

REPORT NUMBER: NCAP-KAR-16-017

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

**KIA MOTORS MANUFACTURING GEORGIA, INC.
2016 KIA OPTIMA LX 4-DOOR SEDAN**

NHTSA NUMBER: M20164206

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



FEBRUARY 17, 2016

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

1. Report No. NCAP-KAR-16-017	2. Government Accession No.	3. Recipient's Catalog No.																																																					
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2016 Kia Optima LX 4-Door Sedan NHTSA No. M20164206		5. Report Date February 17, 2016																																																					
		6. Performing Organization Code KAR																																																					
7. Authors Mr. Javier J. Martinez, Project Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO		8. Performing Organization Report No. TR-P35001-05-NC																																																					
		10. Work Unit No.																																																					
9. Performing Organization Name and Address KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		11. Contract or Grant No. DTNH22-12-D-00259																																																					
		13. Type of Report and Period Covered Final Test Report, February 3 - 17, 2016																																																					
12. Sponsoring Agency Name and Address 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		14. Sponsoring Agency Code NRM-110																																																					
		15. Supplementary Notes																																																					
16. Abstract <p>A 56 km/h NCAP Frontal Impact Test was conducted on a 2016 Kia Optima LX 4-door sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on February 3, 2016.</p> <p>The impact velocity of the vehicle was 56.57 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 430 mm at the vehicle's centerline. The test vehicle's performance is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700.0</td> <td>184.9</td> <td>700.0</td> <td>282.4</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-18</td> <td>52</td> <td>-10</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.22</td> <td>1</td> <td>0.50</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>970.0</td> <td>2620</td> <td>852.3</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-243.1</td> <td>2520</td> <td>-450.7</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-508.0</td> <td>6800</td> <td>-385.3</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-1335.6</td> <td>6800</td> <td>-411.3</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700.0	184.9	700.0	282.4	Maximum Chest Compression	mm	63	-18	52	-10	Nij	N/A	1	0.22	1	0.50	Neck Tension	N	4170	970.0	2620	852.3	Neck Compression	N	4000	-243.1	2520	-450.7	Left Femur Force	N	10000	-508.0	6800	-385.3	Right Femur Force	N	10000	-1335.6	6800	-411.3
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		19. Security Classification of this report UNCLASSIFIED	20. Security Classification of this page UNCLASSIFIED	21. No. of Pages 135	22. Price																																																		

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56 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 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated October 2015.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2016 Kia Optima LX 4-door sedan at a velocity of 56.57 km/h. The test was performed at KARCO Engineering, LLC. on February 3, 2016. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. Seat belt load cells were placed on both 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. 141) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 106 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 430 mm located at the vehicle 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 and lower torso contacted the airbag. Both the left knee and right knee contacted the knee airbag and steering rim.

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

The occupant data is summarized below:

ATD Position	HIC ₁₅	T ¹	T ²	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	184.9	72.0	87.0	-18	0.22	970.0	-243.1	-508.0	-1335.6
Passenger (5th)	282.4	60.8	75.8	-10	0.50	852.3	-450.7	-385.3	-411.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

CONVERSION FACTORS

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20164206
Model Year	2016
Make	Kia
Model	Optima LX
Body Style	4-Door Sedan
VIN	5XXGT4L39GG019402
Body Color	Sangria
Odometer Reading (km / mi)	21 / 13
Engine Displacement (L)	2.4
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motors Manufacturing Georgia, Inc.
Date of Manufacture	Nov-15

GVWR (kg)	2040
GAWR Front (kg)	1160
GAWR Rear (kg)	1140

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: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	235	235
Recommended Tire Size	P205/65R16	P205/65R16
Tire Size on Vehicle	P205/65R16	P205/65R16
Tire Manufacturer	NEXEN	NEXEN
Tire Model	N Priz AH8	N Priz AH8
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	95H	95H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	VAHE FAER 3215	VAHE FAER 3215
DOT Safety Code Right	VAHE FAER 3215	VAHE JACL 3215

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	447.5	287.5		479.5	370.0	
Right	kg	448.0	287.5		464.5	362.5	
Ratio	%	60.9%	39.1%	100.0%	56.3%	43.7%	100.0%
Total	kg	895.5	575.0	1470.5	944.0	732.5	1676.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1470.5	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	1681.3	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	712	716	712	720	1097
As Tested	mm	704	709	671	683	1226
Post-Test	mm	725	733	669	676	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2805
Total Vehicle Length at Left Side	mm	4135
Total Vehicle Length at Centerline	mm	4850
Total Vehicle Length at Right Side	mm	4138
Weight of Ballast in Cargo Area	kg	64.0
Weight of Vehicle Components Removed	kg	22.0

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Door Mirrors (3.5 kg), Tail Lights (4.0 kg), Trunk Trim and Tools (12.0 kg), Bottom Engine Covers (2.5 kg)

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

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	4850
2	Total Width	1840
3	Bumper Top Height	550
4	Bumper Bottom Height	415
5	Longitudinal Member Top Height	530
6	Distance Between Longitudinal Members	935
7	Longitudinal Member Width	65
8	Engine Top Height	805
9	Engine Bottom Height	190
10	Engine and Gearbox Width	460
11	Front Bumper to Engine Distance	706
12	Front Shock Absorber Fixing Height	890
13	Bonnet Leading Edge Height	777
14	Front Shock Absorber Fixing Width	1200
15	Front Bumper to Front Axle Distance	969
16	Front Axle to A-Pillar Distance	540
17	A-Pillar to B-Pillar Distance	1004
18	B-Pillar to Rear Axle Distance	1160
19	B-Pillar to C-Pillar Distance	767
20	Roof Sill Bottom Height	1325
21	Roof Sill Top Height	1446
22	Floor Sill Bottom Height	187
23	Floor Sill Top Height	370

All measurements in millimeters.

DATA SHEET NO. 2

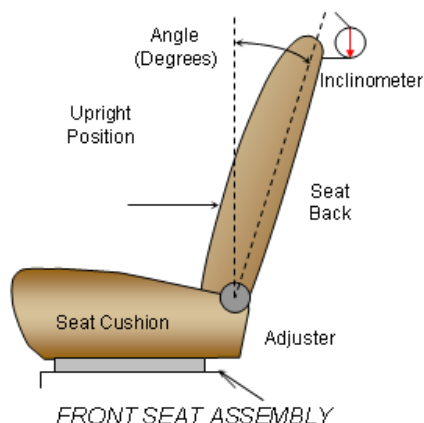
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20164206
 Test Date: 2/3/16

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 headrest post.

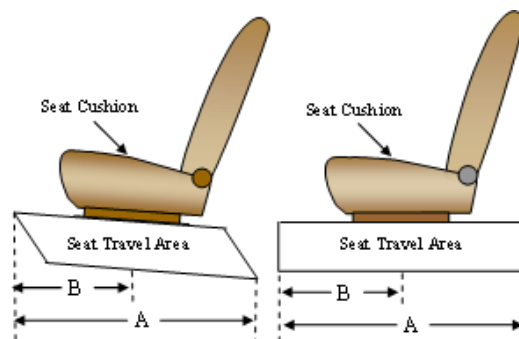


SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	2.5
Passenger Seat Back Angle	0.3

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	300 mm	150 mm
Passenger Seat	230 mm	0 mm

SEAT BELT UPPER ANCHORAGE

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

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	H
Passenger Seat	4	H

DATA SHEET NO. 2 ... (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

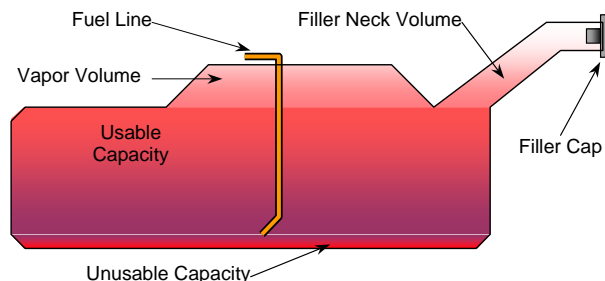
Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	70.02
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	64.42 to 65.82
Actual Amount of Stoddard Solvent Used	65.14
1/3 of Usable Capacity	23.34

FUEL PUMP

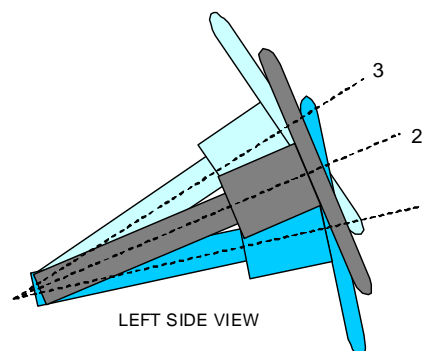
The vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel for 1.0 second after the ignition is switched to the "ON" position and while the engine is running.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

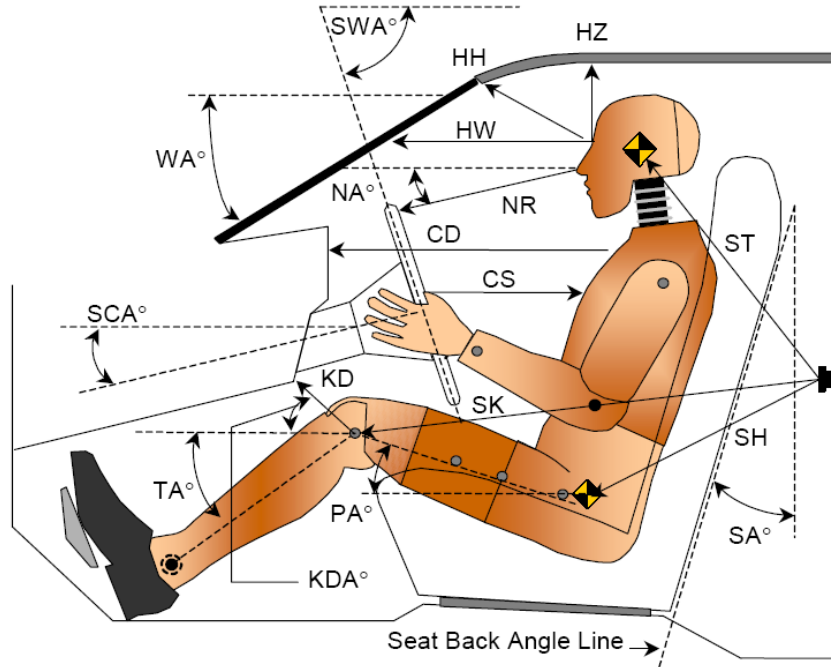
STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.3	94
Geometric Center Position, No. 2	23.5	117
Uppermost Position, No. 3	26.7	140
Telescoping Steering Wheel Travel		46
Test Position	23.5	117

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16



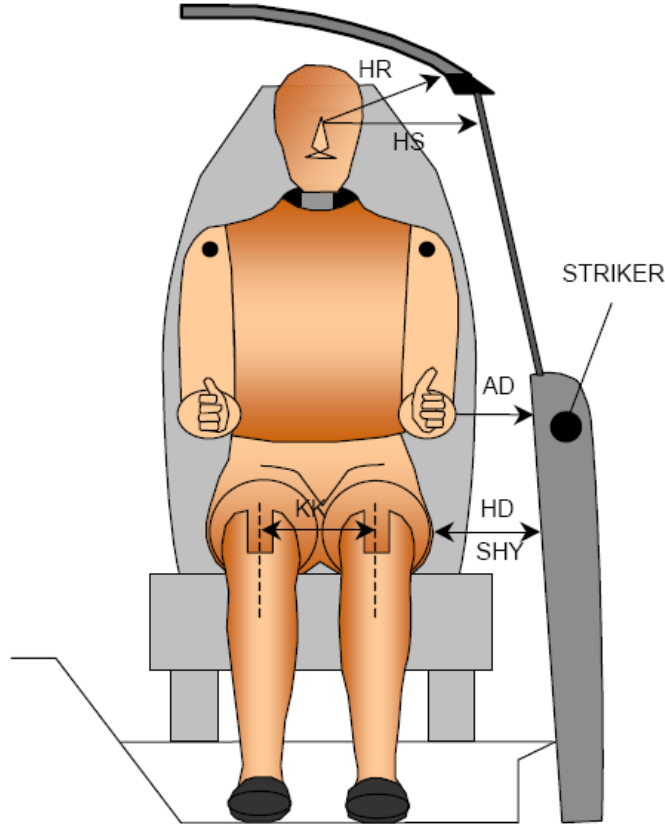
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		23.8		
SWA°	Steering Wheel Angle		66.9		
SCA°	Steering Column Angle		23.1		
SA°	Seat Back Angle (On Headrest Post)		2.5		0.3
HZ	Head to Roof	204	90.0	220	90.0
HH	Head to Header	338	22.6	280	43.9
HW	Head to Windshield	658	0.0	661	0.0
NR	Nose to Rim	420	6.6	472	23.7
CD	Chest to Dash	575	9.6	443	0.0
CS	Chest to Steering Hub	353	2.4		
RA	Rim to Abdomen	236	0.0		
KDL	Left Knee to Dash	223	16.5	162	36.7
KDR	Right Knee to Dash	216	23.5	156	32.0
PA°	Pelvic Angle		23.2		19.4
TA°	Tibia Angle		38.0		43.7
SK	Striker to Knee	614	15.7	289	8.7
ST	Striker to Head	401	18.7	386	52.3
SH	Striker to H-Point	342	51.5	411	37.1

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

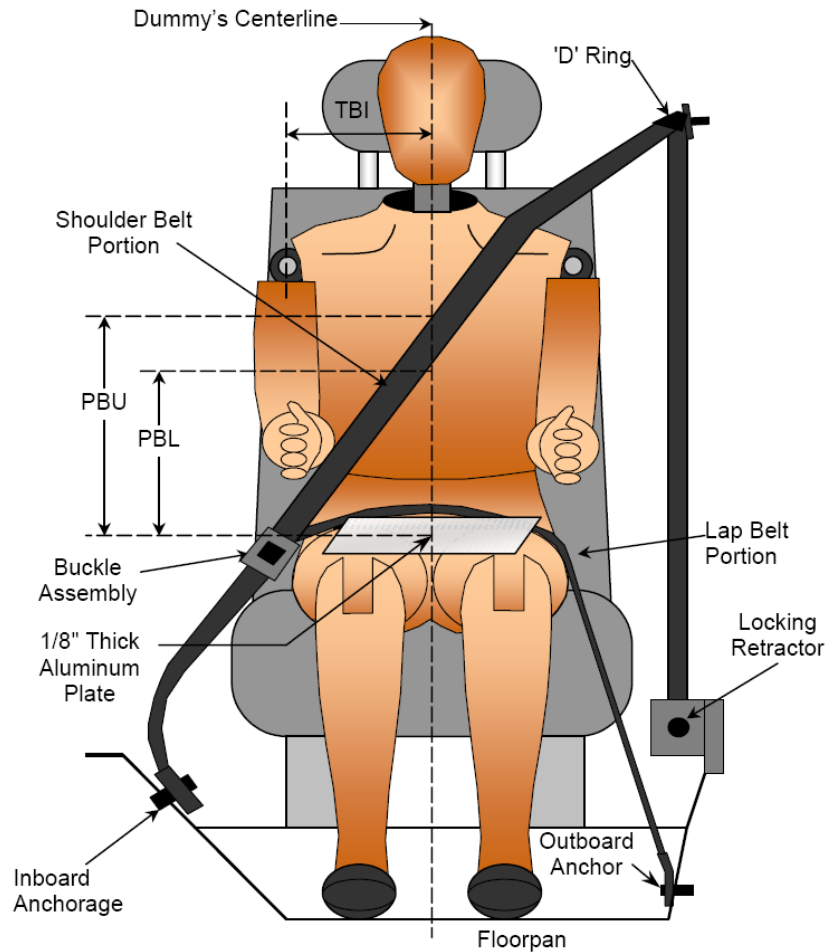


Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	115	93
HD	H-Point to Door	160	194
HR	Head to Side Header	209	261
HS	Head to Side Window	337	365
KK	Knee to Knee	330	170
SHY	Striker to H-Point (Y-Direction)	264	292
AA	Ankle to Ankle	276	180

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20164206
Test Date: 2/3/16



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	355	321
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	313	245

BELT LENGTH DATA

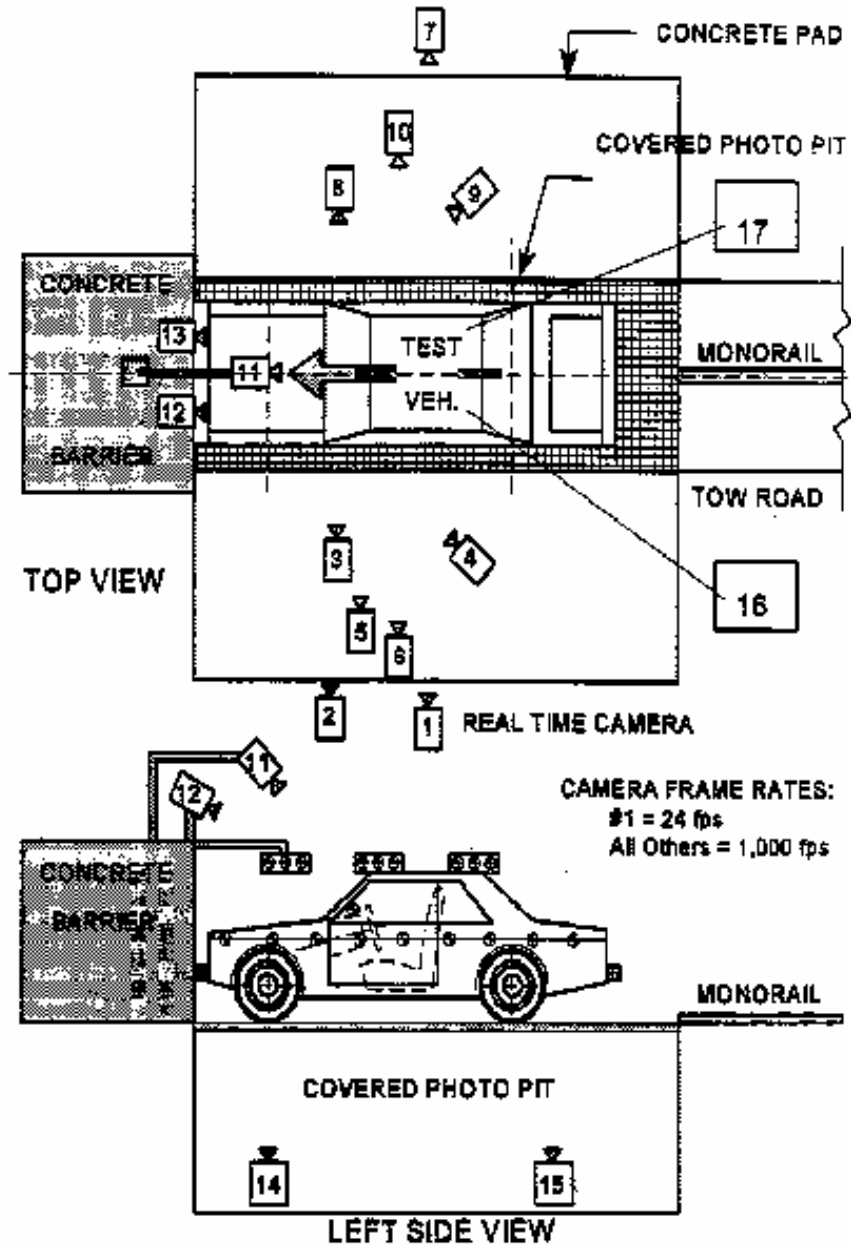
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	887	960
Lap Belt Length as Measured on ATD	mm	626	675
Remainder of Belt on Reel	mm	945	820
Total Belt Length for Continuous Webbing Systems	mm	2458	2455

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 ... (CONTINUED)

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

CAMERA LOCATIONS

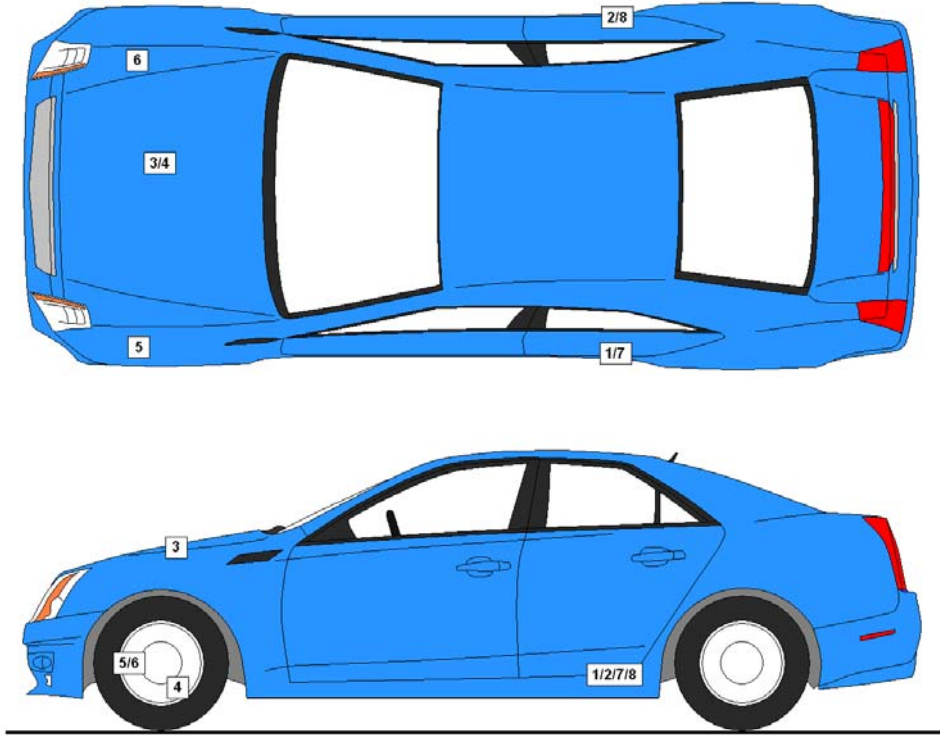
No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	24	1000
3	Left Front Half	-1701	-6197	-1701	50	1000
4	Left Angle	-6696	-10308	-3211	ZOOM	1000
5	Steering Column - Top	-1966	-10412	-3688	50	1000
6	Steering 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)	-3400	-250	-1350	12	1000
17	Onboard Passenger Airbag (Optional)	-3400	250	-1350	12	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: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1873	-750	-352
2	Right Rear Accelerometer X-Direction	1873	750	-352
3	Engine Top X	4070	160	-820
4	Engine Bottom X	4105	100	-200
5	Left Rear Accelerometer Z-Direction	1873	-750	-352
6	Right Rear Accelerometer Z-Direction	1873	750	-352
7	Left Rear Accelerometer X-Direction Redundant	1873	-750	-352
8	Right Rear Accelerometer X-Direction Redundant	1873	750	-352

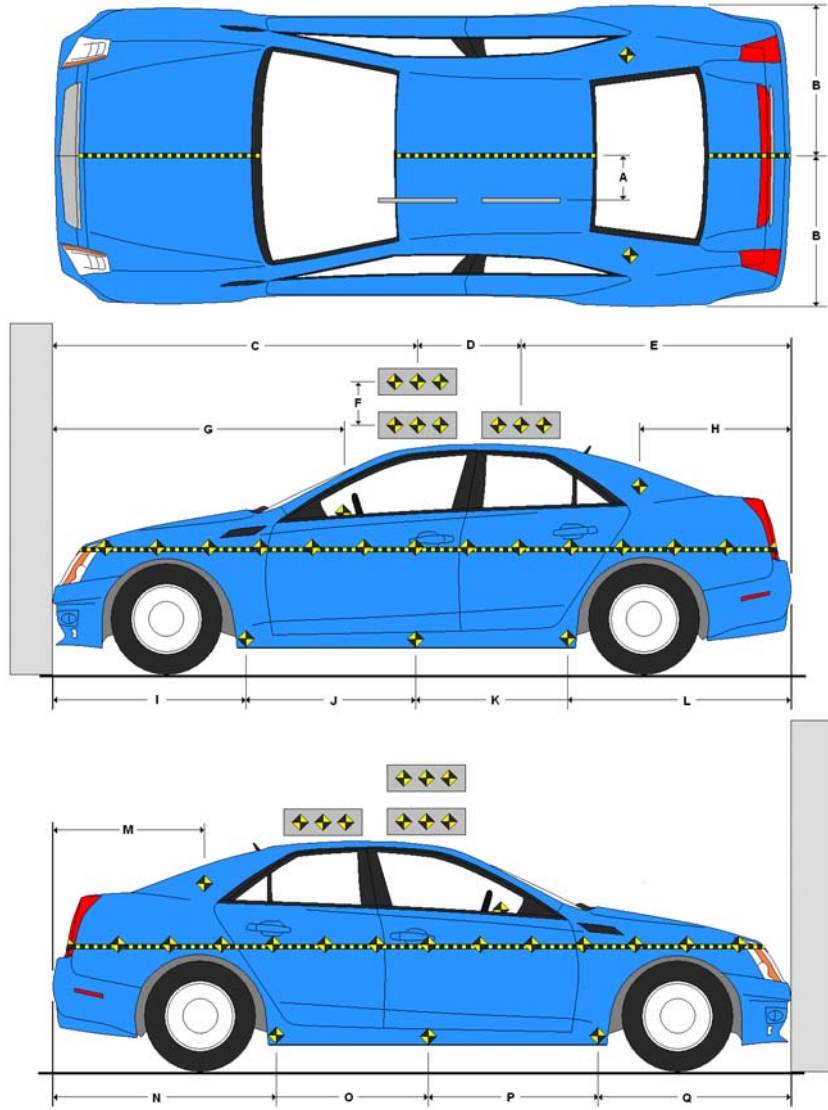
Reference Points: X – Rear Surface of Vehicle (+ forward)
 Y – Vehicle Centerline (+ to right)
 Z – Ground Plane (+ down)

DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

Item	Value
A	380
B	540
C	2262
D	610
E	1978
F	305
G	1750
H	987
I	1425
J	959
K	959
L	1506
M	996
N	1515
O	957
P	957
Q	1420



All measurements in millimeters.

