REPORT NUMBER: TR-P34007-02-NC

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

AUDI AG
2014 AUDI Q5 2.0T QUATTRO
5-DOOR MPV

NHTSA NUMBER: M20145800TWG2

PREPARED BY:
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JUNE 4, 2014

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 DTNH22-12-D-00259.

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Date of Acceptance

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SECTION 1
PURPOSE AND SUMMARY OF TEST

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. DTNH22-12-D-00259. The purpose of this test was to obtain out-of-position occupant injury data for a side airbag deployment.

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

SUMMARY

The effects of a roof mounted curtain airbag and a seat mounted torso/pelvis airbag deployment in a 2014 Audi Q5 2.0T Quattro 5-door MPV with an out-of-position 6-year old dummy were evaluated. The test was performed at KARCO Engineering, LLC. on May 21, 2014. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Three (3) high-speed digital cameras and one (1) real time camera were used to document the deployment of the airbags. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

A 6-year old anthropomorphic test device (ATD) was placed in the right front passenger seating position facing inboard according to the dummy placement instructions (3.3.5.1) in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The 6-year old ATD was instrumented with head tri-axial accelerometers and upper and lower neck force transducers.

Fifteen (15) channels of data were recorded using an on-board data acquisition system. Appendix B contains dummy response data traces. Appendix C contains the instrumentation data channel assignments. Appendix D contains ATD calibration sheets.

Orientation of the 6-year old dummy was in the inboard facing position leaning back against the passenger door. The dummy was seated on a foam wedge and its upper spine was aligned with the deploying trajectory of the airbag. This orientation complies with section 3.3.5.1 of the Technical Working Group (TWG) recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

The passenger side door remained closed during the test, and was operable after the airbag deployed.

The 6-year old dummy's visible contact points were as follows: The ATD's head contacted the curtain airbag. The ATD's left arm and pelvis contacted the torso/pelvis airbag.

The occupant data is summarized below:

ATD Position	HIC_{15}	T^1	T^2	Avg G	Ntf	Nte	Ncf	Nce
Passenger	3.2	7.0	22.0	8.6	0.00	0.00	0.39	0.82

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

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	^oF	^oC	=(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: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	6-Year Old / 186
Head Contact	Curtain Airbag
Chest Contact	None
Abdomen Contact	None
Pelvis Contact	Torso/Pelvis Airbag
Left Knee Contact	None
Right Knee Contact	None

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

DATA CHANNELS

Description	Quantity
3 Year Old ATD Sensors	15
Belt Assessment Sensors	0
Vehicle Structure Accelerometers	0
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20145800
Model Year	2014
Make	Audi
Model	Q5 2.0T Quattro
Body Style	5-Door MPV
VIN	WA1LFBFP3EA044520
Body Color	Monsoon Gray Metallic
Odometer Reading (km / mi)	66 / 41
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Seat Belt Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	Rear Side Airbags

Does Owner's Manual provide instructions to turn off automatic door locks?	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG
Date of Manufacture	Oct-13

GVWR (kg)	2435
GAWR Front (kg)	1180
GAWR Rear (kg)	1350

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Split Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				475.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				134.8	*A-B*

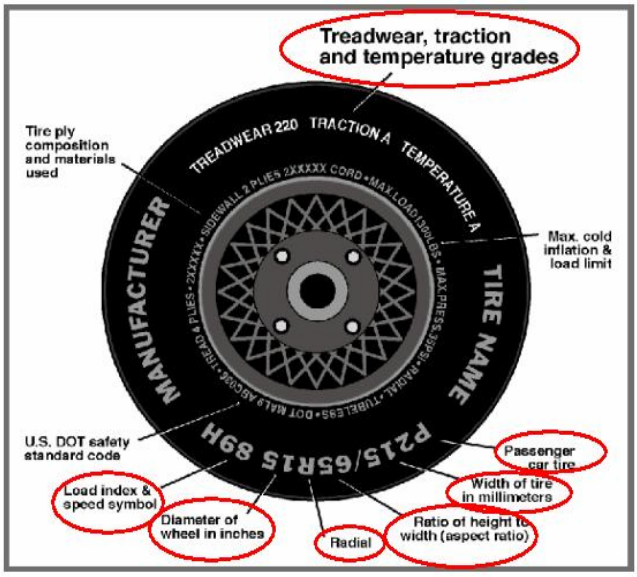
*Vehicle underwent New Car Assessment Program Frontal Impact Testing on February 5, 2014.

DATA SHEET NO. 2 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	P235/60R18	P235/60R18
Tire Size on Vehicle	P235/60R18	P235/60R18
Tire Manufacturer	Continental	Continental
Tire Model	Cross Contact	Cross Contact
Treadwear	480	480
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	2 Rayon, 2 Steel, 1 Polyamide	2 Rayon, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	103H	103H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	AF45 PXX4 3713	AF45 PXX4 3713
DOT Safety Code Right	AF45 PXX4 3713	AF45 PXX4 3713

DATA SHEET NO. 3

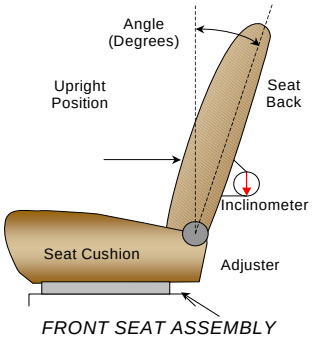
SEAT ADJUSTMENTS

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

SEAT BACK ANGLE

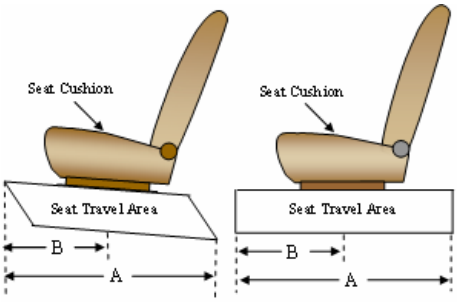
The passenger seat back is positioned per section 3.3.5.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the seat back.



Seating Position	Degrees	Detent
Passenger Seat	21.0	

SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.5.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. The first or forward most position is counted as zero (0)



Seating Position	Total Fore-Aft Travel		Placed in Position	
	mm	Detents	mm	Detents
Passenger Seat	254		254	

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the uppermost position. Position “H” is the uppermost position, followed by position “M_1”. Position “L” is the lowermost position.

Seating Position	Total No. of Positions	Placed in Position
Passenger Seat	5	H

*

*The seat belt pretensioner was fired prior to this test. The seatbelt was taped to the B-pillar to avoid interference with the Torso/Pelvis airbag.

DATA SHEET NO. 4

DUMMY POSITIONING AND AIRBAG DIMENSIONS

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		21.0
AN	Top of Airbag Module to Head/Neck Junction	240	90.0
HD	Head CG to Door Panel/ Window	105	0.0
HSC	Head to Seat Back Centerline	366	0.0
HB	Head to B-Pillar	246	0.0
HZ	Head to Roof (Z)	200	90.0
HHD	Head to Header	347	32.1
ND	Nose to Dash	595	25.8
NS	Nose to Seat Back	297	0.0
NR	Nose to Header	348	32.9
CD	Chest to Dash	509	6.5
CS	Chest to Seat Back	256	0.0
RACL	Right Arm to Seat Back Centerline	299	0.0
LACL	Left Arm to Seat Back Centerline	291	0.0
RA	Right Arm to Door Panel	78	0.0
LA	Left Arm to Door Panel	61	0.0
KK	Knee to Knee	106	0.0
TT	Toe to Toe	64	0.0
KSCR	Right Knee to Seat Cushion Centerline	58	0.0
KSCL	Left Knee to Seat Cushion Centerline	52	0.0
	Head Angle (X Direction)		3.0
	Head Angle (Y Direction)		7.1

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	30
AML	Curtain Airbag Module Length	260
ABL	Curtain Airbag Length	1770
ABW	Curtain Airbag Width	445
AMW	Torso/Pelvis Airbag Module Diameter	20
AML	Torso/Pelvis Airbag Module Length	140
ABL	Torso/Pelvis Airbag Length	320
ABW	Torso/Pelvis Airbag Width	640

