

REPORT NUMBER: NCAP-KAR-18-016

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

**FORD MOTOR CO.
2018 FORD EXPEDITION XLT MAX 4X4 5-DOOR MPV**

NHTSA NUMBER: M20180203

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



MAY 16, 2018

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE, SE
ROOM W43-410
WASHINGTON, DC 20590**

Prepared By: Amirul A. Jassal

Reviewed By: 

Approved By: 

Approval Date: May 16, 2018

Date: _____

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NCAP-KAR-18-016	2. Government Accession No.	3. Recipient's Catalog No.																																																					
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No. M20180203		5. Report Date May 16, 2018																																																					
		6. Performing Organization Code KAR																																																					
7. Authors Mr. Amjad A. Jadallah, Project Engineer, KARCO Mr. Steven D. Matsusaka, Engineering Manager, KARCO		8. Performing Organization Report No. TR-P37400-01-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, May 2 - May 16, 2018																																																					
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 A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2018 Ford Expedition XLT MAX 4x4 5-door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on May 2, 2018. The impact velocity of the vehicle was 56.45 km/h and the ambient temperature at the barrier face at the time of impact was 15.6°C. The target vehicle's post-test maximum crush was 243 mm at DPD4 to the right of the vehicle's centerline. The test vehicle's performance is as follows: <table border="1" style="width: 100%; border-collapse: collapse; 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</td> <td>164.5</td> <td>700</td> <td>326.2</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-20</td> <td>52</td> <td>-9</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.32</td> <td>1</td> <td>0.35</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1604.8</td> <td>2620</td> <td>689.4</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-653.6</td> <td>2520</td> <td>-329.9</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-104.3</td> <td>6800</td> <td>-1207.6</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-173.9</td> <td>6800</td> <td>-791.0</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	164.5	700	326.2	Maximum Chest Compression	mm	63	-20	52	-9	Nij	N/A	1	0.32	1	0.35	Neck Tension	N	4170	1604.8	2620	689.4	Neck Compression	N	4000	-653.6	2520	-329.9	Left Femur Force	N	10000	-104.3	6800	-1207.6	Right Femur Force	N	10000	-173.9	6800	-791.0
Measurement Description	Units	Driver ATD				Passenger ATD																																																	
		Threshold	Result	Threshold	Result																																																		
Head Injury Criteria (HIC ₁₅)	N/A	700	164.5	700	326.2																																																		
Maximum Chest Compression	mm	63	-20	52	-9																																																		
Nij	N/A	1	0.32	1	0.35																																																		
Neck Tension	N	4170	1604.8	2620	689.4																																																		
Neck Compression	N	4000	-653.6	2520	-329.9																																																		
Left Femur Force	N	10000	-104.3	6800	-1207.6																																																		
Right Femur Force	N	10000	-173.9	6800	-791.0																																																		
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave., SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																																																					
		19. Security Classification of this report UNCLASSIFIED																																																					
20. Security Classification of this page UNCLASSIFIED		21. No. of Pages 134	22. Price																																																				

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Camera and Instrumentation Summary	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	25
16	FMVSS 301 Static Rollover Results	27
17	Dummy / Vehicle Temperature Stabilization Chart	28
<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A
B	Dummy Response Data Traces	B
C	ATD Calibration and Performance Verification Data	C

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

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

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated October 2015.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2018 Ford Expedition 5-door MPV at a velocity of 56.45 km/h. The test was performed at KARCO Engineering, LLC. on May 2, 2018. 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. 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 104 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 was 243 mm at DPD4 to the right of the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

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

The occupant data is summarized below:

ATD Position	HIC ₁₅	T ¹ (ms)	T ² (ms)	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	164.5	65.0	80.0	-20	0.32	1604.8	-653.6	-104.3	-173.9
Passenger (5th)	326.2	72.3	87.3	-9	0.35	689.4	-329.9	-1207.6	-791.0

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

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: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20180203
Model Year	2018
Make	Ford
Model	Expedition XLT MAX 4x4
Body Style	5-Door MPV
VIN	1FMJK1JT5JEA10374
Body Color	Magnetic Metallic
Odometer Reading (km / mi)	494 / 307
Engine Displacement (L)	3.5
Type / No. of Cylinders	V6
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	10
Overdrive	Yes
Final Drive	4WD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	Yes
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.
Date of Manufacture	Dec-17

GVWR (kg)	3447
GAWR Front (kg)	1610
GAWR Rear (kg)	1905

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Bench	Bench		
Designated Seating Capacity	2	3	3	8	
Capacity Weight (VCW) (kg)				773.0	A
DSC x 68.04 (kg)				544.3	B
Cargo Weight (RCLW) (kg)*				228.7	A-B

*For trucks or MPVs, if A-B > 136.0kg, RCLW = 136.0kg

DATA SHEET NO. 1 ... (CONTINUED)

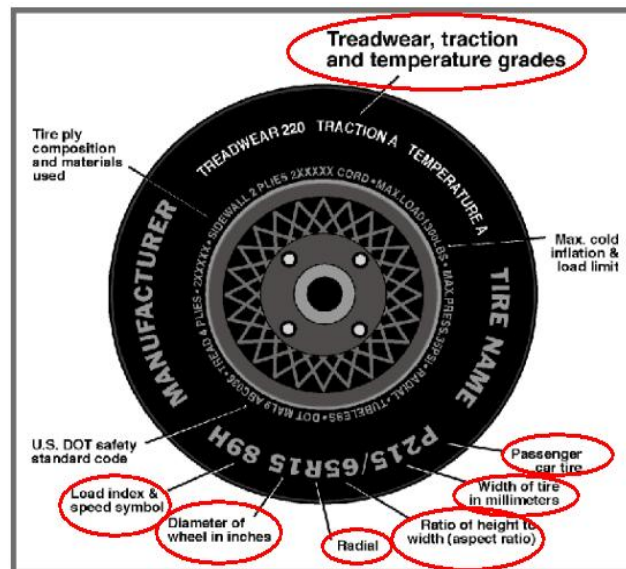
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P275/65R18	P275/65R18
Tire Size on Vehicle	P275/65R18	P275/65R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy XC	Primacy XC
Treadwear	480	480
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	116T	116T
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	APB9 015X 4317	APB9 015X 4317
DOT Safety Code Right	APB9 015X 4317	APB9 015X 4317

DATA SHEET NO. 1 ... (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	655.0	650.0		678.0	777.0	
Right	kg	663.0	647.5		674.0	756.0	
Ratio	%	50.4%	49.6%	100.0%	46.9%	53.1%	100.0%
Total	kg	1318.0	1297.5	2615.5	1352.0	1533.0	2885.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2615.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	136.0	C
Calculated Vehicle Target Weight (TVTW)	kg	2892.5	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	951	942	938	942	1657
As Tested	mm	929	922	912	909	1775
Post-Test	mm	886	903	914	917	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	3340
Total Vehicle Length at Left Side	mm	4979
Total Vehicle Length at Centerline	mm	5650
Total Vehicle Length at Right Side	mm	4975
Weight of Ballast in Cargo Area	kg	172.9
Weight of Vehicle Components Removed	kg	8.5
Amount of Stoddard Solvent in Fuel Tank	L	105.60

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk Trim (8.5 kg)

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

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	5650
2	Total Width	2015
3	Bumper Top Height	830
4	Bumper Bottom Height	758
5	Longitudinal Member Top Height	722
6	Distance Between Longitudinal Members	1230
7	Longitudinal Member Width	80
8	Engine Top Height	1172
9	Engine Bottom Height	355
10	Engine and Gearbox Width	900
11	Front Bumper to Engine Distance	860
12	Front Shock Absorber Fixing Height	829
13	Bonnet Leading Edge Height	1140
14	Front Shock Absorber Fixing Width	922
15	Front Bumper to Front Axle Distance	985
16	Front Axle to A-Pillar Distance	670
17	A-Pillar to B-Pillar Distance	1048
18	B-Pillar to Rear Axle Distance	1500
19	B-Pillar to C-Pillar Distance	903
20	Roof Sill Bottom Height	1740
21	Roof Sill Top Height	1860
22	Floor Sill Bottom Height	420
23	Floor Sill Top Height	525

All measurements in millimeters.

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

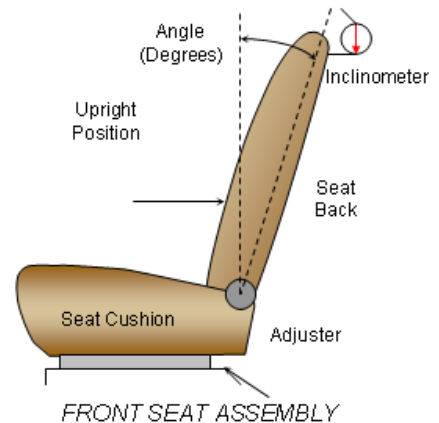
Test Date: 05/02/18

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.

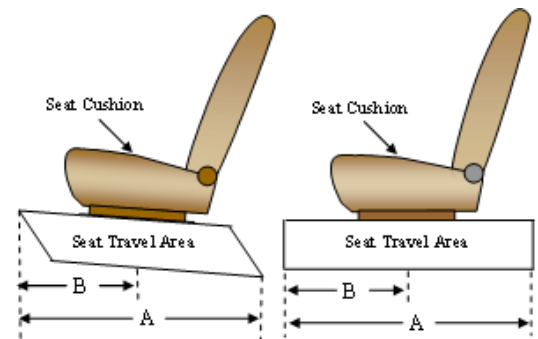
SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	3.8
Passenger Seat Back Angle	6.4



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	318 mm	159 mm
Passenger Seat	258 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 "M2," and 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: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

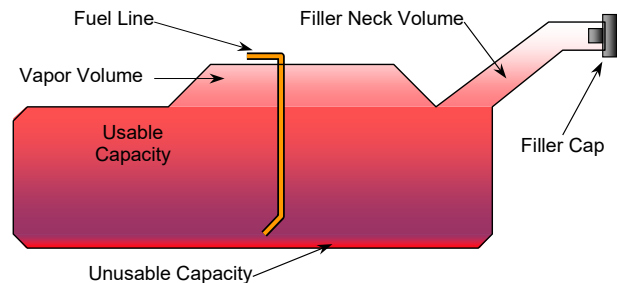
Test Date: 05/02/18

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	113.55
Usable Capacity of "Optional Tank"	N/A
92 - 94% of Usable Capacity	104.47 to 106.74
Actual Amount of Stoddard Solvent Used	105.60
1/3 of Usable Capacity	37.85

FUEL PUMP

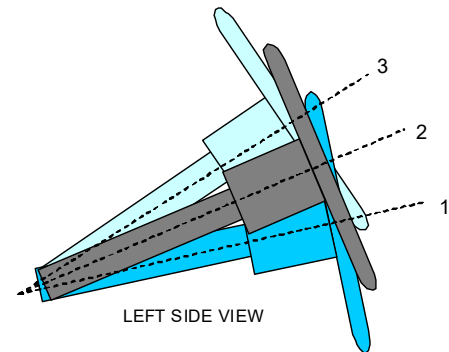
The vehicle is equipped with an electric fuel pump. The electric fuel pump operates for 3 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 3 seconds following the actuation the fuel pump will shut off. The fuel pump operates continuously 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.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.2	122
Geometric Center Position, No. 2	22.0	142
Uppermost Position, No. 3	23.8	162
Telescoping Steering Wheel Travel		40
Test Position	22.0	142

DATA SHEET NO. 3

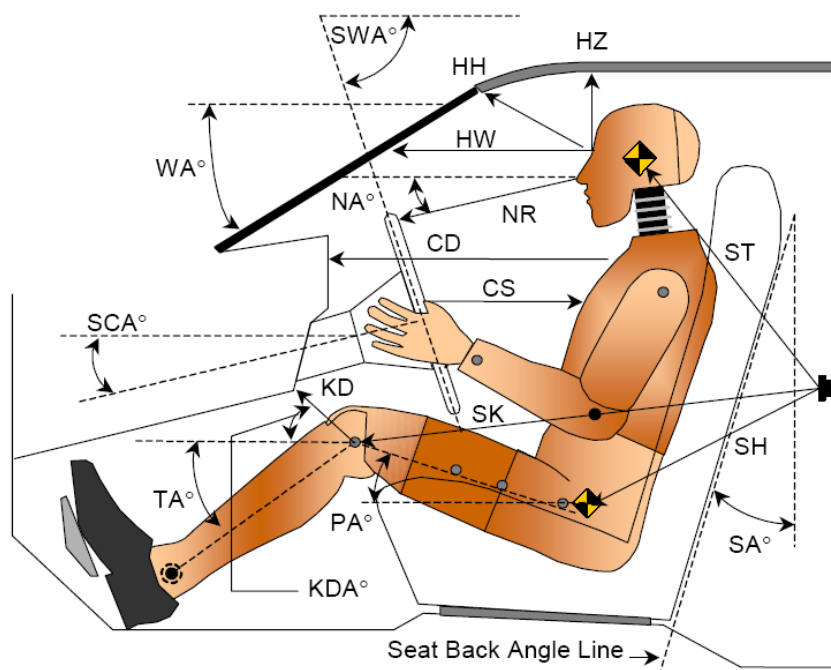
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		31.4		
SWA°	Steering Wheel Angle		68.0		
SCA°	Steering Column Angle		22.0		
SA°	Seat Back Angle (On Headrest Post)		3.8		6.4
HZ	Head to Roof	275	90.0	307	90.0
HH	Head to Header	450	23.7	425	37.5
HW	Head to Windshield	742	0.0	745	0.0
NR	Nose to Rim	363	6.5	496	21.9
CD	Chest to Dash	564	18.9	452	0.9
CS	Chest to Steering Hub	301	1.2		
RA	Rim to Abdomen	181	0.0		
KDL	Left Knee to Dash	174	12.9	96	36.8
KDR	Right Knee to Dash	138	28.5	109	25.8
PA°	Pelvic Angle		24.4		21.1
TA°	Tibia Angle		51.4		61.2
SK	Striker to Knee	641	2.2	723	1.2
ST	Striker to Head	579	72.7	560	63.7
SH	Striker to H-Point	278	18.8	396	9.9

DATA SHEET NO. 4

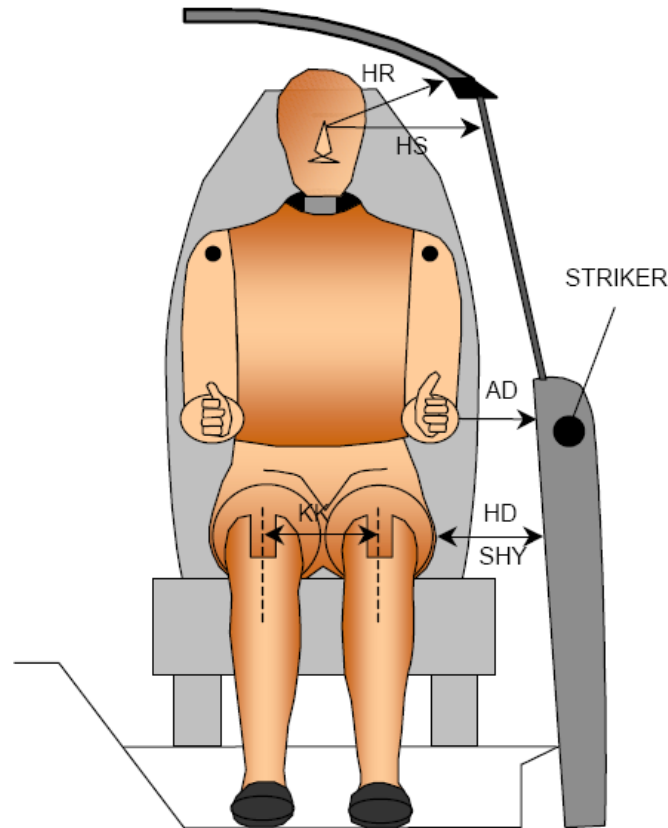
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	112	98
HD	H-Point to Door	169	197
HR	Head to Side Header	249	299
HS	Head to Side Window	373	391
KK	Knee to Knee	330	203
SHY	Striker to H-Point (Y-Direction)	264	297
AA	Ankle to Ankle	370	161

