

REPORT NUMBER: NCAP-KAR-15-014

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**BAYERISCHE MOTOREN WERKE AG
2015 BMW X5 xDRIVE35i 5-DOOR MPV**

NHTSA NUMBER: M20154100

**PREPARED BY:
KARCO ENGINEERING, LLC.
9270 HOLLY ROAD
ADELANTO, CA 92301**



NOVEMBER 26, 2014

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE, SE
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WASHINGTON, DC 20590**

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16. Abstract <p>A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2015 BMW X5 xDrive35i 5-door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on November 13, 2014.</p> <p>The impact velocity of the vehicle was 56.14 km/h and the ambient temperature at the barrier face at the time of impact was 21.1° C. The target vehicle's post-test maximum crush was 460 mm at the vehicle's centerline. The test vehicle's performance is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700.0</td> <td>174.2</td> <td>700.0</td> <td>229.5</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-20</td> <td>52</td> <td>-17</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.30</td> <td>1</td> <td>0.30</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1355.8</td> <td>2620</td> <td>690.4</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-165.6</td> <td>2520</td> <td>-101.4</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>-867.9</td> <td>6805</td> <td>-2088.5</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>-2094.8</td> <td>6805</td> <td>-1270.3</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700.0	174.2	700.0	229.5	Maximum Chest Compression	mm	63	-20	52	-17	Nij	N/A	1	0.30	1	0.30	Neck Tension	N	4170	1355.8	2620	690.4	Neck Compression	N	4000	-165.6	2520	-101.4	Left Femur Force	N	10008	-867.9	6805	-2088.5	Right Femur Force	N	10008	-2094.8	6805	-1270.3
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program, sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-12-D-00259. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated August 2013.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2015 BMW X5 xDrive35i 5-door MPV at a velocity of 56.14 km/h. The test was performed at KARCO Engineering, LLC. on November 13, 2014. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

Three (3) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD) was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. Seat belt load cells were placed on the driver's and passenger's shoulder and lap belts to measure the dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 360) and the right-front passenger (position 2) ATD (Serial No. 635) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 112 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% windshield retention and no intrusion into the protected zone of the windshield during the event.

The maximum static crush of the test vehicle was 460 mm located at the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD's head contacted the airbag and headrest. The upper torso contacted the airbag. Both the left and right knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger ATD's head contacted the airbag and headrest. The upper torso contacted the airbag. Both the left and right knees contacted the knee airbag.

The occupant data is summarized below:

ATD Position	HIC ₁₅	T ¹	T ²	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	174.2	53.1	68.1	-20	0.30	1355.8	-165.6	-867.9	-2094.8
Passenger (5th)	229.5	71.1	86.1	-17	0.30	690.4	-101.4	-2088.5	-1270.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

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	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20154100
Model Year	2015
Make	BMW
Model	X5 xDrive35i
Body Style	5-Door MPV
VIN	5UXKR0C58F0K54780
Body Color	Brown Metallic
Odometer Reading (km / mi)	18 / 11
Engine Displacement (L)	3.0
Type / No. of Cylinders	Inline 6
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	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	Yes
Front Pass. Torso/Pelvis Airbag	No
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	Yes
Driver Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Seat Belt Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	No

Does Owner's Manual provide instructions to turn off automatic door locks?

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Bayerische Motoren Werke AG
Date of Manufacture	Aug-14

GVWR (kg)	2835
GAWR Front (kg)	1279
GAWR Rear (kg)	1624

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

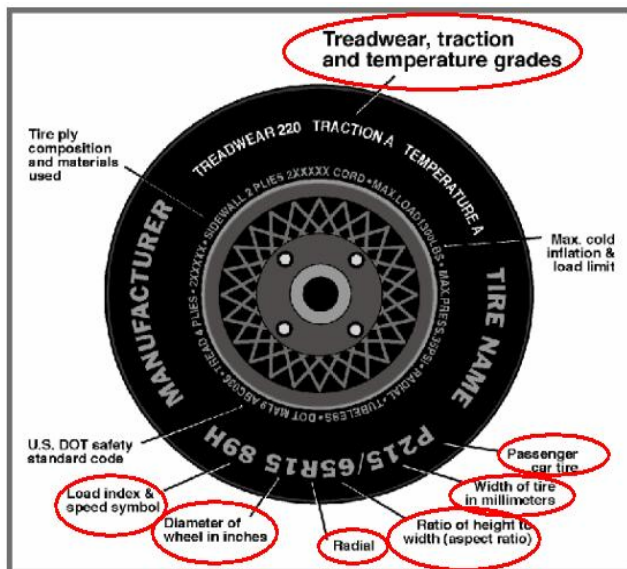
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				500.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				136.0

A
B
A-B

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
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VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	230	280
Recommended Tire Size	P255/55R18	P255/55R18
Tire Size on Vehicle	P255/55R18	P255/55R18
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle LS-2	Eagle LS-2
Treadwear	400	400
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	109H	109H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	M621 KKIR 3114	M621 KKIR 3114
DOT Safety Code Right	M621 KKIR 3114	M621 KKIR 3114

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	520.5	526.5		551.5	646.0	
Right	kg	534.0	545.5		548.5	650.0	
Ratio	%	49.6%	50.4%	100.0%	45.9%	54.1%	100.0%
Total	kg	1054.5	1072.0	2126.5	1100.0	1296.0	2396.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2126.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	136.0	C
Calculated Vehicle Target Weight (TVTW)	kg	2403.5	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	864	866	874	875	1480
As Tested	mm	858	861	845	850	1588
Post-Test	mm	853	853	860	854	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2935
Total Vehicle Length at Left Side	mm	4175
Total Vehicle Length at Centerline	mm	4885
Total Vehicle Length at Right Side	mm	4180
Weight of Ballast in Cargo Area	kg	178.8
Weight of Vehicle Components Removed	kg	9.0
Amount of Stoddard Solvent in Fuel Tank	L	78.84

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Cargo area trim (9.0 kg)

DATA SHEET NO. 1 ... (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	4885
2	Total Width	1937
3	Bumper Top Height	750
4	Bumper Bottom Height	562
5	Longitudinal Member Top Height	575
6	Distance Between Longitudinal Members	770
7	Longitudinal Member Width	80
8	Engine Top Height	965
9	Engine Bottom Height	406
10	Engine and Gearbox Width	600
11	Front Bumper to Engine Distance	596
12	Front Shock Absorber Fixing Height	880
13	Bonnet Leading Edge Height	925
14	Front Shock Absorber Fixing Width	1000
15	Front Bumper to Front Axle Distance	885
16	Front Axle to A-Pillar Distance	650
17	A-Pillar to B-Pillar Distance	968
18	B-Pillar to Rear Axle Distance	1181
19	B-Pillar to C-Pillar Distance	911
20	Roof Sill Bottom Height	1566
21	Roof Sill Top Height	1709
22	Floor Sill Bottom Height	256
23	Floor Sill Top Height	405

All measurements in millimeters.

DATA SHEET NO. 2

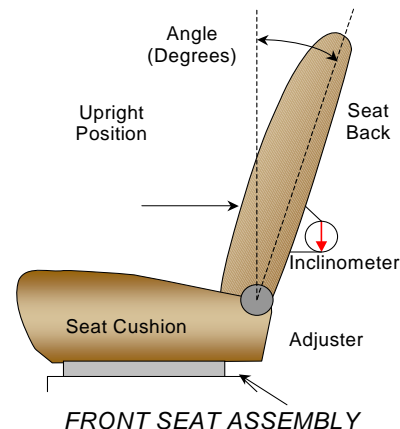
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154100
 Test Date: 11/13/14

NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at $0^\circ \pm 0.5^\circ$. Seat back angle is measured at the seat back.

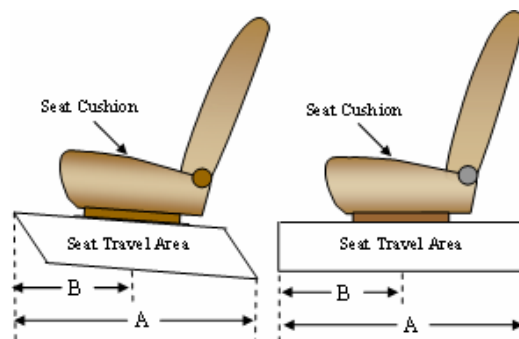


SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	17.8
Passenger Seat Back Angle	14.7

SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.



SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	301 mm	151 mm
Passenger Seat	200 mm	0 mm

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50th percentile adult male ATD for the driver, and a 5th percentile adult female ATD for the passenger. Position "H" is the uppermost position, followed by position "M1". Position "L" is the lowermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	Fixed	Fixed
Passenger Seat	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

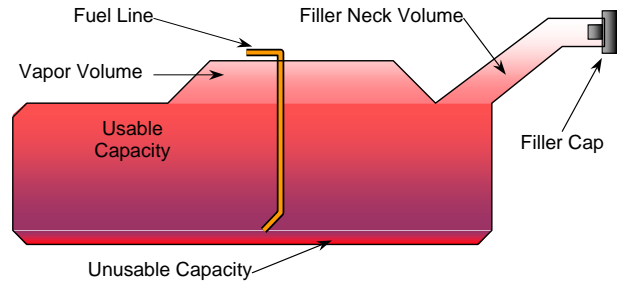
Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	84.78
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	78.00 to 79.69
Actual Amount of Stoddard Solvent Used	78.84
1/3 of Usable Capacity	28.26

FUEL PUMP

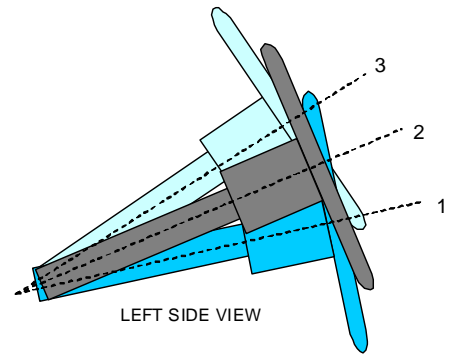
The vehicle is equipped with an electric fuel pump. The fuel pump operates for a few seconds after the ignition switch is turned to the "ON" position. The pump continues to operate if the engine is running.



VEHICLE FUEL TANK ASSEMBLY

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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	22.5	74
Geometric Center Position, No. 2	24.1	102
Uppermost Position, No. 3	25.7	130
Telescoping Steering Wheel Travel		56
Test Position	24.1	102

DATA SHEET NO. 3

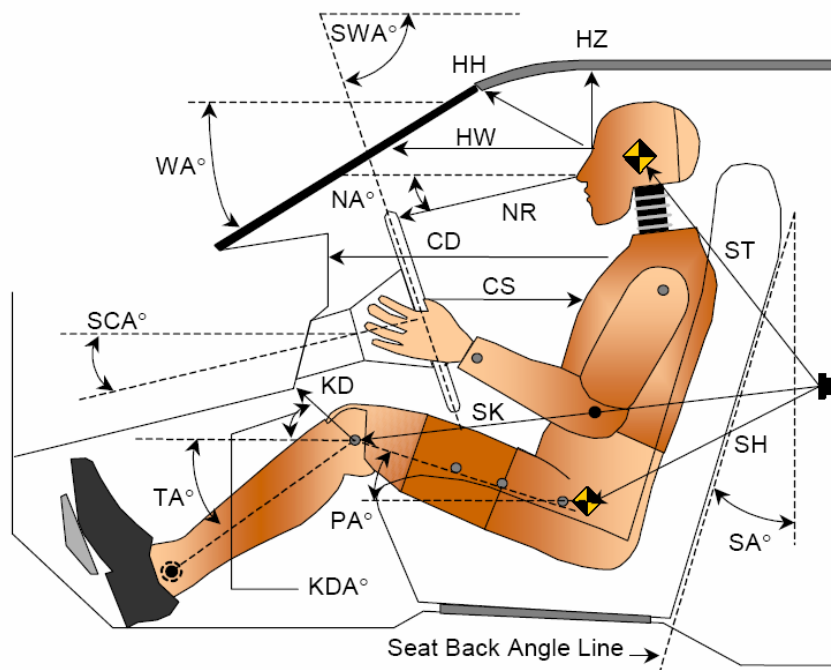
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV

NHTSA No.: M20154100

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 11/13/14



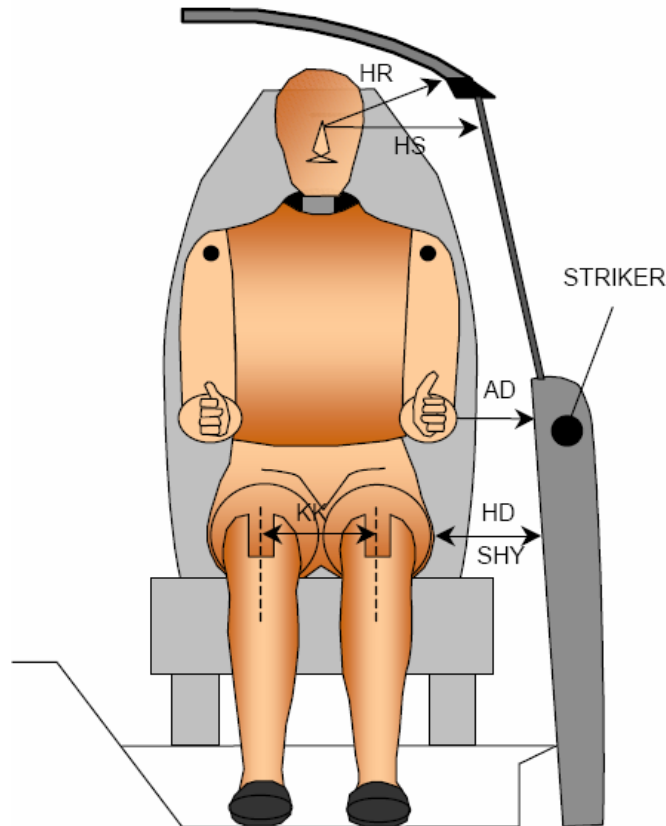
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		30.1		
SWA°	Steering Wheel Angle		23.1		
SCA°	Steering Column Angle		66.9		
SA°	Seat Back Angle (On Headrest Post)		17.8		14.7
HZ	Head to Roof	220	90.0	265	90.0
HH	Head to Header	424	24.7	310	44.3
HW	Head to Windshield	653	0.0	655	0.0
NR	Nose to Rim	373	5.1	526	26.4
CD	Chest to Dash	512		456	
CS	Chest to Steering Hub	300	0.0		
RA	Rim to Abdomen	208	0.0		
KDL	Left Knee to Dash	209	29.9	128	29.1
KDR	Right Knee to Dash	204	18.2	149	30.9
PA°	Pelvic Angle		23.3		20.8
TA°	Tibia Angle		42.8		53.0
SK	Striker to Knee	492	13.0	596	4.4
ST	Striker to Head	475	83.0	426	72.9
SH	Striker to H-Point	247	55.4	302	32.2

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	137	161
HD	H-Point to Door	149	220
HR	Head to Side Header	242	271
HS	Head to Side Window	374	379
KK	Knee to Knee	323	168
SHY	Striker to H-Point (Y-Direction)	243	290
AA	Ankle to Ankle	354	190

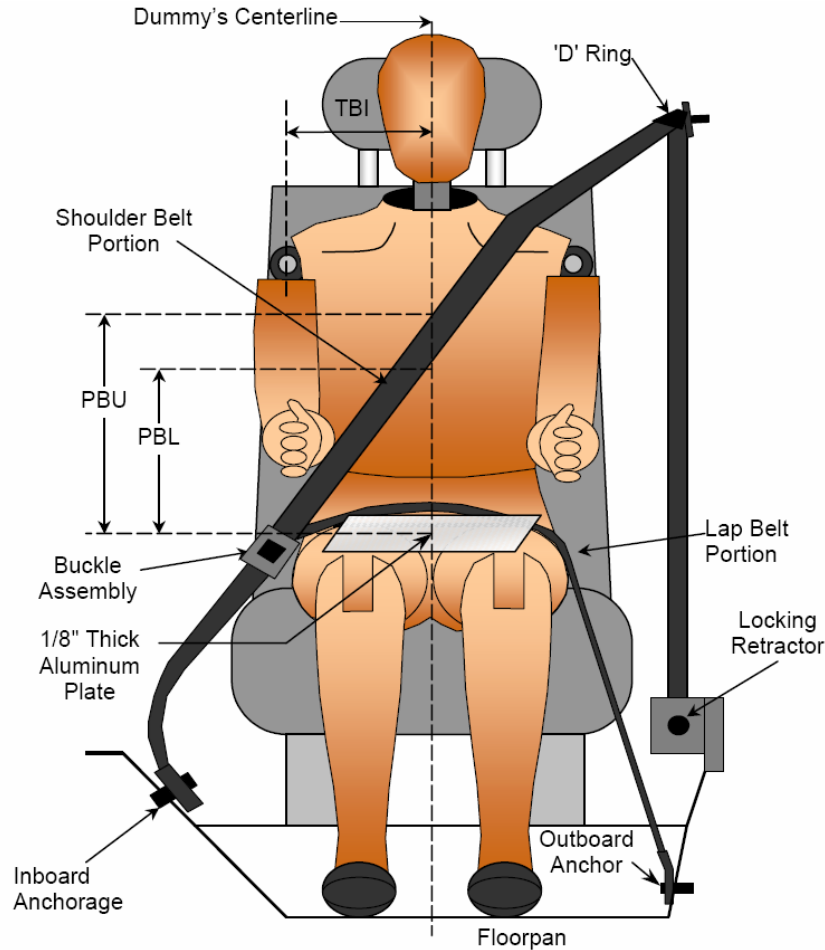
DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV

NHTSA No.: M20154100

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 11/13/14



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	272	300
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	344	220

BELT LENGTH DATA

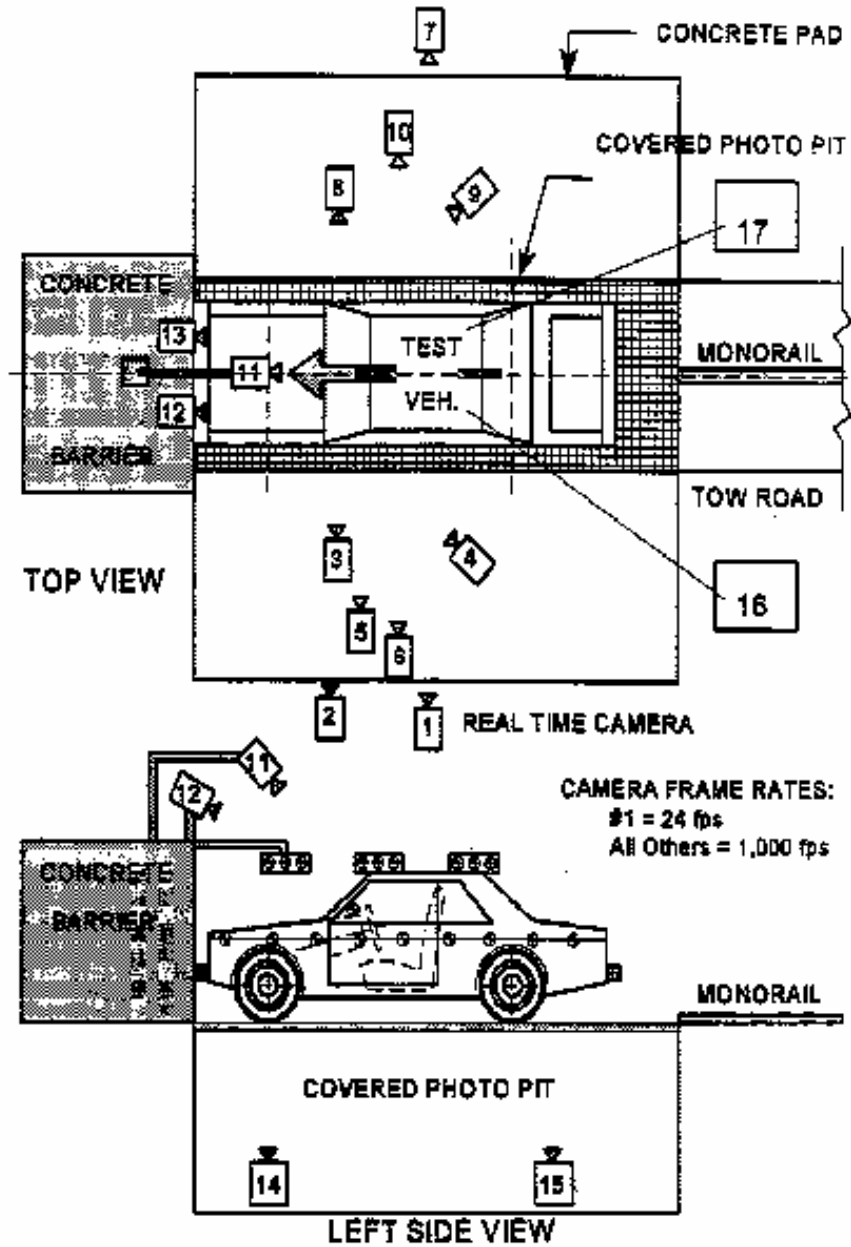
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	911	938
Lap Belt Length as Measured on ATD	mm	595	609
Remainder of Belt on Reel	mm	1152	1098
Total Belt Length for Continuous Webbing Systems	mm	2658	2645

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 ... (CONTINUED)

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

CAMERA LOCATIONS

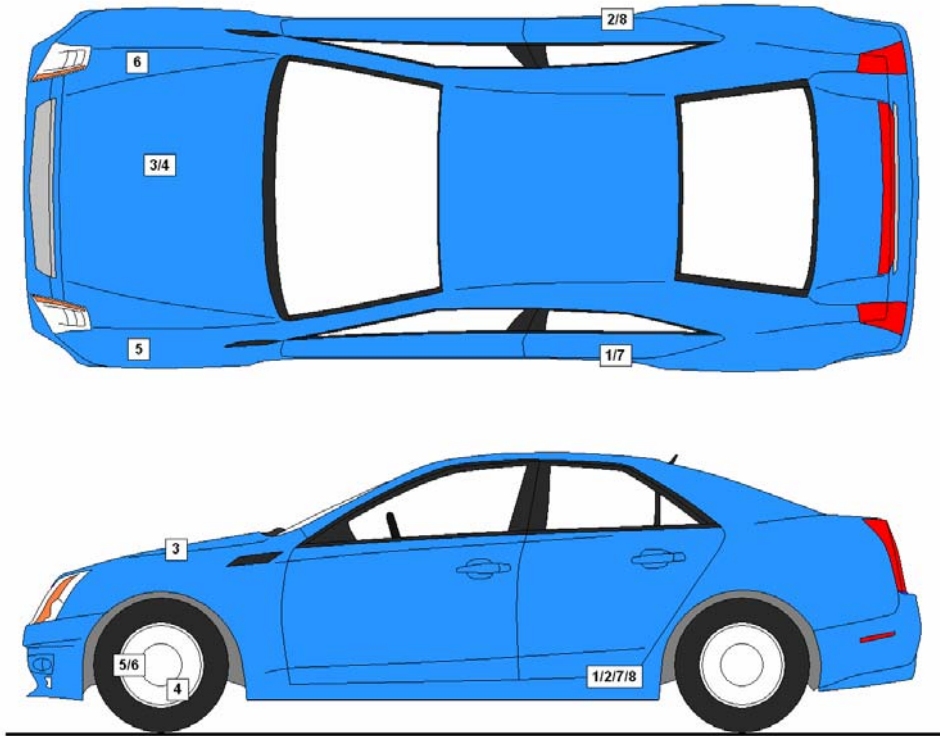
No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	24	1000
3	Left Front Half	-1701	-6197	-1701	50	1000
4	Left Angle	-6696	-10308	-3211	ZOOM	1000
5	Steering Column - Top	-1966	-10412	-3688	50	1000
6	Steering Column - Bottom	-1972	-10412	-3379	50	1000
7	Right Overall	-2336	7569	-1012	24	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	ZOOM	1000
10	Right Angle	-6217	9516	-4830	ZOOM	1000
11	Windshield	-354	0	-5749	12	1000
12	Driver Windshield	297	-366	-2460	12	1000
13	Passenger Windshield	297	366	-2460	24	1000
14	Pit Front	-756	0	1495	20	1000
15	Pit Rear	-3398	0	1495	20	1000
16	Onboard Driver Airbag (Optional)	-1100	250	-1550	13	1000
17	Onboard Passenger Airbag (Optional)	-1100	-250	-1550	13	1000
18	Real-Time Left View of Impact					
19	Real-Time Right View of Impact					

Coordinates: +X = forward impact plane
 +Y = right of monorail center
 +Z = into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1885	-774	-455
2	Right Rear Accelerometer X-Direction	1885	774	-455
3	Engine Top X	4366	71	-897
4	Engine Bottom X	3641	0	-270
5	Left Rear Accelerometer Z-Direction	1885	-774	-455
6	Right Rear Accelerometer Z-Direction	1885	774	-455
7	Left Rear Accelerometer X-Direction Redundant	1860	-774	-455
8	Right Rear Accelerometer X-Direction Redundant	1860	774	-455

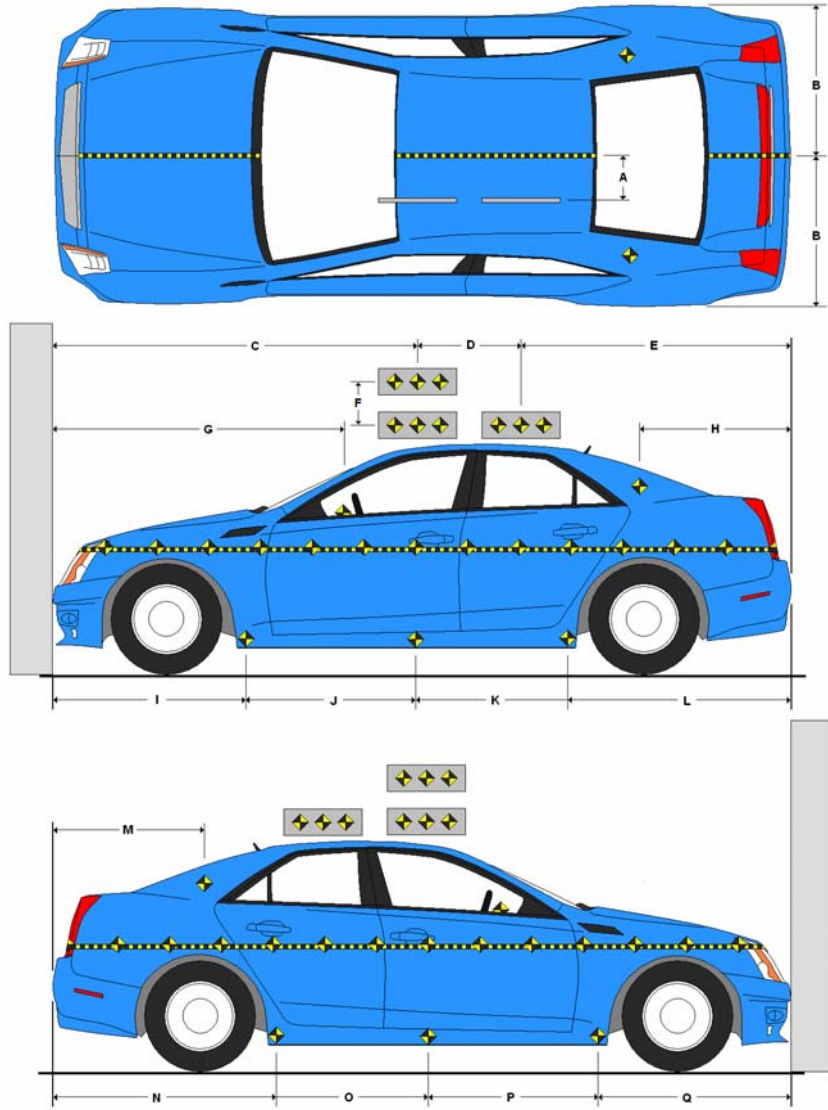
Reference Points: X – Rear Surface of Vehicle (+ forward)
 Y – Vehicle Centerline (+ to right)
 Z – Ground Plane (+ down)

DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

Item	Value
A	
B	969
C	2365
D	610
E	1906
F	
G	1920
H	620
I	1390
J	960
K	960
L	1575
M	639
N	1575
O	963
P	963
Q	1385



All measurements in millimeters.