DATA SHEET NO. 5

HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Head CG	X	G's	9.5	10.6	-13.6	7.3
Head CG	Y	G's	8.3	16.9	-10.1	7.2
Head CG	Z	G's	29.2	7.3	-4.7	10.2
Head CG Resultant	N/A	G's	33.6	7.3		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	217.1	299.6	-44.6	25.6
Neck Force	Y	Newtons	315.0	175.4	-10.0	15.3
Neck Force	Z	Newtons	11.0	6.7	-1004.1	33.3
Neck Force Resultant	N/A	Newtons	1011.2	33.3		
Neck Moment	X	Nm	19.9	251.0	-1.7	17.0
Neck Moment	Y	Nm	8.5	13.1	-21.5	194.5
Neck Moment	Z	Nm	8.0	32.4	-0.1	8.7
Neck Moment Resultant	N/A	Nm	28.9	204.9		

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Pass. 6 YO			
			Max	Time	Min	Time
Neck Force	X	Newtons	56.0	8.6	-337.2	108.7
Neck Force	Y	Newtons	129.7	12.5	-215.3	191.0
Neck Force	Z	Newtons	6.0	7.0	-898.6	32.5
Neck Force Resultant	N/A	Newtons	898.7	32.5		
Neck Moment	X	Nm	32.8	242.9	-0.6	8.0
Neck Moment	Y	Nm	41.4	32.4	-0.1	3.5
Neck Moment	Z	Nm	9.8	22.8	-23.7	271.4
Neck Moment Resultant	N/A	Nm	51.5	106.4		

HEAD INJURY CRITERIA (HIC 15)

Location	Pass. 6 YO			
	HIC15	T^1	T^2	Avg G
Head CG	3.2	7.0	22.0	8.6

UPPER NECK NIJ VALUES

Location	Pass. 6 YO			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.00	0.00	0.39	0.82

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door MPV NHTSA No.: M20145800TWG2

Test Program: TWG 3.3.5.1 Test Date: 05/21/14

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Front View	1820	-315	-1480	-4.2	50	1000
2	High Speed 3/4 View	1535	-1630	-1575	-3.1	50	1000
3	High Speed Side View	125	-2710	-1080	-2.0	35	1000