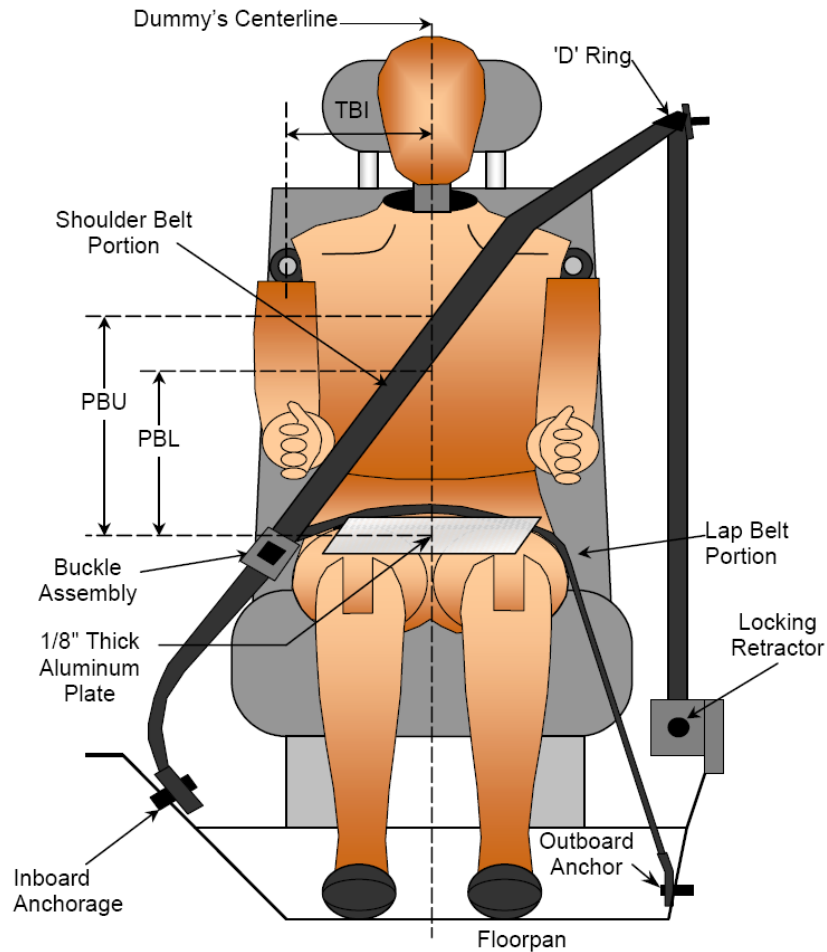
DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



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	335	294
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	265	198

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	895	919
Lap Belt Length as Measured on ATD	mm	655	705
Remainder of Belt on Reel	mm	880	719
Total Belt Length for Continuous Webbing Systems	mm	2430	2343

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

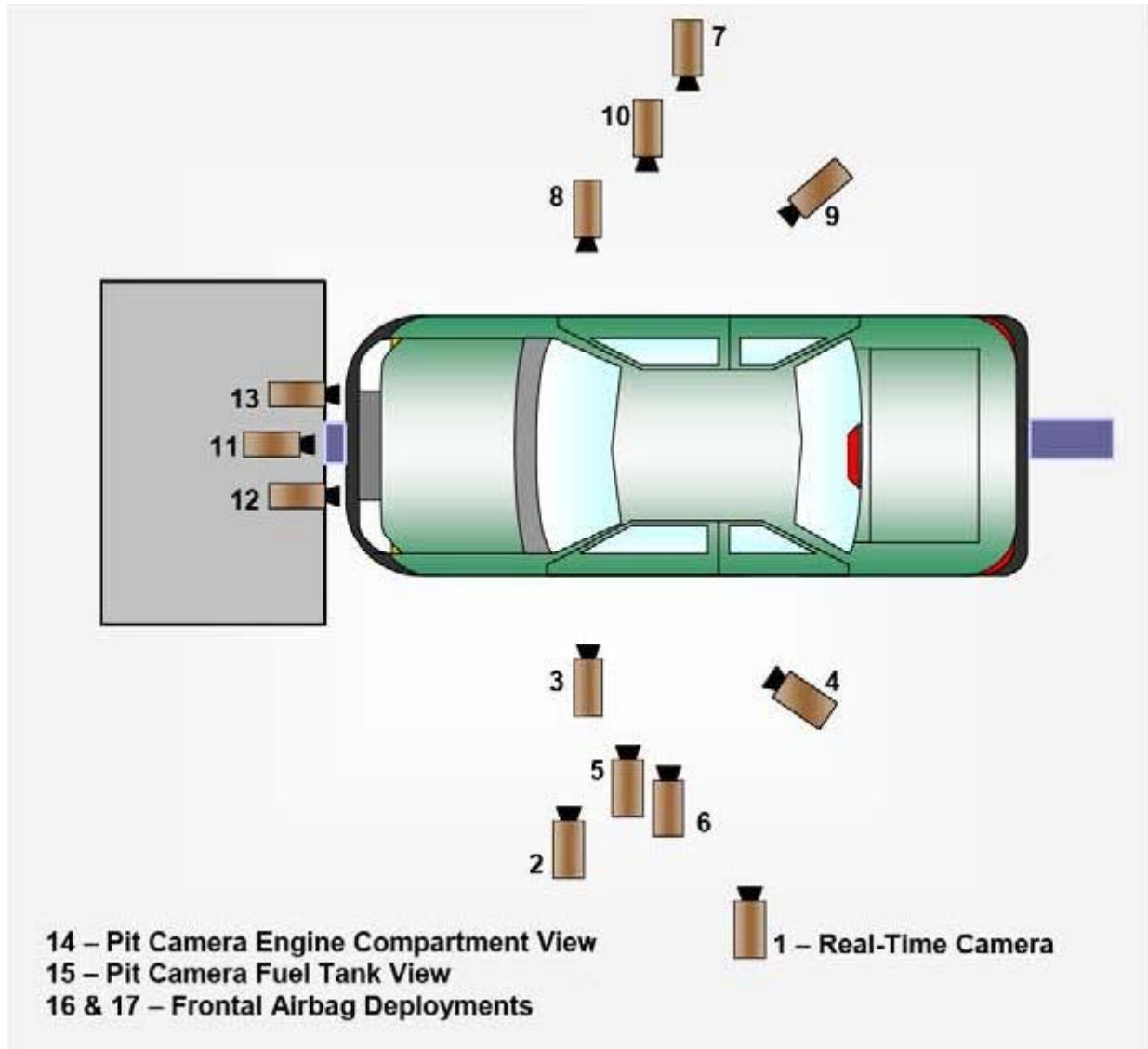
Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 ... (CONTINUED)**HIGH-SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPVNHTSA No.: M20180203Test Program: 56.3 km/h Frontal Impact NCAP TestTest Date: 05/02/18**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	50	1000
3	Left Front Half	-1701	-6197	-1701	35	1000
4	Left Angle	-6696	-10308	-3211	105	1000
5	Steering Column - Top	-1966	-10412	-3688	35	1000
6	Steering Column - Bottom	-1972	-10412	-3379	35	1000
7	Right Overall	-2336	7569	-1012	20	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	35	1000
10	Right Angle	-6217	9516	-4830	85	1000
11	Windshield	-354	0	-5749	28	1000
12	Driver Windshield	297	-366	-2460	24	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)	-3530	300	-1770	8	1000
17	Onboard Passenger Airbag (Optional)	-3530	-300	-1770	8	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

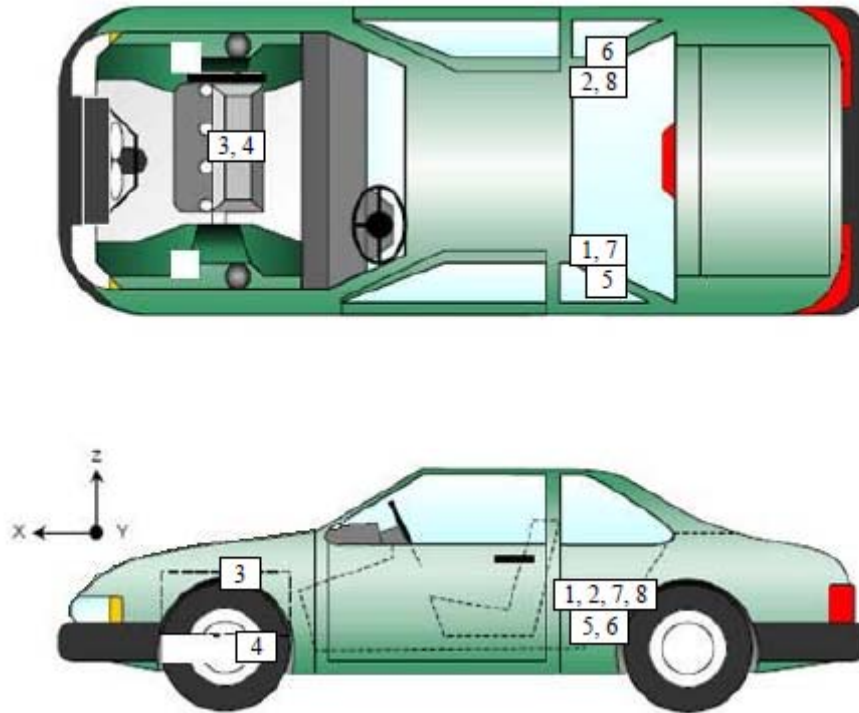
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	2380	-690	-620
2	Right Rear Accelerometer X-Direction	2380	690	-620
3	Engine Top X	4860	20	-1130
4	Engine Bottom X	4025	10	-280
5	Left Rear Accelerometer Z-Direction	2380	690	-620
6	Right Rear Accelerometer Z-Direction	2380	-690	-620
7	Left Rear Accelerometer X-Direction Redundant	2380	690	-620
8	Right Rear Accelerometer X-Direction Redundant	2380	690	-620

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

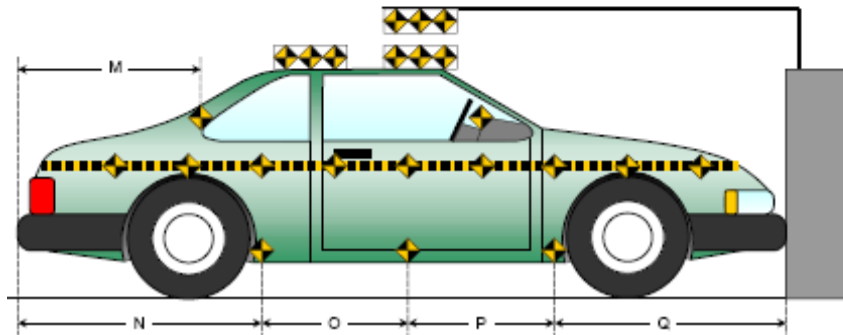
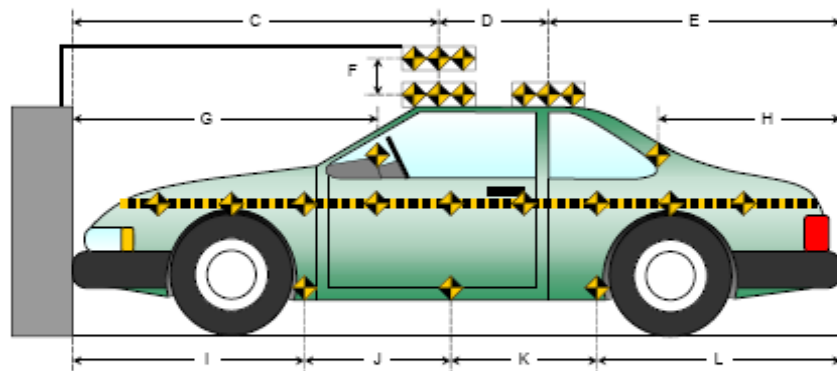
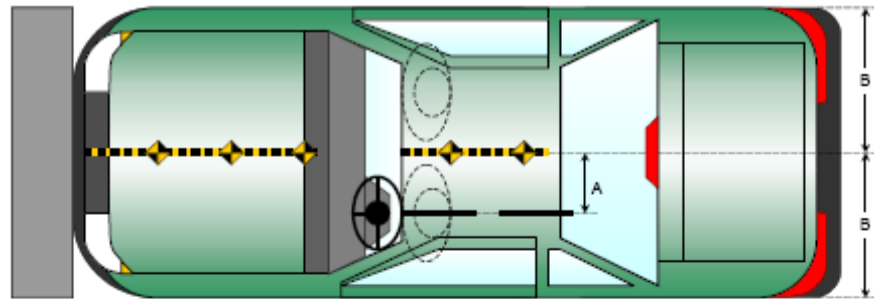
Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18

Item	Value
A	485
B	1008
C	2280
D	610
E	2751
F	305
G	1938
H	435
I	1526
J	1122
K	1122
L	1875
M	420
N	1874
O	1118
P	1118
Q	1540



All measurements in millimeters.

DATA SHEET NO. 9

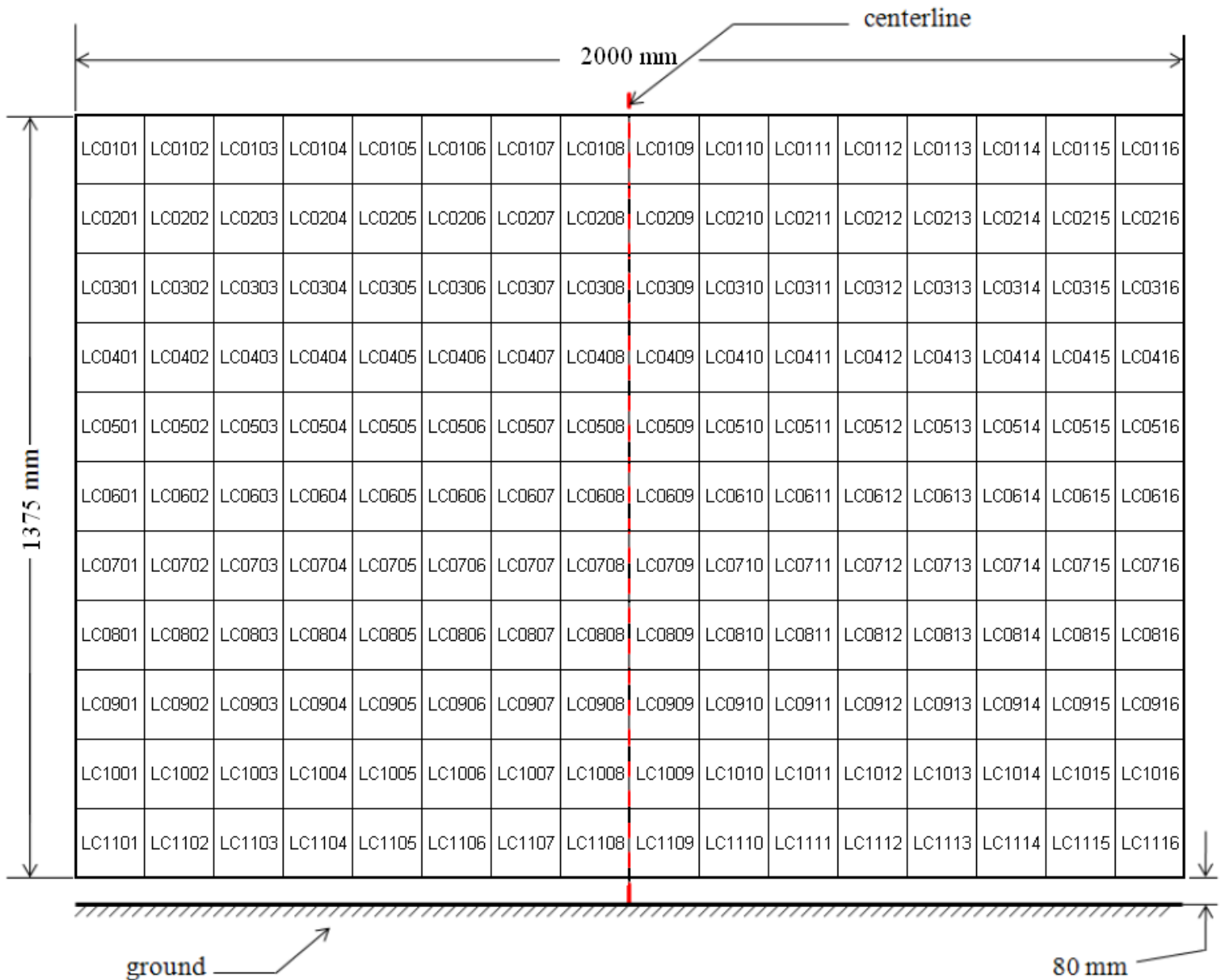
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