DATA SHEET NO. 9

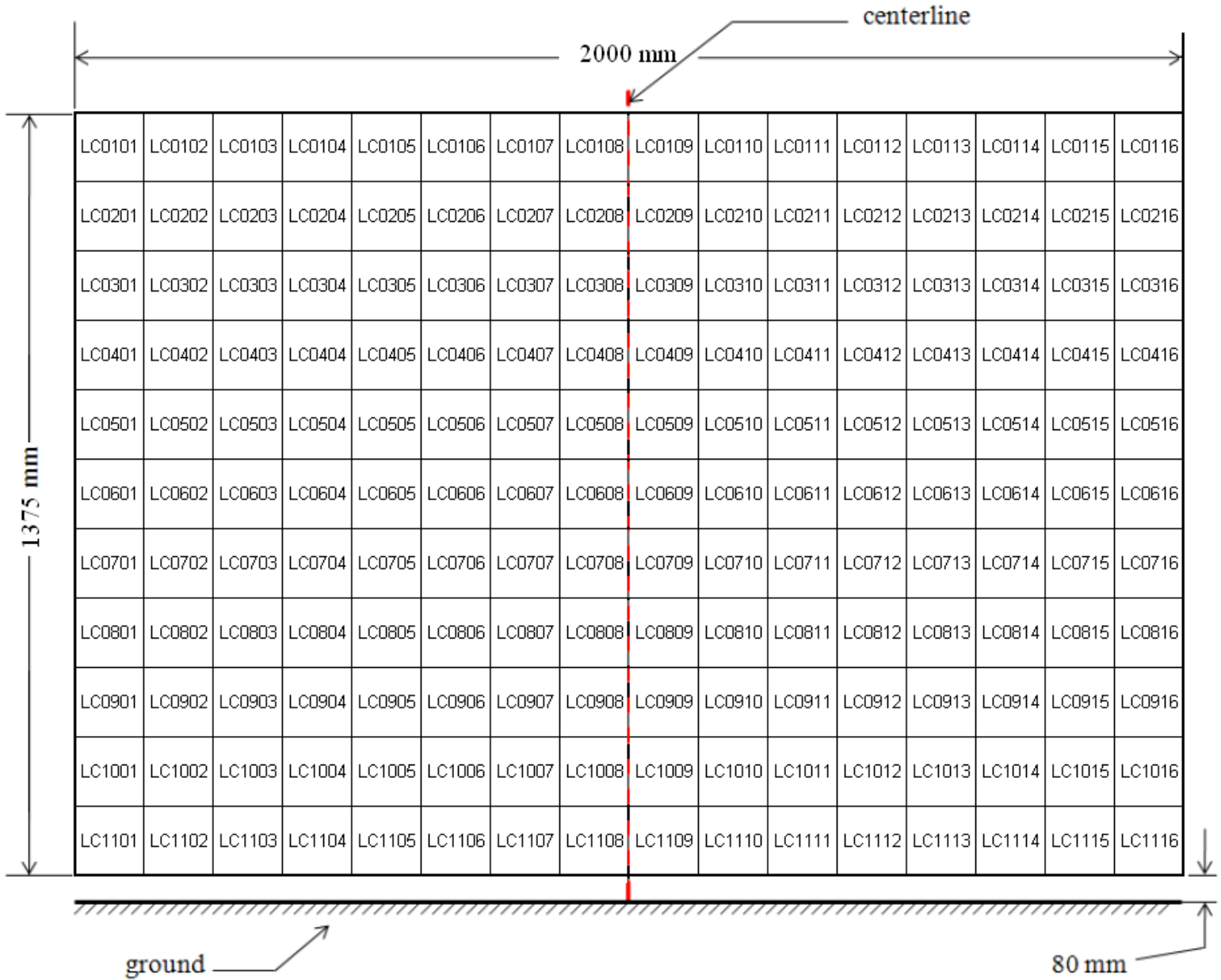
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan

NHTSA No.: M20164206

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 2/3/16



DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

INSTRUMENTATION

Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	4
Load Cell Barrier	528
Total	634

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: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type/Serial No.	P572E 50th Percentile Male ATD / 360	P572O 5th Percentile Female ATD / 141
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	Frontal Airbag	Frontal Airbag
Left Knee Contact	Knee Airbag, Steering Wheel Rim	Frontal Airbag
Right Knee Contact	Knee Airbag, Steering Wheel Rim	Frontal Airbag

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Jammed Shut	Jammed Shut
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	3	0
Seat Back Failure	None	None
Glazing Damage	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

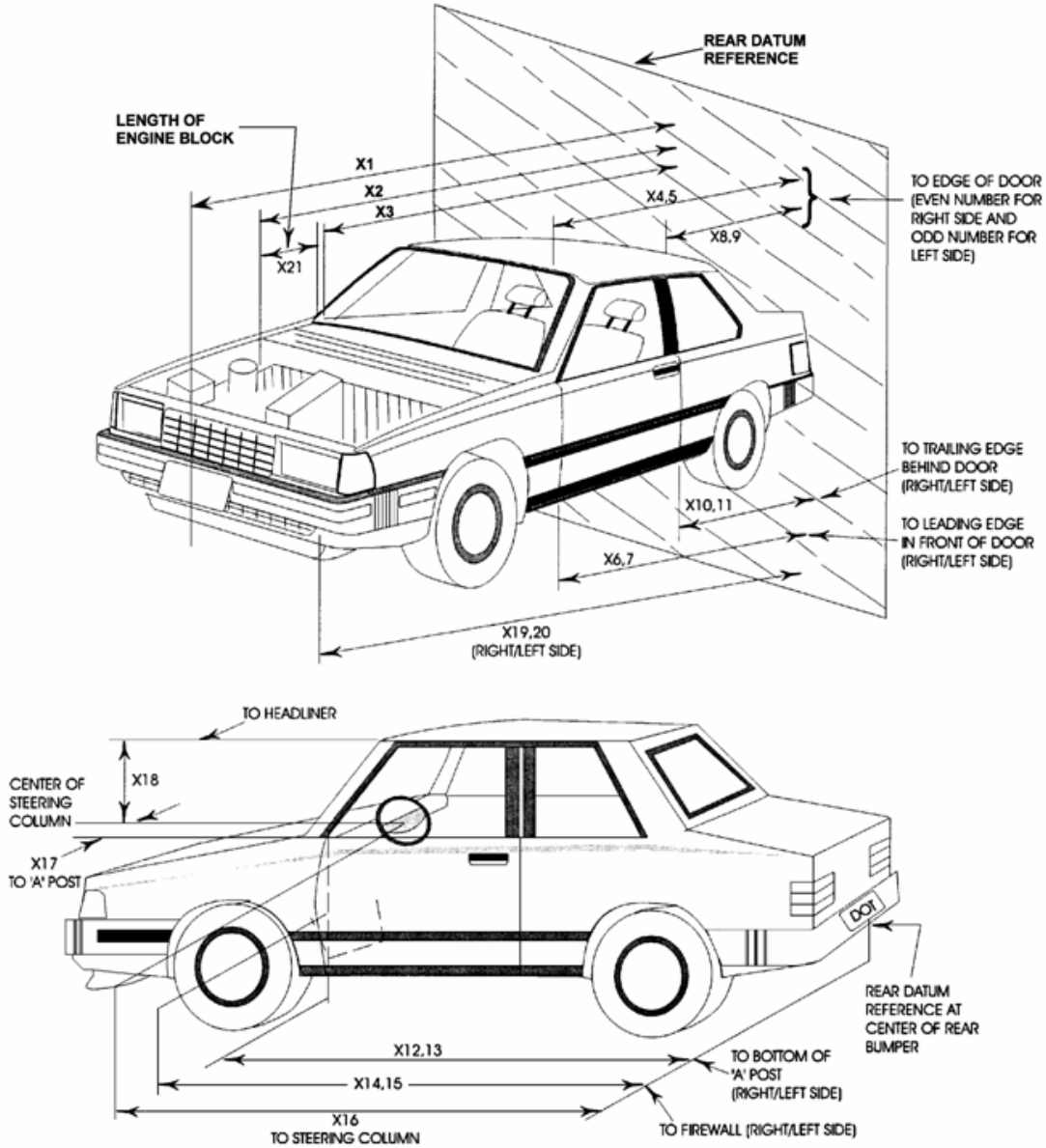
Measured Parameter	Units	Value
Left Side	mm	5240
Center	mm	5209
Right Side	mm	5350
Average	mm	5266

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/Pelvis)	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16



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

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4850	4420	-430
2	Rear Surface of Vehicle to Front of Engine	4144	4210	66
3	RSOV to Firewall	3760	3755	-5
4	RSOV to Upper Leading Edge of Right Door	3390	3410	20
5	RSOV to Upper Leading Edge of Left Door	3387	3390	3
6	RSOV to Lower Leading Edge of Right Door	3336	3233	-103
7	RSOV to Lower Leading Edge of Left Door	3327	3340	13
8	RSOV to Upper Trailing Edge of Right Door	2230	2225	-5
9	RSOV to Upper Trailing Edge of Left Door	2230	2238	8
10	RSOV to Lower Trailing Edge of Right Door	2234	2233	-1
11	RSOV to Lower Trailing Edge of Left Door	2225	2240	15
12	RSOV to Bottom of A-Pillar, Right Side	3322	3343	21
13	RSOV to Bottom of A-Pillar, Left Side	3306	3343	37
14	RSOV to Firewall, Right Side	3795	3630	-165
15	RSOV to Firewall, Left Side	3780	3520	-260
16	RSOV to Steering Column	2885	2925	40
17	Center of Steering Column to A-Pillar	420	410	-10
18	Center of Steering Column to Headliner	400	390	-10
19	RSOV to Right Side of Front Bumper	4138	4130	-8
20	RSOV to Left Side of Front Bumper	4135	4030	-105
21	Length of Engine Block	525	525	0
RD	RSOV to Right Side of Dash Panel	3226	3110	-116
CD	RSOV to Center of Dash Panel	3035	3110	75
LD	RSOV to Left Side of Dash Panel	3147	3110	-37

All measurements in millimeters.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

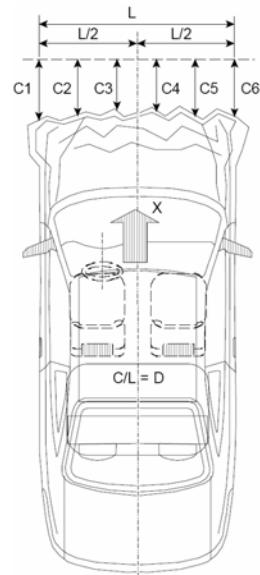
VEHICLE INFORMATION

VIN: 5XXGT4L39GG019402 Wheelbase (mm): 2805
 Vehicle Size Category: 4-Door Sedan Test Weight (kg): 1676.5

ACCELEROMETER DATA

Accelerometer Locations: Left Rear Crossmember
 Cal. Procedure/Interval: Drop Test / 6 months
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 56.57
 Velocity Change (km/h): 65.8
 Time of Separation (msec): 68.1

Linearity: Good



CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
 Midpoint of Damage: Vehicle Centerline
 Damage Region Length (mm): 1379
 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	225	460	235
C2	Crush Zone 2 at Left Side	mm	65	360	295
C3	Crush Zone 3 at Left Side	mm	15	375	360
C4	Crush Zone 4 at Right Side	mm	16	415	399
C5	Crush Zone 5 at Right Side	mm	63	470	407
C6	Crush Zone 6 at Right Side	mm	221	490	269
L	C1 to C6	mm	1379		

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

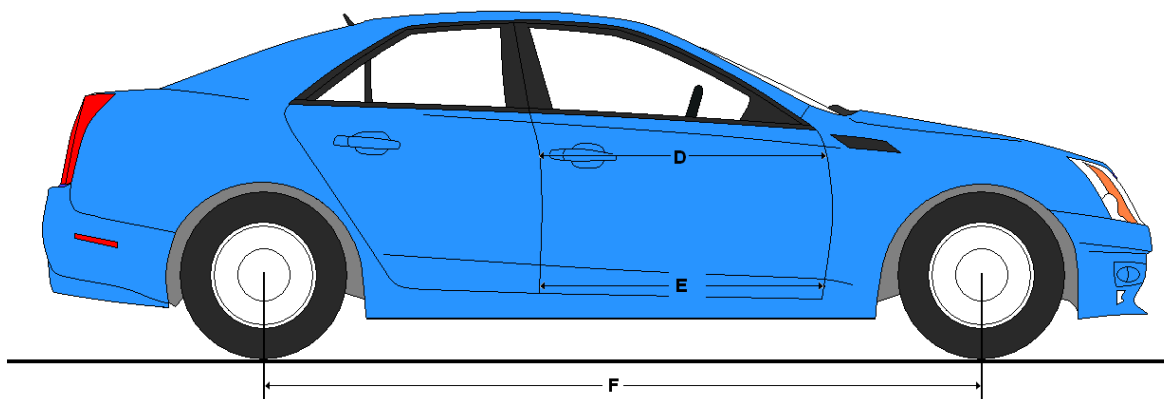
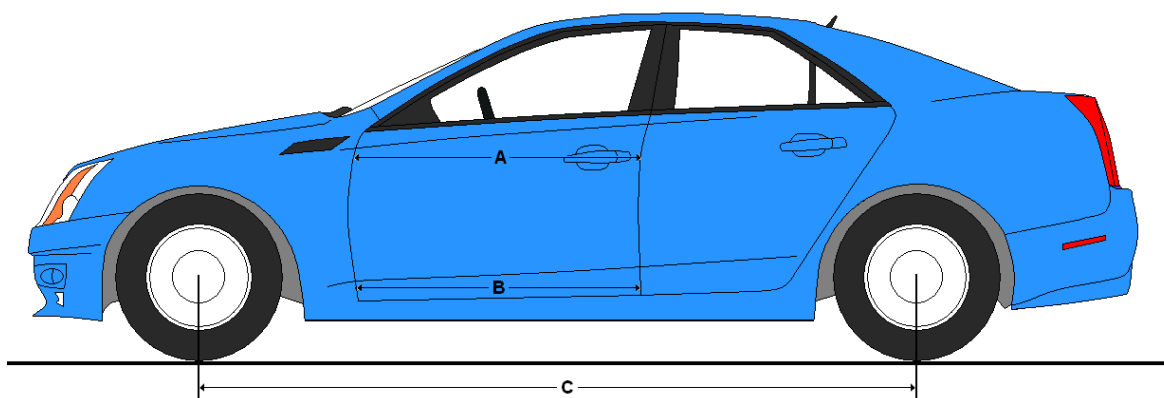
Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1007	1016	-9
B	Left Side Lower	mm	926	928	-2
D	Right Side Upper	mm	1009	1015	-6
E	Right Side Lower	mm	901	905	-4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2805	2738	67
F	Right Side Wheelbase	mm	2805	2758	47



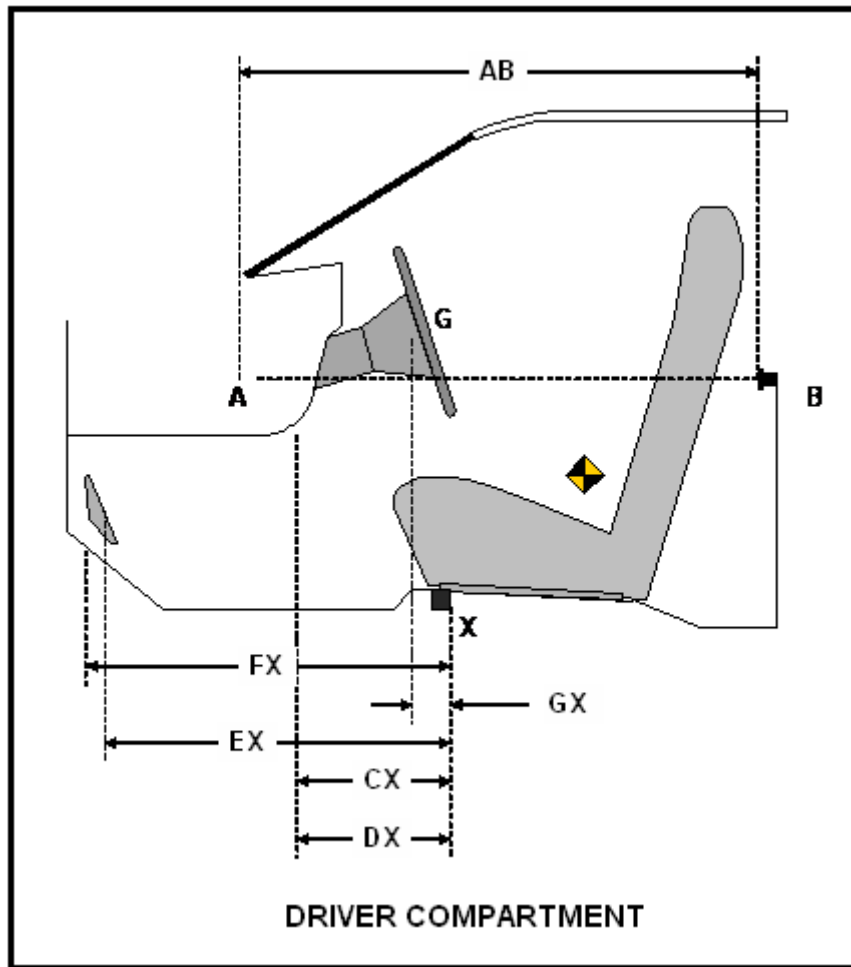
DATA SHEET NO. 14 ... (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	730	866	-136
CX	Left Knee Bolster to X	mm	300	300	0
DX	Right Knee Bolster to X	mm	285	290	-5
EX	Brake Pedal to X	mm	580	530	50
FX	Foot Rest to X	mm	590	605	-15
GX	Center of Steering Wheel Hub to X	mm	60	97	-37

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

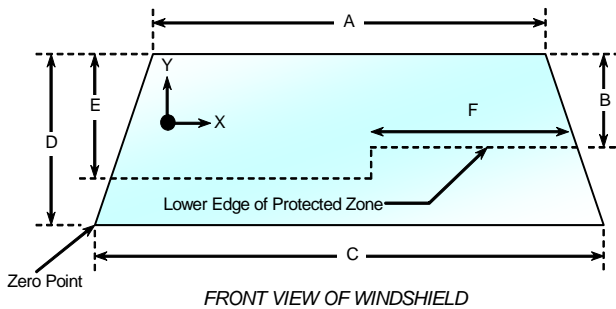
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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: 21.0° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2425	2425	100.0%
Right Side	2425	2425	100.0%
Total	4850	4850	100.0%



Item	Units	Value
A	mm	1200
B	mm	360
C	mm	1475
D	mm	800
E	mm	500
F	mm	515

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: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 13.3°C Test Time: 12:31 PM

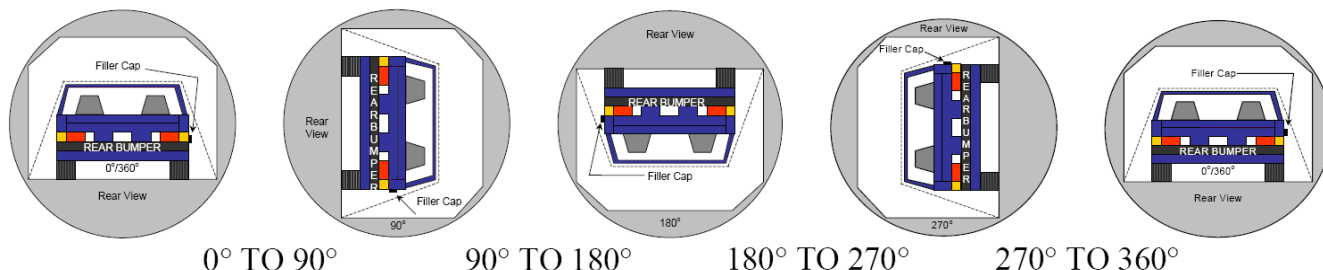
Stoddard Solvent Spillage Measurements

- 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: 2016 Kia Optima LX 4-Door Sedan NHTSA No.: M20164206
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 2/3/16



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°	82	300	382
90° To 180°	83	300	383
180° To 270°	77	300	377
270° To 360°	79	300	379

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°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 17

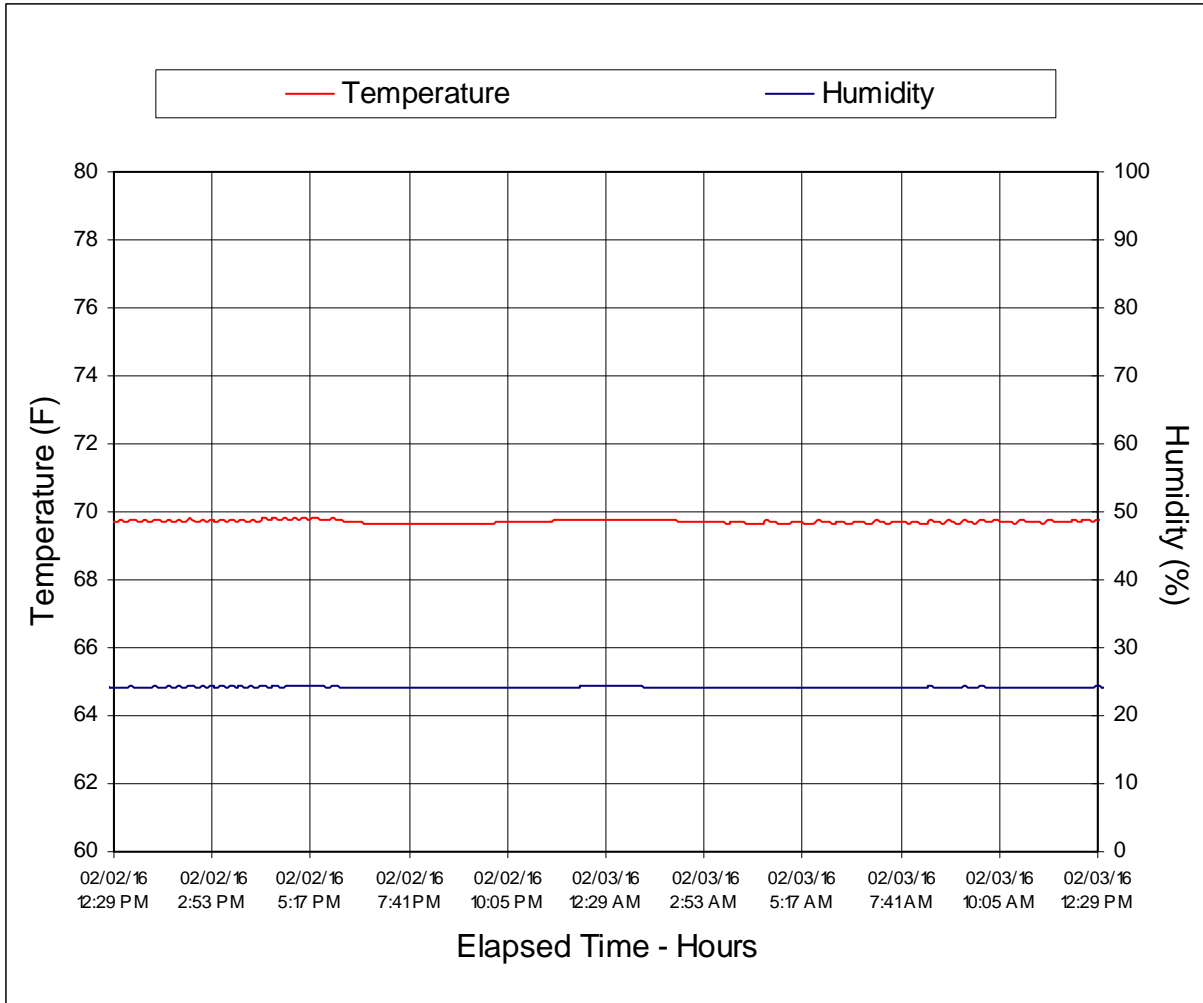
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan

NHTSA No.: M20164206

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 2/3/16



**APPENDIX A
PHOTOGRAPHS**

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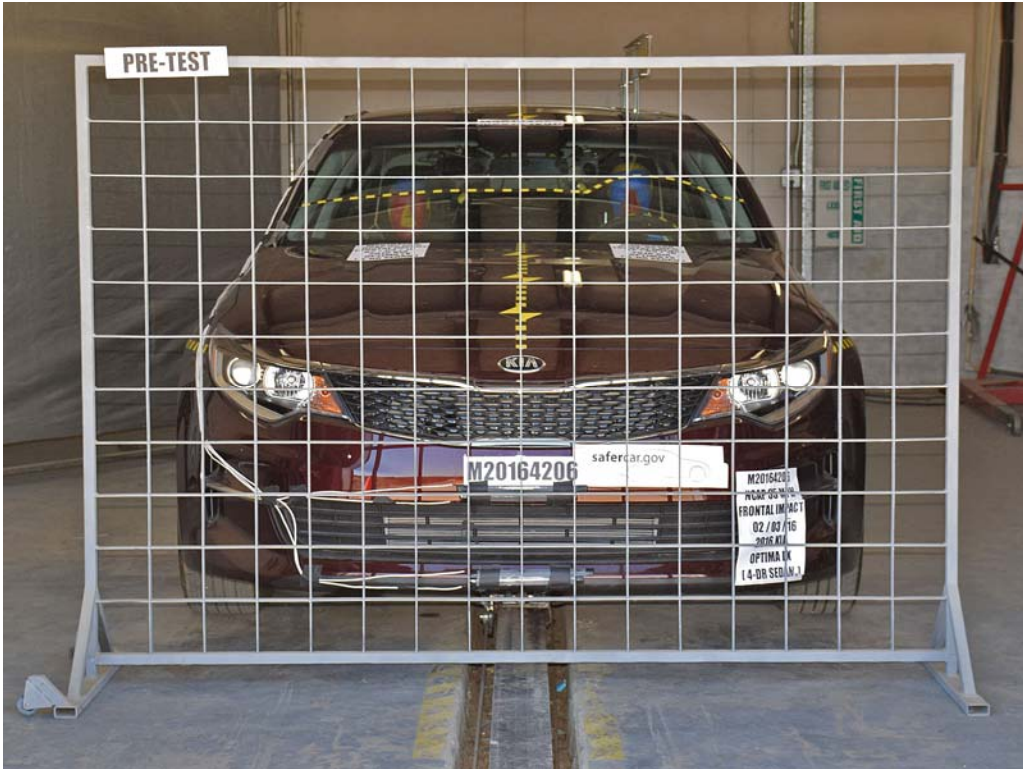


