Header	290	
CD	Chest to Dash	455	
CS	Chest to Seat Back	256	
RACL	Right Arm to Seat Back Centerline	348	
LACL	Left Arm to Seat Back Centerline		
RA	Right Arm to Door Panel	26	
LA	Left Arm to Door Panel		
KK	Knee to Knee	147	
TT	Toe to Toe	230	
KSCR	Right Knee to Seat Cushion Centerline	5	
KSCL	Left Knee to Seat Cushion Centerline	143	
	Head Level (X Direction)		8.2
	Head Level (Y Direction)		13.2

DATA SHEET NO. 5

SID IIs ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2
 Test Program: TWG 3.3.5.2 Test Date: 04/04/12

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. SID IIs			
			Max	Time	Min	Time
Head CG	X	G's	7.2	47.0	-12.0	28.0
Head CG	Y	G's	9.9	22.3	-12.2	16.1
Head CG	Z	G's	19.1	16.3	-4.5	11.2
Head CG Resultant	N/A	G's	20.1	16.3		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. SID IIs			
			Max	Time	Min	Time
Neck Force	X	Newtons	250.1	18.2	-69.0	128.3
Neck Force	Y	Newtons	212.1	21.3	-342.6	48.0
Neck Force	Z	Newtons	144.1	113.3	-2187.5	22.6
Neck Force Resultant	N/A	Newtons	2205.5	22.6		
Neck Moment	X	Nm	8.5	141.1	-53.2	23.8
Neck Moment	Y	Nm	16.2	16.9	-15.4	30.6
Neck Moment	Z	Nm	3.9	133.5	-13.2	48.9
Neck Moment Resultant	N/A	Nm	54.3	23.8		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. SID IIs			
	HIC15	T ¹	T ²	Avg G
Head CG	10.6	26.9	41.9	13.8

UPPER NECK NIJ VALUES

Location	Pass. SID IIs			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.09	0.11	0.54	0.69

DATA SHEET NO. 6

CAMERA LOCATIONS

Test Vehicle: 2012 Lexus ES350 4-Door Sedan NHTSA No.: MC5115TWG2

Test Program: TWG 3.3.5.2 Test Date: 04/04/12

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Real Time	-10	-2950	-995	0.0	N/A	30
2	High Speed Side View	-10	-2925	-920	0.0	35	1000
3	High Speed 3/4 View	-1560	-1580	-120	-4.2	50	1000
4	High Speed Front View	-1840	-10	-1195	-2.5	50	1000

* All measurements are taken relative to CG of dummy's head.

APPENDIX A

PHOTOGRAPHS

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FIGURE 1. Right Front ¾ View, As Received