DATA SHEET NO. 10**TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY**

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

INSTRUMENTATION

Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	2
Load Cell Barrier	528
Total	632

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: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18

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	None	None
Left Knee Contact	Knee Bolster	Knee Bolster
Right Knee Contact	Knee Bolster	Knee Bolster

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	3	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	1265
Center	mm	1220
Right Side	mm	1260
Average	mm	1248

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	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

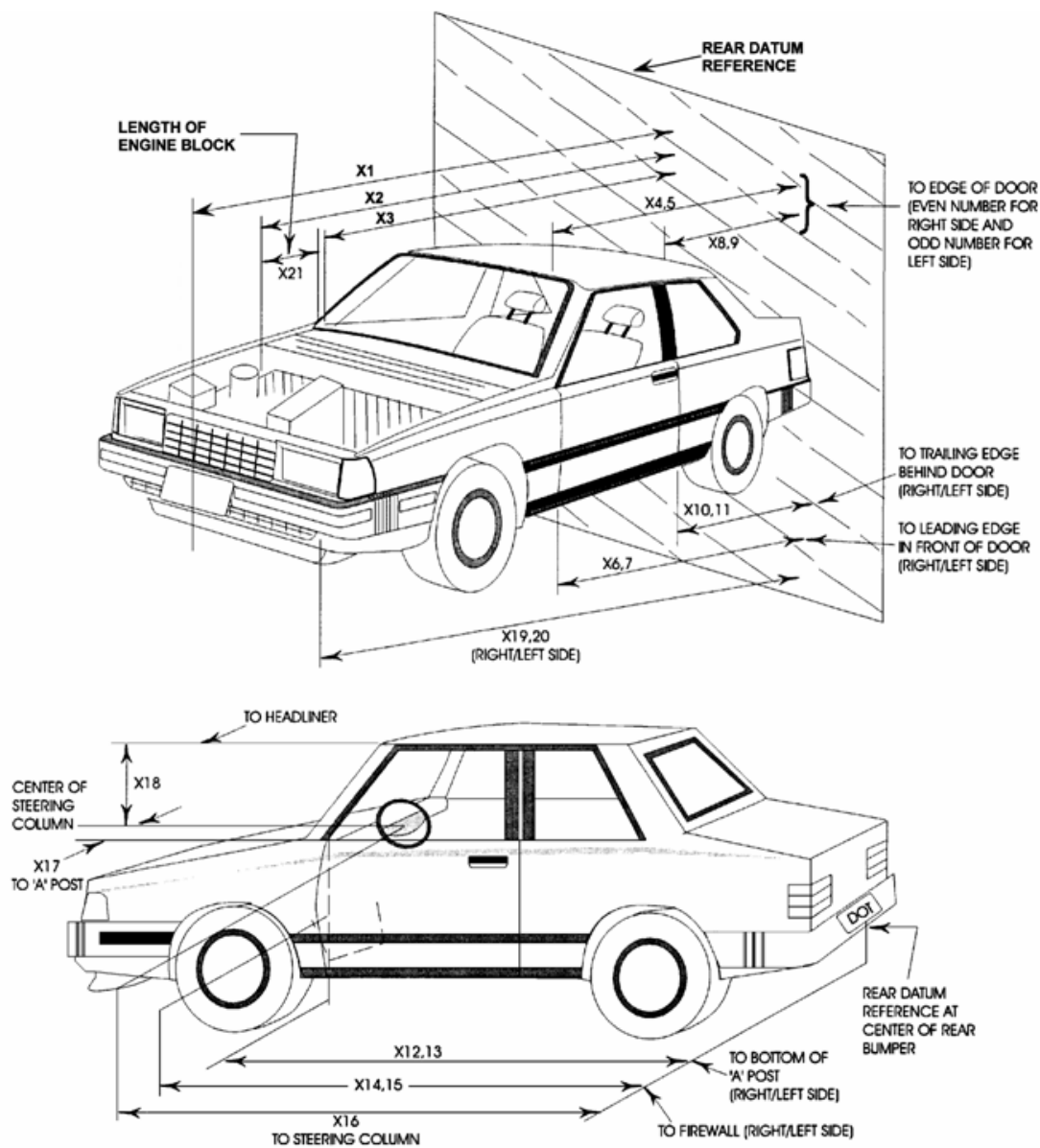
DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



DATA SHEET NO. 12 ... (CONTINUED)**VEHICLE PROFILE MEASUREMENTS**Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPVNHTSA No.: M20180203Test Program: 56.3 km/h Frontal Impact NCAP TestTest Date: 05/02/18

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	5650	5417	-233
2	Rear Surface of Vehicle to Front of Engine	4790	4700	-90
3	RSOV to Firewall	4490	4470	-20
4	RSOV to Upper Leading Edge of Right Door	4030	4070	40
5	RSOV to Upper Leading Edge of Left Door	4056	4073	17
6	RSOV to Lower Leading Edge of Right Door	4025	4025	0
7	RSOV to Lower Leading Edge of Left Door	4017	4033	16
8	RSOV to Upper Trailing Edge of Right Door	2880	2877	-3
9	RSOV to Upper Trailing Edge of Left Door	2840	2885	45
10	RSOV to Lower Trailing Edge of Right Door	2850	2861	11
11	RSOV to Lower Trailing Edge of Left Door	2850	2871	21
12	RSOV to Bottom of A-Pillar, Right Side	4011	4001	-10
13	RSOV to Bottom of A-Pillar, Left Side	3977	4006	29
14	RSOV to Firewall, Right Side	4470	4500	30
15	RSOV to Firewall, Left Side	4485	4500	15
16	RSOV to Steering Column	3512	3590	78
17	Center of Steering Column to A-Pillar	430	440	10
18	Center of Steering Column to Headliner	460	490	30
19	RSOV to Right Side of Front Bumper	4975	4870	-105
20	RSOV to Left Side of Front Bumper	4979	4900	-79
21	Length of Engine Block	500	500	0
RD	RSOV to Right Side of Dash Panel	3735	3755	20
CD	RSOV to Center of Dash Panel	3715	3720	5
LD	RSOV to Left Side of Dash Panel	3725	3760	35

All measurements in millimeters.

DATA SHEET NO. 13**ACCIDENT INVESTIGATION DIVISION DATA**Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPVNHTSA No.: M20180203Test Program: 56.3 km/h Frontal Impact NCAP TestTest Date: 05/02/18**VEHICLE INFORMATION**VIN: 1FMJK1JT5JEA10374Wheelbase (mm): 3340Vehicle Size Category: MPVTest Weight (kg): 2885.0**ACCELEROMETER DATA**Accelerometer Locations: Left Rear CrossmemberCal. Procedure/Interval: Vibration Test / 6 monthsIntegration Algorithm: NHTSA StandardImpact Velocity (km/h): 56.45Velocity Change (km/h): 65.3Time of Separation (msec): 79.8Linearity: Good**CRUSH PROFILE**

Collision Deformation Classification:

12FDEW1

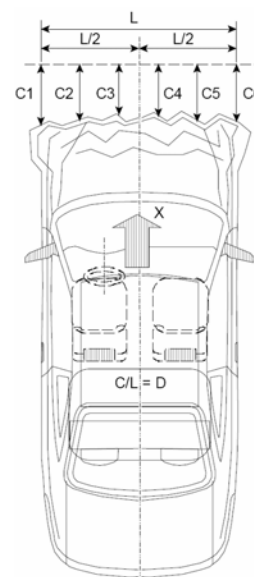
Midpoint of Damage:

Vehicle Centerline

Damage Region Length (mm):

1527

Impact Mode:

Full Frontal

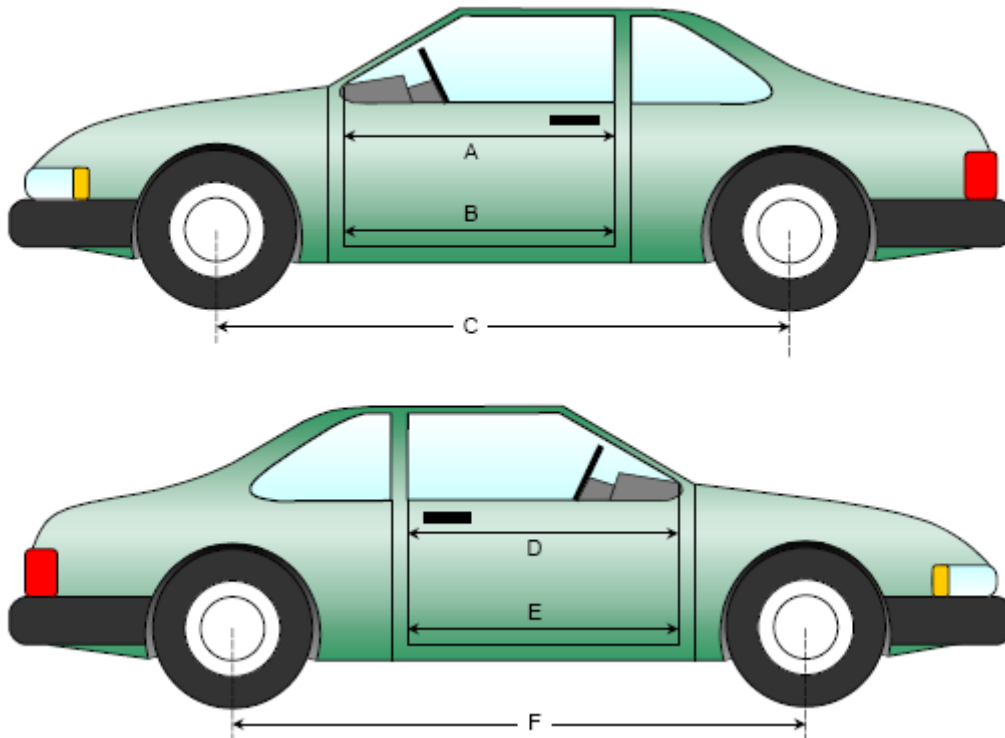
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	204	390	186
C2	Crush Zone 2 at Left Side	mm	43	265	222
C3	Crush Zone 3 at Left Side	mm	9	245	236
C4	Crush Zone 4 at Right Side	mm	10	253	243
C5	Crush Zone 5 at Right Side	mm	44	285	241
C6	Crush Zone 6 at Right Side	mm	204	400	196
L	C1 to C6	mm	1527		

DATA SHEET NO. 14**VEHICLE INTRUSION MEASUREMENTS**Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPVNHTSA No.: M20180203Test Program: 56.3 km/h Frontal Impact NCAP TestTest Date: 05/02/18**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1047	1058	-11
B	Left Side Lower	mm	1018	1031	-13
D	Right Side Upper	mm	1056	1056	0
E	Right Side Lower	mm	1019	1026	-7

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3340	3270	70
F	Right Side Wheelbase	mm	3340	3250	90



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

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

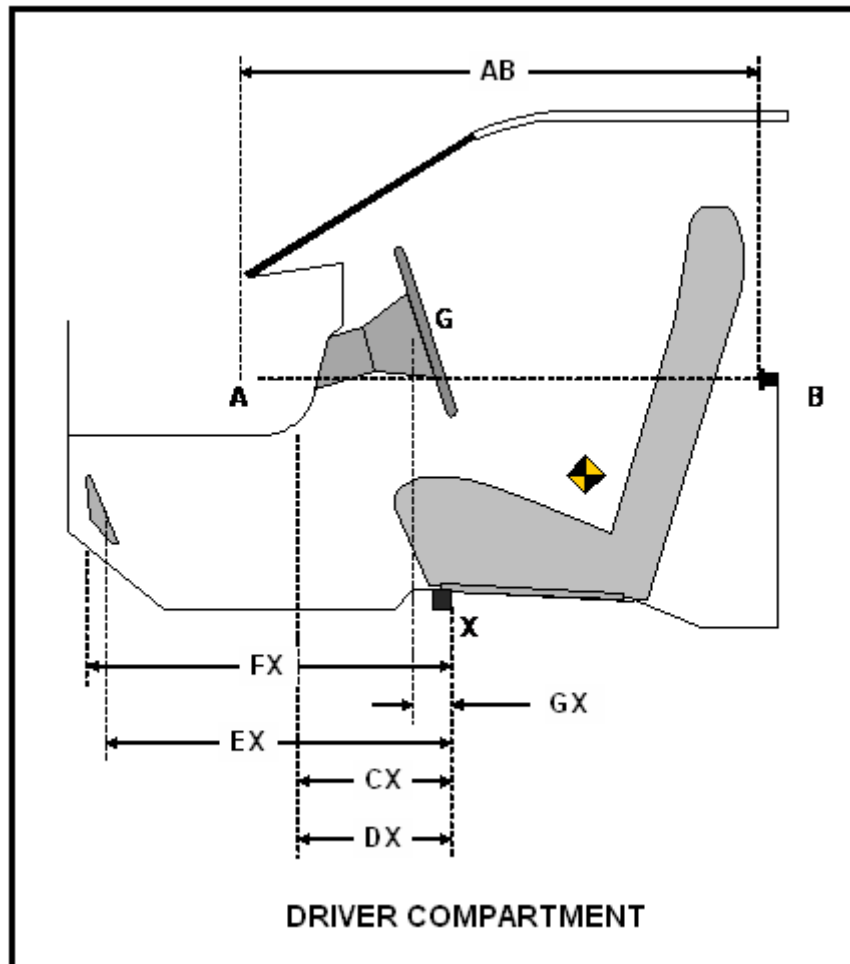
Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	951	961	-10
CX	Left Knee Bolster to X	mm	335	340	-5
DX	Right Knee Bolster to X	mm	330	350	-20
EX	Brake Pedal to X	mm	570	675	-105
FX	Foot Rest to X	mm	600	560	40
GX	Center of Steering Wheel Hub to X	mm	80	120	-40

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

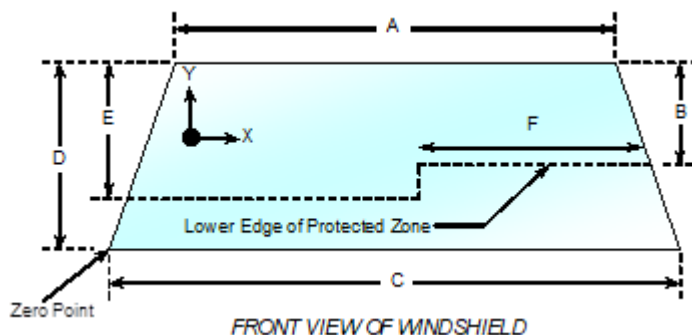
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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: 20.9° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2345	2345	100.0%
Right Side	2345	2345	100.0%
Total	4690	4690	100.0%



Item	Units	Value
A	mm	1460
B	mm	472
C	mm	1710
D	mm	760
E	mm	535
F	mm	530

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: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 05/02/18

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 15.6° C Test Time: 4:59 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

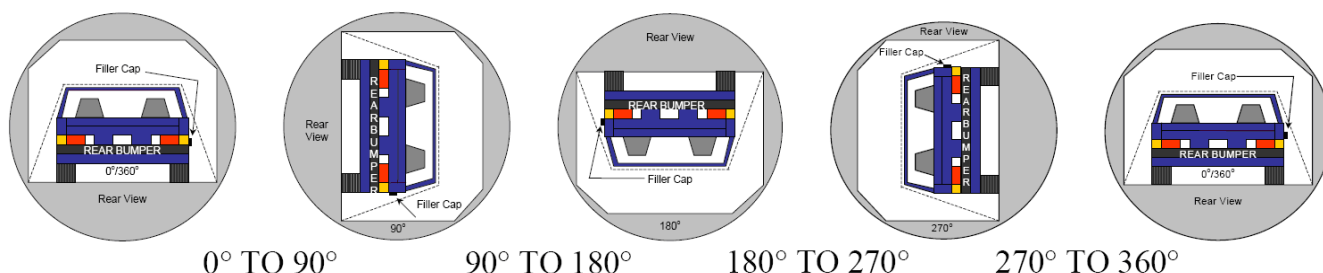
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