DATA SHEET NO. 9

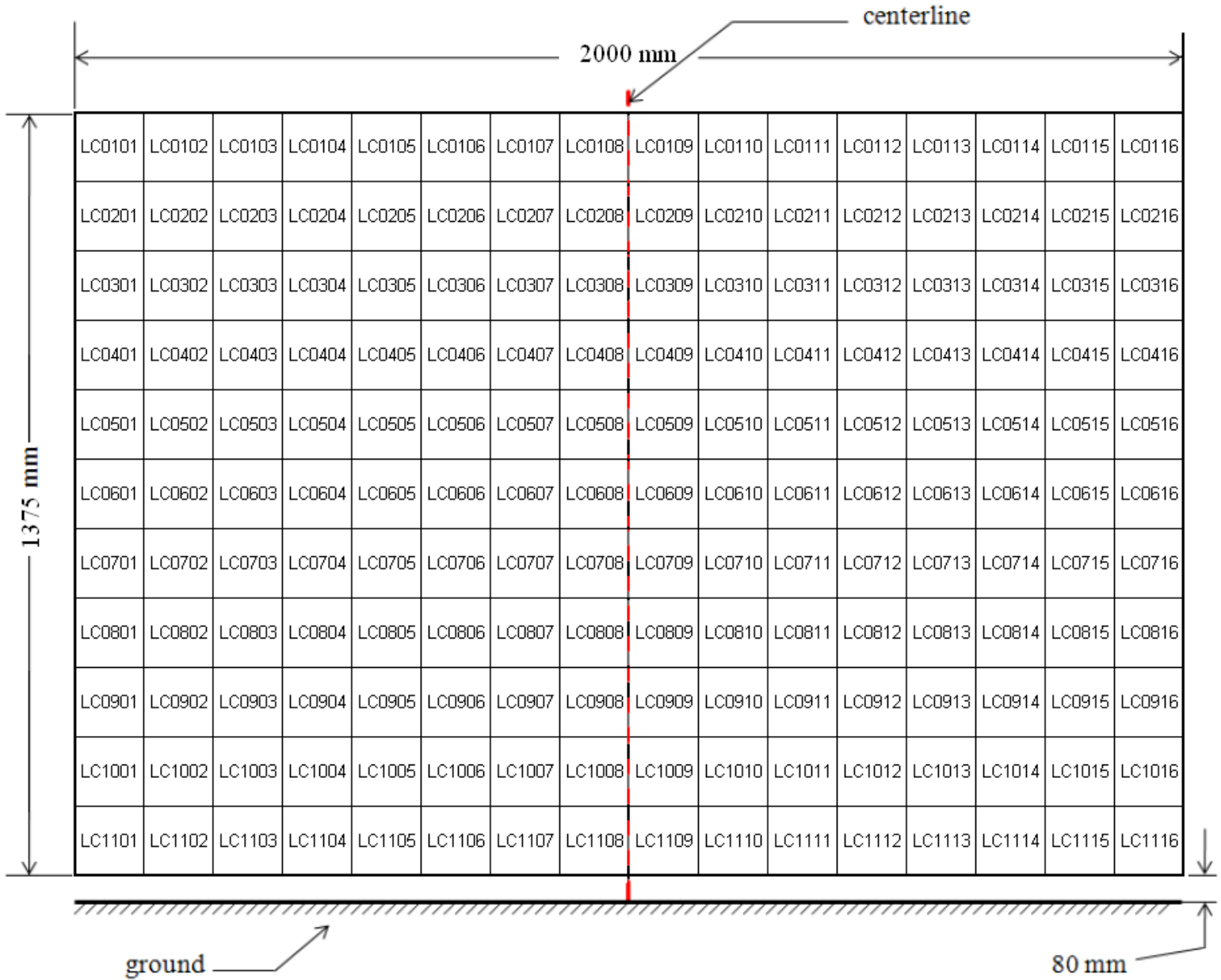
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV

NHTSA No.: M20154100

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 11/13/14



DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

INSTRUMENTATION

Driver Dummy Accelerometers	50
Passenger Dummy Accelerometers	50
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	4
Load Cell Barrier	528
Total	640

CAMERA COVERAGE

High-Speed Vehicle On Board	2
High-Speed Off board	14
Real Time	3
Total	19

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type/Serial No.	P572E 50th Percentile Male ATD / 360	P572O 5th Percentile Female ATD / 635
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	3	2
Seat Back Failure	None	None
Glazing Damage	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Broken
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

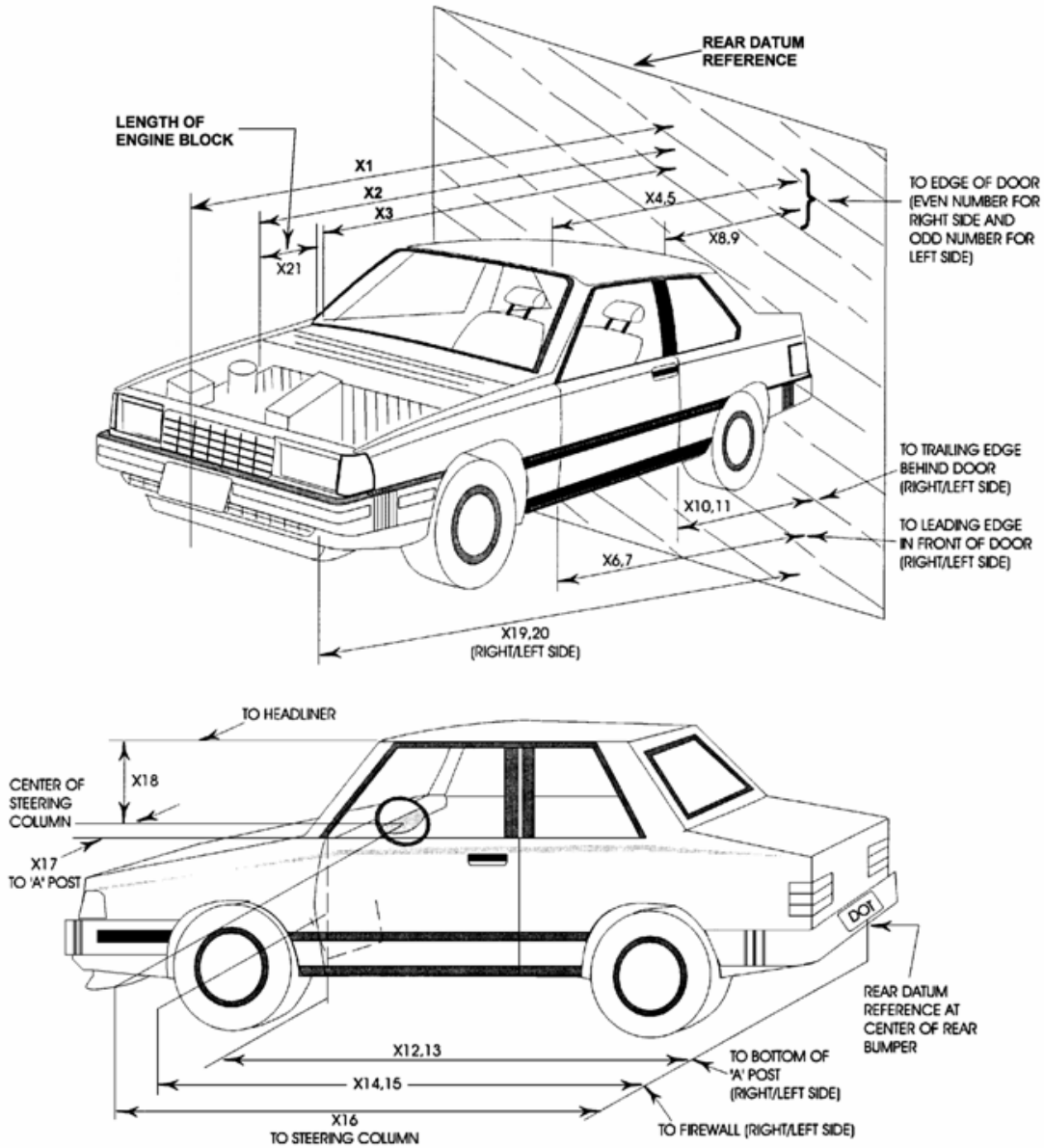
Measured Parameter	Units	Value
Left Side	mm	856
Center	mm	940
Right Side	mm	831
Average	mm	876

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Curtain)	Yes	Yes	Yes	No
Side Airbag 2 (Torso)	Yes	No	Yes	No
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other	No		No	

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14



DATA SHEET NO. 12 ... (CONTINUED)**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4885	4425	-460
2	Rear Surface of Vehicle to Front of Engine	4289	4101	-188
3	RSOV to Firewall	3525	3515	-10
4	RSOV to Upper Leading Edge of Right Door	3365	3373	8
5	RSOV to Upper Leading Edge of Left Door	3355	3320	-35
6	RSOV to Lower Leading Edge of Right Door	3345	3351	6
7	RSOV to Lower Leading Edge of Left Door	3340	3351	11
8	RSOV to Upper Trailing Edge of Right Door	2244	2253	9
9	RSOV to Upper Trailing Edge of Left Door	2230	2245	15
10	RSOV to Lower Trailing Edge of Right Door	2256	2262	6
11	RSOV to Lower Trailing Edge of Left Door	2250	2261	11
12	RSOV to Bottom of A-Pillar, Right Side	3256	3286	30
13	RSOV to Bottom of A-Pillar, Left Side	3247	3282	35
14	RSOV to Firewall, Right Side	3995	3978	-17
15	RSOV to Firewall, Left Side	3990	3972	-18
16	RSOV to Steering Column	2800	2765	-35
17	Center of Steering Column to A-Pillar	435	440	5
18	Center of Steering Column to Headliner	405	415	10
19	RSOV to Right Side of Front Bumper	4180	4155	-25
20	RSOV to Left Side of Front Bumper	4175	4070	-105
21	Length of Engine Block	585	585	0
RD	RSOV to Right Side of Dash Panel	3000	2995	-5
CD	RSOV to Center of Dash Panel	2874	2900	26
LD	RSOV to Left Side of Dash Panel	3000	3007	7

All measurements in millimeters.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

VEHICLE INFORMATION

VIN: 5UXKR0C58F0K54780 Wheelbase (mm): 2935
 Vehicle Size Category: 5-Door MPV Test Weight (kg): 2396.0

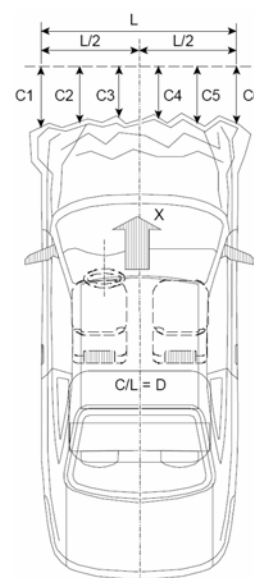
ACCELEROMETER DATA

Accelerometer Locations: Left Rear Crossmember
 Cal. Procedure/Interval: Drop Test / 6 months
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 56.14
 Velocity Change (km/h): 64.5
 Time of Separation (msec): 70.3

Linearity: Good

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
 Midpoint of Damage: Vehicle Centerline
 Damage Region Length (mm): 1684
 Impact Mode: Full Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	260	400	140
C2	Crush Zone 2 at Left Side	mm	66	437	371
C3	Crush Zone 3 at Left Side	mm	10	459	449
C4	Crush Zone 4 at Right Side	mm	10	467	457
C5	Crush Zone 5 at Right Side	mm	66	440	374
C6	Crush Zone 6 at Right Side	mm	260	330	70
L	C1 to C6	mm	1684		

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV

NHTSA No.: M20154100

Test Program: 56 km/h Frontal Impact NCAP Test

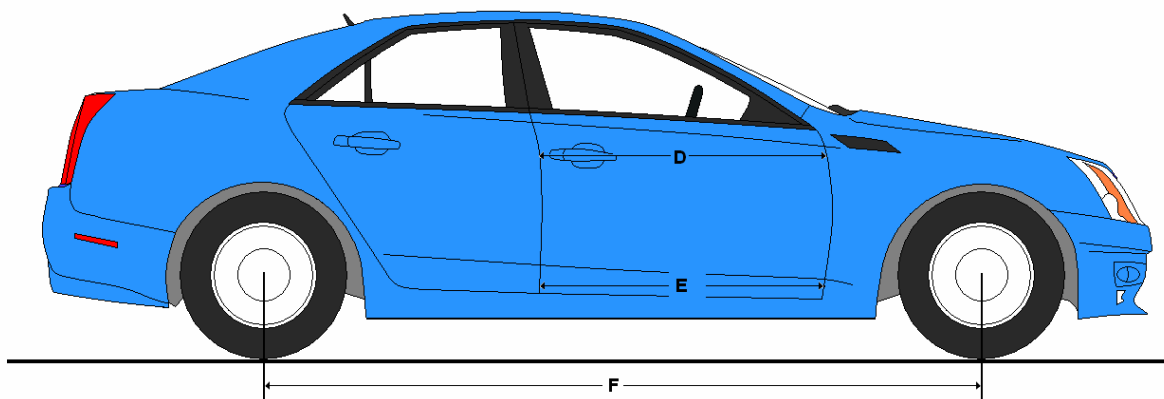
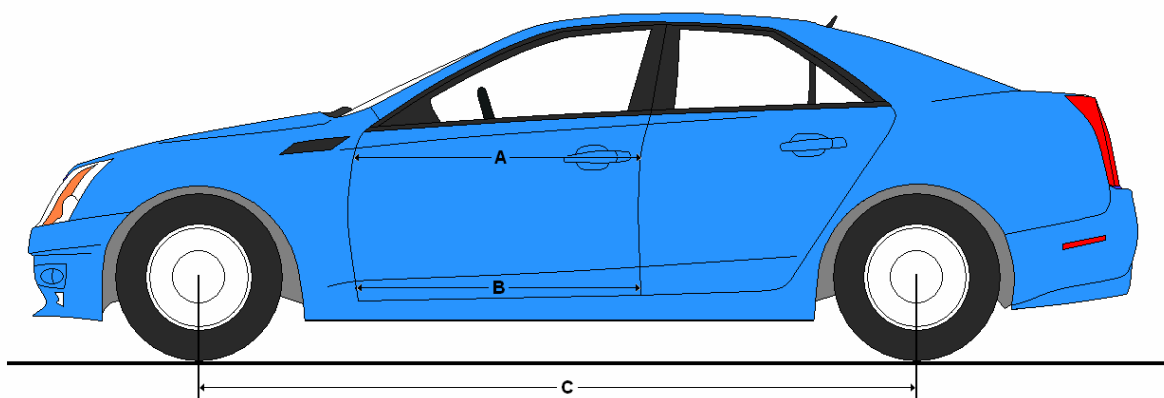
Test Date: 11/13/14

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	971	969	2
B	Left Side Lower	mm	931	930	1
D	Right Side Upper	mm	969	964	5
E	Right Side Lower	mm	916	920	-4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2935	2843	92
F	Right Side Wheelbase	mm	2935	2857	78



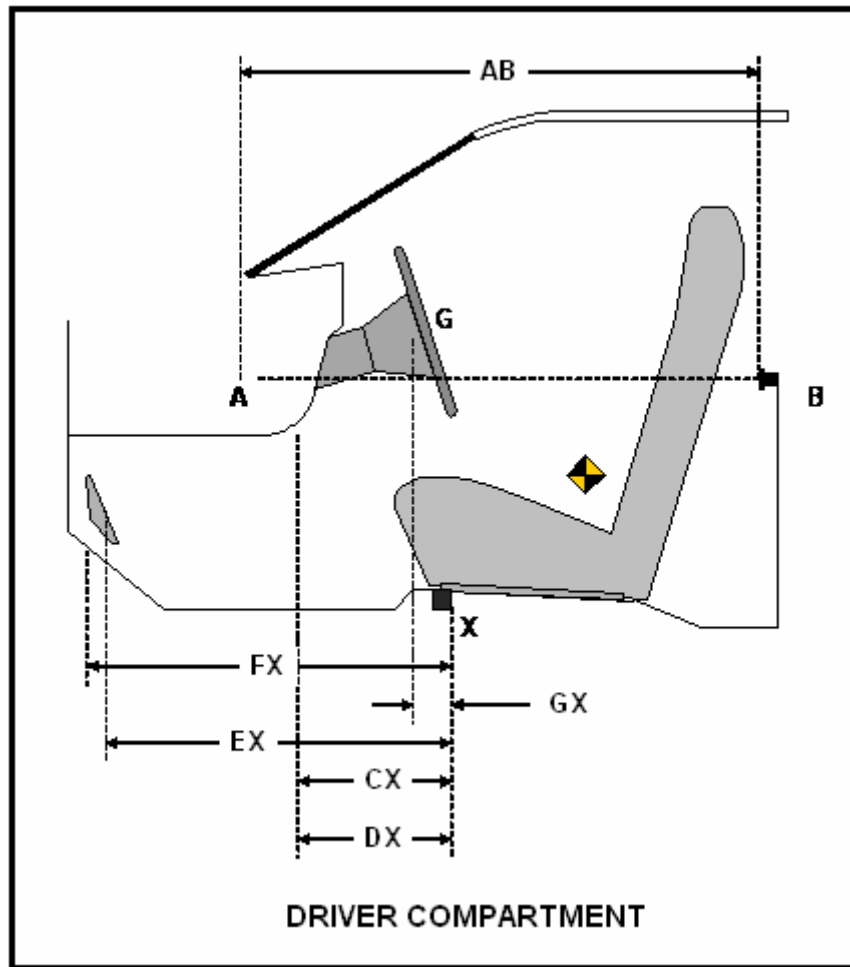
DATA SHEET NO. 14 ... (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jamb)	mm	750	748	2
CX	Left Knee Bolster to X	mm	370	368	2
DX	Right Knee Bolster to X	mm	360	355	5
EX	Brake Pedal to X	mm	560	550	10
FX	Foot Rest to X	mm	585	572	13
GX	Center of Steering Wheel Hub to X	mm	110	120	-10

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

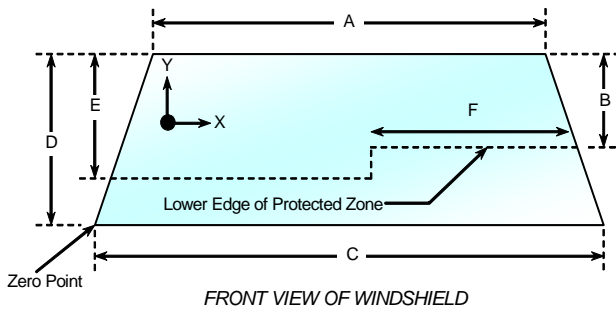
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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

Temperature of windshield molding during test: 21.2 ° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2348	2348	100.0%
Right Side	2348	2348	100.0%
Total	4696	4696	100.0%



Item	Units	Value
A	mm	1295
B	mm	303
C	mm	1590
D	mm	905
E	mm	498
F	mm	605

AREAS OF PROTECTED ZONE FAILURES

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

X	Y

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

DATA SHEET NO. 15 ... (CONTINUED)

SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.1° C Test Time: 2:15 PM

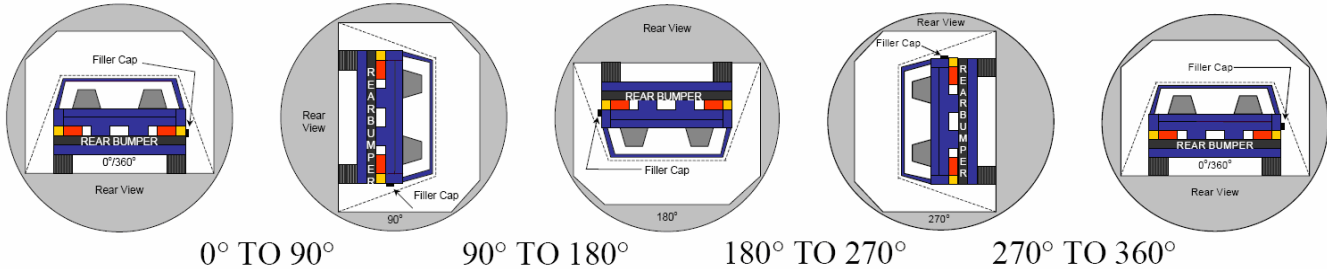
Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: There was no Stoddard solvent spillage.

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard solvent spillage: There was no Stoddard solvent spillage.

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	84	300	384
90° To 180°	81	300	381
180° To 270°	79	300	379
270° To 360°	82	300	382

FMVSS 301 SPILLAGE TABLE

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

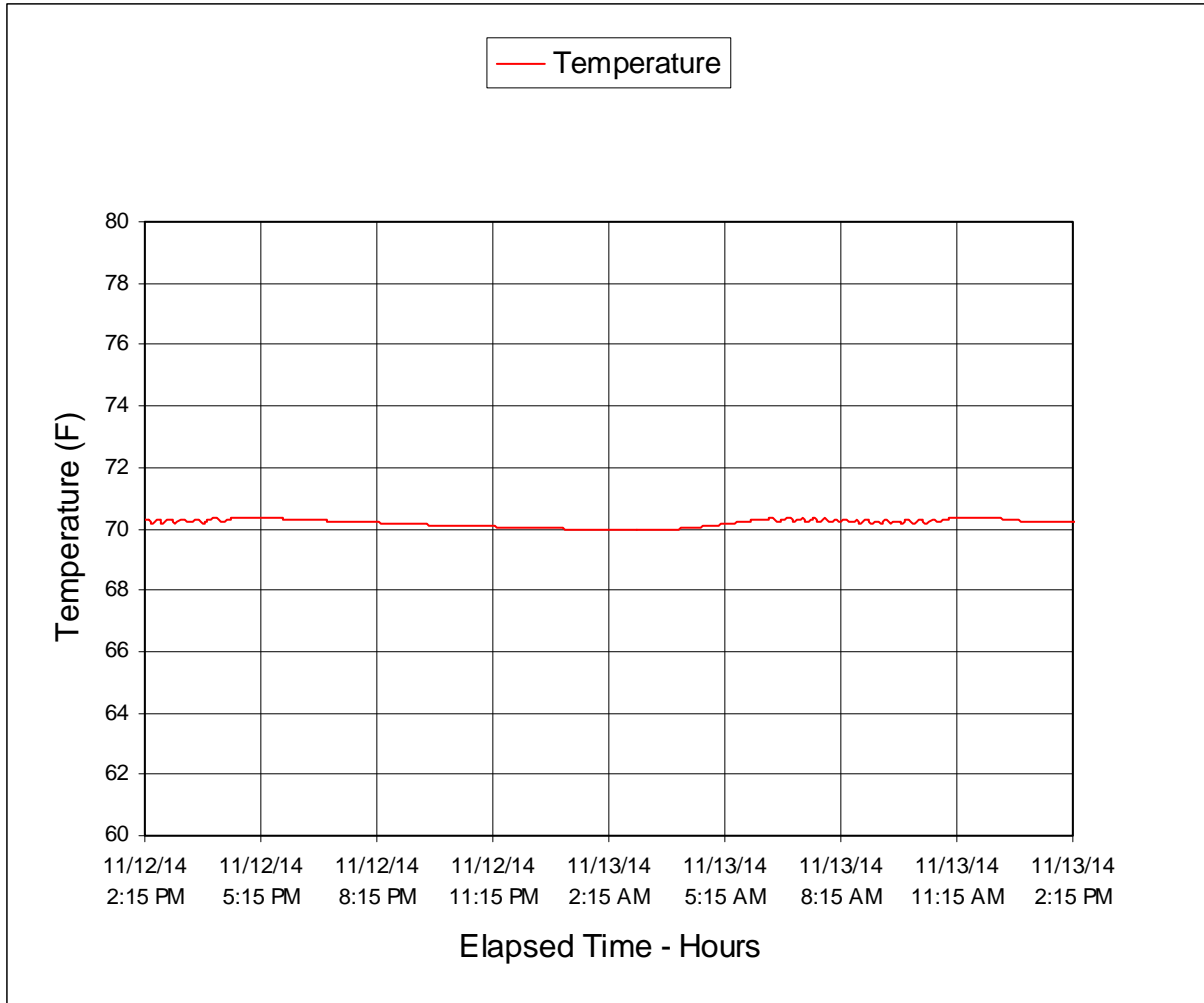
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV NHTSA No.: M20154100
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/13/14



**APPENDIX A
PHOTOGRAPHS**

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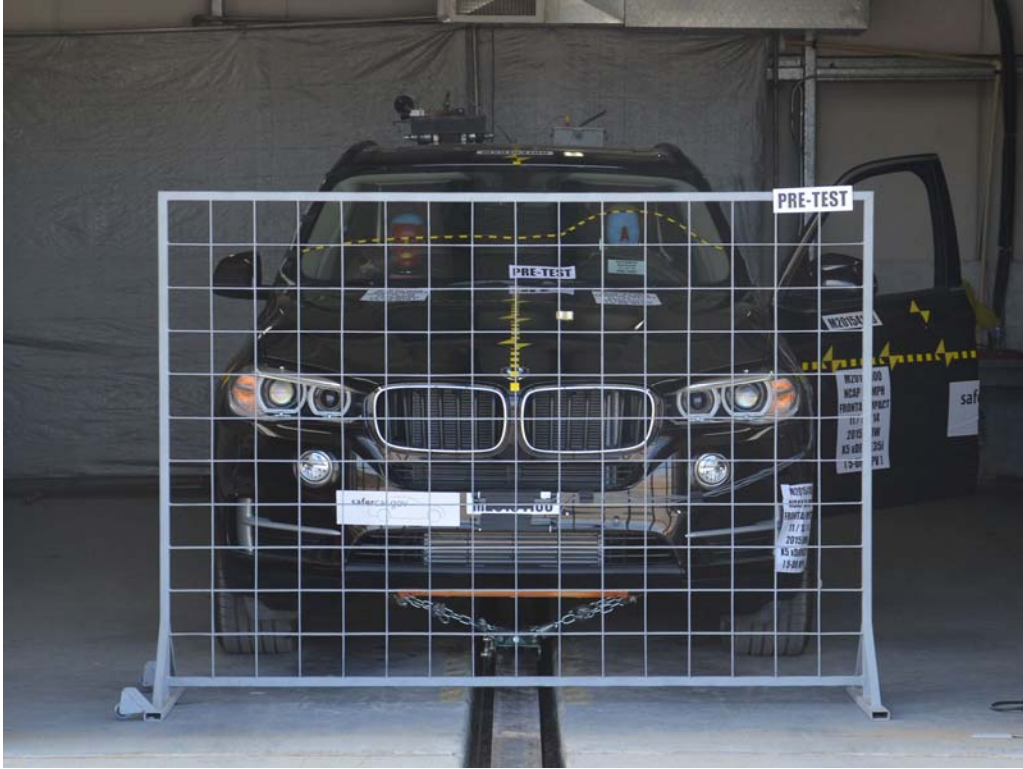


