

**REPORT NUMBER: NCAP-KAR-15-021**

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

**BAYERISCHE MOTOREN WERKE AG  
2015 BMW X3 XDRIVE28i 5-DOOR MPV**

**NHTSA NUMBER: M20154104**

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



**DECEMBER 23, 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  
ROOM W43-410  
WASHINGTON, DC 20590**



## TECHNICAL REPORT DOCUMENTATION PAGE

<b>1. Report No.</b> NCAP-KAR-15-021	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>																																																					
<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Testing of a 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154104		<b>5. Report Date</b> December 23, 2014																																																					
		<b>6. Performing Organization Code</b> KAR																																																					
<b>7. Authors</b> Mr. Balbino A. Beltran, Project Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO		<b>8. Performing Organization Report No.</b> TR-P34001-06-NC																																																					
<b>9. Performing Organization Name and Address</b> KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		<b>10. Work Unit No.</b>																																																					
		<b>11. Contract or Grant No.</b> DTNH22-12-D-00259																																																					
<b>12. Sponsoring Agency Name and Address</b> U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		<b>13. Type of Report and Period Covered</b> Final Test Report, Dec. 11 - 23, 2014																																																					
		<b>14. Sponsoring Agency Code</b> NVS-111																																																					
<b>15. Supplementary Notes</b>																																																							
<b>16. Abstract</b> A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2015 BMW X3 xDrive28i 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 indicative 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 December 11, 2014.  The impact velocity of the vehicle was 55.74 km/h and the ambient temperature at the barrier face at the time of impact was 13.3° C. The target vehicle's post-test maximum crush was 584 mm to the right of the vehicle's centerline. The test vehicle's performance is as follows:																																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <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 (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700.0</td> <td>201.6</td> <td>700.0</td> <td>171.6</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-21</td> <td>52</td> <td>-19</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.25</td> <td>1</td> <td>0.34</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1251.0</td> <td>2620</td> <td>597.9</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-194.8</td> <td>2520</td> <td>-423.1</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>-1376.7</td> <td>6805</td> <td>-2376.5</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>-2726.6</td> <td>6805</td> <td>-745.4</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC <sub>15</sub> )	N/A	700.0	201.6	700.0	171.6	Maximum Chest Compression	mm	63	-21	52	-19	Nij	N/A	1	0.25	1	0.34	Neck Tension	N	4170	1251.0	2620	597.9	Neck Compression	N	4000	-194.8	2520	-423.1	Left Femur Force	N	10008	-1376.7	6805	-2376.5	Right Femur Force	N	10008	-2726.6	6805	-745.4
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<b>17. Key Words</b> 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave., SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																																																					
<b>19. Security Classification of this report</b> UNCLASSIFIED	<b>20. Security Classification of this page</b> UNCLASSIFIED	<b>21. No. of Pages</b> 134	<b>22. Price</b>																																																				

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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 X3 xDrive28i 5-door MPV at a velocity of 55.74 km/h. The test was performed at KARCO Engineering, LLC. on December 11, 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 50<sup>th</sup> percentile male anthropomorphic test device (ATD) was placed in the driver seating position and one Part 572O 5<sup>th</sup> 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 584 mm located to the right side of 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 glovebox.

The occupant data is summarized below:

ATD Position	HIC <sub>15</sub>	T <sup>1</sup>	T <sup>2</sup>	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	201.6	70.3	85.3	-21	0.25	1251.0	-194.8	-1376.7	-2726.6
Passenger (5th)	171.6	63.4	78.4	-19	0.34	597.9	-423.1	-2376.5	-745.4

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

#### 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 <sup>2</sup>	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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

### TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20154104
Model Year	2015
Make	BMW
Model	X3 xDrive28i
Body Style	5-Door MPV
VIN	5UXWX9C50F0D52099
Body Color	Melbourne Red Metallic
Odometer Reading (km / mi)	34 / 21
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	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	No
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
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### DATA FROM CERTIFICATION LABEL

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

GVWR (kg)	2304
GAWR Front (kg)	1089
GAWR Rear (kg)	1279

### 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)				410.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				69.8	A-B

## DATA SHEET NO. 1 ... (CONTINUED)

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14



### VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	240
Recommended Tire Size	P245/50R18	P245/50R18
Tire Size on Vehicle	P255/55R18	P255/55R18
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Cinturato P7	Cinturato P7
Treadwear	500	500
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	100V	100V
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	93V2 N371 0814	93V2 N371 0814
DOT Safety Code Right	93V2 N371 0814	93V2 N371 0814

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	460.5	470.0		491.5	550.0	
Right	kg	450.5	460.0		470.5	532.0	
Ratio	%	49.5%	50.5%	100.0%	47.1%	52.9%	100.0%
Total	kg	911.0	930.0	1841.0	962.0	1082.0	2044.0

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1841.0	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	69.8	C
Calculated Vehicle Target Weight (TVTW)	kg	2051.8	A+B+C

**TEST VEHICLE ATTITUDES**

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	835	840	850	840	1420
As Tested	mm	826	824	826	825	1487
Post-Test	mm	1046	1050	834	827	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2810
Total Vehicle Length at Left Side	mm	4115
Total Vehicle Length at Centerline	mm	4646
Total Vehicle Length at Right Side	mm	4128
Weight of Ballast in Cargo Area	kg	88.4
Weight of Vehicle Components Removed	kg	33.0
Amount of Stoddard Solvent in Fuel Tank	L	62.30

**VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:**

Cargo area trim (16.0 kg), Exhaust (17.0 kg)

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

No.	Description	Pre-Test
1	Total Length	4646
2	Total Width	1875
3	Bumper Top Height	735
4	Bumper Bottom Height	516
5	Longitudinal Member Top Height	570
6	Distance Between Longitudinal Members	800
7	Longitudinal Member Width	70
8	Engine Top Height	876
9	Engine Bottom Height	228
10	Engine and Gearbox Width	570
11	Front Bumper to Engine Distance	705
12	Front Shock Absorber Fixing Height	935
13	Bonnet Leading Edge Height	853
14	Front Shock Absorber Fixing Width	1220
15	Front Bumper to Front Axle Distance	846
16	Front Axle to A-Pillar Distance	615
17	A-Pillar to B-Pillar Distance	961
18	B-Pillar to Rear Axle Distance	1130
19	B-Pillar to C-Pillar Distance	817
20	Roof Sill Bottom Height	1490
21	Roof Sill Top Height	1621
22	Floor Sill Bottom Height	289
23	Floor Sill Top Height	383

All measurements in millimeters.

## DATA SHEET NO. 2

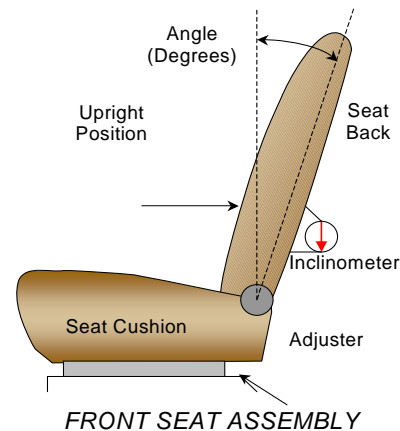
### SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154104  
 Test Date: 12/11/14

#### 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.

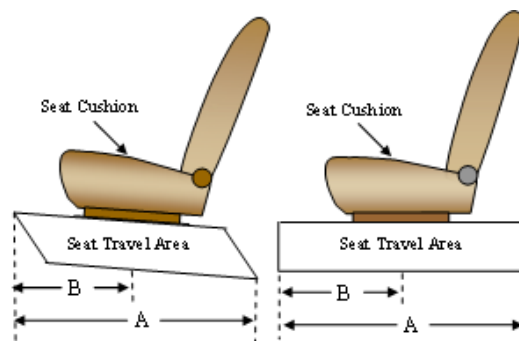


#### SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	24.0
Passenger Seat Back Angle	18.1

#### 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	312 mm	156 mm
Passenger Seat	250 mm	0 mm

#### SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50<sup>th</sup> percentile adult male ATD for the driver, and a 5<sup>th</sup> 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**

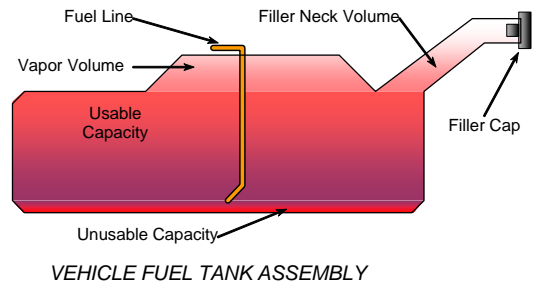
Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank"	66.99
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	61.63 to 62.97
Actual Amount of Stoddard Solvent Used	62.30
1/3 of Usable Capacity	22.33

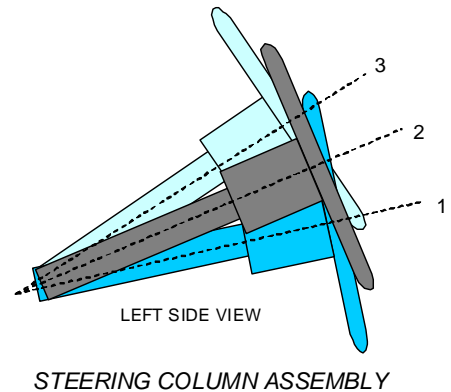
**FUEL PUMP**

The vehicle is equipped with an electric fuel pump. The fuel pump operates for 5 seconds after the ignition is switched to the "ON" position. After pressure has been built up the pump switches to sleep mode until the engine is started or the pressure decreases.



**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 POSITIONING**

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	25.9	79
Geometric Center Position, No. 2	24.2	108
Uppermost Position, No. 3	22.4	137
Telescoping Steering Wheel Travel		58
Test Position	24.2	108

### DATA SHEET NO. 3

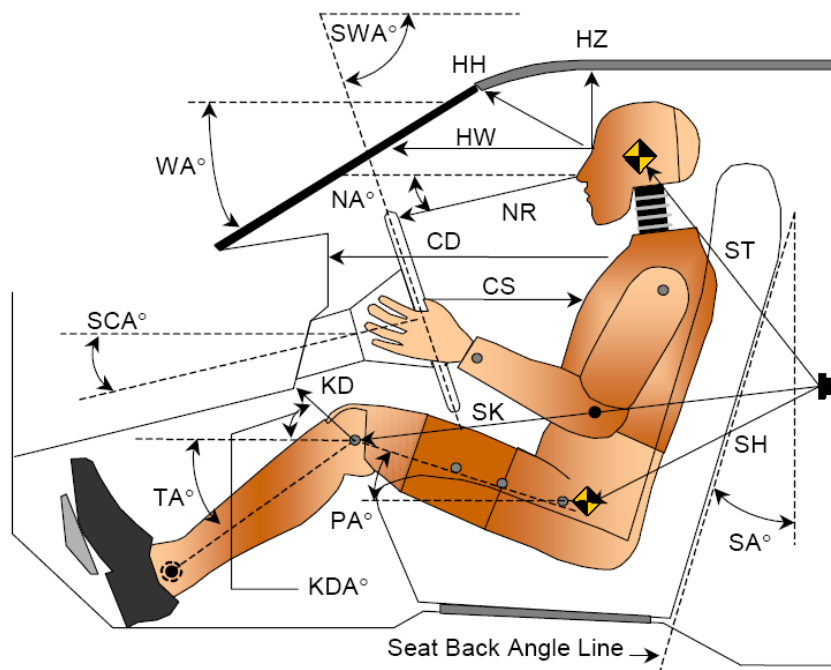
### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 12/11/14



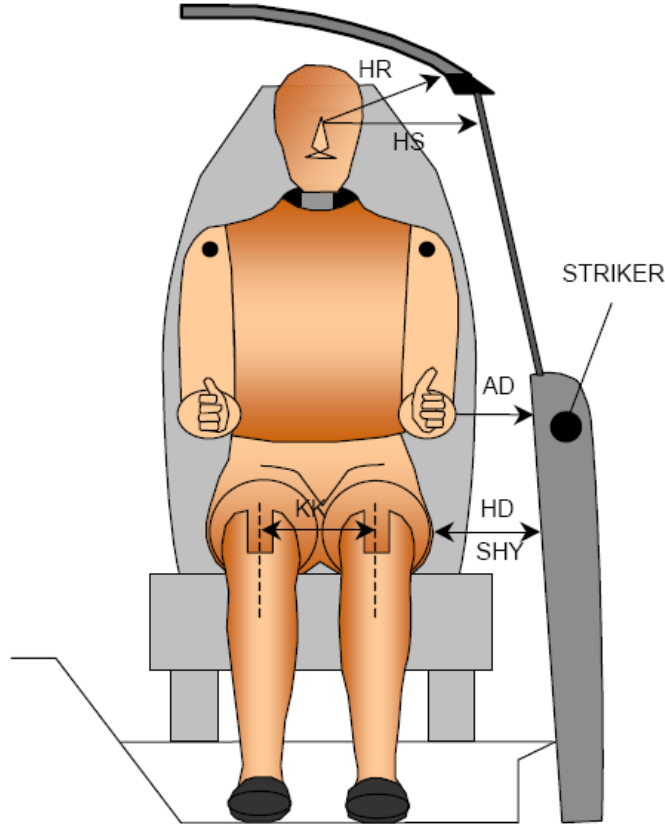
**LEFT SIDE VIEW**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		31.7		
SWA°	Steering Wheel Angle		65.9		
SCA°	Steering Column Angle		24.1		
SA°	Seat Back Angle (On Headrest Post)		24.0		18.3
HZ	Head to Roof	241	90.0	250	90.0
HH	Head to Header	412	22.8	321	39.4
HW	Head to Windshield	690	0.0	640	0.0
NR	Nose to Rim	408	8.6	440	37.0
CD	Chest to Dash	528	13.1	366	12.4
CS	Chest to Steering Hub	306	0.0		
RA	Rim to Abdomen	210	0.0		
KDL	Left Knee to Dash	192	32.7	63	54.0
KDR	Right Knee to Dash	133	30.6	97	42.0
PA°	Pelvic Angle		24.9		21.5
TA°	Tibia Angle		47.2		54.5
SK	Striker to Knee	540	11.4	628	6.9
ST	Striker to Head	453	86.2	435	68.8
SH	Striker to H-Point	255	33.3	345	28.8

## DATA SHEET NO. 4

### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV      NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test      Test Date: 12/11/14



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	133	79
HD	H-Point to Door	160	128
HR	Head to Side Header	270	276
HS	Head to Side Window	342	363
KK	Knee to Knee	320	220
SHY	Striker to H-Point (Y-Direction)	246	282
AA	Ankle to Ankle	325	160

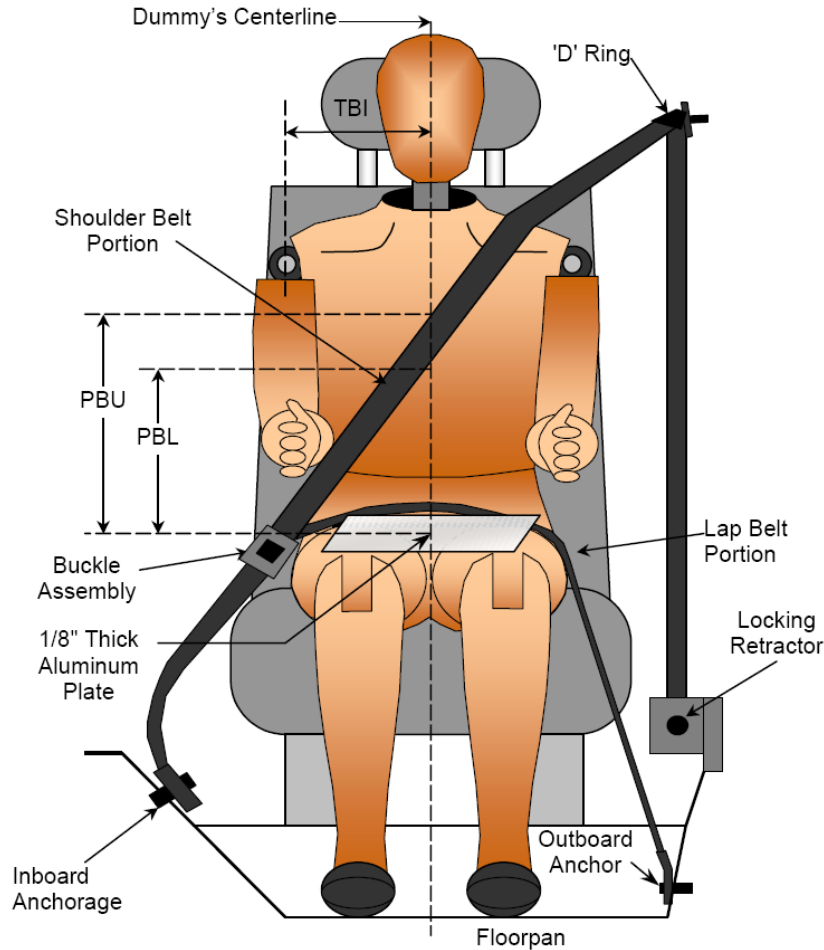
**DATA SHEET NO. 5**  
**SEAT BELT POSITIONING DATA**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 12/11/14



**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	358	321
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	267	231

**BELT LENGTH DATA**

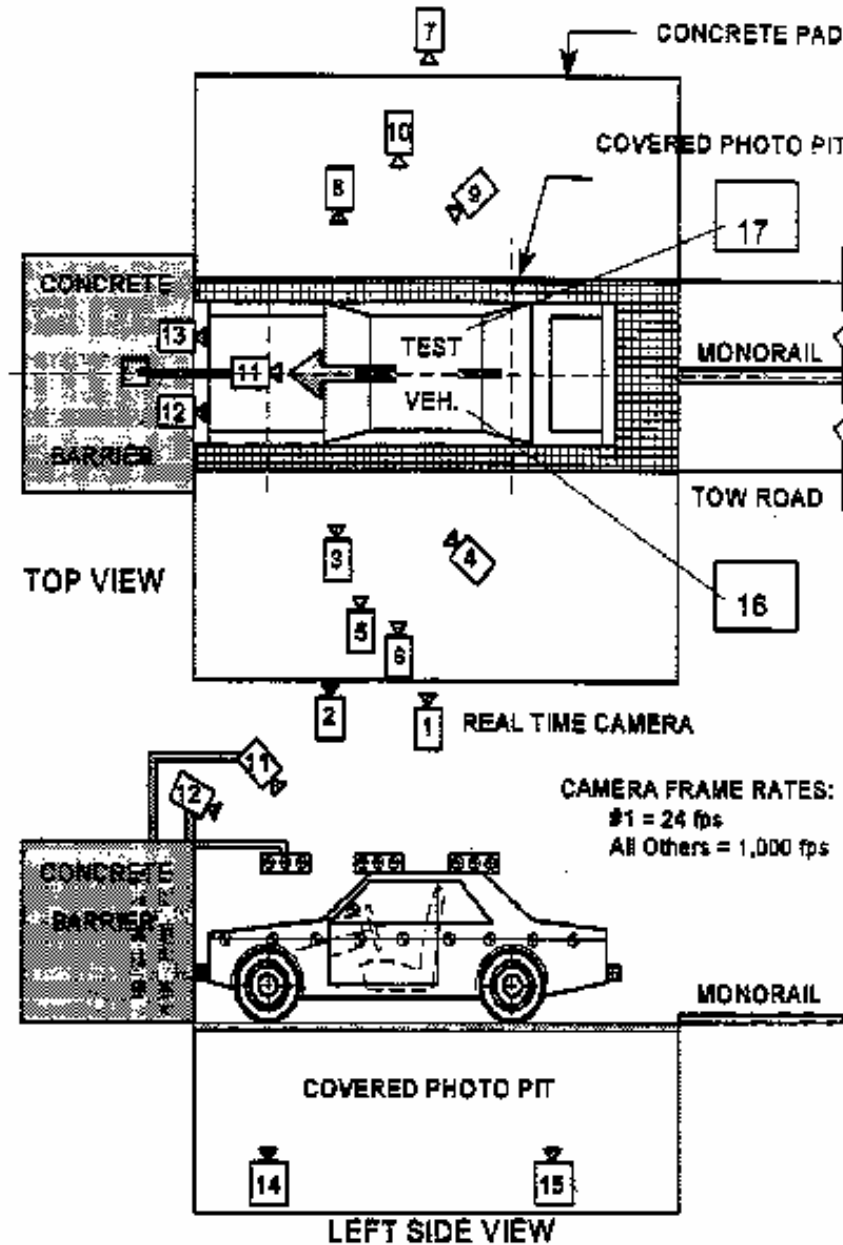
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	858	948
Lap Belt Length as Measured on ATD	mm	544	575
Remainder of Belt on Reel	mm	1020	874
Total Belt Length for Continuous Webbing Systems	mm	2422	2397

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

CAMERA POSITIONS FOR FRONTAL IMPACTS



**DATA SHEET NO. 6 ... (CONTINUED)**

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**CAMERA LOCATIONS**

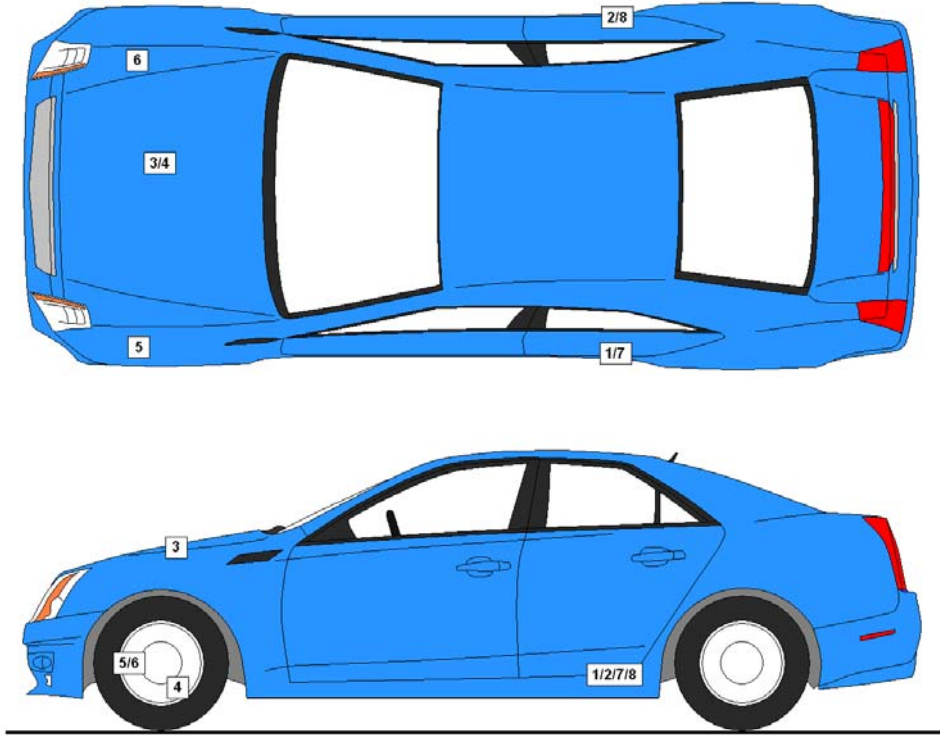
No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	24	1000
3	Left Front Half	-1701	-6197	-1701	50	1000
4	Left Angle	-6696	-10308	-3211	ZOOM	1000
5	Steering Column - Top	-1966	-10412	-3688	50	1000
6	Steering 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)	-1130	-240	-1570	13	1000
17	Onboard Passenger Airbag (Optional)	-1130	240	-1570	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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1706	-740	-408
2	Right Rear Accelerometer X-Direction	1706	740	-408
3	Engine Top X	3820	-65	-870
4	Engine Bottom X	3760	-185	-260
5	Left Rear Accelerometer Z-Direction	1706	-740	-408
6	Right Rear Accelerometer Z-Direction	1706	-740	-408
7	Left Rear Accelerometer X-Direction Redundant	1706	-740	-408
8	Right Rear Accelerometer X-Direction Redundant	1706	-740	-408

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

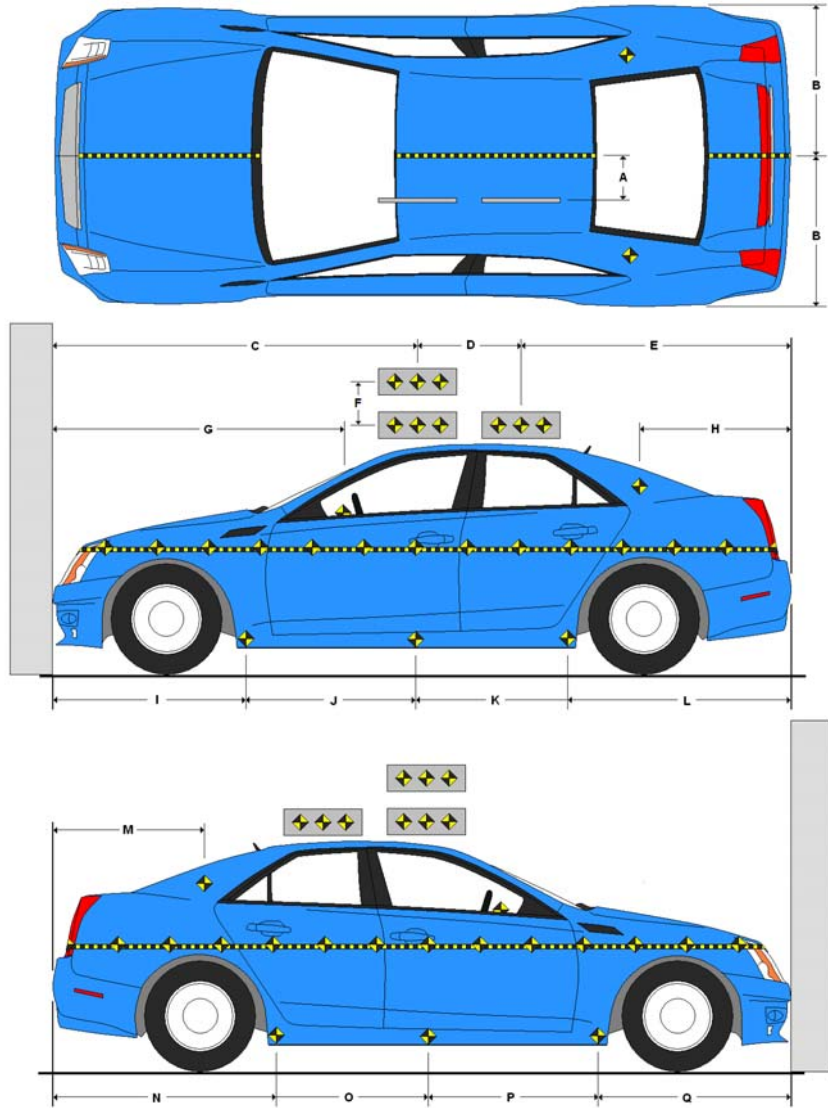
**DATA SHEET NO. 8**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

Item	Value
A	385
B	938
C	2406
D	610
E	1621
F	305
G	1870
H	591
I	1391
J	881
K	881
L	1493
M	585
N	1503
O	879
P	879
Q	1385



All measurements in millimeters.