Coordinates: +X = forward of vehicle relative to dummy's head CG

+Y = right of vehicle relative to dummy's head CG

+Z = into ground

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

FIGURE 1. Right Front ¾ View, As Received

FIGURE 2. Vehicle Certification Label

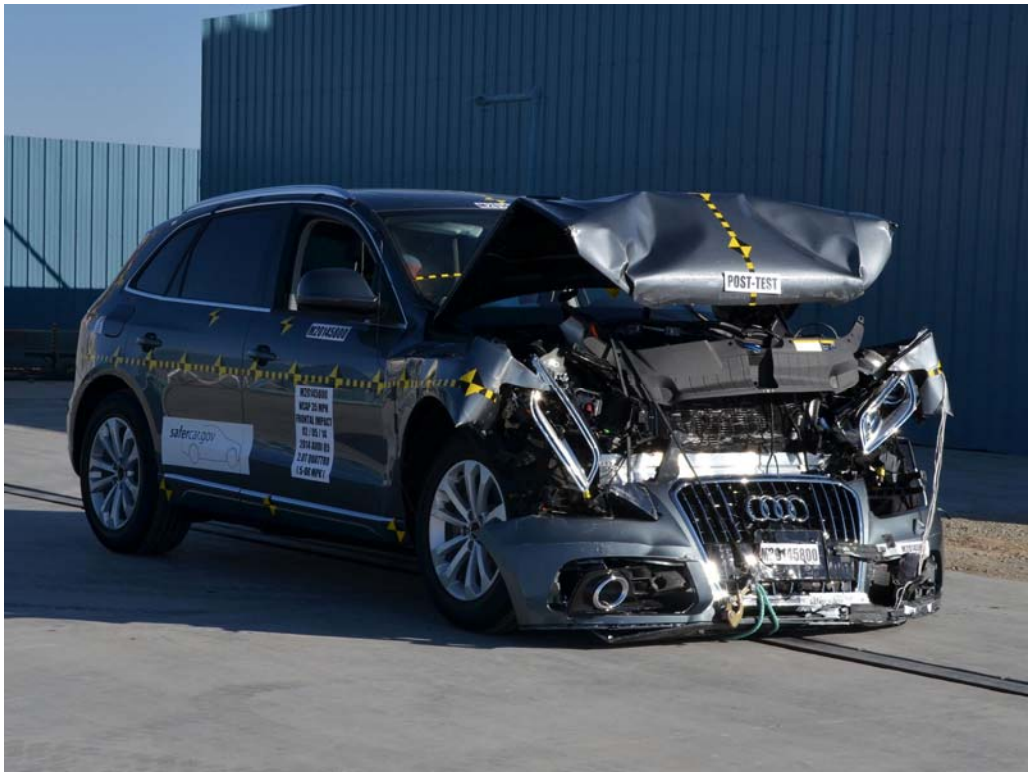


FIGURE 3. Post-Test Right Front ¾ View of NCAP Frontal Impact Test

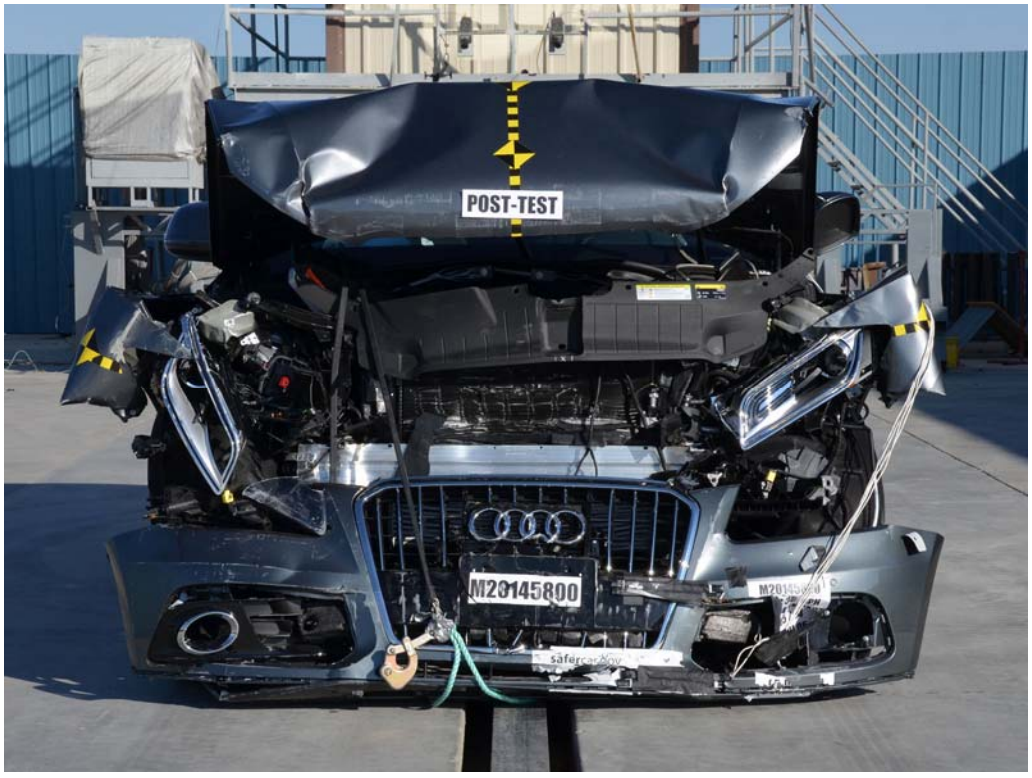


FIGURE 4. Post-Test Front View of NCAP Frontal Impact Test

FIGURE 5. Post-Test Left Front ¾ View of NCAP Frontal Impact Test

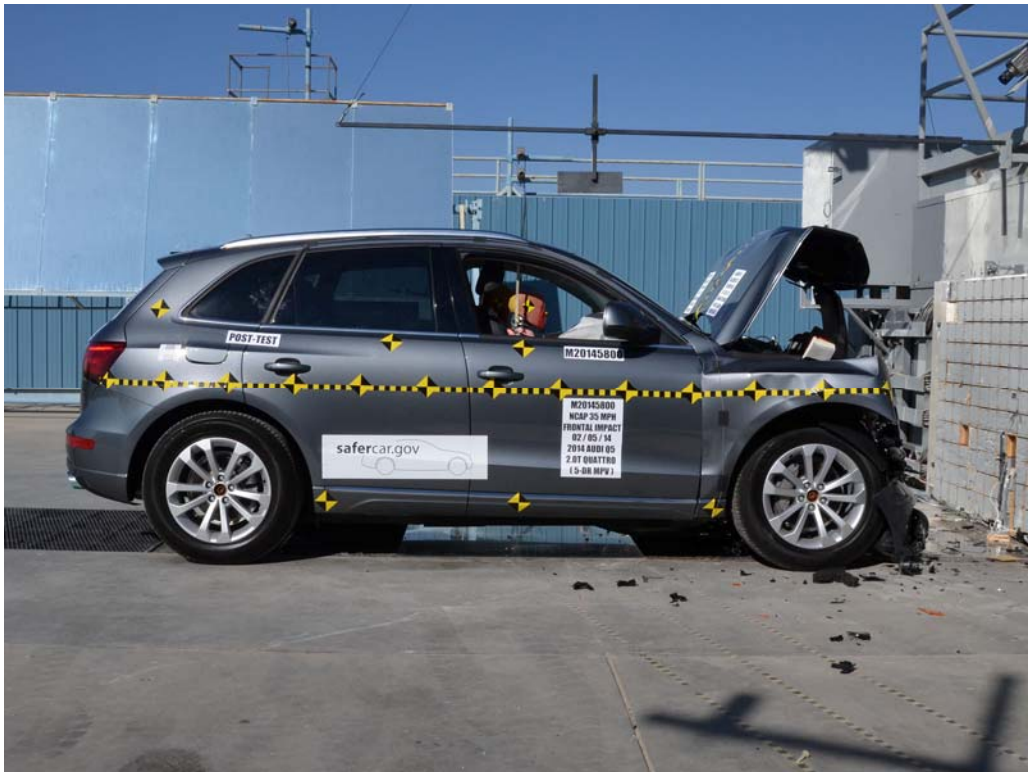


FIGURE 6. Post-Test Right Side View of NCAP Frontal Impact Test

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

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

FIGURE 9. Pre-Test Dummy Position, ¾ View

FIGURE 10. Post-Test Dummy Position, ¾ 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 ¾ View

APPENDIX B
DUMMY RESPONSE DATA TRACES

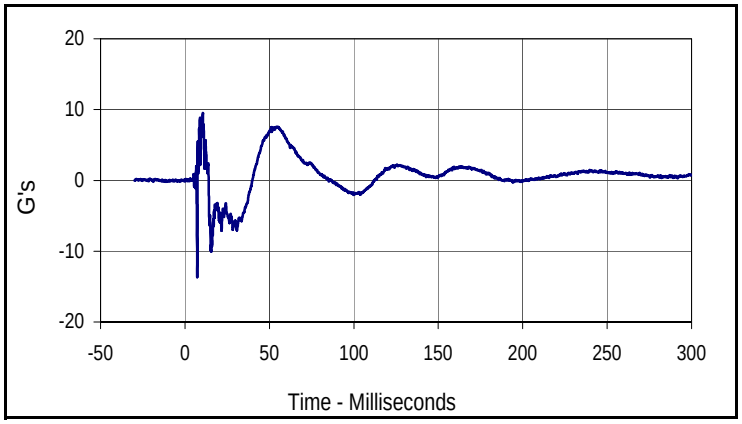
TABLE OF DATA PLOTS

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door Hatchback

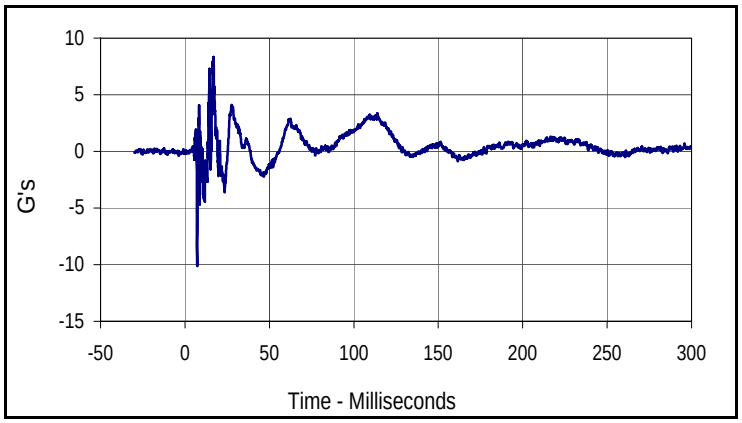
Test Program: TWG 3.3.5.1

Test Date: 5/21/14

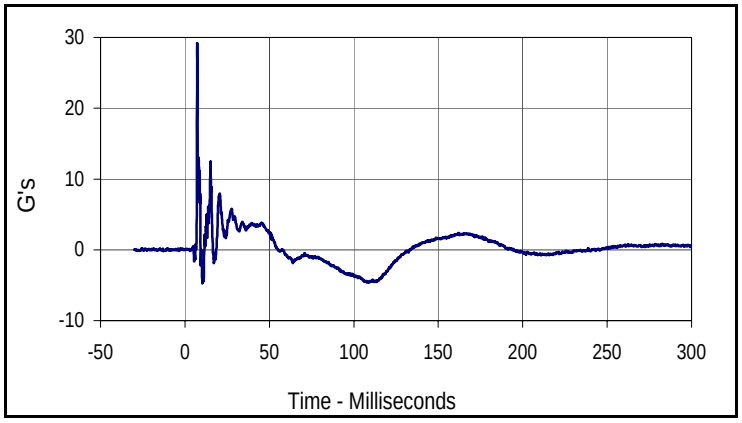
NHTSA No.: M20145800TWG2



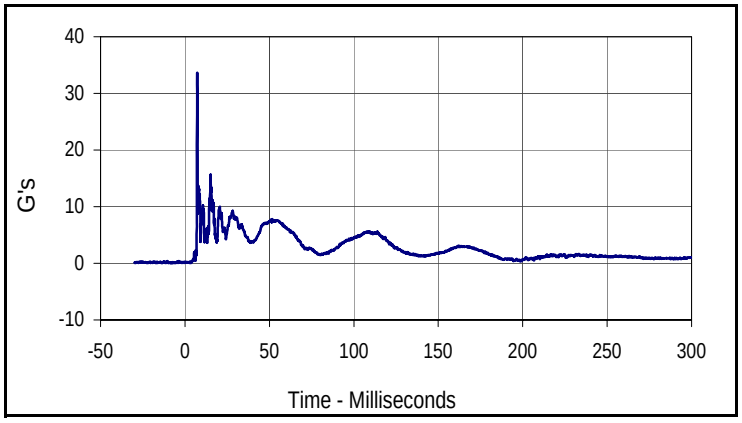
Curve Description			
6 Yr. Old Head X			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
9.5	10.6	-13.6	7.3



Curve Description			
6 Yr. Old Head Y			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
8.3	16.9	-10.1	7.2

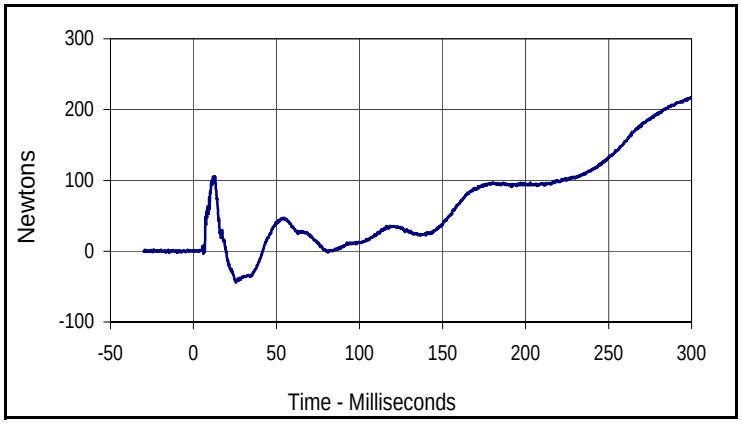


Curve Description			
6 Yr. Old Head Z			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
29.2	7.3	-4.7	10.2