FIGURE 1. Load Cell Location



FIGURE 2. Load Cell Wall



FIGURE 3. Manufacturer's Label

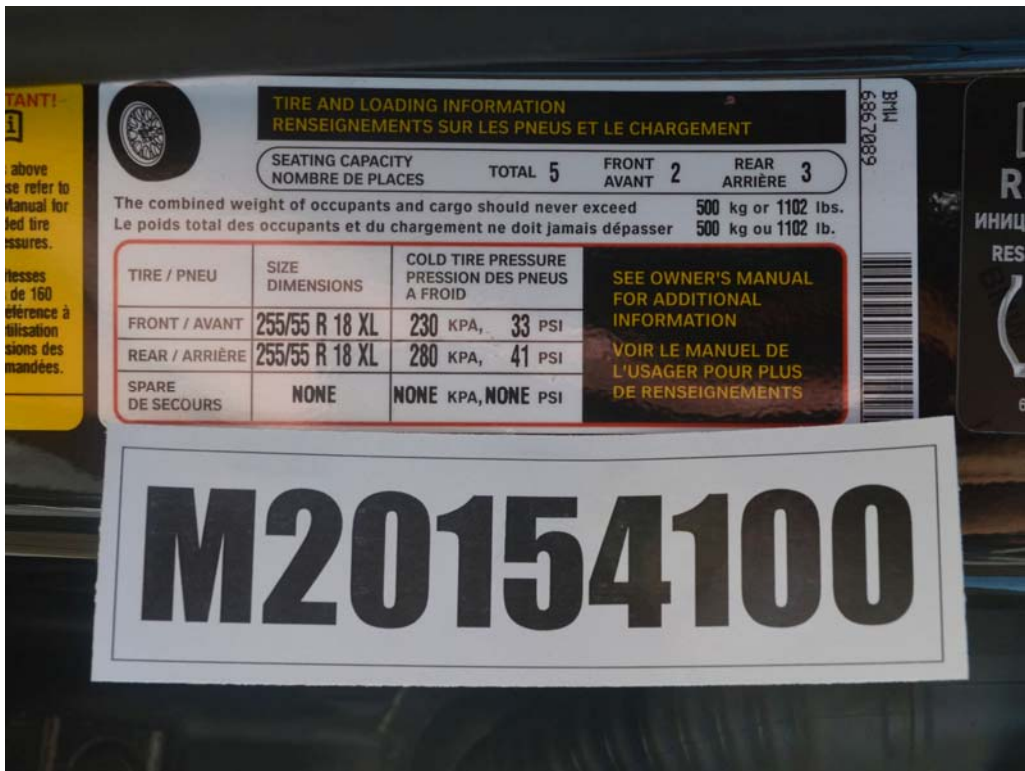


FIGURE 4. Tire Placard



FIGURE 5. 2015 BMW X5 Frontal as Delivered



FIGURE 6. Left Rear $\frac{3}{4}$ View, as Received



FIGURE 7. Pre-Test Front View of Test Vehicle



FIGURE 8. Post-Test Front View of Test Vehicle



FIGURE 9. Pre-Test Left View of Test Vehicle

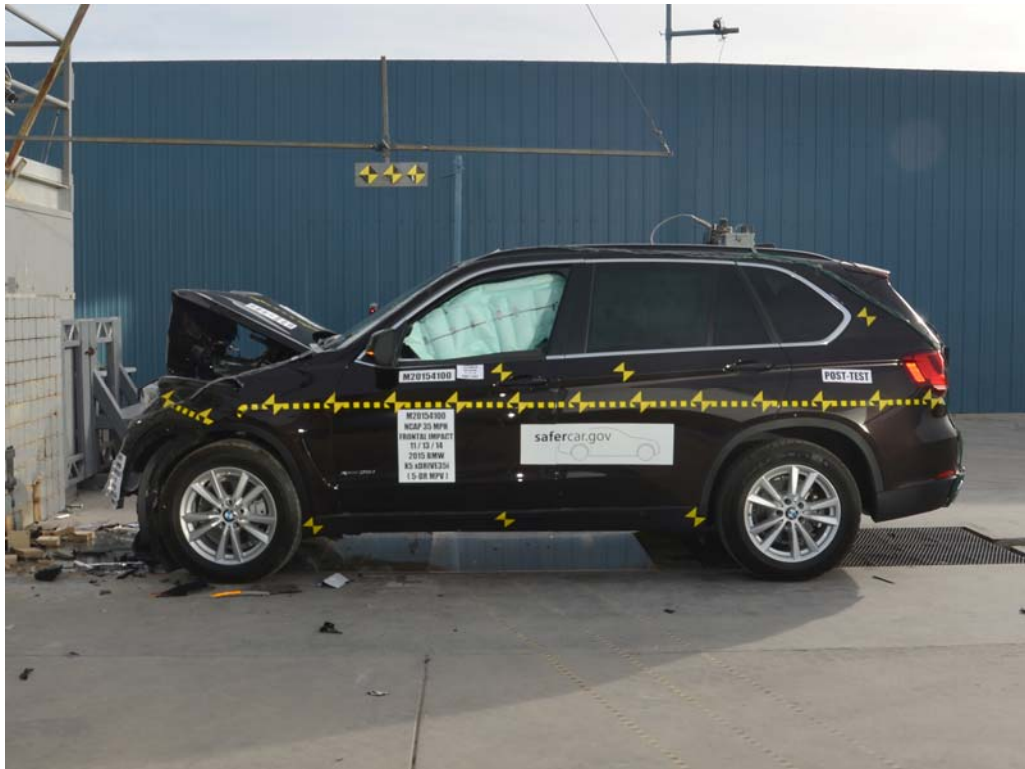


FIGURE 10. Post-Test Left View of Test Vehicle



FIGURE 11. Pre-Test Right View of Test Vehicle

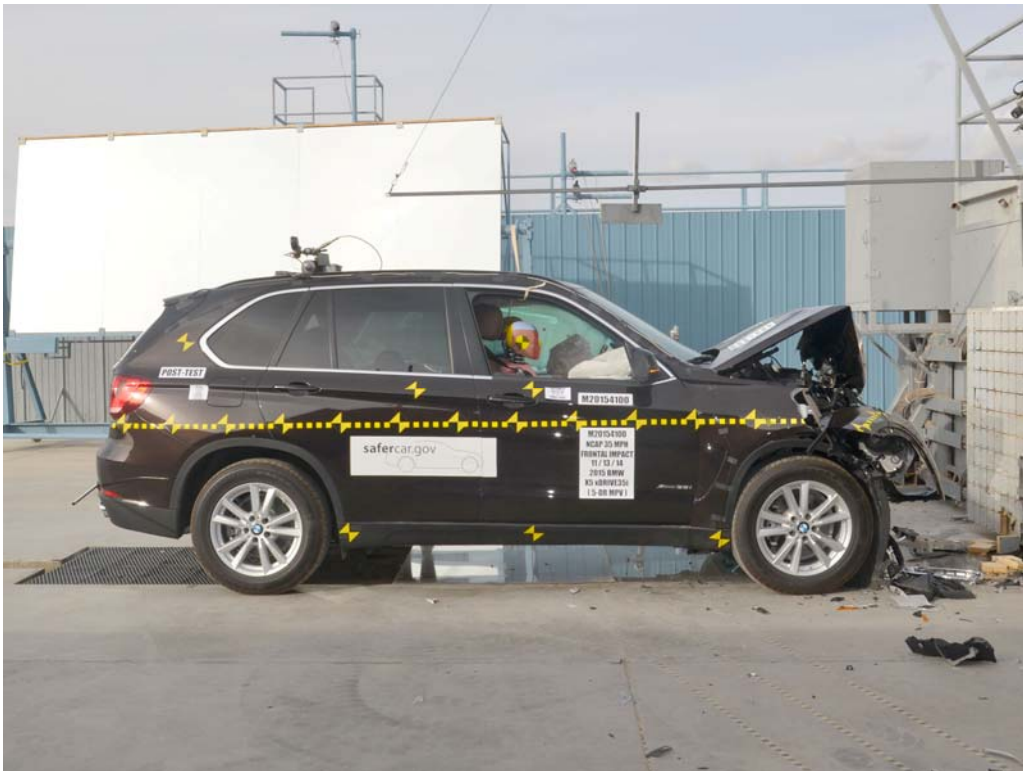


FIGURE 12. Post-Test Right View of Test Vehicle



FIGURE 15. Pre-Test Left Rear $\frac{3}{4}$ View



FIGURE 16. Post-Test Left Rear $\frac{3}{4}$ View



FIGURE 17. Pre-Test Windshield View

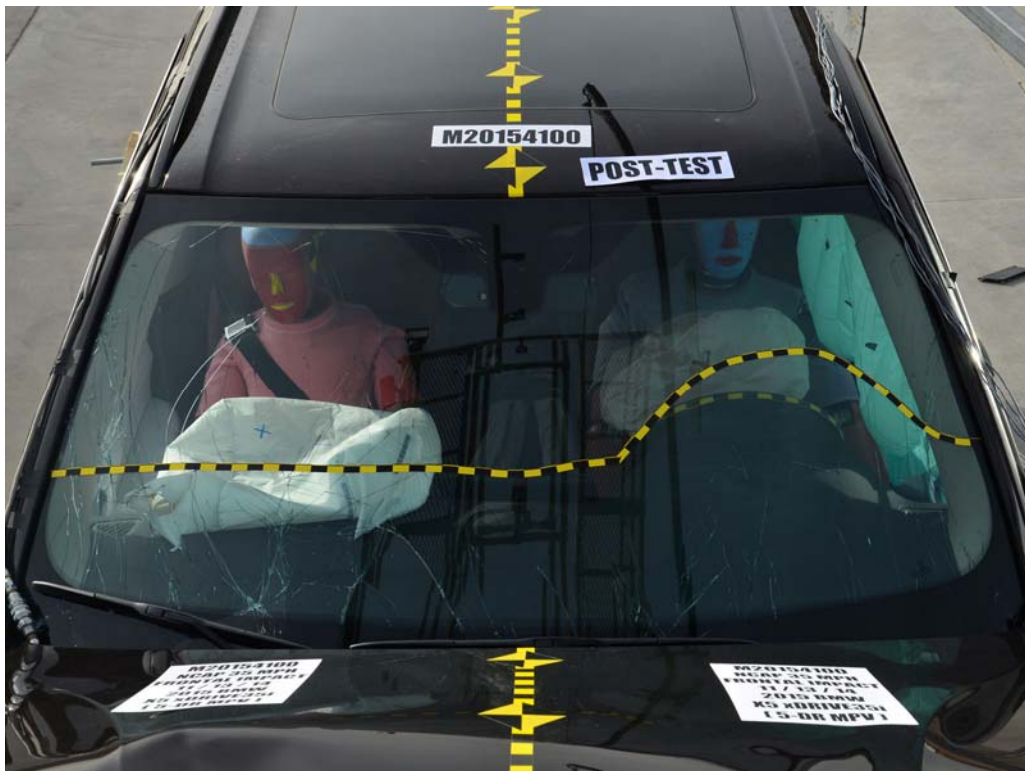


FIGURE 18. Post-Test Windshield View



FIGURE 19. Pre-Test Engine Compartment View



FIGURE 20. Post-Test Engine Compartment View

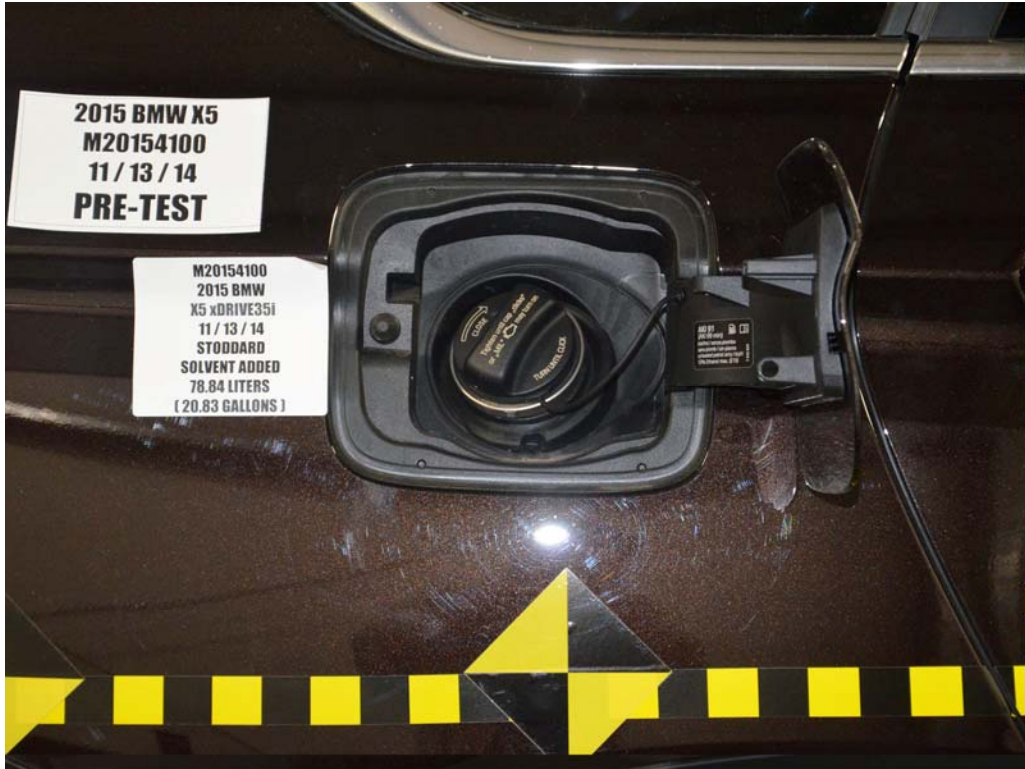


FIGURE 21. Pre-Test Fuel Filler Cap View



FIGURE 22. Post-Test Fuel Filler Cap View

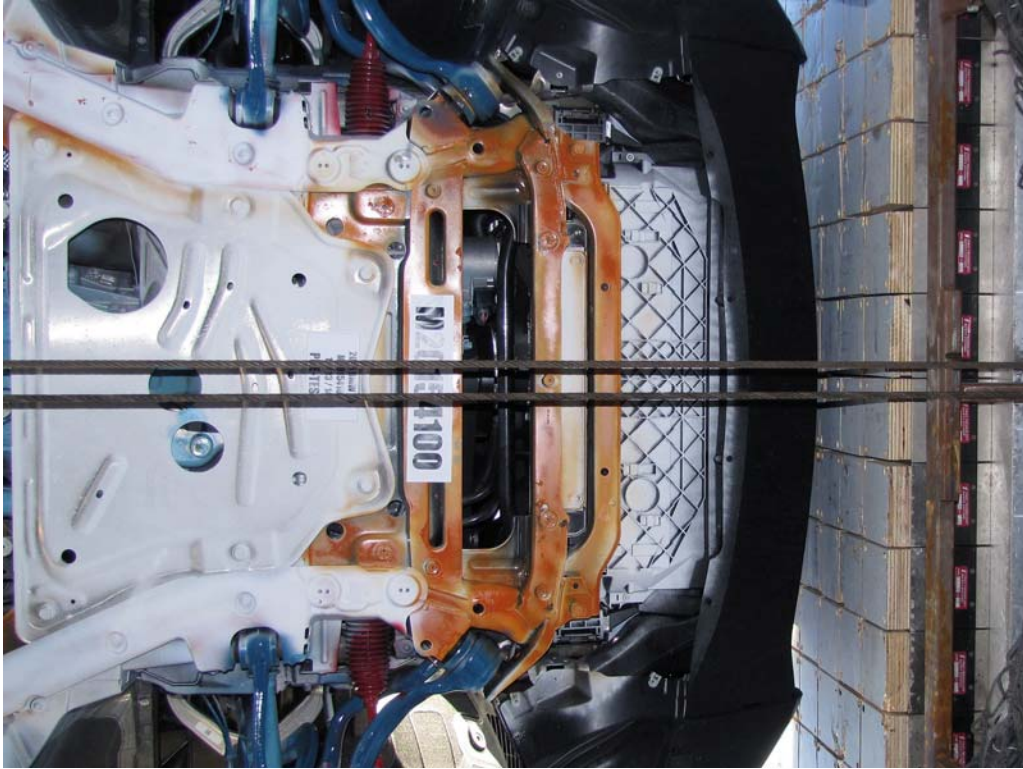


FIGURE 23. Pre-Test Front Underbody View

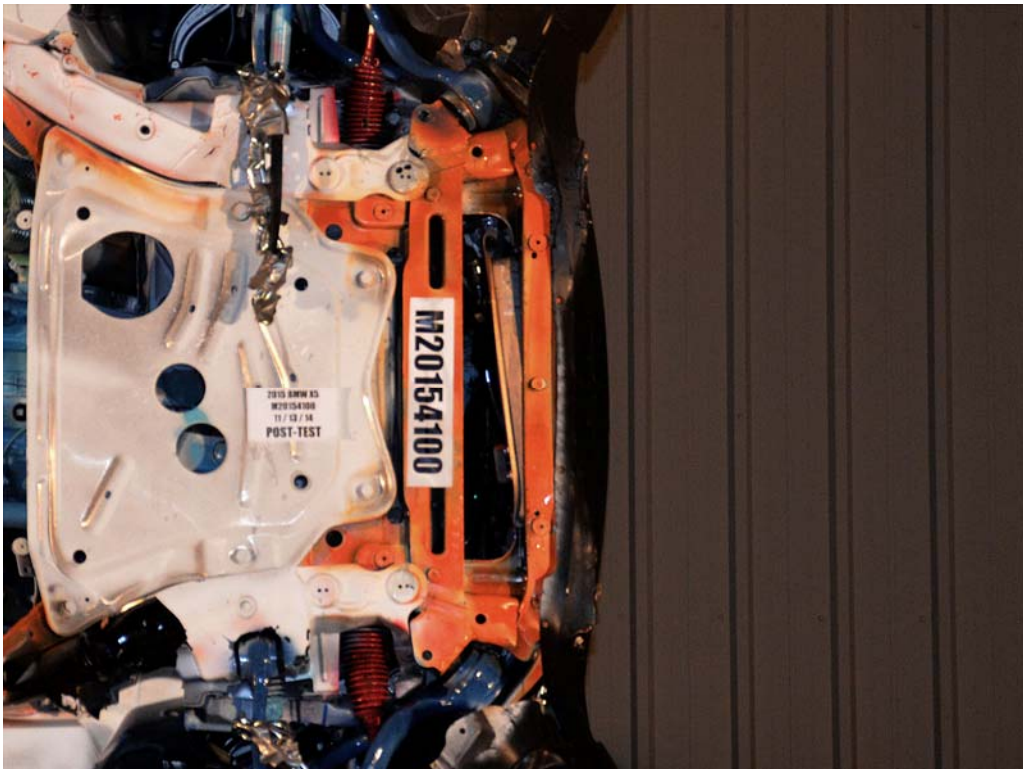


FIGURE 24. Post-Test Front Underbody View

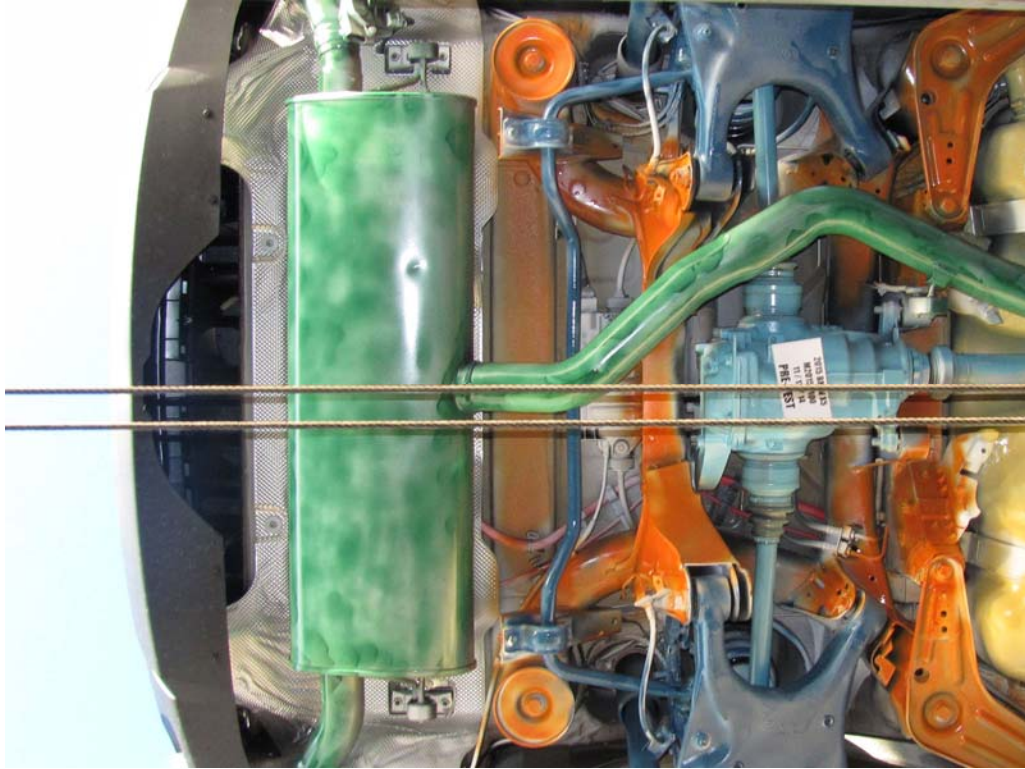


FIGURE 25. Pre-Test Rear Underbody View

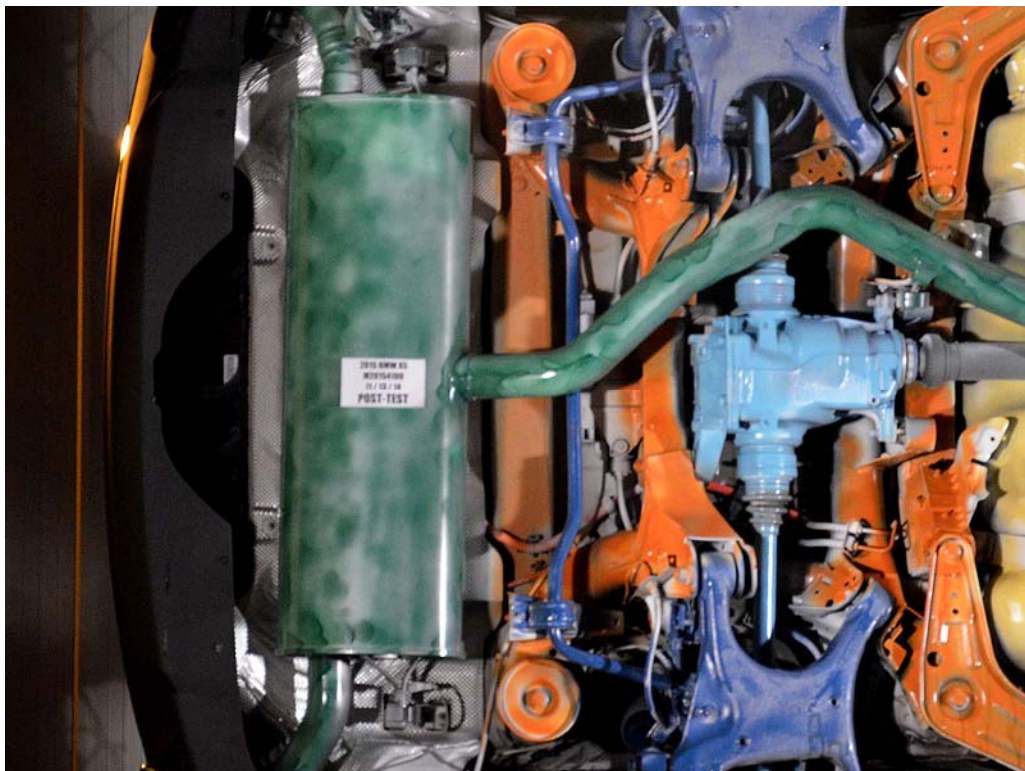


FIGURE 26. Post-Test Rear Underbody View



FIGURE 27. Pre-Test Dummy Cable Routing



FIGURE 28. Post-Test Dummy Cable Routing



FIGURE 29. Pre-Test Driver Dummy Front View



FIGURE 30. Post-Test Driver Dummy Front View



FIGURE 31. Pre-Test Driver Dummy Window View



FIGURE 32. Post-Test Driver Dummy Window View



FIGURE 33. Pre-Test Driver Dummy and Vehicle Interior View



FIGURE 34. Post-Test Driver Dummy and Vehicle Interior View



FIGURE 35. Pre-Test Driver's Seat Fore-Aft Markings



FIGURE 36. Post-Test Driver's Seat Fore-Aft Markings



FIGURE 37. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 38. Post-Test View of Belt Anchorage for Driver Dummy



FIGURE 39. Pre-Test Driver Dummy Feet



FIGURE 40. Post-Test Driver Dummy Feet



FIGURE 41. Pre-Test Driver's Side Knee Bolster



FIGURE 42. Post-Test Driver's Side Knee Bolster



FIGURE 43. Pre-Test Driver's Side Floorpan



FIGURE 44. Post-Test Driver's Side Floorpan

Photograph Not Available

FIGURE 45. Post-Test Driver Dummy Face

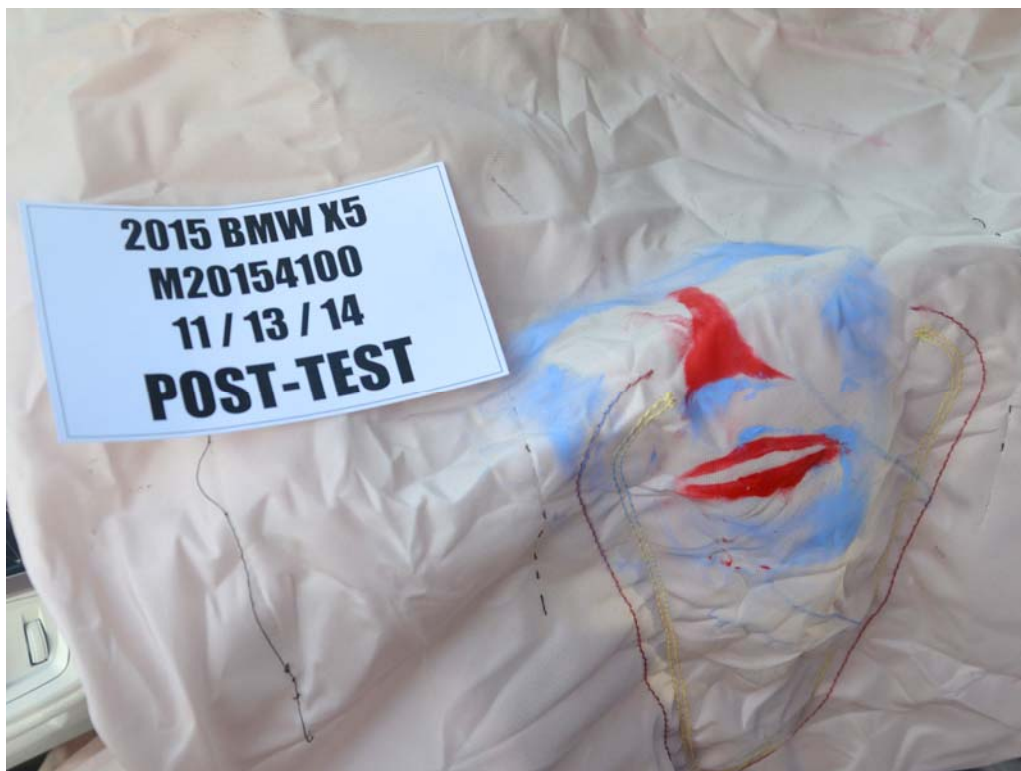


FIGURE 46. Post-Test Driver Dummy Contact with Airbag



FIGURE 47. Post-Test Driver Dummy Contact with Headrest



FIGURE 47a. Post-Test Driver Dummy Contact with Knee Airbag

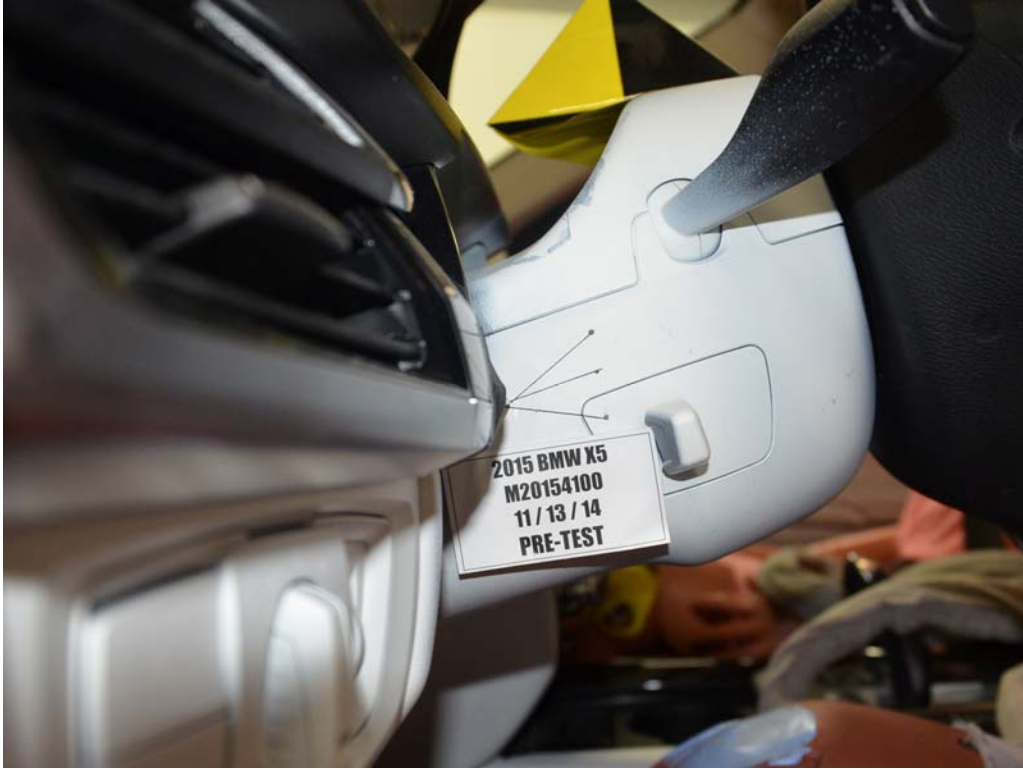


FIGURE 48. Pre-Test View of the Steering Wheel



FIGURE 49. Post-Test View of the Steering Wheel



FIGURE 50. Pre-Test Passenger Dummy Front View



FIGURE 51. Post-Test Passenger Dummy Front View



FIGURE 52. Pre-Test Passenger Dummy Window View



FIGURE 53. Post-Test Passenger Dummy Window View



FIGURE 54. Pre-Test Passenger Dummy and Vehicle Interior View



FIGURE 55. Post-Test Passenger Dummy and Vehicle Interior View



FIGURE 56. Pre-Test Passenger's Seat Fore-Aft Markings



FIGURE 57. Post-Test Passenger's Seat Fore-Aft Markings



FIGURE 58. Pre-Test View of Belt Anchorage for Passenger Dummy



FIGURE 59. Post-Test View of Belt Anchorage for Passenger Dummy



FIGURE 60. Pre-Test Passenger Dummy Feet



FIGURE 61. Post-Test Passenger Dummy Feet



FIGURE 62. Pre-Test Passenger's Side Knee Bolster



FIGURE 63. Post-Test Passenger's Side Knee Bolster



FIGURE 64. Pre-Test Passenger's Side Floorpan



FIGURE 65. Post-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger Dummy Face