**DATA SHEET NO. 9**

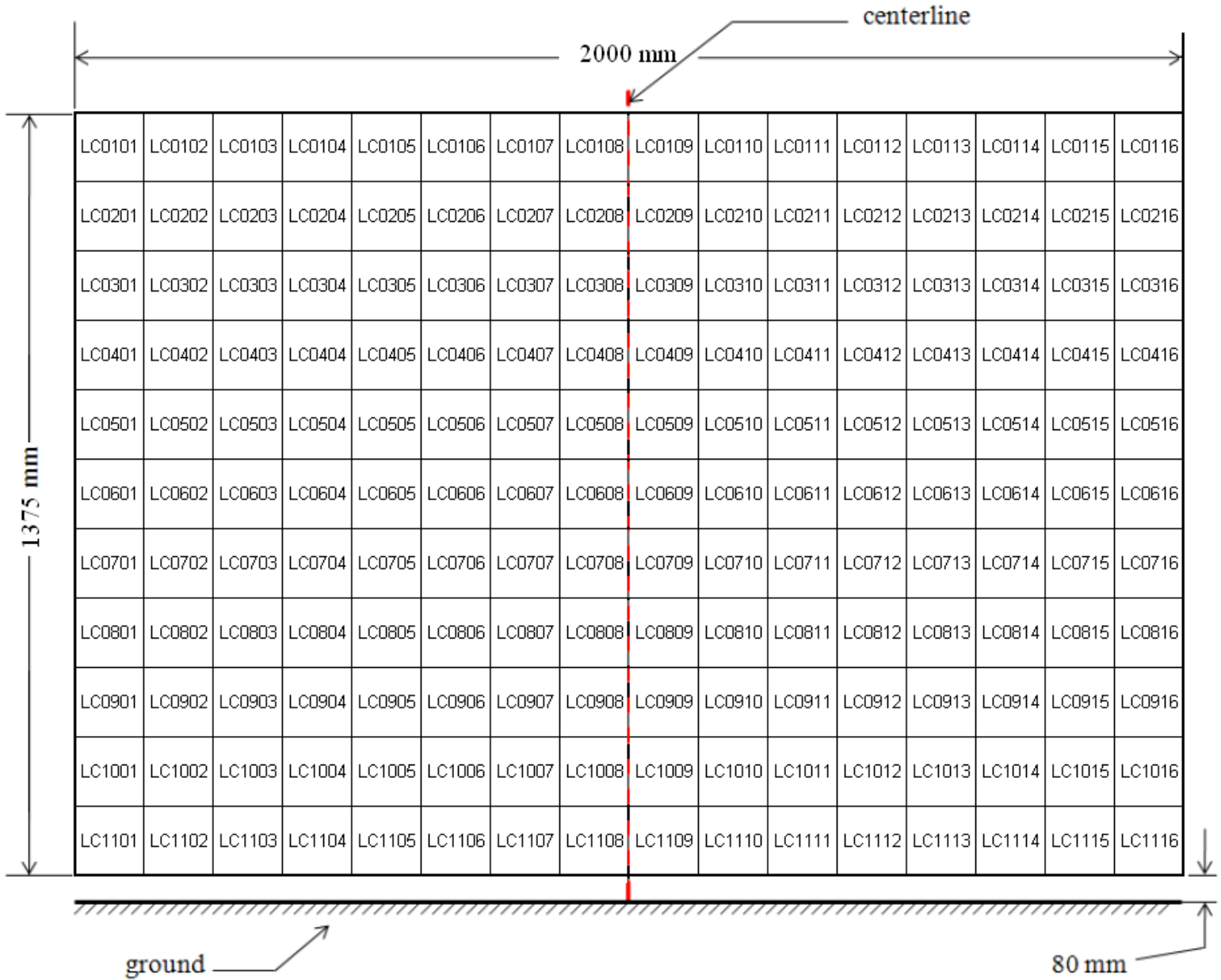
**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 12/11/14



**DATA SHEET NO. 10**

**TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**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	Glovebox
Right Knee Contact	Knee Airbag	Glovebox

**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)	7	1
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**

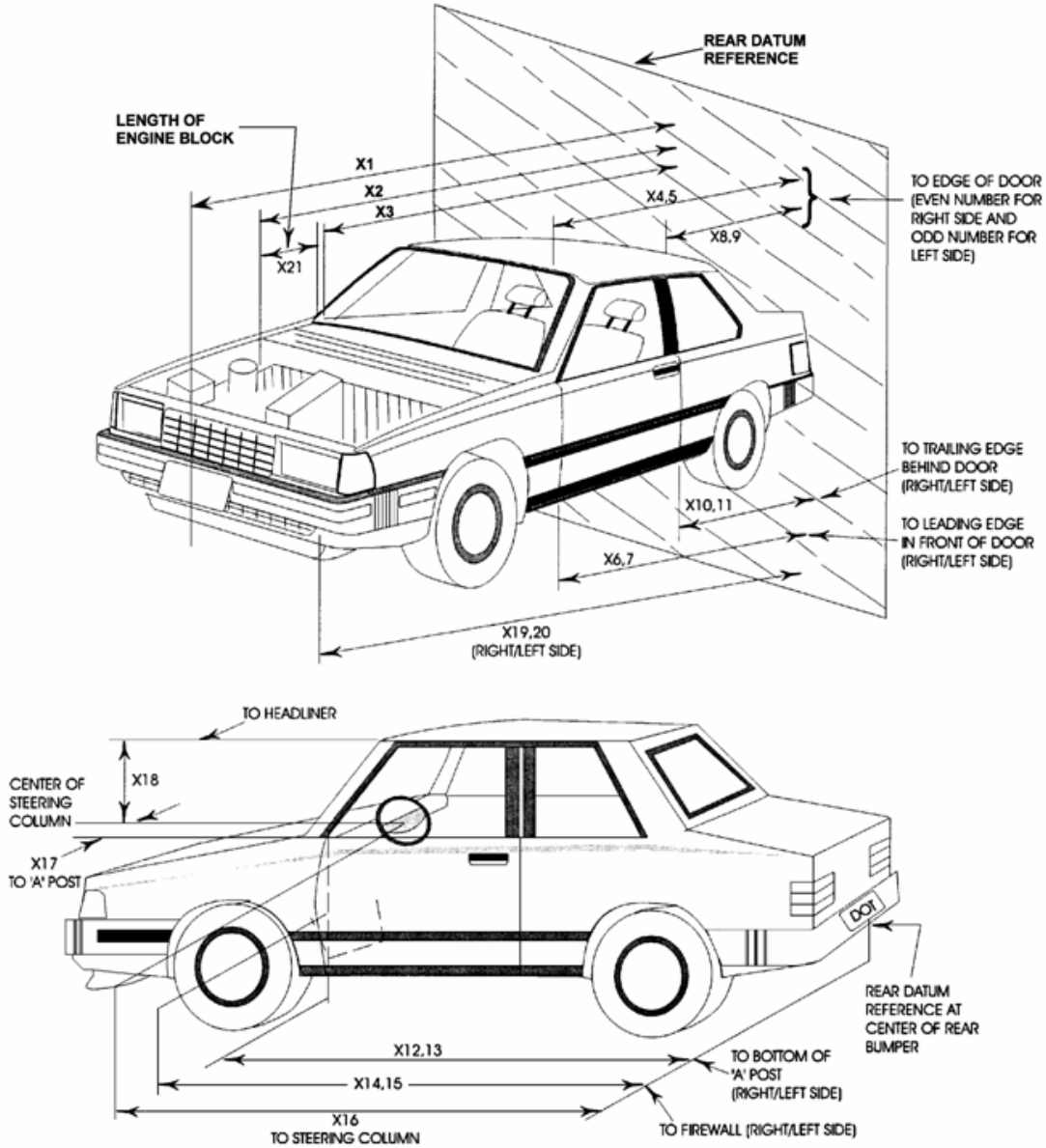
Measured Parameter	Units	Value
Left Side	mm	894
Center	mm	892
Right Side	mm	934
Average	mm	907

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Curtain)	Yes	No	Yes	No
Side Airbag 2 (Torso)	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	
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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14



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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4646	4121	-525
2	Rear Surface of Vehicle to Front of Engine	4115	3865	-250
3	RSOV to Firewall	3177	3182	5
4	RSOV to Upper Leading Edge of Right Door	2127	2131	4
5	RSOV to Upper Leading Edge of Left Door	3941	3830	-111
6	RSOV to Lower Leading Edge of Right Door	3096	3060	-36
7	RSOV to Lower Leading Edge of Left Door	2840	2812	-28
8	RSOV to Upper Trailing Edge of Right Door	2600	2640	40
9	RSOV to Upper Trailing Edge of Left Door	3178	3182	4
10	RSOV to Lower Trailing Edge of Right Door	2036	2025	-11
11	RSOV to Lower Trailing Edge of Left Door	4128	3660	-468
12	RSOV to Bottom of A-Pillar, Right Side	3091	3061	-30
13	RSOV to Bottom of A-Pillar, Left Side	2730	2705	-25
14	RSOV to Firewall, Right Side	2835	2810	-25
15	RSOV to Firewall, Left Side	3185	3177	-8
16	RSOV to Steering Column	2134	2125	-9
17	Center of Steering Column to A-Pillar	3192	3163	-29
18	Center of Steering Column to Headliner	2046	2020	-26
19	RSOV to Right Side of Front Bumper	3376	3375	-1
20	RSOV to Left Side of Front Bumper	3401	3342	-59
21	Length of Engine Block	3356	3340	-16
RD	RSOV to Right Side of Dash Panel	600	600	0
CD	RSOV to Center of Dash Panel	430	435	5
LD	RSOV to Left Side of Dash Panel	425	410	-15

All measurements in millimeters.

**DATA SHEET NO. 13**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

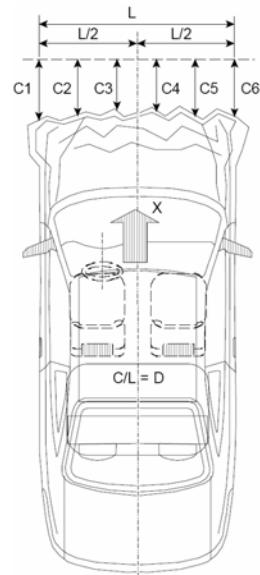
**VEHICLE INFORMATION**

VIN: 5UXWX9C50F0D52099 Wheelbase (mm): 2810  
 Vehicle Size Category: 5-Door MPV Test Weight (kg): 2044.0

**ACCELEROMETER DATA**

Accelerometer Locations: Left Rear Crossmember  
 Cal. Procedure/Interval: Drop Test / 6 months  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 55.74  
 Velocity Change (km/h): 64.2  
 Time of Separation (msec): 70.3

Linearity: Good



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW2  
 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1647  
 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	240	570	330
C2	Crush Zone 2 at Left Side	mm	60	590	530
C3	Crush Zone 3 at Left Side	mm	1	568	567
C4	Crush Zone 4 at Right Side	mm	1	585	584
C5	Crush Zone 5 at Right Side	mm	60	595	535
C6	Crush Zone 6 at Right Side	mm	235	545	310
L	C1 to C6	mm	1647		

**DATA SHEET NO. 14**

**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test

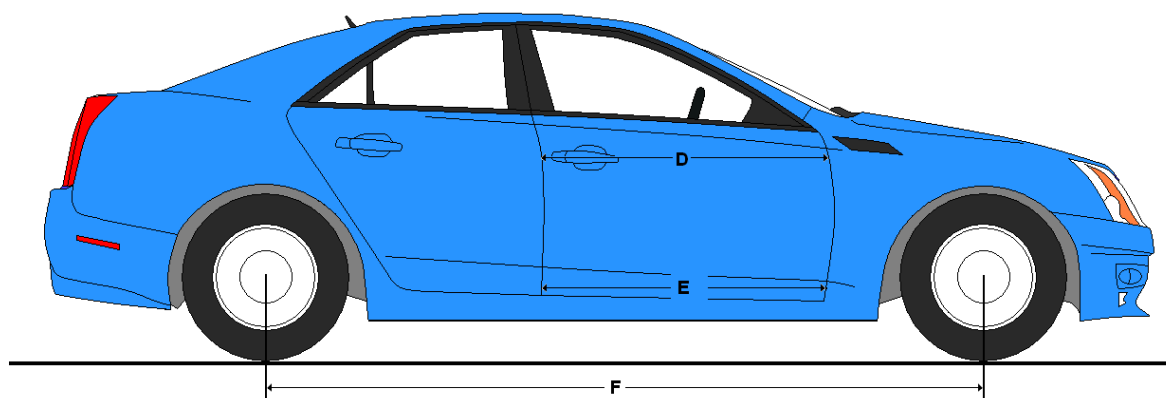
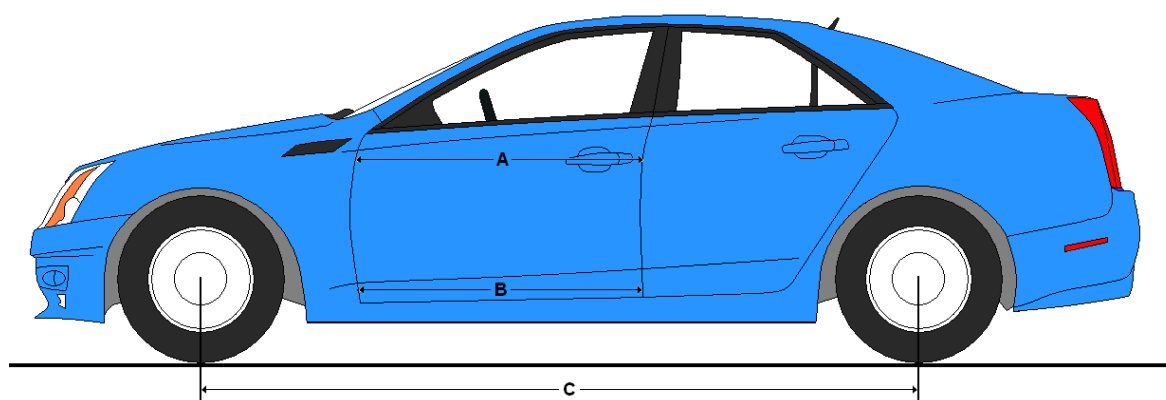
Test Date: 12/11/14

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	975	974	1
B	Left Side Lower	mm	846	845	1
D	Right Side Upper	mm	966	966	0
E	Right Side Lower	mm	849	848	1

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2810	2700	110
F	Right Side Wheelbase	mm	2810	2715	95



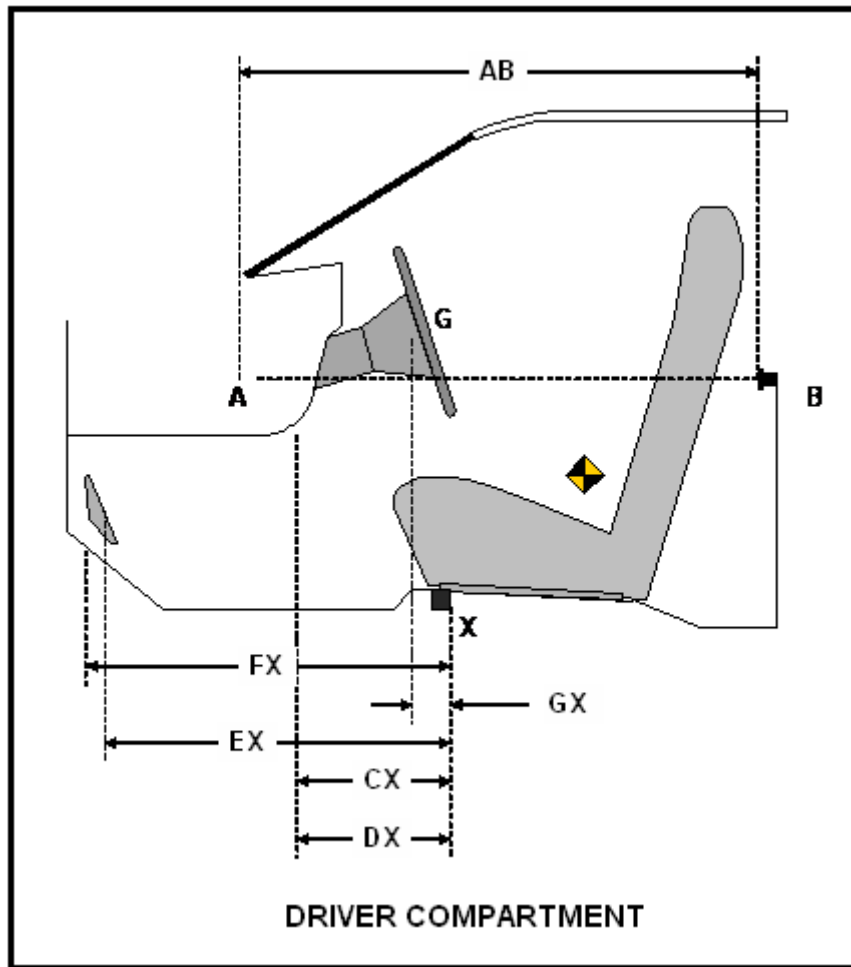
**DATA SHEET NO. 14 ... (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV      NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test      Test Date: 12/11/14

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jamb)	mm	866	871	-5
CX	Left Knee Bolster to X	mm	315	260	55
DX	Right Knee Bolster to X	mm	305	270	35
EX	Brake Pedal to X	mm	540	545	-5
FX	Foot Rest to X	mm	595	595	0
GX	Center of Steering Wheel Hub to X	mm	45	50	-5

X = Front of Seat Track (Stationary)



**DATA SHEET NO. 15**

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

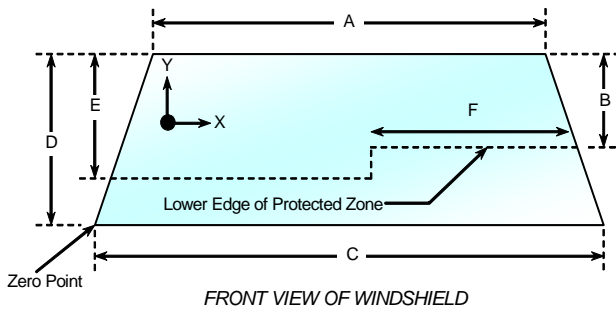
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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	2229	2229	100.0%
Right Side	2229	2229	100.0%
Total	4458	4458	100.0%



Item	Units	Value
A	mm	1242
B	mm	335
C	mm	1499
D	mm	858
E	mm	472
F	mm	555

**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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 13.3° C Test Time: 1:29 PM

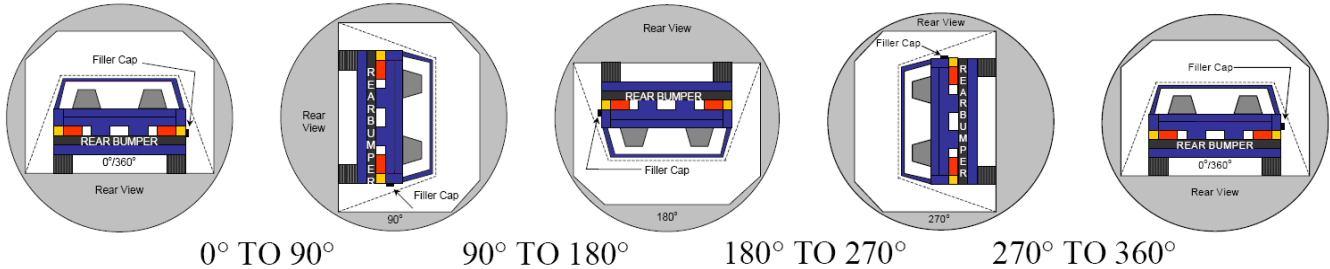
**Stoddard Solvent Spillage Measurements**

- 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 X3 xDrive28i 5-Door MPV NHTSA No.: M20154104  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 12/11/14



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°	85	300	385
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**

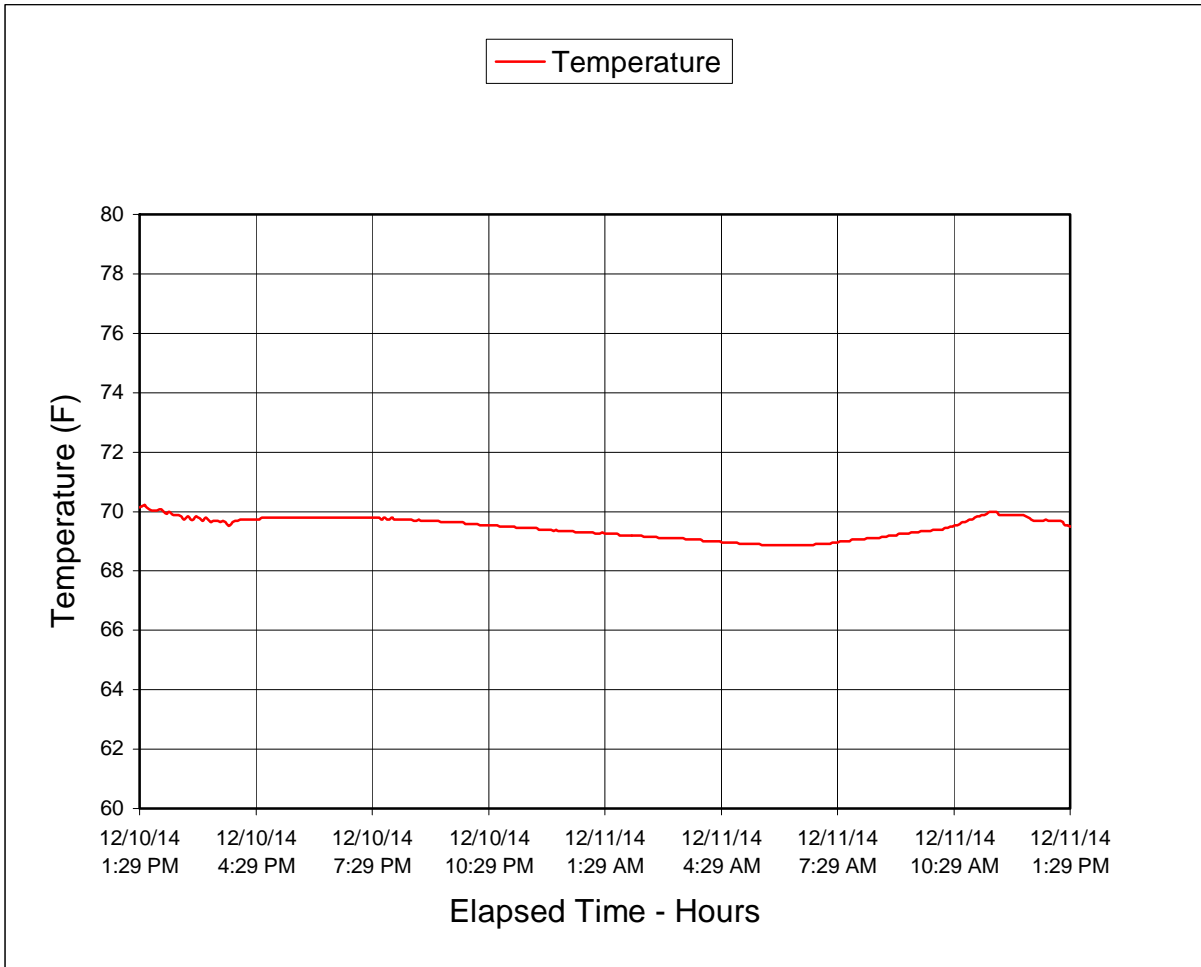
**DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No.: M20154104

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 12/11/14



**APPENDIX A  
PHOTOGRAPHS**

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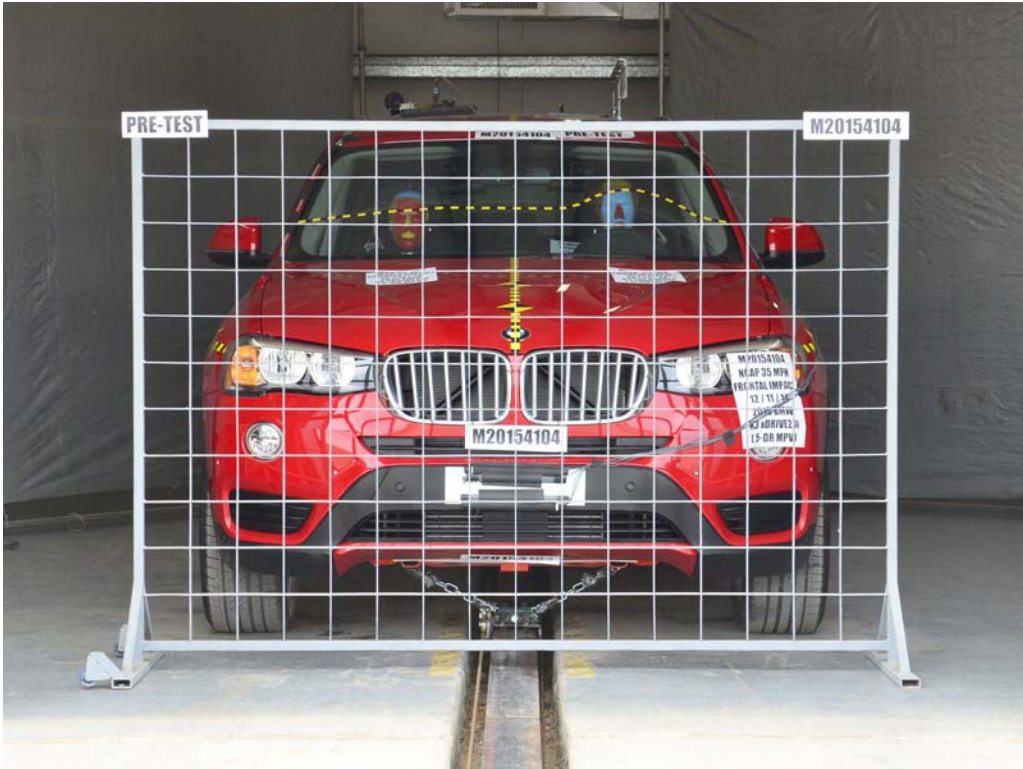