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°	80	300	78
90° To 180°	82	300	81
180° To 270°	80	300	81
270° To 360°	81	300	80

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

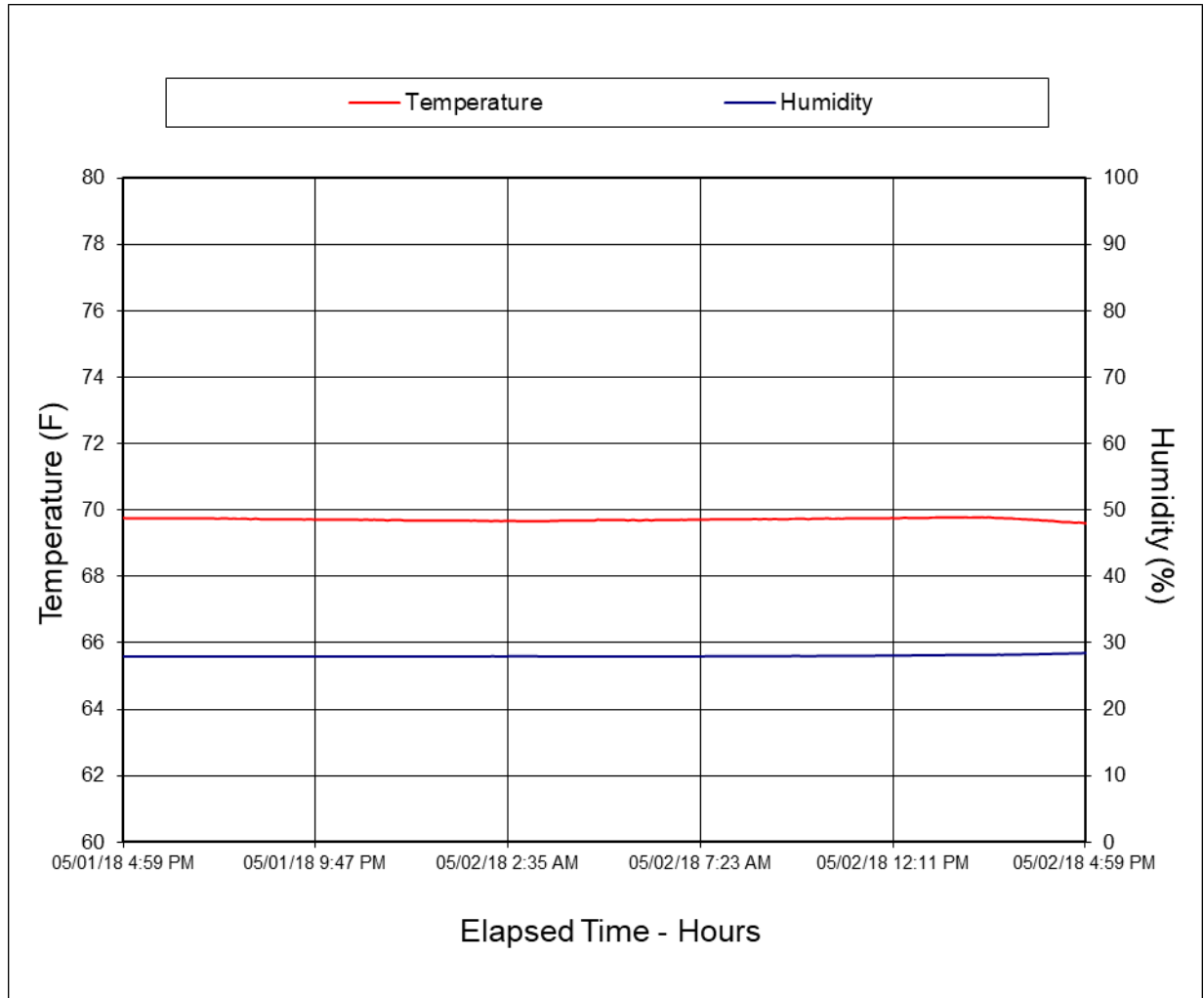
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV

NHTSA No.: M20180203

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 05/02/18



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	Load Cell Location	A-1
2	Pre-Test Load Cell Wall	A-1
3	Post-Test Load Cell Wall	A-2
4	Manufacturer's Label	A-2
5	Tire Placard	A-3
6	2018 Ford Expedition XLT MAX 4x4 Frontal as Delivered	A-3
7	Left Rear $\frac{3}{4}$ View, as Received	A-4
8	Pre-Test Front View of Test Vehicle	A-4
9	Post-Test Front View of Test Vehicle	A-5
10	Pre-Test Left View of Test Vehicle	A-5
11	Post-Test Left View of Test Vehicle	A-6
12	Pre-Test Right View of Test Vehicle	A-6
13	Post-Test Right View of Test Vehicle	A-7
14	Pre-Test Right Front $\frac{3}{4}$ View	A-7
15	Post-Test Right Front $\frac{3}{4}$ View	A-8
16	Pre-Test Left Rear $\frac{3}{4}$ View	A-8
17	Post-Test Left Rear $\frac{3}{4}$ View	A-9
18	Pre-Test Windshield View	A-9
19	Post-Test Windshield View	A-10
20	Pre-Test Engine Compartment View	A-10
21	Post-Test Engine Compartment View	A-11
22	Pre-Test Fuel Filler Cap View	A-11
23	Post-Test Fuel Filler Cap View	A-12
24	Pre-Test Front Underbody View	A-12
25	Post-Test Front Underbody View	A-13
26	Pre-Test Rear Underbody View	A-13
27	Post-Test Rear Underbody View	A-14
28	Pre-Test Dummy Cable Routing	A-14
29	Post-Test Dummy Cable Routing	A-15
30	Pre-Test Driver Dummy Front View	A-15
31	Post-Test Driver Dummy Front View	A-16
32	Pre-Test Driver Dummy Window View	A-16
33	Post-Test Driver Dummy Window View	A-17
34	Pre-Test Driver Dummy and Vehicle Interior View	A-17
35	Post-Test Driver Dummy and Vehicle Interior View	A-18
36	Pre-Test Driver's Seat Fore-Aft Markings	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
37	Post-Test Driver's Seat Fore-Aft Markings	A-19
38	Pre-Test View of Belt Anchorage for Driver Dummy	A-19
39	Post-Test View of Belt Anchorage for Driver Dummy	A-20
40	Pre-Test Driver Dummy Feet	A-20
41	Post-Test Driver Dummy Feet	A-21
42	Pre-Test Driver's Side Knee Bolster	A-21
43	Post-Test Driver's Side Knee Bolster	A-22
44	Pre-Test Driver's Side Floorpan	A-22
45	Post-Test Driver's Side Floorpan	A-23
46	Post-Test Driver Dummy Face	A-23
47	Post-Test Driver Dummy Contact with Airbag	A-24
48	Post-Test Driver Dummy Contact with Headrest	A-24
48a	Post-Test Driver Dummy Contact with Knee Airbag	A-25
49	Pre-Test View of the Steering Wheel	A-25
50	Post-Test View of the Steering Wheel	A-26
51	Pre-Test Passenger Dummy Front View	A-26
52	Post-Test Passenger Dummy Front View	A-27
53	Pre-Test Passenger Dummy Window View	A-27
54	Post-Test Passenger Dummy Window View	A-28
55	Pre-Test Passenger Dummy and Vehicle Interior View	A-28
56	Post-Test Passenger Dummy and Vehicle Interior View	A-29
57	Pre-Test Passenger's Seat Fore-Aft Markings	A-29
58	Post-Test Passenger's Seat Fore-Aft Markings	A-30
59	Pre-Test View of Belt Anchorage for Passenger Dummy	A-30
60	Post-Test View of Belt Anchorage for Passenger Dummy	A-31
61	Pre-Test Passenger Dummy Feet	A-31
62	Post-Test Passenger Dummy Feet	A-32
63	Pre-Test Passenger's Side Knee Bolster	A-32
64	Post-Test Passenger's Side Knee Bolster	A-33
65	Pre-Test Passenger's Side Floorpan	A-33
66	Post-Test Passenger's Side Floorpan	A-34
67	Post-Test Passenger Dummy Face	A-34
68	Post-Test Passenger Dummy Contact with Airbag	A-35
69	Post-Test Passenger Dummy Contact with Headrest	A-35
69a	Post-Test Passenger Dummy Contact with Knee Bolster	A-36
70	Photograph of Ballast Installed in Vehicle	A-36

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
71	Post-Test Stoddard Solvent Spillage Location View	A-37
72	Post-Test Speed Trap Read-Out	A-37
73	Vehicle at 0° on Static Rollover Device	A-38
74	Vehicle at 90° on Static Rollover Device	A-38
75	Vehicle at 180° on Static Rollover Device	A-39
76	Vehicle at 270° on Static Rollover Device	A-39
77	Vehicle at 360° on Static Rollover Device	A-40
78	2018 Ford Expedition XLT MAX 4x4 Frontal Impact Event	A-40
79	Monroney Label Photograph	A-41



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. 2018 Ford Expedition XLT MAX 4x4 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 ¾ 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