FIGURE 67. Post-Test Passenger Dummy Contact with Airbag



FIGURE 68. Post-Test Passenger Dummy Contact with Headrest



FIGURE 68a. Post-Test Passenger Dummy Contact with Knee Airbag



FIGURE 69. Photograph of Ballast Installed in Vehicle

Photograph Not Applicable

**No Stoddard
Solvent Spillage**

FIGURE 70. Post-Test Stoddard Solvent Spillage Location View



FIGURE 71. Post-Test Speed Trap Read-Out

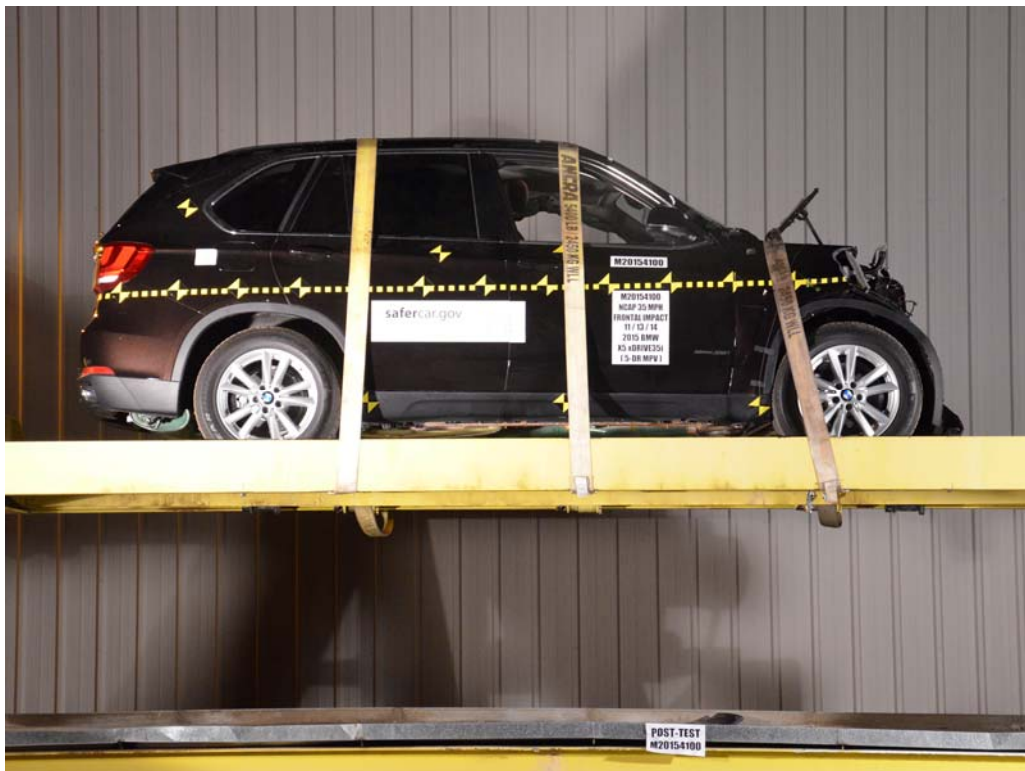


FIGURE 72. Vehicle at 0° on Static Rollover Device

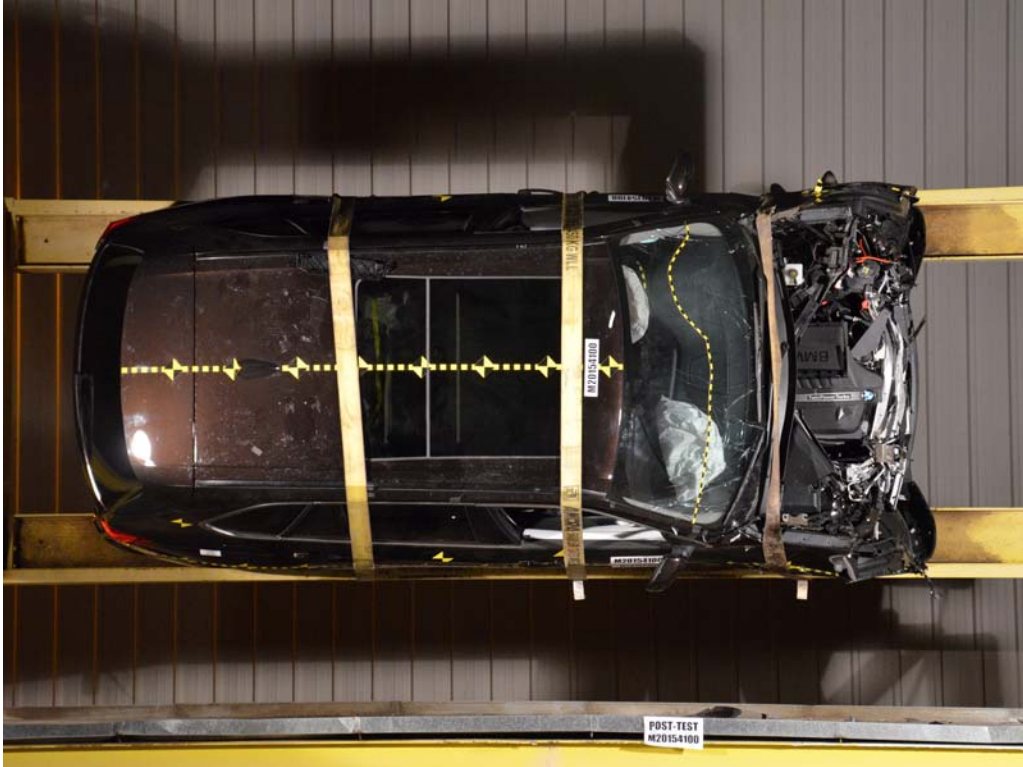


FIGURE 73. Vehicle at 90° on Static Rollover Device

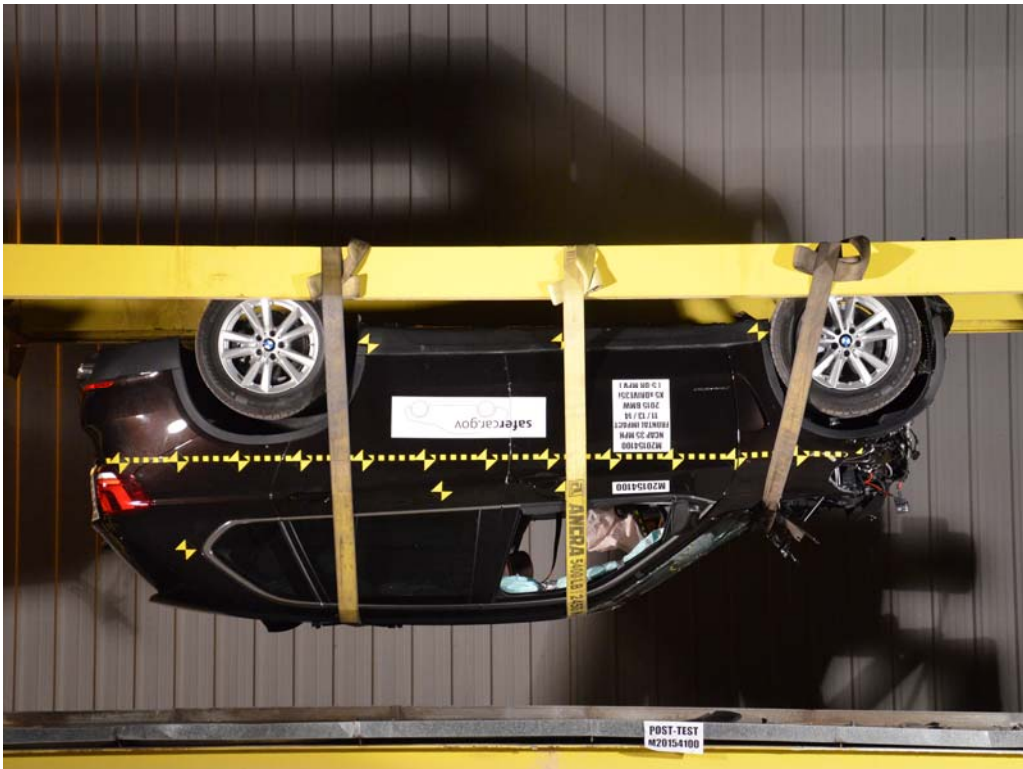


FIGURE 74. Vehicle at 180° on Static Rollover Device

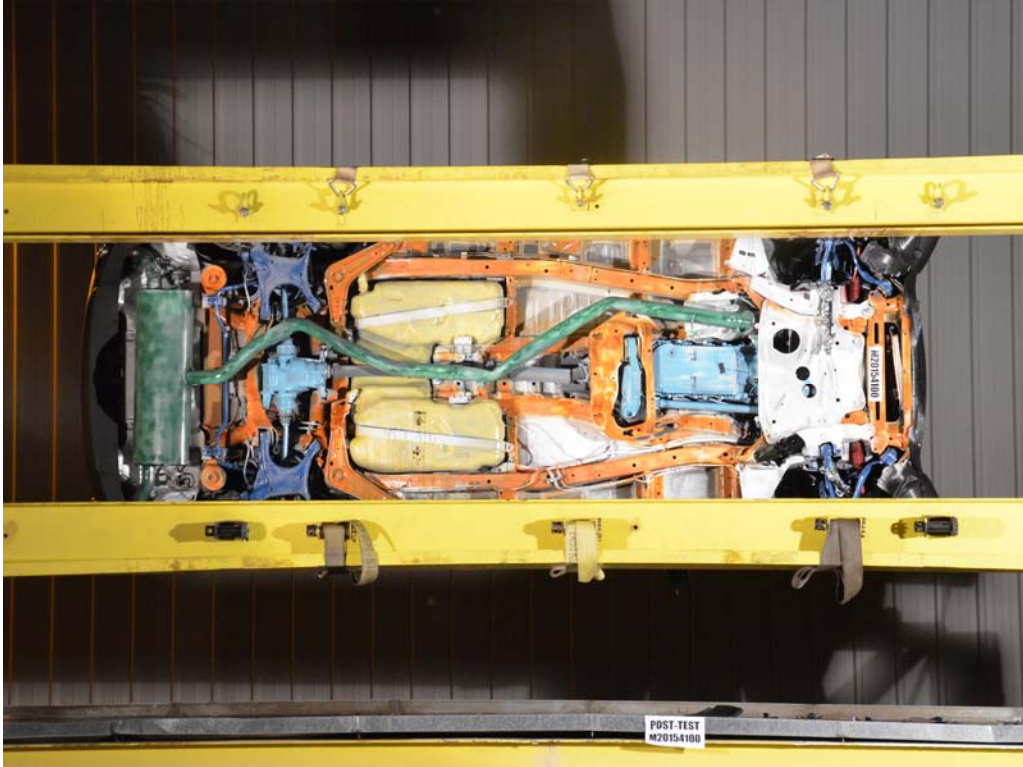


FIGURE 75. Vehicle at 270° on Static Rollover Device



FIGURE 76. Vehicle at 360° on Static Rollover Device



FIGURE 77. 2015 BMW X5 Frontal Impact Event

The Ultimate Driving Machine®
2015 BMW X5 xDrive35i

Manufacturer's Suggested Retail Price	\$ 55,500.00
Options and Additional Charges: (Optional equipment may require additional equipment, check with your authorized BMW center).	
Sparkling Brown Metallic	\$ 550.00
Terra Dakota Leather	\$ 1,450.00
Power adj. steering column	Included
Sport leather steering wheel	Included
Universal garage-door opener	Included
Chrome Line exterior	Included
Road rails black	Included
Auto-dimming mirrors	Included
Lumbar support	Included
Storage package	Included
Heated front seats	Included
Poplar Wood Trim	Included
Automatic PDC	Included
Automatic climate control	Included
Ambiance lighting	Included
LED Fog Lights	Included
Navigation system w/ touchpad	Included
BMW Assist eCall	Included
BMW TeleServices	Included
BMW Online and BMW Apps	Included
Advanced RTI	Included
Remote Services	\$ 600.00
Destination Charge	\$ 900.00
Total Suggested Retail Price	\$ 58,450.00

<p>Standard Features</p> <p>Performance and efficiency</p> <ul style="list-style-type: none"> 3.0-liter BMW TwinPower Turbo inline 6-cylinder, 24-valve engine with high-revving direct injection, Valvetronic and Double VANOS with variable valve timing Driving Dynamics Control with ECO PRO mode 8-speed Steptronic automatic transmission with Sport and Manual shift modes <p>Handling, ride and braking</p> <ul style="list-style-type: none"> Drive all-wheel-drive system Dynamic Stability Control (DSC) including Brake Turn Dynamic Traction Control (DTC), Brake Drying, and Brake Steering Release, with Dynamic Traction Control (DTC) and Dynamic Brake Control 4-wheel anti-lock braking disc brakes <p>Exterior</p> <ul style="list-style-type: none"> Xenon Adaptive Headlights with dynamic auto-leveling, Corner LED lighting Automatic sun-protecting sunshades 10-way heated power front seats with 4-way lumbar support 4000mAh split-riding rear seats 	<p>Comfort and convenience</p> <ul style="list-style-type: none"> Passenger monitor Power windows Power Doorlocks, heated front and rear Power folding, heated exterior mirrors with auto-dimming function <p>Instrumentation and controls</p> <ul style="list-style-type: none"> 5-spoke leather-wrapped multi-function sport steering wheel Drive system with on-board computer and touchpad Controller, and 8 programmable memory buttons BMW Navigation System with 12.2" high-resolution screen, Voice Command System and Advanced Real Time Traffic Information <p>Audio system</p> <ul style="list-style-type: none"> BMW iDrive® paper audio system with HD Radio <p>Safety and security</p> <ul style="list-style-type: none"> Driver and passenger's front airbag supplemental restraint system (SRS) with advanced technology BMW Assist eCall with a 10-year subscription BMW Assist eCall with a 10-year subscription <p>Warranty</p> <ul style="list-style-type: none"> 4-year/50,000-mile New Vehicle (NV) Limited Warranty 12 Year Rust Protection Limited Warranty 4-year/Unlimited Mileage Roadside Assistance Program
---	---

PARTS CONTENT INFORMATION

For Vehicles in this Car Line:
US/Canadian Parts Content: **5%**
Major Source of Foreign Parts Content:
GERMANY: 65%

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

For this Vehicle:
Final Assembly Point: **SPARTANBURG, SC, USA**
Country of Origin:
Engine: **AUSTRIA**
Transmission: **GERMANY**

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score	Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.	
Frontal Crash	Not Rated
Side Crash	Not Rated
Rollover	Not Rated

Star ratings range from 1 to 5 stars (***** with 5 being the highest). Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236

This vehicle is equipped with bumpers that can withstand an impact of 2.2 miles per hour with damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

BMW Ultimate Service™

\$0 Maintenance Program:
For the first 4 years or 50,000 miles, whichever comes first on all factory-recommended services*

Your Maintenance Costs:
Engine Oil Services: \$0 Brake Pads: \$0
Engine Drive Belts: \$0 Brake Discs: \$0
Inspection Services: \$0 Brake Fluid: \$0

*Coverage is not transferable to subsequent purchasers, leases, or lessees. Please see brochure.com/bmwdealer or ask your authorized BMW center for details.

EPA DOT Fuel Economy and Environment

21 MPG combined city/hwy	Standard SUVs range from 13 to 27 MPG. The best vehicle rates 119 MPGe.	\$2,500 in fuel costs over 5 years compared to the average new vehicle.
4.8 gallons per 100 miles		

Annual fuel Cost \$2,700

Fuel Economy & Greenhouse Gas Rating (passenger vehicles) Smog Rating (passenger vehicles)

This vehicle used 111 grams CO₂ per mile. The best smog is 0 grams per mile (hydrogen only). Producing and distributing fuel also create emissions; learn more at fuel-economy.gov.

Actual results may vary for many reasons, including driving style and how you drive and maintain your vehicle. The reported new vehicle with an EPA and used \$11,000 in fuel and 7 years. Cost estimates are based on 15,000 miles per year at \$3.81 per gallon. MPGe is miles per gallon gasoline equivalent. Vehicle emissions are a significant source of ozone, smog and toxics.

fuel-economy.gov
Calculate personalized estimated average vehicle.

BMW of North America, LLC
Woodcliff Lake, NJ 07977

VPC Location: OXNARD, CALIFORNIA

Part of Entry: GREENVILLE-SPARTANBURG
Carrier: WAGGONERS TRUCKING

Sold To: Creative BMW 1500 Auto Mall Dr Santa Ana CA (951) 231-5000	Ship To: Creative BMW 1500 Auto Mall Dr Santa Ana CA (951) 231-5000
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02/10/2015

FIGURE 78. Monroney label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

<u>Plot</u>		<u>Page</u>
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11	Driver Upper Neck Force Z vs. Time Primary	B-4
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30	Passenger Right Femur Force vs. Time	B-10

The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

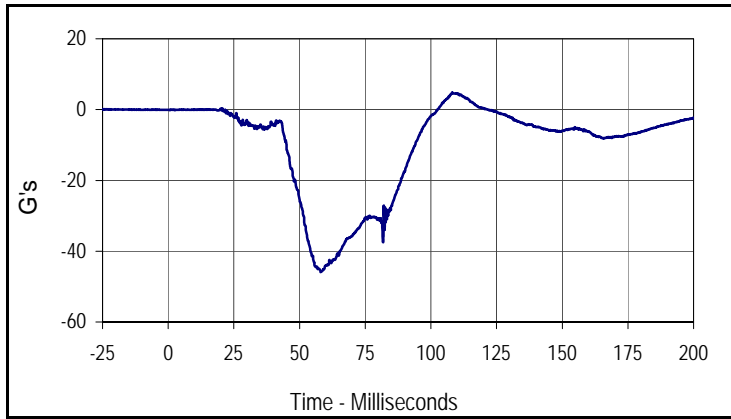
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Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
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Driver Head Front Z Acceleration
Driver Head Top X Acceleration
Driver Head Top Y Acceleration
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Driver Head Left Z Acceleration
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Force Z Redundant
Driver Right Femur Force Z Redundant
Driver Shoulder Belt Force
Driver Lap Belt Force
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y

Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Head Front Y Acceleration
Passenger Head Front Z Acceleration
Passenger Head Top X Acceleration
Passenger Head Top Y Acceleration
Passenger Head Left X Acceleration
Passenger Head Left Z Acceleration
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Z Redundant
Passenger Right Femur Force Z Redundant
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X

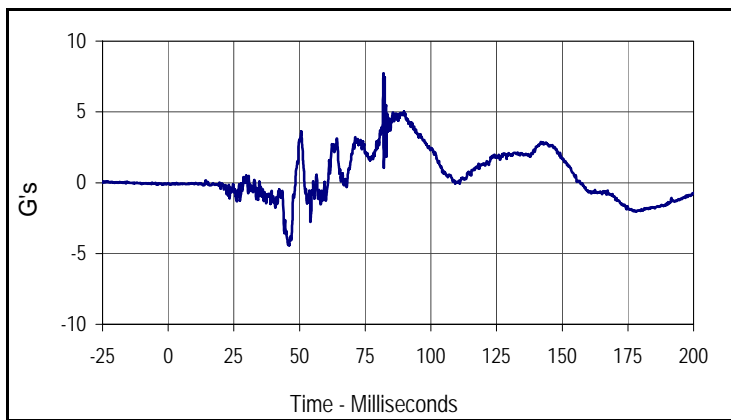
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Passenger Right Lower Tibia Moment X
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Passenger Right Lower Tibia Force Z
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Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Rear Z
Vehicle Right Rear Z
Load Cell Barrier LC0101 – LC 1116

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

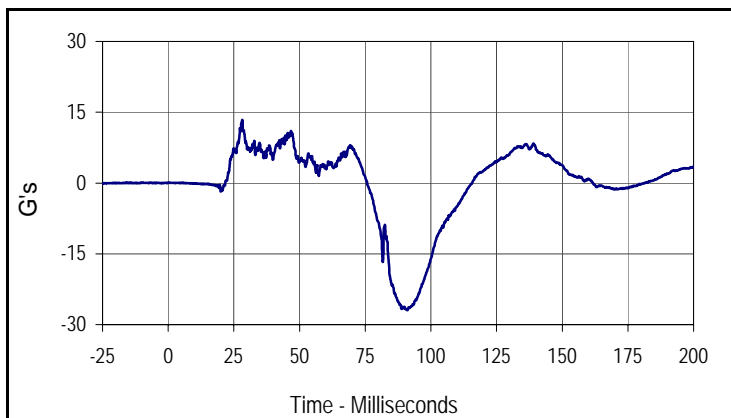
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 Test Date: 11/13/14



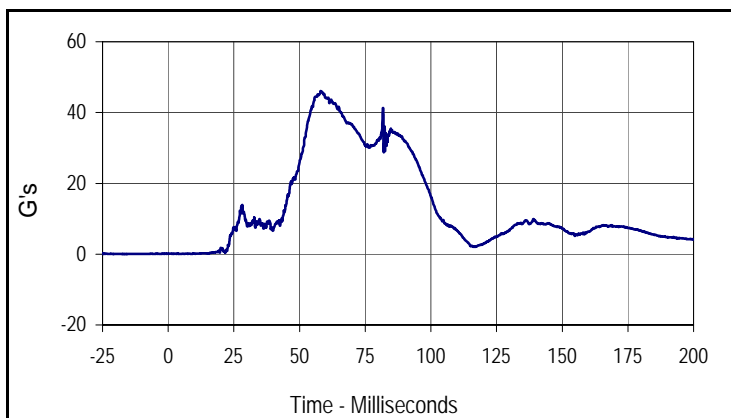
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Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
4.8	108.2	-45.9	58.0



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.6	81.9	-4.4	46.1



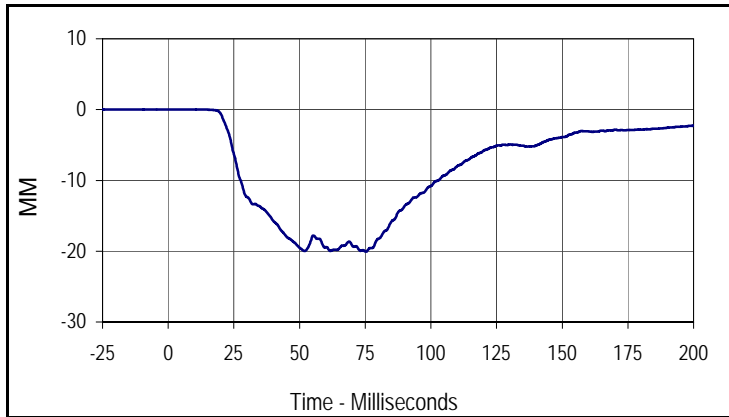
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Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
13.4	28.2	-27.0	91.0



Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
46.1	58.0	0.1	6.1

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

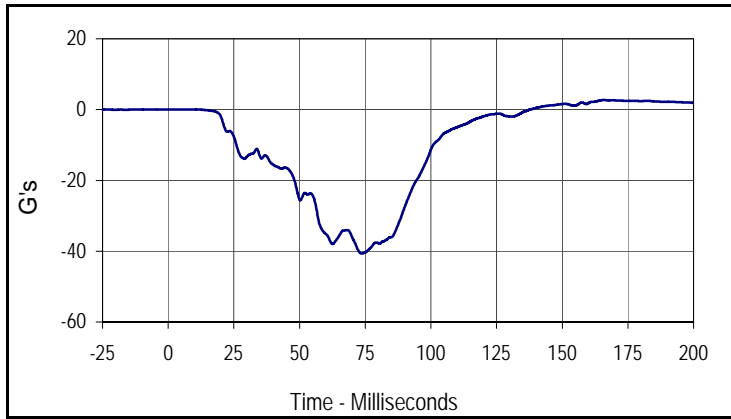
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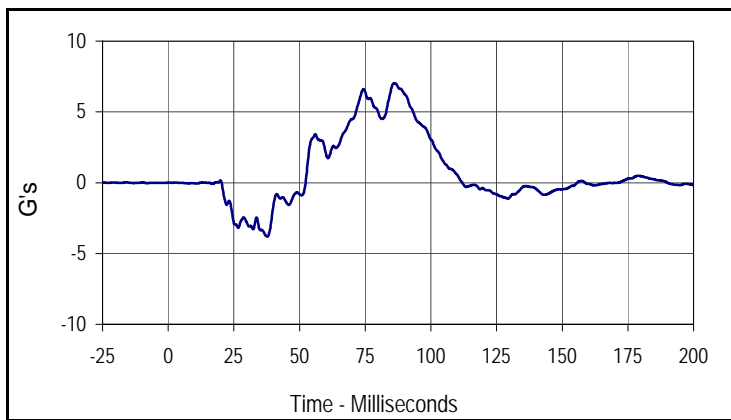
Curve Description			
Driver Chest Deflection			
Plot No.	Type	SAE Class	Units
005	FIL	600	MM
Max	Time	Min	Time
0.0	12.0	-20.1	75.3

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

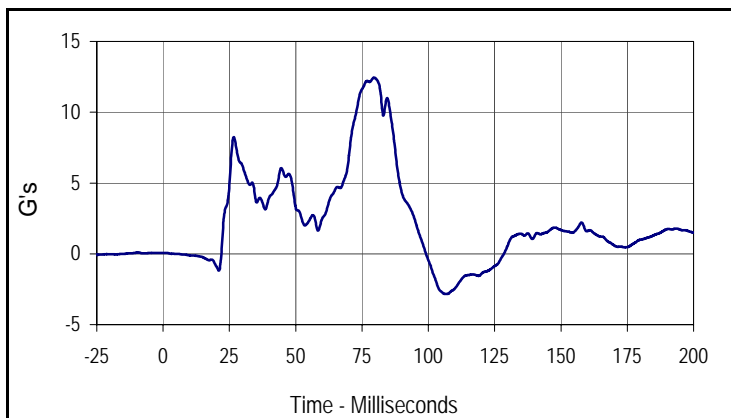
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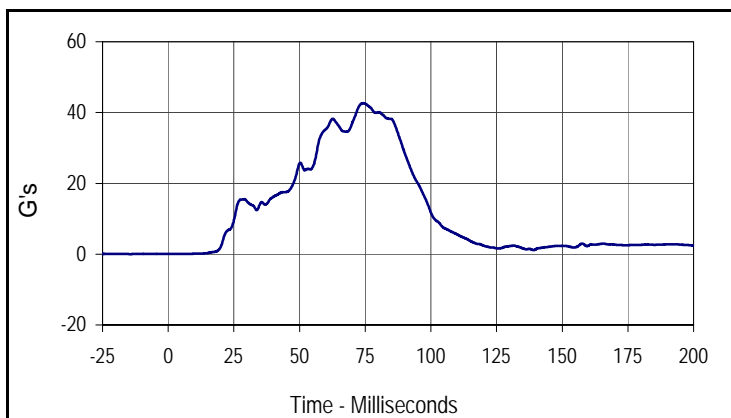
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Driver Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
2.7	165.8	-40.6	73.7



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
7.0	86.2	-3.8	37.7



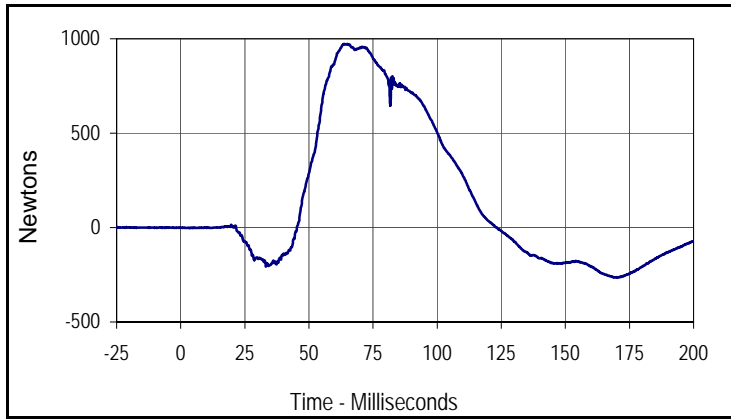
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Driver Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
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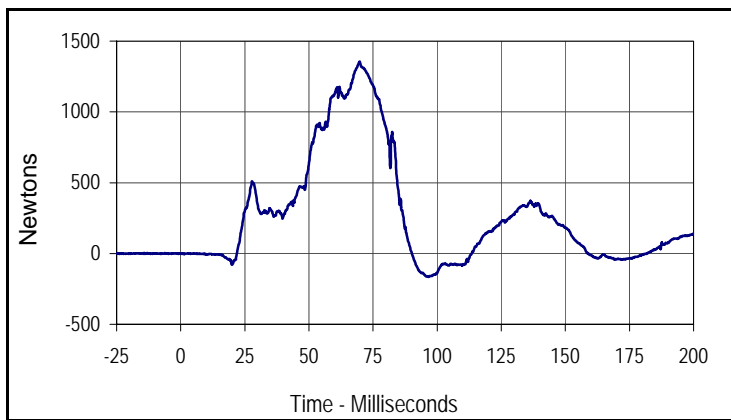
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Driver Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
009	RES	180	G's
Max	Time	Min	Time
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Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

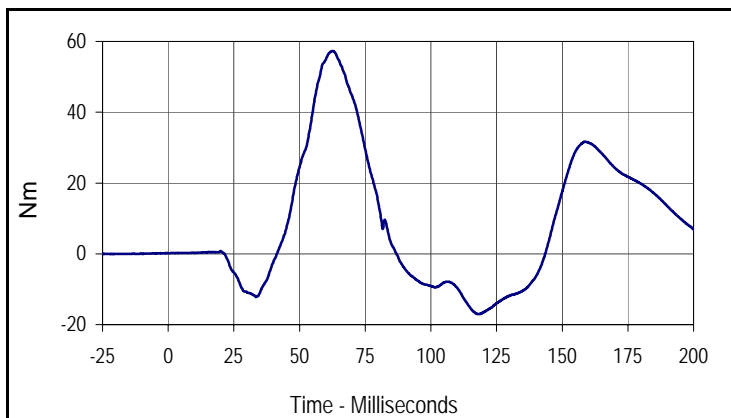
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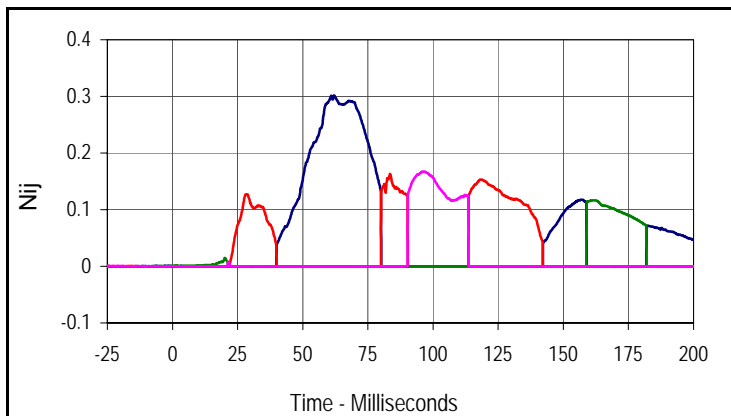
Curve Description			
Driver Upper Neck Force X			
Plot No.	Type	SAE Class	Units
010	FIL	1000	Newtons
Max	Time	Min	Time
973.1	65.1	-265.0	169.2



Curve Description			
Driver Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
011	FIL	1000	Newtons
Max	Time	Min	Time
1355.8	69.8	-165.6	96.6



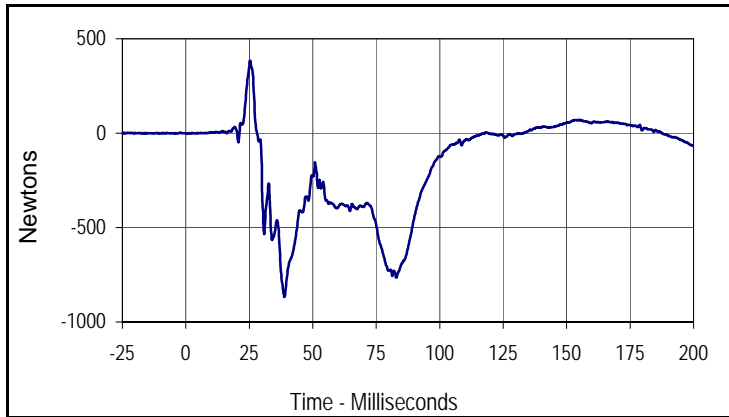
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Driver Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
57.3	62.7	-17.0	118.3