FIGURE 1. Load Cell Location

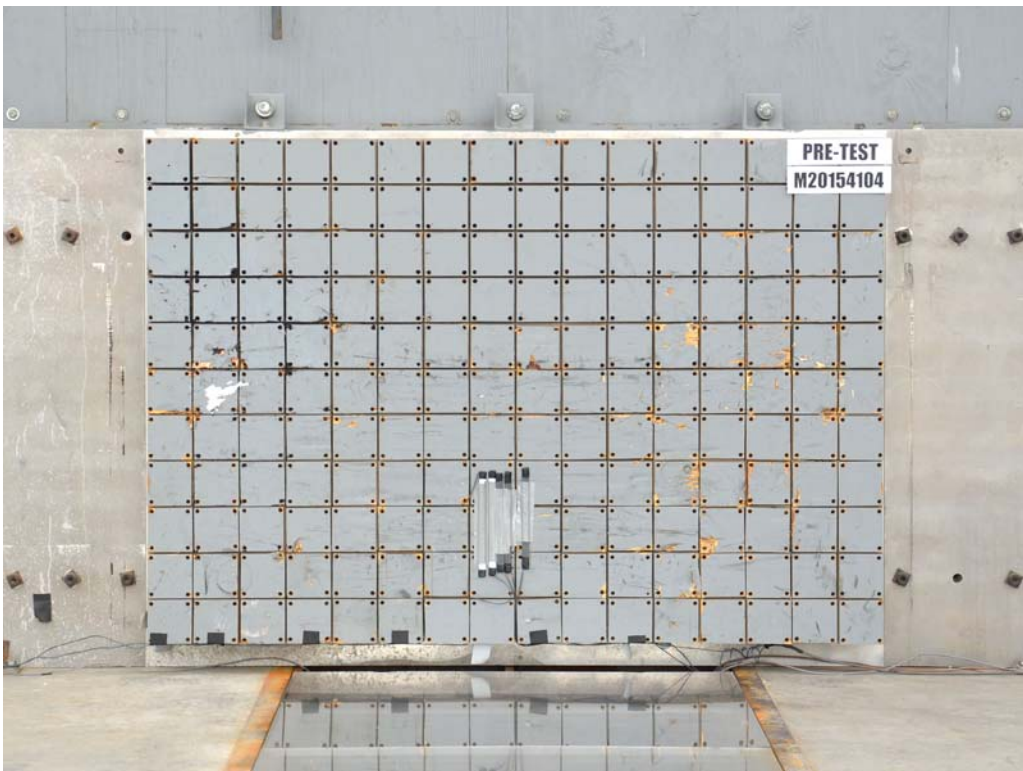


FIGURE 2. Load Cell Wall



FIGURE 3. Manufacturer's Label

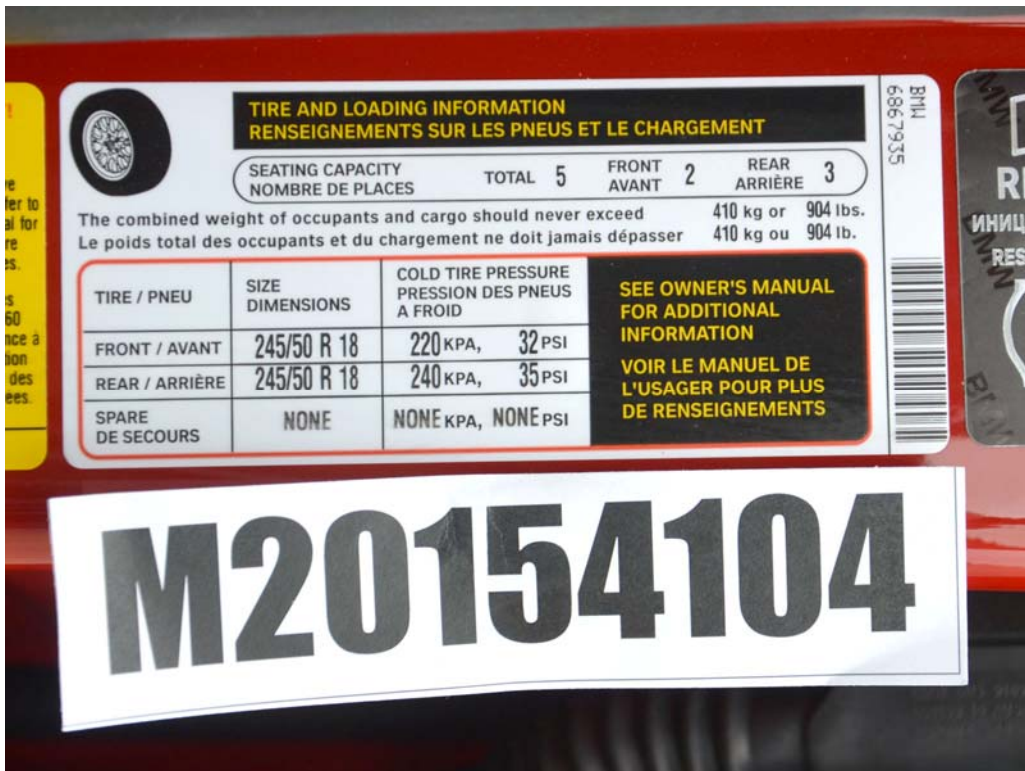


FIGURE 4. Tire Placard



FIGURE 5. 2015 BMW X3 Frontal as Delivered



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



FIGURE 7. Pre-Test Front View of Test Vehicle

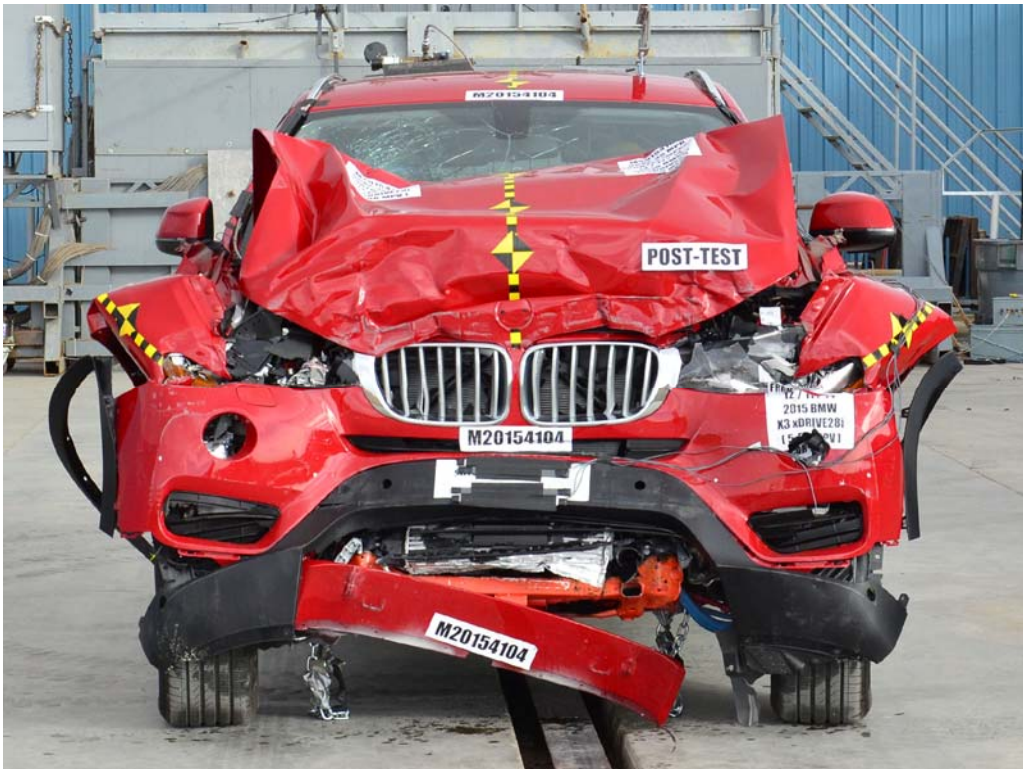


FIGURE 8. Post-Test Front View of Test Vehicle



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 13. Pre-Test Right Front  $\frac{3}{4}$  View