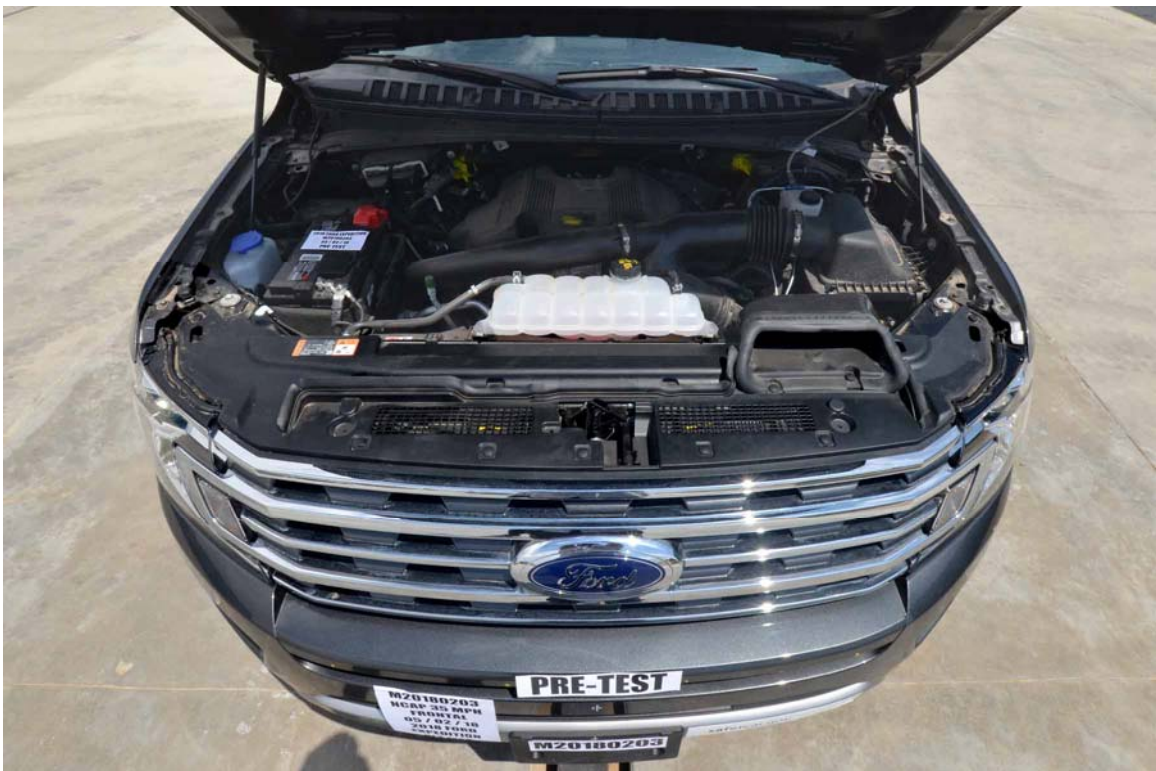


FIGURE 20. Pre-Test Engine Compartment View



FIGURE 21. Post-Test Engine Compartment View



FIGURE 22. Pre-Test Fuel Filler Cap View



FIGURE 23. Post-Test Fuel Filler Cap View

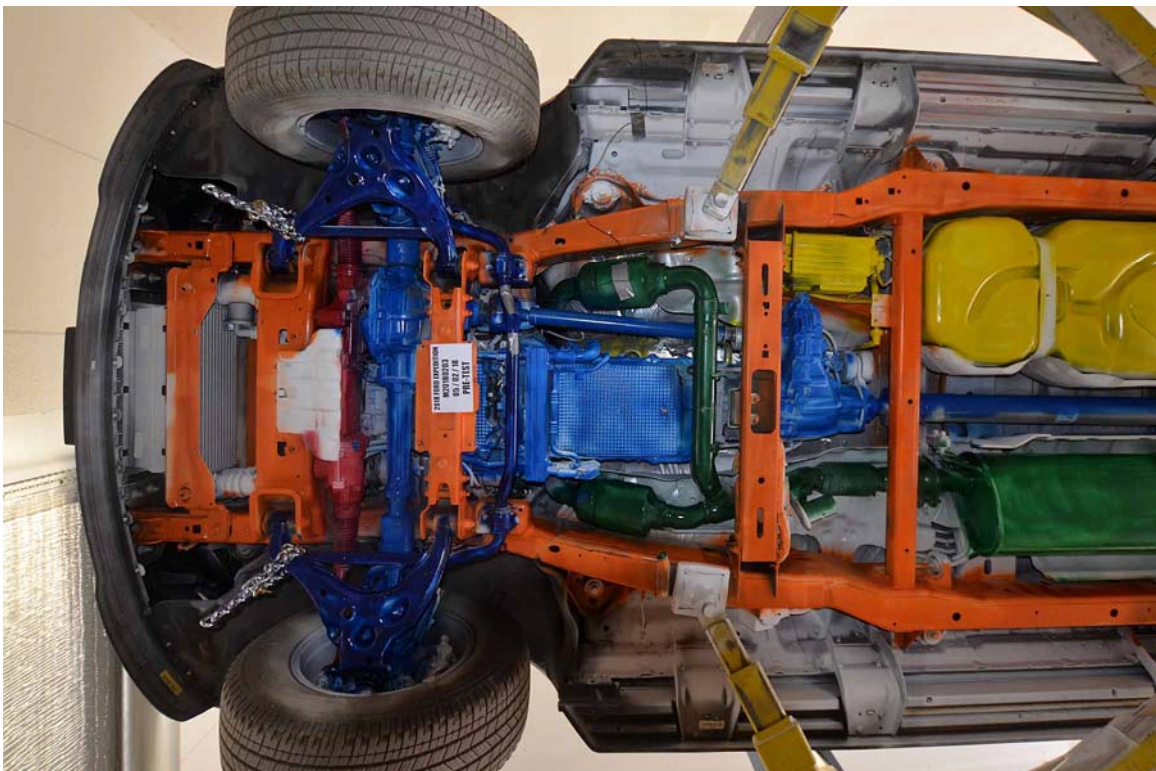


FIGURE 24. Pre-Test Front Underbody View



FIGURE 25. Post-Test Front Underbody View

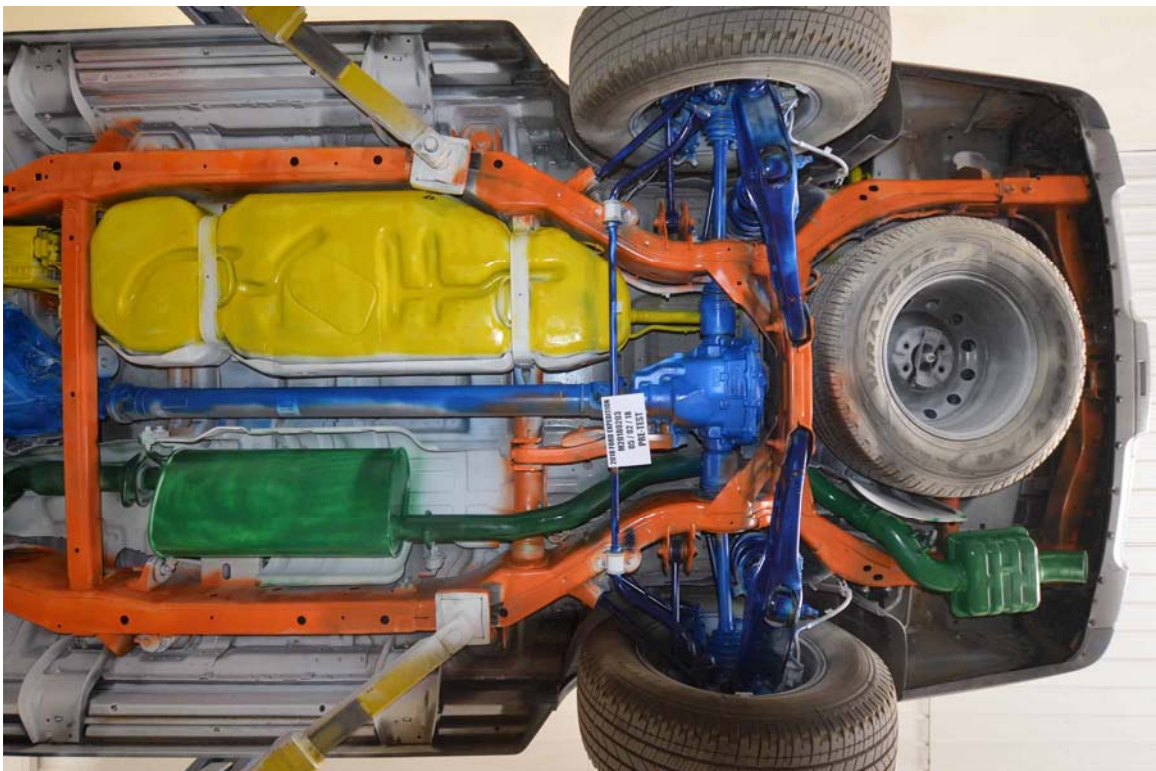


FIGURE 26. Pre-Test Rear Underbody View

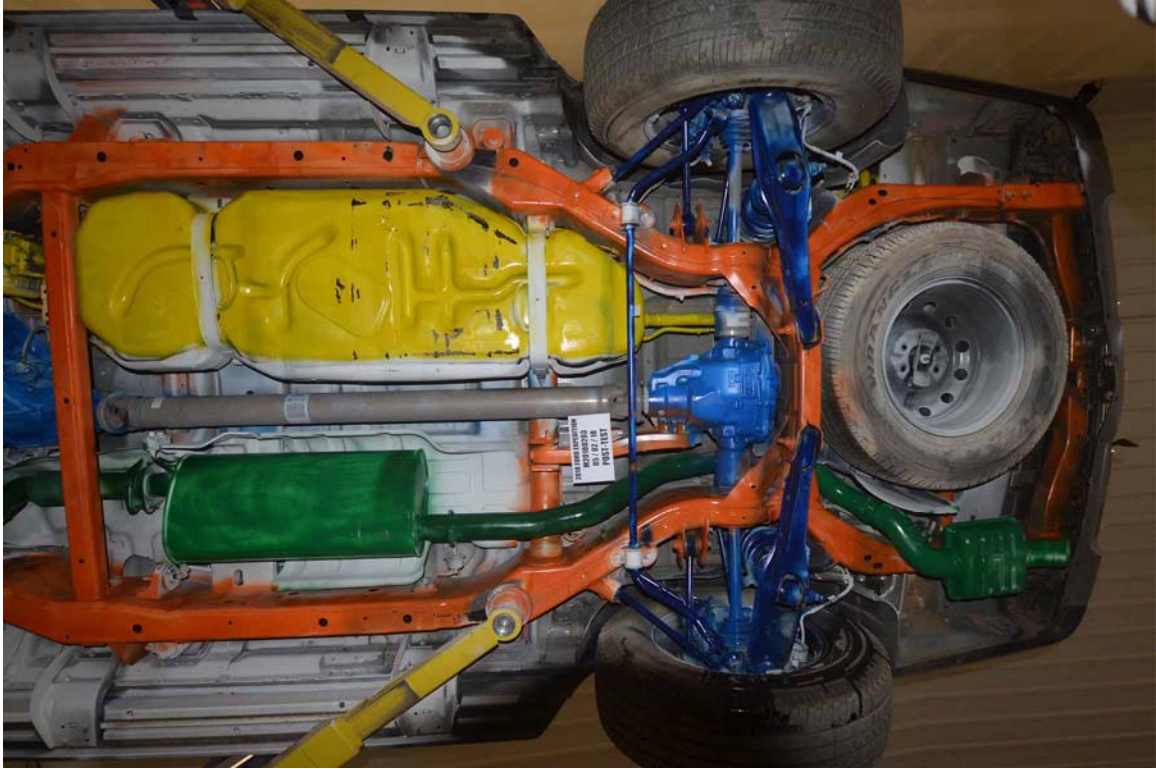


FIGURE 27. Post-Test Rear Underbody View



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

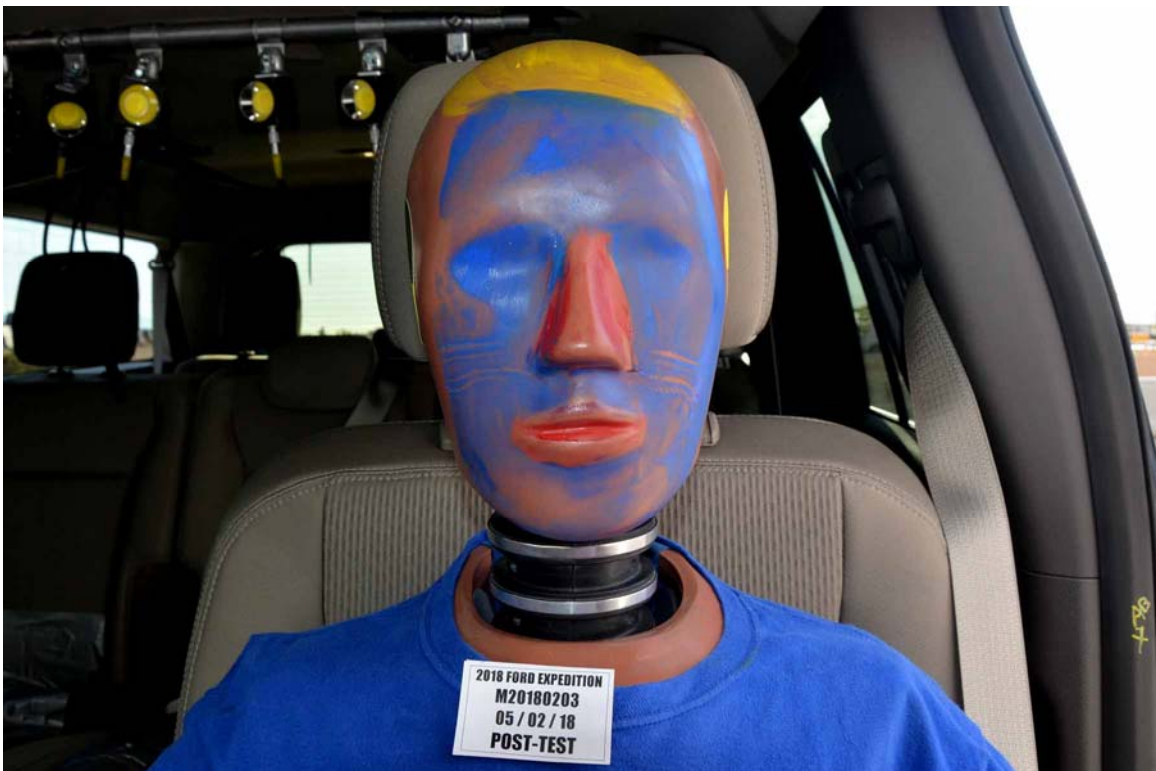


FIGURE 46. Post-Test Driver Dummy Face



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 Bolster

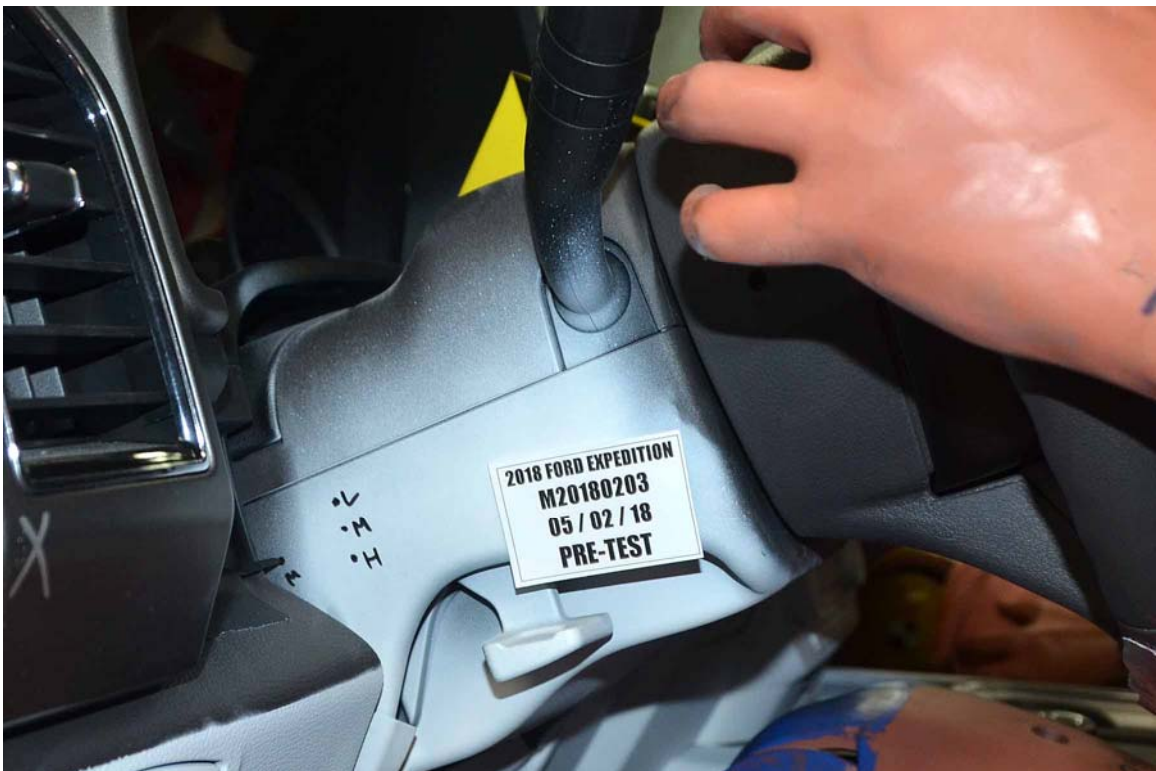


FIGURE 49. Pre-Test View of the Steering Wheel



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 Knee Bolster



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

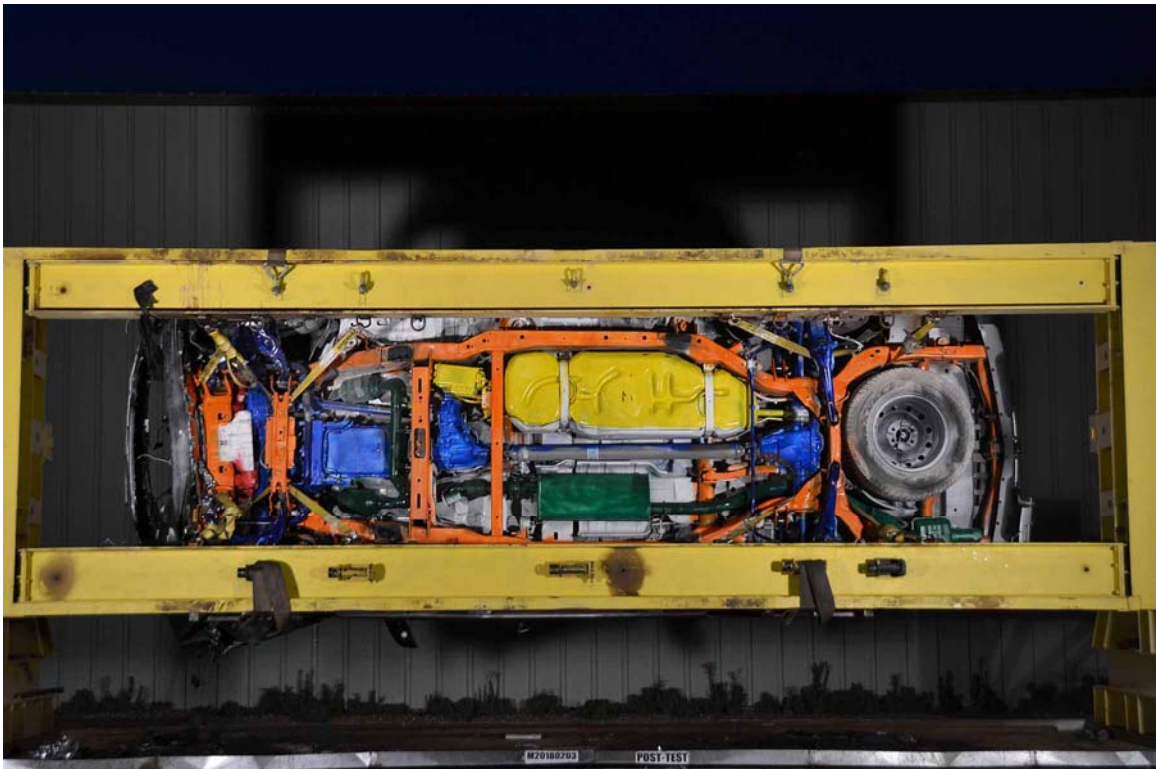


FIGURE 76. Vehicle at 270° on Static Rollover Device



FIGURE 77. Vehicle at 360° on Static Rollover Device

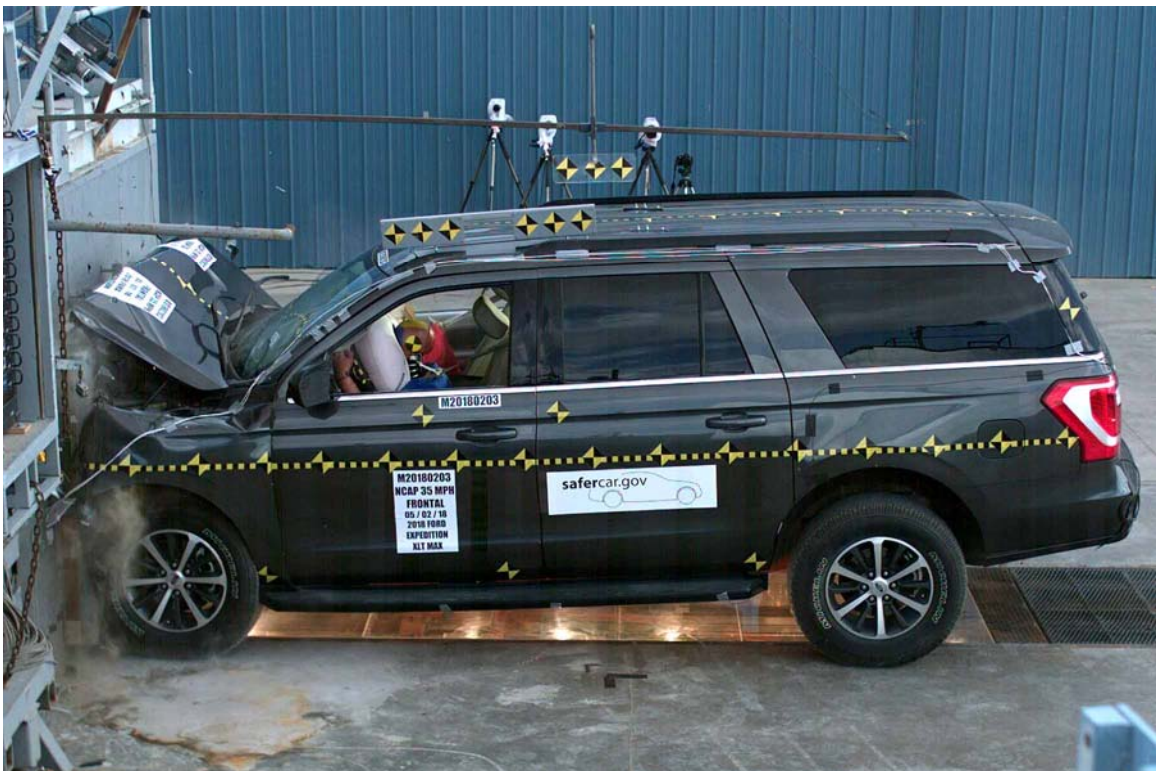


FIGURE 78. 2018 Ford Expedition XLT MAX 4x4 Frontal Impact Event

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Plot		Page
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