FIGURE 2. Vehicle Certification Label

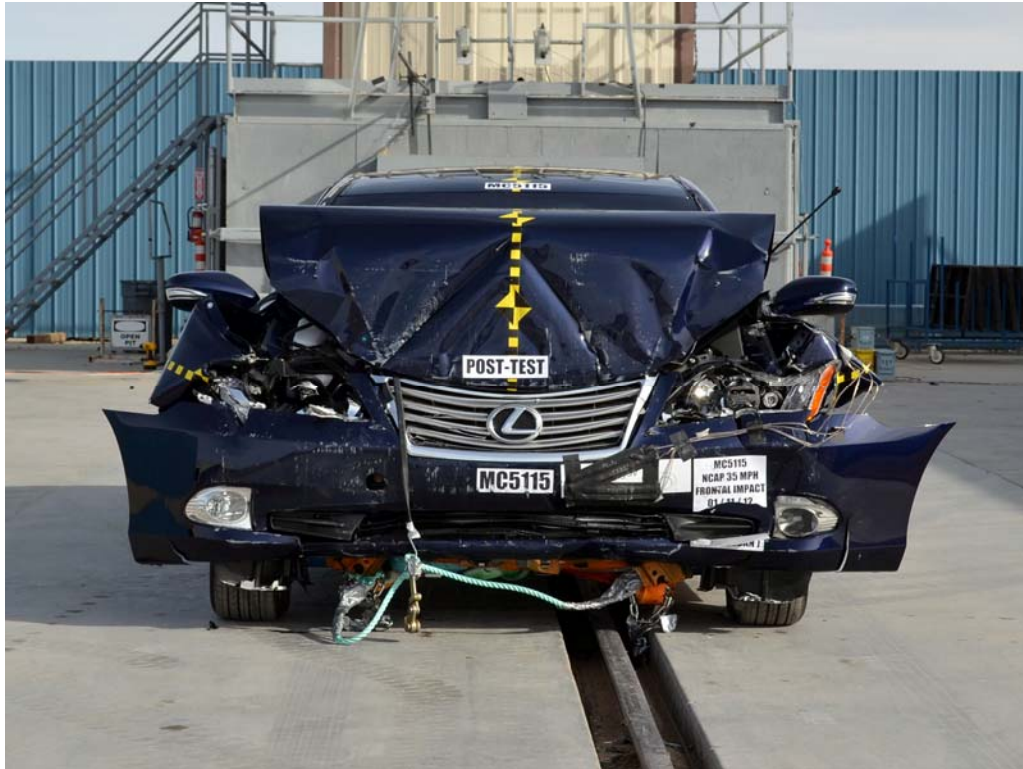


FIGURE 3. Post-Test Front View of NCAP Frontal Impact Test



FIGURE 4. Post-Test Left Front ¾ View of NCAP Frontal Impact Test



FIGURE 5. Post-Test Right Front 3/4 View of NCAP Frontal Impact Test



FIGURE 6. Post-Test Right Side View of NCAP Frontal Impact Test



FIGURE 7. Pre-Test Dummy Position, Left Side View



FIGURE 8. Post-Test Dummy Position, Left Side View



FIGURE 9. Pre-Test Dummy Position, $\frac{3}{4}$ View



FIGURE 10. Post-Test Dummy Position, $\frac{3}{4}$ View



FIGURE 11. Pre-Test Dummy Position, Front View



FIGURE 12. Post-Test Dummy Position, Front View



FIGURE 13. Post-Test Airbags, Left Side View



FIGURE 14. Post-Test Airbags, Left Front $\frac{3}{4}$ View

APPENDIX B

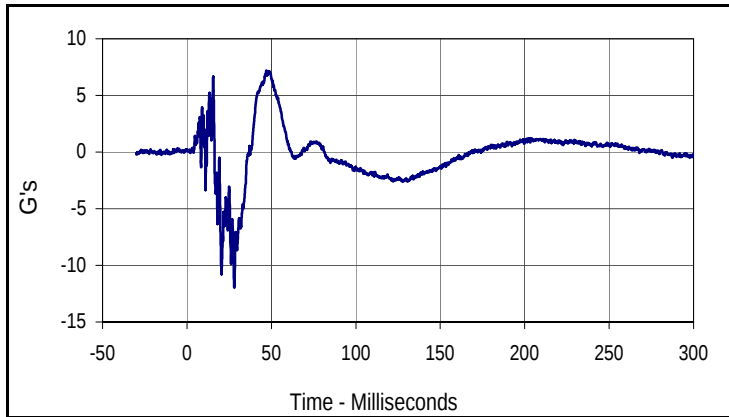
DATA PLOTS

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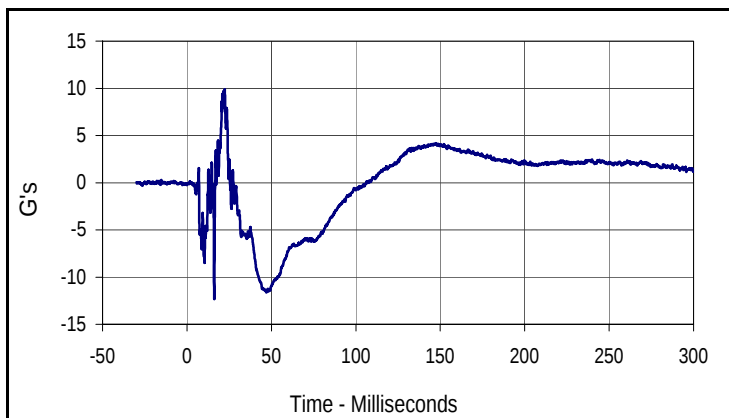
Plot		Page
1	Pass. (SID IIs) Head X	B-1
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12	Pass. (SID IIs) Upper Neck Moment Resultant	B-3