FIGURE 14. Post-Test Right Front  $\frac{3}{4}$  View



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



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

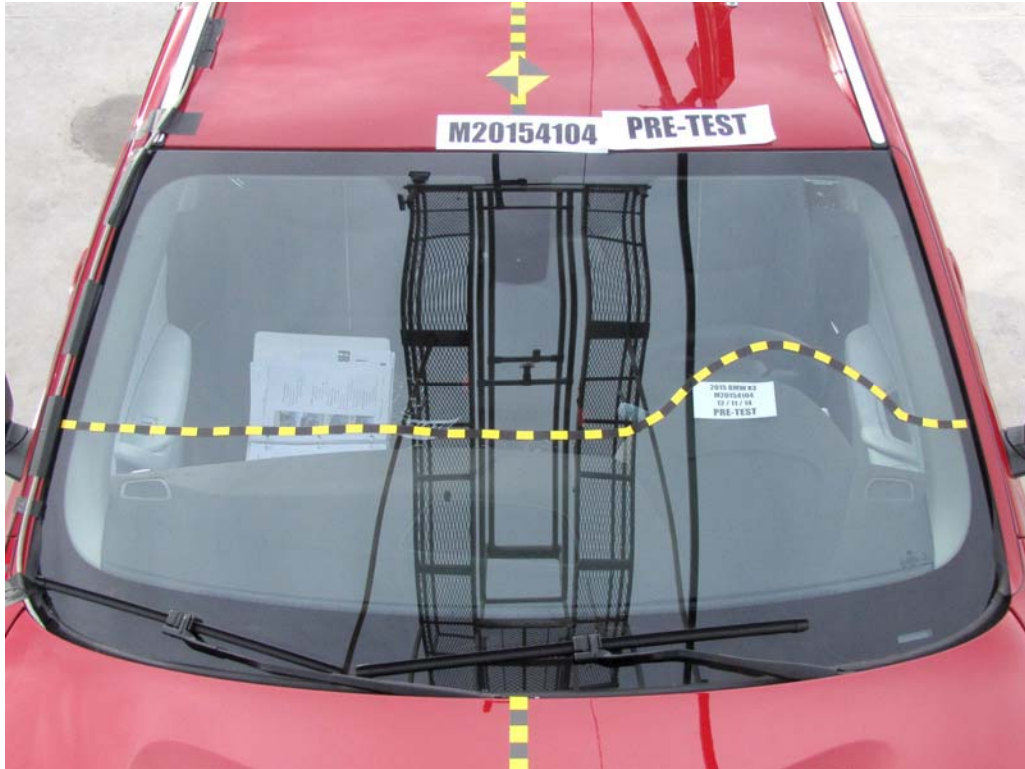


FIGURE 17. Pre-Test Windshield View



FIGURE 18. Post-Test Windshield View



FIGURE 19. Pre-Test Engine Compartment View

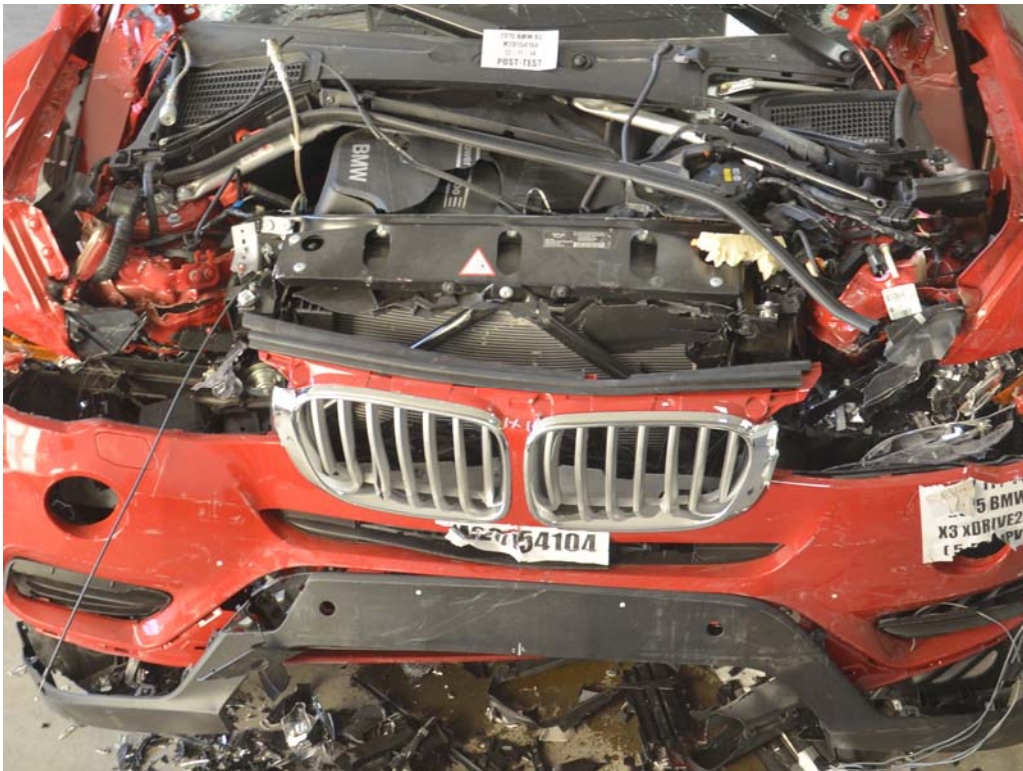


FIGURE 20. Post-Test Engine Compartment View



FIGURE 21. Pre-Test Fuel Filler Cap View



FIGURE 22. Post-Test Fuel Filler Cap View

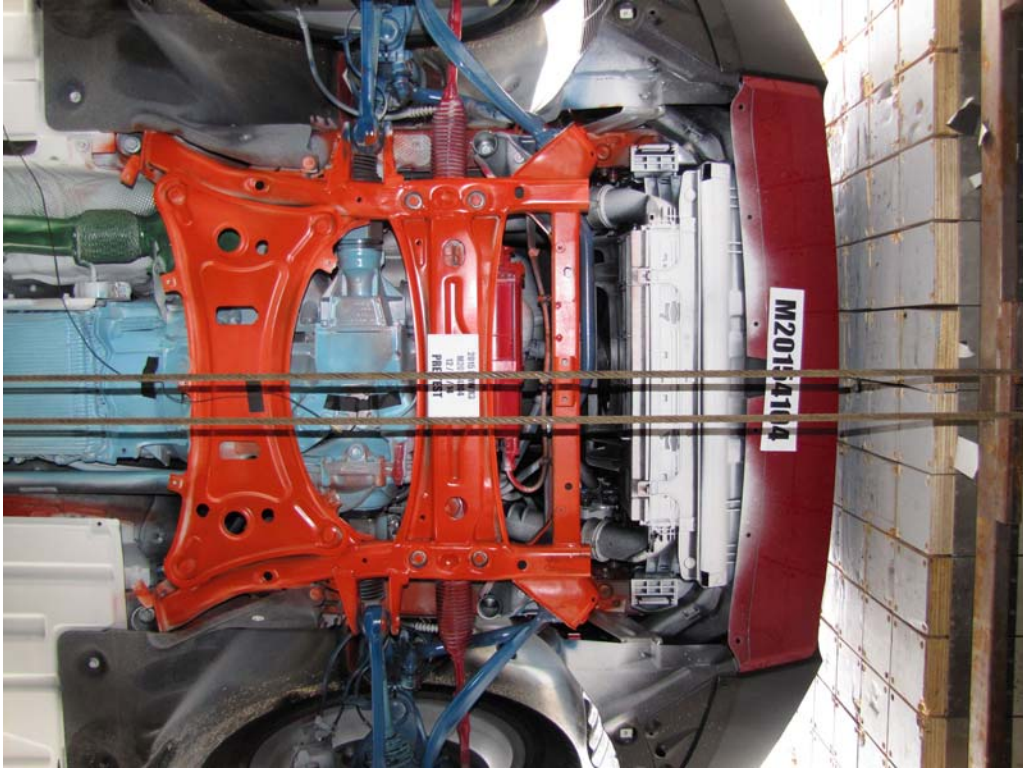


FIGURE 23. Pre-Test Front Underbody View

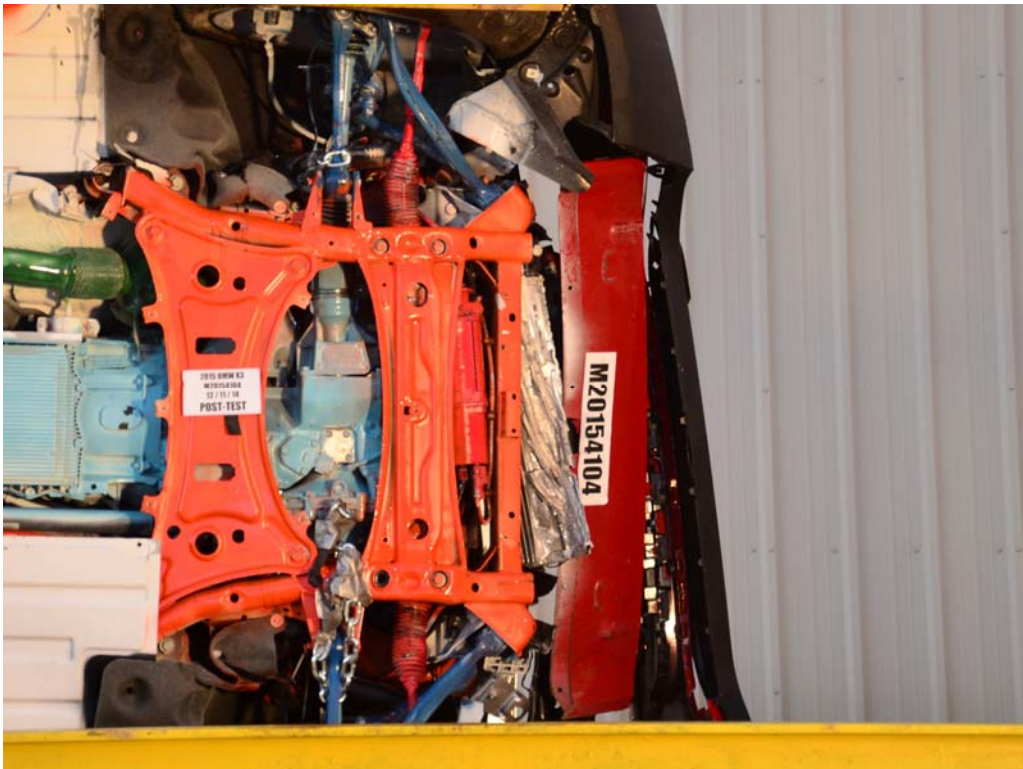


FIGURE 24. Post-Test Front Underbody View

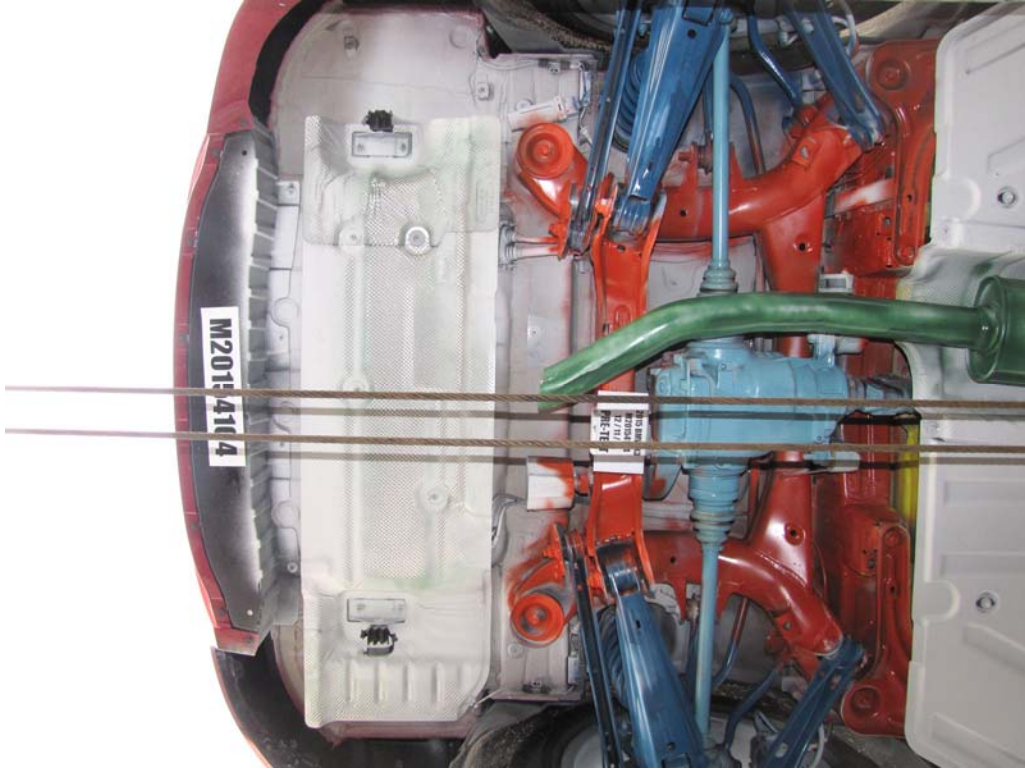


FIGURE 25. Pre-Test Rear Underbody View

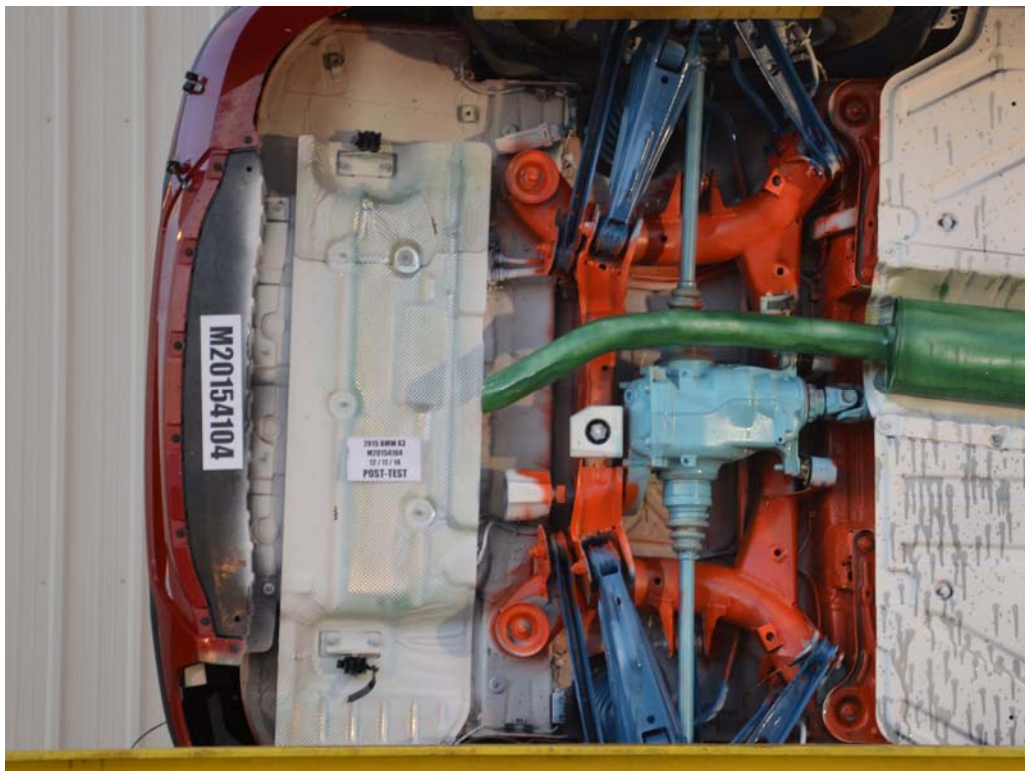


FIGURE 26. Post-Test Rear Underbody View



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



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 Glovebox



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

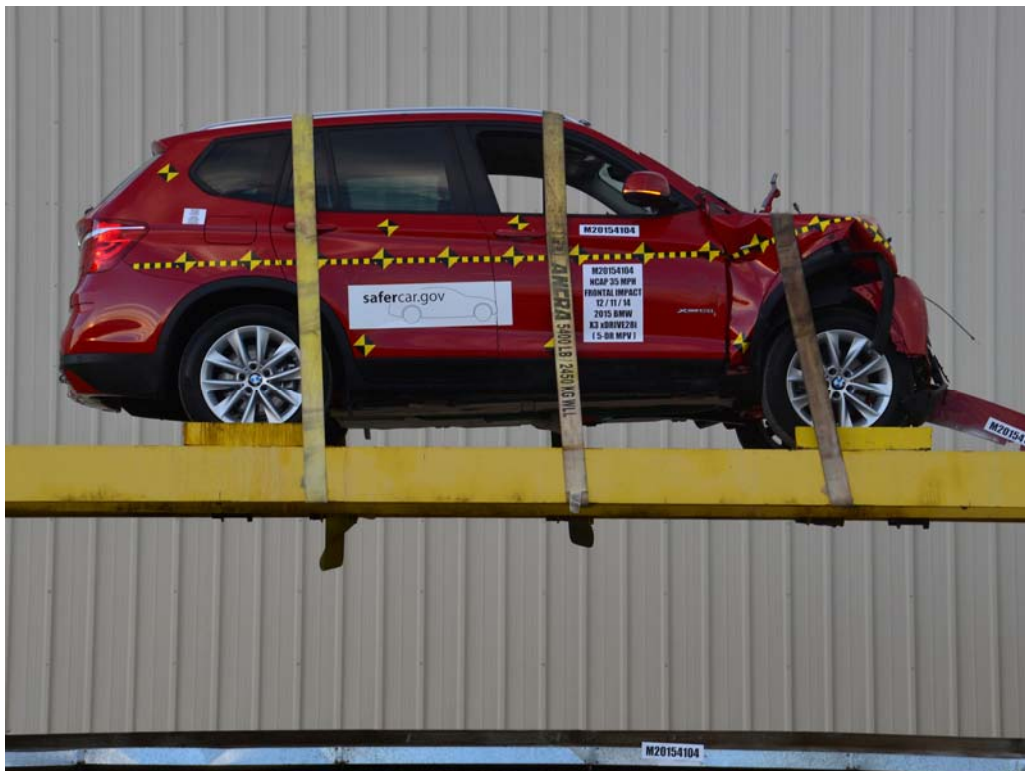


FIGURE 72. Vehicle at 0° on Static Rollover Device



FIGURE 73. Vehicle at 90° on Static Rollover Device



FIGURE 74. Vehicle at 180° on Static Rollover Device

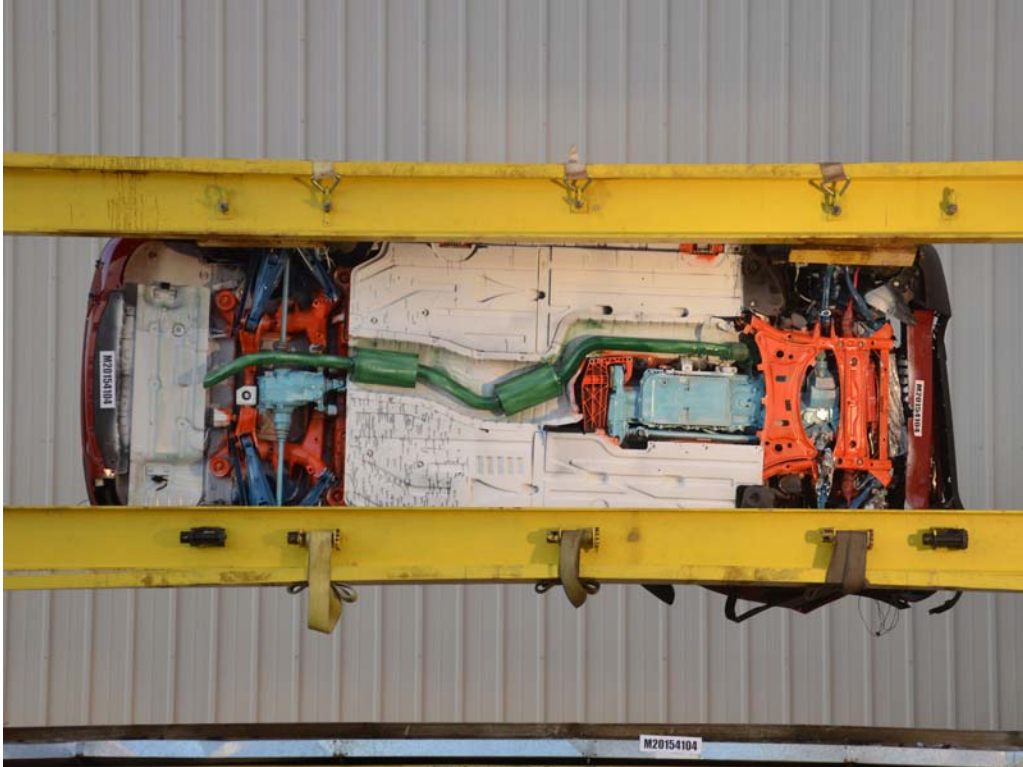


FIGURE 75. Vehicle at 270° on Static Rollover Device

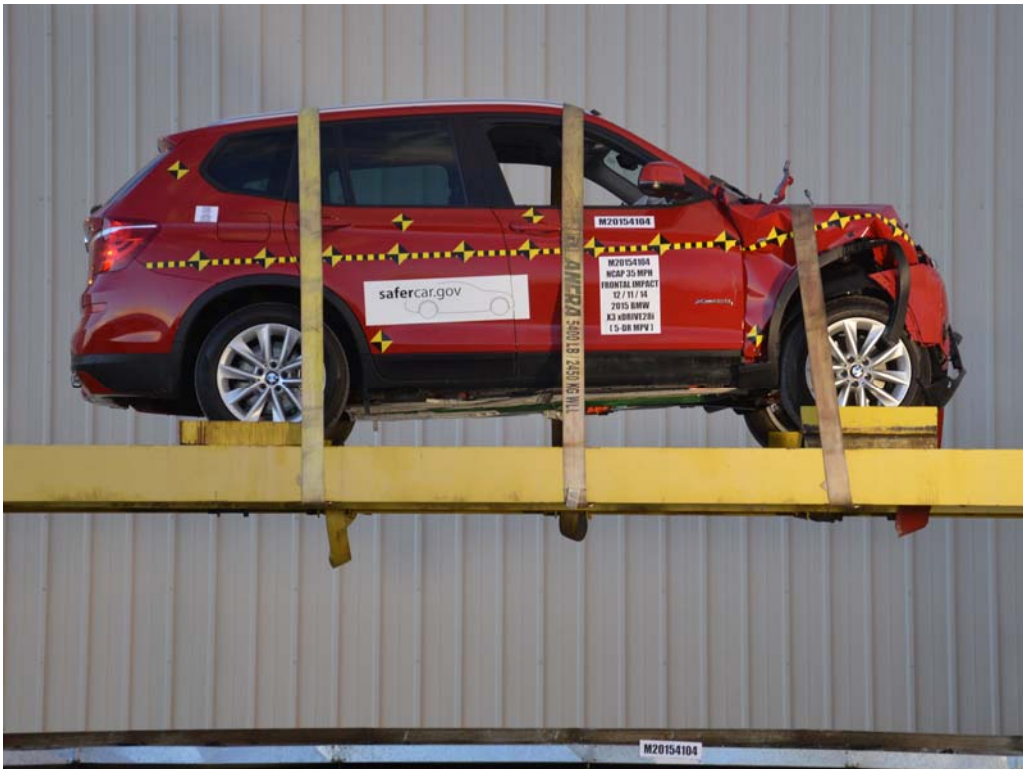


FIGURE 76. Vehicle at 360° on Static Rollover Device



FIGURE 77. 2015 BMW X3 Frontal Impact Event

**The Ultimate Driving Machine®**  
2015 BMW X3 xDrive28i

<p><b>Manufacturer's Suggested Retail Price</b> \$ 40,000.00</p> <p><b>Options and Additional Charges:</b> (Optional equipment only, excludes special equipment) (Check with your authorized BMW dealer)</p> <p><b>Melbourne Red Metallic</b> \$ 550.00</p> <p><b>Driver Assistance Package</b> \$ 990.00</p> <p><b>Features:</b></p> <ul style="list-style-type: none"> <li>Auto Hold</li> <li>Auto Start/Stop Function</li> <li>Sport leather steering wheel</li> <li>Anti-theft alarm system</li> <li>Power tailgate</li> <li>Universal garage-door opener</li> <li>Roof rails in Satin Aluminum</li> <li>Auto-dimming mirrors</li> <li>Auto-dimming rearview mirror</li> <li>Power front seats</li> <li>Split fold-down rear seat</li> <li>Storage package</li> <li>Heated front seats</li> <li>500.00</li> <li>Fluxline Antracite Wood Trim</li> <li>Black High gloss instr panel</li> <li>Automatic climate control</li> <li>Ambiance lighting</li> <li>LED Fog Lights</li> <li>Navigation system</li> <li>BMW Assist eCall</li> <li>BMW TeleServices</li> <li>BMW Online and BMW Apps</li> <li>Advanced RTT</li> <li>Remote Services</li> <li>Hands-Free Bluetooth and USB</li> <li>Destination Charge</li> <li>850.00</li> <li><b>Total Suggested Retail Price</b> \$ 45,600.00</li> </ul>	<p><b>Standard Features</b></p> <p><b>Performance and efficiency</b></p> <ul style="list-style-type: none"> <li>2.0L I4, 16 valve, inline 4-cylinder BMW TwinPower Turbo engine and High Precision Direct Injection, Valvetronic and Double VANOS</li> <li>8-speed automatic</li> <li>Auto Start-Stop Function</li> <li>Driving Dynamics Control with ECO PRO mode</li> <li>8-Speed STEPTRONIC automatic transmission with Sport and Manual modes and Adaptive Transmission Control (ATC)</li> </ul> <p><b>Handling, ride and braking</b></p> <ul style="list-style-type: none"> <li>Active Steering Assist system</li> <li>Dynamic Stability Control (DSC), including Brake Dring, Brake Steering, Drive Off Road and Brake Hold Compression</li> <li>MR Drive Van (MDC)</li> <li>Active roll-over protection bars with Dynamic Brake Control</li> </ul> <p><b>Exterior</b></p> <ul style="list-style-type: none"> <li>LED halogen</li> <li>Privacy glass</li> <li>Auto Sunroof with roll-over</li> </ul> <p><b>Interior seating</b></p> <ul style="list-style-type: none"> <li>8 support points from seats with driver's seat and optional memory</li> <li>40/20/40 split-folding rear seat</li> <li>Comfort and convenience</li> <li>Automatic cruise control</li> <li>Non-sheer seatbelts with Automatic head/neck control</li> </ul> <p><b>Power windows</b></p> <ul style="list-style-type: none"> <li>Automatic opening/closing rear window and electric side-view mirrors</li> </ul> <p><b>Instrumentation and controls</b></p> <ul style="list-style-type: none"> <li>3-spoke leather-wrapped multi-function sport steering wheel</li> <li>USB audio connection and hands-free Bluetooth including Audio Streaming</li> <li>Color display with on-board computer, Controller and 8-Programmable memory buttons</li> <li>Dynamic Cruise Control</li> <li>Tire Pressure Monitor</li> </ul> <p><b>Safety and security</b></p> <ul style="list-style-type: none"> <li>Active Protection System (APS), front and rear</li> <li>Driver's and passenger's front safety supplemental restraint system (SRS) with advanced technology</li> <li>Frontal air-activated side-impact airbags</li> <li>BMW Assist eCall with a 10-year subscription</li> </ul> <p><b>Warranty</b></p> <ul style="list-style-type: none"> <li>4-year/50,000-mile New Vehicle/3-year Limited Mileage</li> <li>3-year/50,000-mile Powertrain Limited Mileage</li> <li>4-year/Unlimited Mileage Roadside Assistance Program</li> </ul>	<p><b>PARTS CONTENT INFORMATION</b></p> <p>For Vehicles in this Car Line: US/Canadian Parts Content: <b>15%</b></p> <p>Major Source of Foreign Parts Content: <b>GERMANY: 70%</b></p> <p>Note: Parts content does not include final assembly, distribution, or other non-parts costs.</p> <p>For this Vehicle: Final Assembly Point: <b>SPARTANBURG, SC, USA</b></p> <p>Country of Origin: <b>GERMANY</b></p> <p>Engine: <b>GERMANY</b></p> <p>Transmission: <b>GERMANY</b></p>
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<p><b>BMW Ultimate Service™</b></p> <p><b>Maintenance Program:</b></p> <p><b>\$0</b></p> <p>For the first 4 years or 50,000 miles, whichever comes first on all factory-recommended services*</p>	<p><b>Your Maintenance Costs:</b></p> <p>Engine Oil Services: \$0 Brake Pads: \$0</p> <p>Engine Drive Belts: \$0 Brake Disks: \$0</p> <p>Inspection Services: \$0 Brake Fluid: \$0</p> <p><small>*Coverage is not transferable to subsequent purchasers, complete or incomplete. Please see brochure for the dealer or ask your authorized BMW dealer for details.</small></p>
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<p><b>EPA DOT Fuel Economy and Environment</b></p> <p><b>Fuel Economy</b></p> <p><b>24</b> MPG combined city/hwy</p> <p>21 MPG city</p> <p>28 MPG highway</p> <p>4.2 gallons per 100 miles</p> <p><b>You spend \$1,000 in fuel costs over 5 years compared to the average new vehicle.</b></p> <p><b>Annual fuel cost \$2,400</b></p> <p>Fuel Economy &amp; Greenhouse Gas Rating (average mpg) Smog Rating (average smog)</p> <p>1 6 10 15 20 Best</p> <p><b>fuel economy.gov</b></p>	<p><b>Gasoline Vehicle</b></p> <p><b>Star ratings range from 1 to 5 stars (*** with 5 being the highest)</b></p> <p>Source: National Highway Traffic Safety Administration (NHTSA)</p> <p>www.safercar.gov or 1-888-327-4225</p> <p><b>Frontal Crash</b> Driver Not Rated Passenger Not Rated</p> <p><b>Side Crash</b> Front seat Not Rated Rear seat Not Rated</p> <p><b>Rollover</b> Not Rated</p> <p><b>Star ratings range from 1 to 5 stars (*** with 5 being the highest)</b></p> <p>Source: National Highway Traffic Safety Administration (NHTSA)</p> <p>www.safercar.gov or 1-888-327-4225</p> <p>This vehicle is equipped with features that can reduce the risk of a crash. However, the vehicle is not immune to all risks. The vehicle is not immune to all risks. The vehicle is not immune to all risks.</p> <p>BMW of North America, LLC Woodcliff Lake, NJ 07877</p> <p>VPC Location: OXNARD, CALIFORNIA</p> <p>Port of Entry: GREENVILLE, SPARTANBURG Carrier: WAGGONER TRUCKING</p> <p>Sell To: Covier BMW 1500 Auto Mall Dr Santa Ana, CA (857) 231-5000</p> <p>Sell To: Covier BMW 1500 Auto Mall Dr Santa Ana, CA (857) 231-8300</p>
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VIN: SUXW9C56F0D52099

FIGURE 78. Monroney label Photograph

**APPENDIX B**  
**DUMMY RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

<u>Plot</u>		<u>Page</u>
1	Driver Head X Acceleration vs. Time Primary	B-1
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3	Driver Head Z Acceleration vs. Time Primary	B-1
4	Driver Head Resultant Acceleration vs. Time Primary	B-1
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29	Passenger Left Femur Force vs. Time	B-10
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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](http://www.nhtsa.dot.gov)

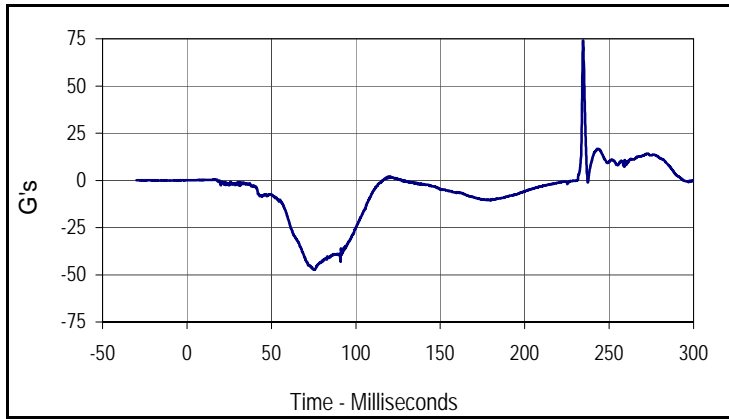
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Driver Head Left X Acceleration  
Driver Head Left Z Acceleration  
Driver Upper Neck Force Y  
Driver Upper Neck Moment X  
Driver Upper Neck Moment Z  
Driver Chest X Acceleration Redundant  
Driver Chest Y Acceleration Redundant  
Driver Chest Z 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  
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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  
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Passenger Left Lower Tibia Force Z  
Passenger Right Upper Tibia Moment X

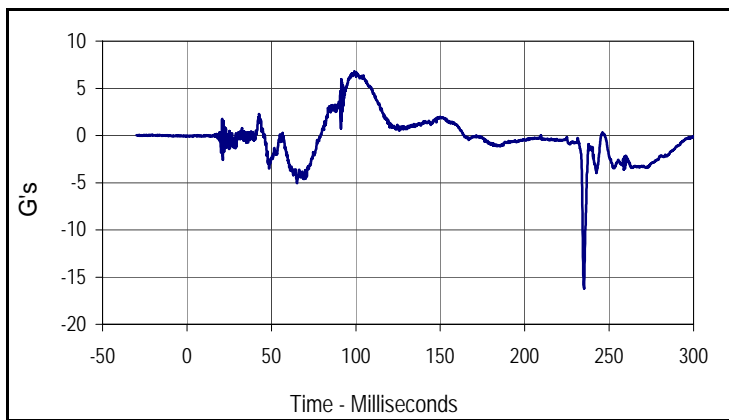
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Passenger Right Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Left Rear Seat Crossmember X  
Left Rear Seat Crossmember Z  
Right Rear Seat Crossmember X  
Right Rear Seat Crossmember Z  
Vehicle Engine Top X  
Vehicle Engine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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

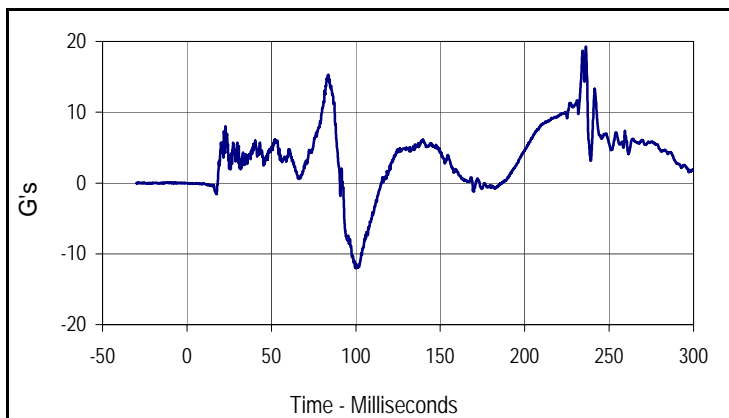
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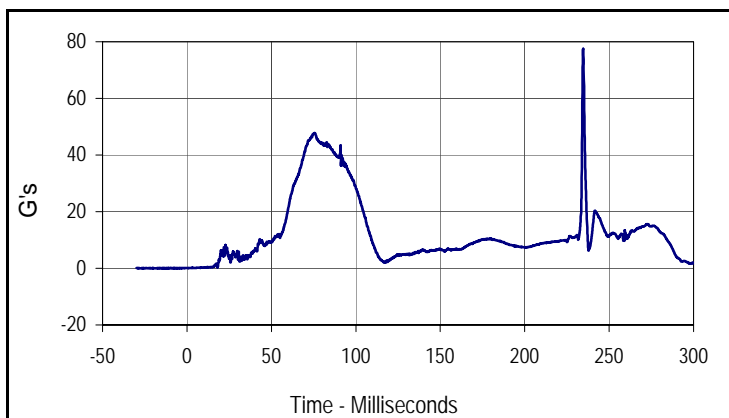
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Max	Time	Min	Time
6.8	99.2	-16.2	235.1



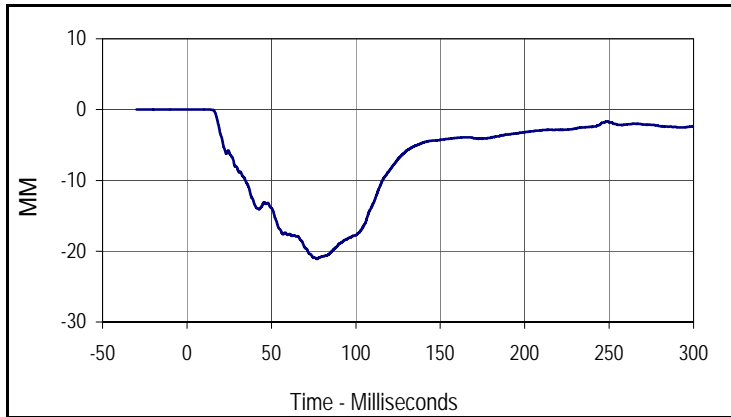
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Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
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Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

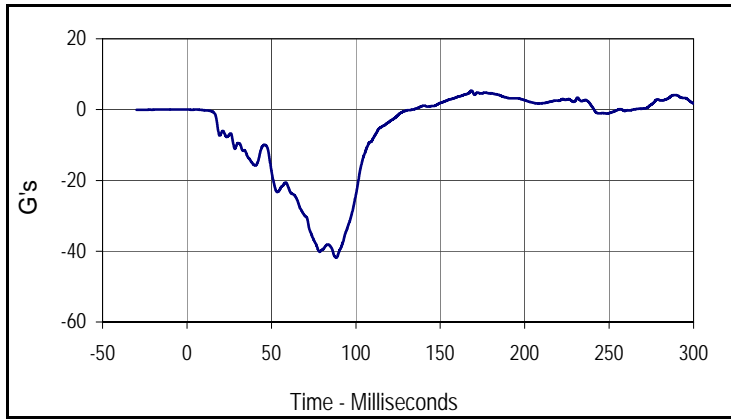
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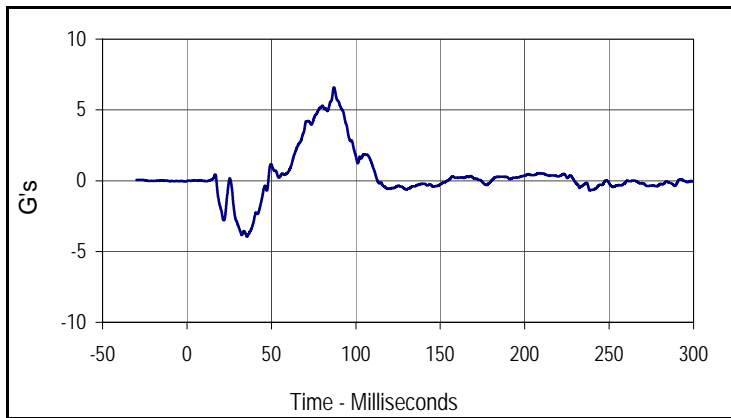
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Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

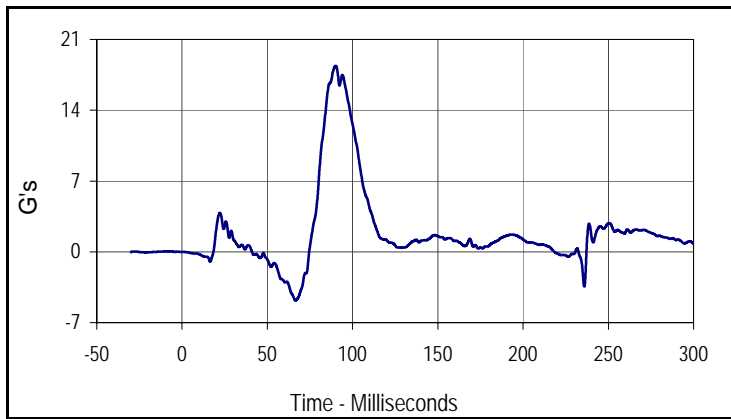
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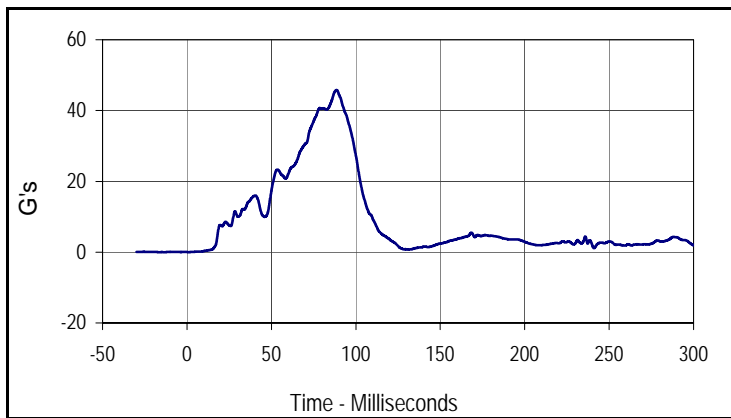
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5.4	168.5	-41.8	88.5



Curve Description			
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Max	Time	Min	Time
6.6	87.1	-3.9	35.5



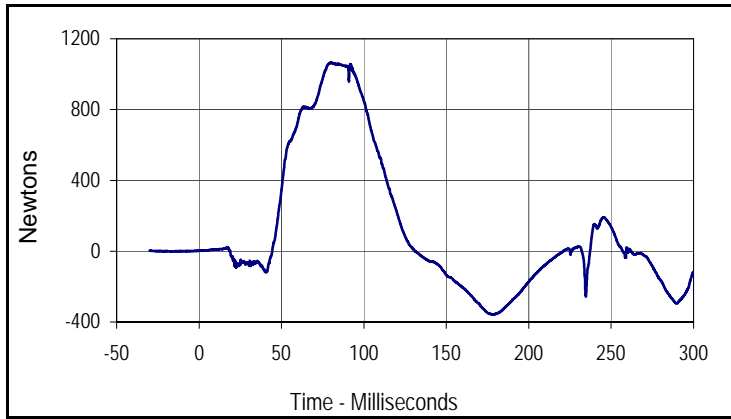
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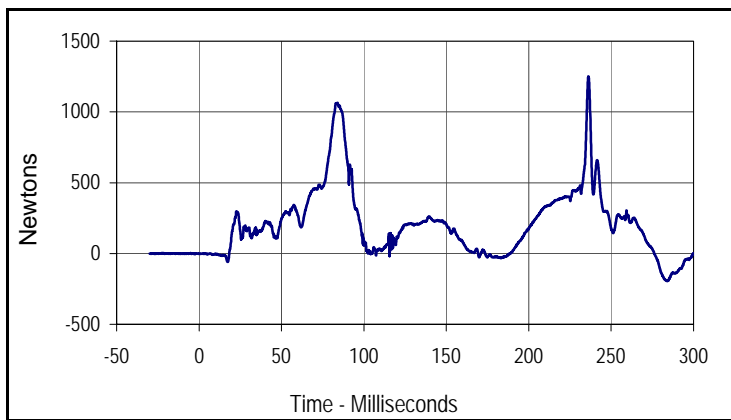
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Driver Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
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Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

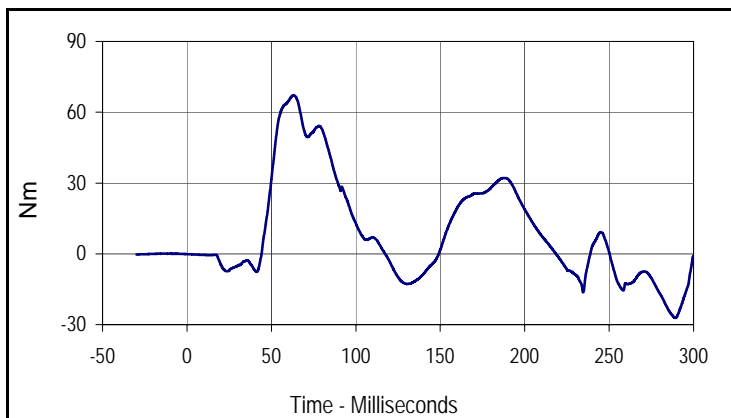
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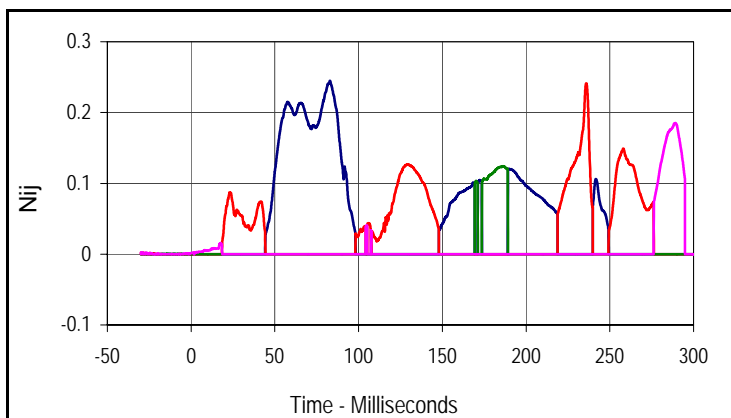
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Curve Description			
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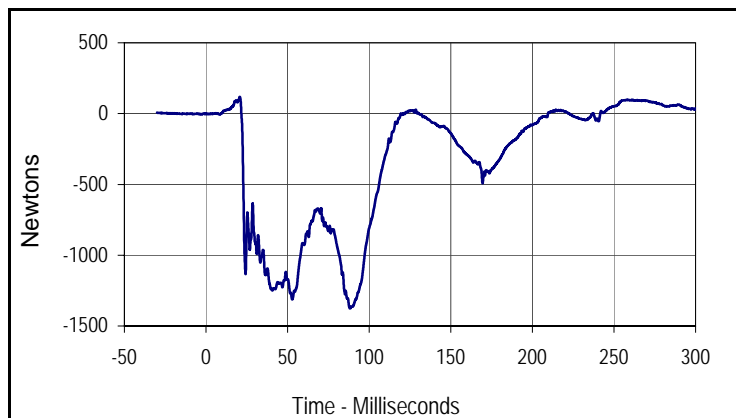
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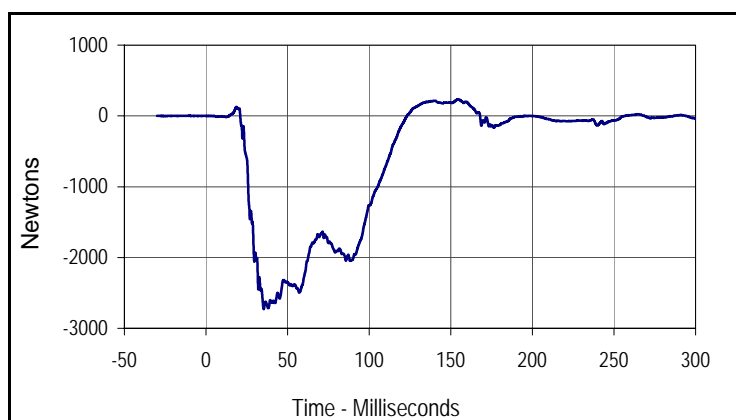
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Driver Nij			
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Nte	FIL	0.24	235.9
Ncf	FIL	0.12	186.1
Nce	FIL	0.19	289.2

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154104  
 Test Date: 12/11/14