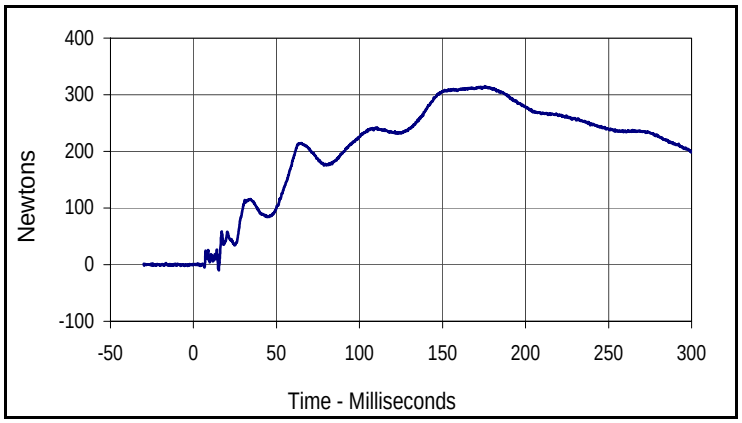


Curve Description			
6 Yr. Old Head Resultant			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
33.6	7.3	0.0	3.3

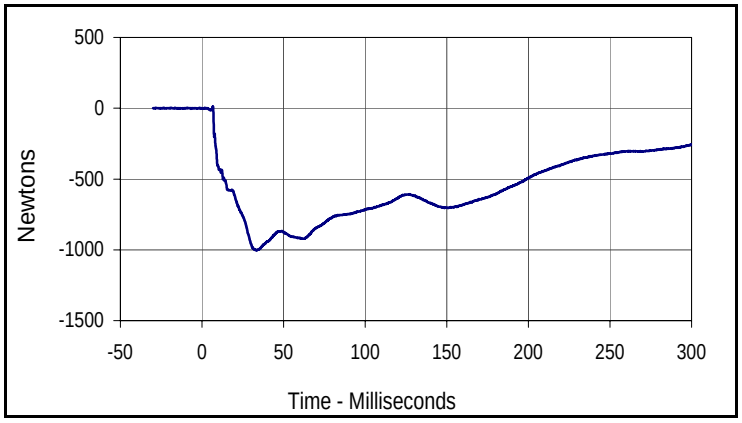
Test Vehicle:	2014 Audi Q5 2.0T Quattro 5-Door Hatchback	Test Date:	5/21/14
Test Program:	TWG 3.3.5.1	NHTSA No.:	M20145800TWG2



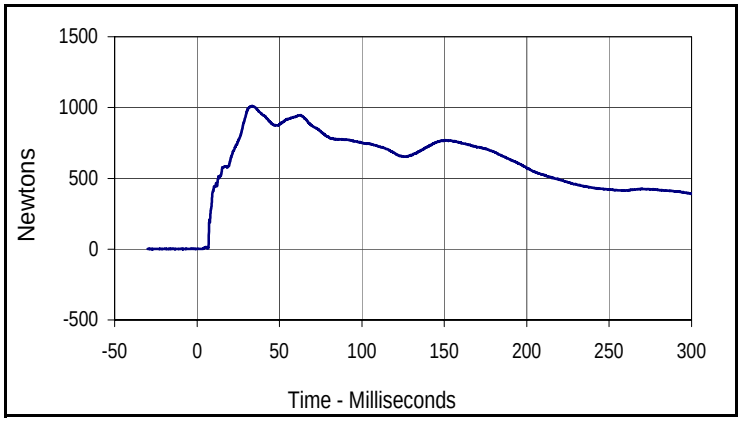
Curve Description			
6 Yr. Old Upper Neck Force X			
Plot No.	Type	SAE Class	Units
005	FIL	1000	Newtons
Max	Time	Min	Time
217.1	299.6	-44.6	25.6



Curve Description			
6 Yr. Old Upper Neck Force Y			
Plot No.	Type	SAE Class	Units
006	FIL	1000	Newtons
Max	Time	Min	Time
315.0	175.4	-10.0	15.3

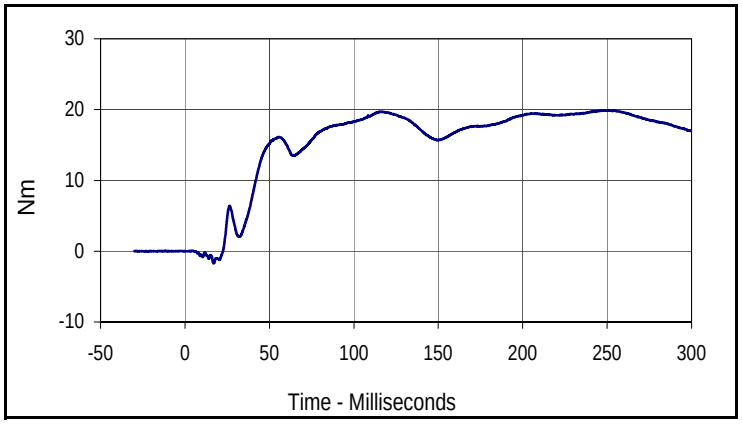


Curve Description			
6 Yr. Old Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
007	FIL	600	Newtons
Max	Time	Min	Time
11.0	6.7	-1004.1	33.3

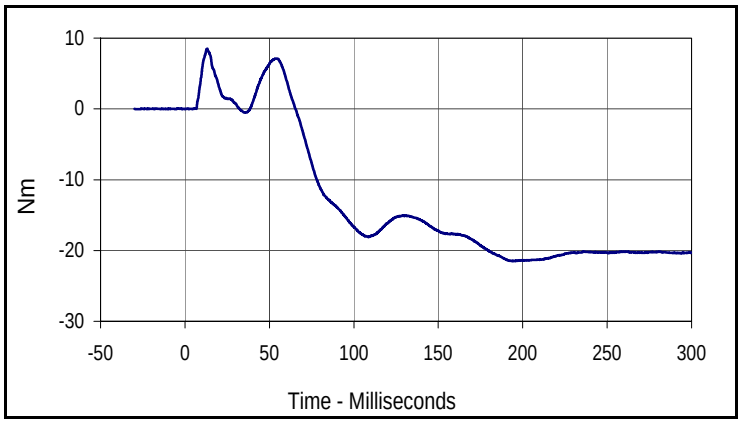


Curve Description			
6 Yr. Old Upper Neck Force Resultant			
Plot No.	Type	SAE Class	Units
008	RES	1000	Newtons
Max	Time	Min	Time
1011.2	33.3	0.6	3.1

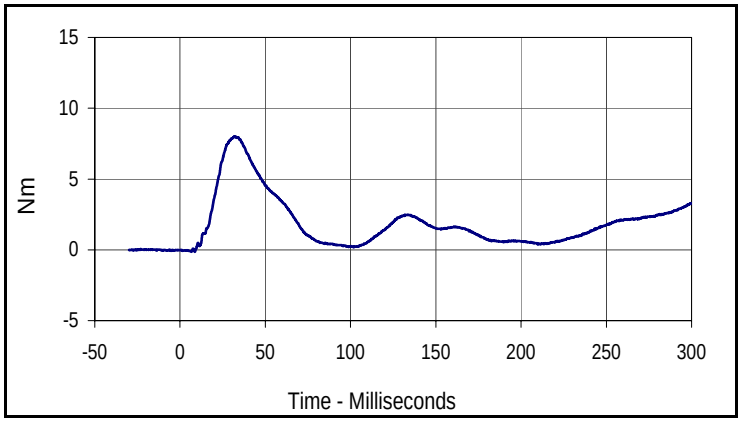
Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door Hatchback
Test Program: TWG 3.3.5.1
Test Date: 5/21/14
NHTSA No.: M20145800TWG2