FIGURE 1. Load Cell Location

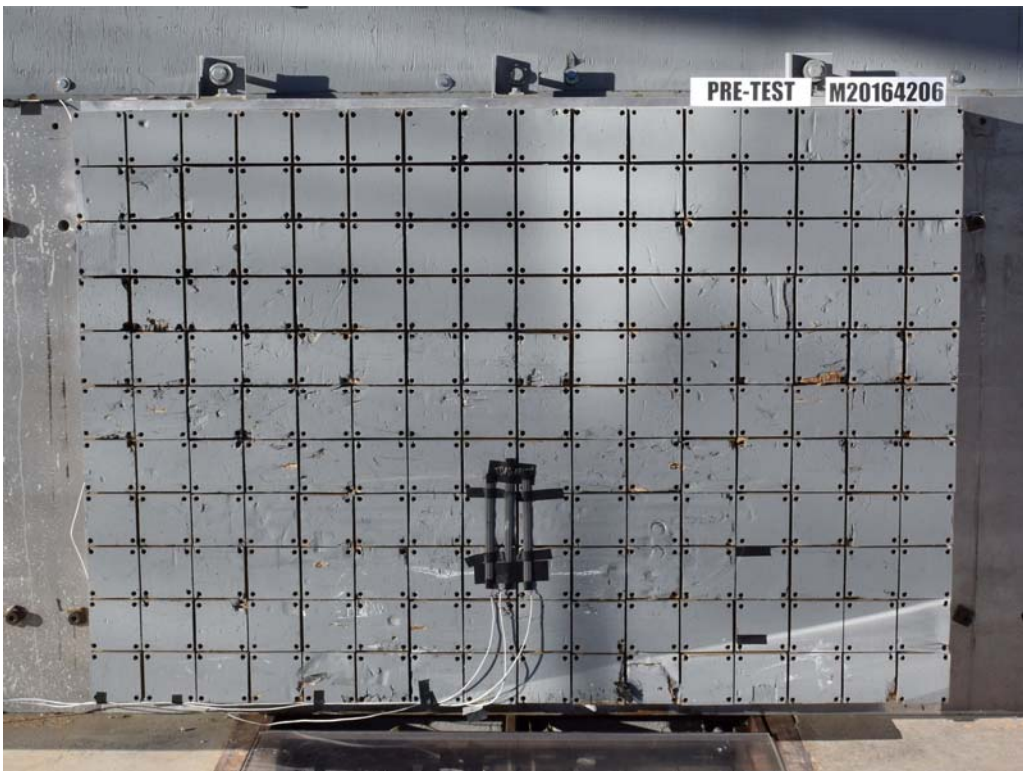


FIGURE 2. Pre-Test Load Cell Wall



FIGURE 3. Post-Test Load Cell Wall



FIGURE 4. Manufacturer's Label

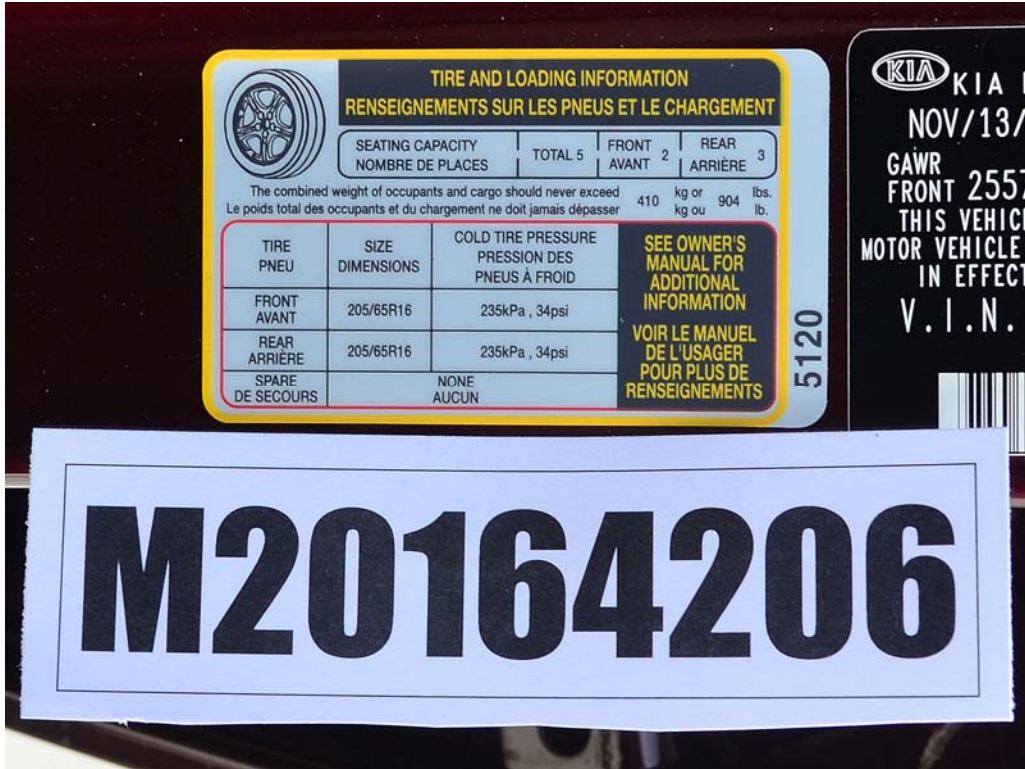


FIGURE 5. Tire Placard



FIGURE 6. 2016 Kia Optima Frontal as Delivered



FIGURE 7. Left Rear $\frac{3}{4}$ View, as Received



FIGURE 8. Pre-Test Front View of Test Vehicle



FIGURE 9. Post-Test Front View of Test Vehicle



FIGURE 10. Pre-Test Left View of Test Vehicle



FIGURE 11. Post-Test Left View of Test Vehicle



FIGURE 12. Pre-Test Right View of Test Vehicle



FIGURE 13. Post-Test Right View of Test Vehicle



FIGURE 14. Pre-Test Right Front ¼ View



FIGURE 15. Post-Test Right Front $\frac{3}{4}$ View



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



FIGURE 17. Post-Test Left Rear $\frac{3}{4}$ View



FIGURE 18. Pre-Test Windshield View



FIGURE 19. Post-Test Windshield View



FIGURE 20. Pre-Test Engine Compartment View



FIGURE 21. Post-Test Engine Compartment View



FIGURE 22. Pre-Test Fuel Filler Cap View



FIGURE 23. Post-Test Fuel Filler Cap View



FIGURE 24. Pre-Test Front Underbody View

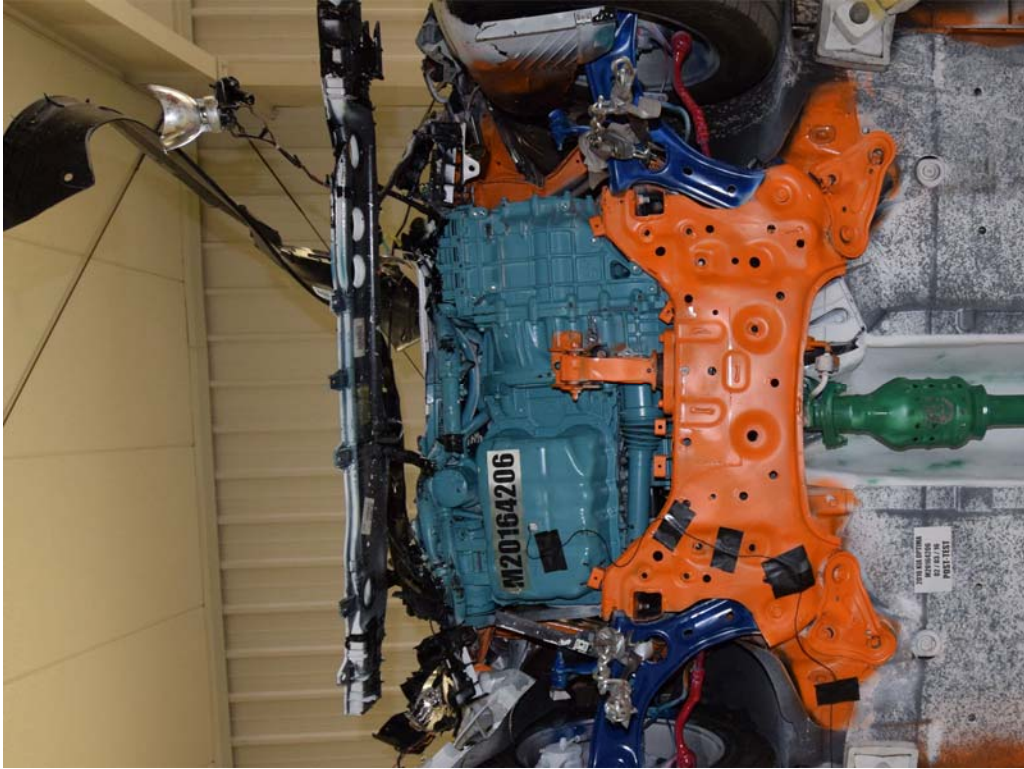


FIGURE 25. Post-Test Front Underbody View

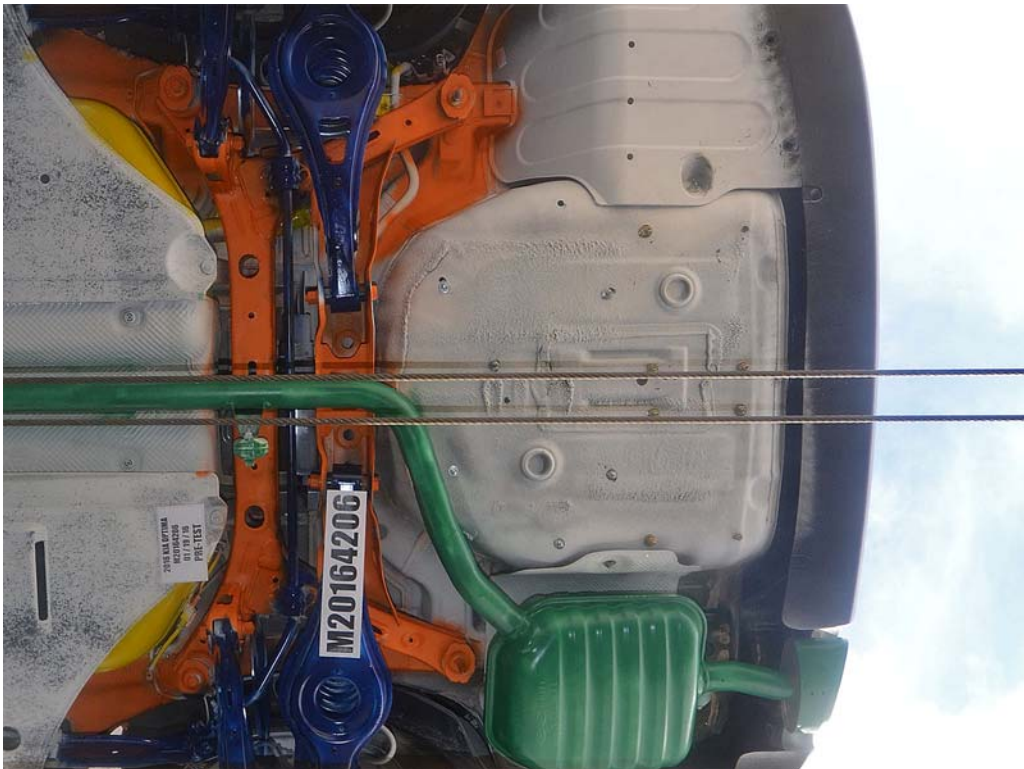


FIGURE 26. Pre-Test Rear Underbody View

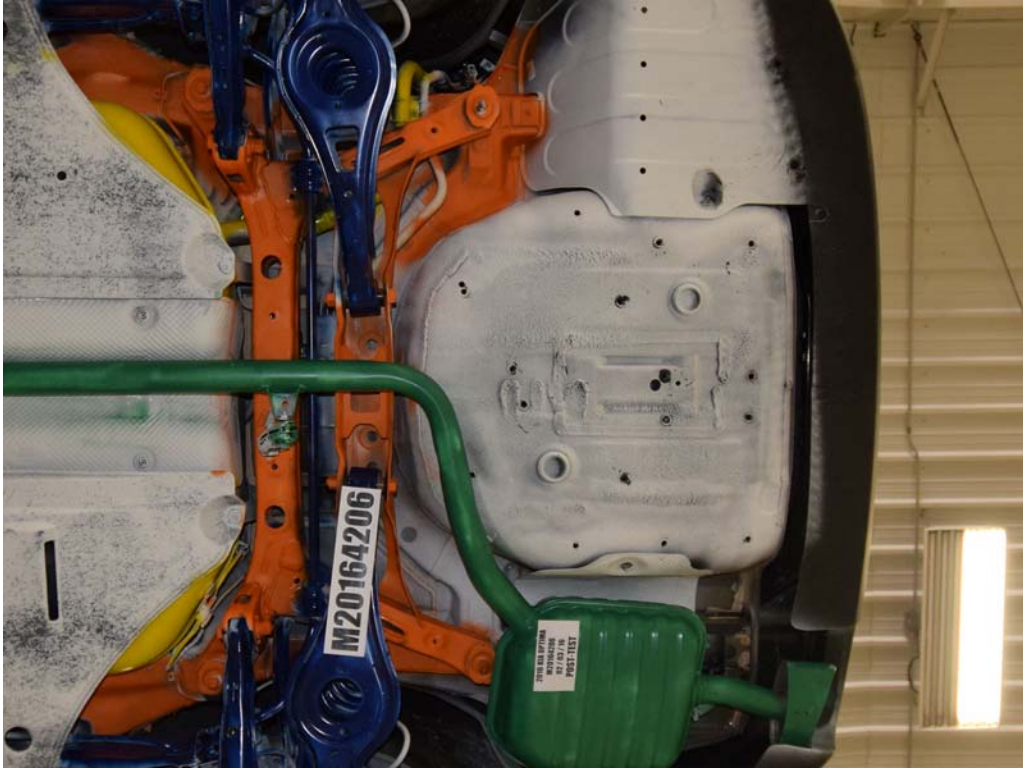


FIGURE 27. Post-Test Rear Underbody View

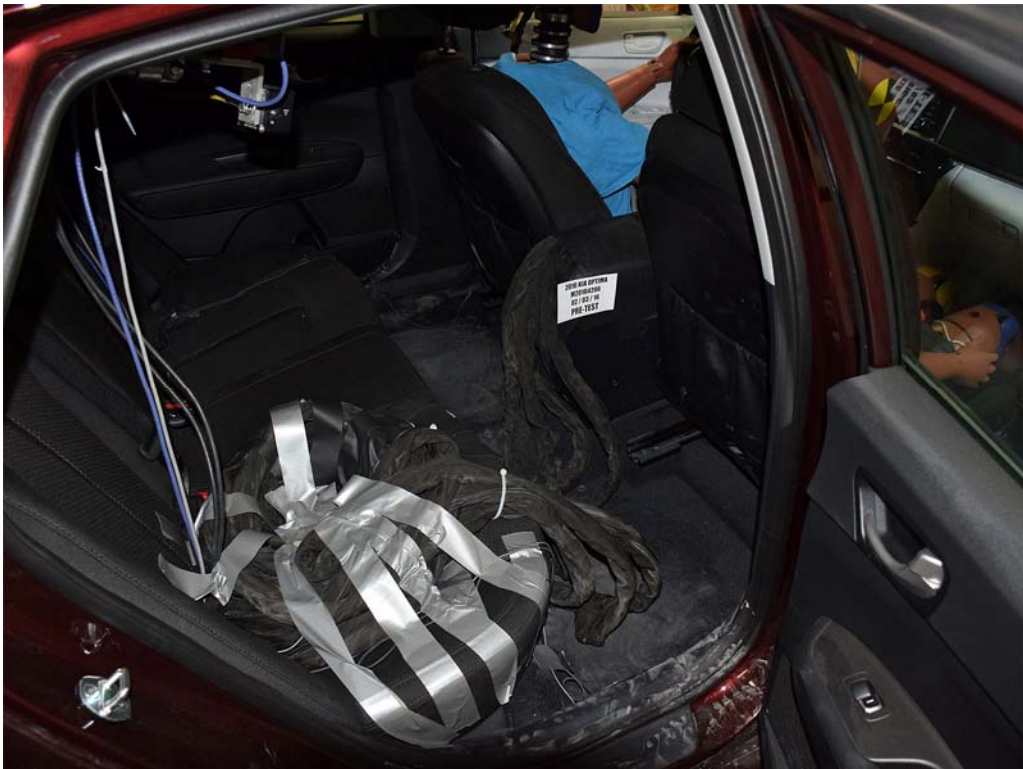


FIGURE 28. Pre-Test Dummy Cable Routing



FIGURE 29. Post-Test Dummy Cable Routing



FIGURE 30. Pre-Test Driver Dummy Front View



FIGURE 31. Post-Test Driver Dummy Front View



FIGURE 32. Pre-Test Driver Dummy Window View



FIGURE 33. Post-Test Driver Dummy Window View



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



FIGURE 35. Post-Test Driver Dummy and Vehicle Interior View



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



FIGURE 37. Post-Test Driver's Seat Fore-Aft Markings



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



FIGURE 39. Post-Test View of Belt Anchorage for Driver Dummy



FIGURE 40. Pre-Test Driver Dummy Feet



FIGURE 41. Post-Test Driver Dummy Feet



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



FIGURE 43. Post-Test Driver's Side Knee Bolster



FIGURE 44. Pre-Test Driver's Side Floorpan



FIGURE 45. Post-Test Driver's Side Floorpan



FIGURE 46. Post-Test Driver Dummy Face



FIGURE 47. Post-Test Driver Dummy Contact with Airbag



FIGURE 48. Post-Test Driver Dummy Contact with Headrest



FIGURE 48a. Post-Test Driver Dummy Contact with Knee Airbag



FIGURE 49. Pre-Test View of the Steering Wheel



FIGURE 50. Post-Test View of the Steering Wheel



FIGURE 51. Pre-Test Passenger Dummy Front View



FIGURE 52. Post-Test Passenger Dummy Front View



FIGURE 53. Pre-Test Passenger Dummy Window View



FIGURE 54. Post-Test Passenger Dummy Window View



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



FIGURE 56. Post-Test Passenger Dummy and Vehicle Interior View



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



FIGURE 58. Post-Test Passenger's Seat Fore-Aft Markings



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



FIGURE 60. Post-Test View of Belt Anchorage for Passenger Dummy



FIGURE 61. Pre-Test Passenger Dummy Feet



FIGURE 62. Post-Test Passenger Dummy Feet



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



FIGURE 64. Post-Test Passenger's Side Knee Bolster



FIGURE 65. Pre-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger's Side Floorpan



FIGURE 67. Post-Test Passenger Dummy Face



FIGURE 68. Post-Test Passenger Dummy Contact with Airbag



FIGURE 69. Post-Test Passenger Dummy Contact with Headrest



FIGURE 69a. Post-Test Passenger Dummy Contact with Airbag



FIGURE 70. Photograph of Ballast Installed in Vehicle

Photograph Not Applicable

No Stoddard Solvent Spillage

FIGURE 71. Post-Test Stoddard Solvent Spillage Location View



FIGURE 72. Post-Test Speed Trap Read-Out



FIGURE 73. Vehicle at 0° on Static Rollover Device

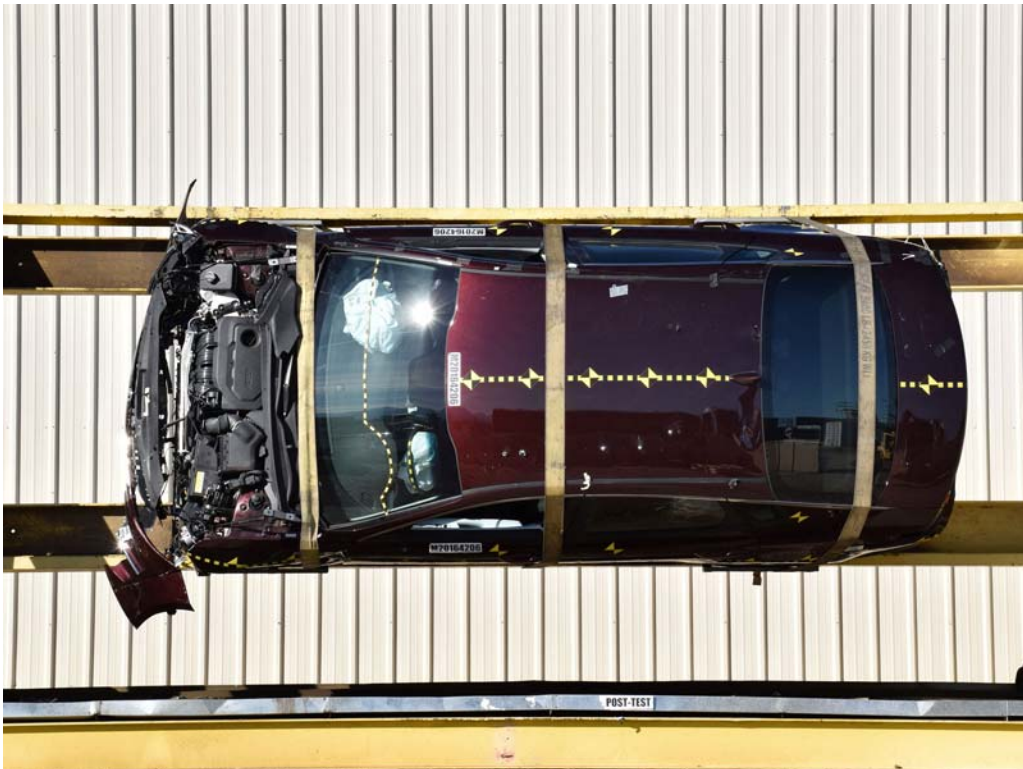


FIGURE 74. Vehicle at 90° on Static Rollover Device



FIGURE 75. Vehicle at 180° on Static Rollover Device

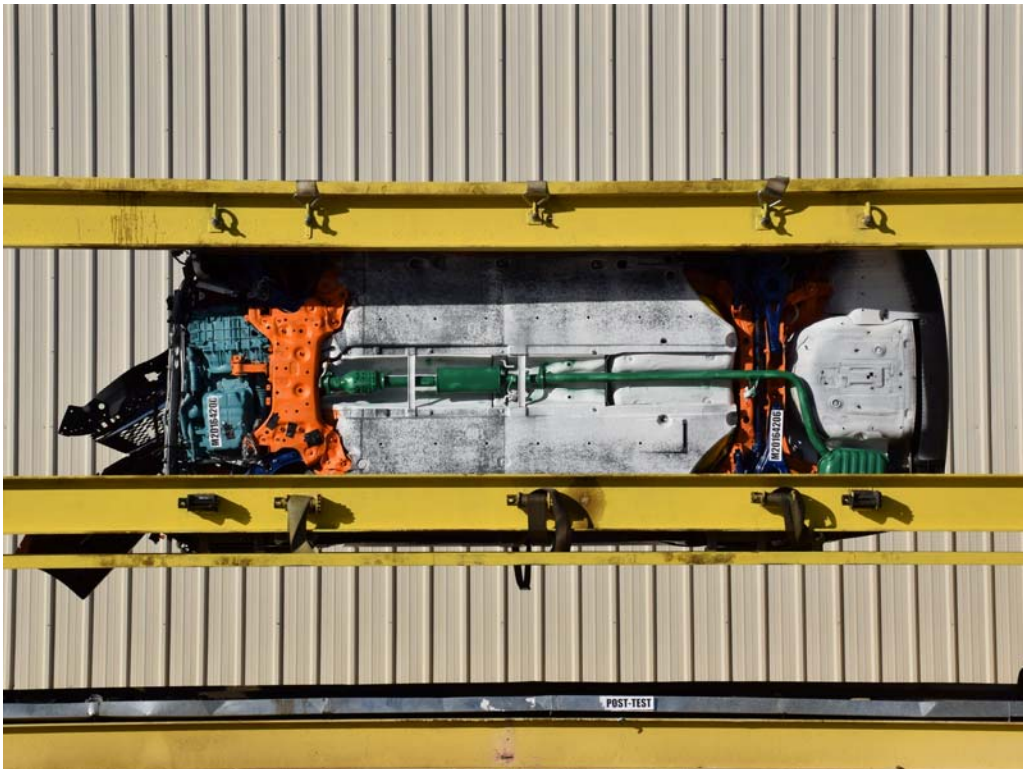


FIGURE 76. Vehicle at 270° on Static Rollover Device



FIGURE 77. Vehicle at 360° on Static Rollover Device

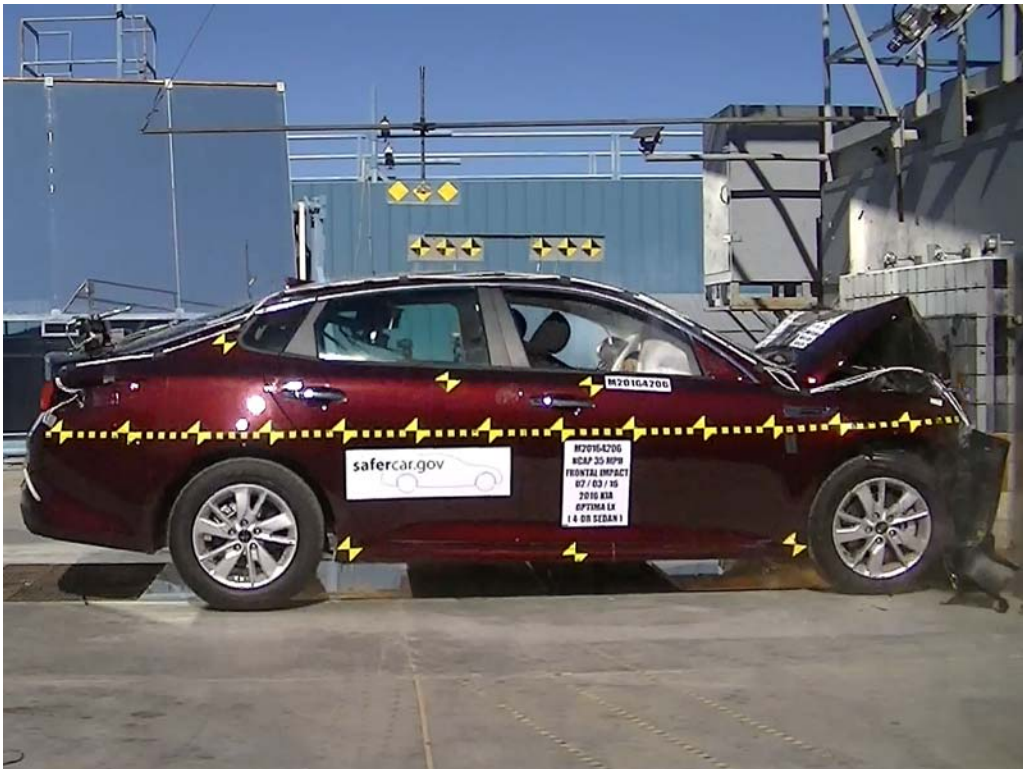


FIGURE 78. 2016 Kia Optima Frontal Impact Event

2016 KIA OPTIMA LX MODEL / OPTION CODE: 53222 / 010 EXTERIOR / INTERIOR: SANGRIA/BLACK VEHICLE ID NUMBER: 5XXGT4L39GG019402 ENGINE NUMBER: G4UJK37 PORT OF ENTRY: WEST POINT MODE OF TRANSPORT: TRUCK		SOLD TO: WOODS PALMEN KIA OF KENOSHA 6301 76TH STREET KENOSHA, WI 53142		SHIP TO: WOODS			
STANDARD FEATURES MECHANICAL 2.4 L Gas Direct Injection (GDI) 4-Cyl Engine 6-Speed Automatic Transmission w/ Active Eco System Drive Mode Select (DMS) 16" Alloy Wheels SAFETY Dual Front Advanced Airbags Front Seat Mounted Side Airbags Driver's Knee Airbag Full-Length Side Curtain Airbags Lower Anchors and Tethers for Children (LATCH) Anti-Lock Braking System (ABS) Traction Control System (TCS) Electronic Stability Control (ESC) Vehicle Stability Management (VSM) Hill-start Assist Control (HAC) Tire Pressure Monitoring System (TPMS) INTERIOR, COMFORT & CONVENIENCE Air Conditioning Power Windows, Door Locks & Outside Mirrors AM/FM/CD/MP3 Audio w/ 5" LCD Rear Camera Display SIRIUSXM® Satellite Radio (free 3 mo. subscription*) USB / Auxiliary Input Jack and 12 Volt Outlet Bluetooth® Wireless Technology Adjustable Driver's Seat w/ Lumbar Support Adjustable Front Passenger's Seat w/ Height Adjuster 60/40 Split Folding Rear Seats Remote Keyless Entry Cruise Control Tilt & Telescopic Steering Column Steering Wheel Controls (Bluetooth/Audio/Cruise) EXTERIOR Single Projection Headlight Outside Mirrors w/ LED Turn Signal Indicators WARRANTY 10 Year/100,000 Mile Limited Powertrain Warranty 5 Year/60,000 Mile Limited Basic Warranty 5 Year/60,000 Mile Roadside Assistance *Ask dealer for details		MANUFACTURER'S SUGGESTED RETAIL PRICE \$21,840.00 ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features) Cargo Mat Carpeted Floor Mats Wheel Locks MSRP INCLUDING OPTIONS \$22,120.00 INLAND FREIGHT AND HANDLING \$825.00 TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE \$22,945.00		EPA DOT Fuel Economy and Environment Gasoline Vehicle Fuel Economy 30 MPG 25 city 37 highway 3.3 gallons per 100 miles You Save \$1500 in fuel costs over 5 years compared to the average new vehicle. Annual fuel COST \$1500 Fuel Economy & Greenhouse Gas Rating 7 Smog Rating 5 Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$8,000 in fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. MPGe is miles per gallon (petrol equivalent). Vehicle emissions are a significant source of air pollution and global warming. fuelconomy.gov Calculate personalized estimates and compare vehicles		GOVERNMENT 5-STAR SAFETY RATINGS This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk. Star ratings range from 1 to 5 stars (***** with 5 being the highest). Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236 PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 57% MAJOR SOURCES OF FOREIGN PARTS: 43% NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS. FOR THIS VEHICLE FINAL ASSEMBLY POINT: USA COUNTRY OF ORIGIN: USA ENGINE: USA TRANSMISSION: USA	
TOTAL ADDITIONAL WEIGHT: 16.7							