Test Vehicle: 2012 Lexus ES350 4-Door Sedan
 Test Program: TWG 3.3.5.2

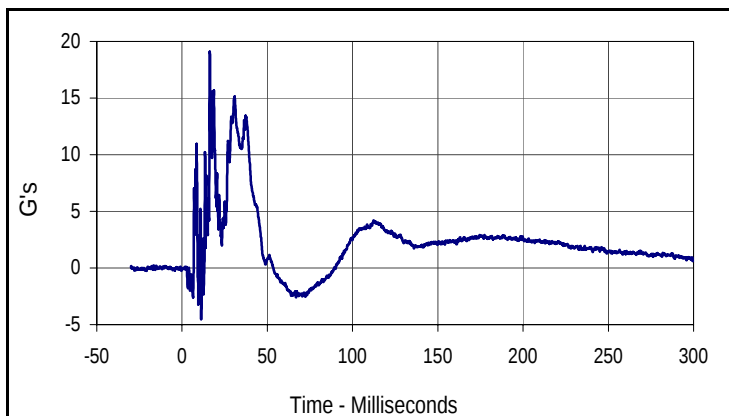
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 NHTSA No.: MC5115TWG2



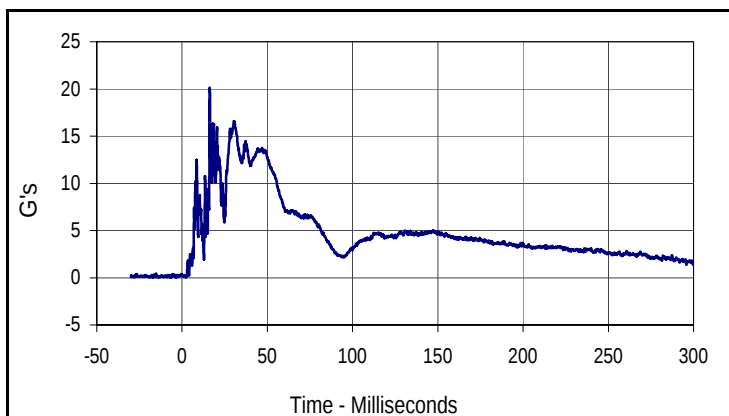
Curve Description			
Pass. SID-IIs Head X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
7.2	47.0	-12.0	28.0



Curve Description			
Pass. SID-IIs Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
9.9	22.3	-12.2	16.1



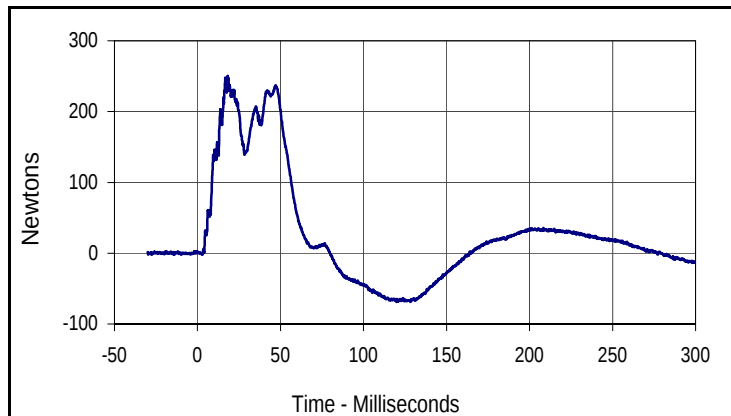
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Max	Time	Min	Time
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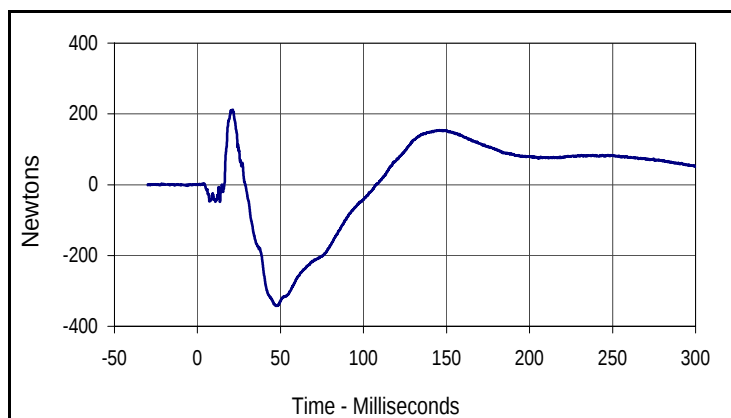
Curve Description			
Pass. SID-IIs Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
20.1	16.3	0.0	2.1