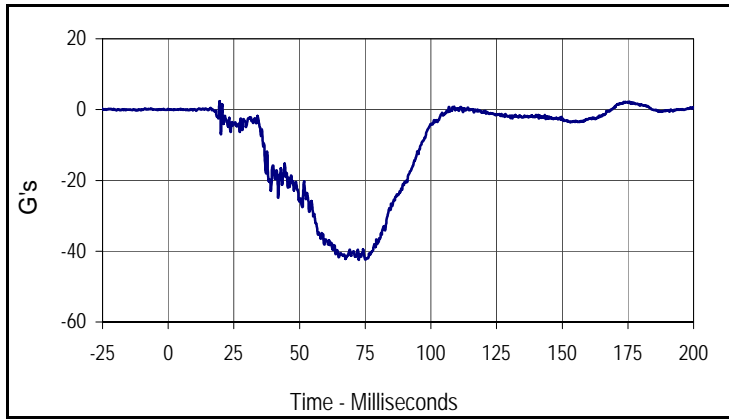
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Max	Time	Min	Time
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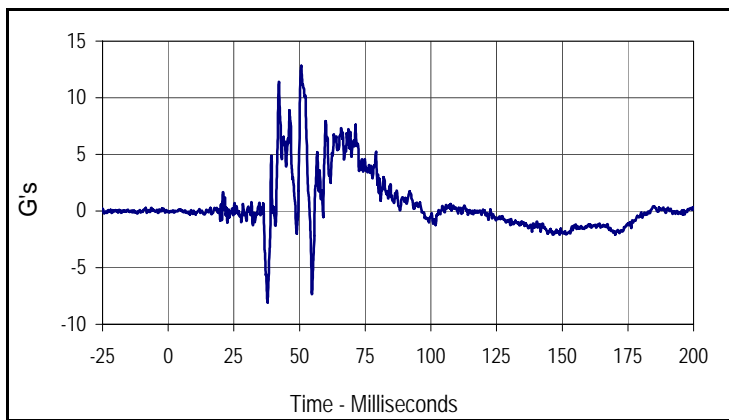
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Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

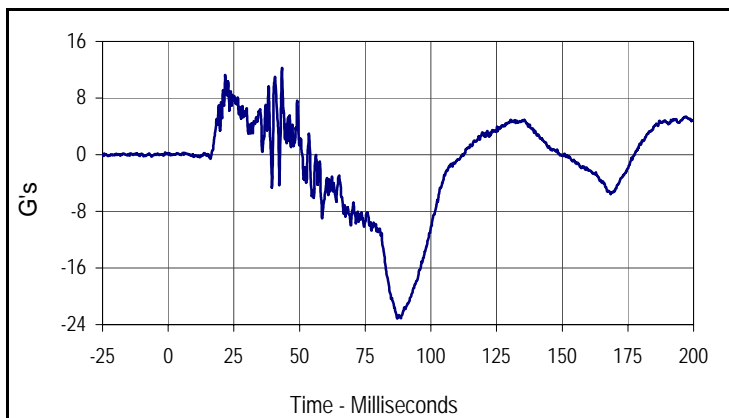
NHTSA No.: M20154104  
 Test Date: 12/11/14



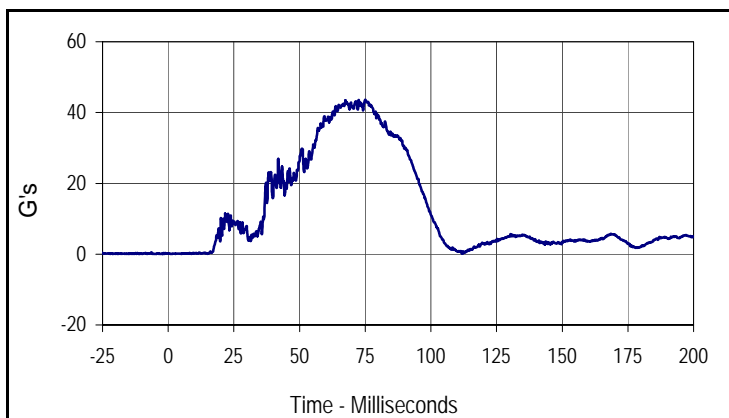
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
2.4	19.6	-42.4	72.6



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
12.8	50.6	-8.1	37.8



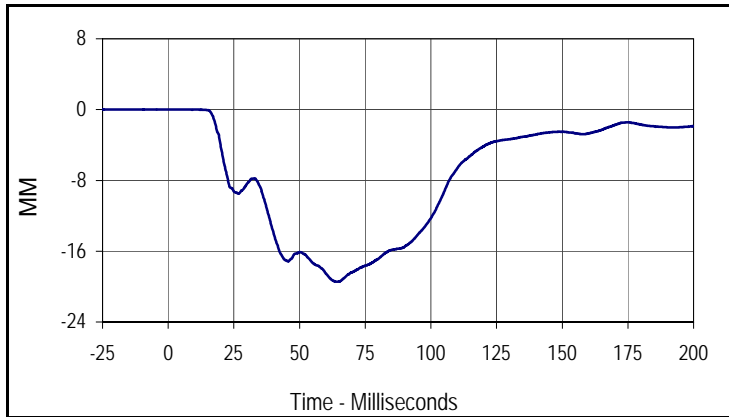
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
017	FIL	1000	G's
Max	Time	Min	Time
12.2	43.3	-23.1	87.2



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
018	RES	1000	G's
Max	Time	Min	Time
43.6	75.0	0.0	2.8

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

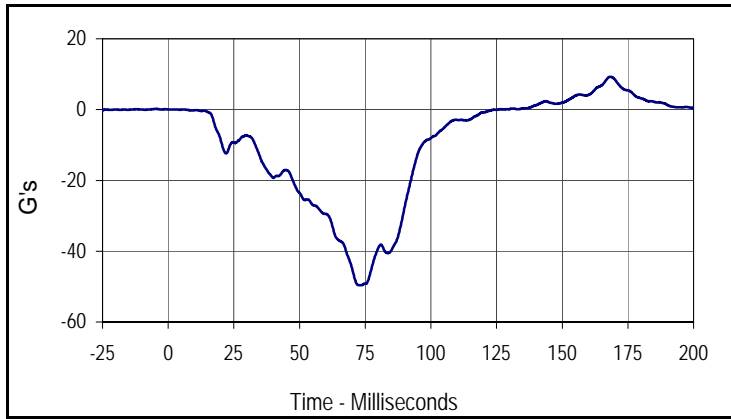
NHTSA No.: M20154104  
 Test Date: 12/11/14



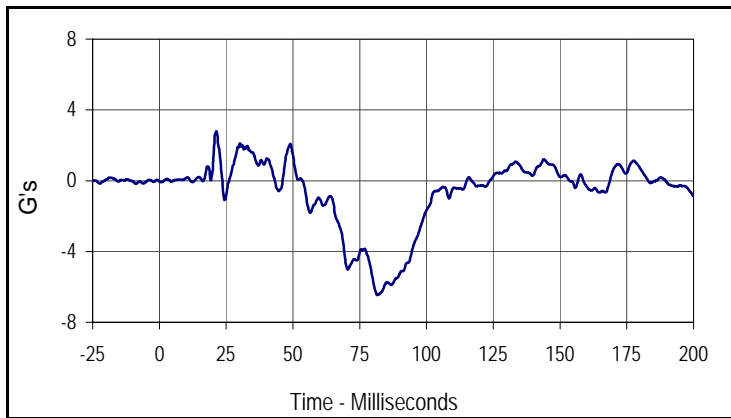
Curve Description			
Passenger Chest Deflection			
Plot No.	Type	SAE Class	Units
019	FIL	600	MM
Max	Time	Min	Time
0.0	5.7	-19.5	63.9

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

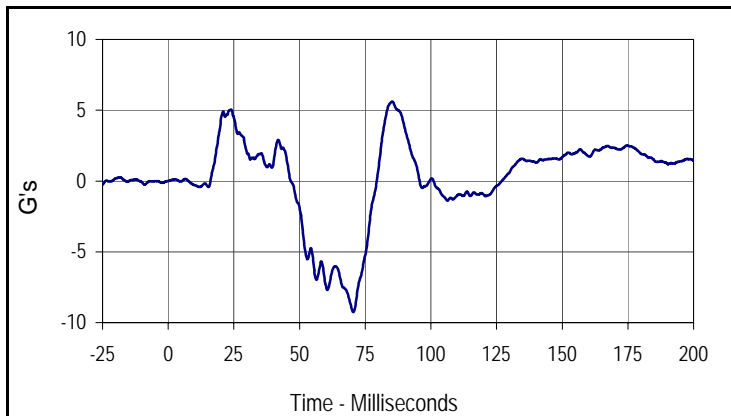
NHTSA No.: M20154104  
 Test Date: 12/11/14



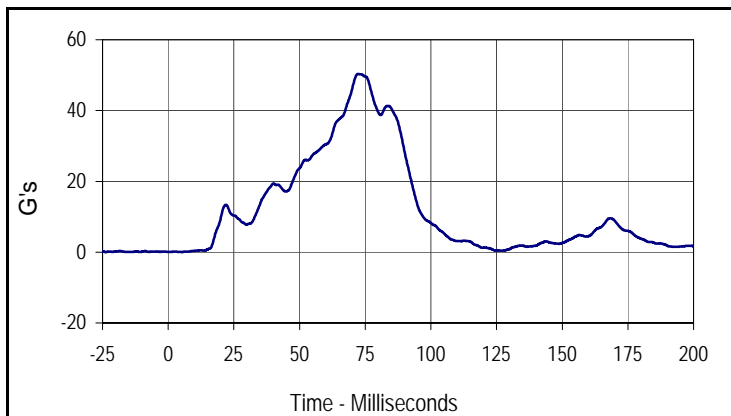
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
9.3	168.3	-49.6	73.5



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
021	FIL	180	G's
Max	Time	Min	Time
2.8	21.4	-6.5	81.6



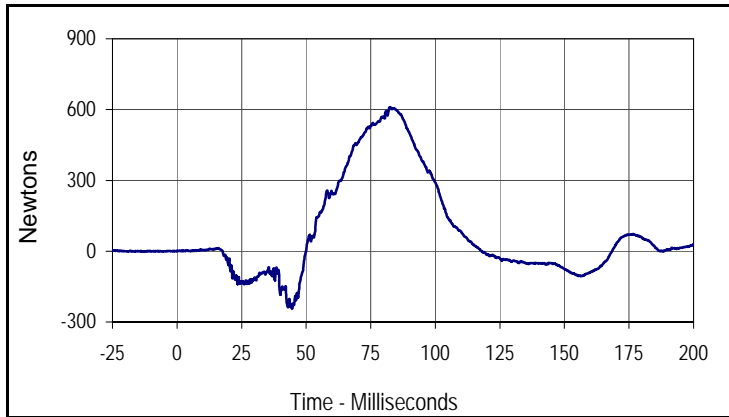
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
022	FIL	180	G's
Max	Time	Min	Time
5.6	85.3	-9.3	70.5



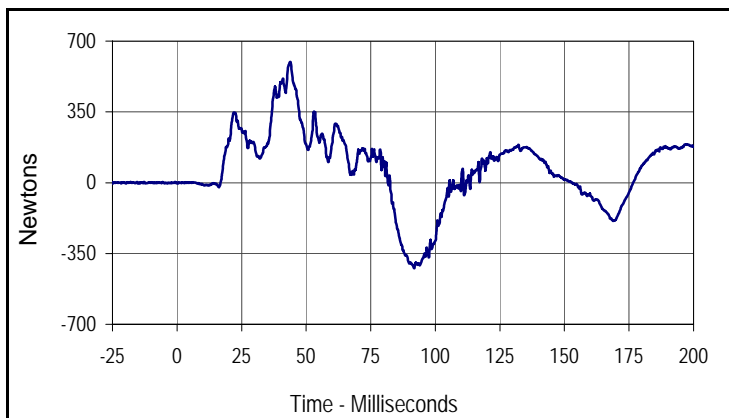
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
023	RES	180	G's
Max	Time	Min	Time
50.3	72.3	0.0	5.3

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

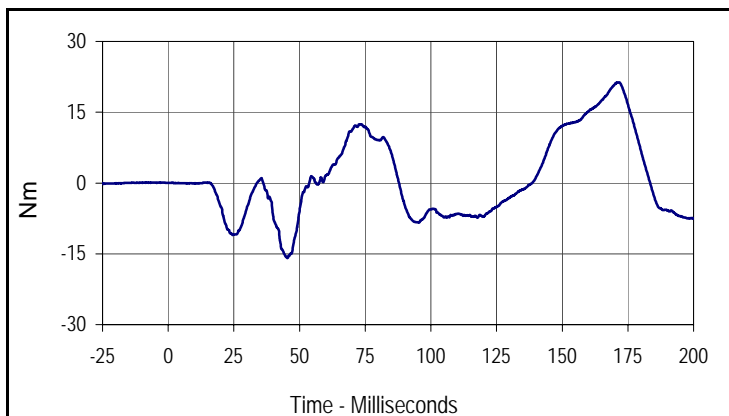
NHTSA No.: M20154104  
 Test Date: 12/11/14



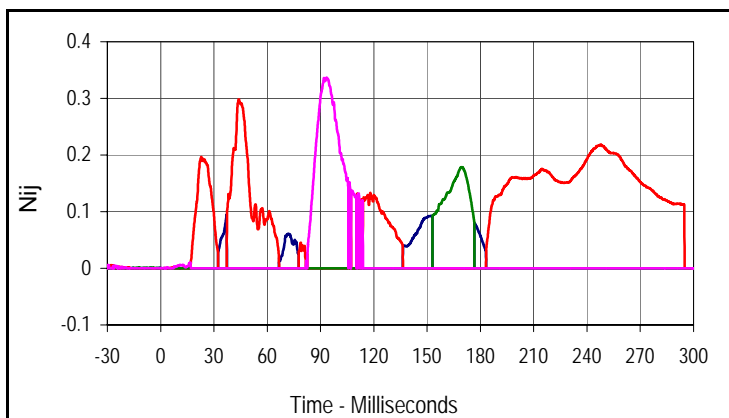
Curve Description			
Passenger Upper Neck Force X			
Plot No.	Type	SAE Class	Units
024	FIL	1000	Newtons
Max	Time	Min	Time
610.1	82.3	-244.2	44.5



Curve Description			
Passenger Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
025	FIL	1000	Newtons
Max	Time	Min	Time
597.9	43.9	-423.1	91.8



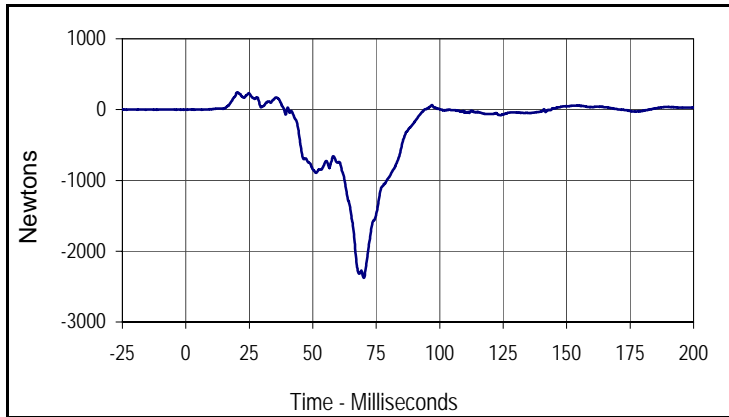
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
026	FIL	600	Nm
Max	Time	Min	Time
21.3	171.1	-15.9	45.3



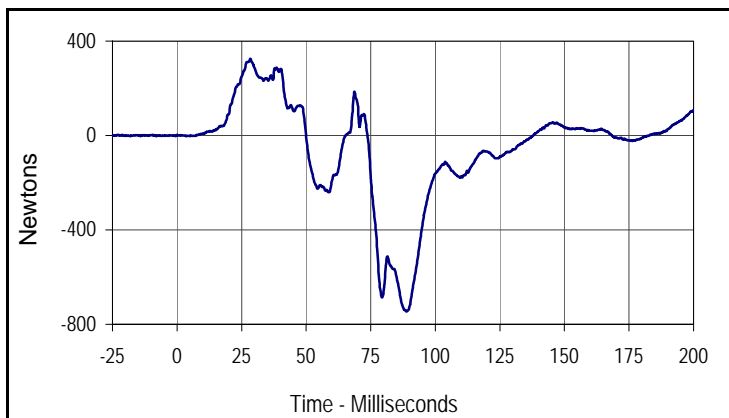
Curve Description			
Passenger Nij			
Units	Type	Max	Time
Ntf	FIL	0.09	37.2
Units	Type	Max	Time
Nte	FIL	0.30	44.0
Units	Type	Max	Time
Ncf	FIL	0.18	169.8
Units	Type	Max	Time
Nce	FIL	0.34	93.3

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20154104  
 Test Date: 12/11/14



Curve Description			
Passenger Left Femur Force Z			
Plot No.	Type	SAE Class	Units
027	FIL	600	Newtons
Max	Time	Min	Time
243.8	20.2	-2376.5	70.2



Curve Description			
Passenger Right Femur Force Z			
Plot No.	Type	SAE Class	Units
028	FIL	600	Newtons
Max	Time	Min	Time
324.8	28.4	-745.4	88.9

**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: 11/18/14



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:

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Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 11/18/14



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

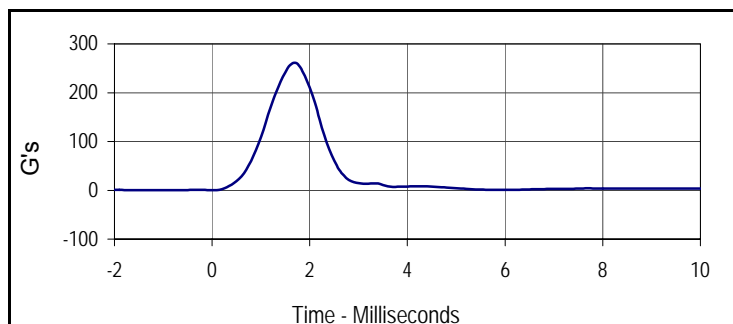
Test Date: 11/18/14



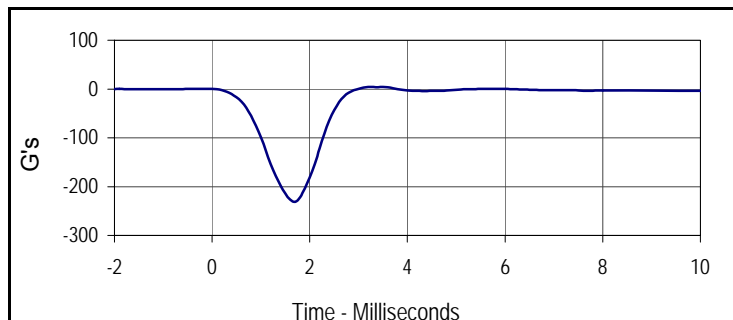
ATD Serial No.: 360

Test I.D.: M360HD004

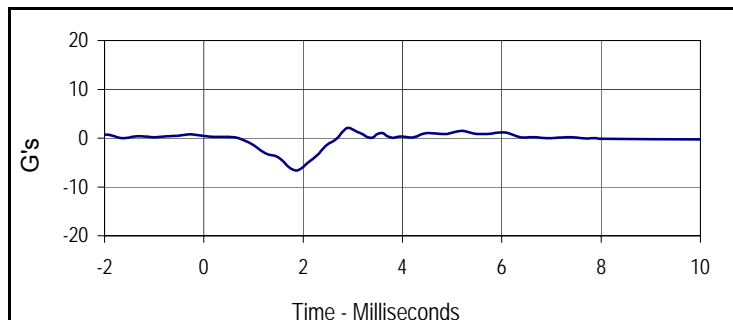
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	362	Pass
Temperature During Soak	Max	18.9 to 25.6	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass
	Min		31.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	31.9	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	261.5	Pass
Peak Lateral Acceleration	G's	≤15.0	6.6	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



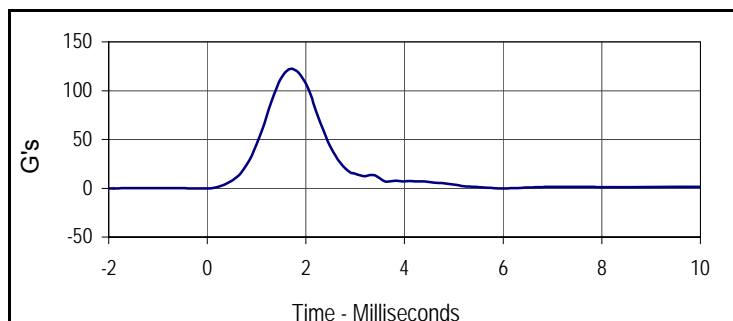
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
261.5	1.7	0.2	-1.7



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.4	3.5	-231.1	1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
2.1	2.9	-6.6	1.9



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
122.4	1.7	-0.2	-1.9

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

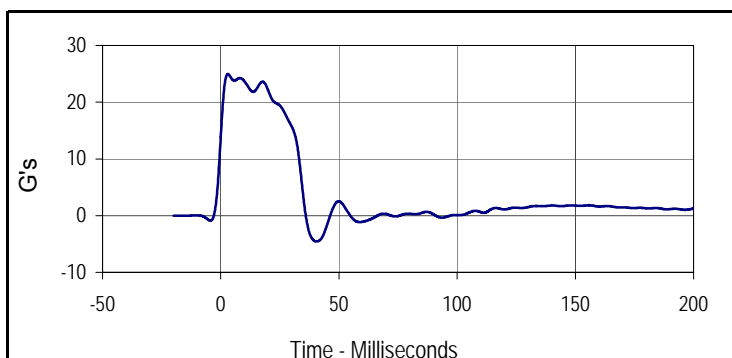
Test Date: 11/18/14



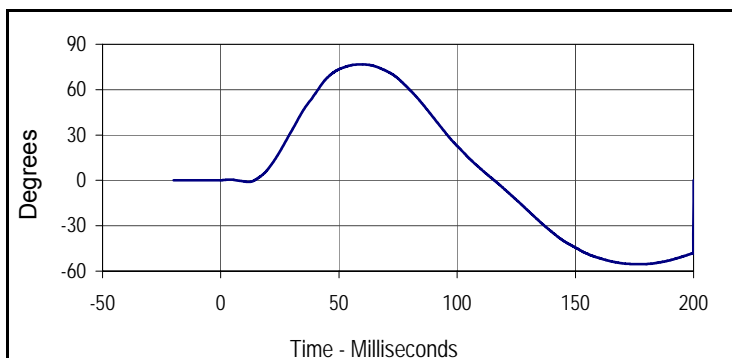
ATD Serial No.: 360

Test I.D.: M360NF004

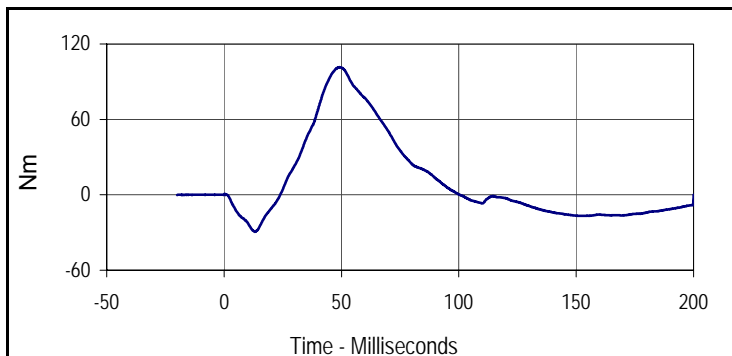
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	427	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass	
	Min		31.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	31.9	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.92	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.7	Pass
	20 Msec.	G's	17.6 to 22.6	22.1	Pass
	30 Msec.	G's	12.5 to 18.5	15.7	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	15.7	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	76.6	Pass
	Time	Msec.	57.0 to 64.0	59.3	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	115.8	Pass	
Moment About Occ. Condyle	Max	Nm	88.1 to 108.5	101.6	Pass
	Time	Msec.	47.0 to 58.0	49.3	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	100.4	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
25.0	3.0	-4.5	40.6



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
76.6	59.3	-55.4	177.1



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
101.6	49.3	-29.4	13.1

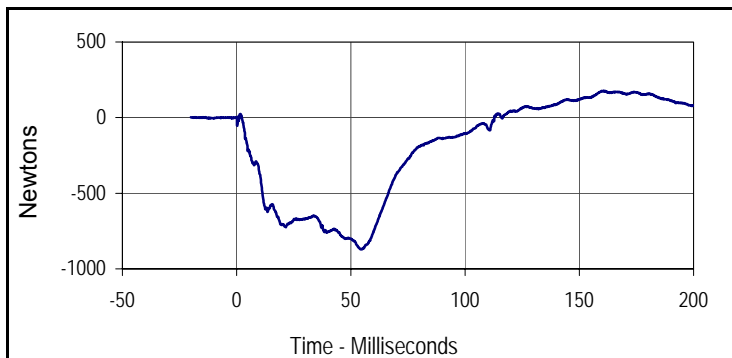
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 11/18/14

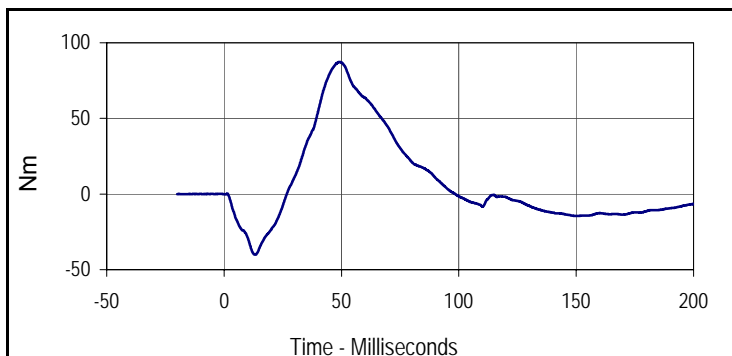


ATD Serial No.: 360

Test I.D.: M360NF004



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
177.4	160.6	-871.5	54.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
87.3	49.2	-40.1	13.4

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

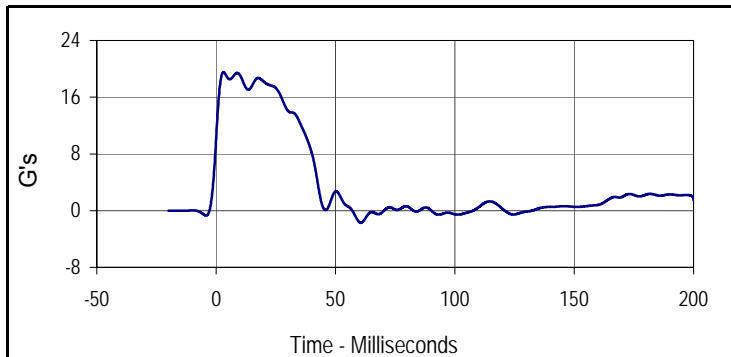
Test Date: 11/18/14



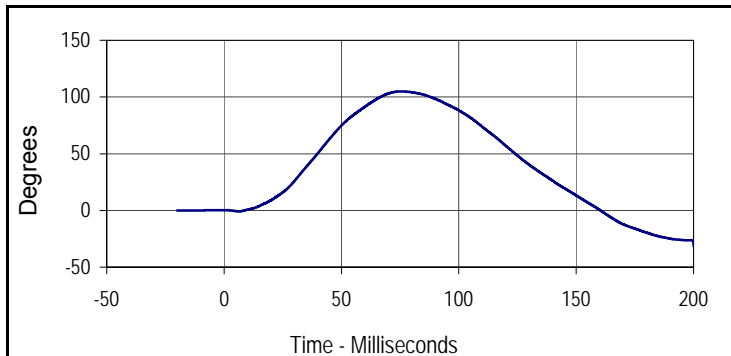
ATD Serial No.: 360

Test I.D.: M360NE004

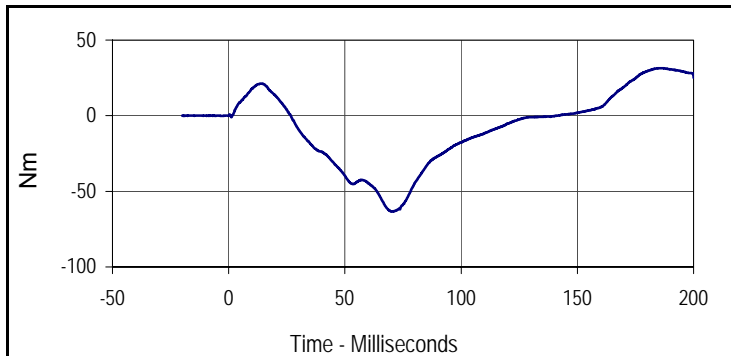
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	472	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass	
	Min		31.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	31.9	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	19.1	Pass
	20 Msec.	G's	14.0 to 19.0	18.2	Pass
	30 Msec.	G's	11.0 to 16.0	14.1	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	14.1	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	42.0	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	104.9	Pass
	Time	Msec.	72.0 to 82.0	75.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	160.3	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-63.4	Pass
	Time	Msec.	65.0 to 79.0	70.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	141.2	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
19.5	3.1	-1.7	60.6