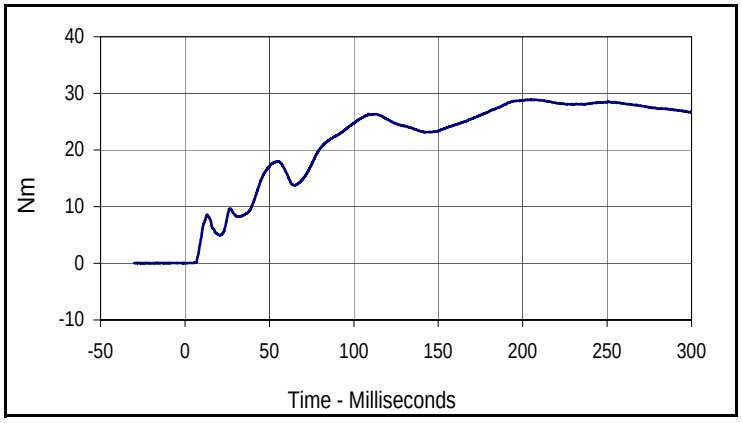
Curve Description			
6 Yr. Old Upper Neck Moment X			
Plot No.	Type	SAE Class	Units
009	FIL	600	Nm
Max	Time	Min	Time
19.9	251.0	-1.7	17.0



Curve Description			
6 Yr. Old Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Nm
Max	Time	Min	Time
8.5	13.1	-21.5	194.5



Curve Description			
6 Yr. Old Upper Neck Moment Z			
Plot No.	Type	SAE Class	Units
011	FIL	600	Nm
Max	Time	Min	Time
8.0	32.4	-0.1	8.7



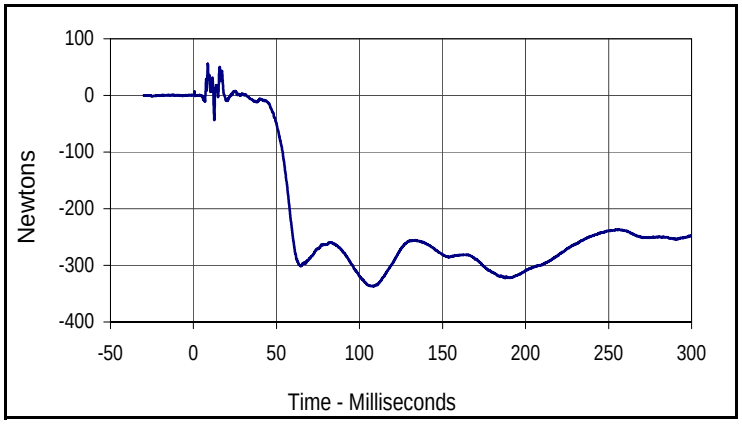
Curve Description			
6 Yr. Old Upper Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
012	RES	600	Nm
Max	Time	Min	Time
28.9	204.9	0.0	0.7

Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door Hatchback

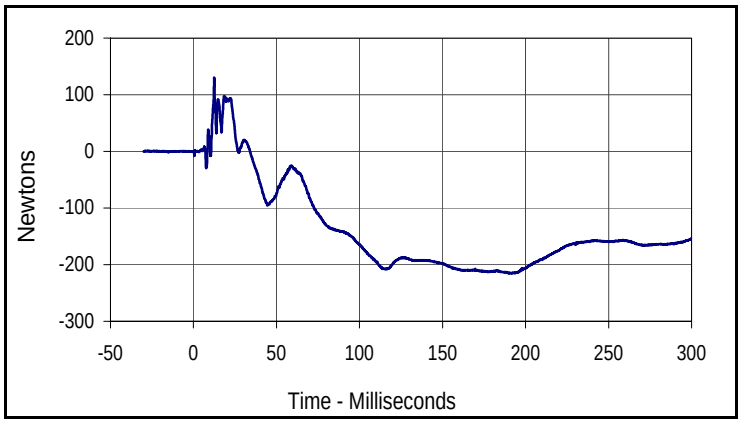
Test Program: TWG 3.3.5.1

Test Date: 5/21/14

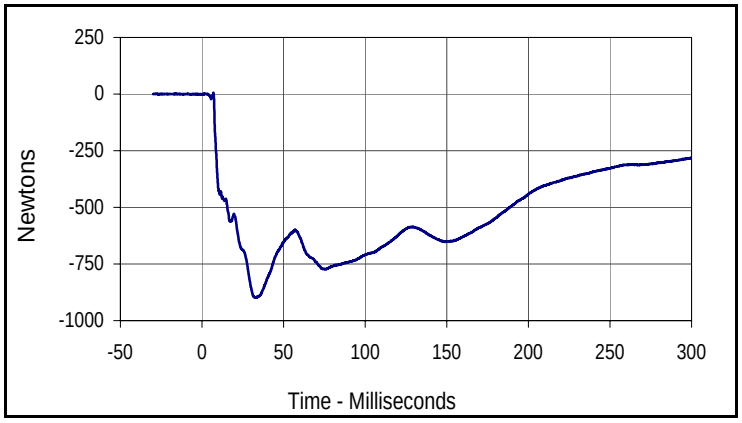
NHTSA No.: M20145800TWG2



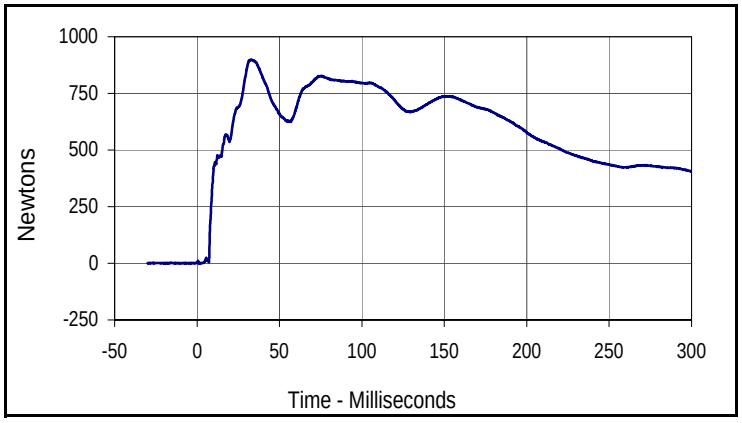
Curve Description			
6 Yr. Old Lower Neck Force X			
Plot No.	Type	SAE Class	Units
013	FIL	1000	Newtons
Max	Time	Min	Time
56.0	8.6	-337.2	108.7



Curve Description			
6 Yr. Old Lower Neck Force Y			
Plot No.	Type	SAE Class	Units
014	FIL	1000	Newtons
Max	Time	Min	Time
129.7	12.5	-215.3	191.0

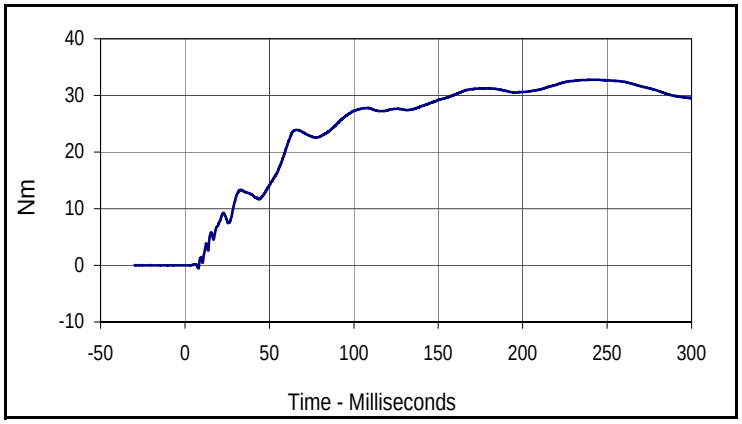


Curve Description			
6 Yr. Old Lower Neck Force Z			
Plot No.	Type	SAE Class	Units
015	FIL	1000	Newtons
Max	Time	Min	Time
6.0	7.0	-898.6	32.5