Test Vehicle: 2012 Lexus ES350 4-Door Sedan
 Test Program: TWG 3.3.5.2

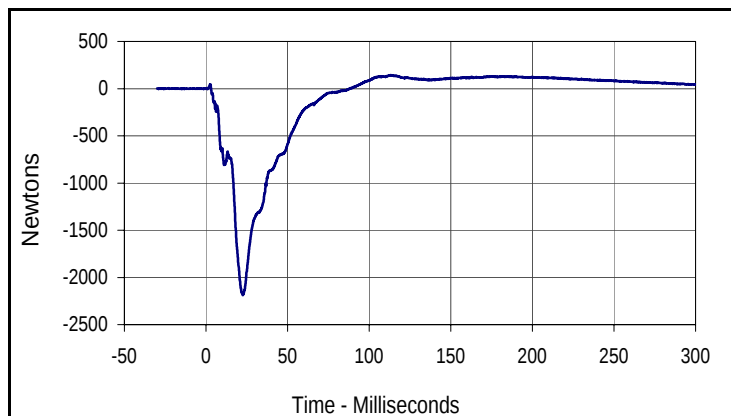
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 NHTSA No.: MC5115TWG2



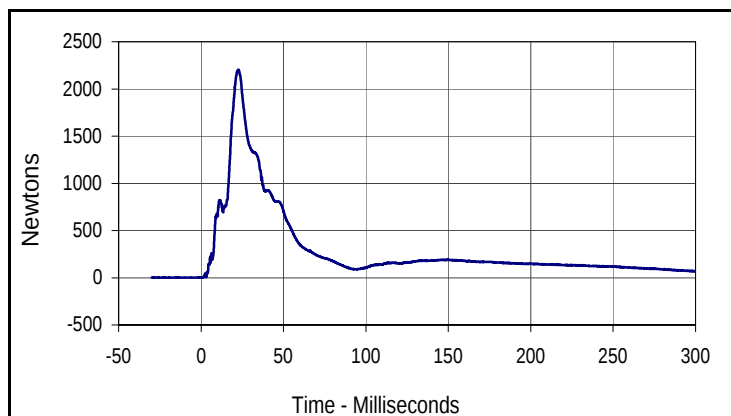
Curve Description			
Pass. SID-IIs Upper Neck Force X			
CURNO	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
250.1	18.2	-69.0	128.3



Curve Description			
Pass. SID-IIs Upper Neck Force Y			
CURNO	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
212.1	21.3	-342.6	48.0



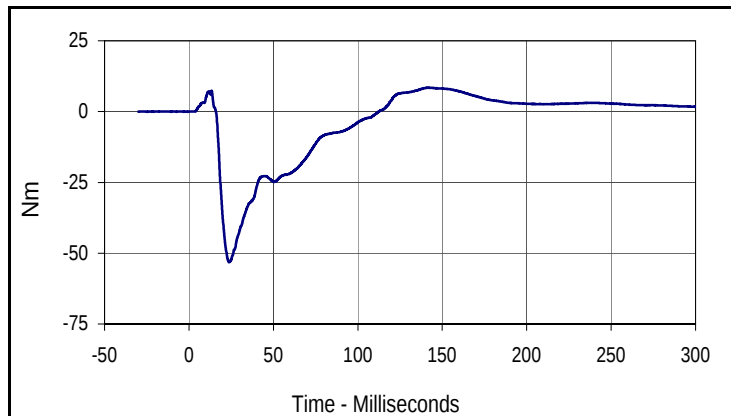
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Pass. SID-IIs Upper Neck Force Z			
CURNO	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
144.1	113.3	-2187.5	22.6



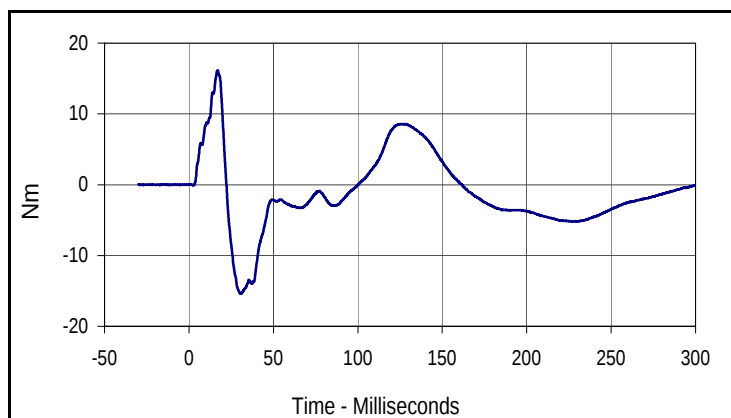
Curve Description			
Pass. SID-IIs Upper Neck Force Resultant			
CURNO	Type	SAE Class	Units
004	RES	1000	Newtons
Max	Time	Min	Time
2205.5	22.6	1.5	0.1