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
104.9	75.5	-31.3	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
31.5	186.9	-63.4	70.5

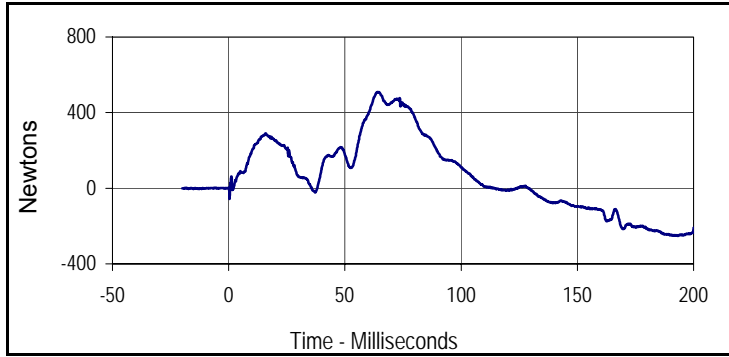
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 11/18/14

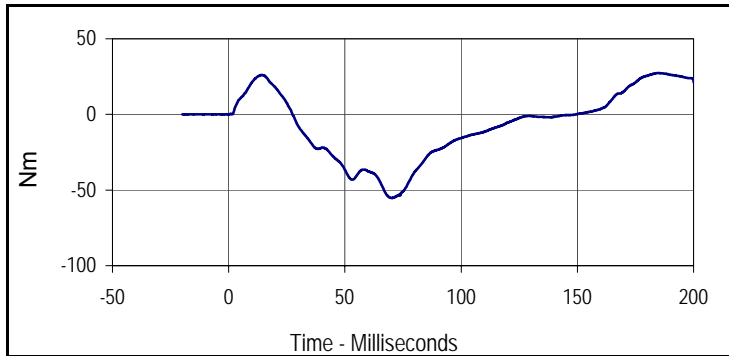


ATD Serial No.: 360

Test I.D.: M360NE004



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
509.7	64.7	-252.4	193.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
27.3	185.0	-55.3	70.4

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

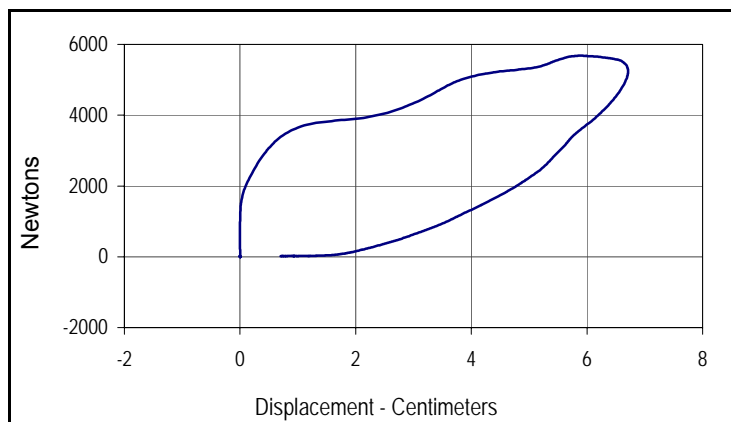
Test Date: 11/18/14



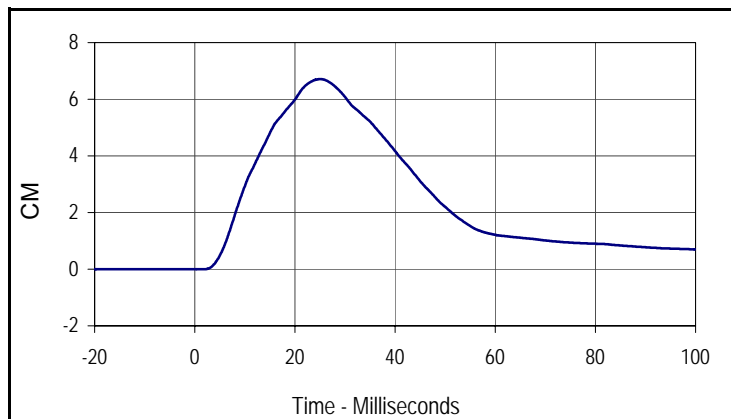
ATD Serial No.: 360

Test I.D.: M360CH004

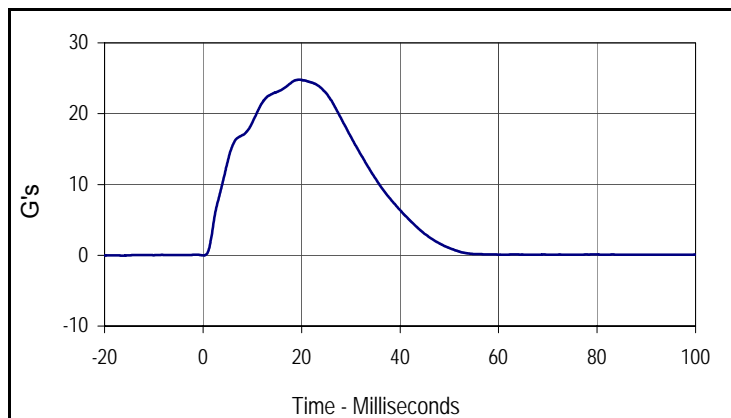
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	547	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass
	Min		31.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.0	Pass
Probe Velocity	m/s	6.58 to 6.82	6.64	Pass
Peak Probe Force	Newtons	5159 to 5893	5681	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.71	Pass
Internal Hysteresis	%	69 to 85	69.7	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	69.7
Peak Probe Force		Peak Chest Deflection	
5681		6.71	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.7	25.0	0.0	-6.9



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.8	19.6	-0.1	-16.3

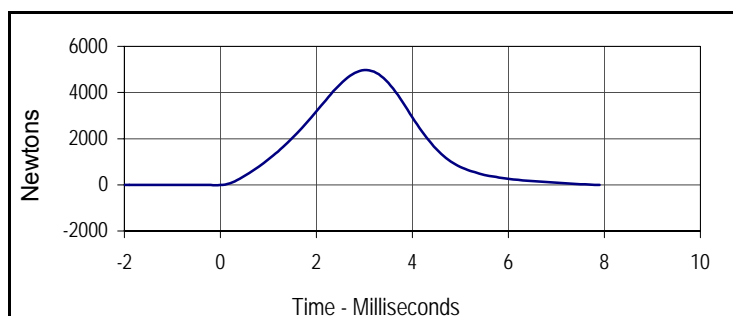


**Left Knee**

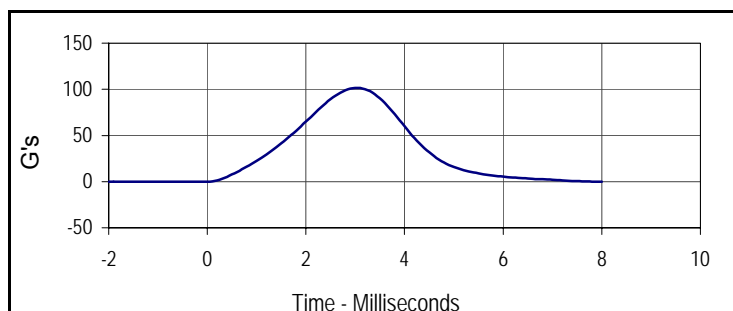
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	602	Pass
Temperature During Soak	Max	18.9 to 25.6	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass
	Min		31.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.0	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	4968	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

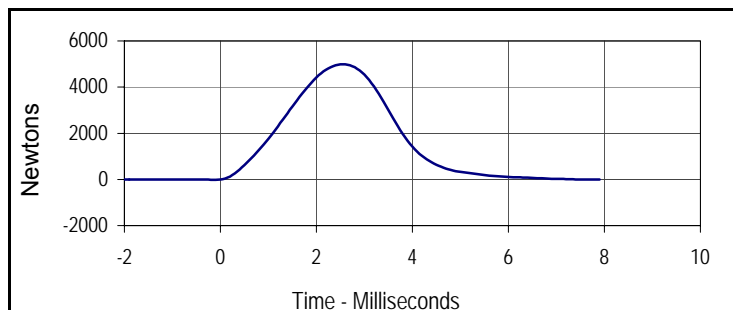
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4987	Pass
<b>Overall Test Results</b>				<b>Pass</b>



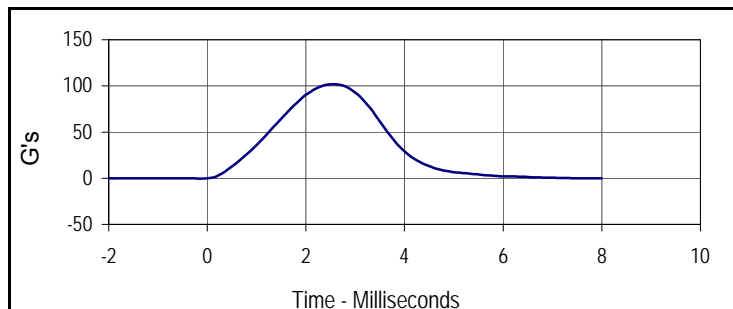
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4968.3	3.0	-11.1	-0.1



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
101.5	3.0	-0.4	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
4987.0	2.6	-18.9	-0.1



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
101.9	2.6	-0.4	0.0

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

Test Date: 11/18/14



ATD Serial No.: 360

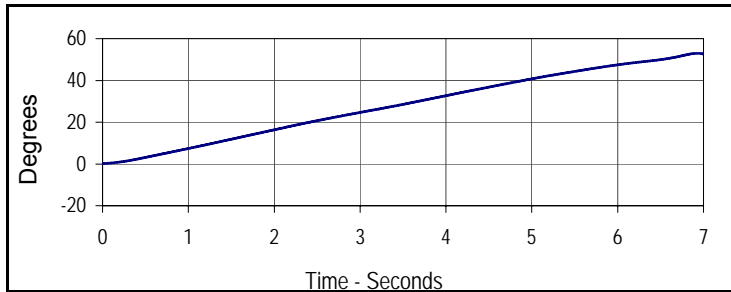
Test I.D.: M360LF004, M360RF004

**Left Hip Joint-Femur Results**

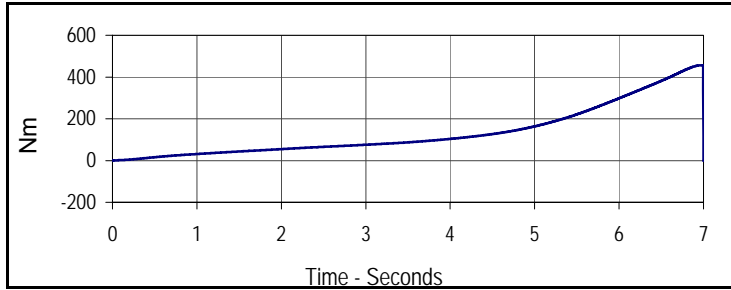
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	677	Pass
Temperature During Soak	Max	18.9 to 25.6	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	32.1	Pass
	Min		31.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass
Rotation Rate	deg/sec	5 to 10	7.6	Pass
Femur Torque at 30°	Nm	≤ 95	90.0	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	42.8	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Hip Joint-Femur Results**

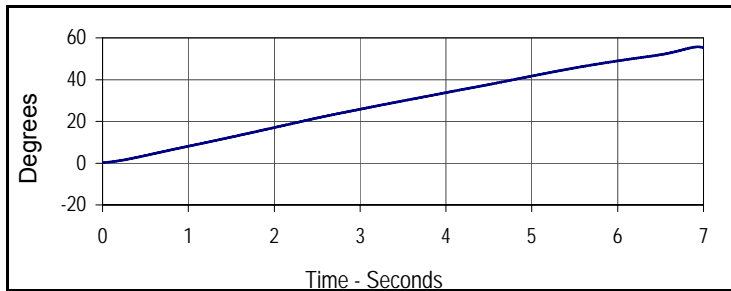
Rotation Rate	deg/sec	5 to 10	8.0	Pass
Femur Torque at 30°	Nm	≤ 95	92.5	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	43.5	Pass
<b>Overall Test Results</b>				<b>Pass</b>



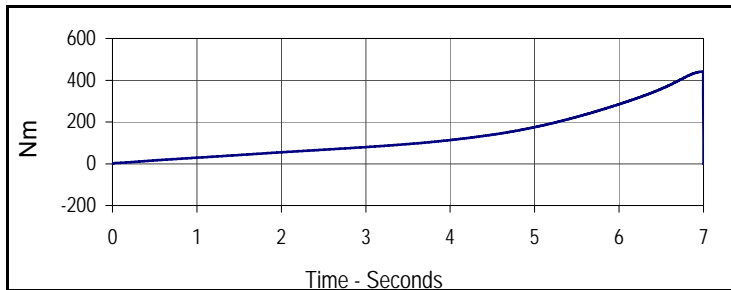
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
53.0	6.9	0.2	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
456.5	7.0	0.2	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
55.7	6.9	0.2	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
440.5	7.0	0.2	0.0

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

Test Date: 11/19/14



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:

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Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 11/19/14



ATD Serial No.: 635

Test I.D.: N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.57	Pass
Laboratory Relative Humidity	%	10 to 70	29.3	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

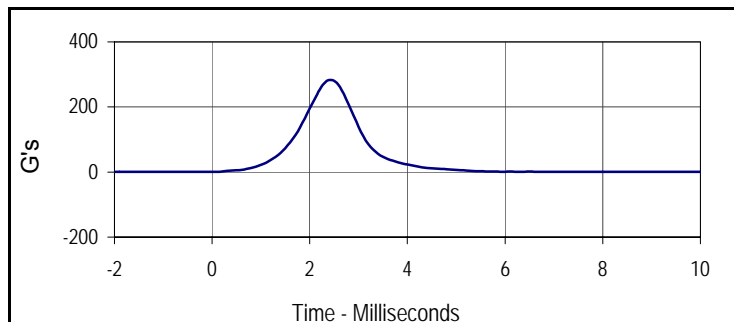
Test Date: 11/19/14



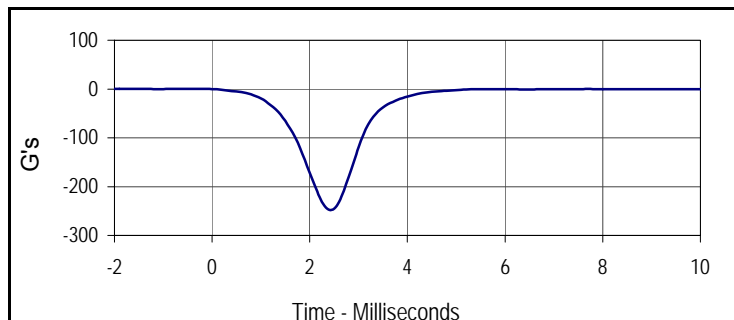
ATD Serial No.: 635

Test I.D.: F635HD049

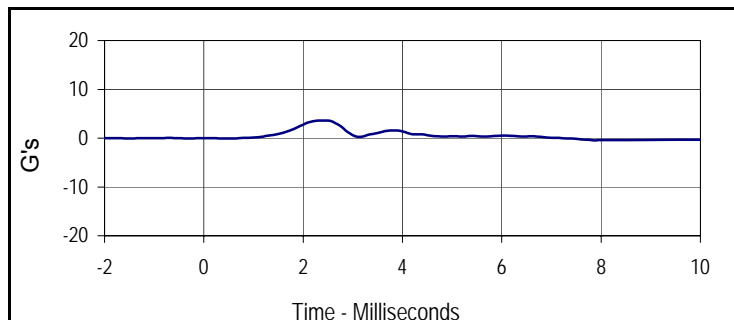
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	422	Pass
Temperature During Soak	Max	18.9 to 25.6	21.6	Pass
	Min		21.5	Pass
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass
	Min		28.6	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	282.8	Pass
Peak Lateral Acceleration	G's	≤15.0	3.6	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	0.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



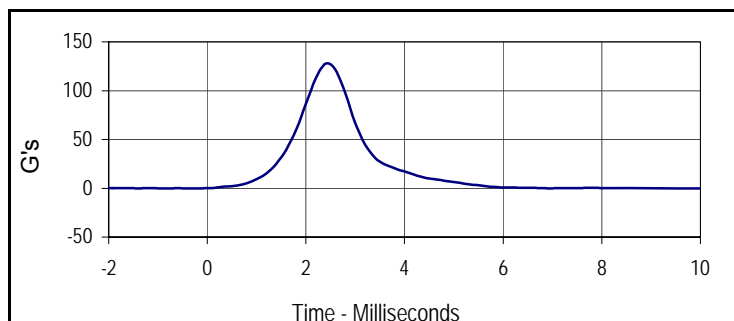
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
282.8	2.4	0.5	0.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	-2.0	-247.5	2.4



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
3.6	2.4	-0.1	0.4



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
127.6	2.4	-0.1	-0.3

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

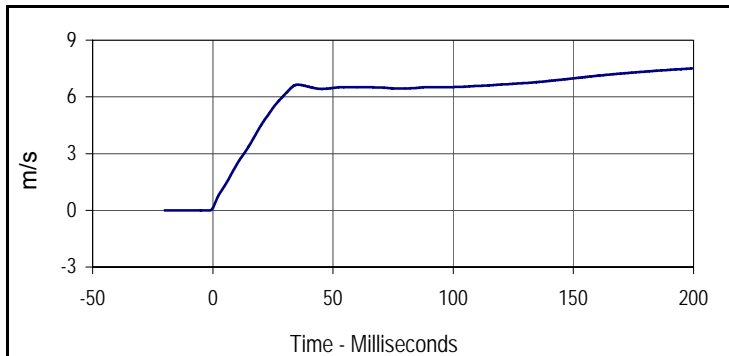
Test Date: 11/19/14



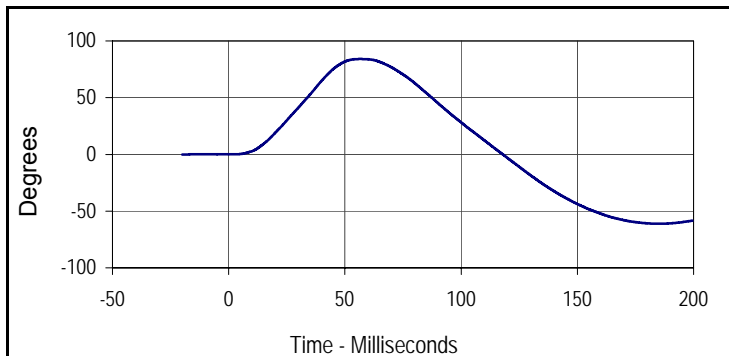
ATD Serial No.: 635

Test I.D.: F635NF049

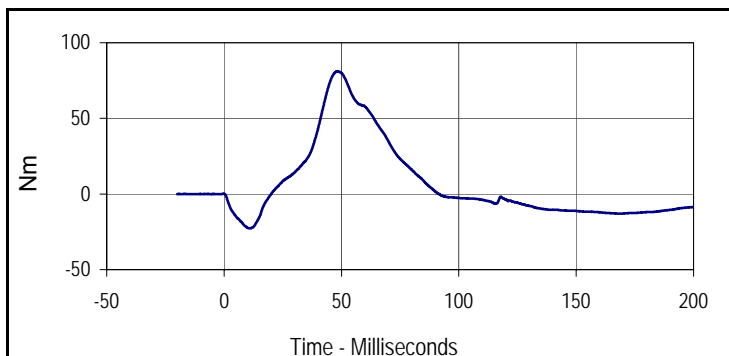
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	487	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass	
	Min		21.5	Pass	
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass	
	Min		28.6	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	28.7	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.94	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	6.1	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	84.1	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	81.1	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	82.4	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.5	199.4	0.0	-1.4



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
84.1	56.6	-61.1	185.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
81.1	48.5	-22.8	10.8

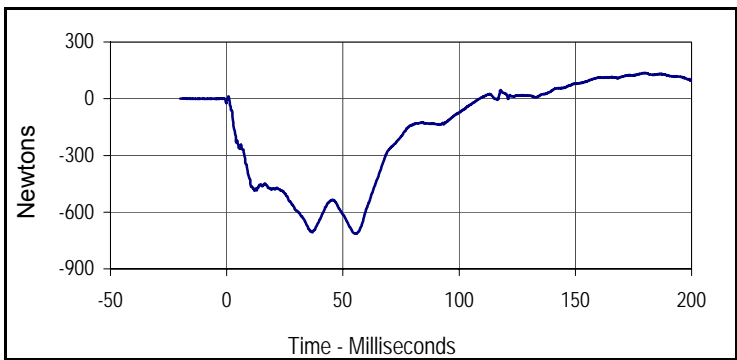
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 11/19/14

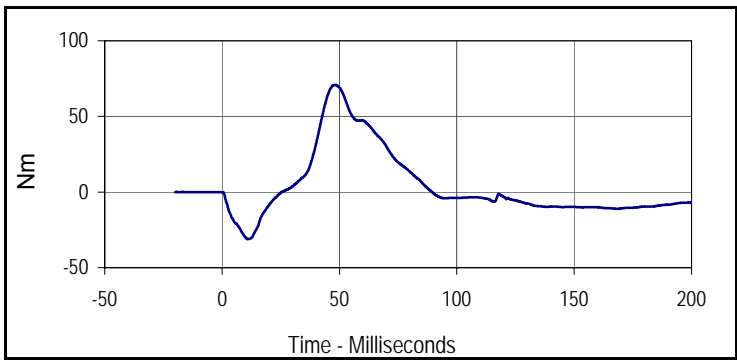


ATD Serial No.: 635

Test I.D.: F635NF049



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
136.5	180.2	-713.8	55.4



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
70.8	48.4	-31.1	10.8

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

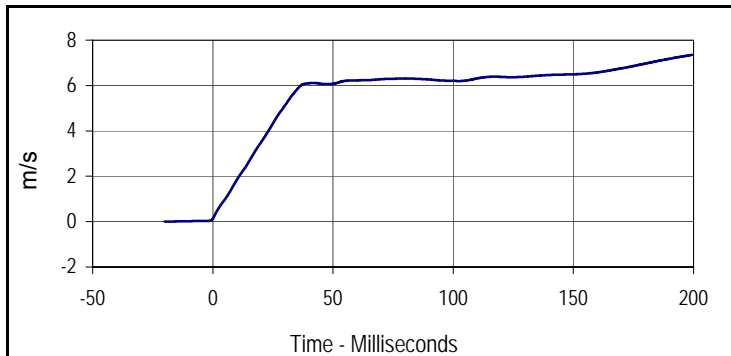
Test Date: 11/19/14



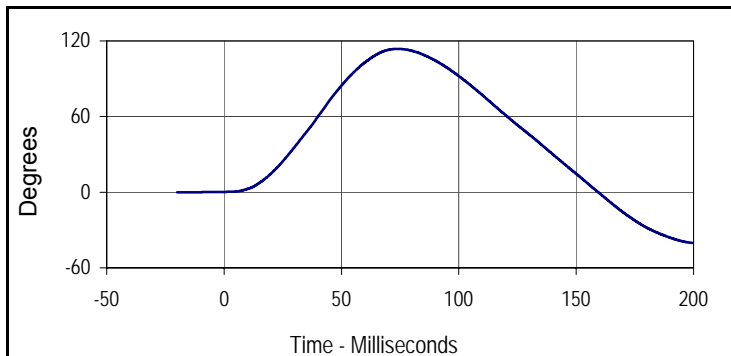
ATD Serial No.: 635

Test I.D.: F635NE049

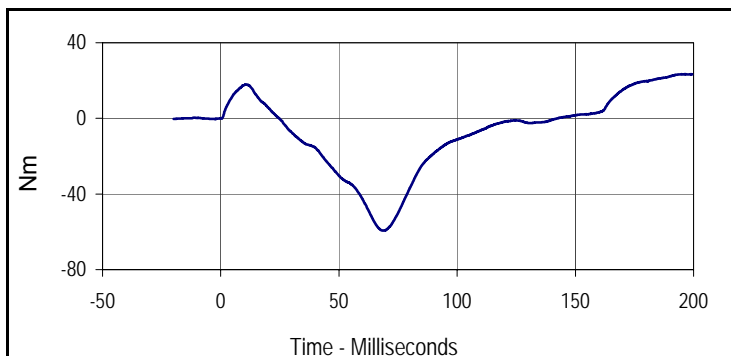
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	552	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass	
	Min		21.5	Pass	
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass	
	Min		28.6	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	28.6	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.03	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.8	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	113.7	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-59.4	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	102.6	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.4	199.4	0.0	-20.0



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
113.7	73.7	-40.2	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
23.4	199.0	-59.4	69.1

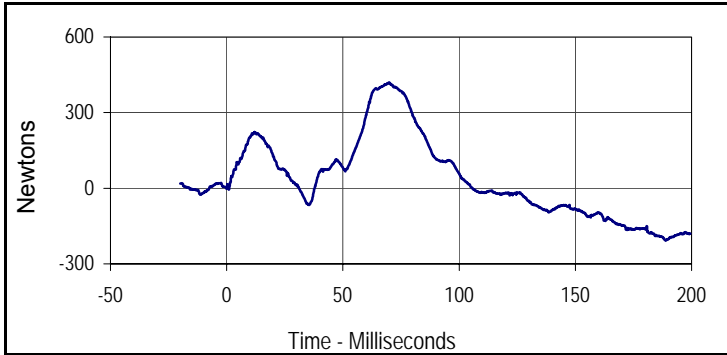
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 11/19/14