FIGURE 79. Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

<u>Plot</u>		<u>Page</u>
1	Driver Head Acceleration X Primary	B-1
2	Driver Head Acceleration Y Primary	B-1
3	Driver Head Acceleration Z Primary	B-1
4	Driver Head Resultant Acceleration Primary	B-1
5	Driver Chest X Deflection	B-2
6	Driver Chest Acceleration X Primary	B-3
7	Driver Chest Acceleration Y Primary	B-3
8	Driver Chest Acceleration Z Primary	B-3
9	Driver Chest Resultant Acceleration Primary	B-3
10	Driver Upper Neck Force X	B-4
11	Driver Upper Neck Force Z	B-4
12	Driver Upper Neck Moment Y	B-4
13	Driver Nij	B-4
14	Driver Left Femur Force Z	B-5
15	Driver Right Femur Force Z	B-5
16	Passenger Head Acceleration X Primary	B-6
17	Passenger Head Acceleration Y Primary	B-6
18	Passenger Head Acceleration Z Primary	B-6
19	Passenger Head Resultant Acceleration Primary	B-6
20	Passenger Chest X Deflection	B-7
21	Passenger Chest Acceleration X Primary	B-8
22	Passenger Chest Acceleration Y Primary	B-8
23	Passenger Chest Acceleration Z Primary	B-8
24	Passenger Chest Resultant Acceleration Primary	B-8
25	Passenger Upper Neck Force X	B-9
26	Passenger Upper Neck Force Z	B-9
27	Passenger Upper Neck Moment Y	B-9
28	Passenger Nij	B-9
29	Passenger Left Femur Force Z	B-10
30	Passenger Right Femur Force Z	B-10

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

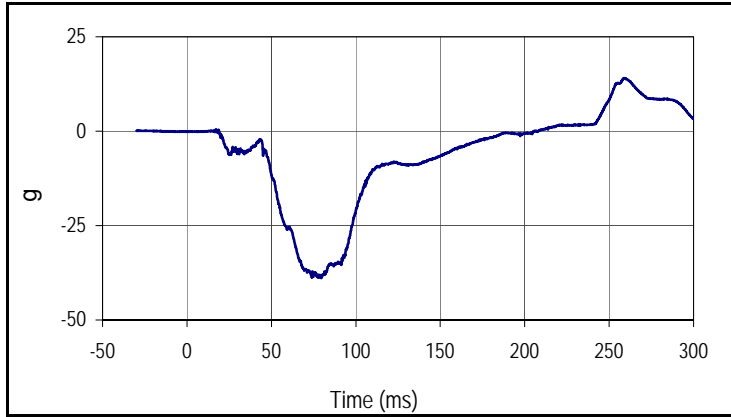
Driver Head X Acceleration Redundant
Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Redundant
Driver Right Femur Redundant
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
Driver Shoulder Belt Force

Driver Lap Belt Force
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
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 Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X

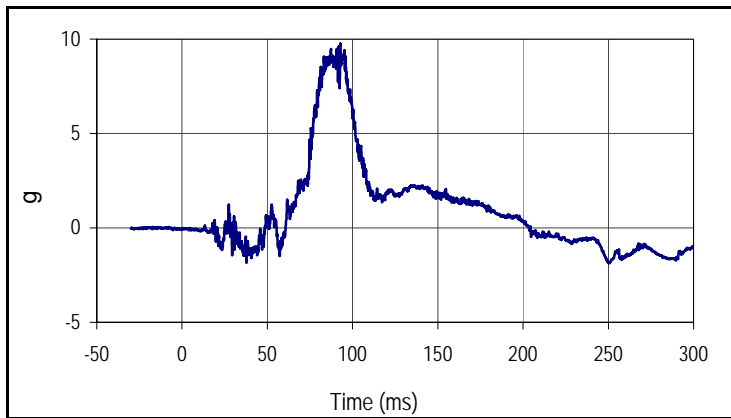
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
Load Cell Barrier Forces and Moments

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

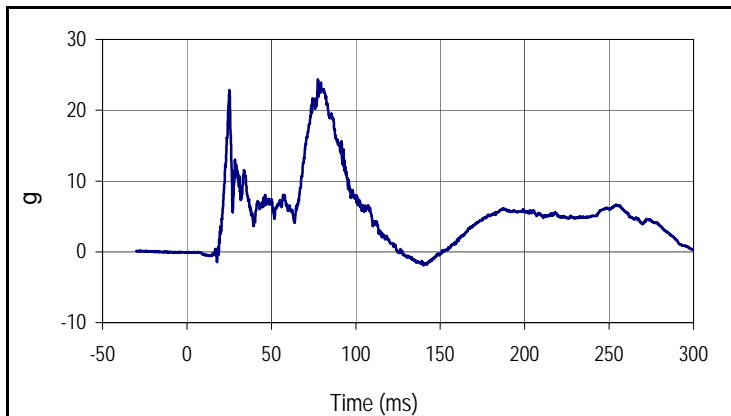
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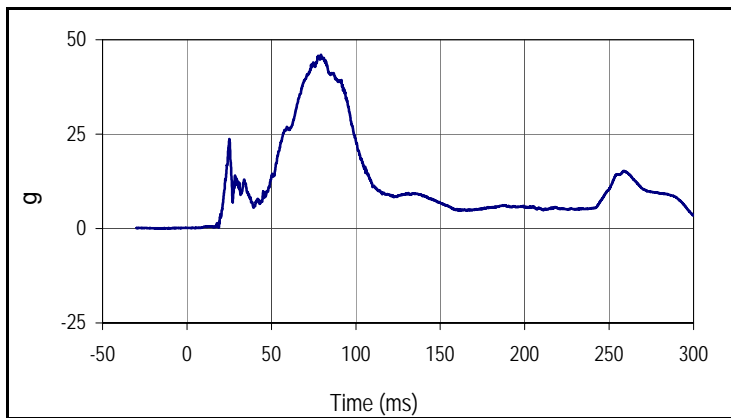
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
14.0	258.8	-38.9	79.6



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
9.8	92.8	-1.9	250.5



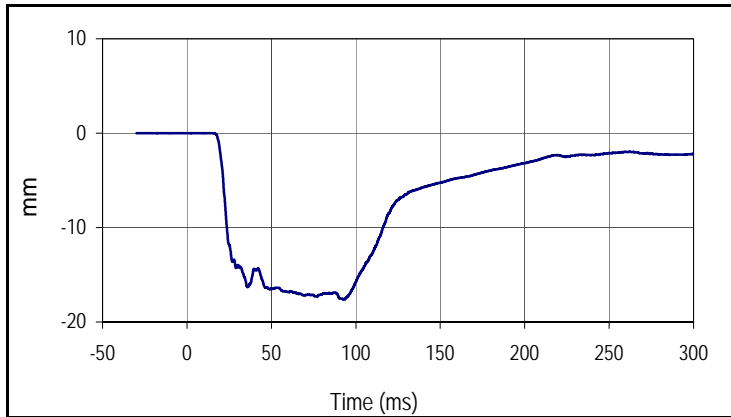
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
24.3	77.6	-1.9	140.0



Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
46.0	79.4	0.1	4.9

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

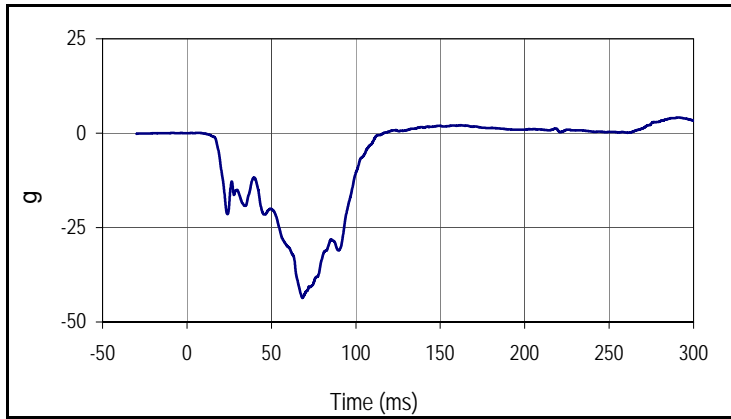
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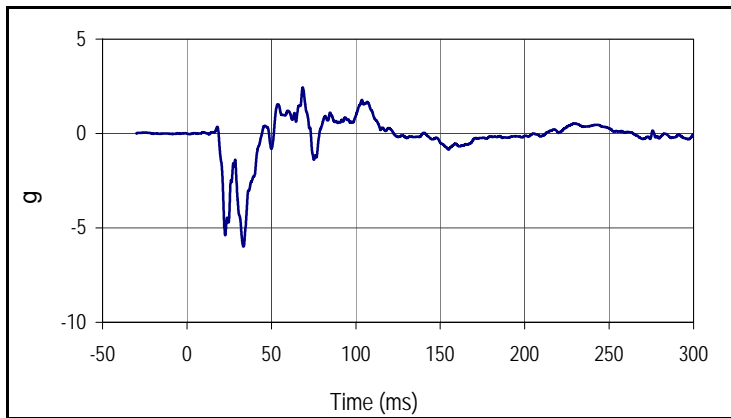
Curve Description			
Driver Chest Deflection			
Plot No.		SAE Class	Units
005		600	mm
Max	Time	Min	Time
0.0	12.5	-17.6	93.1

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

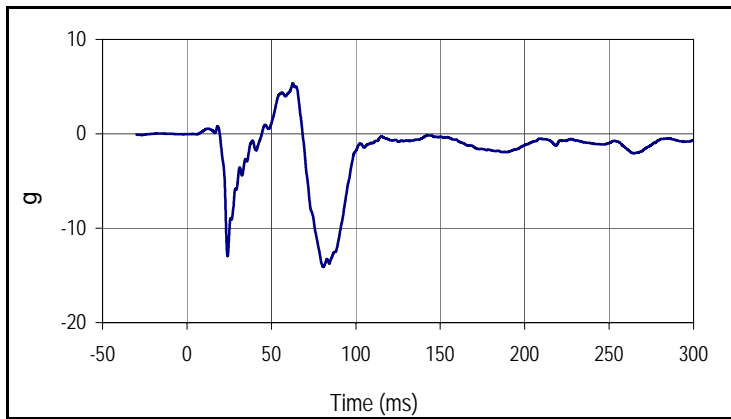
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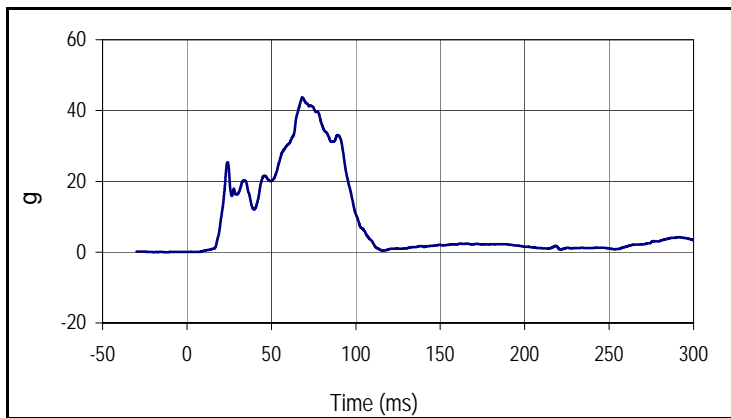
Curve Description			
Driver Chest Acceleration X Primary			
Plot No.		SAE Class	Units
006		180	g
Max	Time	Min	Time
4.2	290.9	-43.6	68.4



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
007		180	g
Max	Time	Min	Time
2.4	68.5	-6.0	33.4



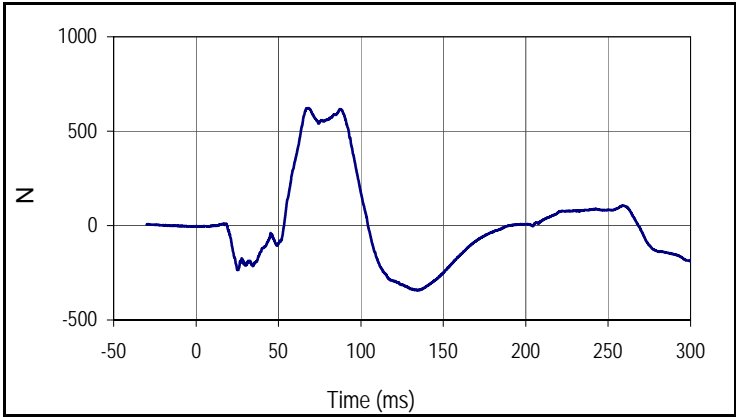
Curve Description			
Driver Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
008		180	g
Max	Time	Min	Time
5.4	62.7	-14.1	80.8



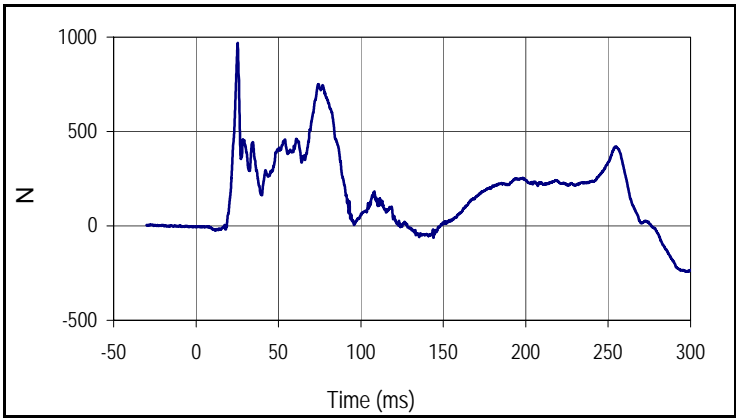
Curve Description			
Driver Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
009		180	g
Max	Time	Min	Time
43.7	68.4	0.0	3.8

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

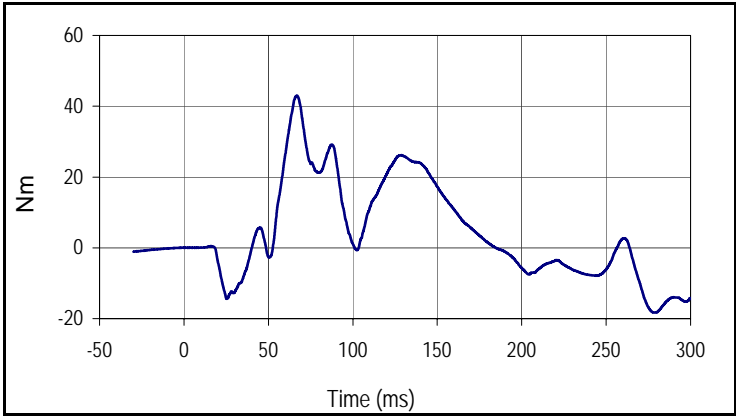
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 Test Date: 2/3/16



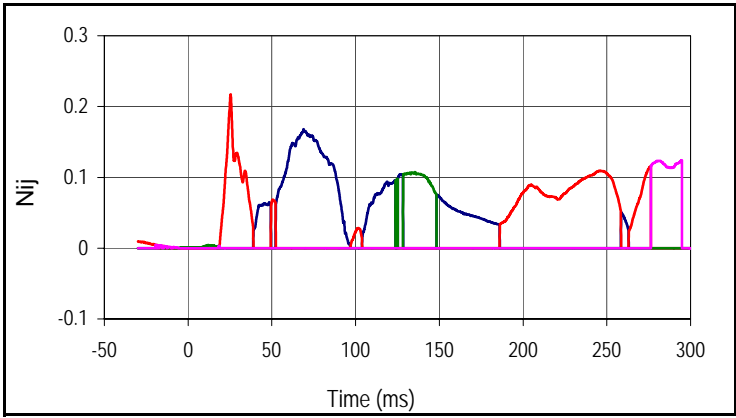
Curve Description			
Driver Upper Neck Force X			
Plot No.		SAE Class	Units
010		1000	N
Max	Time	Min	Time
622.8	67.6	-343.1	134.9



Curve Description			
Driver Upper Neck Force Z			
Plot No.		SAE Class	Units
011		1000	N
Max	Time	Min	Time
970.0	25.3	-243.1	298.1



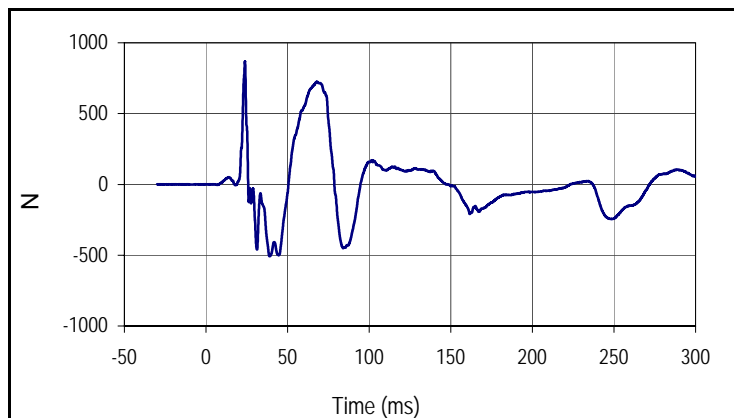
Curve Description			
Driver Upper Neck Moment Y			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
43.0	67.0	-18.3	278.4



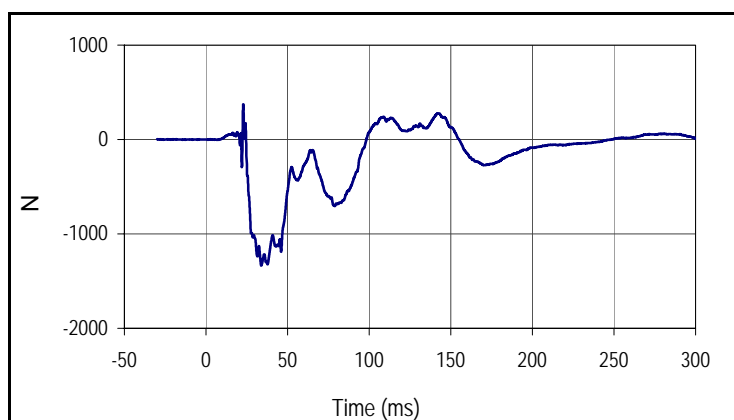
Curve Description			
Driver Nij			
Units	Max	Time	
Ntf	0.17	69.0	
Units	Max	Time	
Nte	0.22	25.4	
Units	Max	Time	
Ncf	0.11	135.5	
Units	Max	Time	
Nce	0.12	294.8	

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20164206
 Test Date: 2/3/16



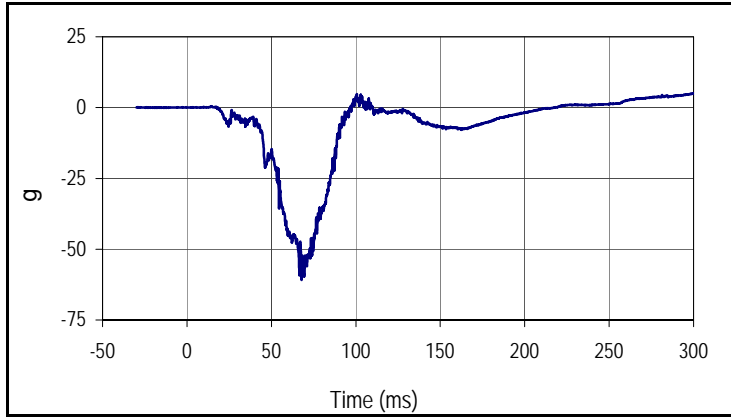
Curve Description			
Driver Left Femur Force Z			
Plot No.		SAE Class	Units
014		600	N
Max	Time	Min	Time
867.9	23.9	-508.0	39.0



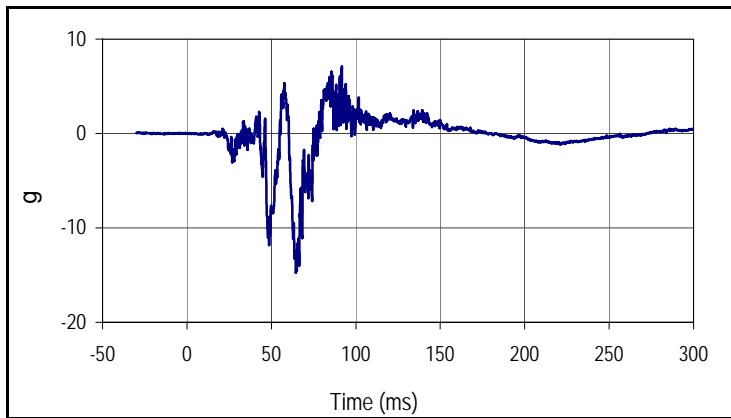
Curve Description			
Driver Right Femur Force Z			
Plot No.		SAE Class	Units
015		600	N
Max	Time	Min	Time
373.6	22.8	-1335.6	33.9

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

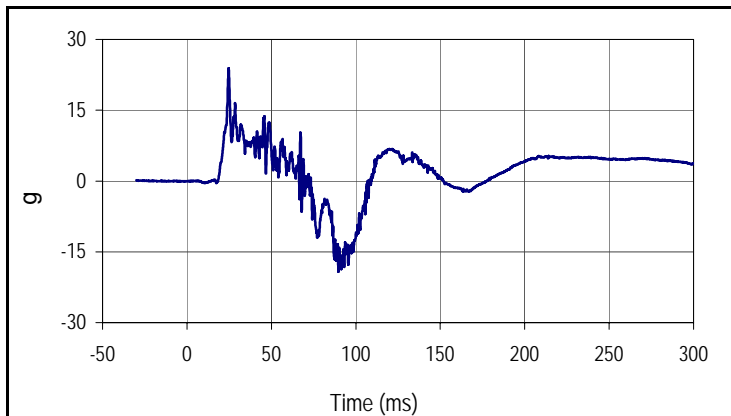
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 Test Date: 2/3/16



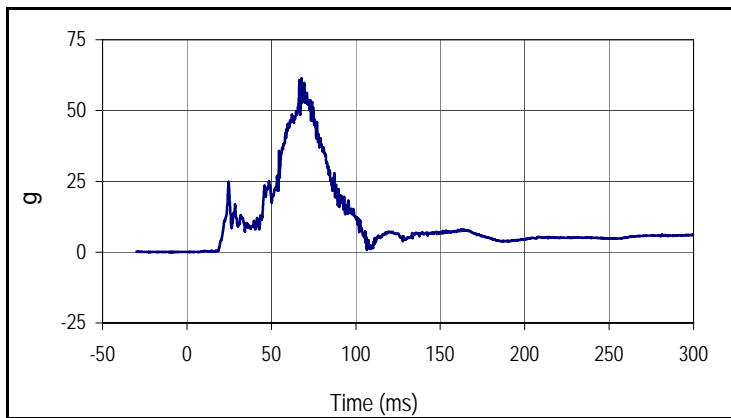
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
5.0	299.8	-60.9	67.8



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
7.1	91.7	-14.8	64.5



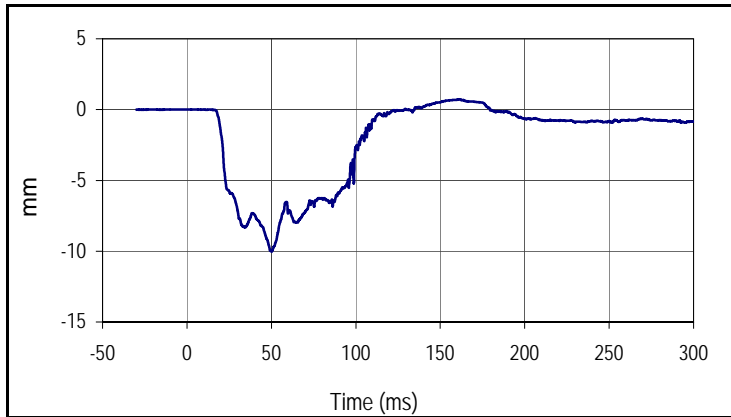
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
018		1000	g
Max	Time	Min	Time
23.9	24.7	-19.2	89.7



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
019		1000	g
Max	Time	Min	Time
61.4	67.9	0.0	4.0

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

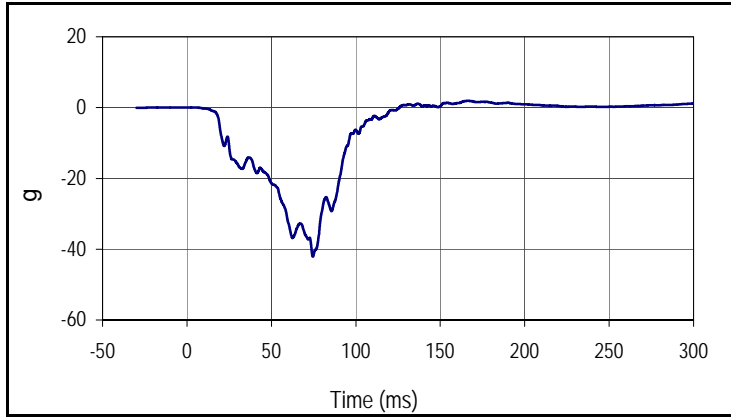
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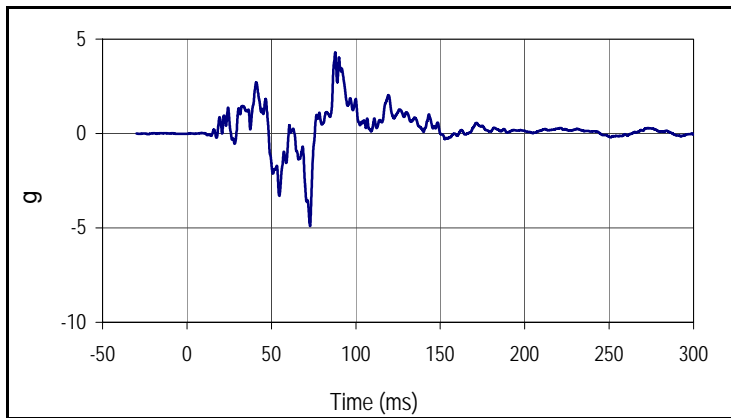
Curve Description			
Passenger Chest Deflection			
Plot No.		SAE Class	Units
020		600	mm
Max	Time	Min	Time
0.7	161.7	-10.0	50.1