Test Vehicle: 2012 Lexus ES350 4-Door Sedan
 Test Program: TWG 3.3.5.2

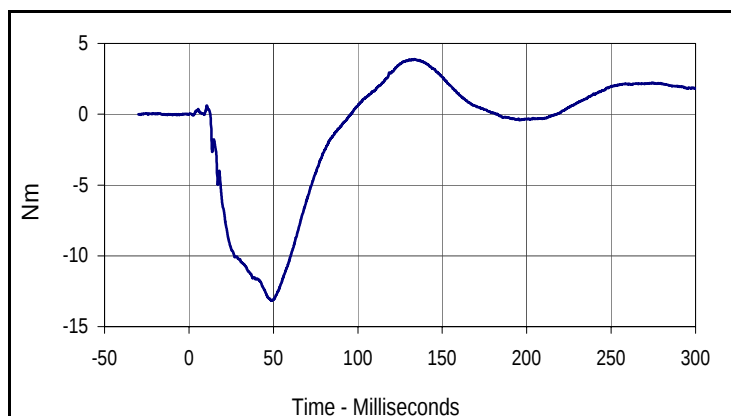
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 NHTSA No.: MC5115TWG2



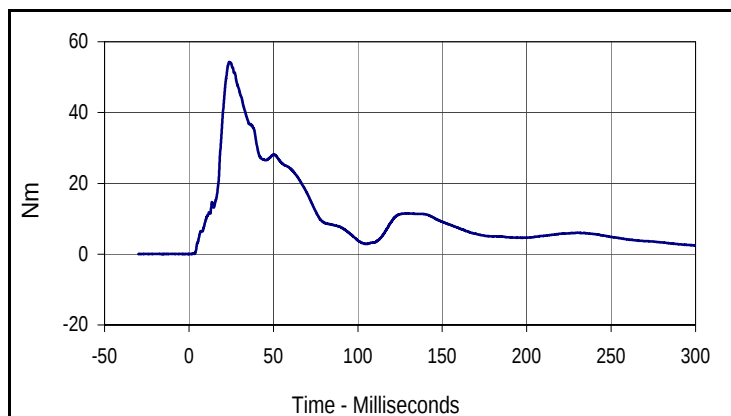
Curve Description			
Pass. SID-IIs Upper Neck Moment X			
CURNO	Type	SAE Class	Units
007	FIL	600	Nm
Max	Time	Min	Time
8.5	141.1	-53.2	23.8



Curve Description			
Pass. SID-IIs Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
008	FIL	600	Nm
Max	Time	Min	Time
16.2	16.9	-15.4	30.6



Curve Description			
Pass. SID-IIs Upper Neck Moment Z			
CURNO	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
3.9	133.5	-13.2	48.9



Curve Description			
Pass. SID-IIs Upper Neck Moment Resultant			
CURNO	Type	SAE Class	Units
007	RES	600	Nm
Max	Time	Min	Time
54.3	23.8	0.0	1.4

APPENDIX C

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.5.2
Instrumentation Data Channel Assignments
A.T.D. Serial Number 294
4/4/12
2012 Lexus ES350 4-Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	P45011	Accel.,full bridge	Endevco	7264C-2K	G
2	HEAD	Y	P51696	Accel.,full bridge	Endevco	7264C-2K	G
3	HEAD	Z	P51708	Accel.,full bridge	Endevco	7264C-2K	G
4	UPPER NECK FORCE	X	1913	Load cell, six axis neck	Denton	1716A	N
5	UPPER NECK FORCE	Y	1913	Load cell, six axis neck	Denton	1716A	N
6	UPPER NECK FORCE	Z	1913	Load cell, six axis neck	Denton	1716A	N
7	UPPER NECK MOMENT	X	1913	Load cell, six axis neck	Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	1913	Load cell, six axis neck	Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	1913	Load cell, six axis neck	Denton	1716A	Nm

APPENDIX D

PRE-TEST AND POST-TEST SID IIS CONFIGURATION AND PERFORMANCE VERIFICATION DATA

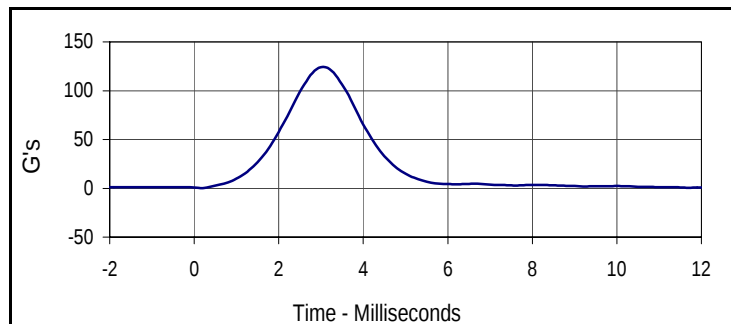
APPENDIX D
PRE-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 294