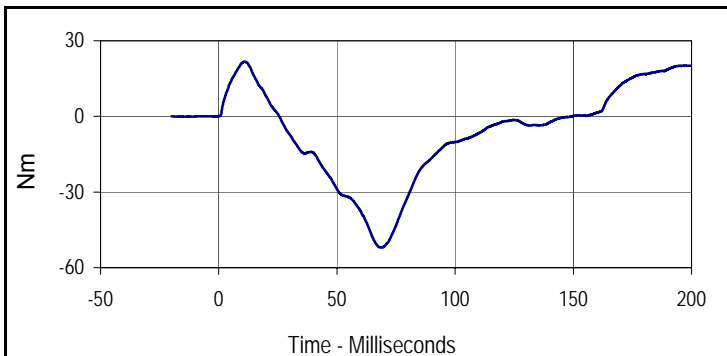


ATD Serial No.: 635

Test I.D.: F635NE049



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
419.7	69.8	-207.0	189.0



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
21.8	10.8	-52.0	69.0

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

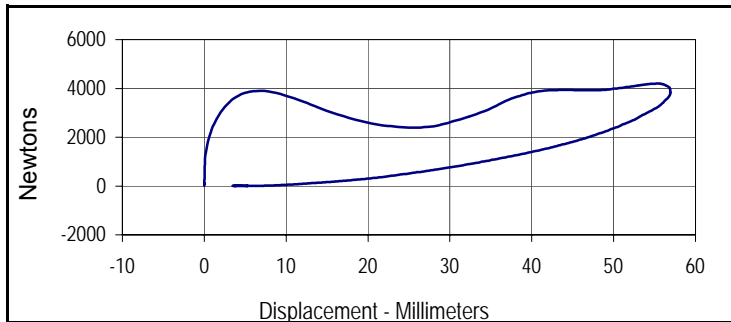
Test Date: 11/19/14



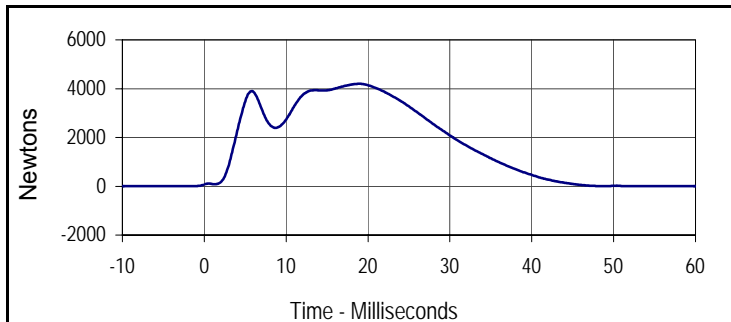
ATD Serial No.: 635

Test I.D.: F635CH049

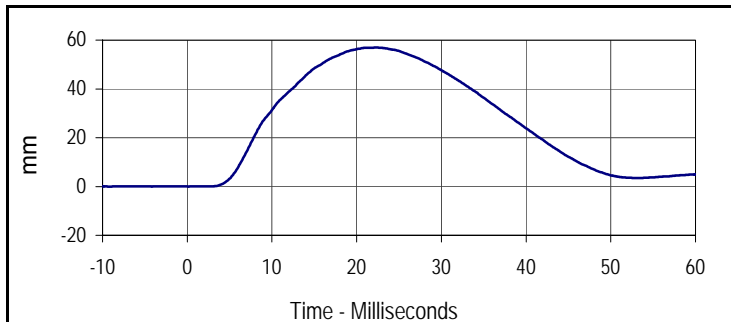
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	597	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.5	Pass
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass
	Min		28.6	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.0	Pass
Probe Velocity	m/s	6.59 to 6.83	6.71	Pass
Peak Chest Deflection	mm	50.0 to 58.0	56.9	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	3987	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4199	Pass
Internal Hysteresis	%	69 to 85	70.4	Pass
Overall Test Results				Pass



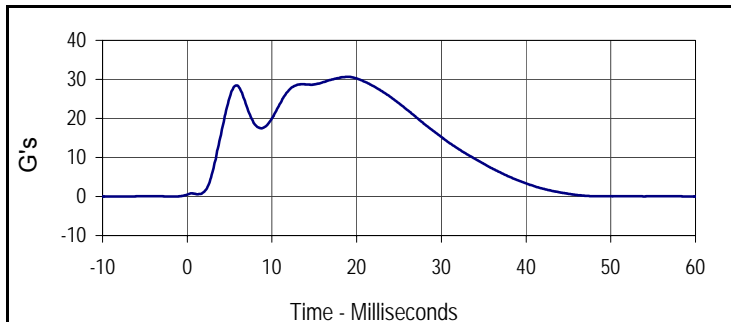
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	70.4
Peak Probe Force		Peak Chest Deflection	
4199.3		56.9	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4199.3	19.0	0.2	66.9



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
56.9	22.3	0.0	-9.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
30.7	19.0	0.0	66.9

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

Test Date: 11/19/14



ATD Serial No.: 635

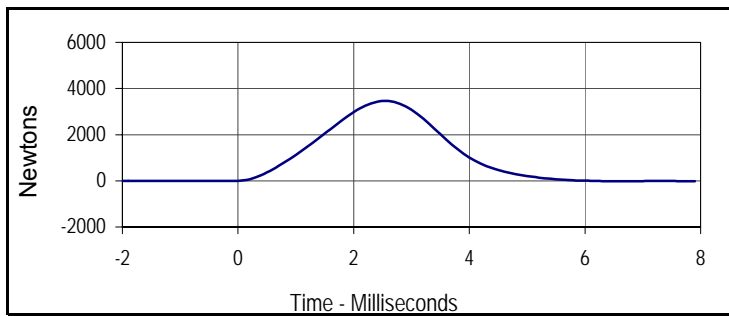
Test I.D.: F635LK049, F635RK049

**Left Knee**

Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	652	Pass
Temperature During Soak	Max	18.9 to 25.6	21.6	Pass
	Min		21.5	Pass
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass
	Min		28.6	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.2	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	3450 to 4060	3464	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

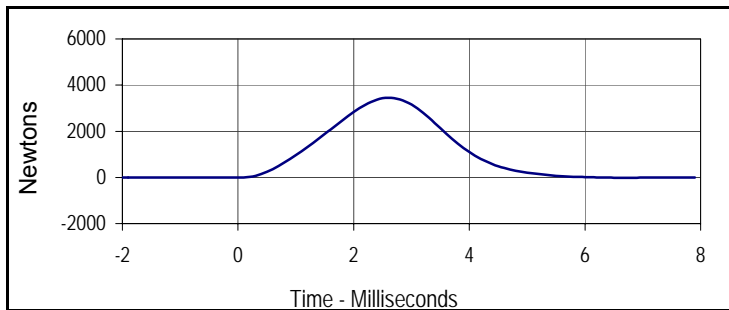
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	3450 to 4060	3453	Pass
<b>Overall Test Results</b>				<b>Pass</b>



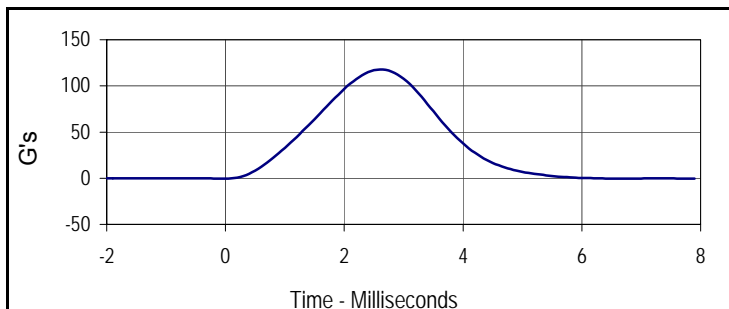
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3463.6	2.5	-22.5	6.6



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
118.2	2.5	-1.1	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3452.7	2.6	-14.4	6.7



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
117.8	2.6	-0.9	0.0

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

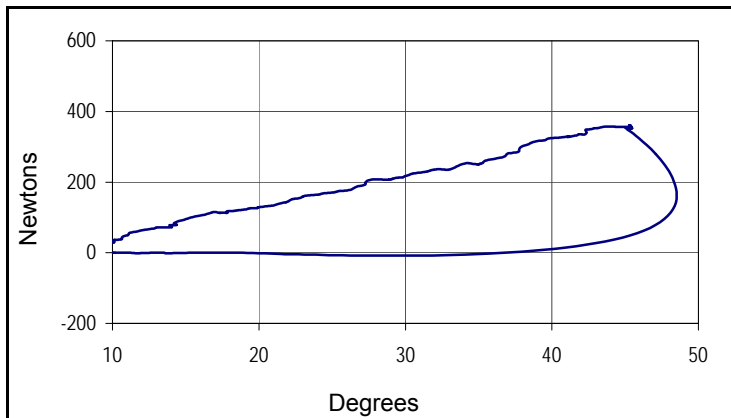
Test Date: 11/19/14



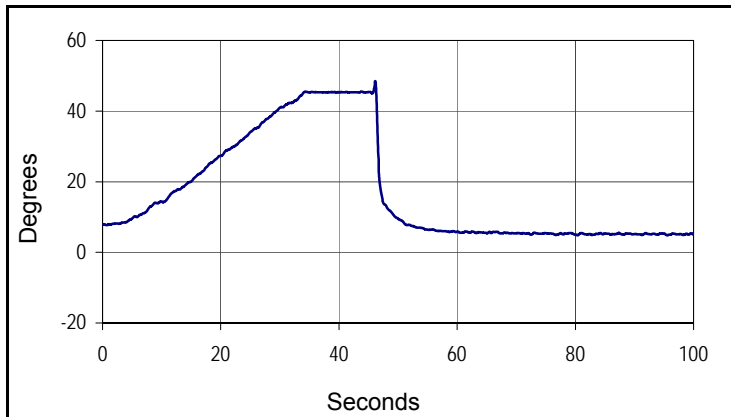
ATD Serial No.: 635

Test I.D.: TF049

Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	717	Pass
Temperature During Soak	Max	18.9 to 25.6	21.6	Pass
	Min		21.5	Pass
Humidity During Soak	Max	10.0 to 70.0	29.3	Pass
	Min		28.6	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.2	Pass
Initial Reference Plane Angle	Degrees	≤ 20	7.9	Pass
Peak Force at 45° +/-0.5°	Newtons	320.0 to 390.0	360.3	Pass
Torso Rotation Rate	deg/sec	0.5 to 1.5	1.1	Pass
Final Reference Plane Angle	Degrees	+/-8	5.2	Pass
Overall Test Results				Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
360.3		48.5



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
48.5	46.2	4.8	80.4

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

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

Test Date: 1G/15/14



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:

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Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 1G15/14



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

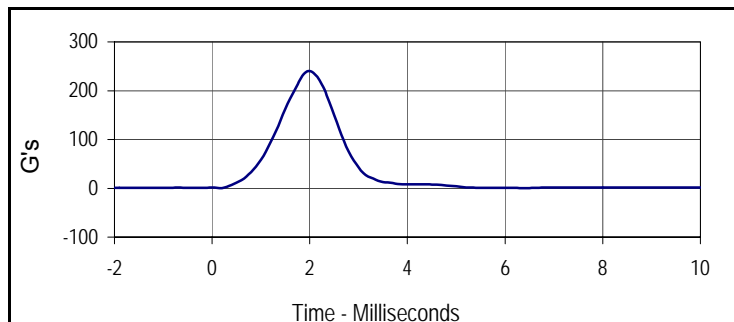
Test Date: 1G15/14



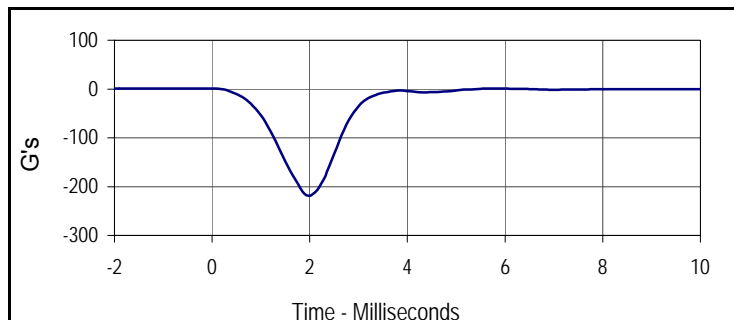
ATD Serial No.: 360

Test I.D.: M360HD005

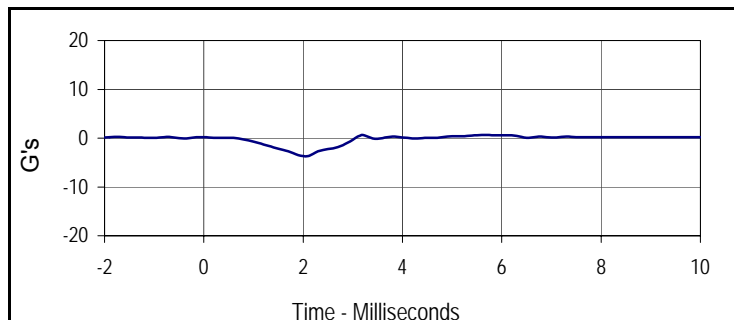
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	311	Pass
Temperature During Soak	Max	18.9 to 25.6	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.3	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	240.3	Pass
Peak Lateral Acceleration	G's	≤15.0	3.7	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	3.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



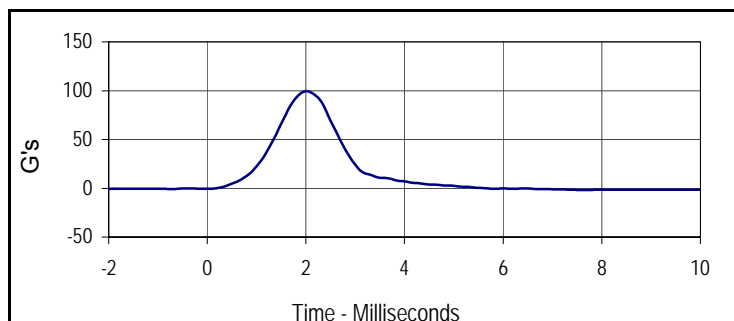
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
240.3	2.0	0.2	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.2	0.0	-218.7	2.0



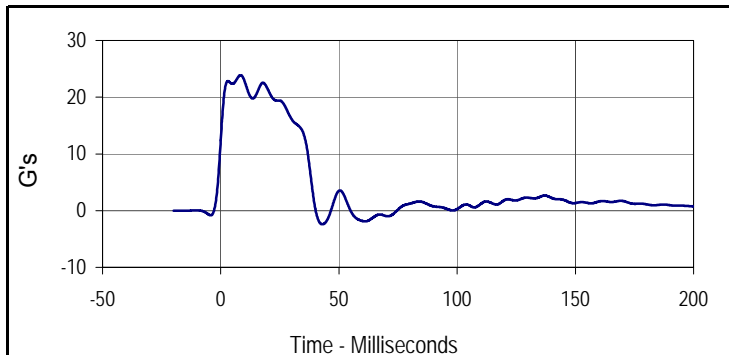
Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
0.7	5.6	-3.7	2.0



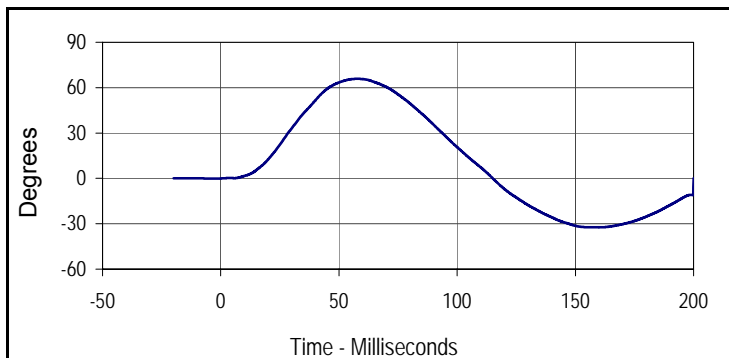
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
99.5	2.0	-0.7	-0.8



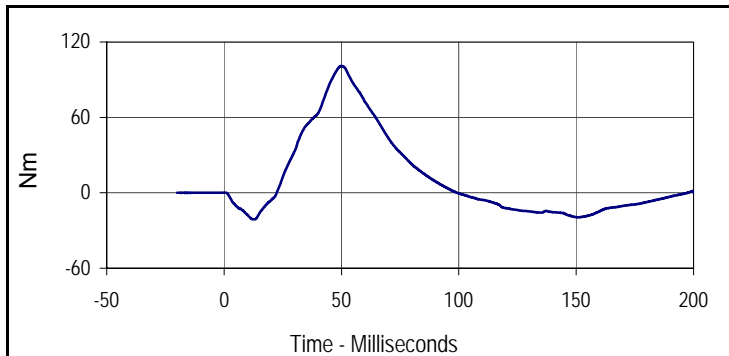
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	376	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass	
	Min		23.1	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	23.4	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.91	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.9	Pass
	20 Msec.	G's	17.6 to 22.6	21.3	Pass
	30 Msec.	G's	12.5 to 18.5	16.1	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	16.1	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	38.4	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	65.8	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	115.1	Pass	
Moment About Occ. Condyle	Max	Nm	88.1 to 108.5	101.0	Pass
	Time	Msec.	47.0 to 58.0	50.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	99.4	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.9	8.4	-2.4	43.0



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
65.8	57.7	-32.3	157.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
101.0	50.1	-21.1	12.9

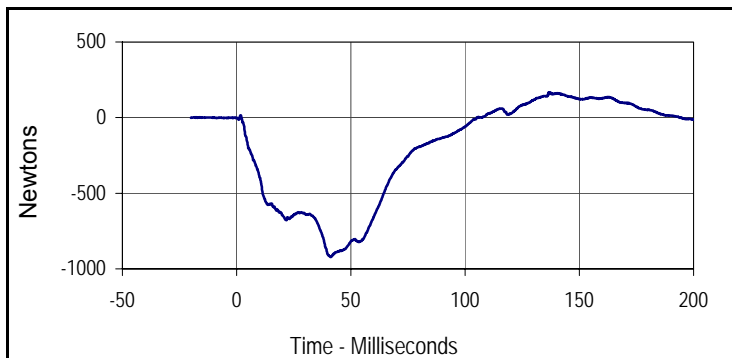
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 1G15/14

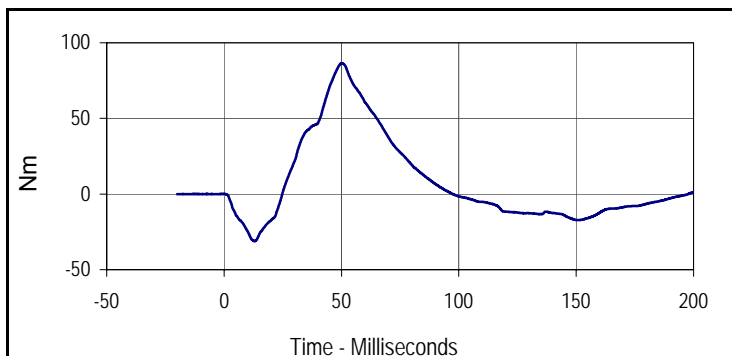


ATD Serial No.: 360

Test I.D.: M360NF005



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
166.1	136.5	-921.6	41.2



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
86.5	50.2	-31.1	13.1

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

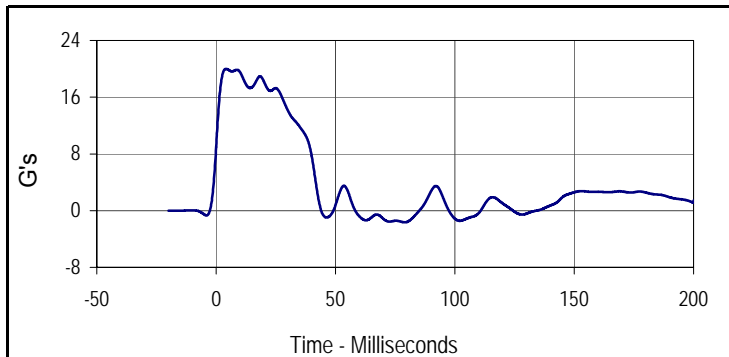
Test Date: 1G15/14



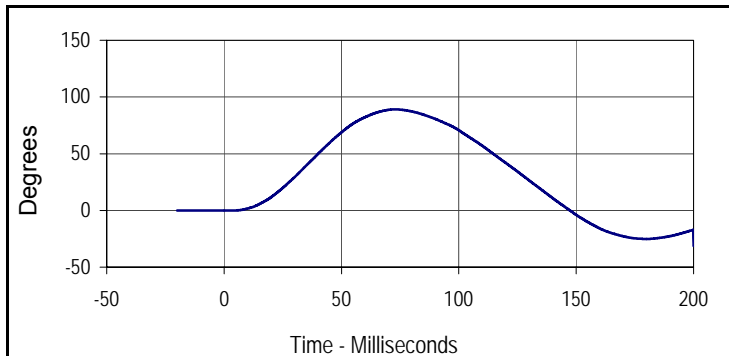
ATD Serial No.: 360

Test I.D.: M360NE005

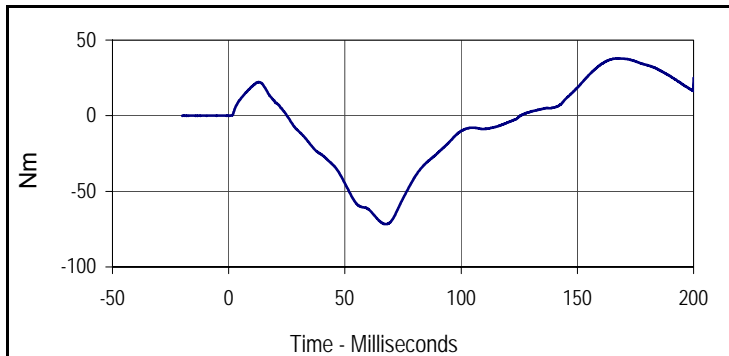
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	421	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass	
	Min		23.1	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	23.4	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	5.95	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	19.5	Pass
	20 Msec.	G's	14.0 to 19.0	18.2	Pass
	30 Msec.	G's	11.0 to 16.0	14.1	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	14.1	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	41.3	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	89.1	Pass
	Time	Msec.	72.0 to 82.0	72.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	147.4	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-71.7	Pass
	Time	Msec.	65.0 to 79.0	67.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	125.6	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
20.0	4.1	-1.6	79.0



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
89.1	72.8	-31.3	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
37.9	166.9	-71.7	67.1

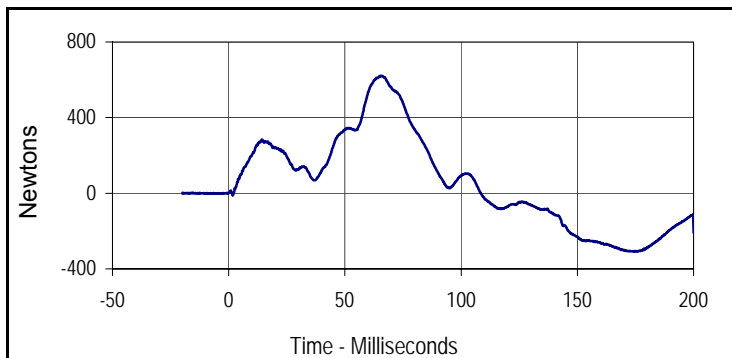
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 1G15/14

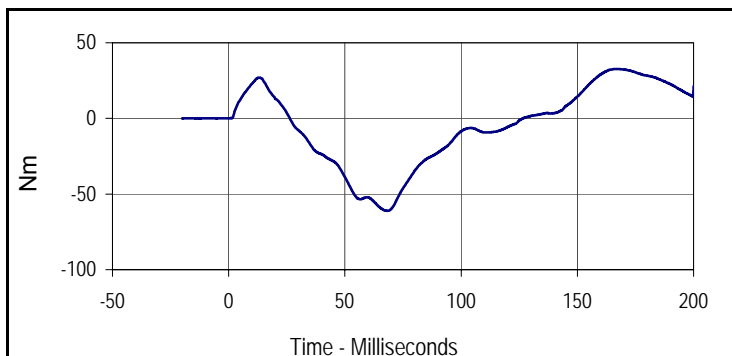


ATD Serial No.: 360

Test I.D.: M360NE005



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
620.5	66.1	-309.4	174.4



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
32.7	167.0	-61.2	68.3

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

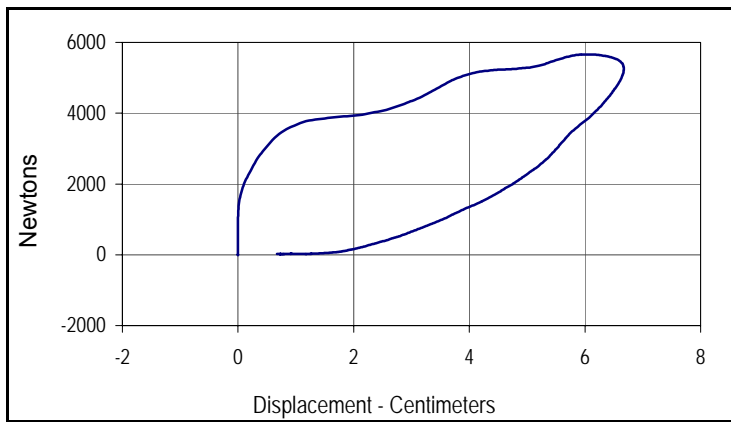
Test Date: 1G15/14



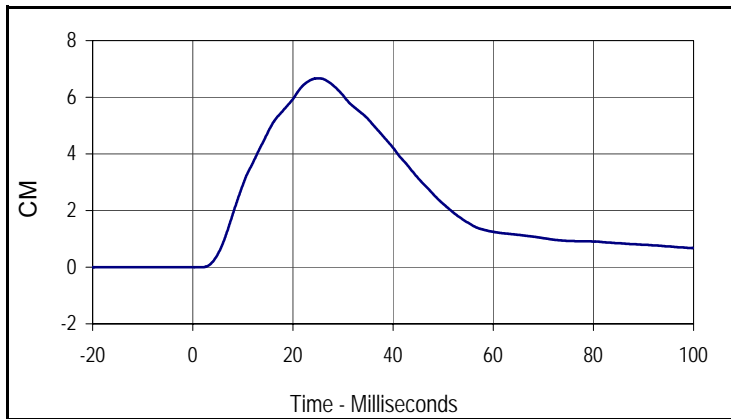
ATD Serial No.: 360

Test I.D.: M360CH005

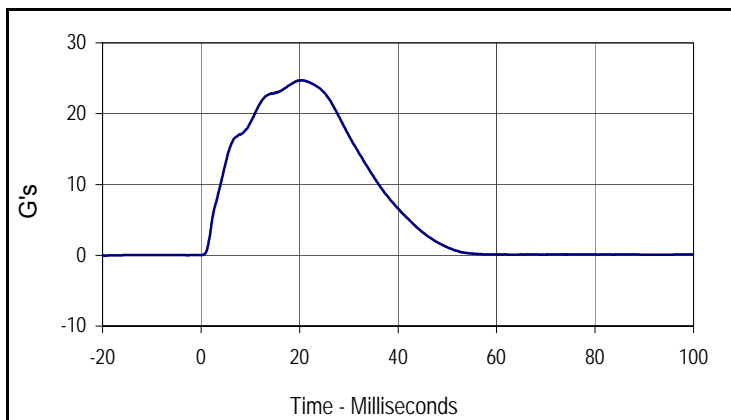
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	496	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.3	Pass
Probe Velocity	m/s	6.58 to 6.82	6.73	Pass
Peak Probe Force	Newtons	5159 to 5893	5657	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.67	Pass
Internal Hysteresis	%	69 to 85	69.5	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	69.5
Peak Probe Force		Peak Chest Deflection	
5657		6.67	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.7	25.1	0.0	1.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.7	20.6	0.0	-20.0



**Left Knee**

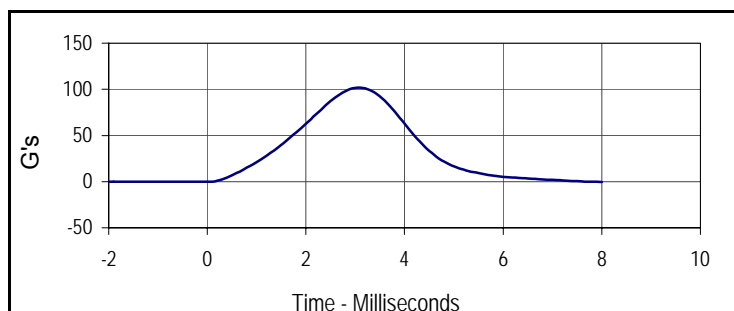
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	551	Pass
Temperature During Soak	Max	18.9 to 25.6	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.2	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4980	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