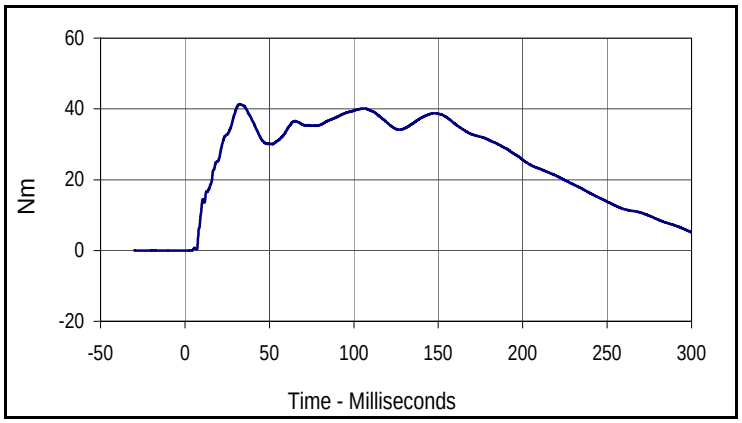


Curve Description			
6 Yr. Old Lower Neck Force Resultant			
Plot No.	Type	SAE Class	Units
016	RES	1000	Newtons
Max	Time	Min	Time
898.7	32.5	0.4	1.8

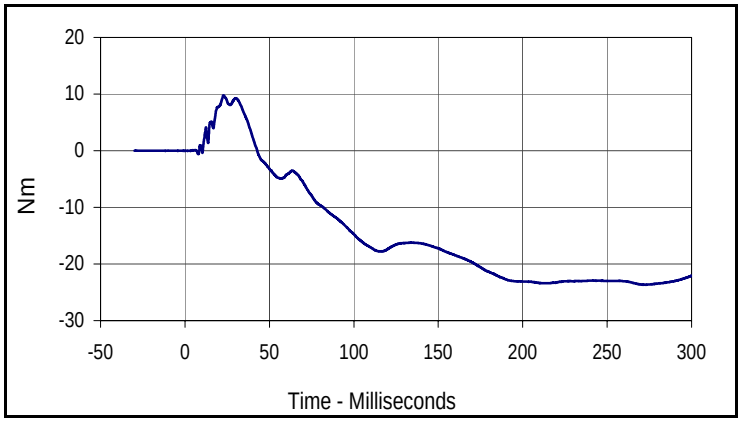
Test Vehicle: 2014 Audi Q5 2.0T Quattro 5-Door Hatchback
Test Program: TWG 3.3.5.1
Test Date: 5/21/14
NHTSA No.: M20145800TWG2



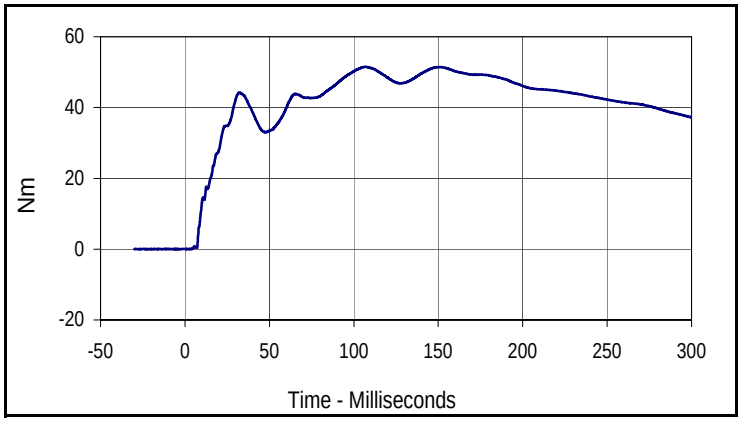
Curve Description			
6 Yr. Old Lower Neck Moment X			
Plot No.	Type	SAE Class	Units
017	FIL	600	Nm
Max	Time	Min	Time
32.8	242.9	-0.6	8.0



Curve Description			
6 Yr. Old Lower Neck Moment Y			
Plot No.	Type	SAE Class	Units
018	FIL	600	Nm
Max	Time	Min	Time
41.4	32.4	-0.1	3.5



Curve Description			
6 Yr. Old Lower Neck Moment Z			
Plot No.	Type	SAE Class	Units
019	FIL	600	Nm
Max	Time	Min	Time
9.8	22.8	-23.7	271.4



Curve Description			
6 Yr. Old Lower Neck Moment Resultant			
Plot No.	Type	SAE Class	Units
020	RES	600	Nm
Max	Time	Min	Time
51.5	106.4	0.0	3.9

APPENDIX C
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

TWG 3.3.5.1
Instrumentation Data Channel Assignments
A.T.D. Serial Number 186
5/21/14
2014 Audi Q5 2.0T Quattro 5-Door Hatchback

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD	X	J34330	Accel.,full bridge	Endevco	7264-2000	G
2	HEAD	Y	P15334	Accel.,full bridge	Endevco	7264C-2000	G
3	HEAD	Z	ACCW9	Accel.,full bridge	Endevco	7264-2000	G
4	UPPER NECK FORCE	X	1646	Load cell, six axis neck	R. A. Denton	1716A	N
5	UPPER NECK FORCE	Y	1646	Load cell, six axis neck	R. A. Denton	1716A	N
6	UPPER NECK FORCE	Z	1646	Load cell, six axis neck	R. A. Denton	1716A	N
7	UPPER NECK MOMENT	X	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
8	UPPER NECK MOMENT	Y	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
9	UPPER NECK MOMENT	Z	1646	Load cell, six axis neck	R. A. Denton	1716A	Nm
10	LOWER NECK FORCE	X	146	Load cell, six axis neck	R. A. Denton	2430	N
11	LOWER NECK FORCE	Y	146	Load cell, six axis neck	R. A. Denton	2430	N
12	LOWER NECK FORCE	Z	146	Load cell, six axis neck	R. A. Denton	2430	N
13	LOWER NECK MOMENT	X	146	Load cell, six axis neck	R. A. Denton	2430	Nm
14	LOWER NECK MOMENT	Y	146	Load cell, six axis neck	R. A. Denton	2430	Nm
15	LOWER NECK MOMENT	Z	146	Load cell, six axis neck	R. A. Denton	2430	Nm

APPENDIX D

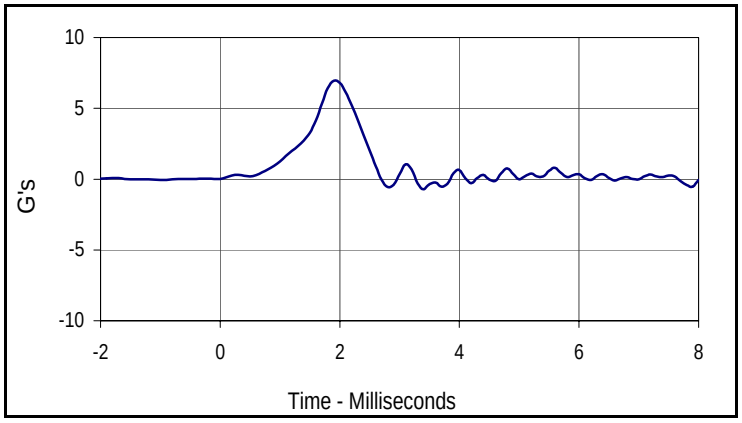
PRE-TEST AND POST-TEST HYBRID III CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Test Program:	Hybrid III 6 Yr Old Head Drop Test	Test Date:	5/19/14
ATD Serial No.:	186	Test I.D.:	186HD028

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	276.1	Pass
Peak Lateral Acceleration	G's	≤15.0	6.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

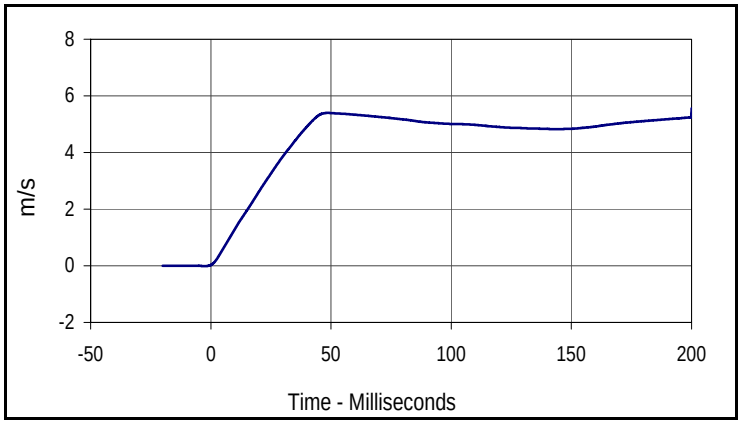
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
276.1	2.0	0.0	-1.5