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

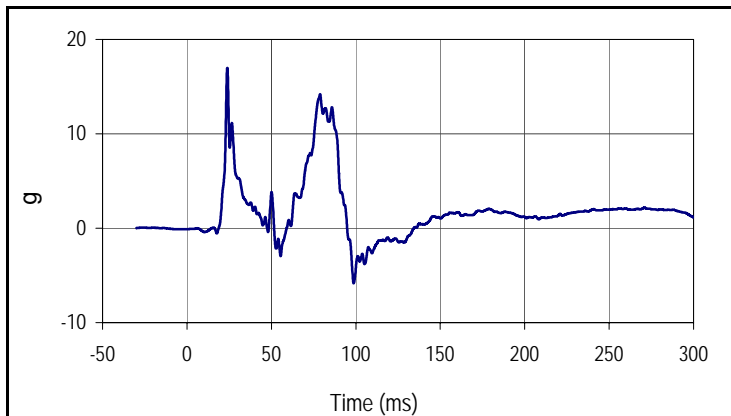
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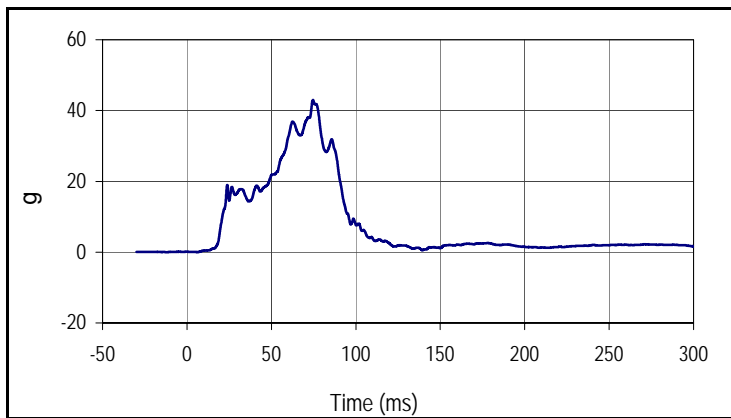
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
2.0	166.4	-42.1	74.6



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
022		180	g
Max	Time	Min	Time
4.3	87.8	-4.9	72.8



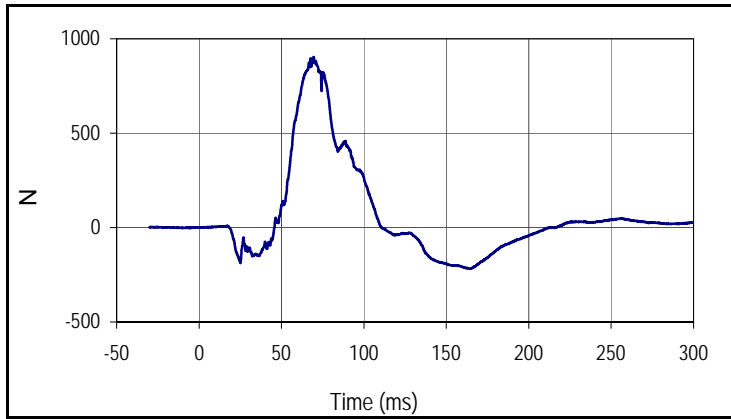
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
023		180	g
Max	Time	Min	Time
17.0	23.9	-5.8	98.7



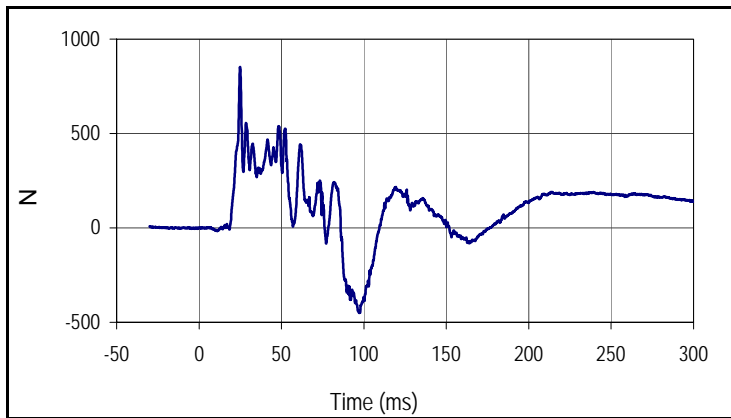
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
024		180	g
Max	Time	Min	Time
43.0	74.6	0.0	6.2

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

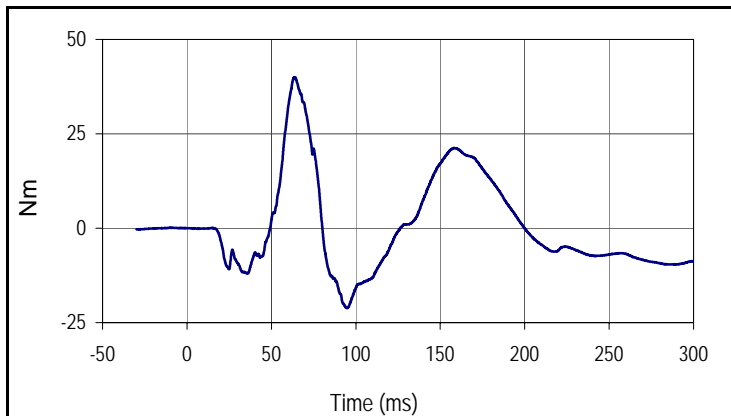
NHTSA No.: M20164206
 Test Date: 2/3/16



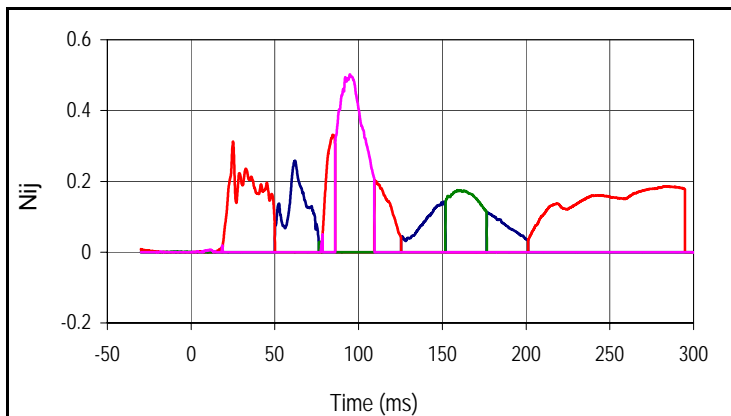
Curve Description			
Passenger Upper Neck Force X			
Plot No.		SAE Class	Units
025		1000	N
Max	Time	Min	Time
902.7	69.6	-218.0	164.7



Curve Description			
Passenger Upper Neck Force Z			
Plot No.		SAE Class	Units
026		1000	N
Max	Time	Min	Time
852.3	24.9	-450.7	97.2



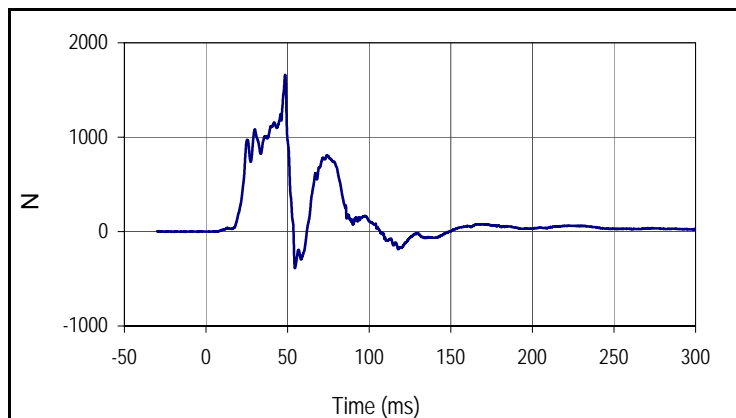
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.		SAE Class	Units
027		600	Nm
Max	Time	Min	Time
40.0	64.0	-21.2	94.8



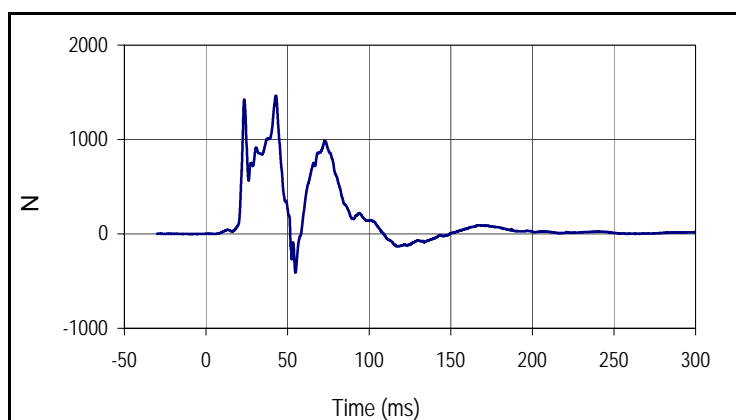
Curve Description		
Passenger Nij		
Units	Max	Time
Ntf	0.26	62.0
Nte	0.33	84.6
Ncf	0.17	159.2
Nce	0.50	94.9

Test Vehicle: 2016 Kia Optima LX 4-Door Sedan
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: M20164206
 Test Date: 2/3/16



Curve Description			
Passenger Left Femur Force Z			
Plot No.		SAE Class	Units
029		600	N
Max	Time	Min	Time
1659.8	48.5	-385.3	54.6



Curve Description			
Passenger Right Femur Force Z			
Plot No.		SAE Class	Units
030		600	N
Max	Time	Min	Time
1465.2	42.9	-411.3	54.9

APPENDIX C
ATD 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: 12/21/15

ATD Serial No.: 360

Test I.D.: N/A



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

Describe the repair on or replacement of parts:

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 12/21/15

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

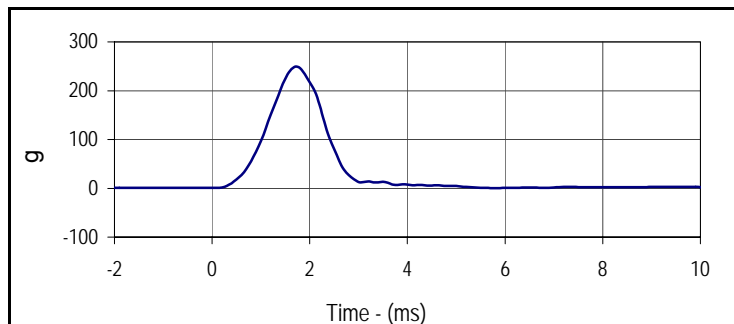
Test Date: 12/21/15



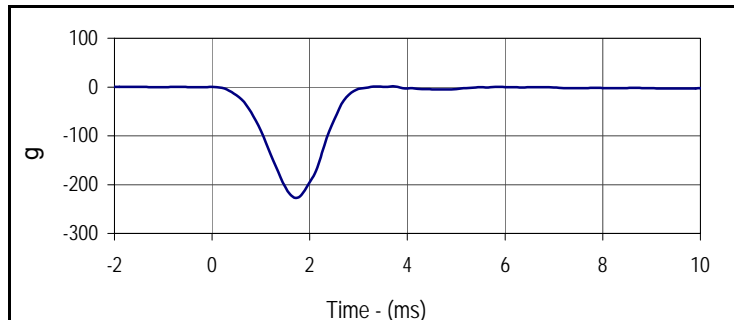
ATD Serial No.: 360

Test I.D.: M360HD014

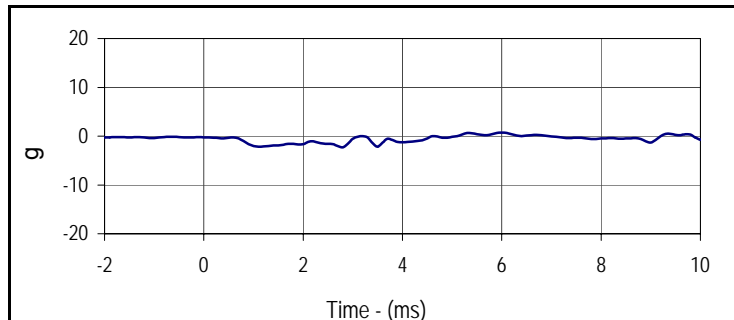
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	305	Pass
Temperature During Soak	Max	18.9 to 25.6	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	18.2	Pass
Peak Resultant Acceleration	g	225.0 to 275.0	249.3	Pass
Peak Lateral Acceleration	g	≤15.0	2.3	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	12.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



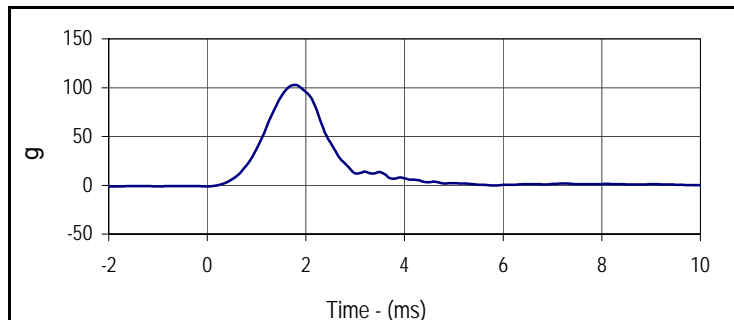
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
249.3	1.7	0.3	88.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
1.4	3.7	-227.4	1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
0.7	6.0	-2.3	2.8



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
102.7	1.8	-2.7	95.7

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

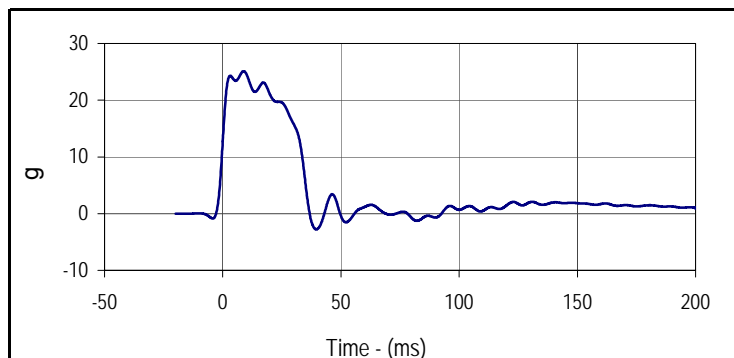
Test Date: 12/21/15



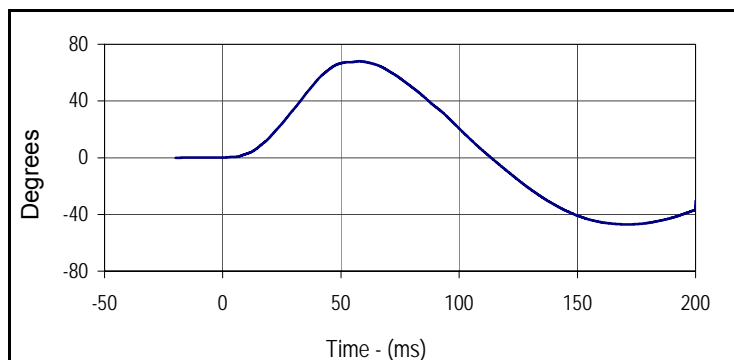
ATD Serial No.: 360

Test I.D.: M360NF014

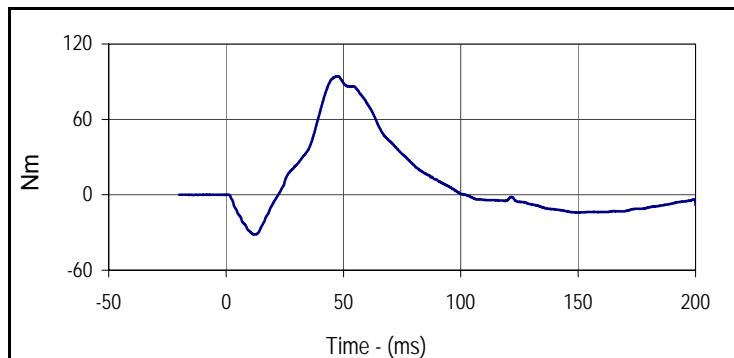
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	370	Pass
Temperature During Soak	Max	20.6 to 22.2	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	18.0	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 Msec.	22.5 to 27.5	24.6	Pass
	20 Msec.	17.6 to 22.6	21.0	Pass
	30 Msec.	12.5 to 18.5	15.8	Pass
Peak Pendulum Decel. after 30 Msec.	g	≤ 29.0	15.8	Pass
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	35.1	Pass
Maximum "D" Plane Rotation	Max	64.0 to 78.0	68.0	Pass
	Time	57.0 to 64.0	57.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	113.5	Pass
Moment About Occ. Condyle	Max	88.1 to 108.5	94.4	Pass
	Time	47.0 to 58.0	47.8	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	102.0	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
25.1	8.8	-2.8	39.6



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
68.0	57.8	-47.0	171.3



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
94.4	47.8	-31.6	11.9

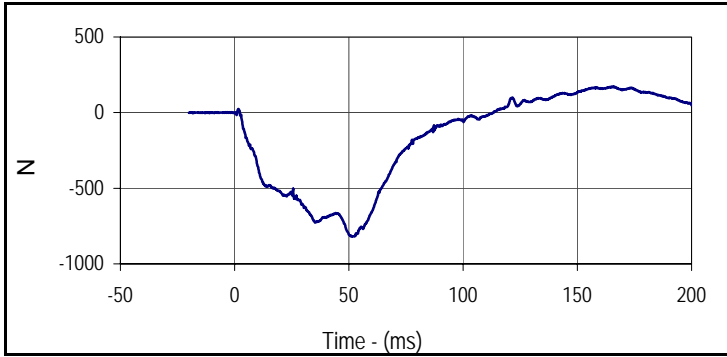
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 12/21/15

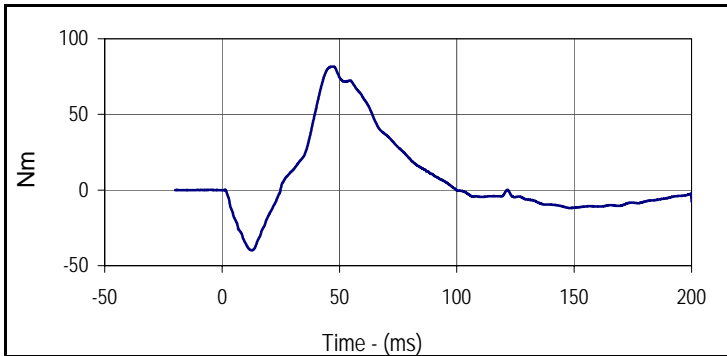


ATD Serial No.: 360

Test I.D.: M360NF014



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
172.7	165.5	-819.5	51.2



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
81.6	47.4	-39.8	12.6

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

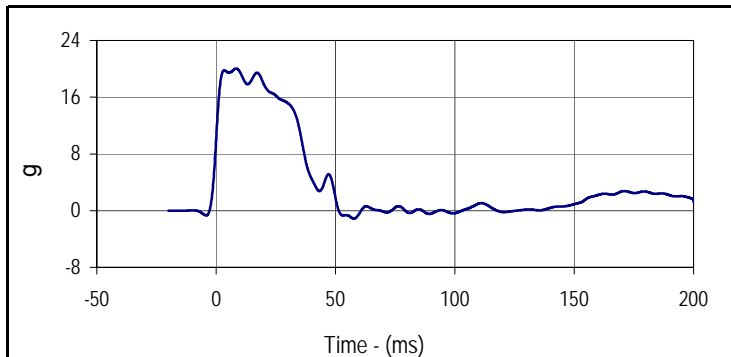
Test Date: 12/21/15



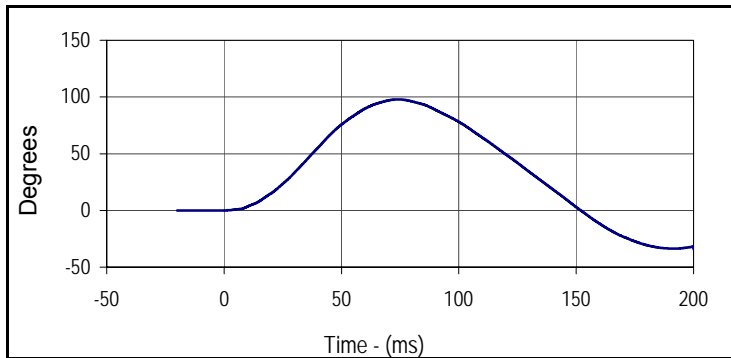
ATD Serial No.: 360

Test I.D.: M360NE014

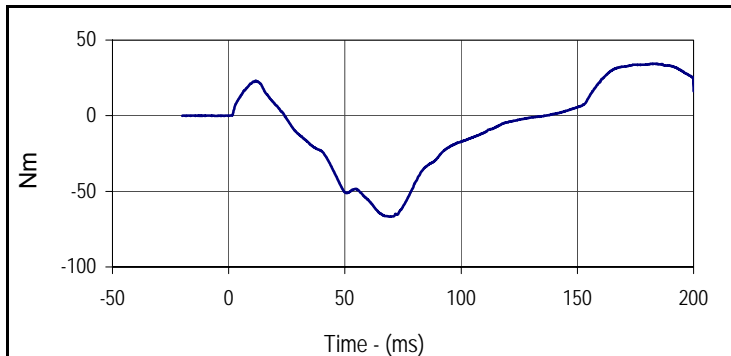
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	415	Pass
Temperature During Soak	Max	20.6 to 22.2	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	17.9	Pass
Pendulum Velocity	m/s	5.94 to 6.19	5.96	Pass
Pendulum Deceleration	10 Msec.	17.2 to 21.2	19.5	Pass
	20 Msec.	14.0 to 19.0	17.8	Pass
	30 Msec.	11.0 to 16.0	15.2	Pass
Peak Pendulum Decel. after 30 Msec.	g	≤ 22.0	15.2	Pass
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	39.3	Pass
Maximum "D" Plane Rotation	Max	81.0 to 106.0	97.9	Pass
	Time	72.0 to 82.0	74.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	152	Pass
Moment About Occ. Condyle	Max	-52.9 to -79.9	-66.8	Pass
	Time	65.0 to 79.0	69.4	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	135.9	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
20.0	8.4	-1.1	57.7



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
97.9	74.1	-34.3	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
34.4	183.3	-66.8	69.4

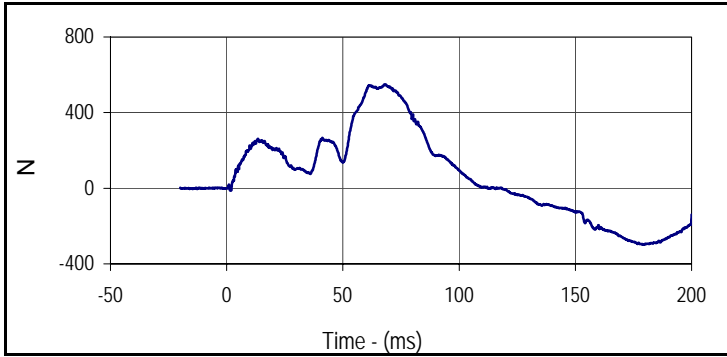
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 12/21/15

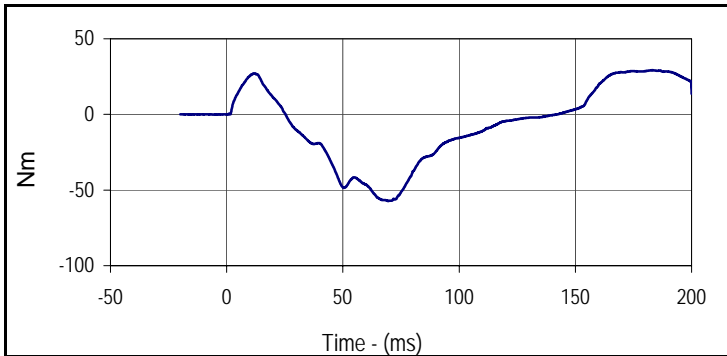


ATD Serial No.: 360

Test I.D.: M360NE014



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
550.3	68.0	-298.2	179.7



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
29.2	183.2	-57.2	69.5

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

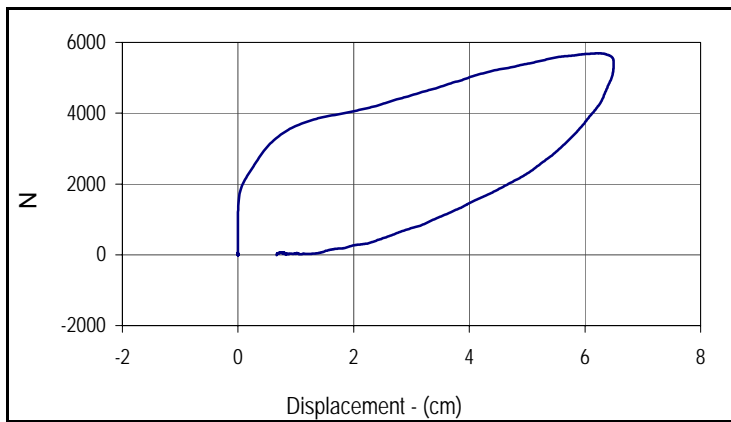
Test Date: 12/21/15



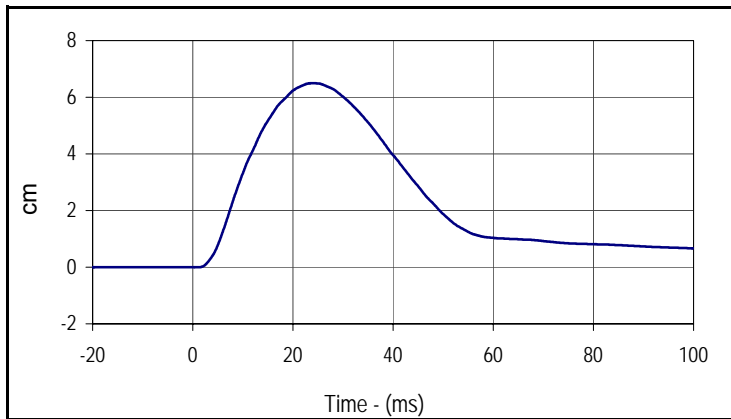
ATD Serial No.: 360

Test I.D.: M360CH014

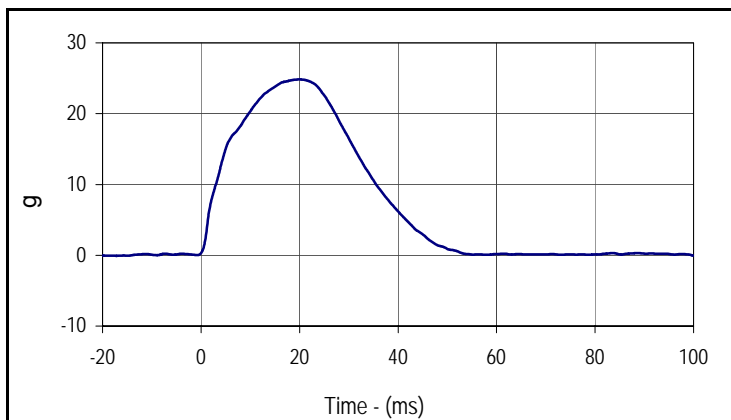
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	490	Pass
Temperature During Soak	Max	20.6 to 22.2	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	17.8	Pass
Probe Velocity	m/s	6.58 to 6.82	6.73	Pass
Peak Probe Force	Newtons	5159 to 5893	5693	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.49	Pass
Internal Hysteresis	%	69 to 85	70.6	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	70.6
Peak Probe Force		Peak Chest Deflection	
5693		6.49	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	cm
Max	Time	Min	Time
6.5	23.8	0.0	1.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
24.9	19.9	-0.1	-17.2