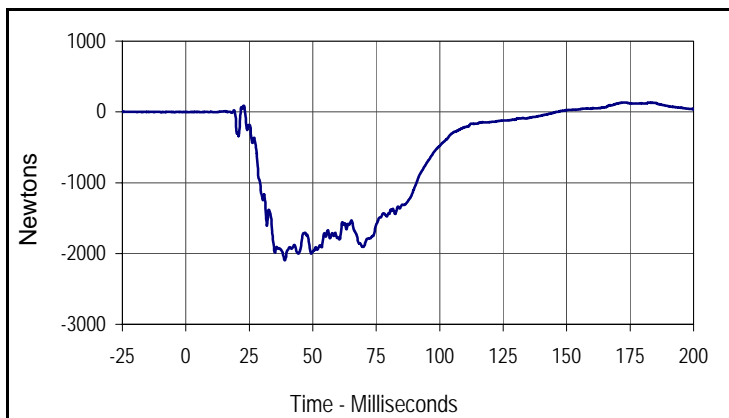
Curve Description			
Driver Nij			
Units	Type	Max	Time
Ntf	FIL	0.30	62.1
Units	Type	Max	Time
Nte	FIL	0.16	83.5
Units	Type	Max	Time
Ncf	FIL	0.12	161.1
Units	Type	Max	Time
Nce	FIL	0.17	96.1

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154100
 Test Date: 11/13/14



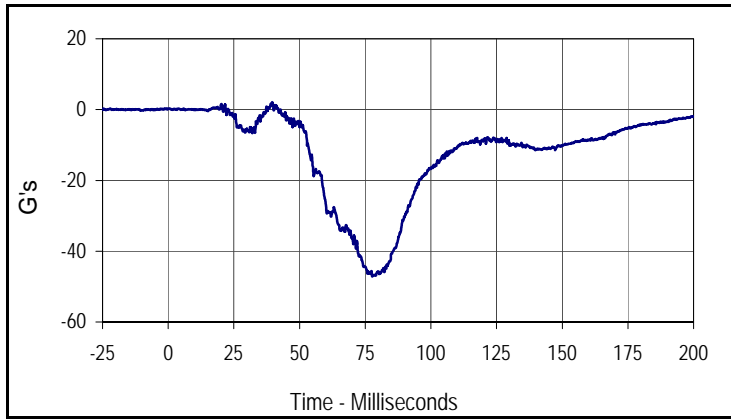
Curve Description			
Driver Left Femur Force Z			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
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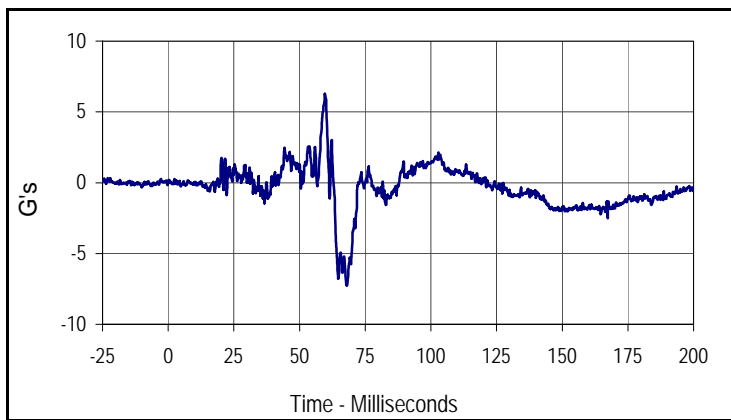
Curve Description			
Driver Right Femur Force Z			
Plot No.	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
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Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

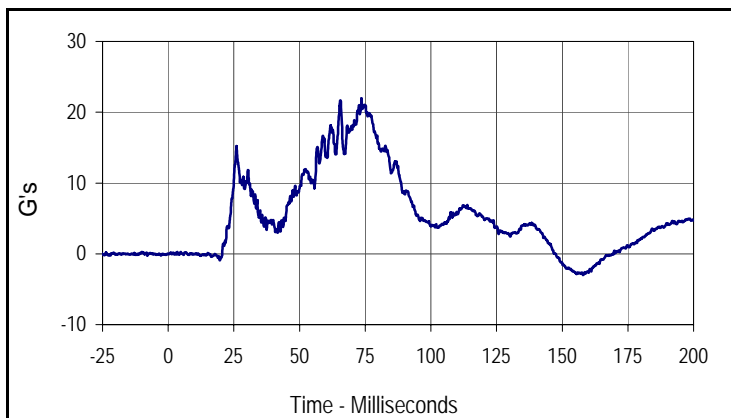
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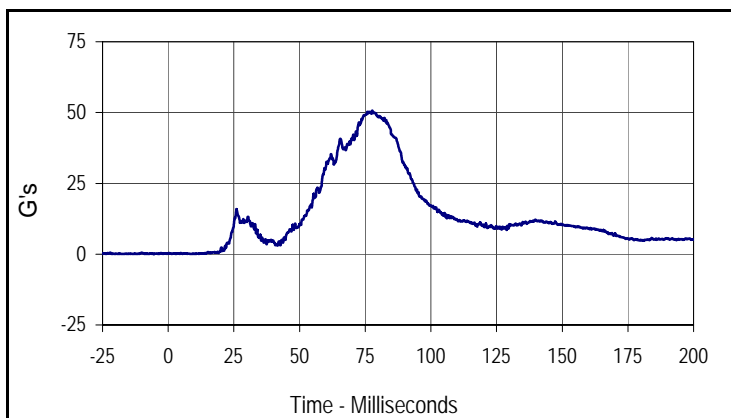
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Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
2.1	39.6	-47.1	77.7



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
6.3	59.7	-7.2	68.1



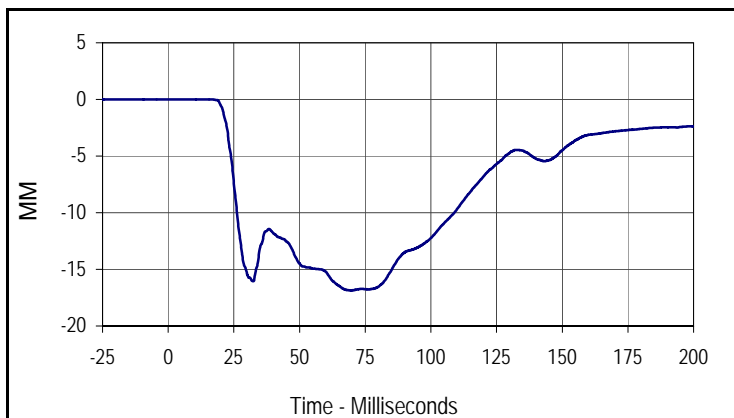
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
017	FIL	1000	G's
Max	Time	Min	Time
22.0	73.6	-3.0	157.9



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
018	RES	1000	G's
Max	Time	Min	Time
50.7	77.7	0.0	11.7

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

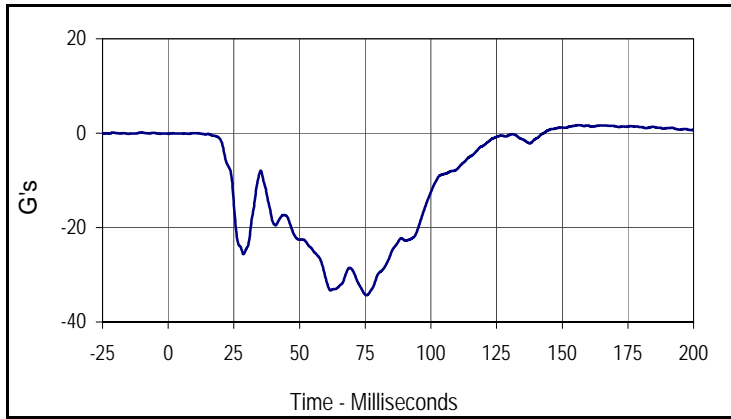
NHTSA No.: M20154100
 Test Date: 11/13/14



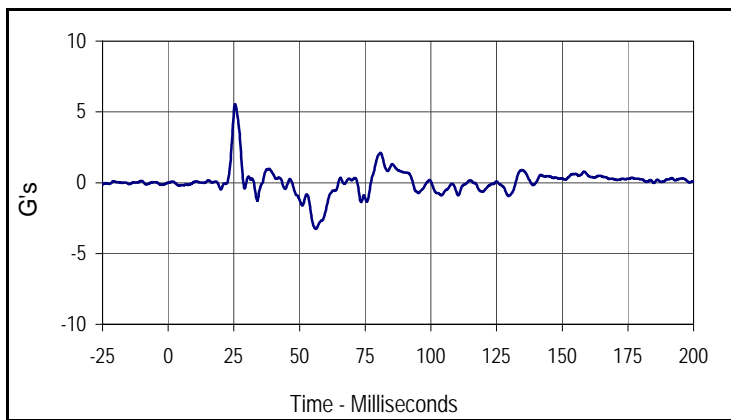
Curve Description			
Passenger Chest Deflection			
Plot No.	Type	SAE Class	Units
019	FIL	600	MM
Max	Time	Min	Time
0.0	2.4	-16.9	69.6

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

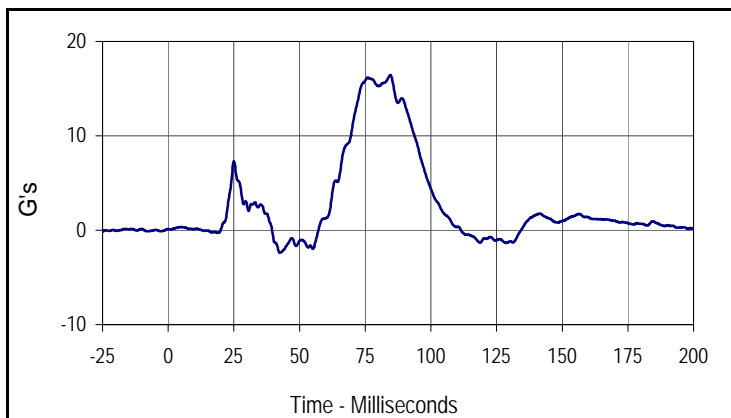
NHTSA No.: M20154100
 Test Date: 11/13/14



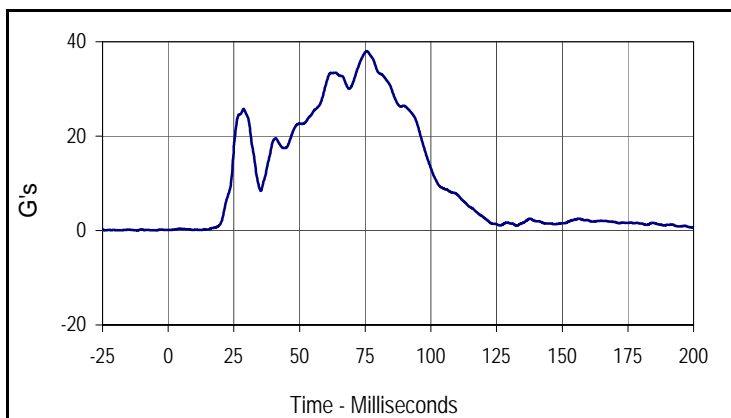
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
1.7	156.3	-34.3	75.5



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
021	FIL	180	G's
Max	Time	Min	Time
5.6	25.5	-3.3	56.1



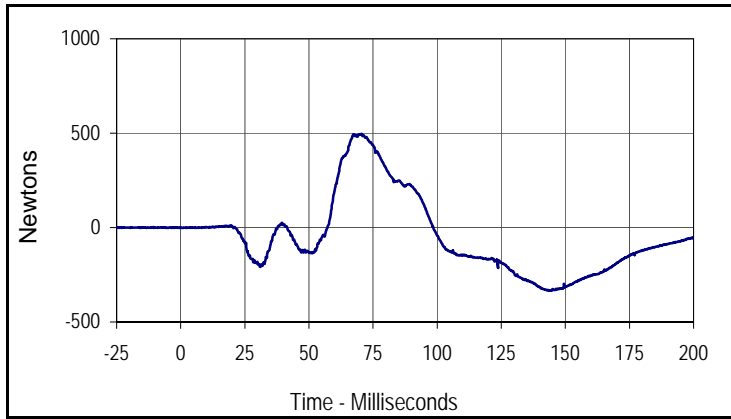
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
022	FIL	180	G's
Max	Time	Min	Time
16.4	84.6	-2.4	42.5



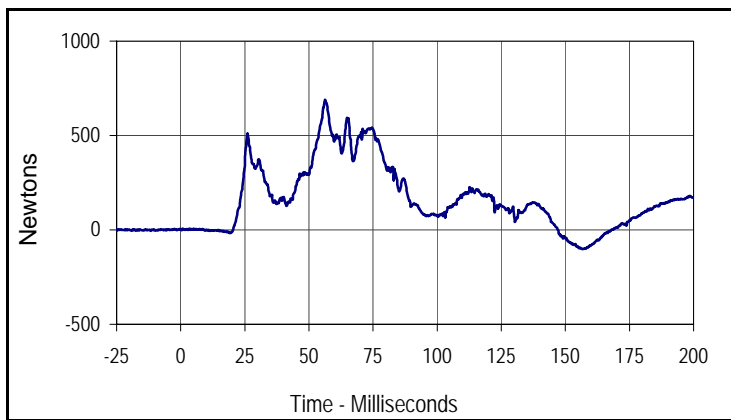
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
023	RES	180	G's
Max	Time	Min	Time
37.9	75.6	0.1	12.3

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

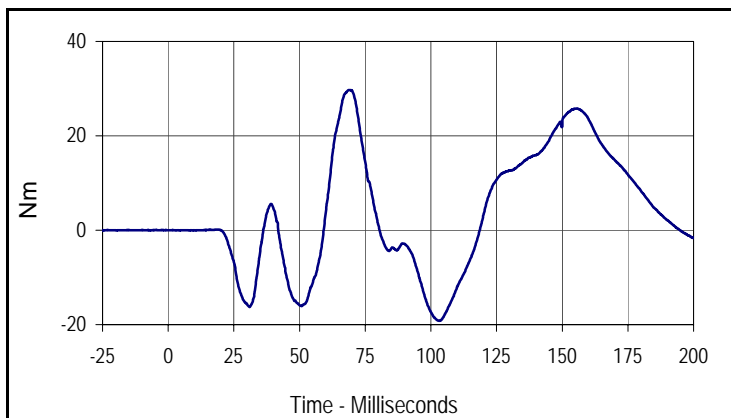
NHTSA No.: M20154100
 Test Date: 11/13/14



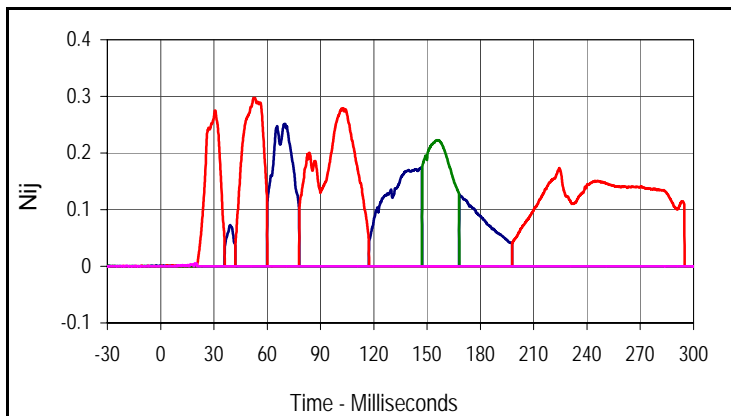
Curve Description			
Passenger Upper Neck Force X			
Plot No.	Type	SAE Class	Units
024	FIL	1000	Newtons
Max	Time	Min	Time
496.9	70.6	-333.7	144.2



Curve Description			
Passenger Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
025	FIL	1000	Newtons
Max	Time	Min	Time
690.4	56.3	-101.4	156.7



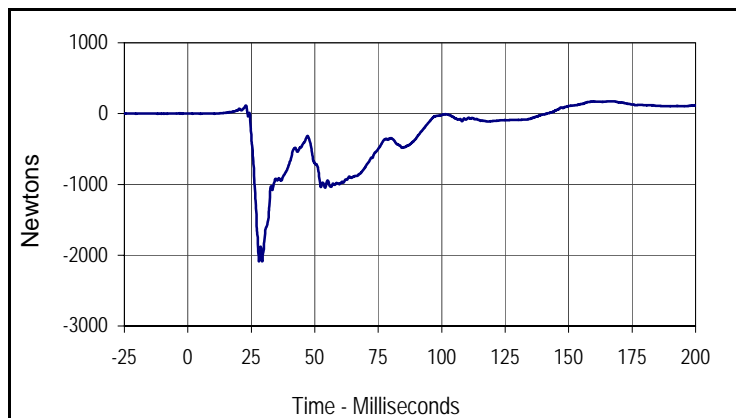
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
026	FIL	600	Nm
Max	Time	Min	Time
29.7	69.1	-19.2	103.4



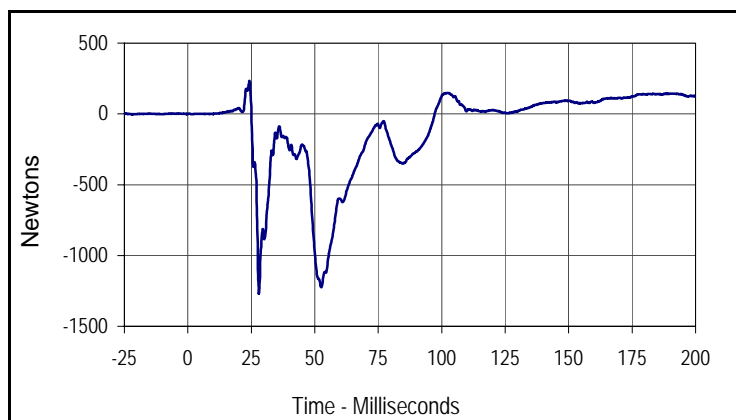
Curve Description			
Passenger Nij			
Units	Type	Max	Time
Ntf	FIL	0.25	70.0
Nte	FIL	0.30	53.1
Ncf	FIL	0.22	155.7
Nce	FIL	0.01	19.8

Test Vehicle: 2015 BMW X5 xDrive35i 5-Door MPV
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154100
 Test Date: 11/13/14



Curve Description			
Passenger Left Femur Force Z			
Plot No.	Type	SAE Class	Units
027	FIL	600	Newtons
Max	Time	Min	Time
174.3	167.9	-2088.5	28.1



Curve Description			
Passenger Right Femur Force Z			
Plot No.	Type	SAE Class	Units
028	FIL	600	Newtons
Max	Time	Min	Time
233.4	24.3	-1270.3	28.0

APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

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

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist

Test Date: 10/23/14



ATD Serial No.: 360

Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on or replacement of parts:

Test Program: Hybrid III 50th Percentile Male External Measurements Test Date: 10/23/14
 ATD Serial No.: 360 Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	29.5	Pass
A - Total sitting height	mm	879 to 889	886	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - H point height	mm	84 to 89	86	Pass
D - H point location from backline	mm	135 to 140	139	Pass
E - Shoulder pivot from backline	mm	84 to 94	91	Pass
F - Thigh clearance	mm	140 to 155	147	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	298	Pass
H - Head back to backline	mm	41 to 46	44	Pass
I - Shoulder to elbow length	mm	330 to 345	337	Pass
J - Elbow rest height	mm	190 to 211	205	Pass
K - Buttock to knee length	mm	579 to 604	587	Pass
L - Popliteal length	mm	429 to 455	437	Pass
M - Knee pivot height	mm	485 to 500	495	Pass
N - Buttock popliteal length	mm	452 to 477	473	Pass
O - Chest depth without jacket	mm	213 to 229	227	Pass
P - Foot length	mm	251 to 267	263	Pass
V - Shoulder breadth	mm	422 to 437	436	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	982	Pass
Z - Waist circumference	mm	836 to 866	865	Pass
AA - Location for chest circumference	mm	429 to 434	431	Pass
BB - Location for waist circumference	mm	226 to 231	231	Pass
Overall Test Results			Pass	

Test Program: Hybrid III 50th Percentile Male Head Drop Test

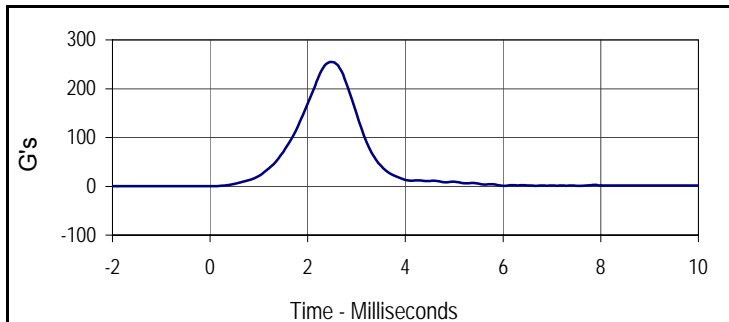
Test Date: 10/23/14



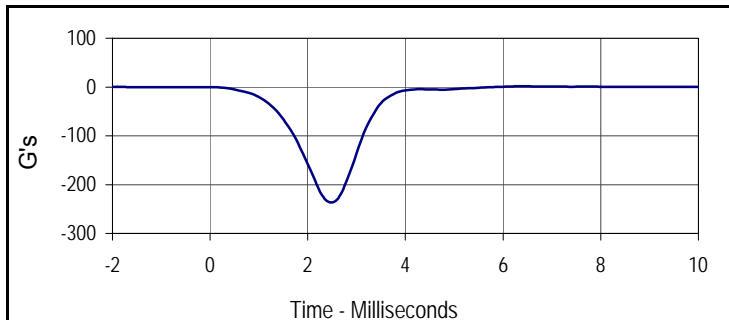
ATD Serial No.: 360

Test I.D.: M360HD002

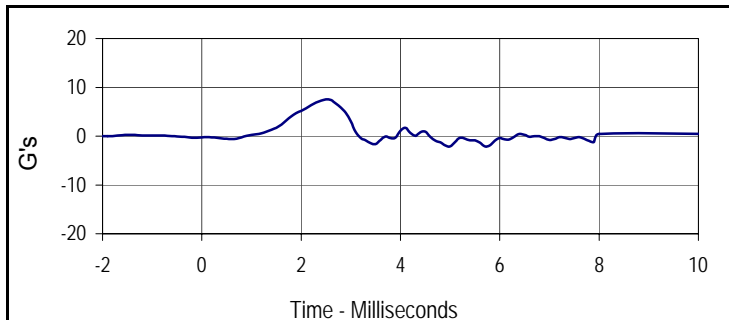
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	317	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass
	Min		40.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	255.0	Pass
Peak Lateral Acceleration	G's	≤15.0	7.6	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	5.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



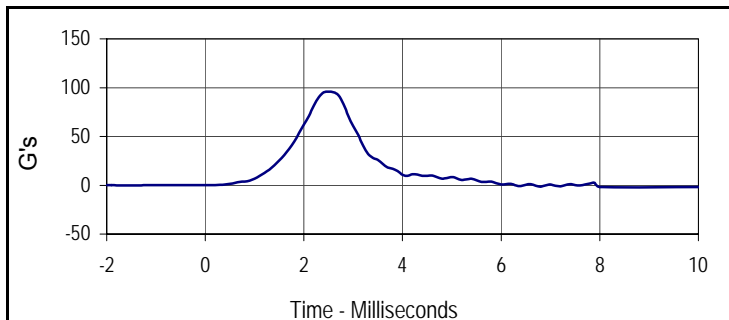
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
255.0	2.5	0.1	-1.8



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.4	6.0	-236.2	2.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
7.6	2.5	-2.1	5.0



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
96.0	2.5	-0.2	-1.5

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

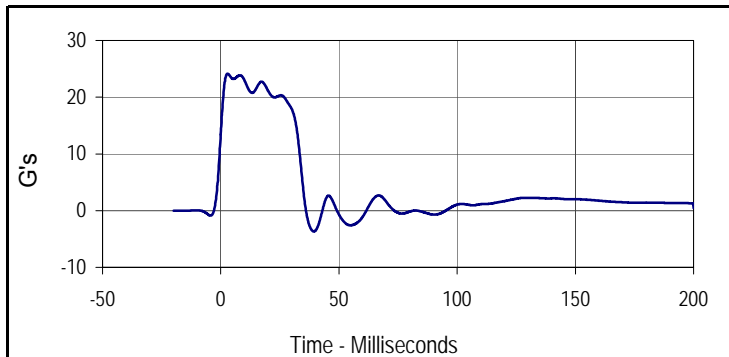
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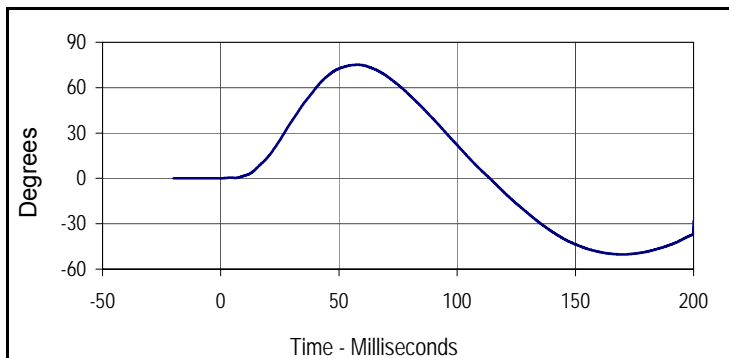
ATD Serial No.: 360

Test I.D.: M360NF002

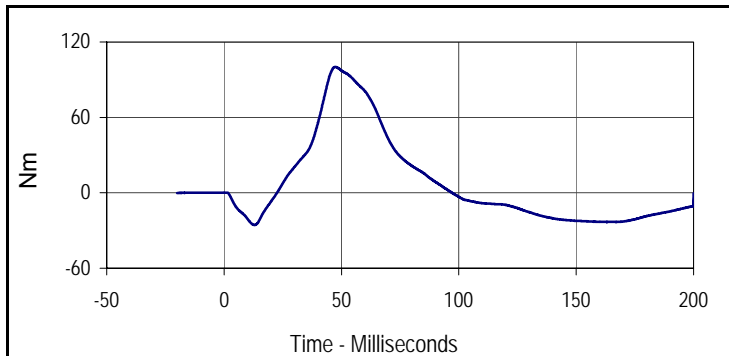
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	362	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass	
	Min		40.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.94	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.0	Pass
	20 Msec.	G's	17.6 to 22.6	21.1	Pass
	30 Msec.	G's	12.5 to 18.5	17.9	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	17.9	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	34.6	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	75.1	Pass
	Time	Msec.	57.0 to 64.0	57.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	113.9	Pass	
Moment About Occ. Condyle	Max	Nm	88.1 to 108.5	100.2	Pass
	Time	Msec.	47.0 to 58.0	47.4	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	97.2	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
24.1	2.9	-3.7	39.4



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
75.1	57.8	-50.3	169.8



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
100.2	47.4	-25.7	13.0

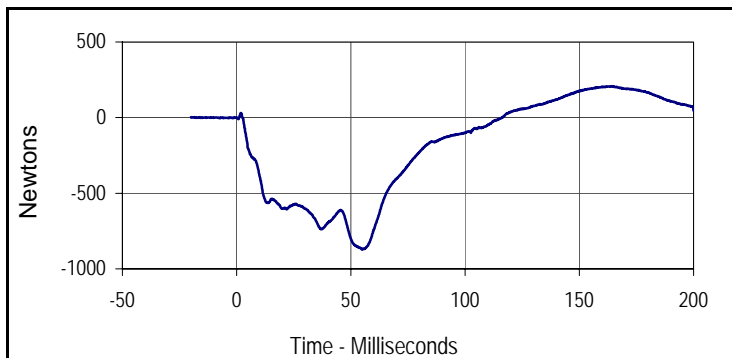
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 10/23/14

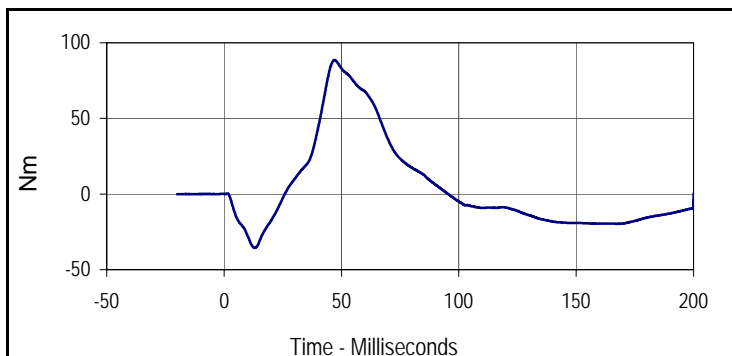


ATD Serial No.: 360

Test I.D.: M360NF002



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
207.2	164.7	-872.8	55.0



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
88.6	47.0	-35.6	13.0

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

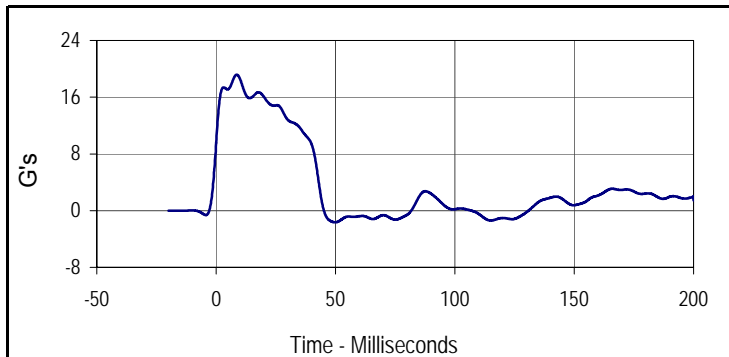
Test Date: 10/23/14



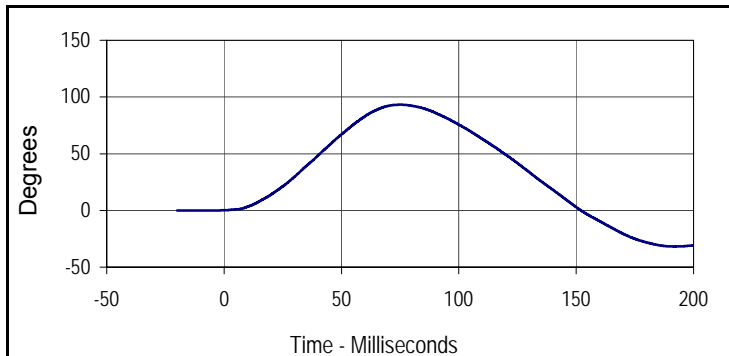
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Test I.D.: M360NE002