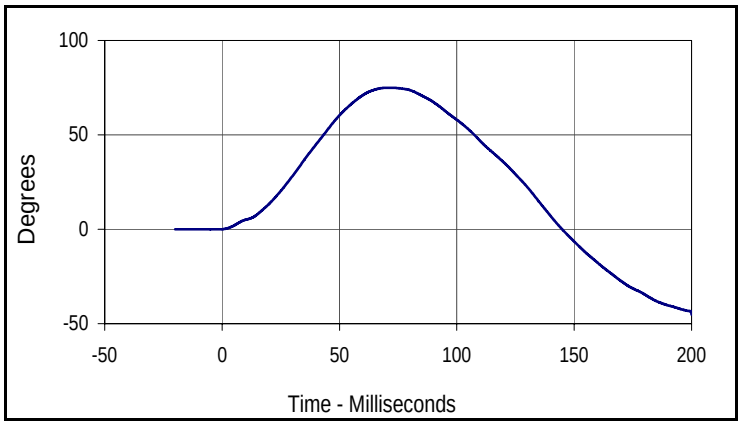
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
6.9	1.9	-0.7	3.4

Test Program:	Hybrid III 6 Yr Old Neck Flexion Test	Test Date:	5/19/14
ATD Serial No.:	186	Test I.D.:	186NF028

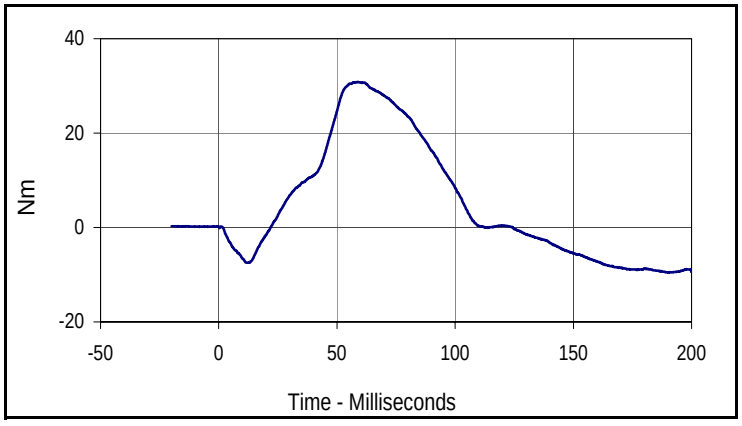
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	4.83 to 5.07	5.02	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.3	Pass
	20 Msec.	m/s	2.4 to 3.4	2.6	Pass
	30 Msec.	m/s	3.8 to 5.0	3.9	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	75.0	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	29.2	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	103.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.6	200.0	0.0	-2.3



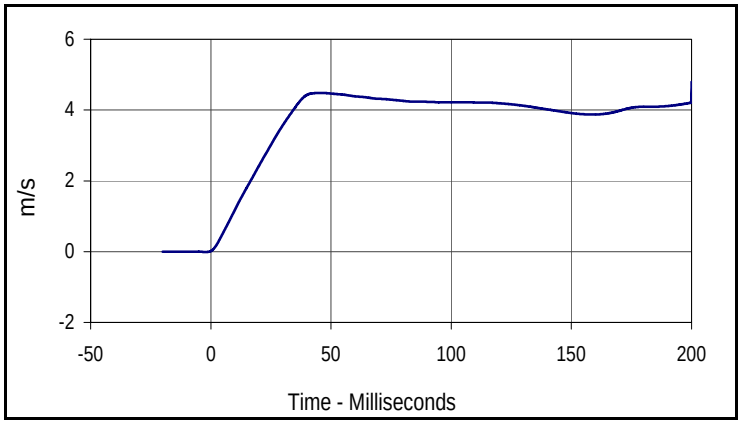
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
75.0	71.8	-45.3	200.0



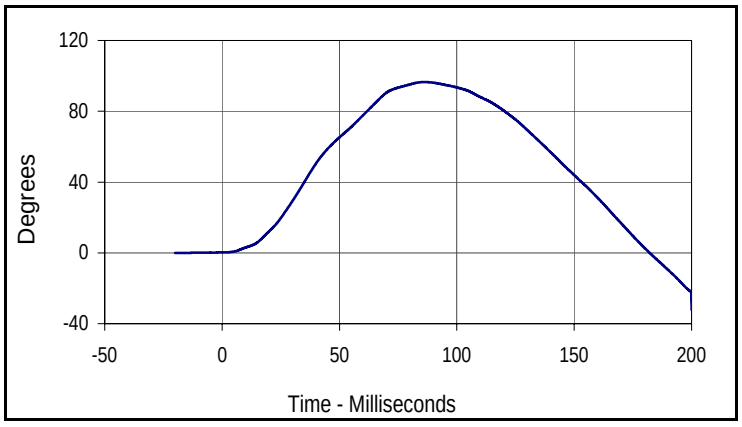
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
30.8	58.7	-9.5	190.2

Test Program:	Hybrid III 6 Yr Old Neck Extension Test	Test Date:	5/19/14
ATD Serial No.:	186	Test I.D.:	186NE028

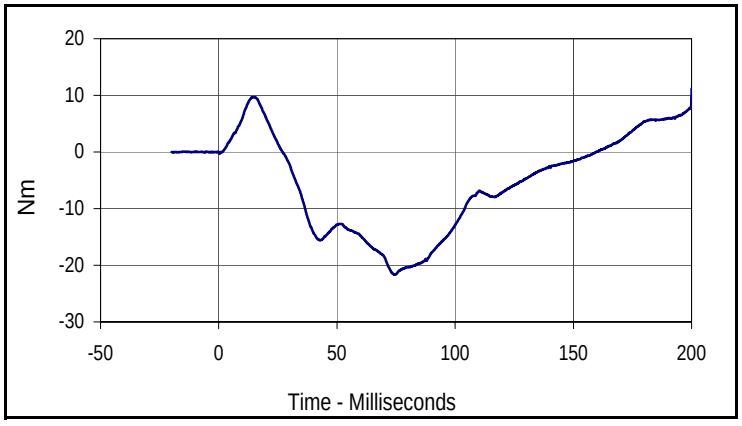
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.31	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.2	Pass
	20 Msec.	m/s	2.2 to 3.0	2.4	Pass
	30 Msec.	m/s	3.2 to 4.2	3.6	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	96.5	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-21.6	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	123.0 to 147.0	127.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.8	200.0	0.0	-2.0



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
96.5	86.1	-32.2	200.0



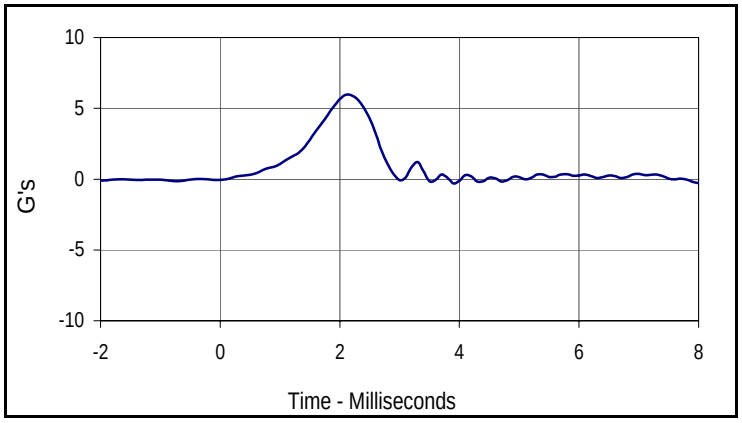
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
11.2	200.0	-21.6	74.5

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

Test Program:	Hybrid III 6 Yr Old Head Drop Test	Test Date:	5/23/14
ATD Serial No.:	186	Test I.D.:	186HD029

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	245.0 to 300.0	269.0	Pass
Peak Lateral Acceleration	G's	≤15.0	5.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