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

Test Date: 12/21/15
 Test I.D.: M360LK014 , M360RK014

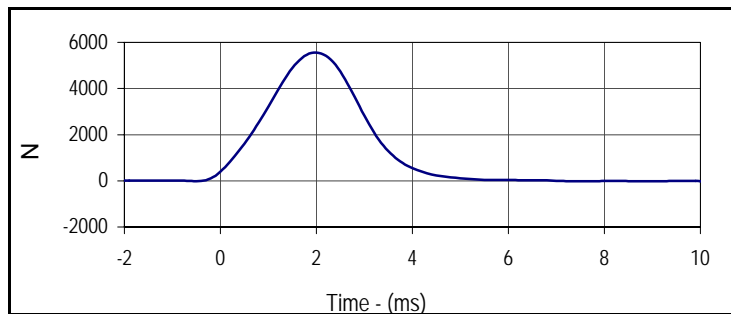


Left Knee

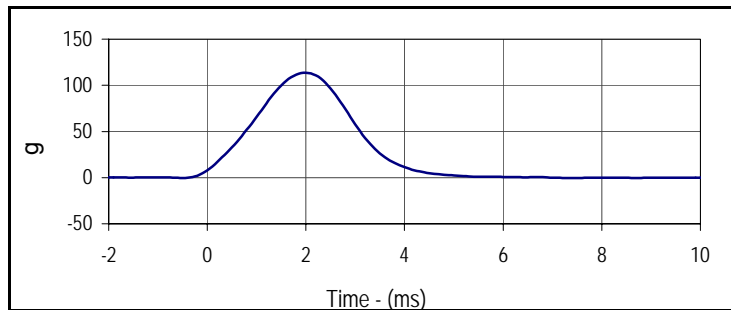
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	545	Pass
Temperature During Soak	Max	18.9 to 25.6	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	17.8	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5559	Pass
Overall Test Results				Pass

Right Knee

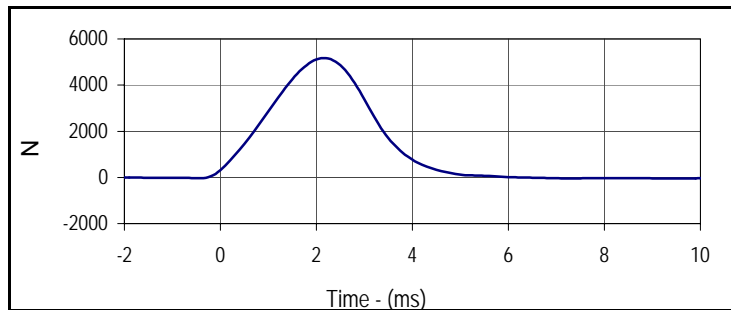
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	4715 to 5782	5168	Pass
Overall Test Results				Pass



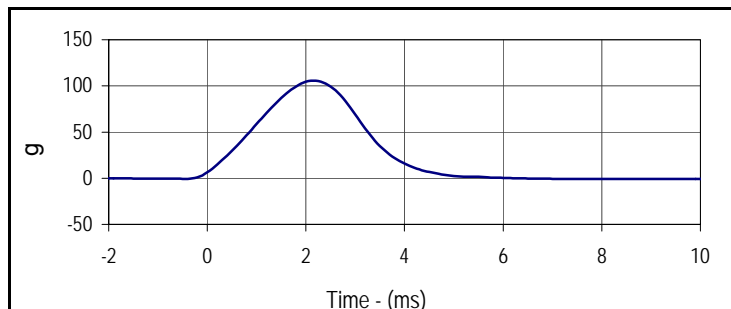
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
5559.4	2.0	-17.8	17.2



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	g
Max	Time	Min	Time
113.6	2.0	-0.4	17.2



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
5168.3	2.2	-46.3	12.0



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	g
Max	Time	Min	Time
105.6	2.2	-0.9	12.0

Test Program: Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test
 ATD Serial No.: 360

Test Date: 12/21/15

Test I.D.: M360LF014, M360RF014

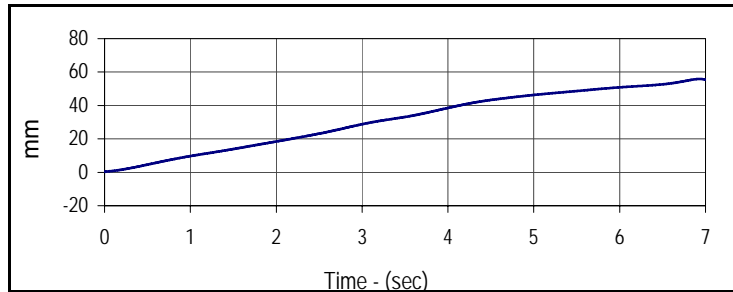


Left Hip Joint-Femur Results

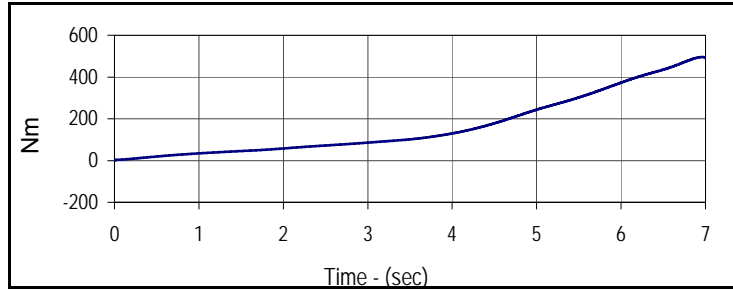
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	620	Pass
Temperature During Soak	Max	18.9 to 25.6	21.0	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	18.3	Pass
	Min		17.7	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	17.7	Pass
Rotation Rate	deg/sec	5 to 10	8.1	Pass
Femur Torque at 30°	Nm	≤ 95	87.2	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	44.1	Pass
Overall Test Results				Pass

Right Hip Joint-Femur Results

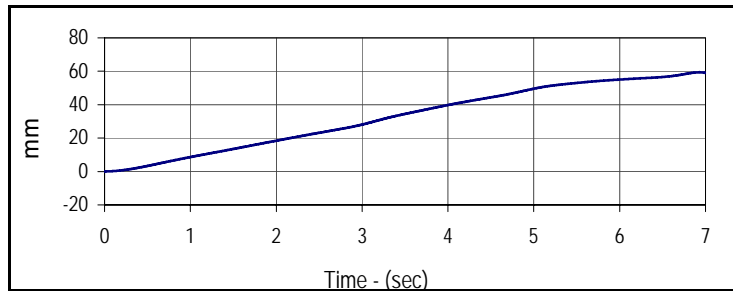
Rotation Rate	deg/sec	5 to 10	8.6	Pass
Femur Torque at 30°	Nm	≤ 95	85.8	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	45.1	Pass
Overall Test Results				Pass



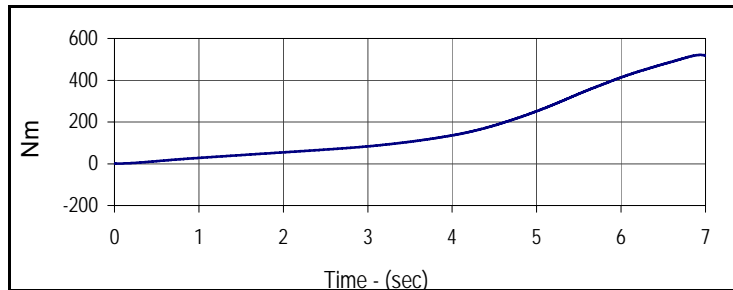
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	mm
Max	Time	Min	Time
55.9	6.9	0.4	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
495.4	7.0	0.4	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	mm
Max	Time	Min	Time
59.4	6.9	0.4	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
521.2	6.9	0.4	0.0

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

Test Date: 12/22/15

ATD Serial No.: 141

Test I.D.: N/A



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

Describe the repair on or replacement of parts:

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 12/22/15



ATD Serial No.: 141

Test I.D.: N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.14	Pass
Laboratory Relative Humidity	%	10 to 70	20.2	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

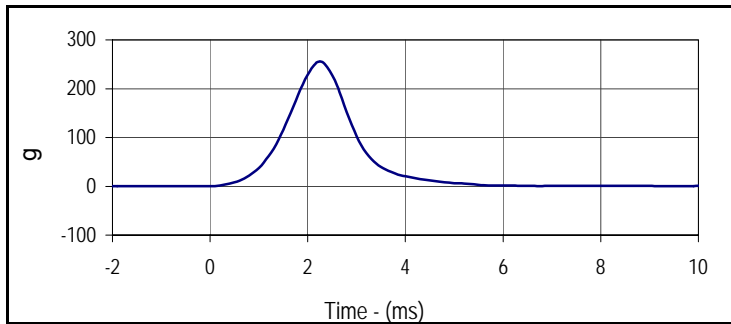
Test Date: 12/22/15



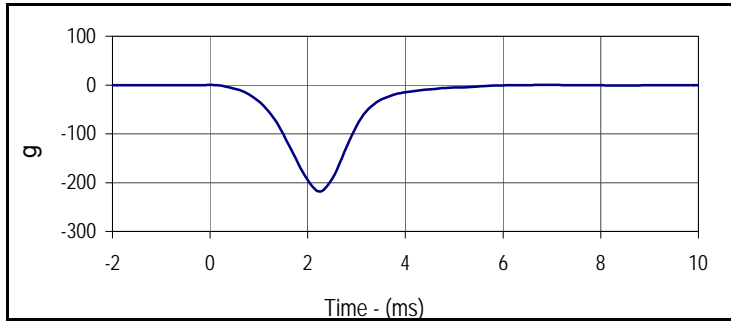
ATD Serial No.: 141

Test I.D.: F141HD071

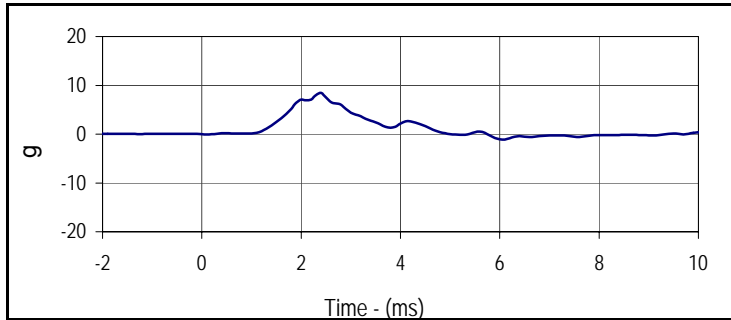
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	401	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass
	Min		20.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.2	Pass
Peak Resultant Acceleration	g	250.0 to 300.0	255.0	Pass
Peak Lateral Acceleration	g	≤15.0	8.5	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	6.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



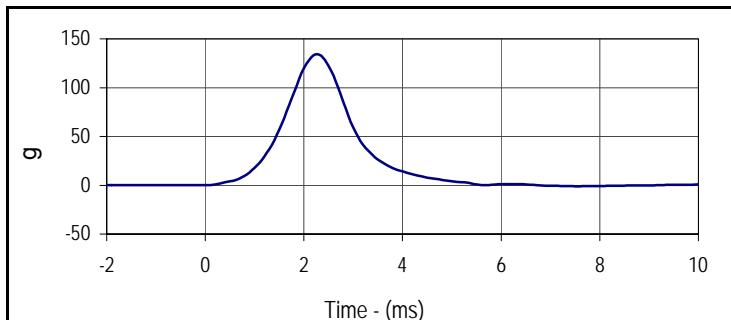
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
255.0	2.2	0.0	0.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
0.4	6.9	-217.3	2.2



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
8.5	2.4	-1.1	6.1



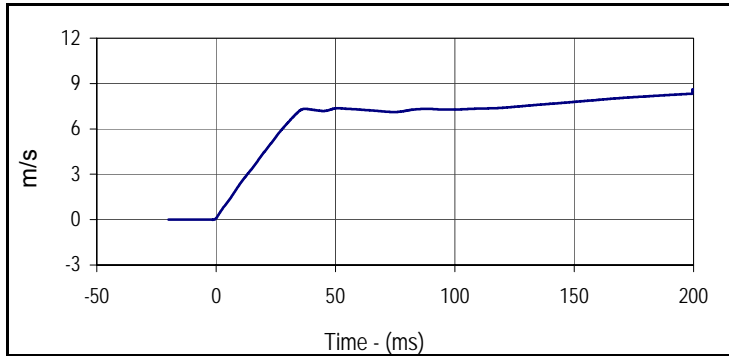
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
133.9	2.3	-1.1	7.5

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test
 ATD Serial No.: 141

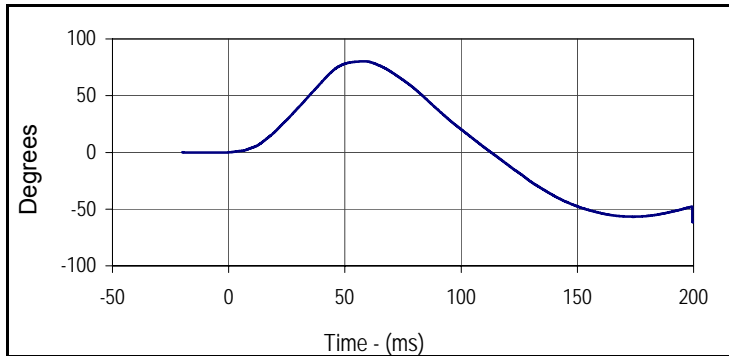
Test Date: 12/22/15
 Test I.D.: F141NF071



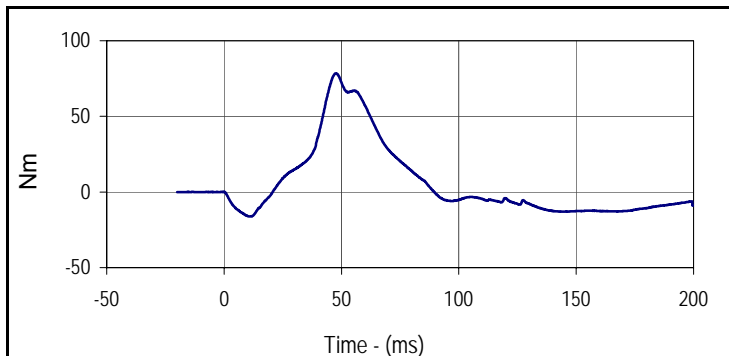
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	466	Pass	
Temperature During Soak	Max	20.6 to 22.2	22.2	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass	
	Min		20.2	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	20.3	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.93	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.4	Pass
	20 Msec.	m/s	4.0 to 5.0	4.4	Pass
	30 Msec.	m/s	5.8 to 7.0	6.4	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	80.3	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	77.0	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	81.5	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
8.6	199.5	0.0	-1.4



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
80.3	58.2	-61.3	199.5



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
78.4	47.4	-16.1	11.2

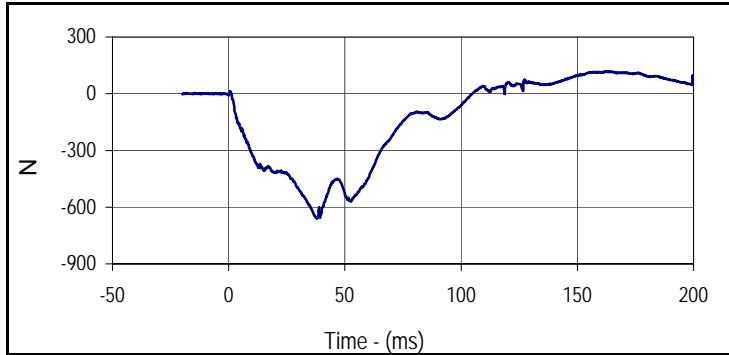
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 12/22/15

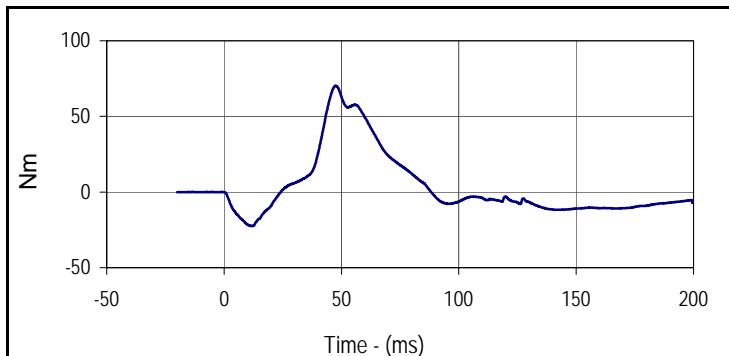


ATD Serial No.: 141

Test I.D.: F141NF071



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
118.8	162.2	-659.2	38.1



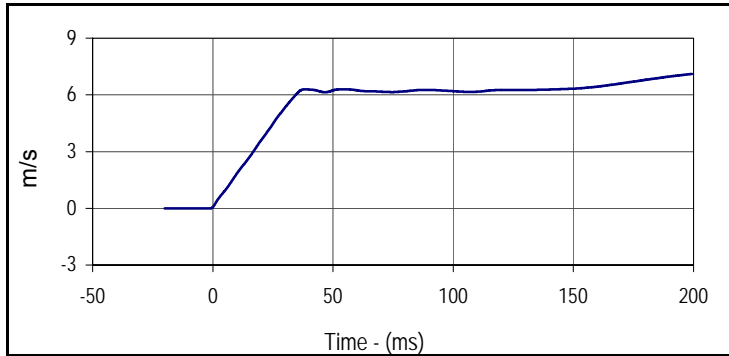
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
70.3	47.4	-22.5	11.6

Test Program: Hybrid III 5th Percentile Female Neck Extension Test
 ATD Serial No.: 141

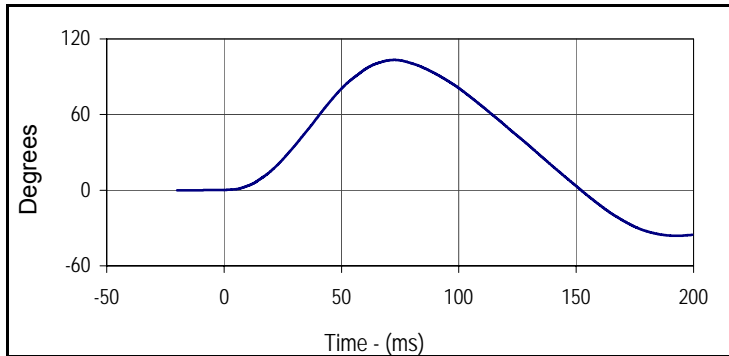
Test Date: 12/22/15
 Test I.D.: F141NE071



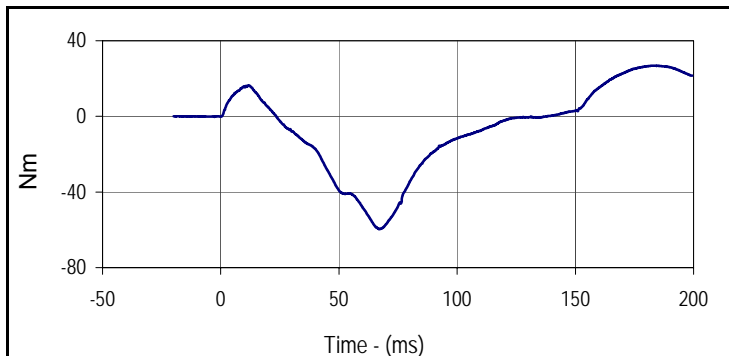
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	531	Pass	
Temperature During Soak	Max	20.6 to 22.2	22.2	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass	
	Min		20.2	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	22.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	20.2	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	5.97	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.8	Pass
	20 Msec.	m/s	3.1 to 3.9	3.6	Pass
	30 Msec.	m/s	4.6 to 5.6	5.3	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	103.4	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	103.9	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.1	199.4	0.0	-1.3



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
103.4	72.5	-36.2	192.8



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
26.9	183.8	-59.6	67.1

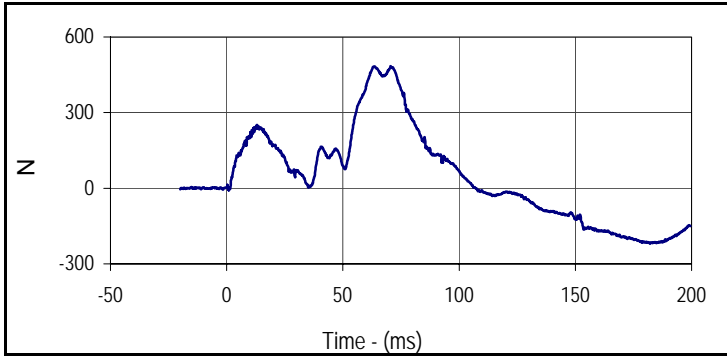
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 12/22/15

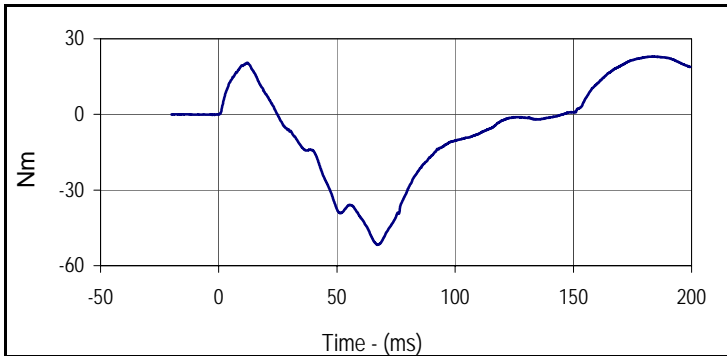


ATD Serial No.: 141

Test I.D.: F141NE071



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
484.3	70.5	-218.6	182.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
23.0	183.9	-51.7	67.1

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

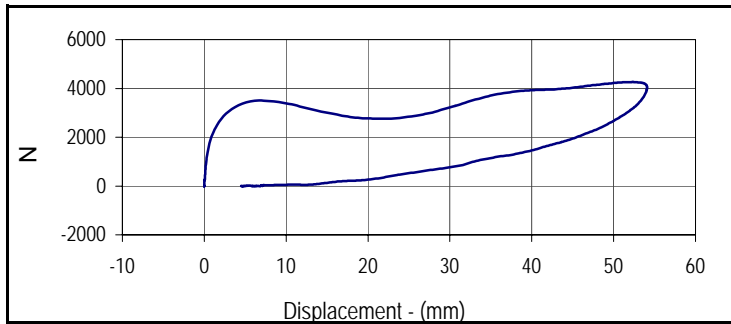
Test Date: 12/22/15



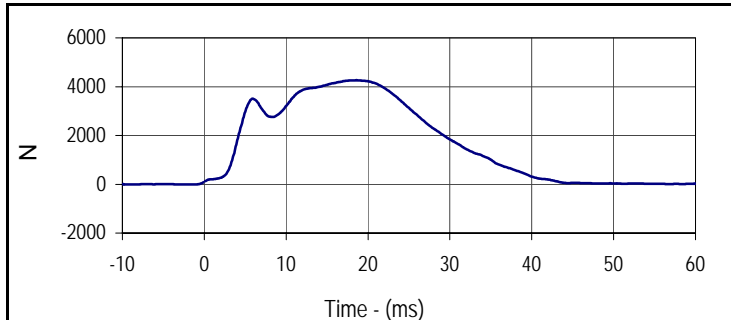
ATD Serial No.: 141

Test I.D.: F141CH071

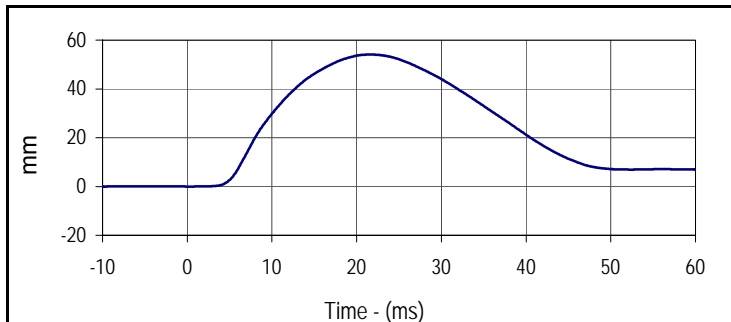
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	576	Pass
Temperature During Soak	Max	20.6 to 22.2	22.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass
	Min		20.2	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.3	Pass
Probe Velocity	m/s	6.59 to 6.83	6.71	Pass
Peak Chest Deflection	mm	50.0 to 58.0	54.1	Pass
Peak Force Between 50 and 58 MM	N	3900 to 4400	4225	Pass
Peak Force Between 18 and 50 MM	N	≤4600	4262	Pass
Internal Hysteresis	%	69 to 85	72.5	Pass
Overall Test Results				Pass



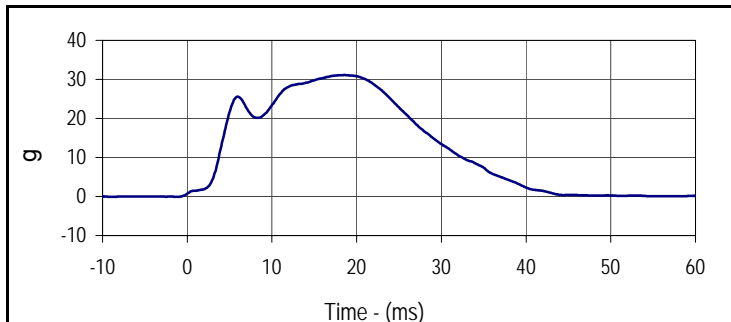
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	72.5
Peak Probe Force		Peak Chest Deflection	
4262.4		54.1	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	N
Max	Time	Min	Time
4262.4	18.6	-13.7	97.7



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	180	mm
Max	Time	Min	Time
54.1	21.6	0.0	0.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
31.1	18.6	-0.1	97.7

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

Test Date: 12/22/15



ATD Serial No.: 141

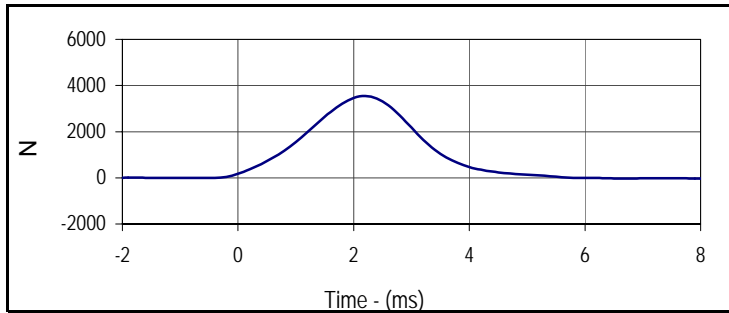
Test I.D.: F141LK071, F141RK071

Left Knee

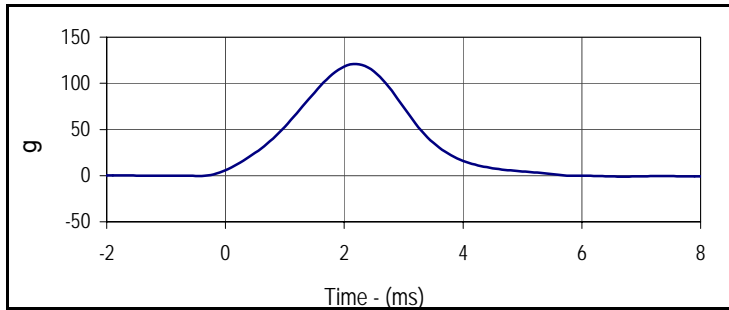
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	631	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass
	Min		20.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.3	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	3450 to 4060	3547	Pass
Overall Test Results				Pass