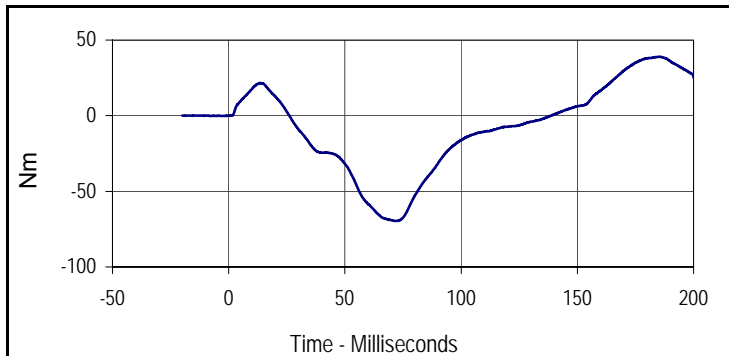
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	417	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass	
	Min		40.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	5.95	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.6	Pass
	20 Msec.	G's	14.0 to 19.0	16.1	Pass
	30 Msec.	G's	11.0 to 16.0	12.8	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	12.8	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	42.6	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	93.2	Pass
	Time	Msec.	72.0 to 82.0	75.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	152.1	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-69.5	Pass
	Time	Msec.	65.0 to 79.0	72.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	138.8	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
19.2	8.6	-1.6	49.8



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
93.2	75.1	-31.8	191.9



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
38.9	185.3	-69.5	72.5

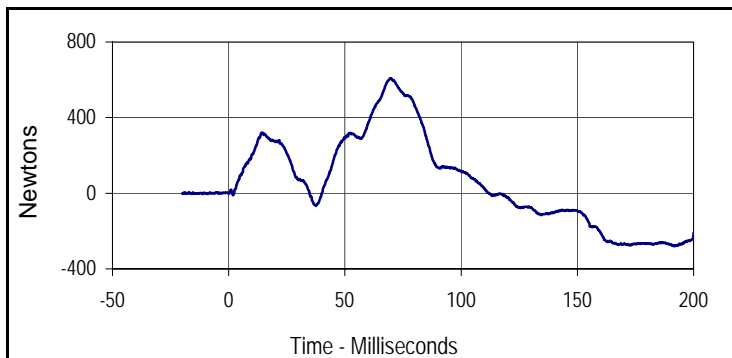
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 10/23/14

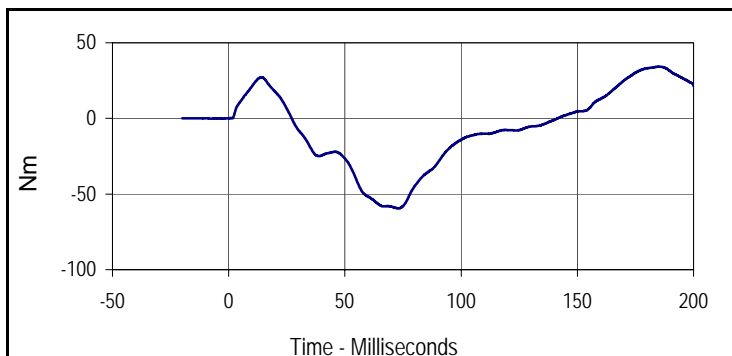


ATD Serial No.: 360

Test I.D.: M360NE002



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
606.6	70.0	-280.2	192.1



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
34.3	185.1	-59.5	72.9

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

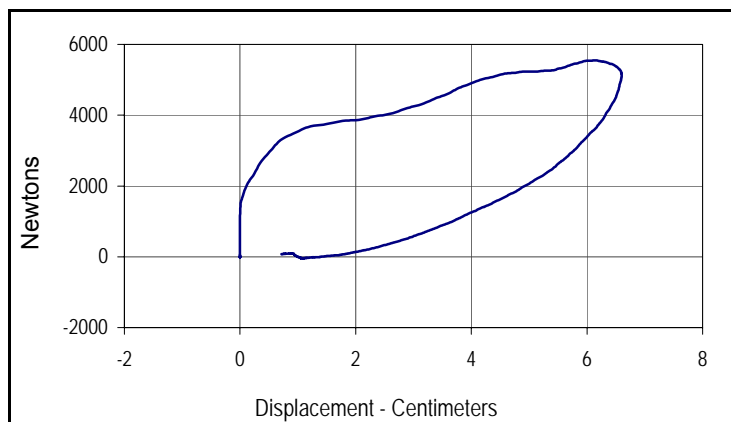
Test Date: 10/23/14



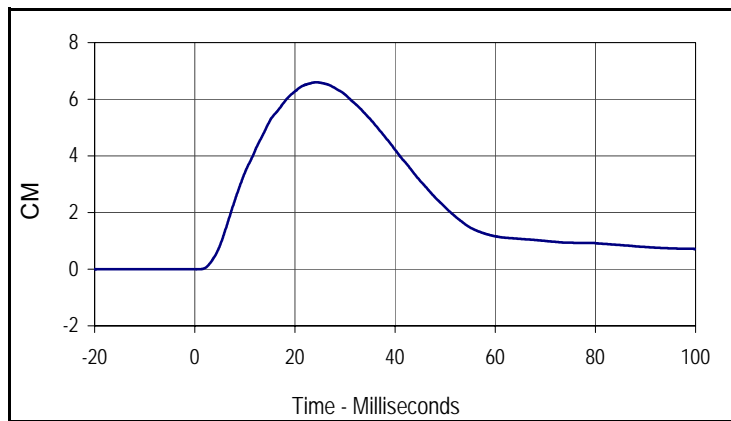
ATD Serial No.: 360

Test I.D.: M360CH002

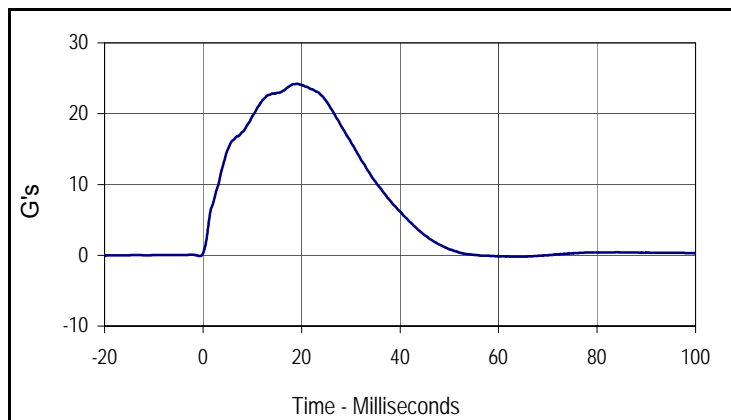
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	492	Pass
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass
	Min		40.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass
Probe Velocity	m/s	6.58 to 6.82	6.74	Pass
Peak Probe Force	Newtons	5159 to 5893	5549	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.60	Pass
Internal Hysteresis	%	69 to 85	72.3	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	72.3
Peak Probe Force		Peak Chest Deflection	
5549		6.60	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.6	24.3	0.0	0.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.2	19.1	-0.2	64.7

Test Program: Hybrid III 50th Percentile Male Knee Impact Test
 ATD Serial No.: 360

Test Date: 10/23/14
 Test I.D.: M360LK002, M360RK002

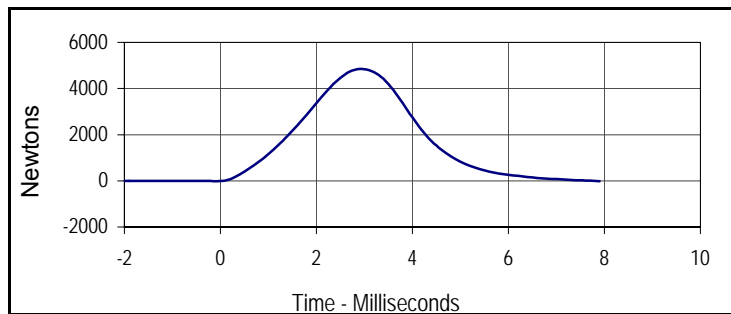


Left Knee

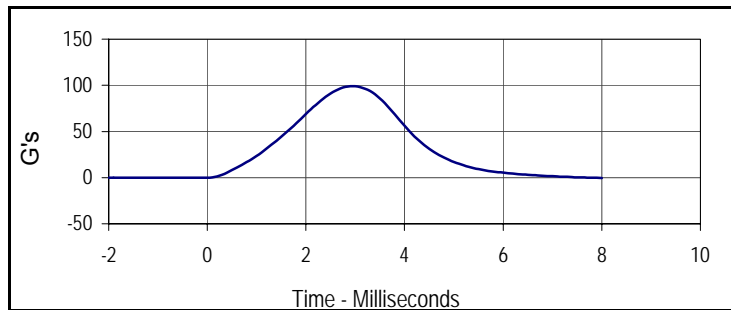
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	547	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass
	Min		40.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	4846	Pass
Overall Test Results				Pass

Right Knee

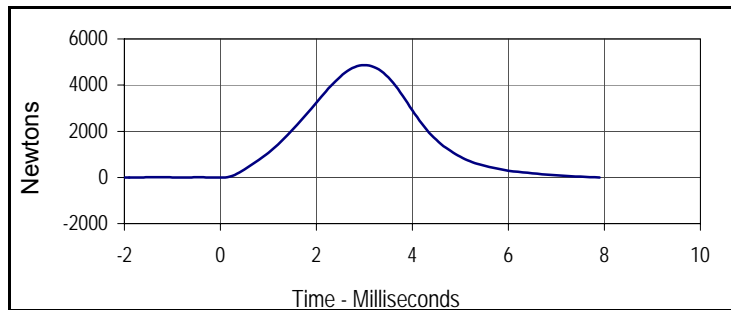
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4865	Pass
Overall Test Results				Pass



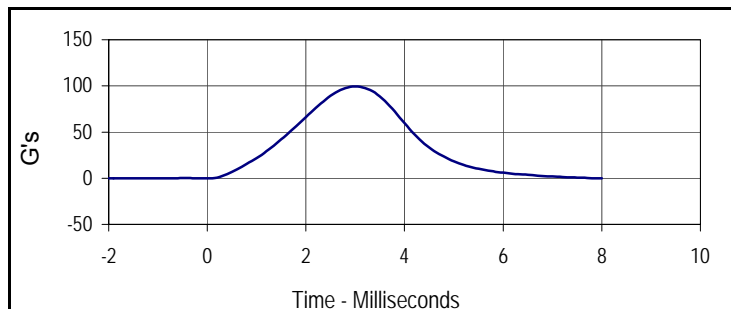
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4845.8	2.9	-10.6	-0.1



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
99.0	2.9	-0.6	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
4864.9	3.0	-9.7	0.0



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
99.4	3.0	-0.5	0.0

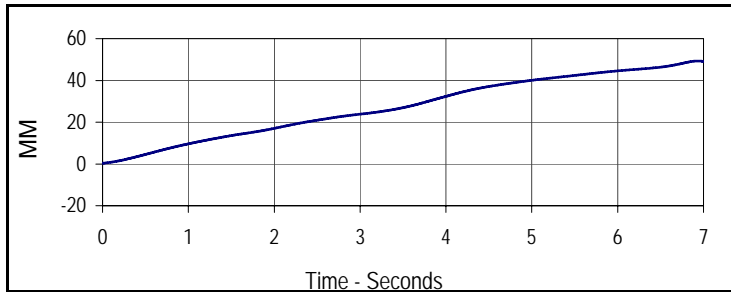


Left Hip Joint-Femur Results

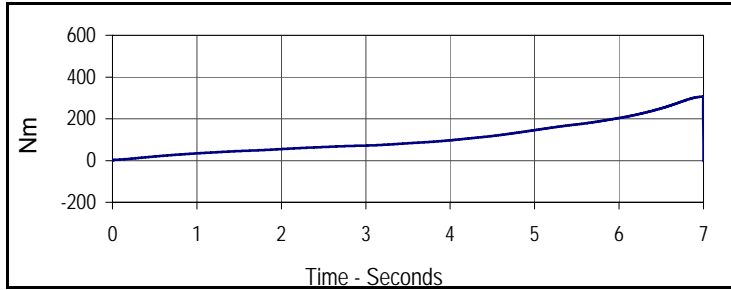
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	622	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	41.0	Pass
	Min		40.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	41.0	Pass
Rotation Rate	deg/sec	5 to 10	7.1	Pass
Femur Torque at 30°	Nm	≤ 95	88.0	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	44.3	Pass
Overall Test Results				Pass

Right Hip Joint-Femur Results

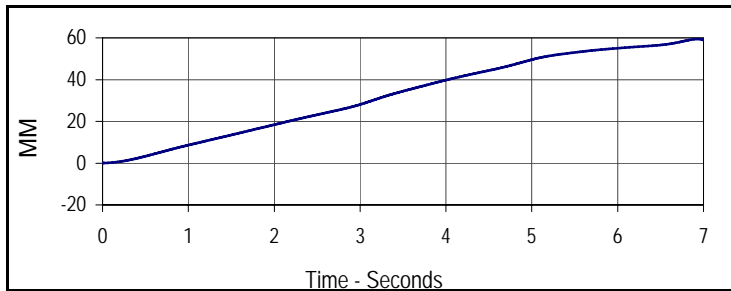
Rotation Rate	deg/sec	5 to 10	8.6	Pass
Femur Torque at 30°	Nm	≤ 95	85.8	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	45.1	Pass
Overall Test Results				Pass



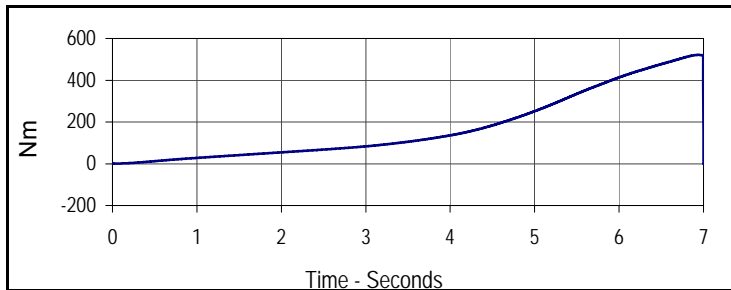
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	MM
Max	Time	Min	Time
49.3	6.9	0.3	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
305.3	7.0	0.3	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	MM
Max	Time	Min	Time
59.4	6.9	0.3	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
521.2	6.9	0.3	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist

Test Date: 10/24/14



ATD Serial No.: 635

Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on or replacement of parts:

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 10/24/14



ATD Serial No.: 635

Test I.D.: N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.14	Pass
Laboratory Relative Humidity	%	10 to 70	40.8	Pass
A - Total sitting height	mm	774.7 to 800.1	786	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	450	Pass
C - H point height	mm	81.3 to 86.3	85	Pass
D - H point location from backline	mm	144.8 to 149.8	146	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	77	Pass
F - Thigh clearance	mm	119.4 to 134.6	126	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	198	Pass
K - Buttock to knee length	mm	520.7 to 546.1	531	Pass
L - Popliteal length	mm	355.6 to 376.0	371	Pass
M - Knee pivot height	mm	393.7 to 419.1	402	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	186	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	473	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	864	Pass
Z - Waist circumference	mm	759.5 to 789.9	766	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	164	Pass
Overall Test Results				Pass

Test Program: Hybrid III 5th Percentile Female Head Drop Test

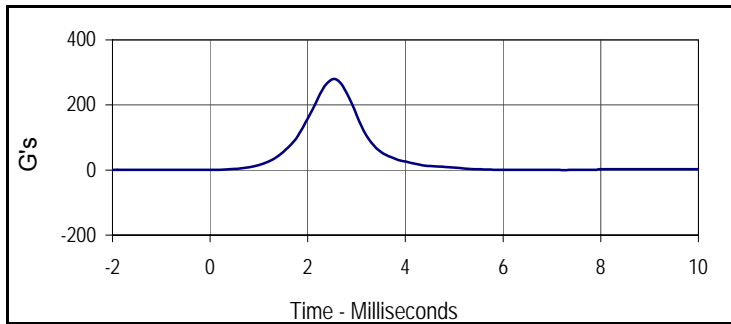
Test Date: 10/24/14



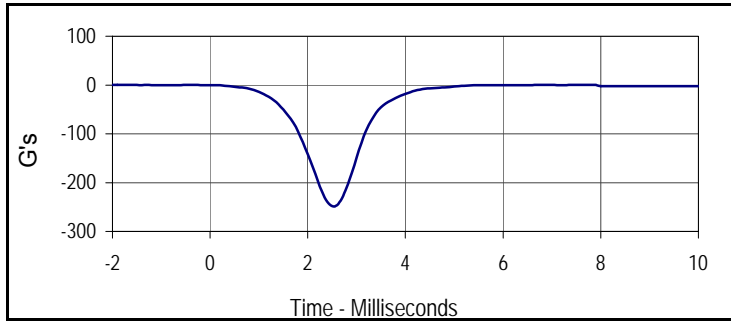
ATD Serial No.: 635

Test I.D.: F635HD047

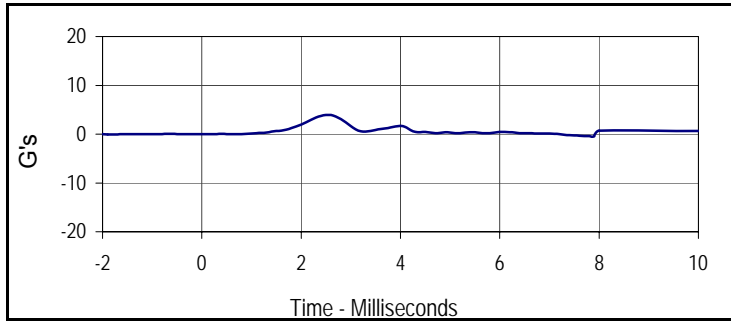
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	312	Pass
Temperature During Soak	Max	18.9 to 25.6	21.1	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	40.9	Pass
	Min		40.6	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	40.6	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	278.6	Pass
Peak Lateral Acceleration	G's	≤15.0	3.9	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	0.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



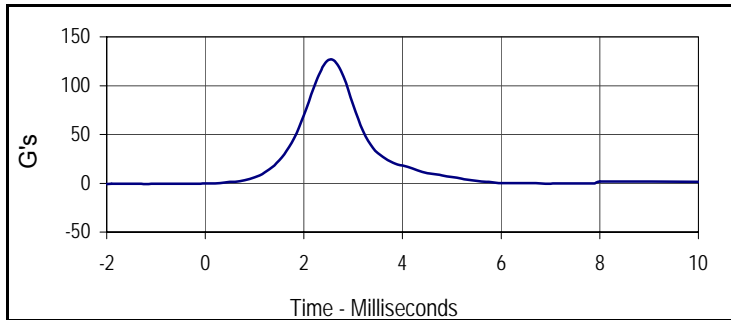
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
278.6	2.5	0.3	0.1



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	-2.0	-248.3	2.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
3.9	2.5	-0.1	-1.8



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
126.3	2.5	-0.7	-2.0

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

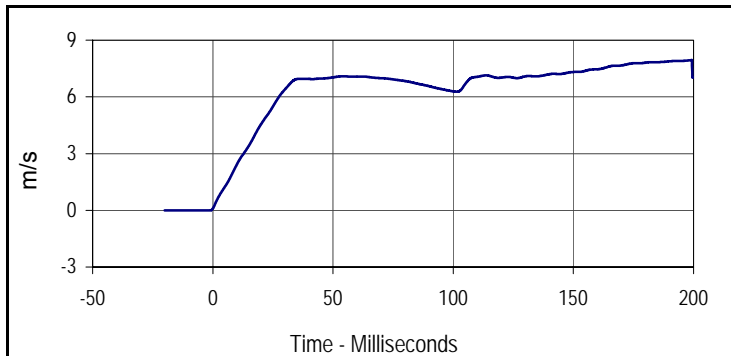
Test Date: 10/24/14



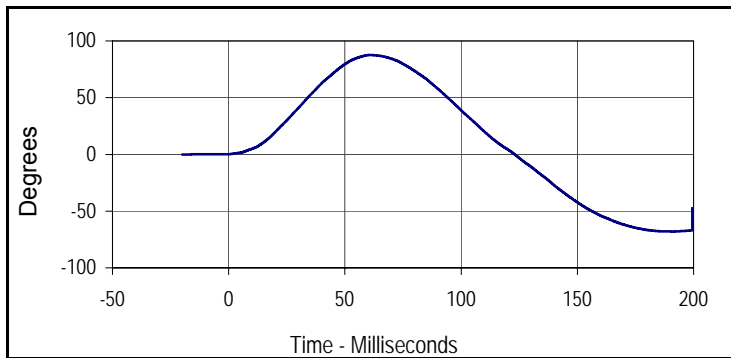
ATD Serial No.: 635

Test I.D.: F635NF047

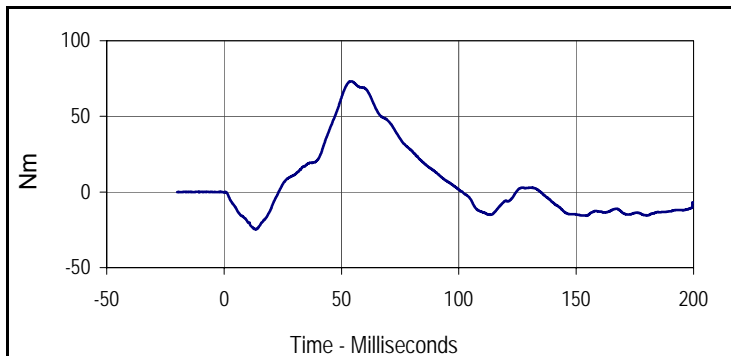
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	357	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.1	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	40.9	Pass	
	Min		40.6	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	40.8	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.11	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.4	Pass
	20 Msec.	m/s	4.0 to 5.0	4.5	Pass
	30 Msec.	m/s	5.8 to 7.0	6.4	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	87.6	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	73.2	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	91.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.9	199.4	0.0	-1.3



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
87.6	60.9	-68.0	191.1



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
73.2	54.1	-24.7	13.7

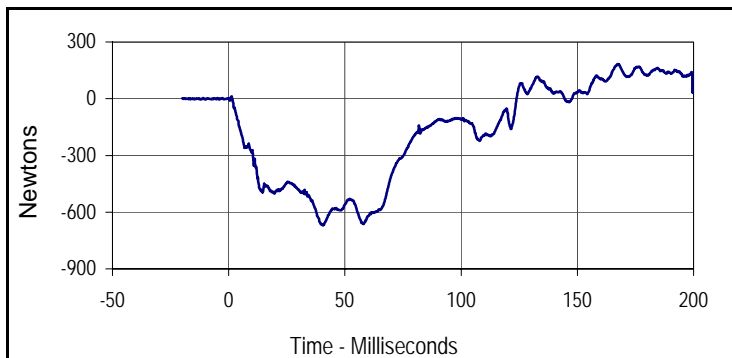
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 10/24/14

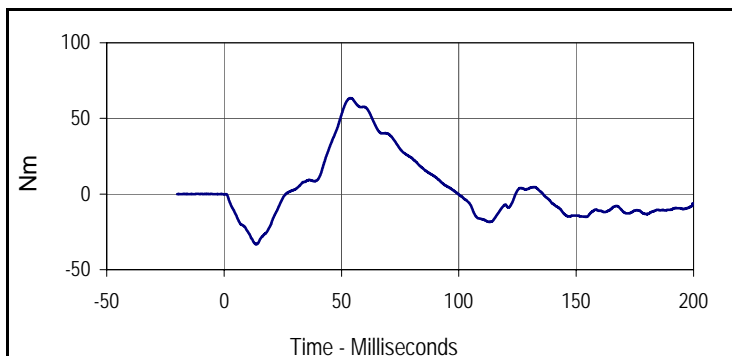


ATD Serial No.: 635

Test I.D.: F635NF047



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
183.2	167.3	-669.8	40.5



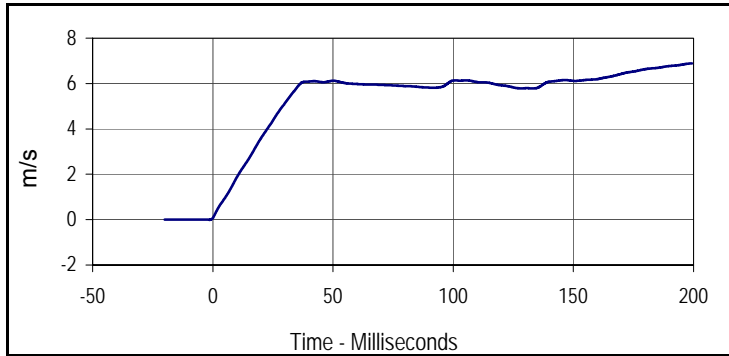
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
63.5	53.7	-33.2	13.7

Test Program: Hybrid III 5th Percentile Female Neck Extension Test
 ATD Serial No.: 635

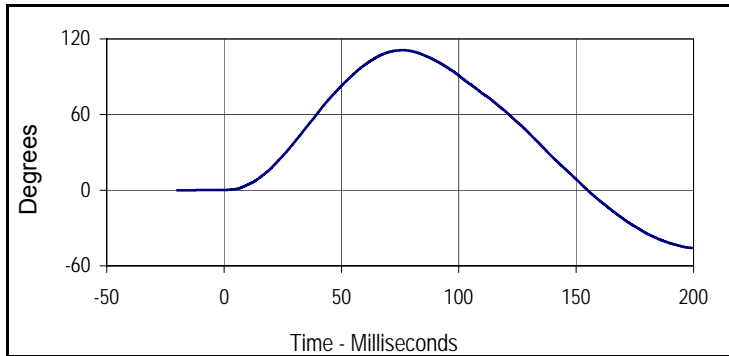
Test Date: 10/24/14
 Test I.D.: F635NE047



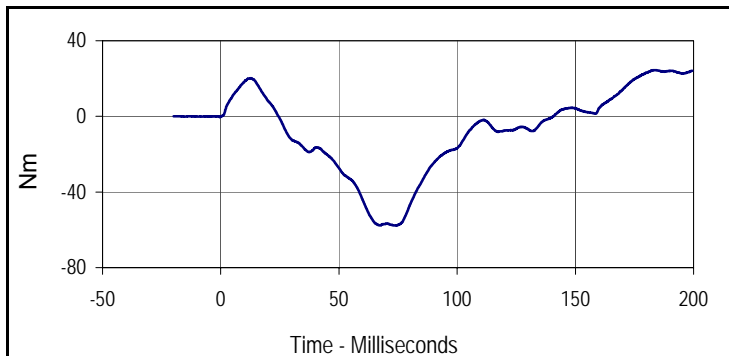
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	412	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.1	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	40.9	Pass	
	Min		40.6	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	40.9	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.9	Pass
	20 Msec.	m/s	3.1 to 3.9	3.6	Pass
	30 Msec.	m/s	4.6 to 5.6	5.1	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	111.1	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-57.8	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	103.8	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.9	199.4	0.0	-1.3



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
111.1	76.2	-45.8	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
24.5	183.8	-57.8	74.2

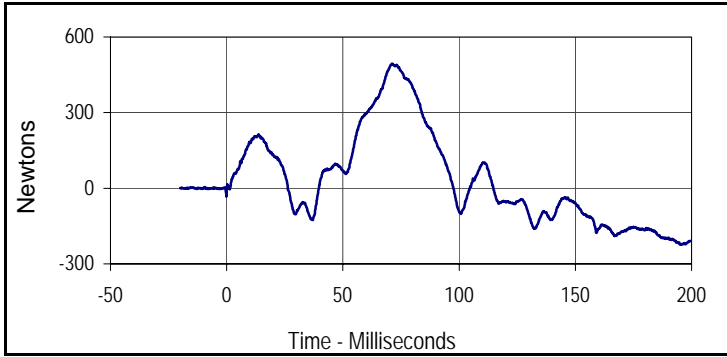
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 10/24/14