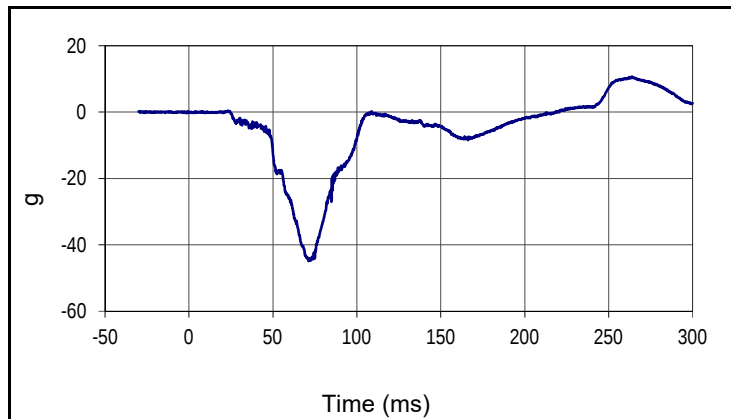
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

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 Force Z Redundant
Driver Right Femur Force Z 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

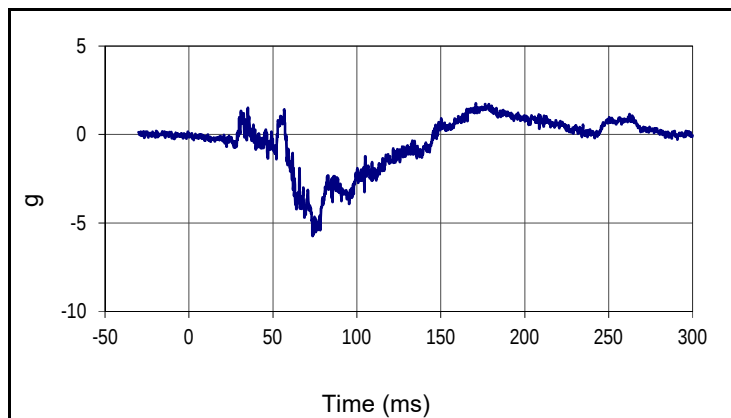
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Redundant
Passenger Right Femur Force Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia 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: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

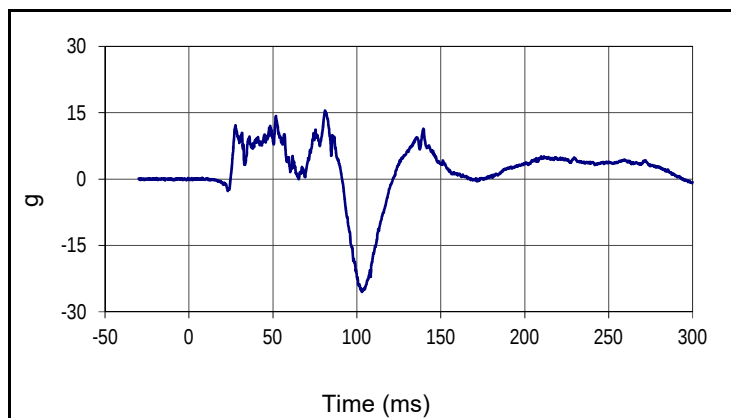
NHTSA No.: M20180203
 Test Date: 05/02/18



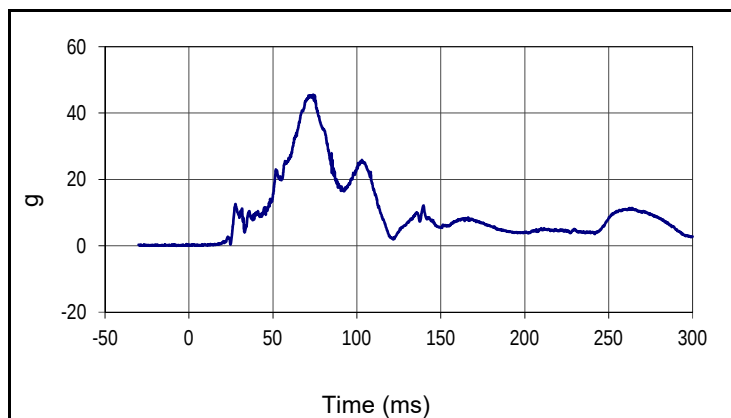
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
10.7	263.9	-44.9	71.2



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
1.8	170.9	-5.7	73.6



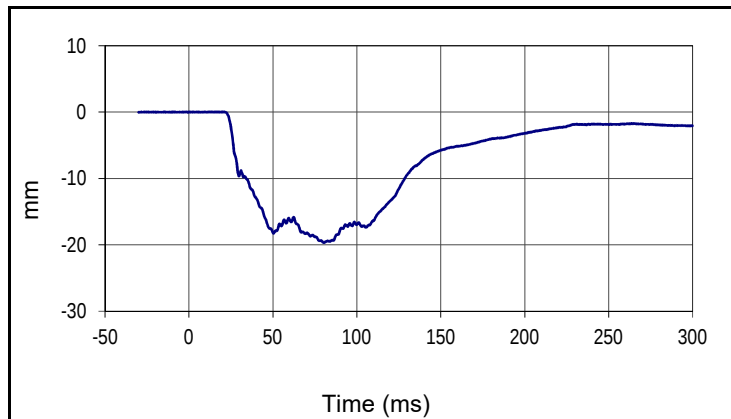
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
15.5	81.0	-25.5	103.0



Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
45.5	74.0	0.0	6.3

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
Test Program: 56.3 km/h Frontal Impact NCAP Test

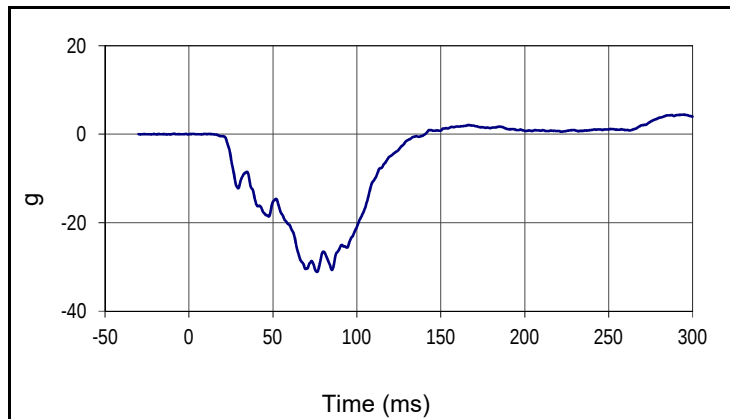
NHTSA No.: M20180203
Test Date: 05/02/18



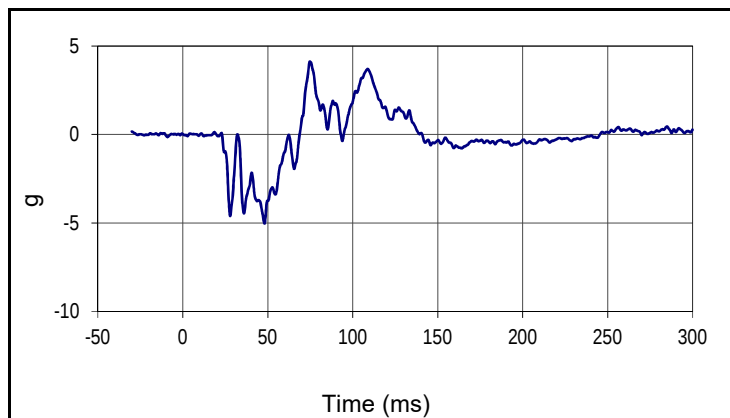
Curve Description			
Driver Chest Deflection			
Plot No.		SAE Class	Units
005		600	mm
Max	Time	Min	Time
0.0	20.5	-19.7	80.4

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

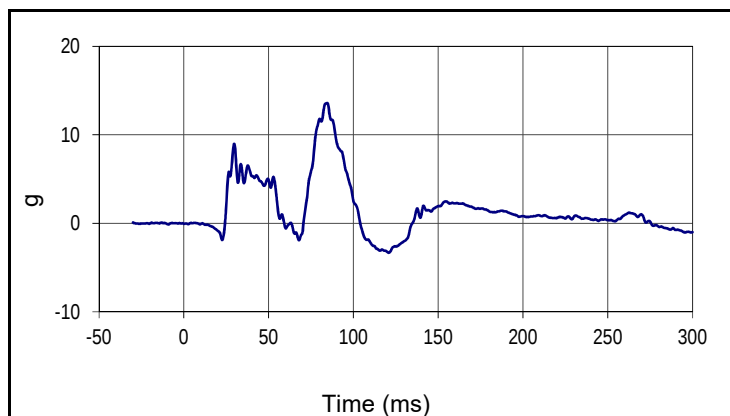
NHTSA No.: M20180203
 Test Date: 05/02/18



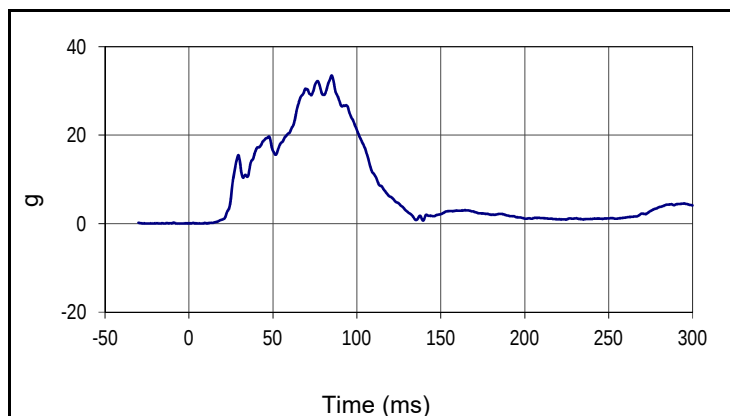
Curve Description			
Driver Chest Acceleration X Primary			
Plot No.		SAE Class	Units
006		180	g
Max	Time	Min	Time
4.4	294.9	-31.1	76.2



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
007		180	g
Max	Time	Min	Time
4.1	74.7	-5.0	48.1



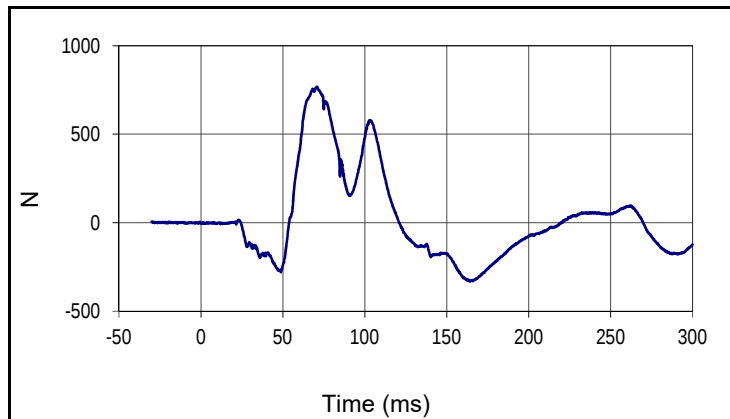
Curve Description			
Driver Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
008		180	g
Max	Time	Min	Time
13.6	84.5	-3.3	120.8



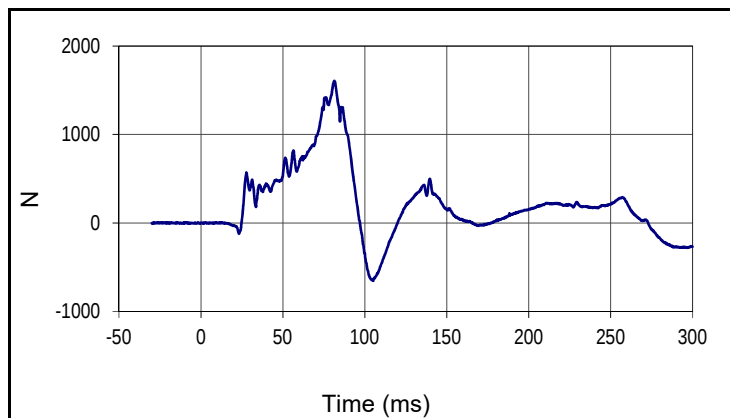
Curve Description			
Driver Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
009		180	g
Max	Time	Min	Time
33.5	85.0	0.0	8.3

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

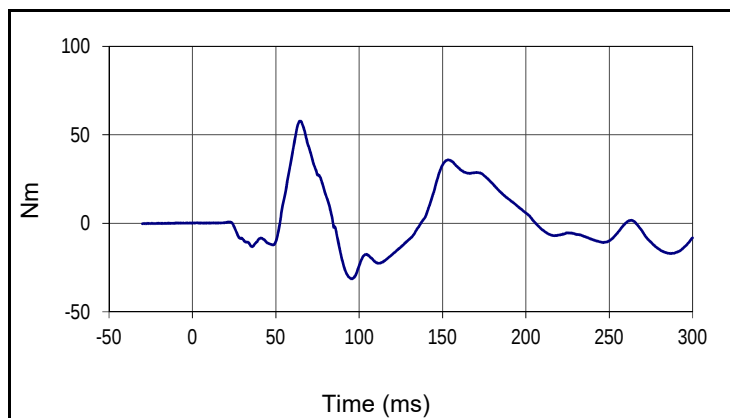
NHTSA No.: M20180203
 Test Date: 05/02/18



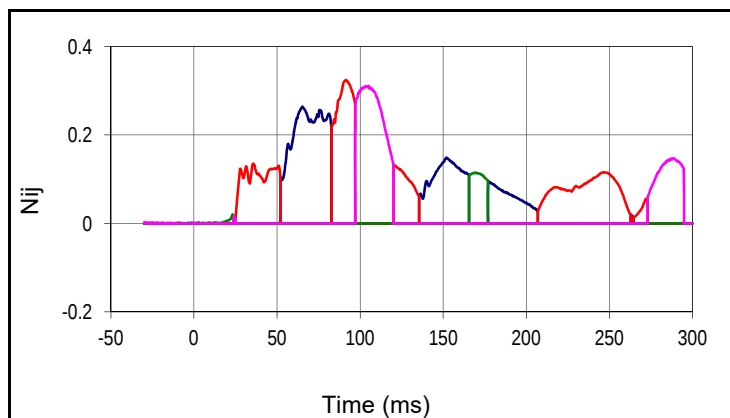
Curve Description			
Driver Upper Neck Force X			
Plot No.		SAE Class	Units
010		1000	N
Max	Time	Min	Time
768.2	71.0	-331.7	163.9



Curve Description			
Driver Upper Neck Force Z			
Plot No.		SAE Class	Units
011		1000	N
Max	Time	Min	Time
1604.8	81.3	-653.6	105.1