Right Knee

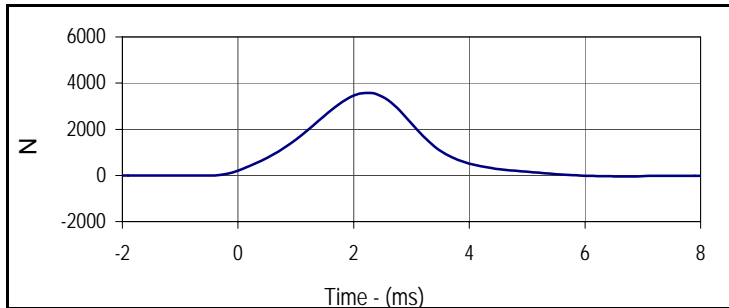
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	3450 to 4060	3580	Pass
Overall Test Results				Pass



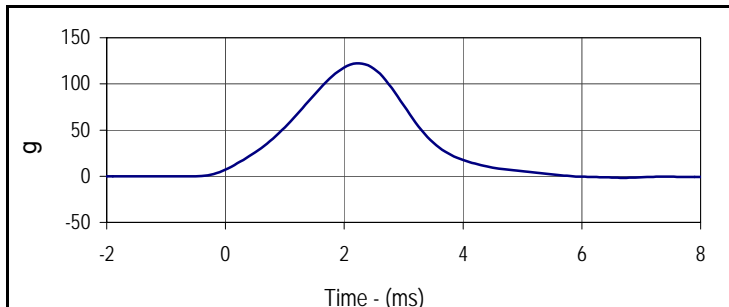
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
3547.4	2.2	-32.9	6.7



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	g
Max	Time	Min	Time
121.0	2.2	-1.1	6.7



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
3579.9	2.2	-49.2	6.7



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	g
Max	Time	Min	Time
122.1	2.2	-1.7	6.7

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

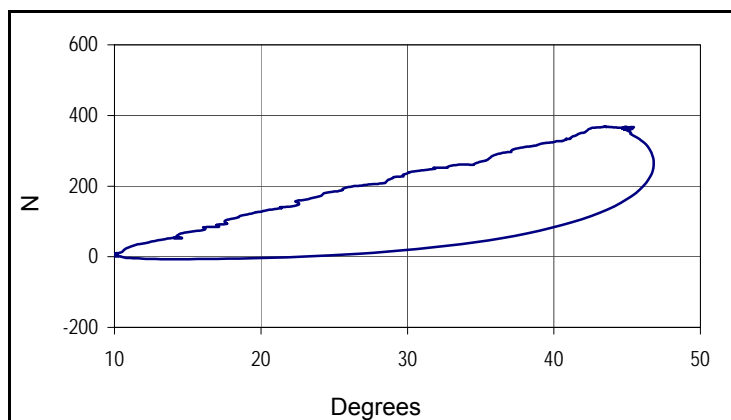
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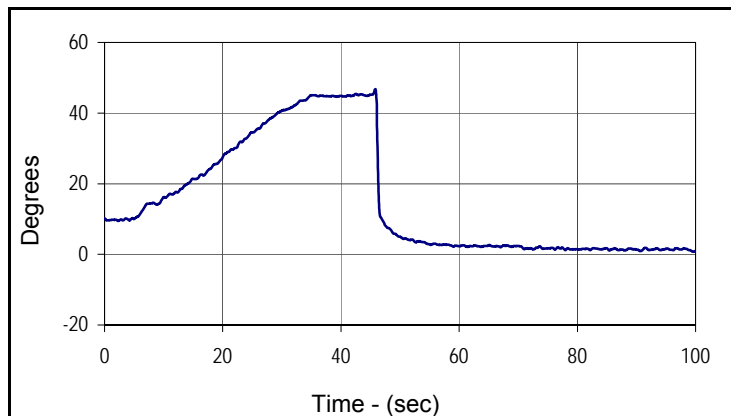
ATD Serial No.: 141

Test I.D.: TF071

Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	696	Pass
Temperature During Soak	Max	18.9 to 25.6	22.2	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	20.3	Pass
	Min		20.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.3	Pass
Initial Reference Plane Angle	Degrees	≤ 20	10.2	Pass
Peak Force at 45° +/-0.5°	N	320.0 to 390.0	368.1	Pass
Torso Rotation Rate	deg/sec	0.5 to 1.5	1.0	Pass
Final Reference Plane Angle	Degrees	+/-8	0.9	Pass
Overall Test Results				Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
369.0		46.8



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
46.8	45.8	0.7	99.7

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

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

Test Date: 2/5/16

ATD Serial No.: 360

Test I.D.: N/A



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

Describe the repair on or replacement of parts:

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 2/5/16

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

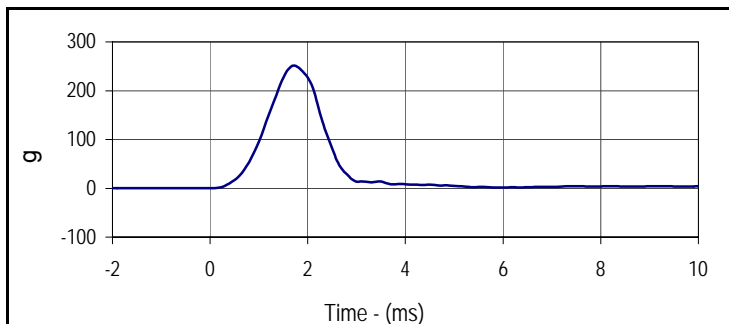
Test Date: 2/5/16



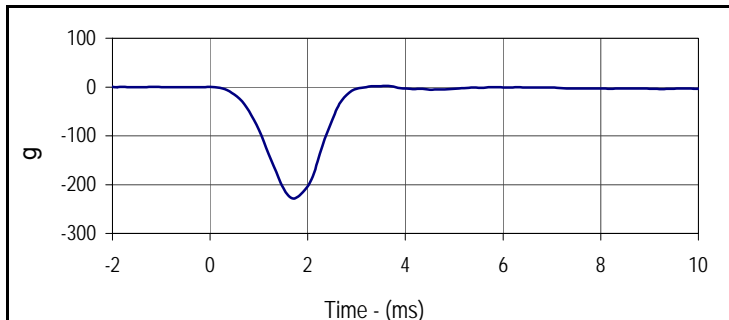
ATD Serial No.: 360

Test I.D.: M360HD015

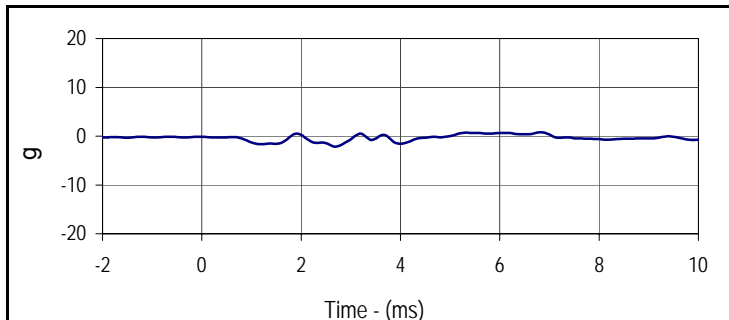
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	322	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.2	Pass
Peak Resultant Acceleration	g	225.0 to 275.0	251.4	Pass
Peak Lateral Acceleration	g	≤15.0	2.2	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	9.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



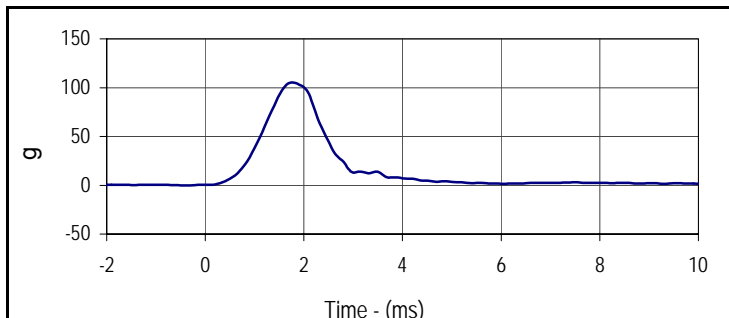
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
251.4	1.7	0.2	-3.4



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
2.2	3.6	-228.5	1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
0.8	6.8	-2.2	2.7



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
104.9	1.8	-1.0	95.4

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

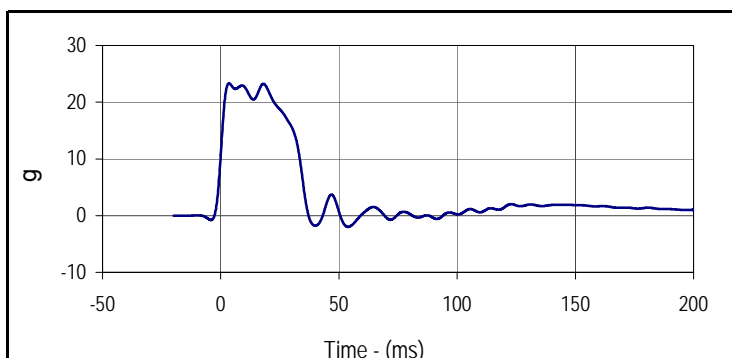
Test Date: 2/5/16



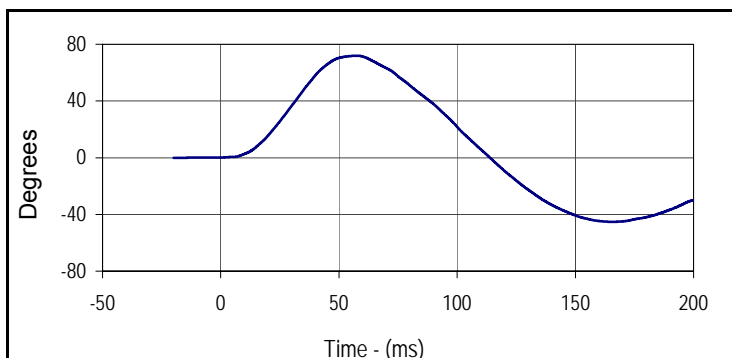
ATD Serial No.: 360

Test I.D.: M360NF015

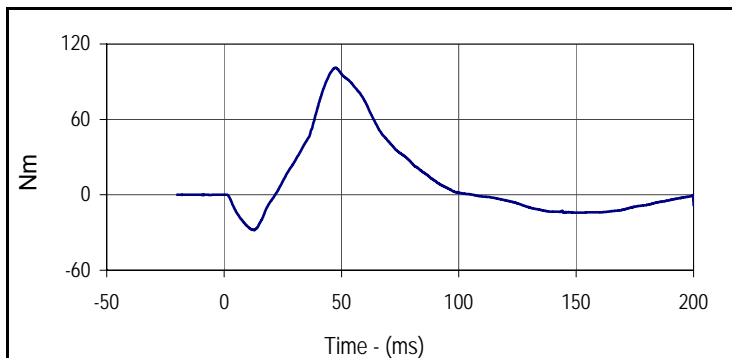
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	387	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.0	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 Msec.	22.5 to 27.5	22.7	Pass
	20 Msec.	17.6 to 22.6	22.1	Pass
	30 Msec.	12.5 to 18.5	15.6	Pass
Peak Pendulum Decel. after 30 Msec.	g	≤ 29.0	15.6	Pass
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	35.1	Pass
Maximum "D" Plane Rotation	Max	64.0 to 78.0	71.9	Pass
	Time	57.0 to 64.0	57.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	113.9	Pass
Moment About Occ. Condyle	Max	88.1 to 108.5	101.3	Pass
	Time	47.0 to 58.0	47.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	106.0	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
23.3	3.5	-2.0	53.9



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
71.9	57.2	-45.2	165.5



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
101.3	47.5	-28.1	13.0

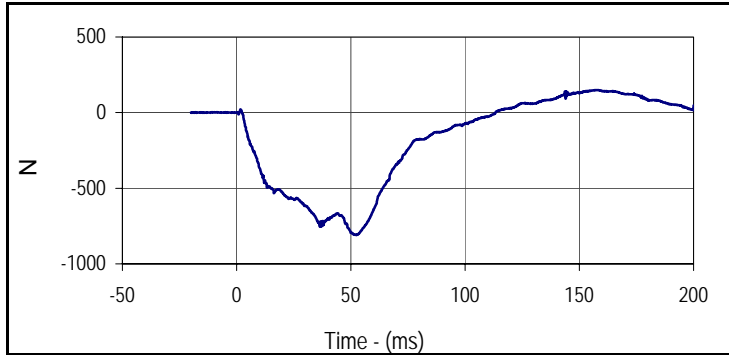
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 2/5/16

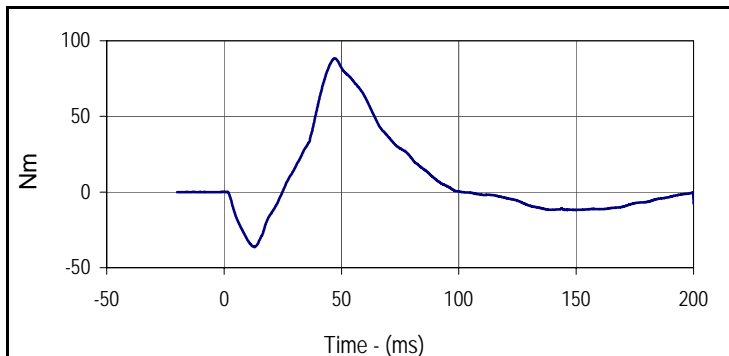


ATD Serial No.: 360

Test I.D.: M360NF015



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
149.3	158.3	-810.4	52.3



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
88.4	47.3	-36.4	13.0

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

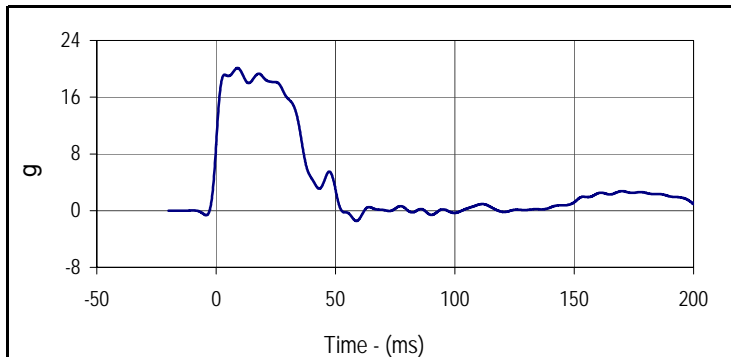
Test Date: 2/5/16



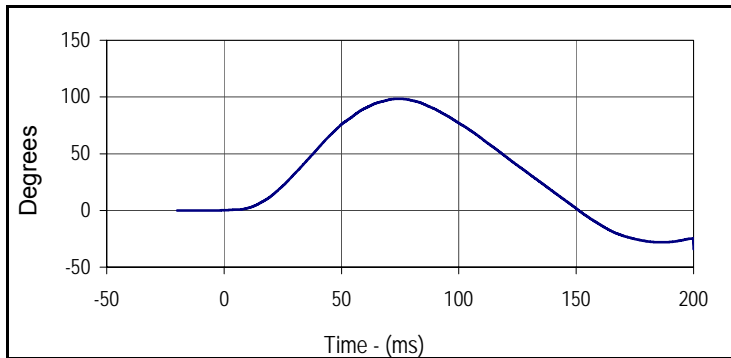
ATD Serial No.: 360

Test I.D.: M360NE015

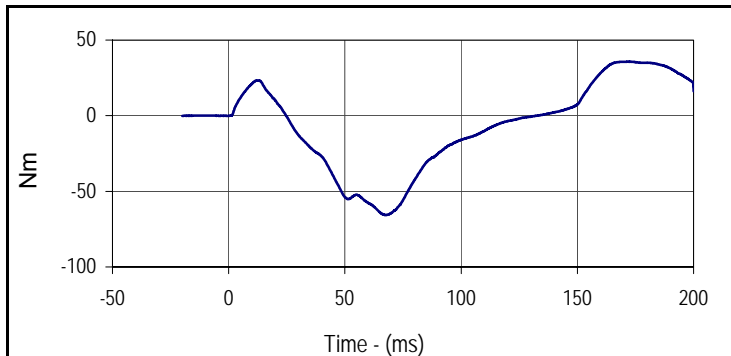
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	432	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	35.9	Pass
Pendulum Velocity	m/s	5.94 to 6.19	5.98	Pass
Pendulum Deceleration	10 Msec.	17.2 to 21.2	19.9	Pass
	20 Msec.	14.0 to 19.0	18.7	Pass
	30 Msec.	11.0 to 16.0	15.8	Pass
Peak Pendulum Decel. after 30 Msec.	g	≤ 22.0	15.8	Pass
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	39.2	Pass
Maximum "D" Plane Rotation	Max	81.0 to 106.0	98.4	Pass
	Time	72.0 to 82.0	74.4	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	151.1	Pass
Moment About Occ. Condyle	Max	-52.9 to -79.9	-65.7	Pass
	Time	65.0 to 79.0	67.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	132.6	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
20.1	8.9	-1.5	58.8



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
98.4	74.4	-34.3	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
35.7	171.7	-65.7	67.5

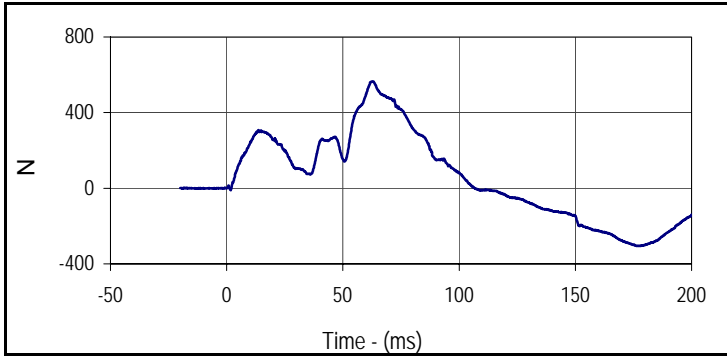
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 2/5/16

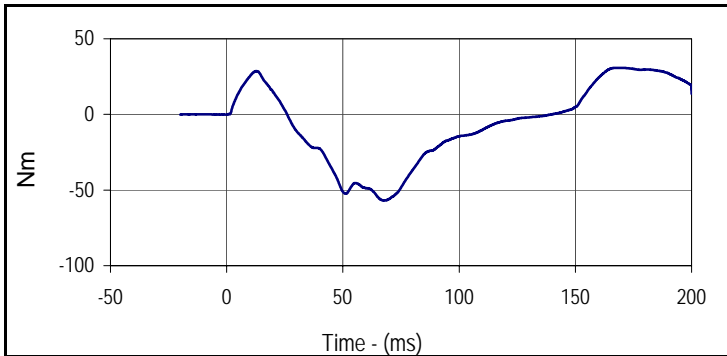


ATD Serial No.: 360

Test I.D.: M360NE015



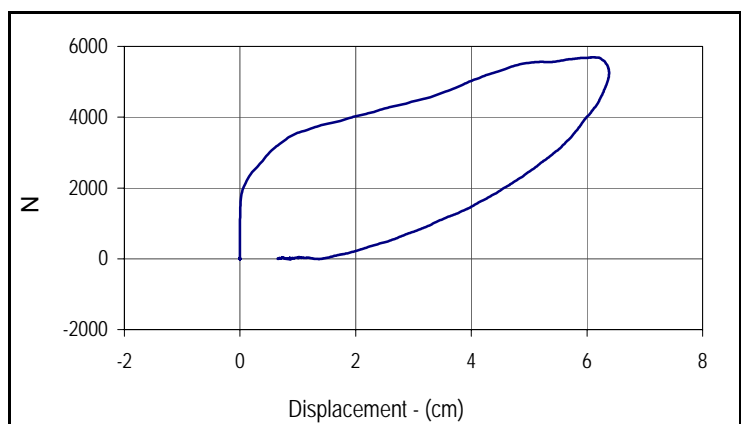
Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
564.8	63.0	-306.0	177.9



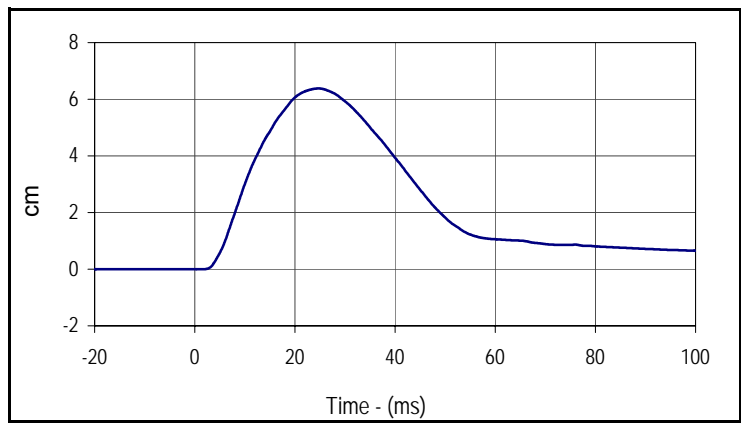
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
30.8	167.6	-57.0	67.6



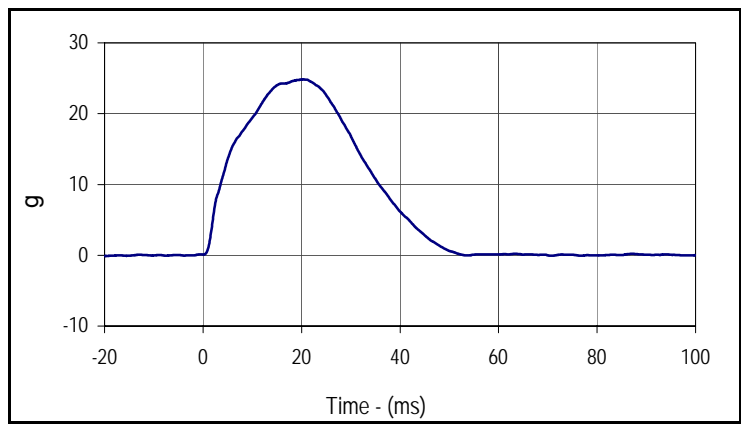
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	507	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.0	Pass
Probe Velocity	m/s	6.58 to 6.82	6.66	Pass
Peak Probe Force	Newtons	5159 to 5893	5691	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.38	Pass
Internal Hysteresis	%	69 to 85	70.6	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	70.6
Peak Probe Force		Peak Chest Deflection	
5691		6.38	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	cm
Max	Time	Min	Time
6.4	24.7	0.0	1.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
24.8	20.3	-0.1	-19.6

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

Test Date: 2/5/16



ATD Serial No.: 360

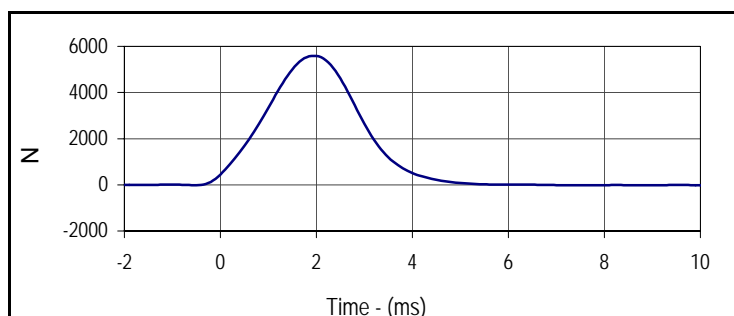
Test I.D.: M360LK015, M360RK015

Left Knee

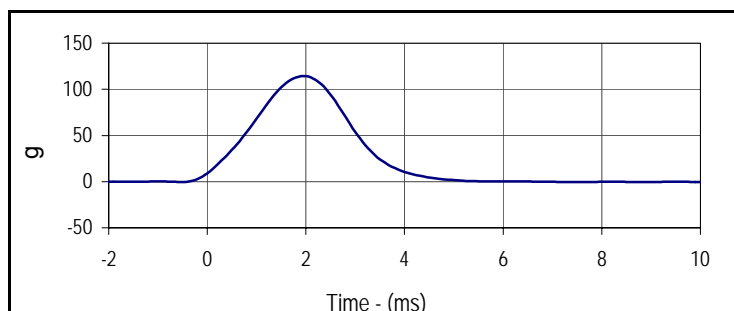
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	562	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.1	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5590	Pass
Overall Test Results				Pass

Right Knee

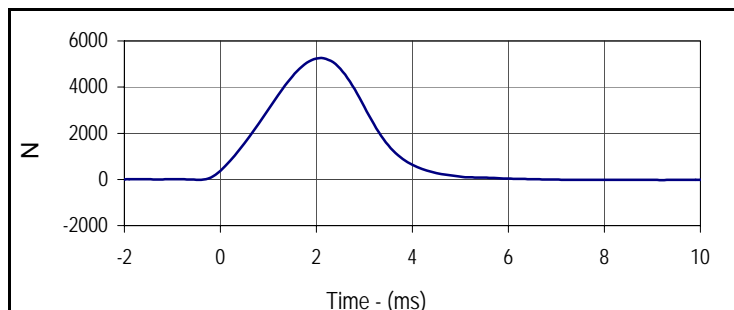
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	4715 to 5782	5263	Pass
Overall Test Results				Pass



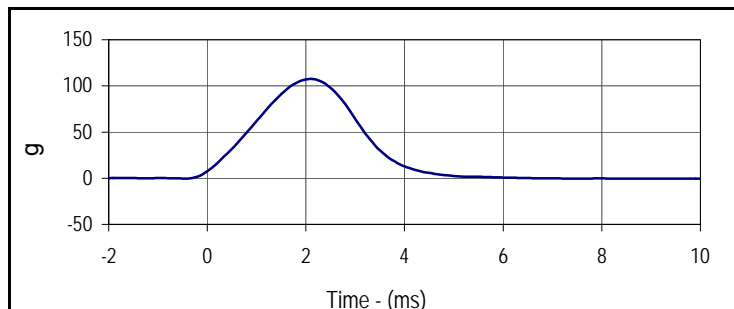
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
5589.7	1.9	-35.3	13.6



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	g
Max	Time	Min	Time
114.2	1.9	-0.7	13.6



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
5263.4	2.1	-28.3	17.4



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	g
Max	Time	Min	Time
107.6	2.1	-0.6	17.4

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

Test Date: 2/5/16



ATD Serial No.: 360

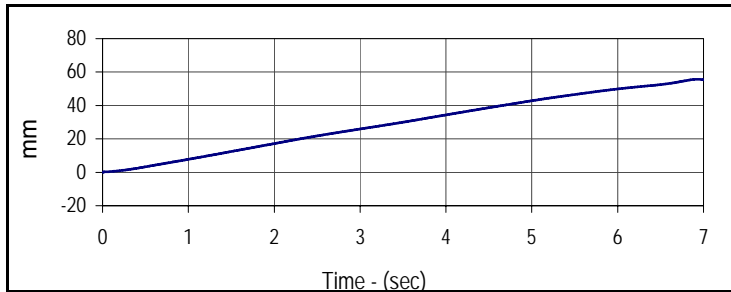
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Left Hip Joint-Femur Results