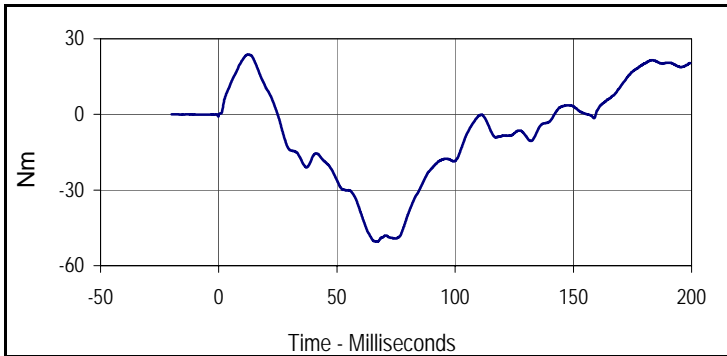


ATD Serial No.: 635

Test I.D.: F635NE047



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
494.8	71.2	-224.4	195.2



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
23.8	12.6	-50.5	67.0

Test Program: Hybrid III 5th Percentile Female Thorax Impact Test

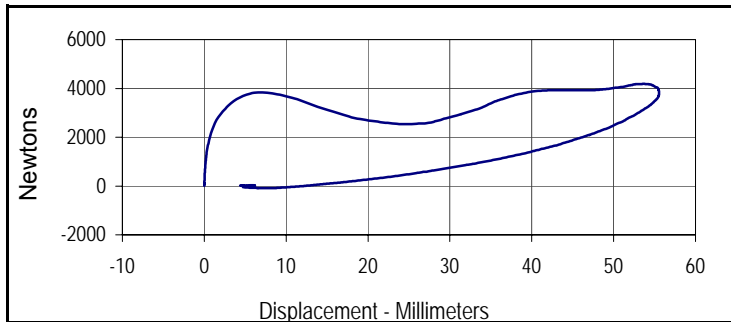
Test Date: 10/24/14



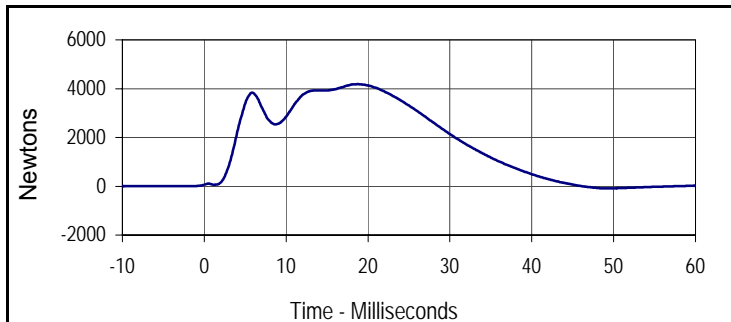
ATD Serial No.: 635

Test I.D.: F635CH047

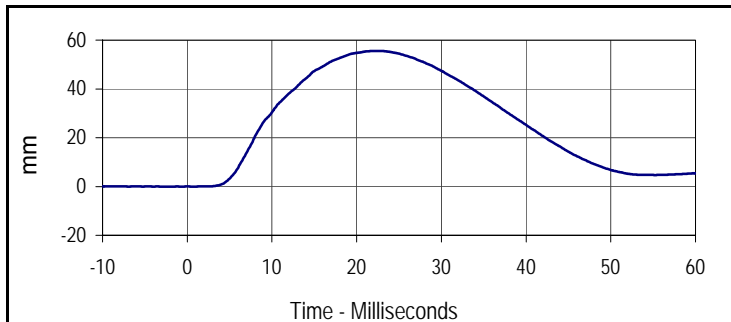
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	477	Pass
Temperature During Soak	Max	20.6 to 22.2	21.1	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	40.9	Pass
	Min		40.6	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	40.7	Pass
Probe Velocity	m/s	6.59 to 6.83	6.73	Pass
Peak Chest Deflection	mm	50.0 to 58.0	55.6	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4016	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4185	Pass
Internal Hysteresis	%	69 to 85	72.2	Pass
Overall Test Results				Pass



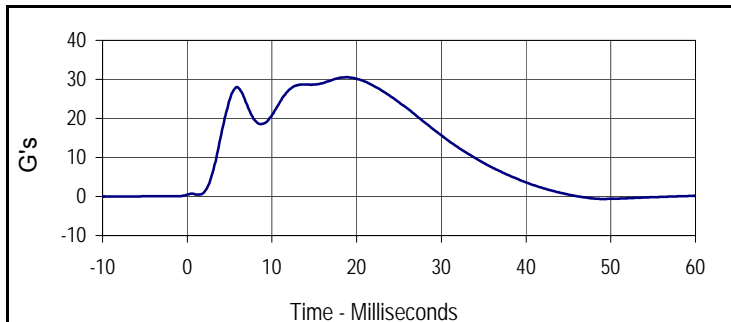
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	72.2
Peak Probe Force		Peak Chest Deflection	
4184.8		55.6	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4184.8	18.8	-86.3	49.0



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
55.6	22.3	0.0	-0.6



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
30.5	18.8	-0.6	49.0

Test Program: Hybrid III 5th Percentile Female Knee Impact Test

Test Date: 10/24/14



ATD Serial No.: 635

Test I.D.: F635LK047, F635RK047

Left Knee

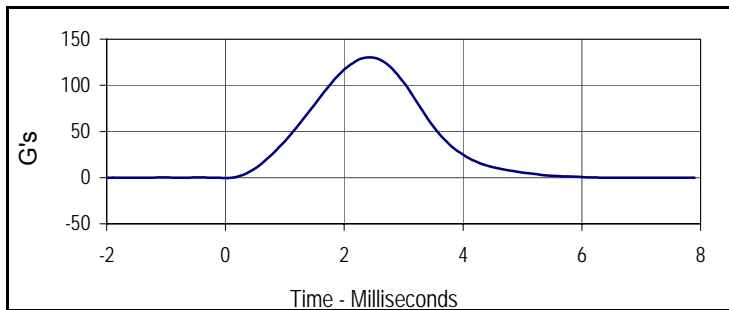
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	534	Pass
Temperature During Soak	Max	18.9 to 25.6	21.1	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	40.9	Pass
	Min		40.6	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	40.7	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	3450 to 4060	3819	Pass
Overall Test Results				Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3823	Pass
Overall Test Results				Pass



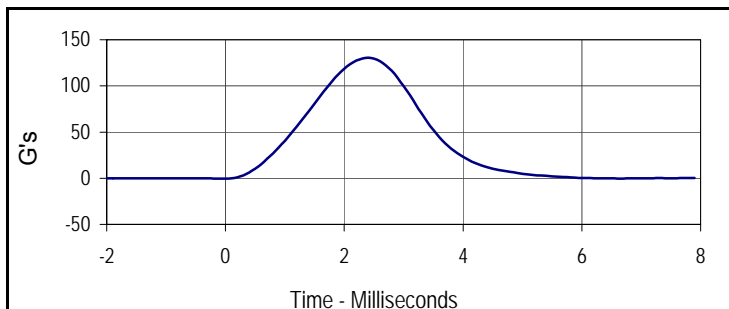
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3819.3	2.4	-8.2	0.0



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
130.3	2.4	-0.7	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3822.9	2.4	-11.3	-0.1



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
130.4	2.4	-0.7	0.0

Test Program: Hybrid III 5th Percentile Female Torso Flexion Test

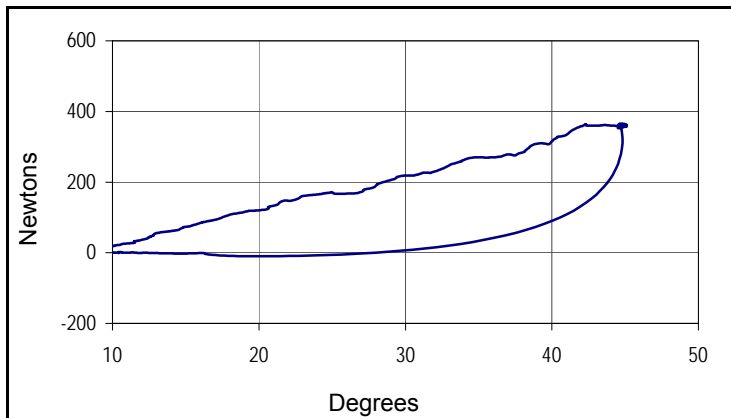
Test Date: 10/24/14



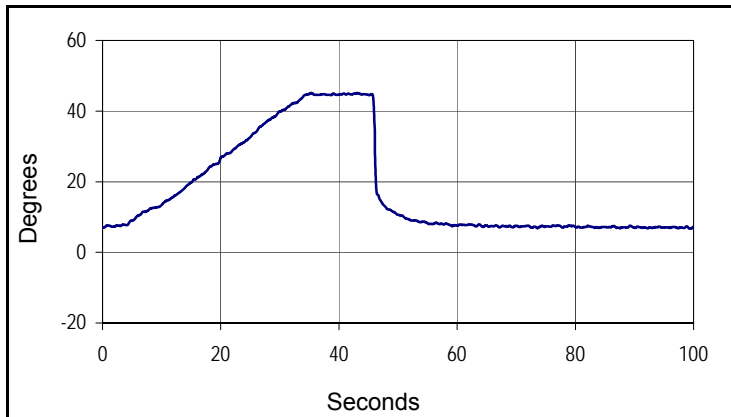
ATD Serial No.: 635

Test I.D.: TF047

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	609	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.1	Pass
	Min	°C		21.1	Pass
Humidity During Soak	Max	%	10.0 to 70.0	40.9	Pass
	Min	%		40.6	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	40.8	Pass
Initial Reference Plane Angle		Degrees	≤ 20	7.1	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	365.3	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	1.0	Pass
Final Reference Plane Angle		Degrees	+/-8	7.2	Pass
Overall Test Results					Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
365.3		45.1



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
45.1	43.1	6.7	99.4

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

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist

Test Date: 11/14/14



ATD Serial No.: 360

Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on or replacement of parts:

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 11/14/14

ATD Serial No.: 360

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	29.5	Pass
A - Total sitting height	mm	879 to 889	886	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - H point height	mm	84 to 89	86	Pass
D - H point location from backline	mm	135 to 140	139	Pass
E - Shoulder pivot from backline	mm	84 to 94	91	Pass
F - Thigh clearance	mm	140 to 155	147	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	298	Pass
H - Head back to backline	mm	41 to 46	44	Pass
I - Shoulder to elbow length	mm	330 to 345	337	Pass
J - Elbow rest height	mm	190 to 211	205	Pass
K - Buttock to knee length	mm	579 to 604	587	Pass
L - Popliteal length	mm	429 to 455	437	Pass
M - Knee pivot height	mm	485 to 500	495	Pass
N - Buttock popliteal length	mm	452 to 477	473	Pass
O - Chest depth without jacket	mm	213 to 229	227	Pass
P - Foot length	mm	251 to 267	263	Pass
V - Shoulder breadth	mm	422 to 437	436	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	982	Pass
Z - Waist circumference	mm	836 to 866	865	Pass
AA - Location for chest circumference	mm	429 to 434	431	Pass
BB - Location for waist circumference	mm	226 to 231	231	Pass
Overall Test Results			Pass	

Test Program: Hybrid III 50th Percentile Male Head Drop Test

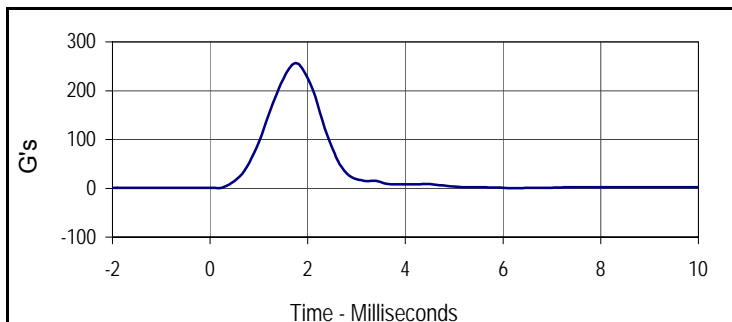
Test Date: 11/14/14



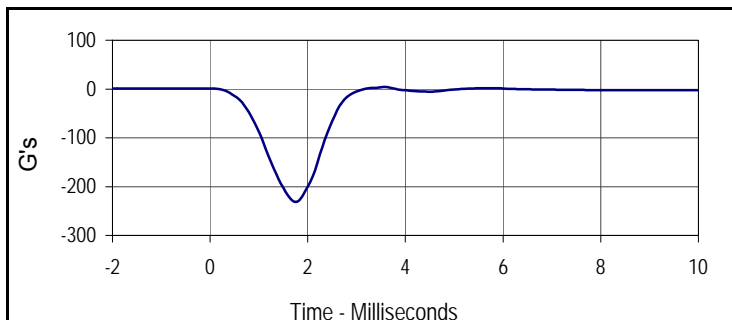
ATD Serial No.: 360

Test I.D.: M360HD003

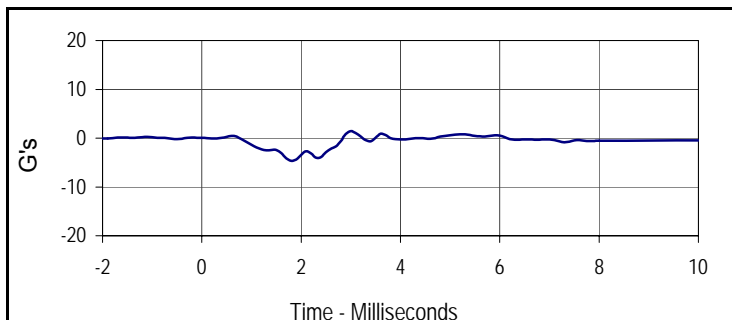
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	300	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	38.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	22.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.4	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	255.2	Pass
Peak Lateral Acceleration	G's	≤15.0	4.7	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	3.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



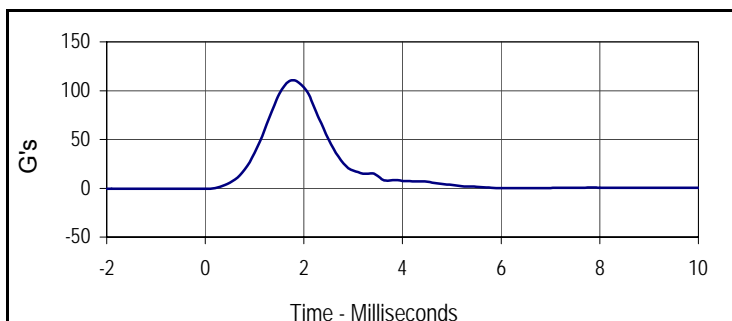
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
255.2	1.8	0.2	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.0	3.6	-230.1	1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
1.5	3.0	-4.7	1.8



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
110.6	1.8	-0.6	-1.1

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

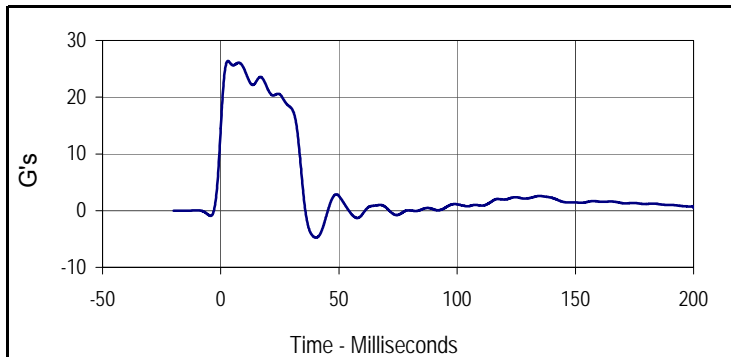
Test Date: 11/14/14



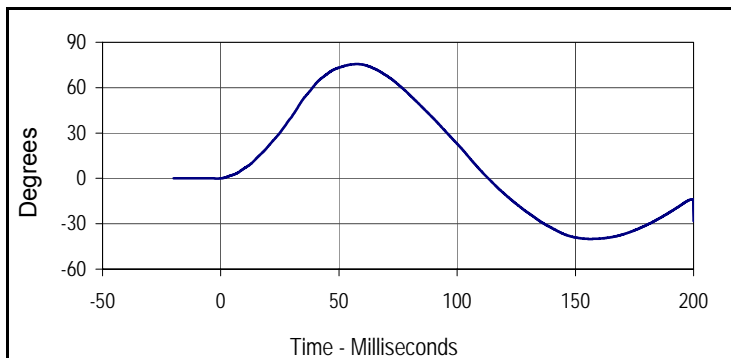
ATD Serial No.: 360

Test I.D.: M360NF003

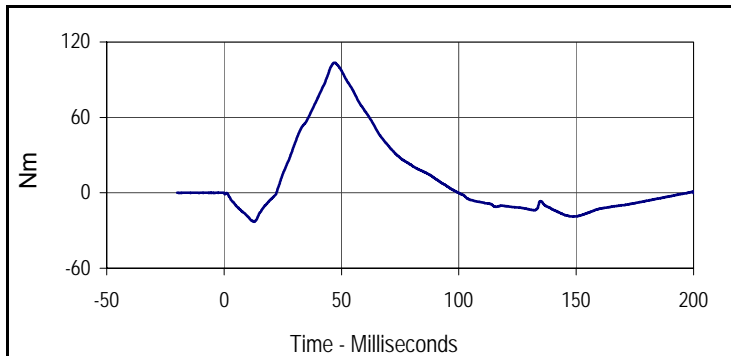
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	365	Pass	
Temperature During Soak	Max	20.6 to 22.2	22.2	Pass	
	Min		21.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	38.4	Pass	
	Min		23.1	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	22.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	37.7	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.96	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	24.9	Pass
	20 Msec.	G's	17.6 to 22.6	21.3	Pass
	30 Msec.	G's	12.5 to 18.5	18.0	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	18.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	34.5	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	75.6	Pass
	Time	Msec.	57.0 to 64.0	57.7	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	113.2	Pass	
Moment About Occ. Condyle	Max	Nm	88.1 to 108.5	103.5	Pass
	Time	Msec.	47.0 to 58.0	47.0	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	99.9	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
26.4	3.0	-4.7	40.3



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
75.6	57.7	-40.0	156.2



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
103.5	47.0	-23.0	12.8

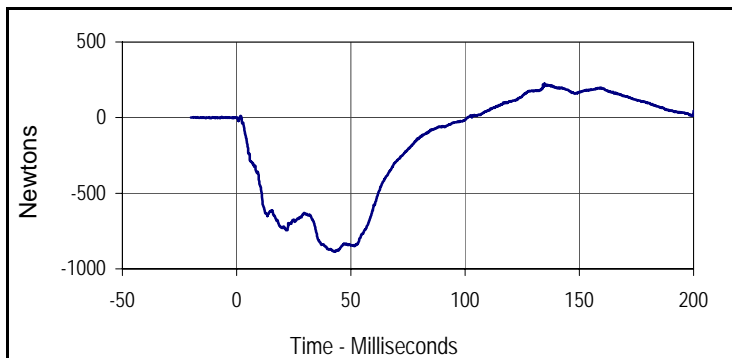
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 11/14/14

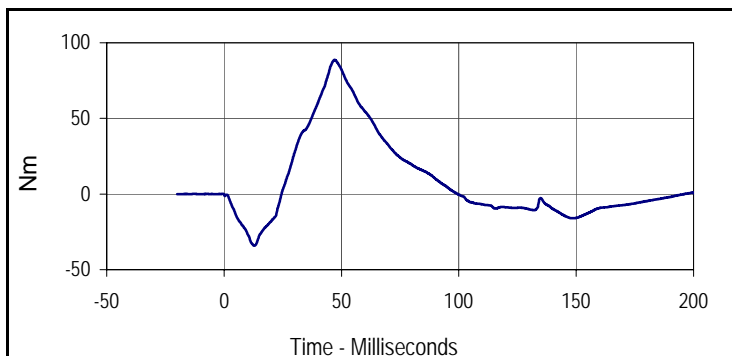


ATD Serial No.: 360

Test I.D.: M360NF003



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
224.0	134.8	-886.2	43.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
88.7	47.1	-34.2	12.8

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

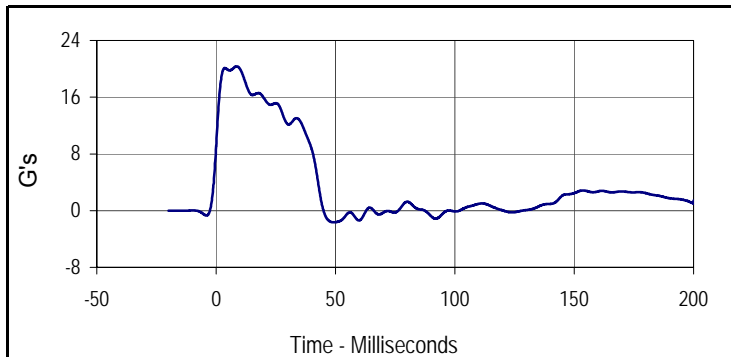
Test Date: 11/14/14



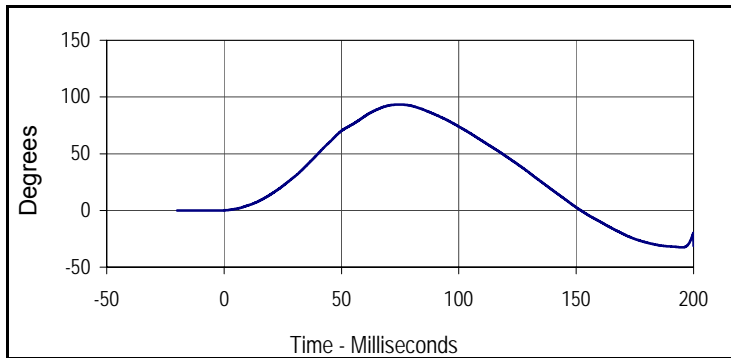
ATD Serial No.: 360

Test I.D.: M360NE003

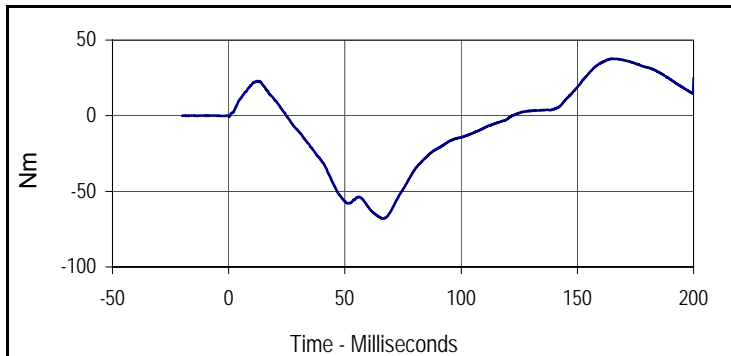
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	410	Pass	
Temperature During Soak	Max	20.6 to 22.2	22.2	Pass	
	Min		21.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	38.4	Pass	
	Min		23.1	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	22.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	37.8	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.12	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	20.0	Pass
	20 Msec.	G's	14.0 to 19.0	15.9	Pass
	30 Msec.	G's	11.0 to 16.0	12.2	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	13.1	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	42.3	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	93.3	Pass
	Time	Msec.	72.0 to 82.0	74.6	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	152	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-68.0	Pass
	Time	Msec.	65.0 to 79.0	66.2	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	122.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
20.3	8.6	-1.7	49.2



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
93.3	74.6	-32.6	195.2



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
37.7	164.7	-68.0	66.2

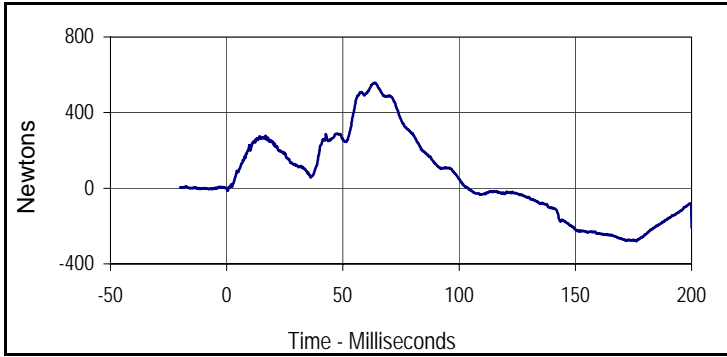
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 11/14/14

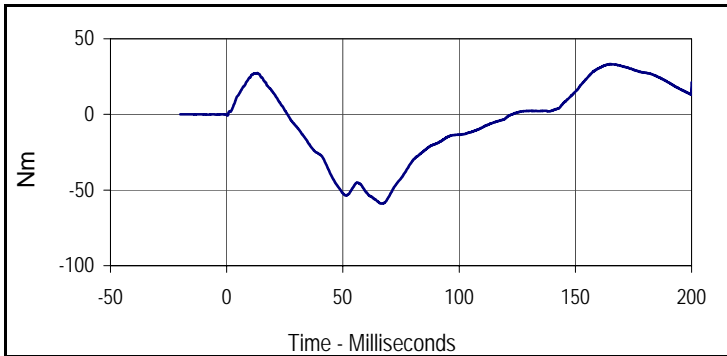


ATD Serial No.: 360

Test I.D.: M360NE003



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
558.0	63.5	-279.1	176.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
33.2	164.7	-58.9	66.5

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

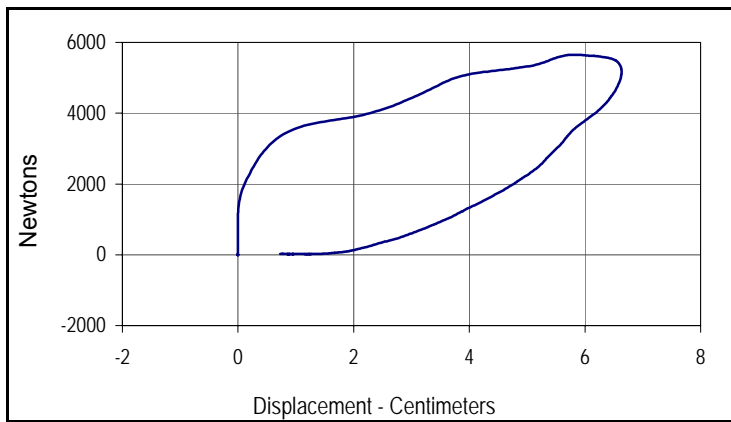
Test Date: 11/14/14



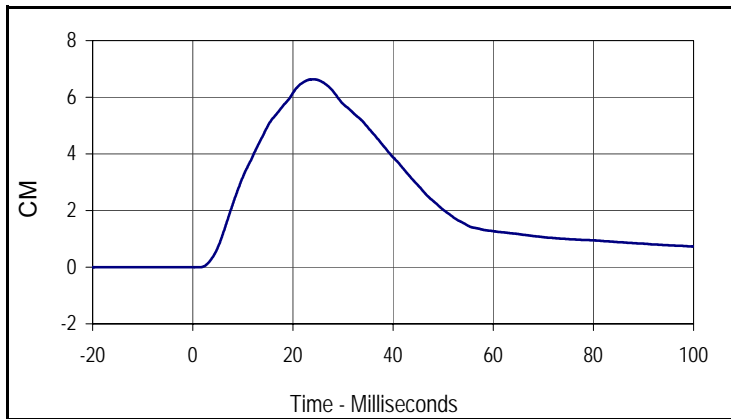
ATD Serial No.: 360

Test I.D.: M360CH003

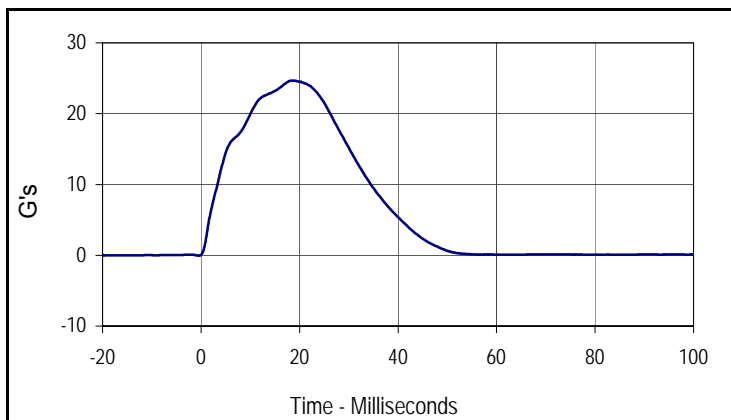
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	485	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	22.2	Pass
	Min	°C		21.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	38.4	Pass
	Min	%		23.1	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	22.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	37.8	Pass
Probe Velocity		m/s	6.58 to 6.82	6.67	Pass
Peak Probe Force		Newtons	5159 to 5893	5650	Pass
Peak Sternum Deflection		CM	6.35 to 7.26	6.63	Pass
Internal Hysteresis		%	69 to 85	70.4	Pass
Overall Test Results					Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	70.4
Peak Probe Force		Peak Chest Deflection	
5650		6.63	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.6	24.0	0.0	1.1



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.7	18.8	-0.1	-0.5

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 11/14/14



ATD Serial No.: 360

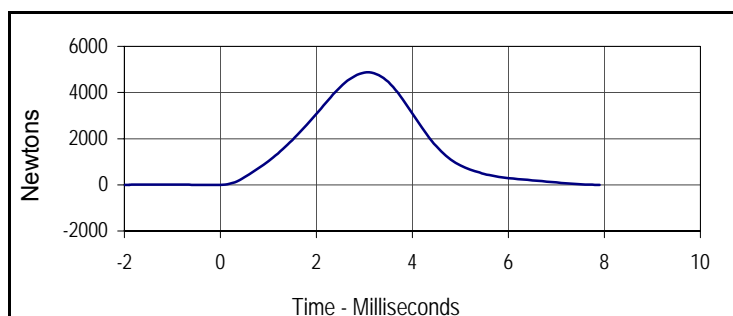
Test I.D.: M360LK003, M360RK003

Left Knee

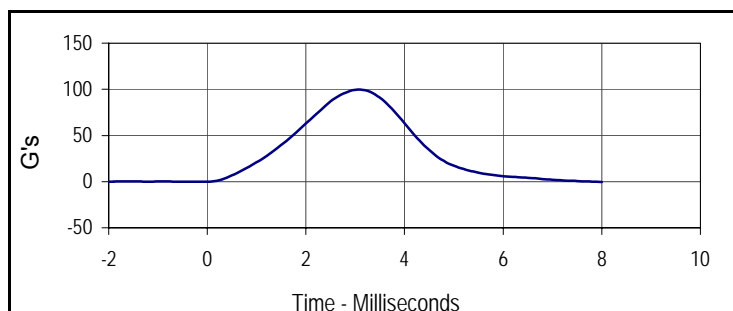
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	540	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	38.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	22.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	37.9	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	4876	Pass
Overall Test Results				Pass