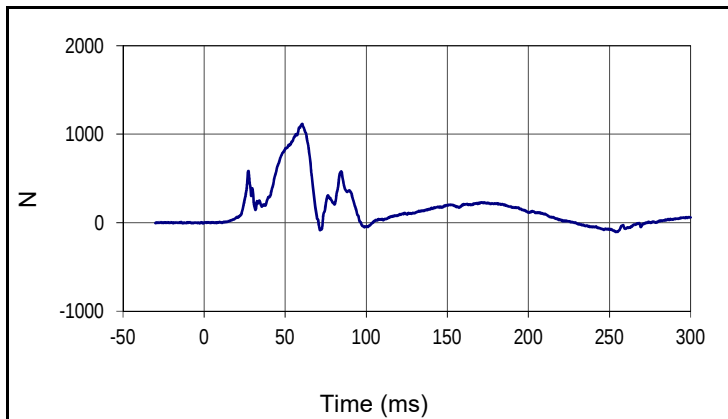
Curve Description			
Driver Upper Neck Moment Y			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
57.8	64.5	-31.4	95.7



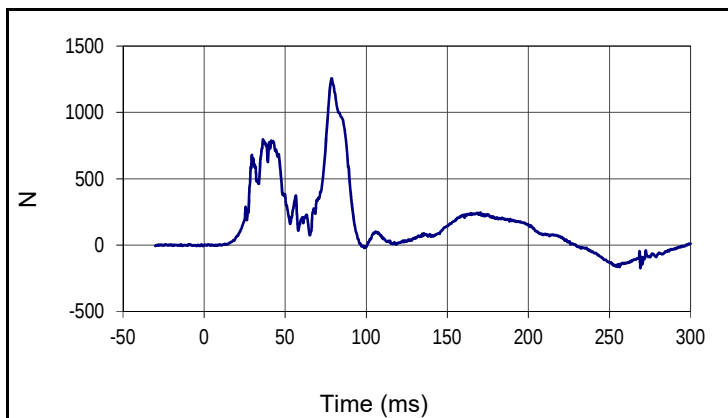
Curve Description		
Driver Nij		
Units	Max	Time
Ntf	0.26	65.2
Units	Max	Time
Nte	0.32	91.5
Units	Max	Time
Ncf	0.11	169.6
Units	Max	Time
Nce	0.31	105.2

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: M20180203
Test Date: 05/02/18



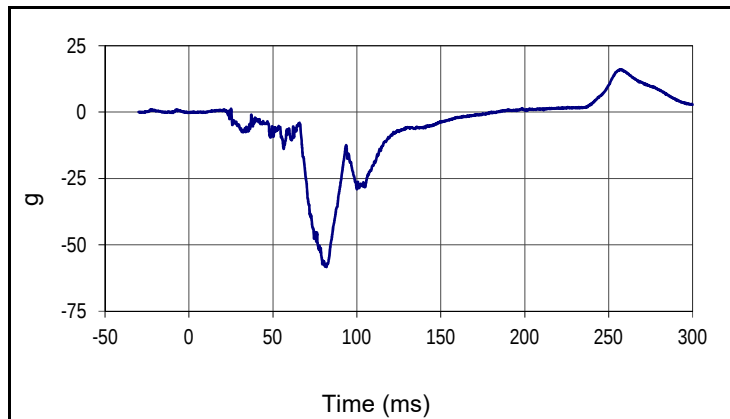
Curve Description			
Driver Left Femur Force Z			
Plot No.		SAE Class	Units
014		600	N
Max	Time	Min	Time
1116.4	60.5	-104.3	254.0



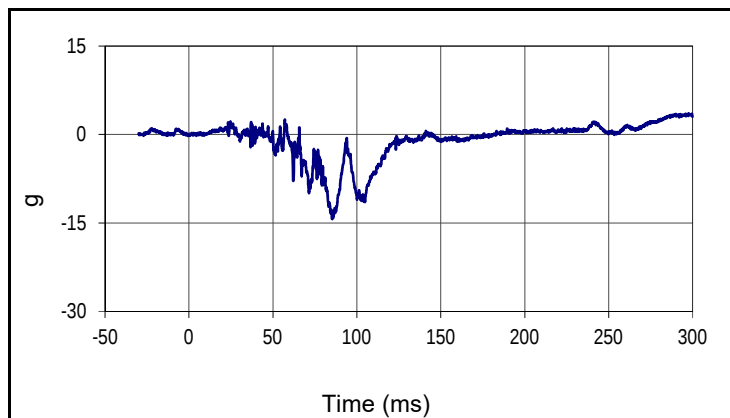
Curve Description			
Driver Right Femur Force Z			
Plot No.		SAE Class	Units
015		600	N
Max	Time	Min	Time
1257.0	78.6	-173.9	269.0

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

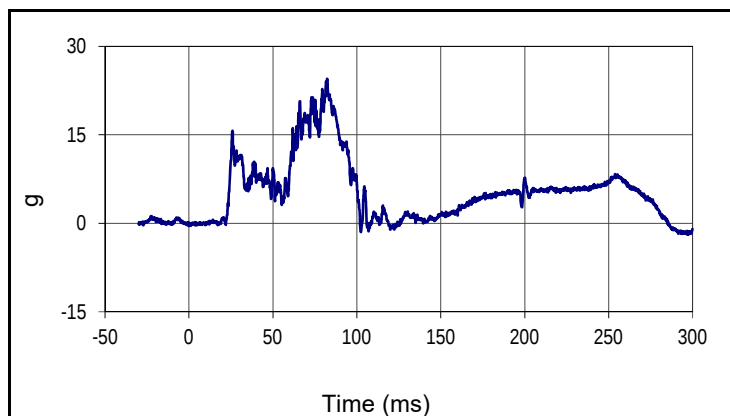
NHTSA No.: M20180203
 Test Date: 05/02/18



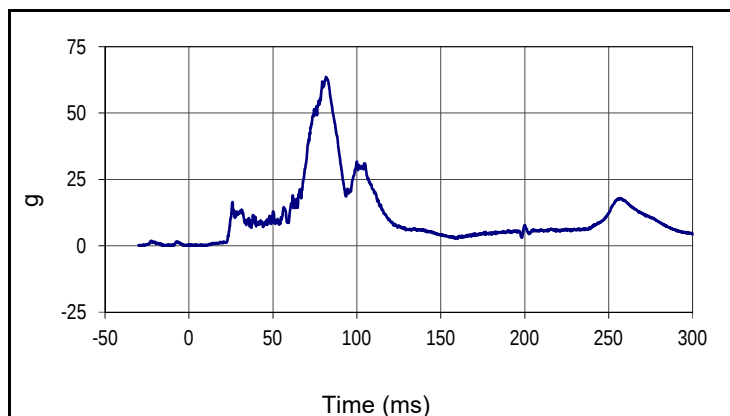
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
16.1	257.0	-58.3	81.9



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
3.5	297.8	-14.3	85.3



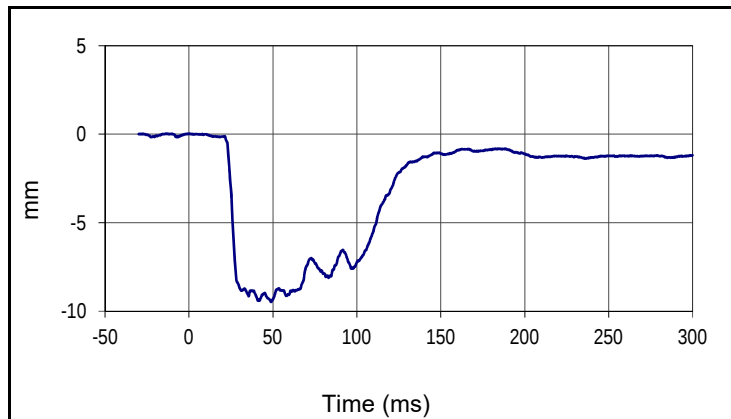
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
018		1000	g
Max	Time	Min	Time
24.5	82.3	-1.9	297.3



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
019		1000	g
Max	Time	Min	Time
63.6	81.6	0.0	1.7

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

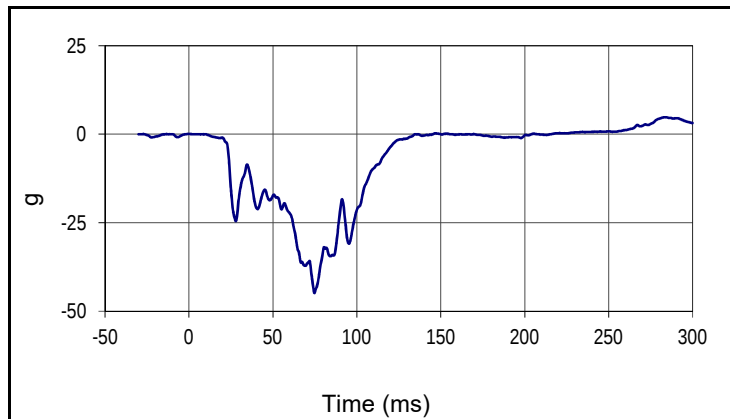
NHTSA No.: M20180203
 Test Date: 05/02/18



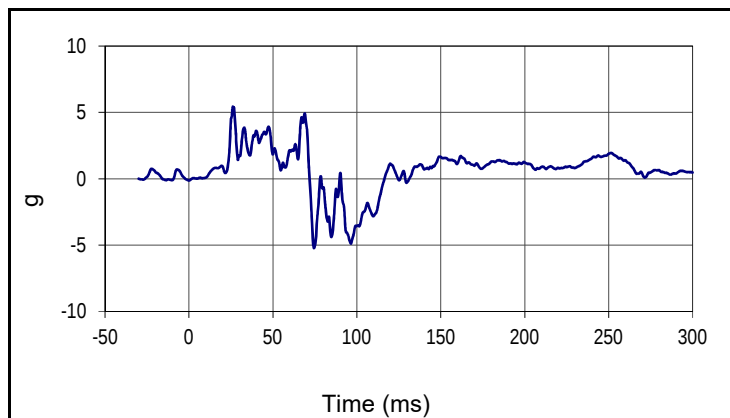
Curve Description			
Passenger Chest Deflection			
Plot No.		SAE Class	Units
020		600	mm
Max	Time	Min	Time
0.0	0.2	-9.5	48.9

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

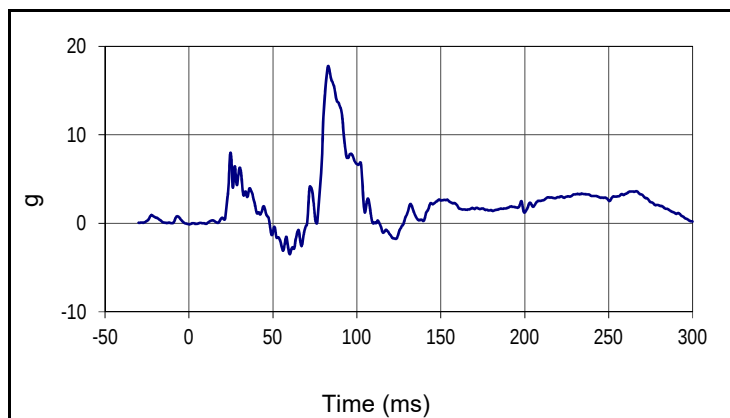
NHTSA No.: M20180203
 Test Date: 05/02/18



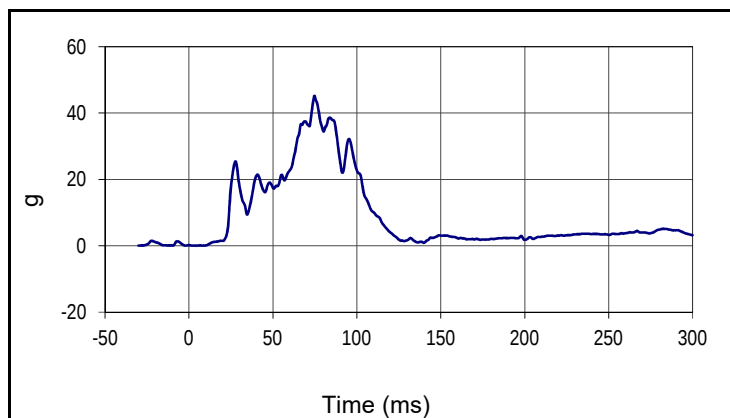
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
4.8	283.9	-44.9	74.7



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
022		180	g
Max	Time	Min	Time
5.4	26.1	-5.2	74.5



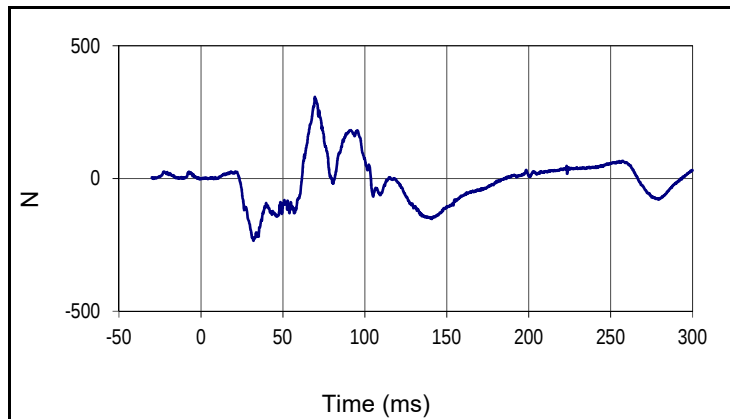
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
023		180	g
Max	Time	Min	Time
17.8	82.9	-3.5	60.0



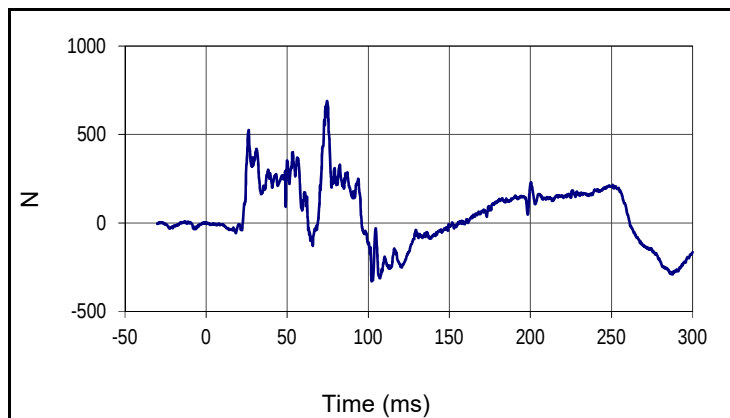
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
024		180	g
Max	Time	Min	Time
45.2	74.7	0.0	1.8

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

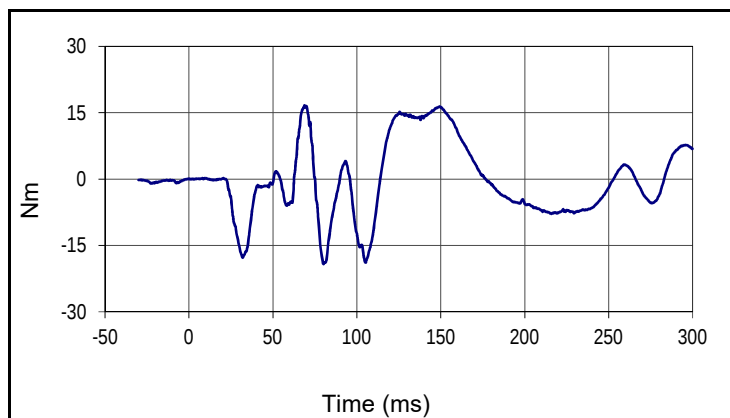
NHTSA No.: M20180203
 Test Date: 05/02/18



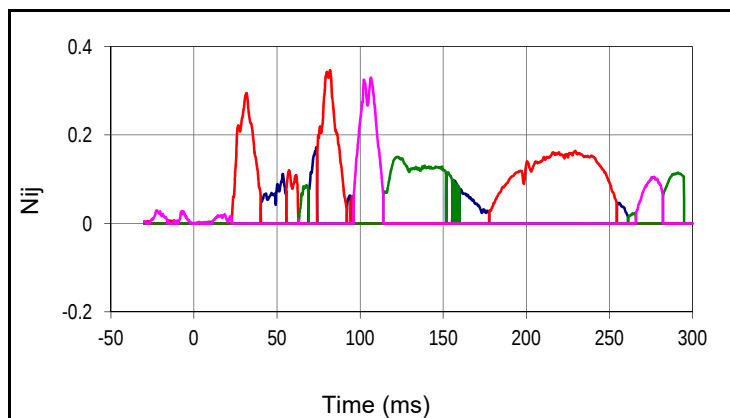
Curve Description			
Passenger Upper Neck Force X			
Plot No.		SAE Class	Units
025		1000	N
Max	Time	Min	Time
306.9	69.5	-234.8	32.0