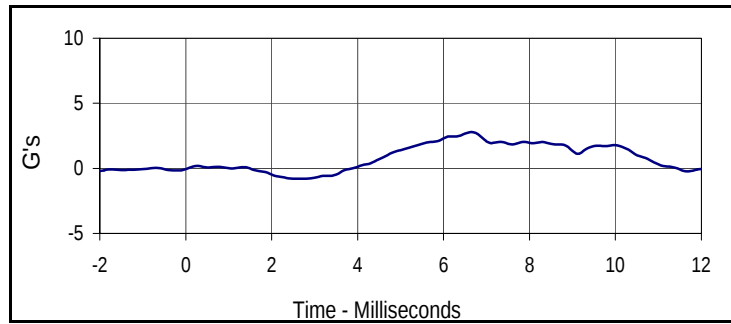
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 Test I.D.: 294HD03B



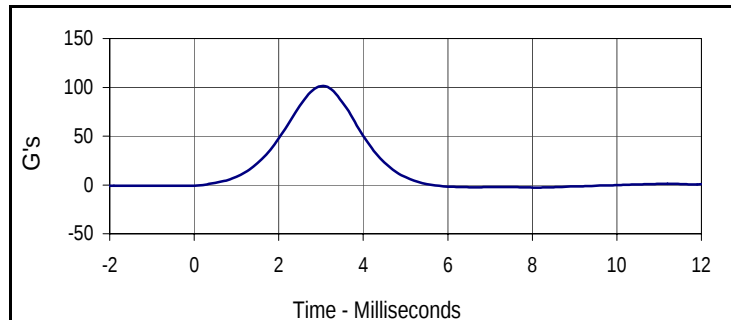
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	280	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.7	Pass
Peak Head Resultant Acceleration	G's	115 to 137	124.0	Pass
Peak Head X Acceleration	G's	<15	2.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	12.1	Pass
Overall Test Results				Pass



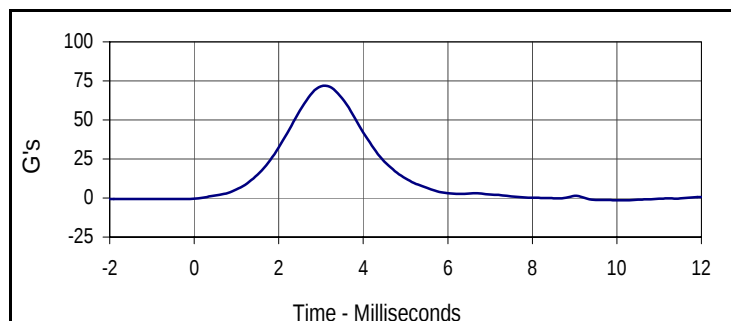
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.0	3.1	0.2	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.3	6.0	-0.8	2.8



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
101.2	3.0	-2.7	8.1



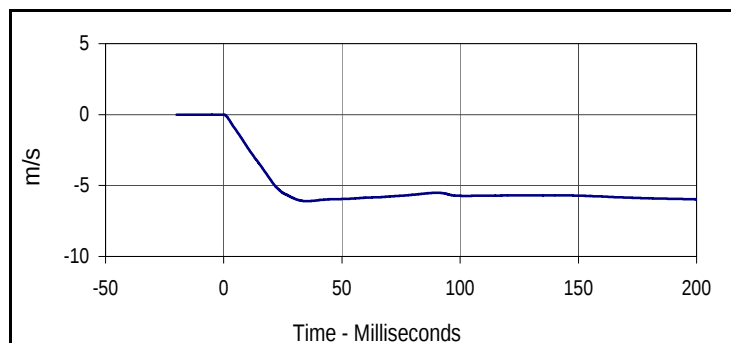
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
72.0	3.1	-1.5	10.0