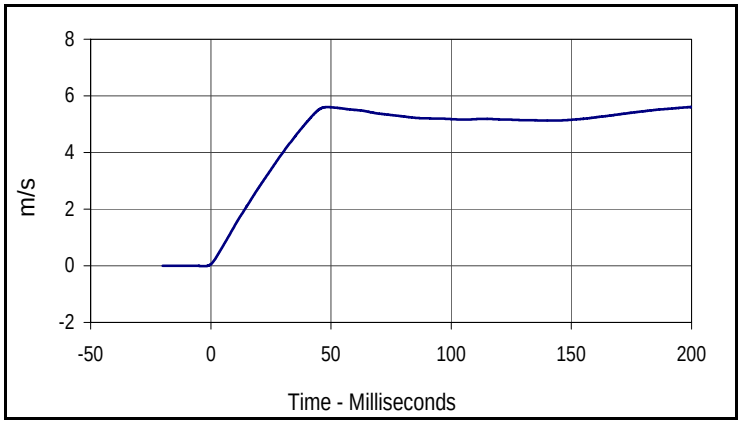
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G
Max	Time	Min	Time
269.0	2.1	0.0	-1.6



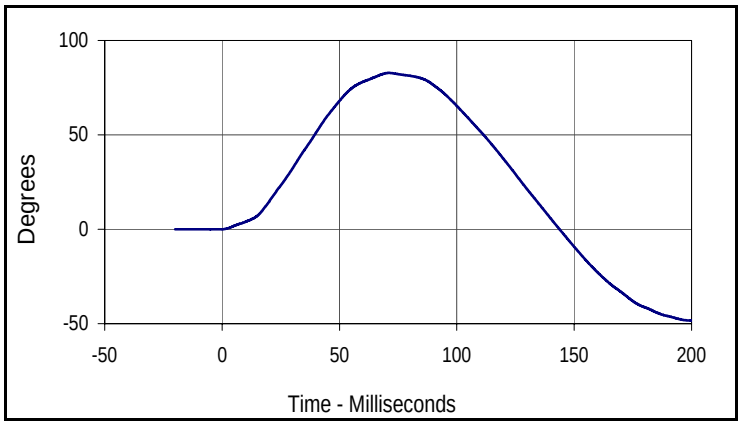
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.9	2.1	-0.3	3.9

Test Program:	Hybrid III 6 Yr Old Neck Flexion Test	Test Date:	5/23/14
ATD Serial No.:	186	Test I.D.:	186NF029

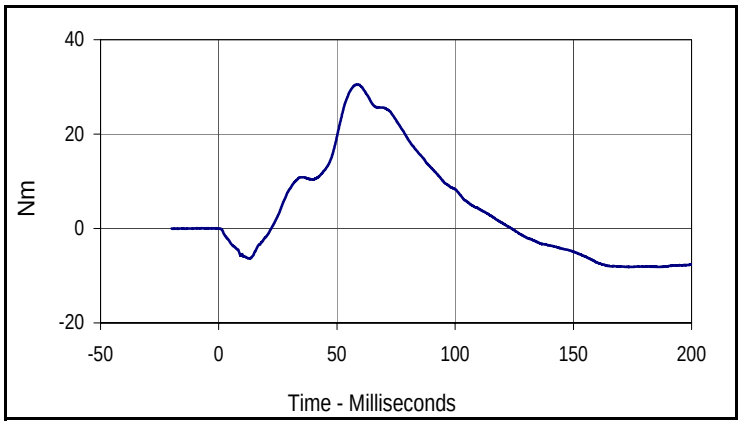
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Pendulum Velocity		m/s	4.83 to 5.07	4.94	Pass
Pendulum Deceleration	10 Msec.	m/s	1.2 to 1.6	1.4	Pass
	20 Msec.	m/s	2.4 to 3.4	2.8	Pass
	30 Msec.	m/s	3.8 to 5.0	4.0	Pass
"D" Plane Rotation	Max	Degrees	74.0 to 92.0	82.8	Pass
Peak Moment in Rotation	Max	Nm	27.0 to 33.0	30.5	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	103.0 to 123.0	106.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.6	200.0	0.0	-2.7



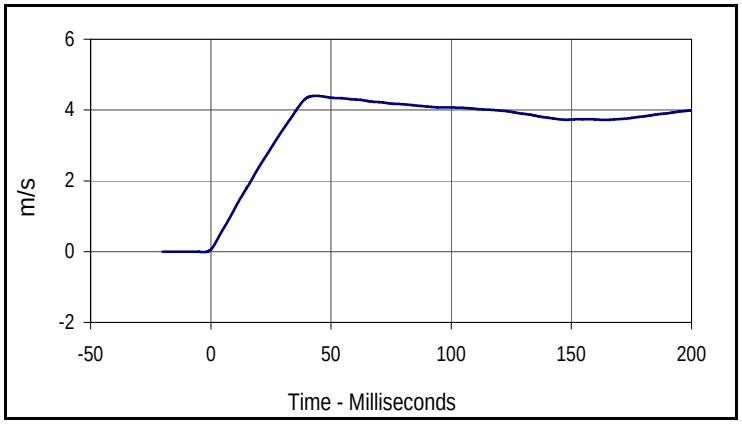
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
82.8	71.1	-48.4	200.0



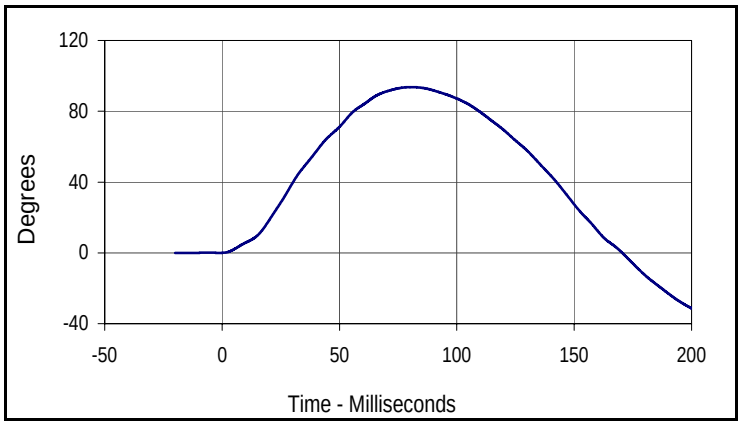
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
30.5	58.8	-8.2	173.4

Test Program:	Hybrid III 6 Yr Old Neck Extension Test	Test Date:	5/23/14
ATD Serial No.:	186	Test I.D.:	186NE029

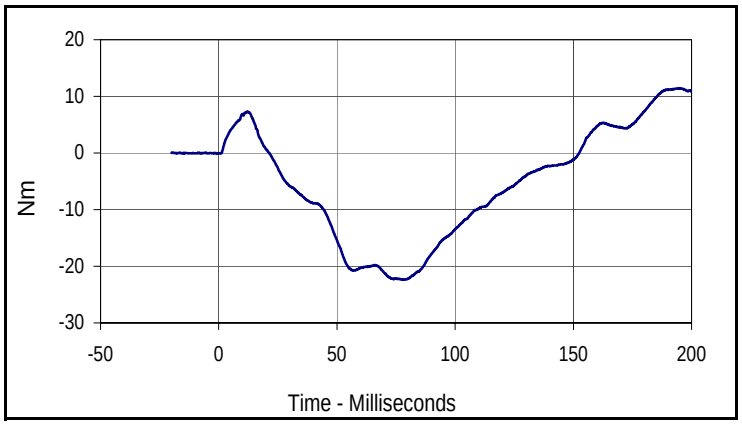
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	4.18 to 4.42	4.35	Pass
Pendulum Deceleration	10 Msec.	m/s	1.0 to 1.4	1.2	Pass
	20 Msec.	m/s	2.2 to 3.0	2.4	Pass
	30 Msec.	m/s	3.2 to 4.2	3.4	Pass
"D" Plane Rotation	Max	Degrees	85.0 to 103.0	93.6	Pass
Peak Moment in Rotation	Max	Nm	-24.0 to -19.0	-22.4	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	123.0 to 147.0	127.0	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.4	43.8	0.0	-2.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
93.6	80.6	-31.3	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
11.5	194.4	-22.4	78.2