Right Knee

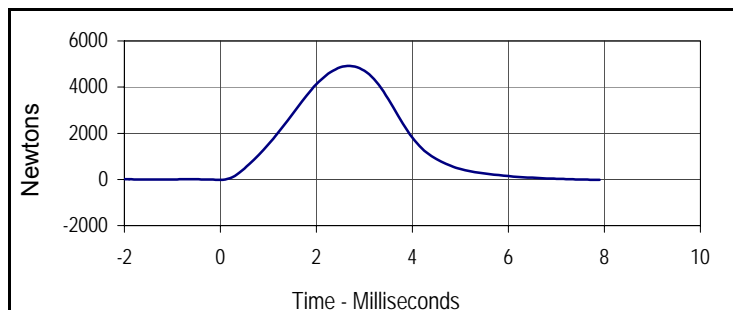
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4922	Pass
Overall Test Results				Pass



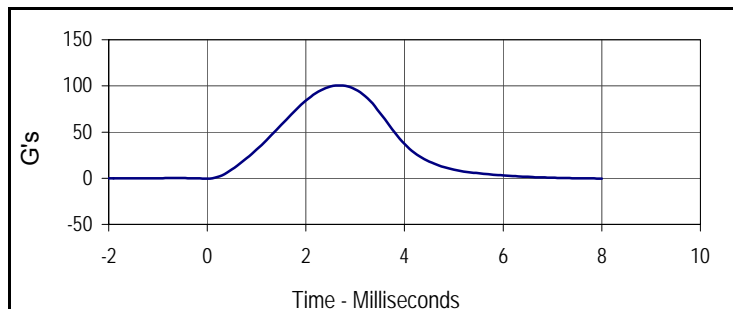
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4876.2	3.1	-10.3	-0.1



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
99.7	3.1	-0.6	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
4921.9	2.7	-16.4	-0.1



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
100.6	2.7	-0.4	0.0

Test Program: Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test

Test Date: 11/14/14



ATD Serial No.: 360

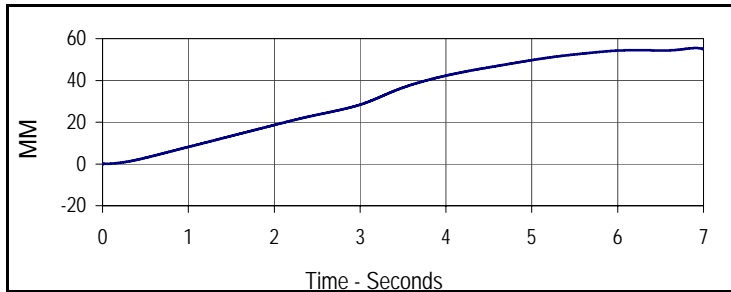
Test I.D.: M360LF003, M360RF003

Left Hip Joint-Femur Results

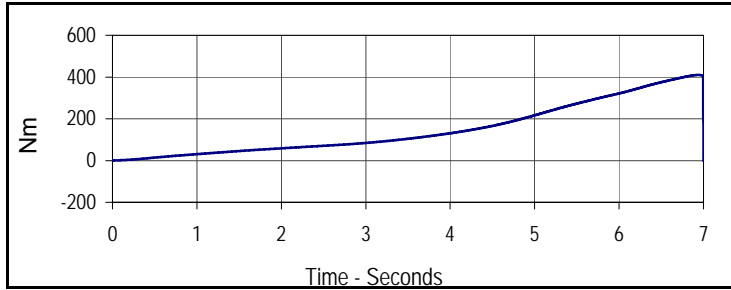
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	615	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	38.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	22.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	37.8	Pass
Rotation Rate	deg/sec	5 to 10	8.0	Pass
Femur Torque at 30°	Nm	≤ 95	85.4	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	48.4	Pass
Overall Test Results				Pass

Right Hip Joint-Femur Results

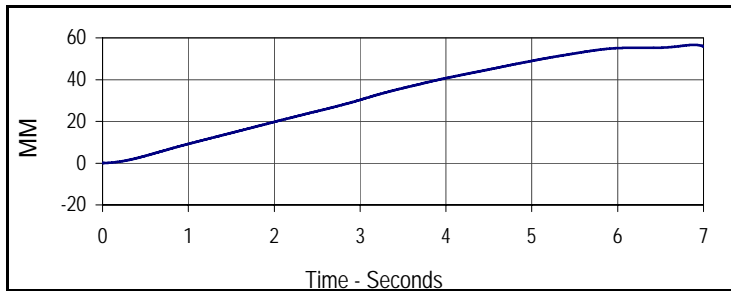
Rotation Rate	deg/sec	5 to 10	8.2	Pass
Femur Torque at 30°	Nm	≤ 95	70.6	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	48.1	Pass
Overall Test Results				Pass



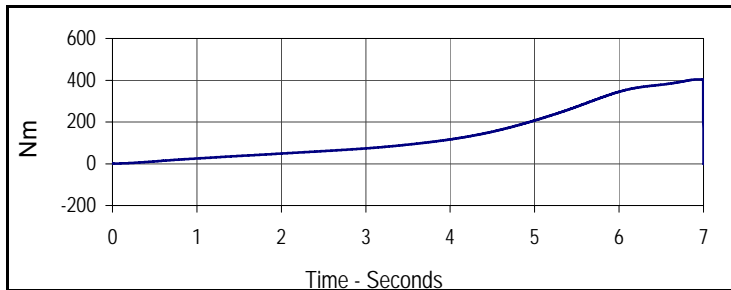
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	MM
Max	Time	Min	Time
55.5	6.9	0.0	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
409.6	6.9	0.0	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	MM
Max	Time	Min	Time
56.7	6.9	0.0	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
404.2	6.9	0.0	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist

Test Date: 11/15/14



ATD Serial No.: 635

Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on or replacement of parts:

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 11/15/14



ATD Serial No.: 635

Test I.D.: N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.73	Pass
Laboratory Relative Humidity	%	10 to 70	37.9	Pass
A - Total sitting height	mm	774.7 to 800.1	786	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	450	Pass
C - H point height	mm	81.3 to 86.3	85	Pass
D - H point location from backline	mm	144.8 to 149.8	146	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	77	Pass
F - Thigh clearance	mm	119.4 to 134.6	126	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	198	Pass
K - Buttock to knee length	mm	520.7 to 546.1	531	Pass
L - Popliteal length	mm	355.6 to 376.0	371	Pass
M - Knee pivot height	mm	393.7 to 419.1	402	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	186	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	473	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	864	Pass
Z - Waist circumference	mm	759.5 to 789.9	766	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	164	Pass
Overall Test Results				Pass

Test Program: Hybrid III 5th Percentile Female Head Drop Test

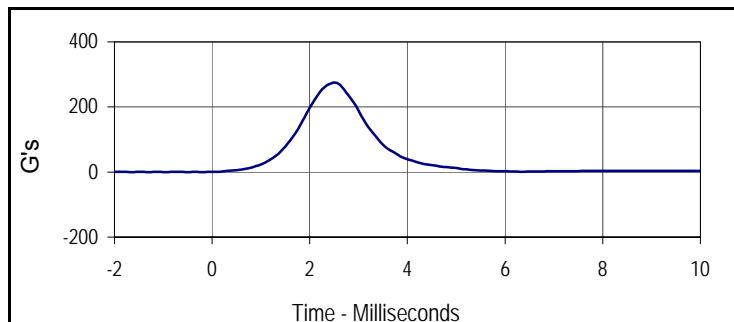
Test Date: 11/15/14



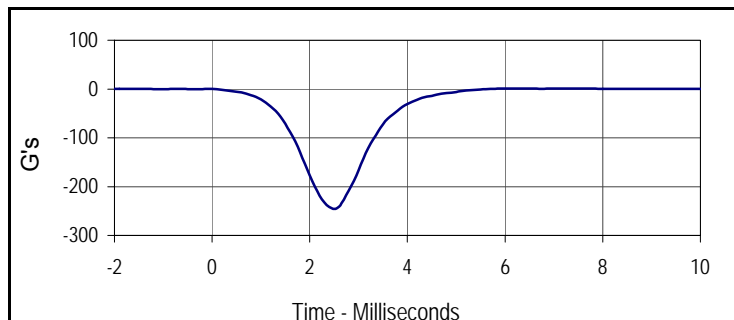
ATD Serial No.: 635

Test I.D.: F635HD048

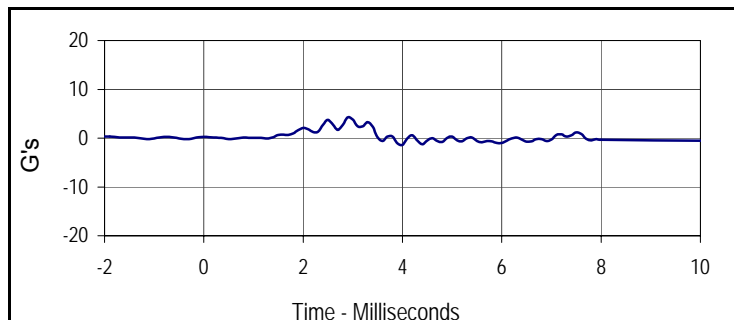
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	400	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.2	Pass
	Min		37.7	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.0	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	274.9	Pass
Peak Lateral Acceleration	G's	≤15.0	4.3	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	1.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



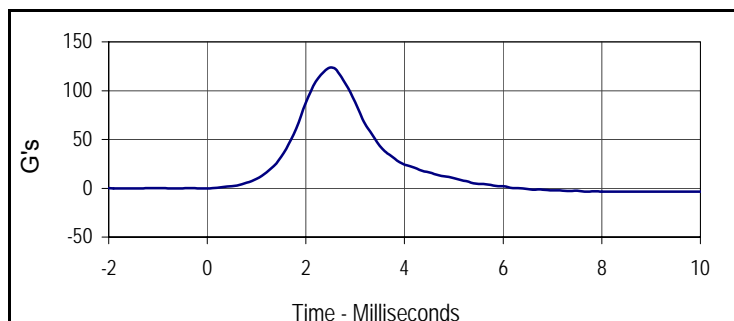
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
274.9	2.5	0.0	-0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.8	6.0	-245.4	2.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
4.3	2.9	-1.3	4.0



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
123.8	2.5	-0.1	-0.7

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

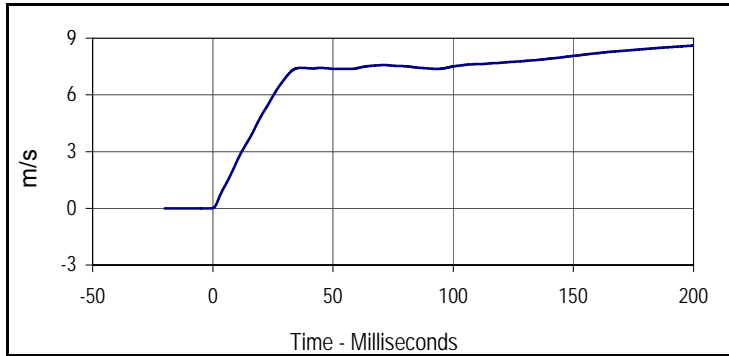
Test Date: 11/15/14



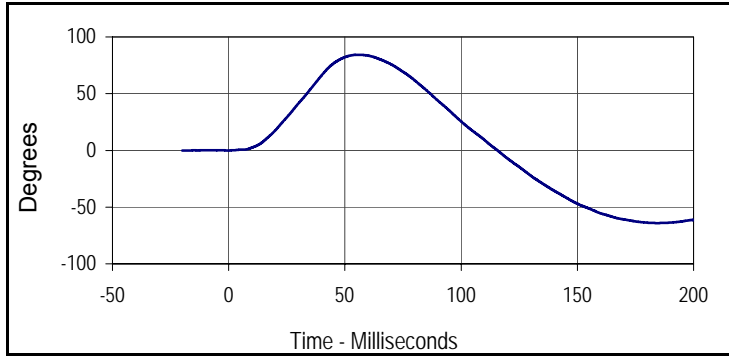
ATD Serial No.: 635

Test I.D.: F635NF048

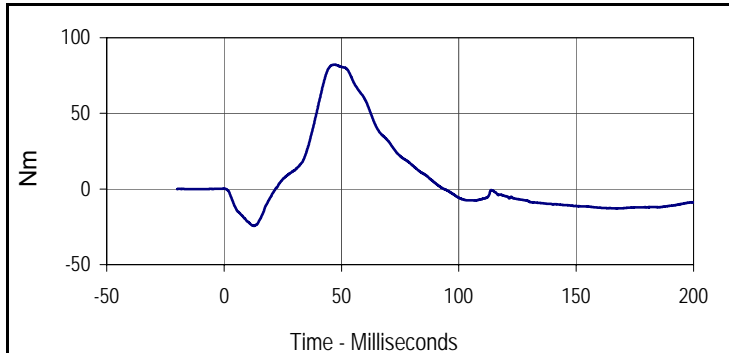
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	351	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		21.4	Pass	
Humidity During Soak	Max	10.0 to 70.0	38.2	Pass	
	Min		37.7	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	37.9	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.01	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.5	Pass
	20 Msec.	m/s	4.0 to 5.0	4.9	Pass
	30 Msec.	m/s	5.8 to 7.0	6.9	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	84.3	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	82.3	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	83.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
8.6	199.4	0.0	-1.1



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
84.3	55.6	-64.0	184.5



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
82.3	47.1	-24.4	12.7

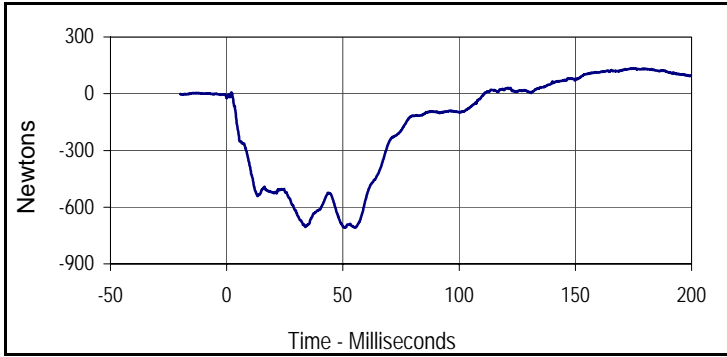
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 11/15/14

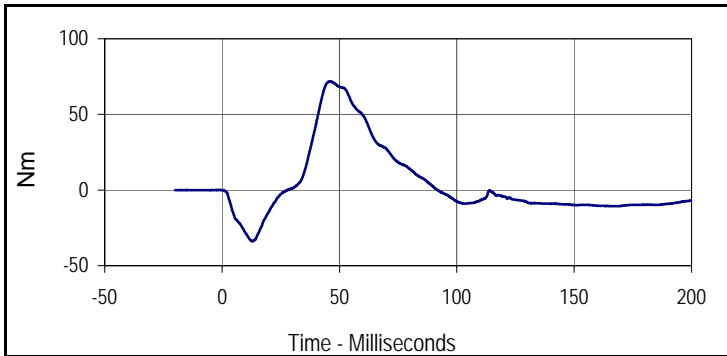


ATD Serial No.: 635

Test I.D.: F635NF048



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
133.9	174.5	-708.9	55.2



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
71.9	45.7	-33.8	13.0

Test Program: Hybrid III 5th Percentile Female Neck Extension Test

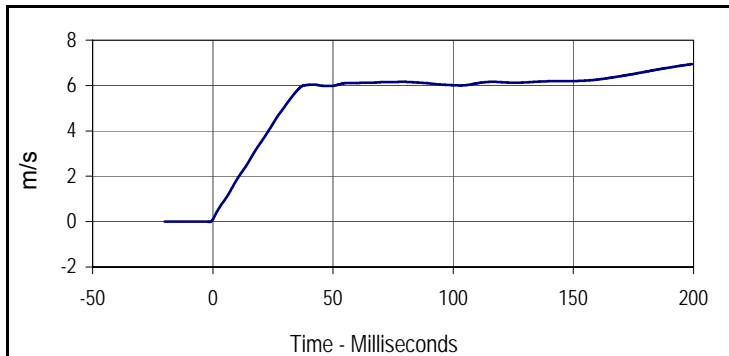
Test Date: 11/15/14



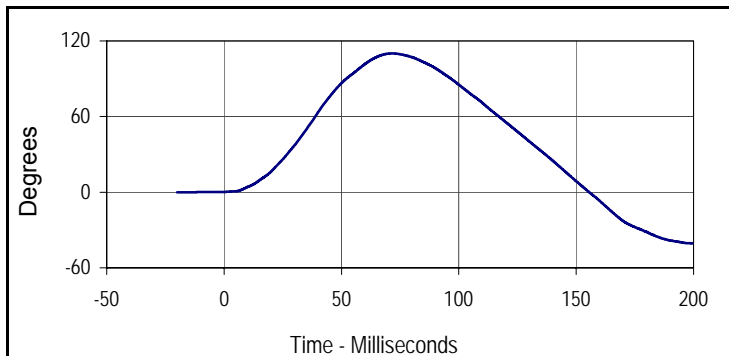
ATD Serial No.: 635

Test I.D.: F635NE048

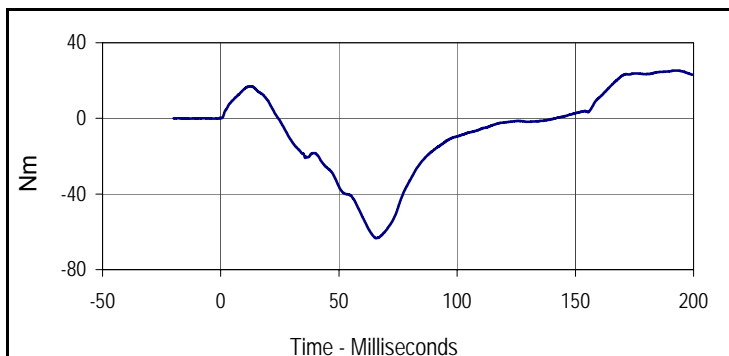
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	386	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		21.4	Pass	
Humidity During Soak	Max	10.0 to 70.0	38.2	Pass	
	Min		37.7	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	37.7	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.01	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.9	Pass
	20 Msec.	m/s	3.1 to 3.9	3.5	Pass
	30 Msec.	m/s	4.6 to 5.6	5.1	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	110.1	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-63.3	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	98.6	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.9	199.4	0.0	-1.5



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
110.1	71.7	-40.6	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
25.3	193.0	-63.3	65.6

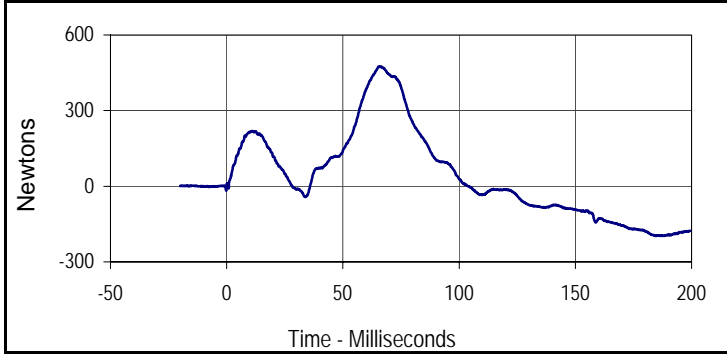
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 11/15/14

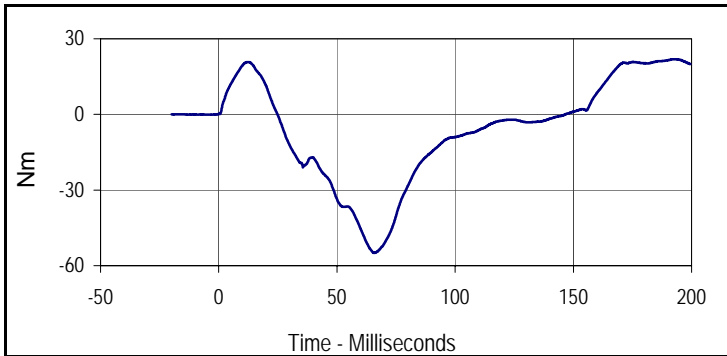


ATD Serial No.: 635

Test I.D.: F635NE048



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
476.1	66.4	-197.8	186.5



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
21.9	193.0	-54.9	65.9

Test Program: Hybrid III 5th Percentile Female Thorax Impact Test

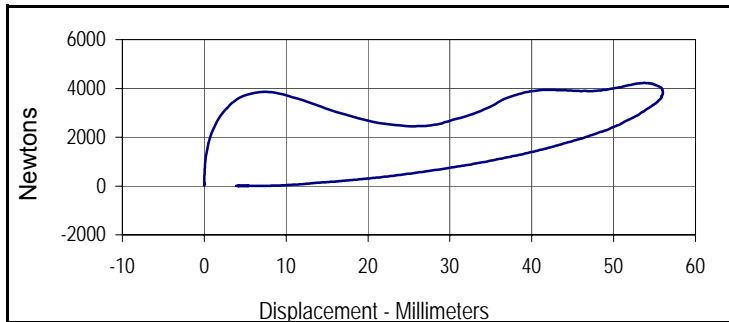
Test Date: 11/15/14



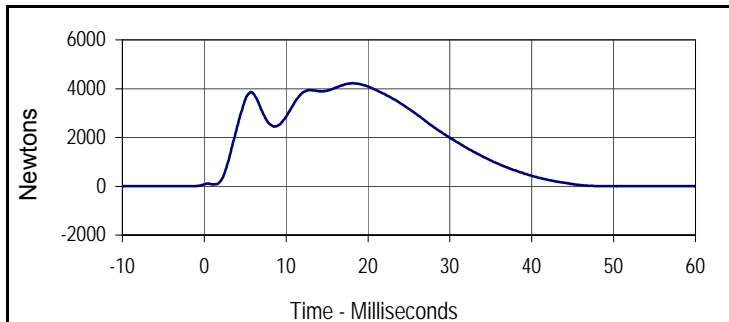
ATD Serial No.: 635

Test I.D.: F635CH048

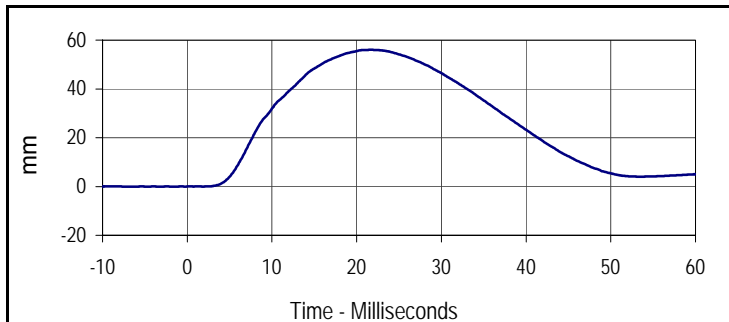
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	436	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.2	Pass
	Min		37.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.1	Pass
Probe Velocity	m/s	6.59 to 6.83	6.72	Pass
Peak Chest Deflection	mm	50.0 to 58.0	56.0	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4005	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4223	Pass
Internal Hysteresis	%	69 to 85	71.3	Pass
Overall Test Results				Pass



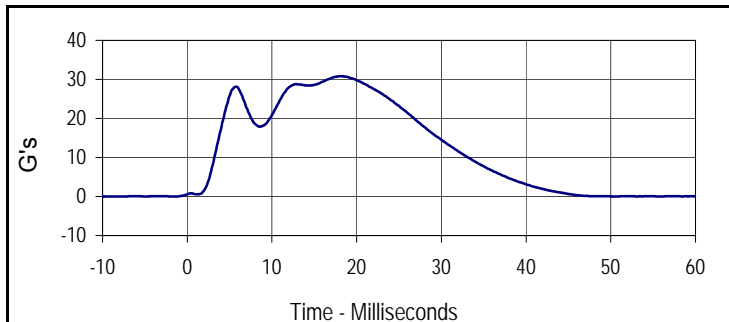
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	71.3
Peak Probe Force		Peak Chest Deflection	
4223.4		56.0	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4223.4	18.1	0.3	-10.0



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
56.0	21.8	0.0	-3.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
30.8	18.1	0.0	-10.0

Test Program: Hybrid III 5th Percentile Female Knee Impact Test

Test Date: 11/15/14



ATD Serial No.: 635

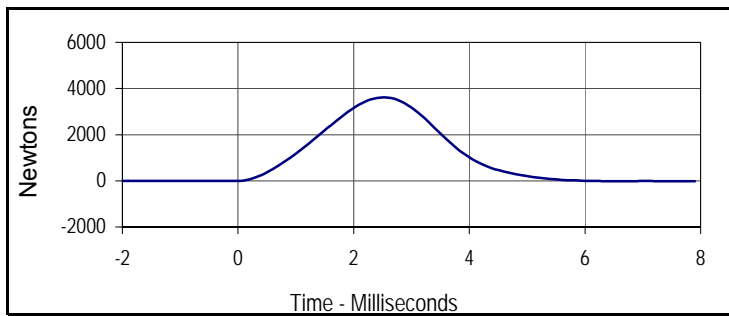
Test I.D.: F635LK048, F635RK048

Left Knee

Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	531	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.2	Pass
	Min		37.7	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.2	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3619	Pass
Overall Test Results				Pass

Right Knee

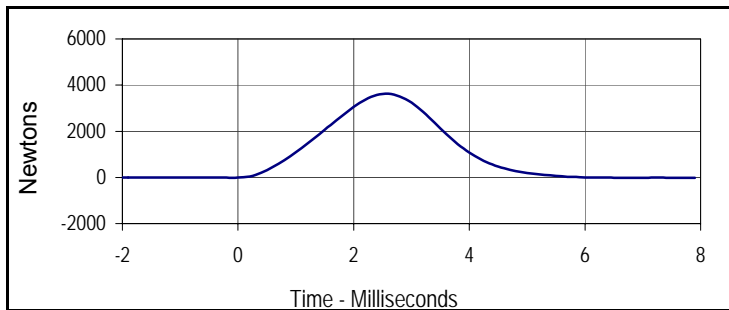
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3625	Pass
Overall Test Results				Pass



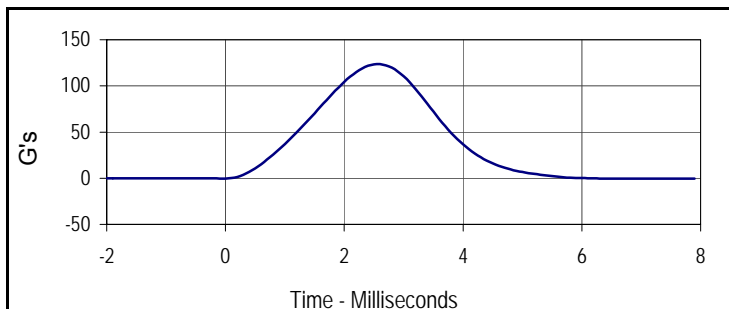
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3618.8	2.5	-21.1	7.9



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
123.5	2.5	-1.2	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3624.9	2.6	-16.5	7.9



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
123.7	2.6	-1.2	0.0

Test Program: Hybrid III 5th Percentile Female Torso Flexion Test

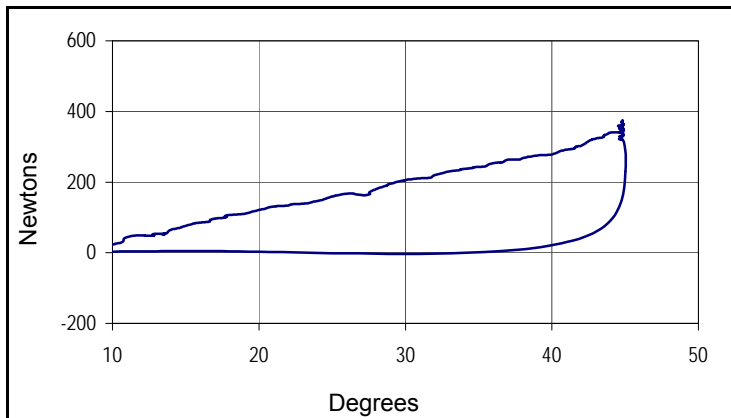
Test Date: 11/15/14



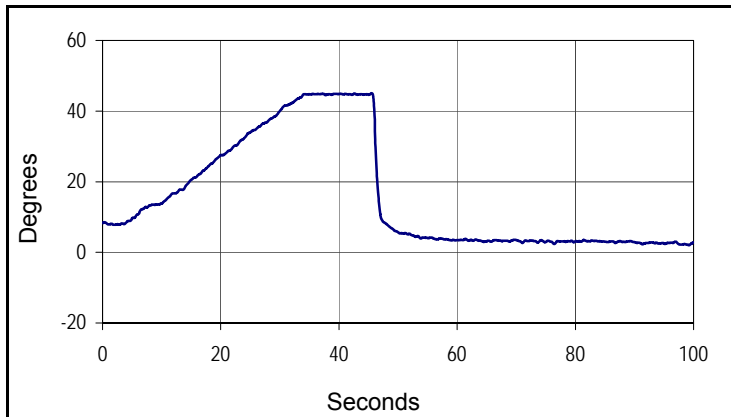
ATD Serial No.: 635

Test I.D.: TF048

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	591	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		21.4	Pass
Humidity During Soak	Max	%	10.0 to 70.0	38.2	Pass
	Min	%		37.7	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	38.2	Pass
Initial Reference Plane Angle		Degrees	≤ 20	8.3	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	374.6	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	1.0	Pass
Final Reference Plane Angle		Degrees	+/-8	2.9	Pass
Overall Test Results					Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
374.6		45.0



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
45.0	45.6	2.0	99.2