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 294

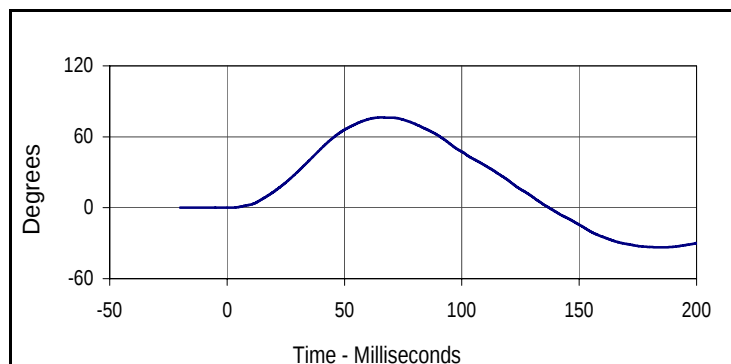
Test Date: 3/27/12
 Test I.D.: 294NB03B



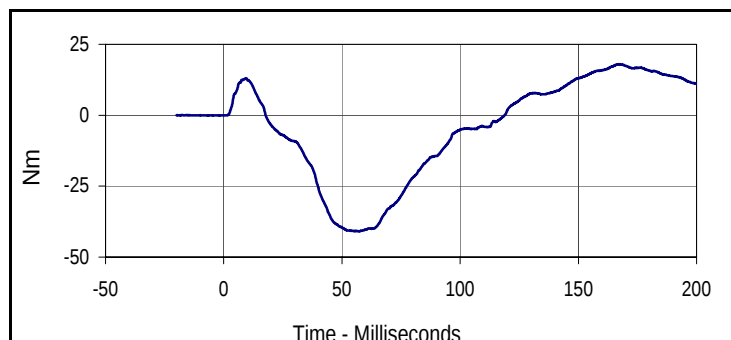
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	300	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.59	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.31	Pass
	15 msec	-3.30 to -4.10	-3.46	Pass
	20 msec	-4.40 to -5.40	-4.64	Pass
	25 msec	-5.40 to -6.10	-5.52	Pass
	25-100 msec	-5.50 to -6.20	-6.11	Pass
D-Plane Rotation	Max	71 to 81	76.3	Pass
	Time	50 to 70	65.5	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-40.9	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	118.8	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.9	-6.1	34.8



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
76.3	65.5	-33.5	184.8



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
18.0	167.2	-40.9	57.0

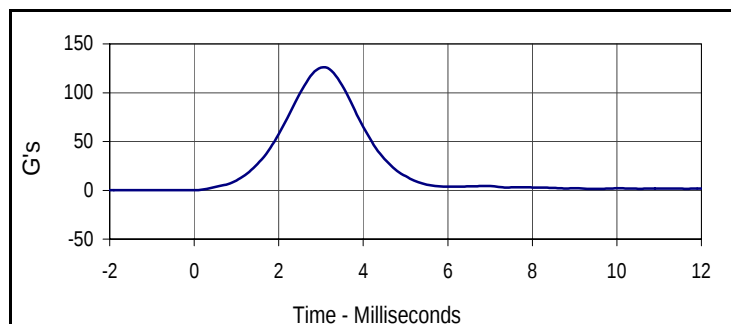
APPENDIX D
POST-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 294

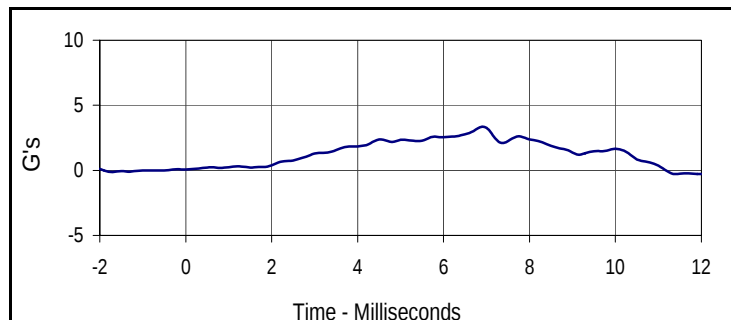
Test Date: 4/6/12
 Test I.D.: 294HD03C



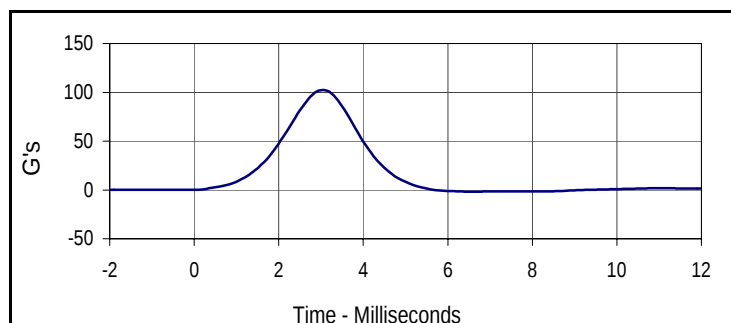
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	240	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Peak Head Resultant Acceleration	G's	115 to 137	125.9	Pass
Peak Head X Acceleration	G's	<15	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	2.3	Pass
Overall Test Results				Pass