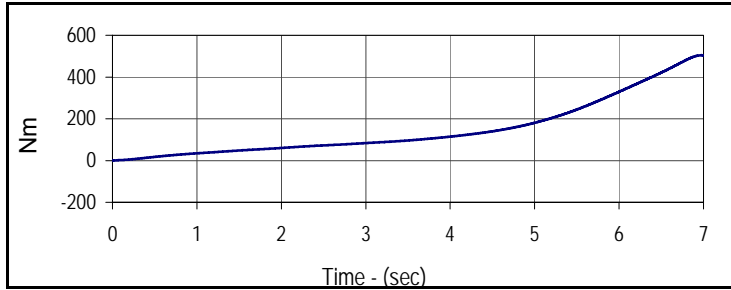
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	637	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		21.0	Pass
Humidity During Soak	Max	10.0 to 70.0	36.6	Pass
	Min		35.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.2	Pass
Rotation Rate	deg/sec	5 to 10	8.0	Pass
Femur Torque at 30°	Nm	≤ 95	93.9	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	43.8	Pass
Overall Test Results				Pass

Right Hip Joint-Femur Results

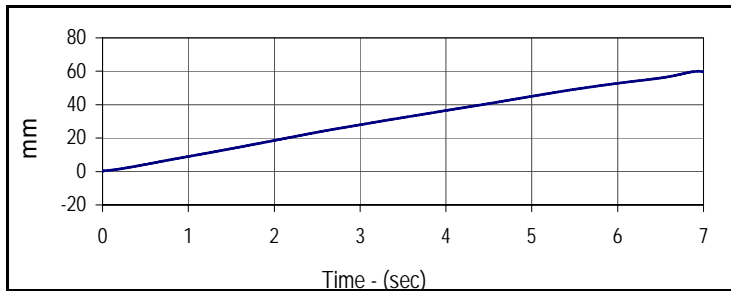
Rotation Rate	deg/sec	5 to 10	8.6	Pass
Femur Torque at 30°	Nm	≤ 95	89.1	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	45.9	Pass
Overall Test Results				Pass



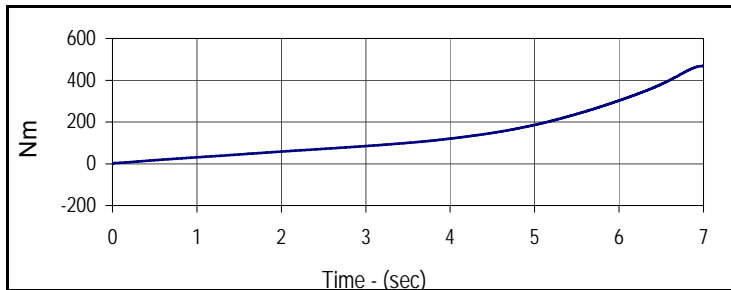
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	mm
Max	Time	Min	Time
55.7	6.9	0.2	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
504.3	7.0	0.2	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	mm
Max	Time	Min	Time
60.0	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
467.7	7.0	0.2	0.0

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

Test Date: 2/8/16

ATD Serial No.: 141

Test I.D.: N/A



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

Describe the repair on or replacement of parts:

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 2/8/16

ATD Serial No.: 141

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.03	Pass
Laboratory Relative Humidity	%	10 to 70	34.3	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

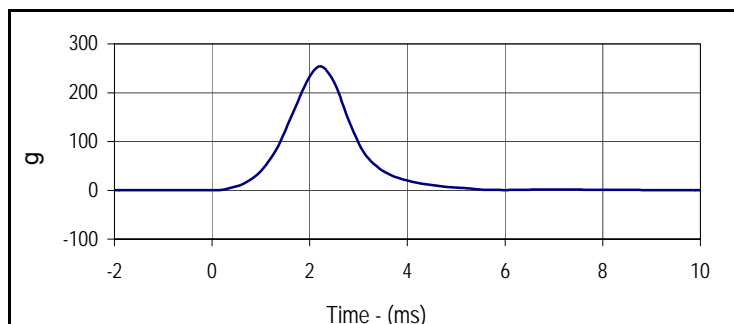
Test Date: 2/8/16



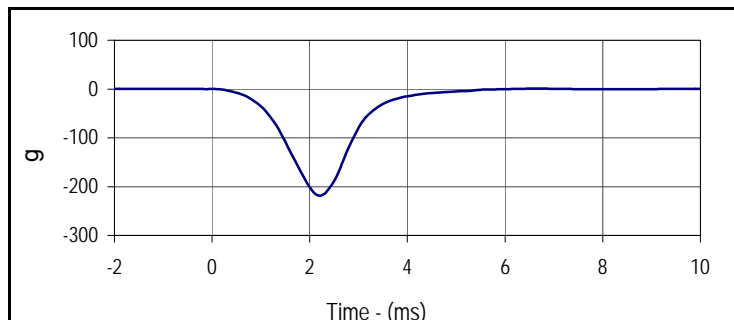
ATD Serial No.: 141

Test I.D.: F141HD072

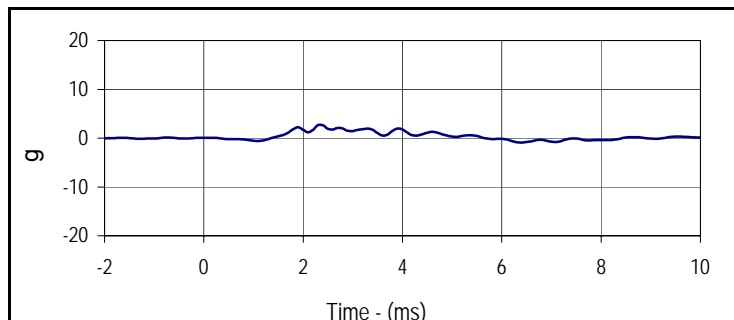
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	309	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.1	Pass
Peak Resultant Acceleration	g	250.0 to 300.0	254.0	Pass
Peak Lateral Acceleration	g	≤15.0	2.7	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	7.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



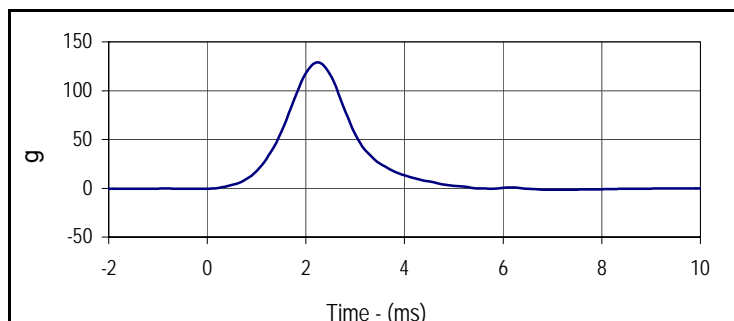
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
254.0	2.2	0.0	172.8



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
0.8	6.7	-219.0	2.2



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
2.7	2.3	-0.9	6.4



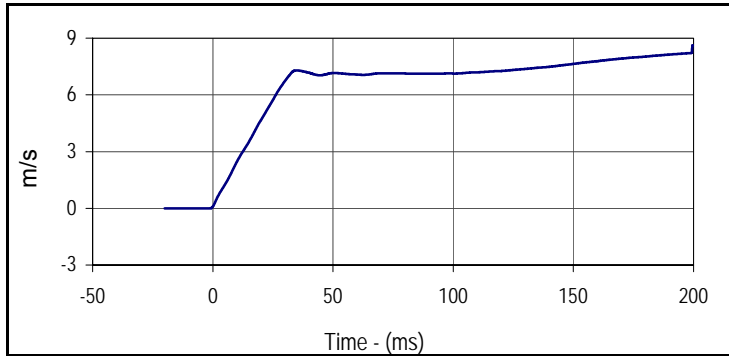
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
128.7	2.2	-1.6	7.1

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test
 ATD Serial No.: 141

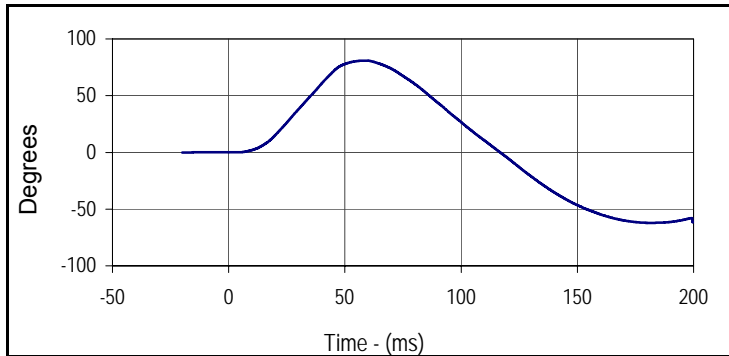
Test Date: 2/8/16
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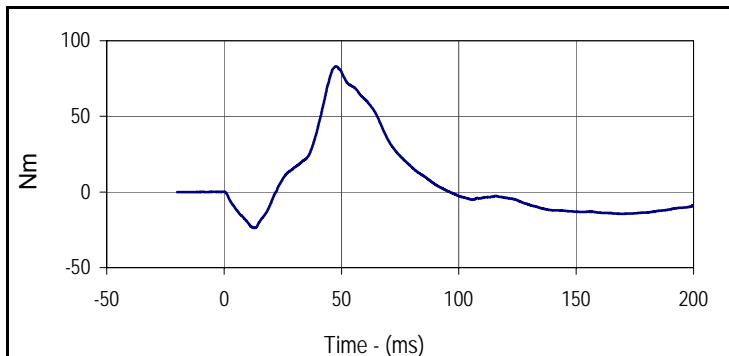
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	374	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass	
	Min		20.9	Pass	
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass	
	Min		33.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	33.9	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.91	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.5	Pass
	20 Msec.	m/s	4.0 to 5.0	4.7	Pass
	30 Msec.	m/s	5.8 to 7.0	6.7	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	81.0	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	81.4	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	83.1	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
8.6	199.5	0.0	-1.4



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
81.0	58.7	-62.1	181.3



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
83.0	47.5	-23.9	13.1

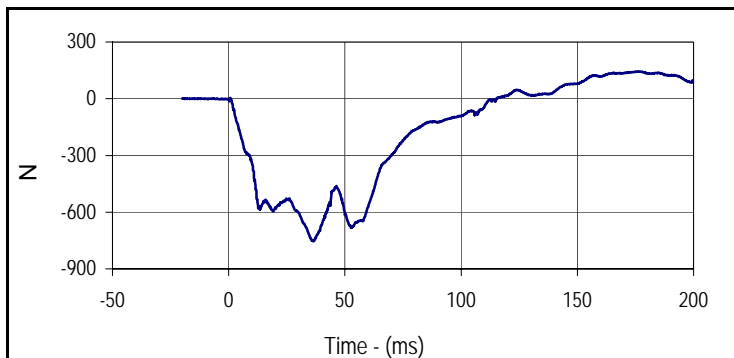
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 2/8/16

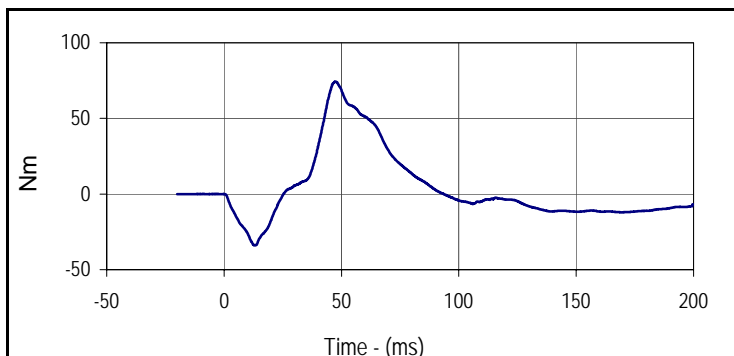


ATD Serial No.: 141

Test I.D.: F141NF072



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
144.6	176.5	-753.8	36.3



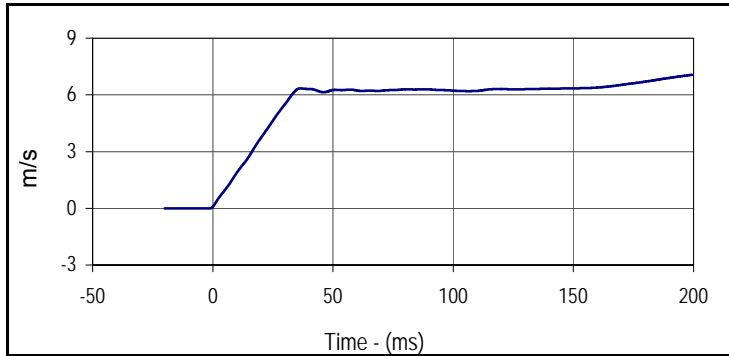
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
74.4	47.4	-34.0	13.1

Test Program: Hybrid III 5th Percentile Female Neck Extension Test
 ATD Serial No.: 141

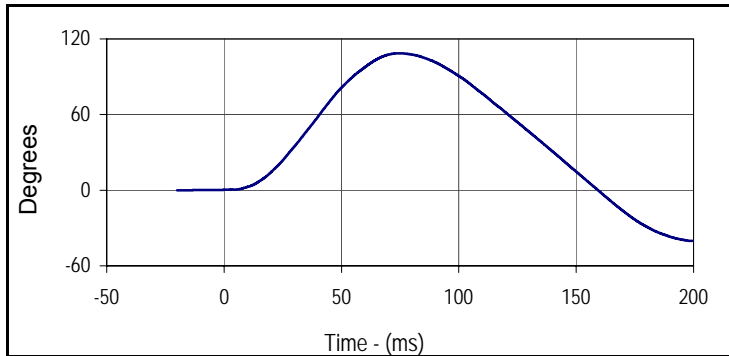
Test Date: 2/8/16
 Test I.D.: F141NE072



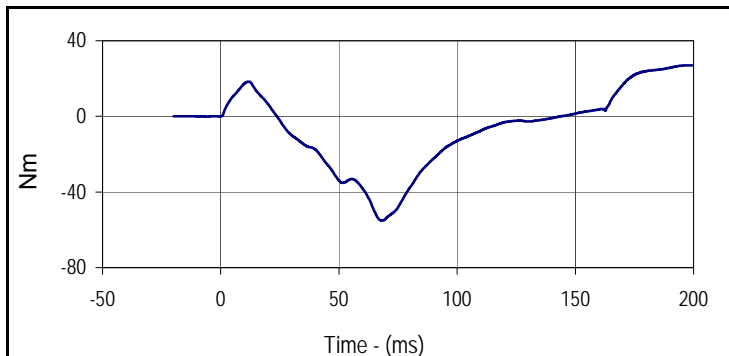
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	439	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass	
	Min		20.9	Pass	
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass	
	Min		33.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	34.6	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.02	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.9	Pass
	20 Msec.	m/s	3.1 to 3.9	3.7	Pass
	30 Msec.	m/s	4.6 to 5.6	5.5	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	108.7	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-55.1	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	105.6	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.1	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
108.7	74.7	-40.3	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
27.0	198.2	-55.1	68.0

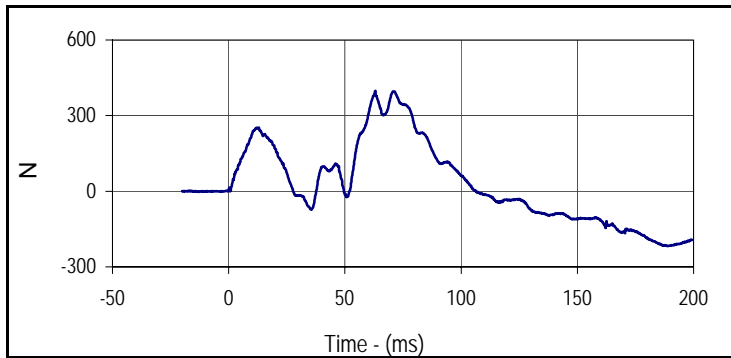
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 2/8/16

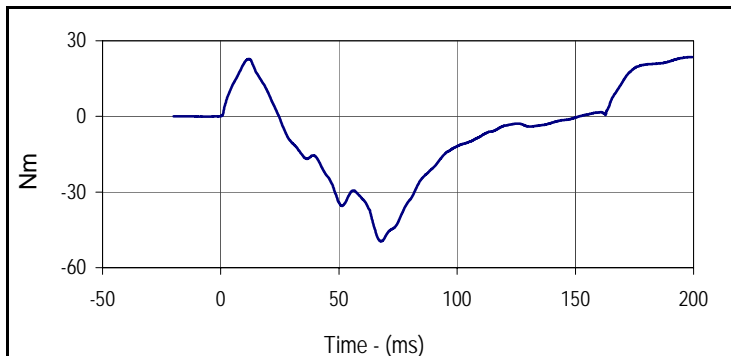


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Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
398.5	63.0	-217.9	188.7



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
23.6	199.0	-49.6	67.9

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

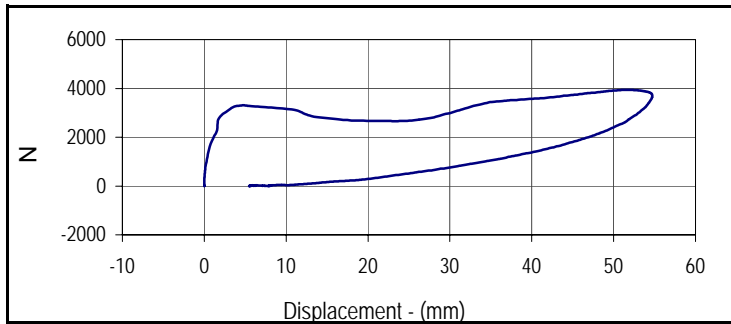
Test Date: 2/8/16



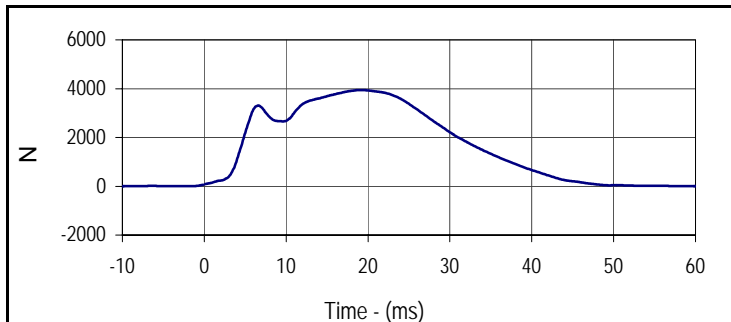
ATD Serial No.: 141

Test I.D.: F141CH072

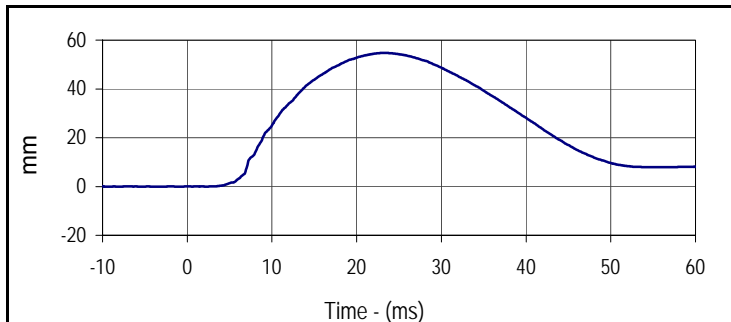
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	484	Pass
Temperature During Soak	Max	20.6 to 22.2	21.2	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	35.3	Pass
Probe Velocity	m/s	6.59 to 6.83	6.61	Pass
Peak Chest Deflection	mm	50.0 to 58.0	54.7	Pass
Peak Force Between 50 and 58 MM	N	3900 to 4400	3915	Pass
Peak Force Between 18 and 50 MM	N	≤4600	3942	Pass
Internal Hysteresis	%	69 to 85	71.7	Pass
Overall Test Results				Pass



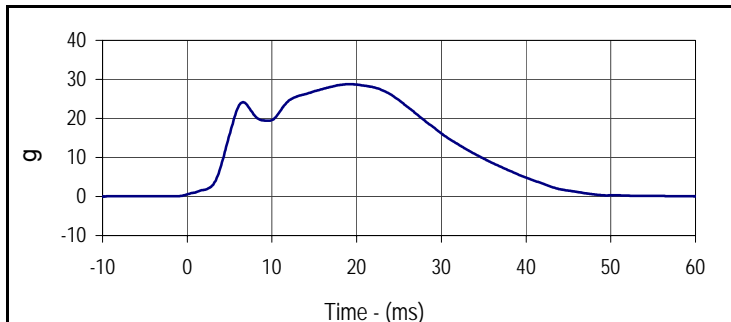
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	71.7
Peak Probe Force		Peak Chest Deflection	
3942.4		54.7	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	N
Max	Time	Min	Time
3942.4	19.3	-5.9	99.0



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
54.7	23.4	0.0	2.3



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
28.8	19.3	0.0	99.0

Test Program: Hybrid III 5th Percentile Female Knee Impact Test
 ATD Serial No.: 141

Test Date: 2/8/16
 Test I.D.: F141LK072, F141RK072

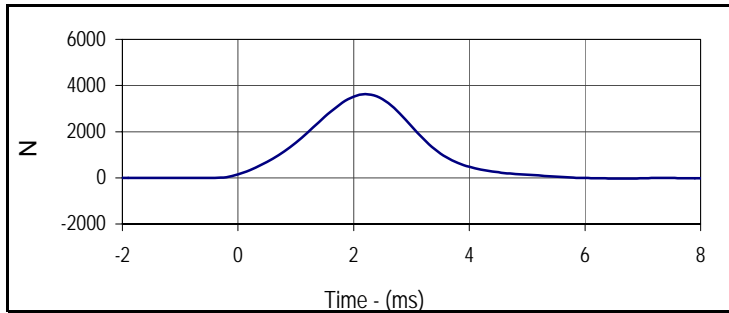


Left Knee

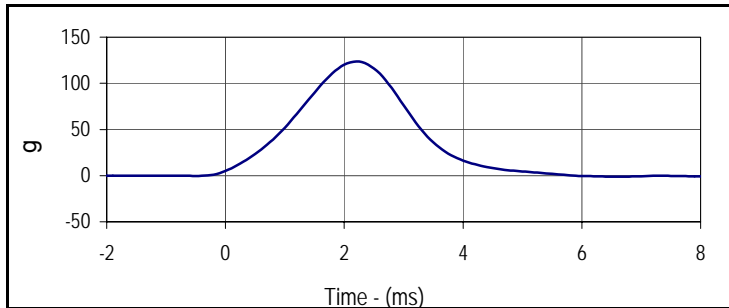
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	539	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	35.9	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	3450 to 4060	3624	Pass
Overall Test Results				Pass

Right Knee

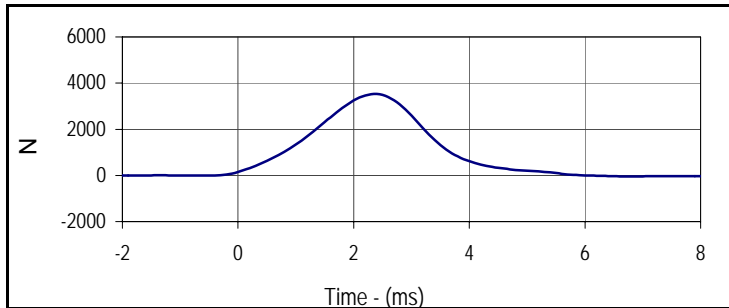
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	3450 to 4060	3528	Pass
Overall Test Results				Pass



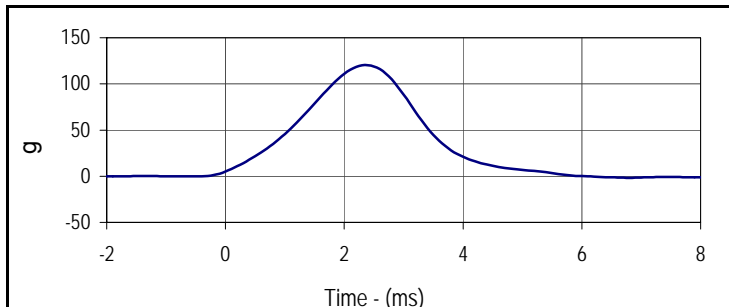
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
3623.7	2.2	-36.9	6.7



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	g
Max	Time	Min	Time
123.6	2.2	-1.3	6.7



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
3527.6	2.4	-48.5	6.8



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	g
Max	Time	Min	Time
120.3	2.4	-1.7	6.8

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

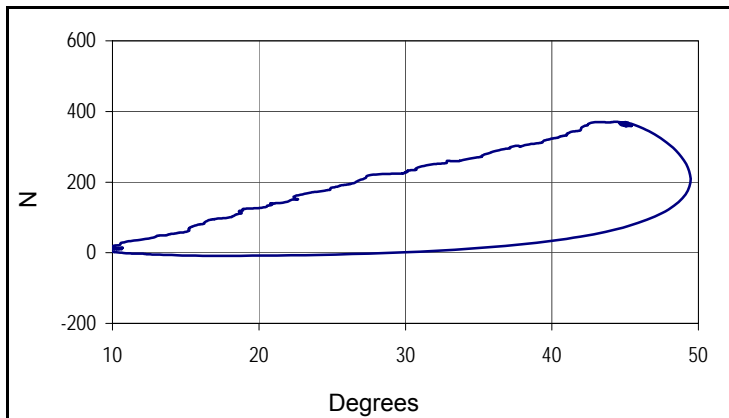
Test Date: 2/8/16

ATD Serial No.: 141

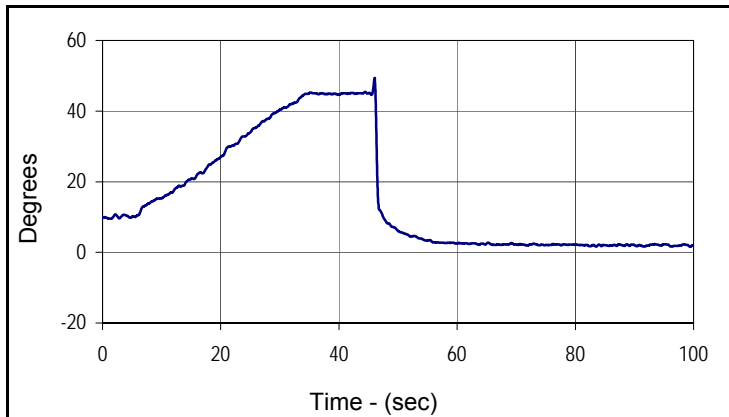
Test I.D.: TF072



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	604	Pass
Temperature During Soak	Max	18.9 to 25.6	21.2	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	36.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	36.2	Pass
Initial Reference Plane Angle	Degrees	≤ 20	9.9	Pass
Peak Force at 45° +/-0.5°	N	320.0 to 390.0	370.0	Pass
Torso Rotation Rate	deg/sec	0.5 to 1.5	1.1	Pass
Final Reference Plane Angle	Degrees	+/-8	2.0	Pass
Overall Test Results				Pass



Curve Description		
Force vs Torso Rotation		
Plot No.	Type	Filter Freq
001	FIL	1 Hz
Peak Force		Peak Rotation
371.0		49.4



Curve Description			
Torso Rotation			
Plot No.	Type	Filter Freq	Units
002	FIL	1 Hz	Degrees
Max	Time	Min	Time
49.4	46.1	1.6	99.4