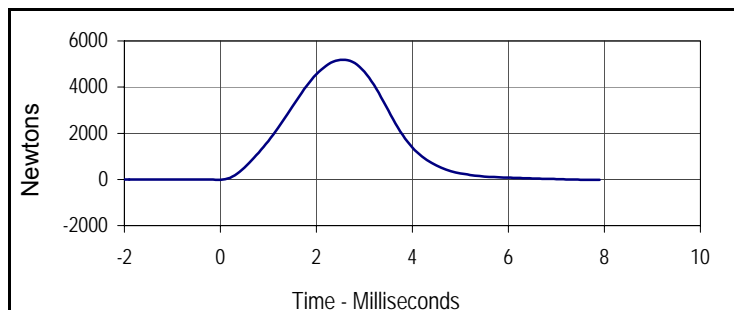
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5187	Pass
<b>Overall Test Results</b>				<b>Pass</b>



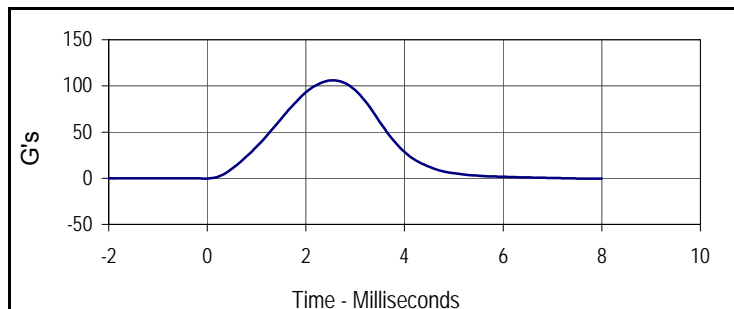
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4980.3	3.1	-12.4	7.9



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
101.8	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
5187.4	2.6	-17.0	7.9



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
106.0	2.6	-0.5	0.0

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

Test Date: 12/15/14



ATD Serial No.: 360

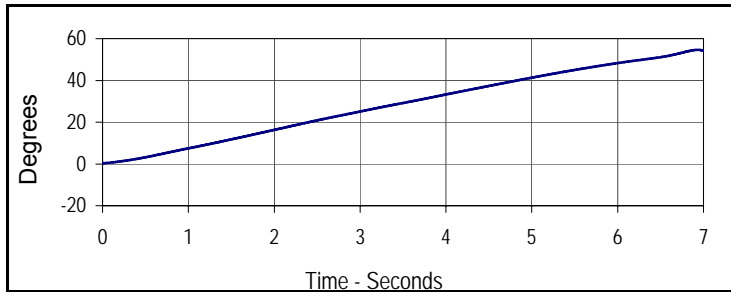
Test I.D.: M360LF005\_M360RF005

**Left Hip Joint-Femur Results**

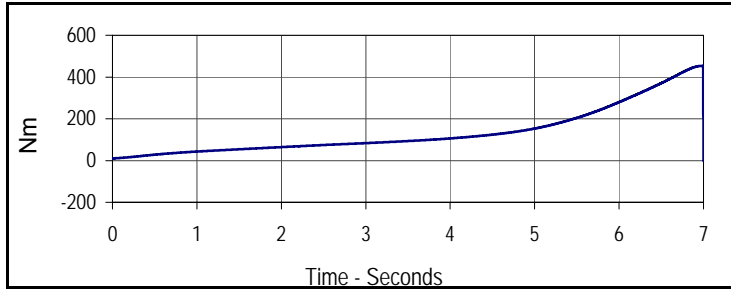
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	626	Pass
Temperature During Soak	Max	18.9 to 25.6	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.4	Pass
	Min		23.1	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.3	Pass
Rotation Rate	deg/sec	5 to 10	7.9	Pass
Femur Torque at 30°	Nm	≤ 95	94.0	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	44.4	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Hip Joint-Femur Results**

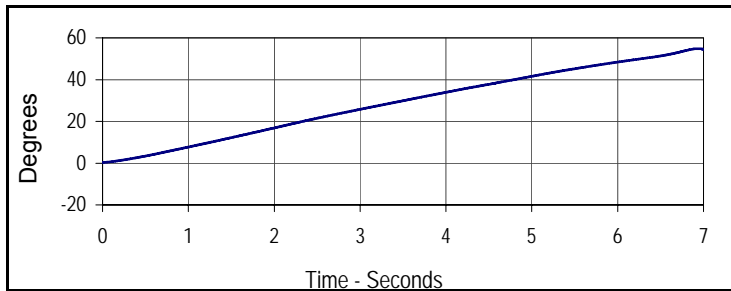
Rotation Rate	deg/sec	5 to 10	7.9	Pass
Femur Torque at 30°	Nm	≤ 95	85.2	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	43.6	Pass
<b>Overall Test Results</b>				<b>Pass</b>



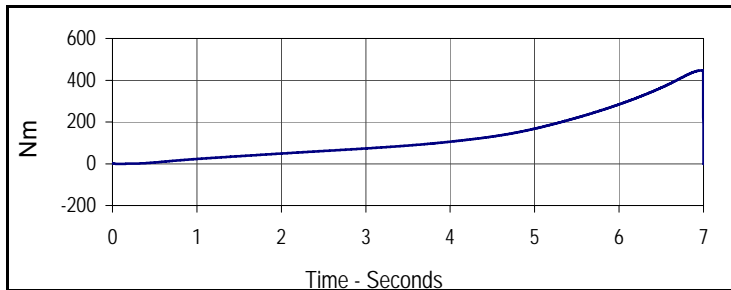
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
54.6	6.9	0.3	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
453.2	7.0	0.3	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
54.8	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
447.3	7.0	0.3	0.0

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

Test Date: 1G16/14



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:

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Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 1G16/14



ATD Serial No.: 635

Test I.D.: N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.30	Pass
Laboratory Relative Humidity	%	10 to 70	22.4	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
<b>Overall Test Results</b>				<b>Pass</b>

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

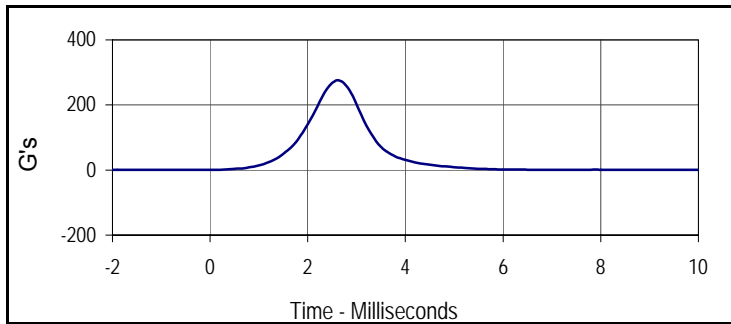
Test Date: 1G16/14



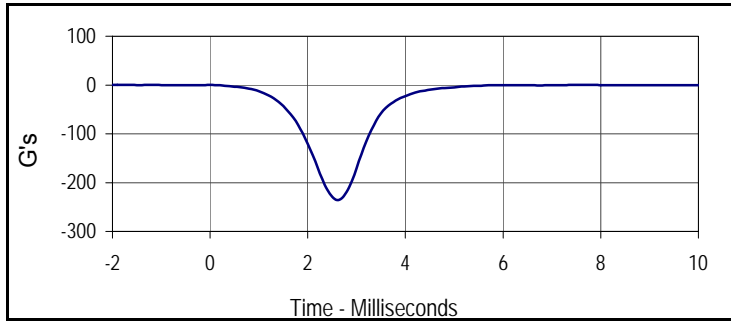
ATD Serial No.: 635

Test I.D.: F635HD050

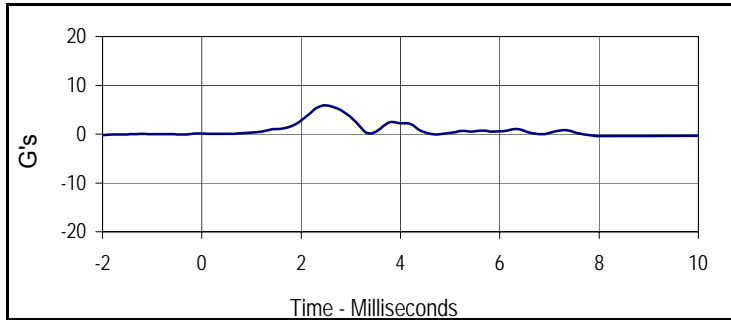
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	402	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass
	Min		22.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.5	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	276.4	Pass
Peak Lateral Acceleration	G's	≤15.0	5.9	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	0.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



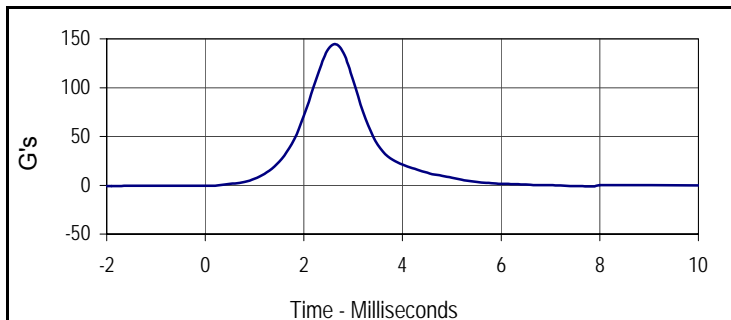
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
276.4	2.6	0.5	-1.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	-1.7	-235.6	2.6



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
5.9	2.5	-0.2	-2.0



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
144.4	2.6	-0.7	-1.7

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

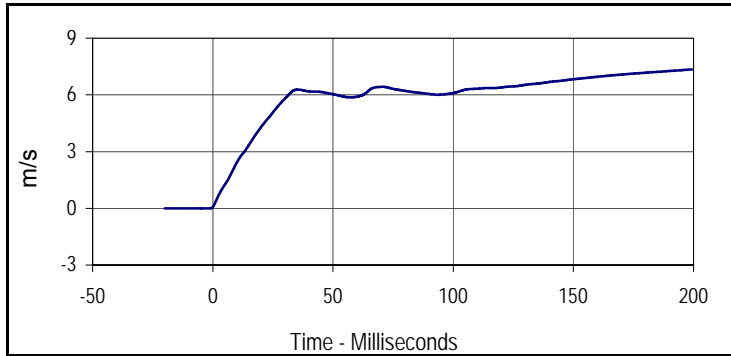
Test Date: 12/16/14



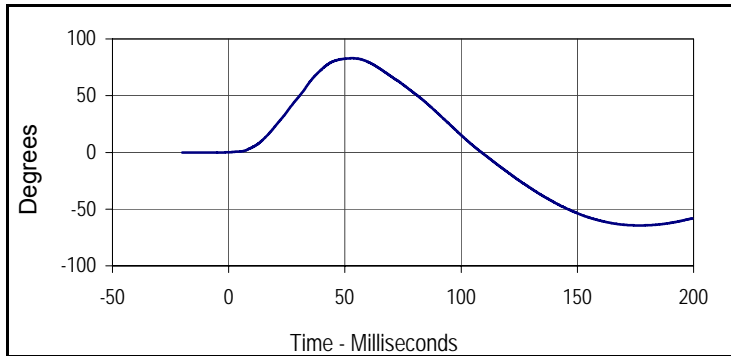
ATD Serial No.: 635

Test I.D.: F635NF050

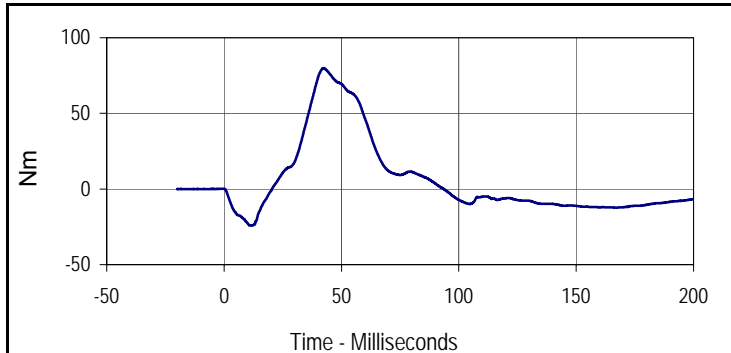
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	467	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass	
	Min		22.2	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	22.3	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.09	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.4	Pass
	20 Msec.	m/s	4.0 to 5.0	4.3	Pass
	30 Msec.	m/s	5.8 to 7.0	5.8	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	83.0	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	79.9	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	80.3	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.3	199.4	0.0	-1.2



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
83.0	53.2	-64.4	176.7



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
79.9	42.4	-24.2	11.7

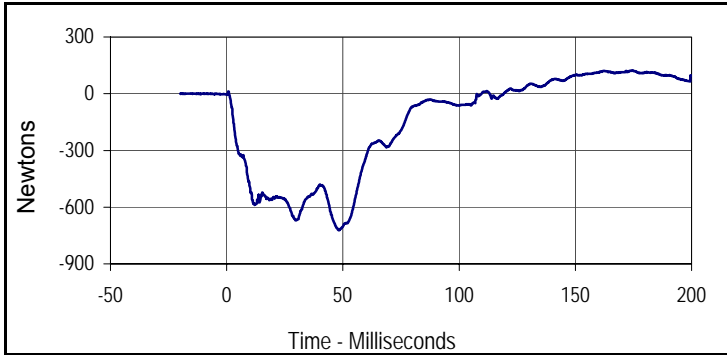
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 1G16/14

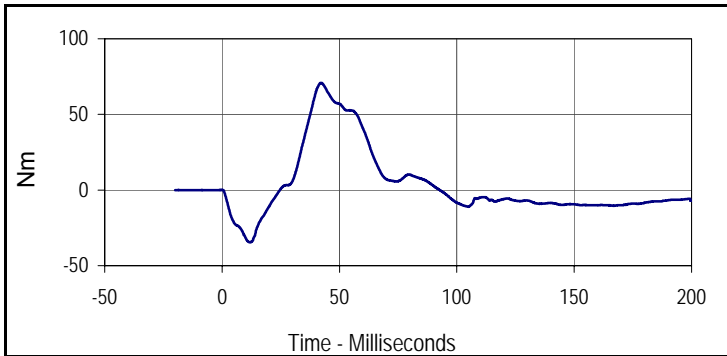


ATD Serial No.: 635

Test I.D.: F635NF050



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
122.8	173.9	-722.9	48.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
70.8	42.2	-34.5	11.9

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

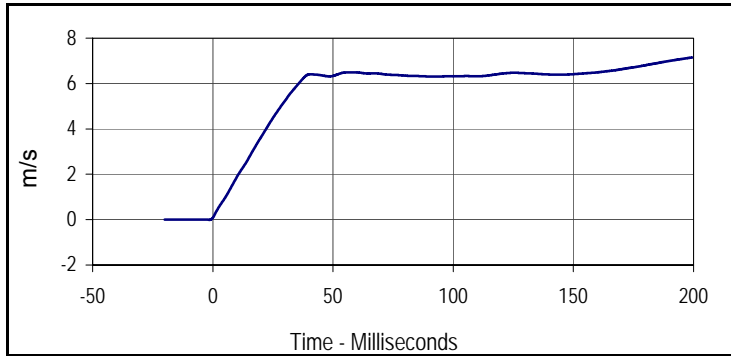
Test Date: 12/16/14



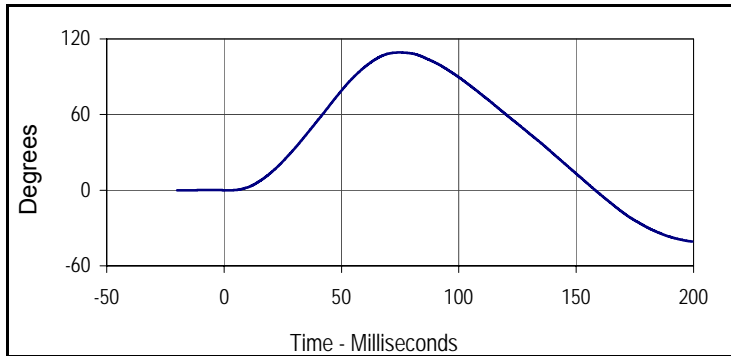
ATD Serial No.: 635

Test I.D.: F635NE050

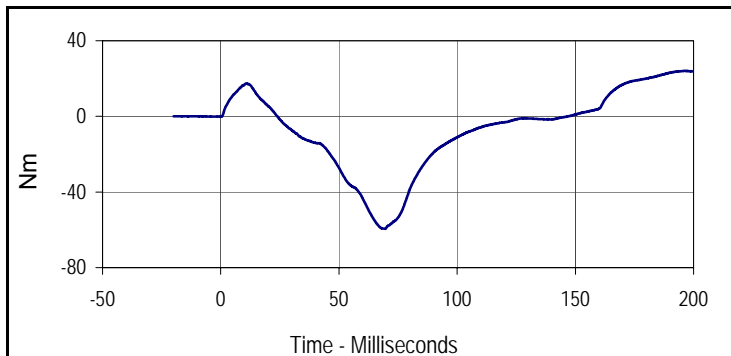
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	532	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass	
	Min		22.2	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	22.3	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.06	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	5.2	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	109.3	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-59.6	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	101.7	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.1	199.4	0.0	-1.4



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
109.3	74.7	-40.7	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
24.1	196.0	-59.6	69.6

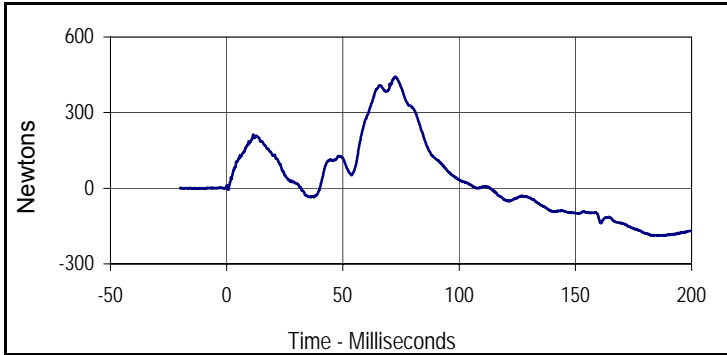
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 12/16/14

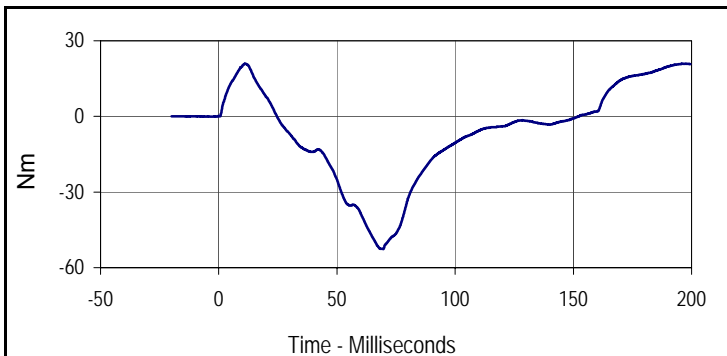


ATD Serial No.: 635

Test I.D.: F635NE050



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
442.1	72.6	-188.5	185.7



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
21.0	11.1	-52.7	69.6

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

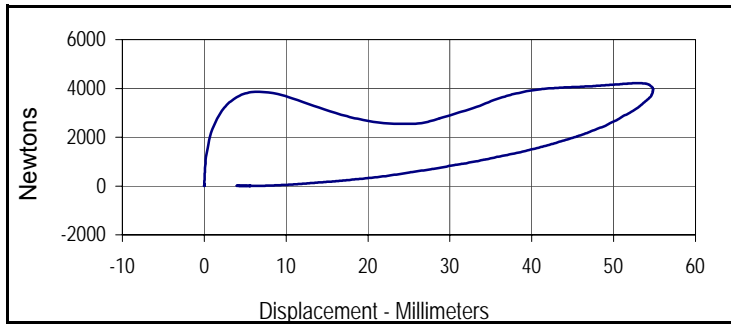
Test Date: 1G16/14



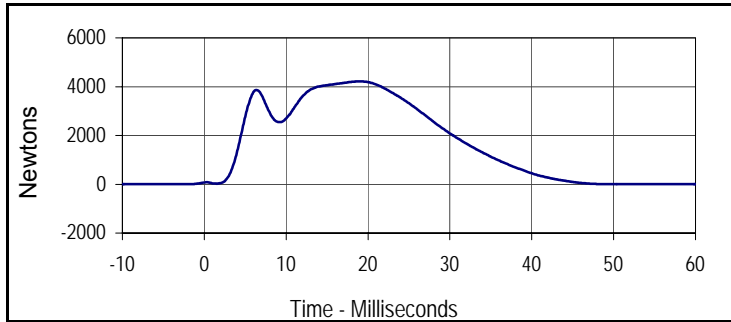
ATD Serial No.: 635

Test I.D.: F635CH050

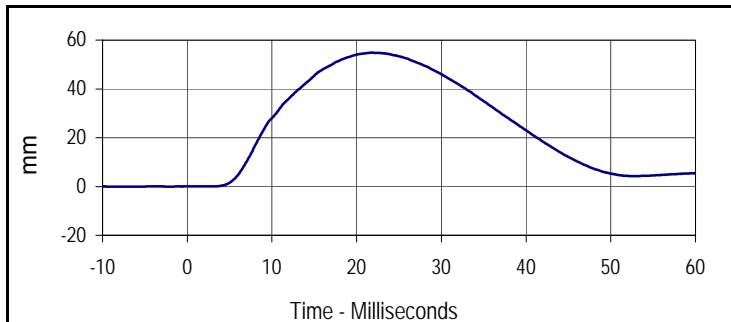
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	577	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass
	Min		22.2	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.2	Pass
Probe Velocity	m/s	6.59 to 6.83	6.71	Pass
Peak Chest Deflection	mm	50.0 to 58.0	54.8	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4156	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4216	Pass
Internal Hysteresis	%	69 to 85	71.0	Pass
Overall Test Results				Pass



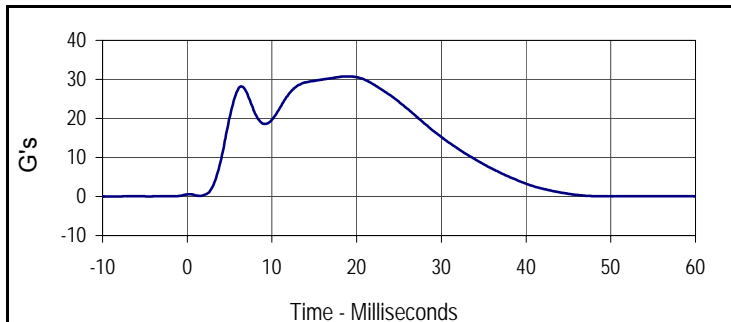
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	71.0
Peak Probe Force		Peak Chest Deflection	
4215.9		54.8	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4215.9	19.1	3.3	-9.7



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
54.8	21.8	0.0	-6.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
30.8	19.1	0.0	-9.7

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

Test Date: 1G16/14



ATD Serial No.: 635

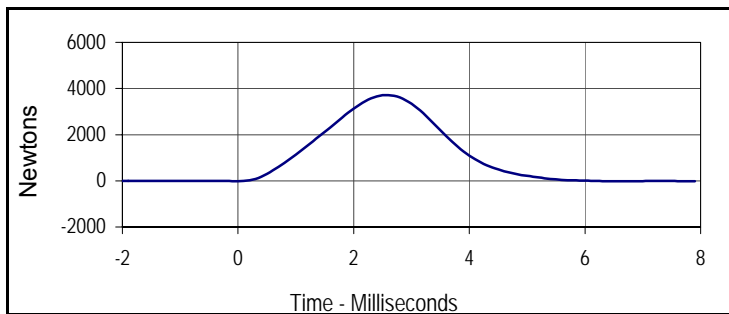
Test I.D.: F635LK050, F635RK050

**Left Knee**

Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	632	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass
	Min		22.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.2	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	3450 to 4060	3718	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

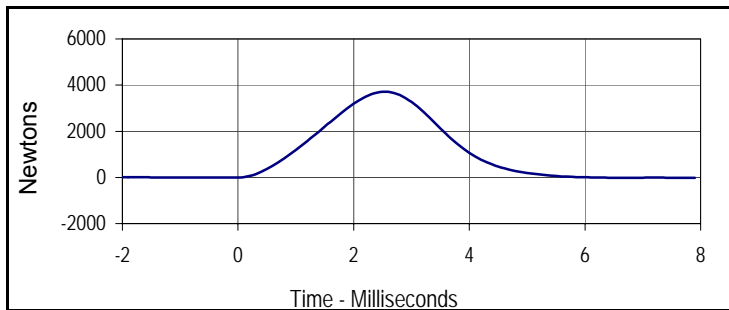
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3710	Pass
<b>Overall Test Results</b>				<b>Pass</b>



Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3717.7	2.6	-20.4	6.6



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
126.8	2.6	-1.2	0.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3709.9	2.5	-19.4	7.9



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
126.6	2.5	-1.2	0.0

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

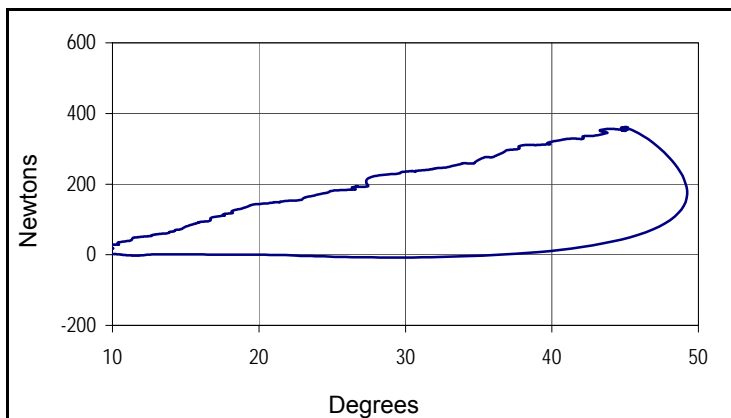
Test Date: 1G16/14



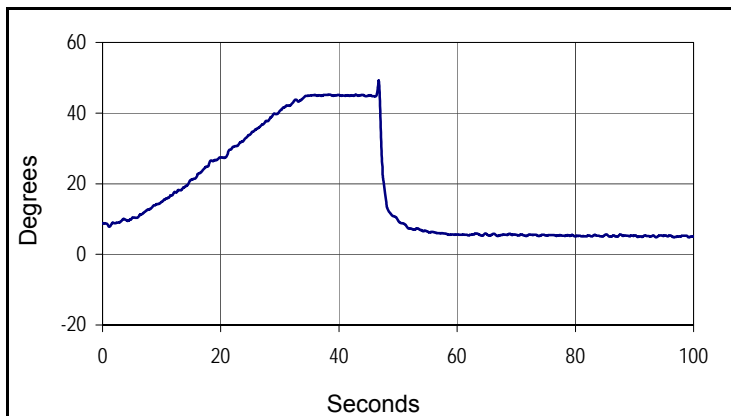
ATD Serial No.: 635

Test I.D.: TF050

Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	697	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	22.5	Pass
	Min		22.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.2	Pass
Initial Reference Plane Angle	Degrees	≤ 20	8.8	Pass
Peak Force at 45° +/-0.5°	Newtons	320.0 to 390.0	361.7	Pass
Torso Rotation Rate	deg/sec	0.5 to 1.5	1.1	Pass
Final Reference Plane Angle	Degrees	+/-8	5.1	Pass
Overall Test Results				Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
361.7		49.2



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
49.2	46.8	4.8	99.2