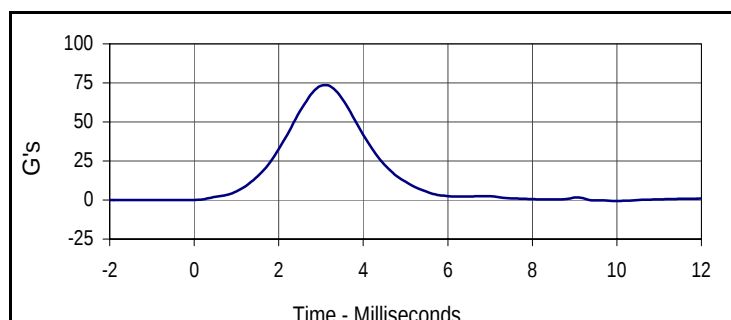
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
125.9	3.1	0.1	-1.1



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.6	5.8	-0.1	-1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
102.2	3.0	-1.8	6.6



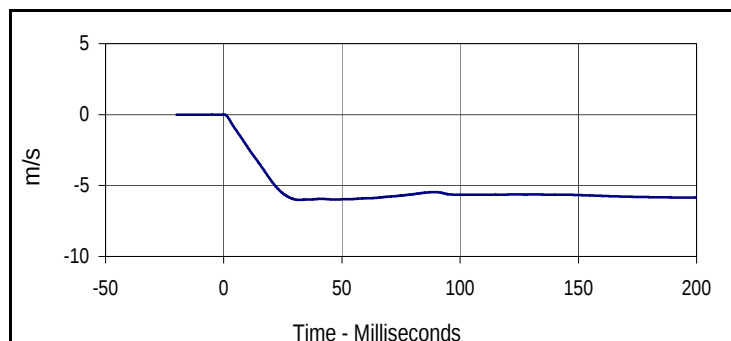
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
73.6	3.1	-0.7	10.0

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 294

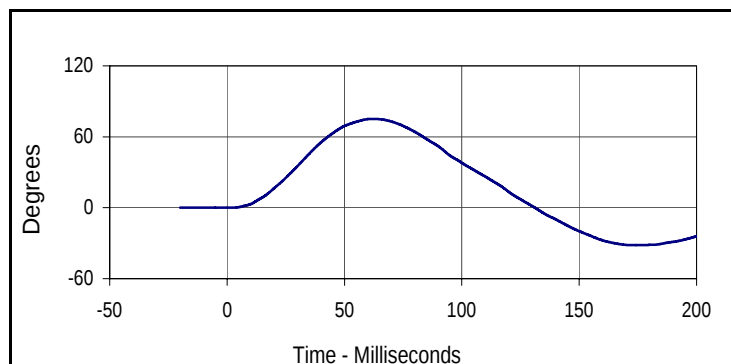
Test Date: 4/6/12
 Test I.D.: 294NB03C



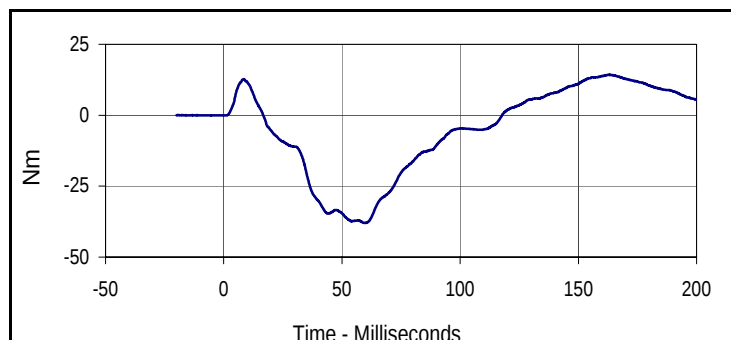
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	280	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.55	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.27	Pass
	15 msec	-3.30 to -4.10	-3.44	Pass
	20 msec	-4.40 to -5.40	-4.64	Pass
	25 msec	-5.40 to -6.10	-5.55	Pass
	25-100 msec	-5.50 to -6.20	-6.01	Pass
D-Plane Rotation	Max	71 to 81	75.2	Pass
	Time	50 to 70	61.8	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-38.0	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	117.8	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.2	-6.0	31.8



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
75.2	61.8	-31.6	172.1



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
14.3	162.8	-38.0	59.6