Curve Description			
Passenger Upper Neck Force Z			
Plot No.		SAE Class	Units
026		1000	N
Max	Time	Min	Time
689.4	74.6	-329.9	102.1



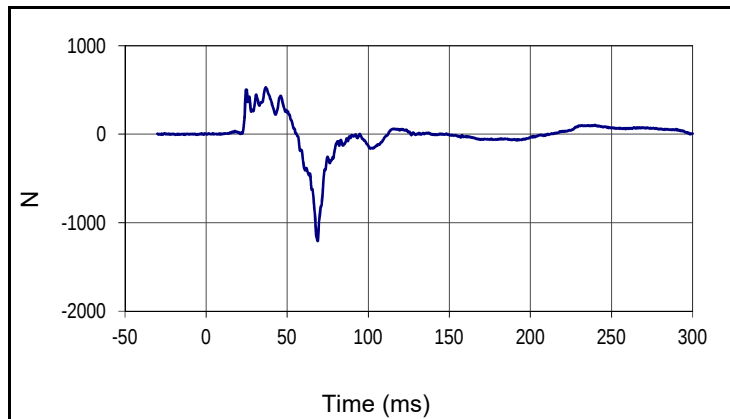
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.		SAE Class	Units
027		600	Nm
Max	Time	Min	Time
16.7	68.8	-19.2	80.2



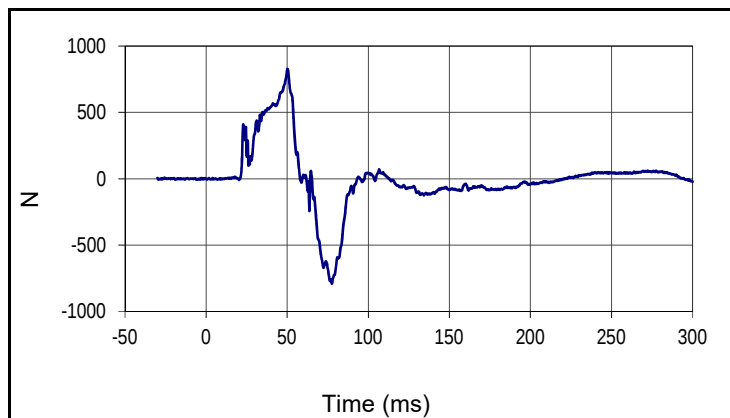
Curve Description		
Passenger Nij		
Units	Max	Time
Ntf	0.17	73.6
Units	Max	Time
Nte	0.35	81.9
Units	Max	Time
Ncf	0.15	122.1
Units	Max	Time
Nce	0.33	106.4

Test Vehicle: 2018 Ford Expedition XLT MAX 4x4 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: M20180203
 Test Date: 05/02/18



Curve Description			
Passenger Left Femur Force Z			
Plot No.		SAE Class	Units
029		600	N
Max	Time	Min	Time
529.5	36.8	-1207.6	68.9



Curve Description			
Passenger Right Femur Force Z			
Plot No.		SAE Class	Units
030		600	N
Max	Time	Min	Time
827.2	50.2	-791.0	77.6

APPENDIX C
ATD CALIBRATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA



**Hybrid III 50th Percentile Male
ATD Damage Checklist**

ATD Serial No.: 360

Test Date: 2018-04-26

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

Technician:

J. Hernandez

Approved By:

P. Puzzuto



Hybrid III 50th Percentile Male
External Measurements

ATD Serial No.: 360

Test Date: 2018-04-26

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
A - Total sitting height	mm	879	889	888	Pass
B - Shoulder pivot height	mm	505	521	512	Pass
C - 'H' point height	mm	84	89	86	Pass
D - 'H' point location from backline	mm	135	140	139	Pass
E - Shoulder pivot from backline	mm	84	94	91	Pass
F - Thigh clearance	mm	140	155	148	Pass
G - Back of elbow to wrist pivot	mm	290	305	300	Pass
H - Head back to backline	mm	41	46	46	Pass
I - Shoulder to elbow length	mm	330	345	337	Pass
J - Elbow rest height	mm	190	211	202	Pass
K - Buttock to knee length	mm	579	604	587	Pass
L - Popliteal length	mm	429	455	447	Pass
M - Knee pivot height	mm	485	500	497	Pass
N - Buttock popliteal length	mm	452	477	468	Pass
O - Chest depth without jacket	mm	213	229	225	Pass
P - Foot length	mm	251	267	261	Pass
V - Shoulder breadth	mm	422	437	427	Pass
W - Foot breadth	mm	91	107	104	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	977	Pass
Z - Waist circum.	mm	836	866	849	Pass
AA - Location for chest circum.	mm	429	434	433	Pass
BB - Location for waist circum.	mm	226	231	230	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



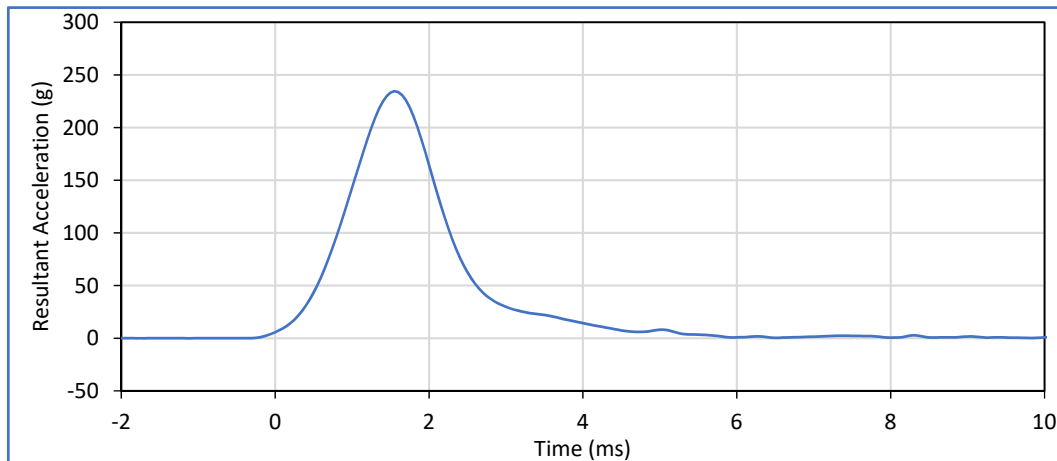
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Head Drop

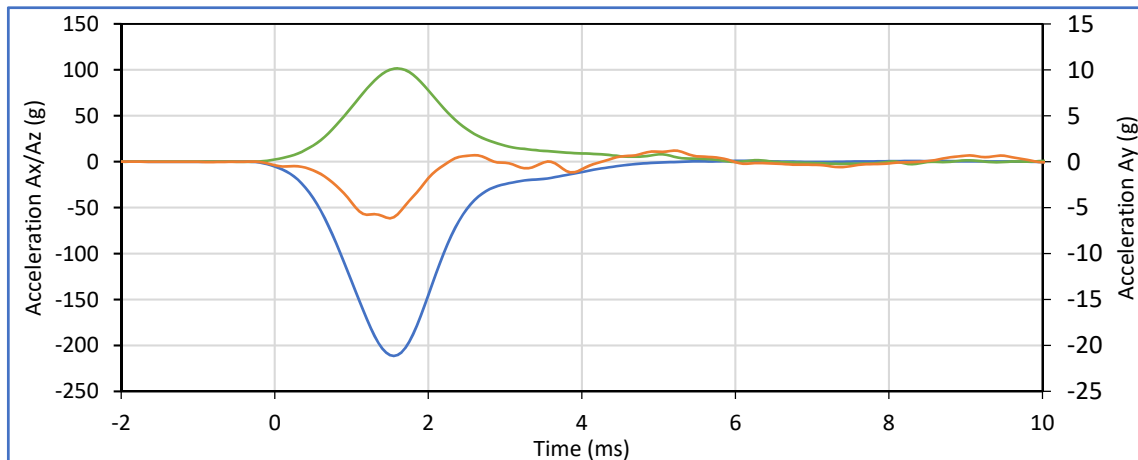
ATD Serial No.: 360

Test Date: 2018-04-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.0	Pass
Laboratory Humidity	%	10	70	31	Pass
Peak Resultant Acceleration	g	225.0	275.0	234.5	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-6.2	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:234.5@1.6
Min:0.2@9.9
SAE Class 1000



Head Ax
Max:1.0@6.1
Min:-211.4@1.6
SAE Class 1000
Head Ay
Max:1.2@5.2
Min:-6.2@1.5
SAE Class 1000
Head Az
Max:101.6@1.6
Min:-2.7@8.3
SAE Class 1000

Technician: _____

T. Lowman

T. Lowman

Approved By: _____

P. Puzzuto

P. Puzzuto

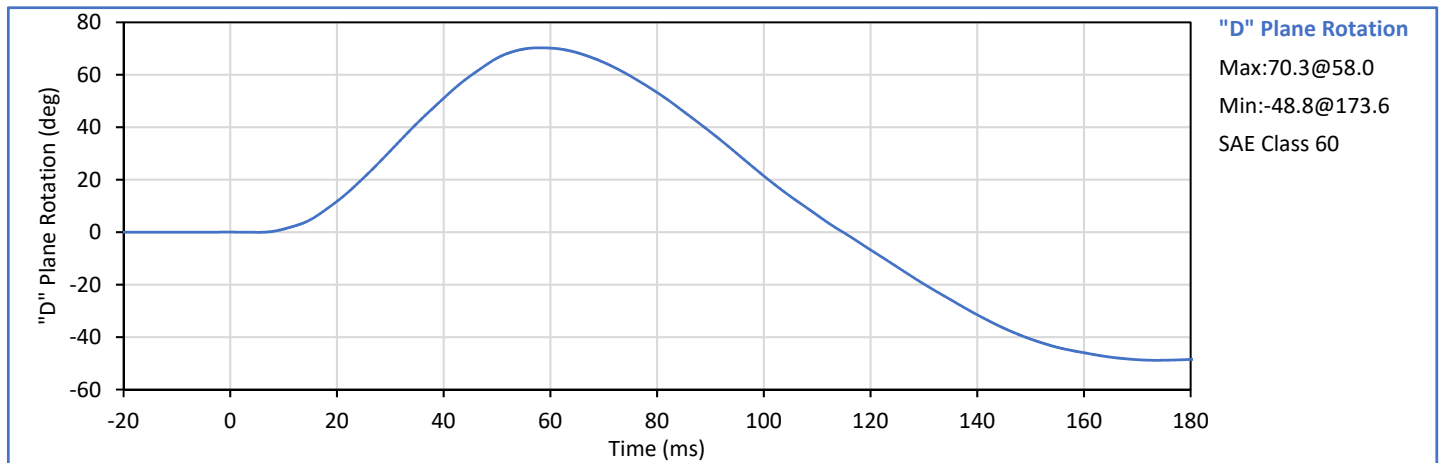
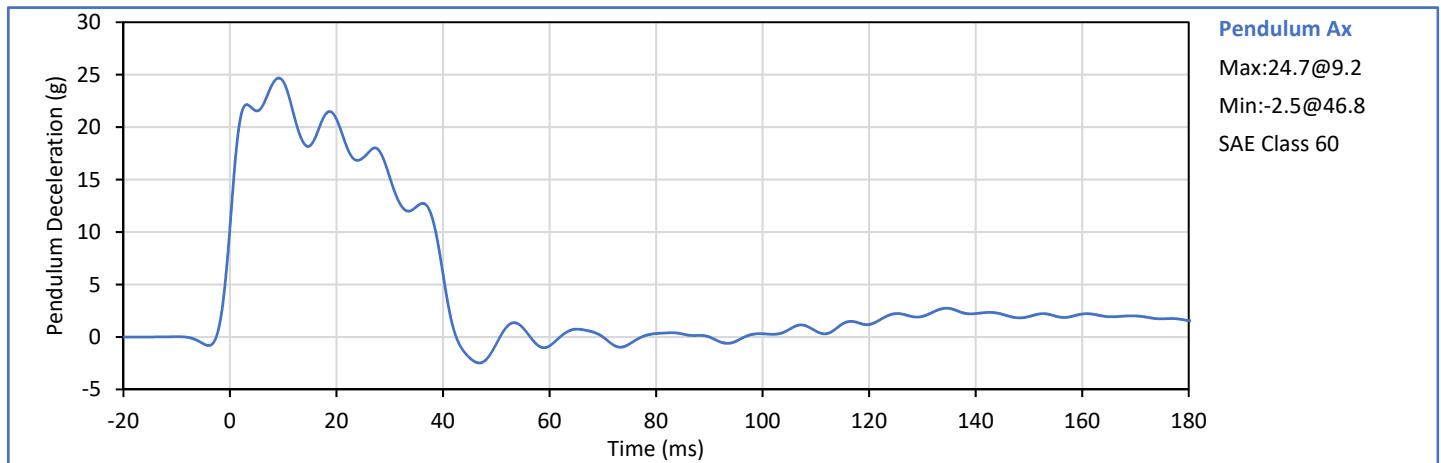


Hybrid III 50th Percentile Male
Neck Flexion Test

ATD Serial No.: 360

Test Date: 2018-04-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	6.89	7.13	6.97	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	24.3	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	20.8	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.2	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.2	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	40.3	Pass
"D" Plane Rotation peak	deg	64.0	78.0	70.3	Pass
	ms	57.0	64.0	58.0	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	114.9	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	99.6	Pass
	ms	47.0	58.0	52.8	Pass
Moment Decay, Peak to Zero	deg	97.0	107.0	97.0	Pass
Overall Test Results					Pass



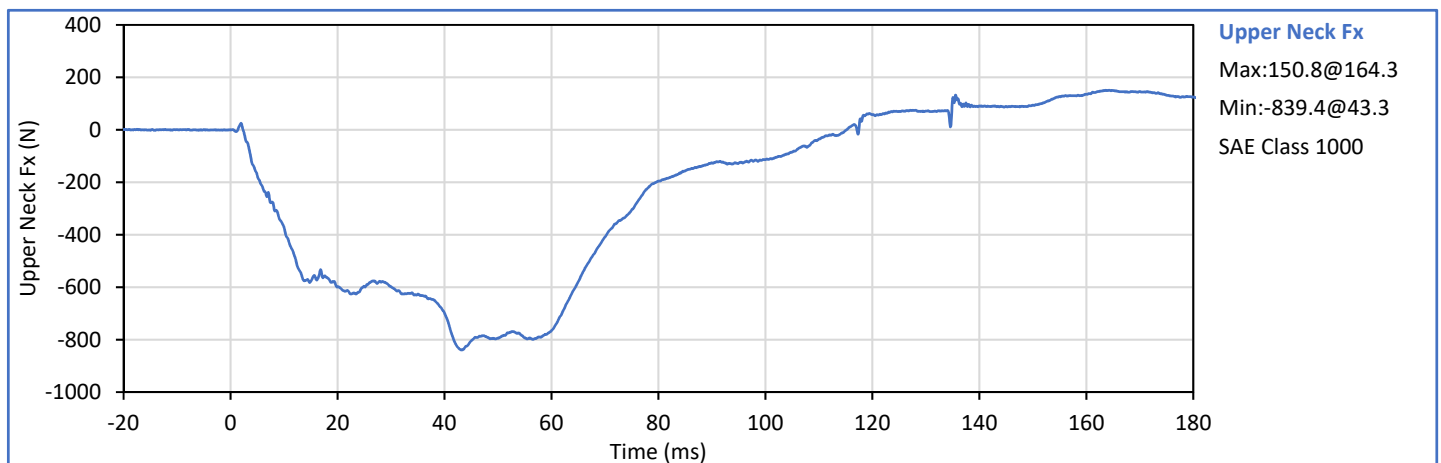
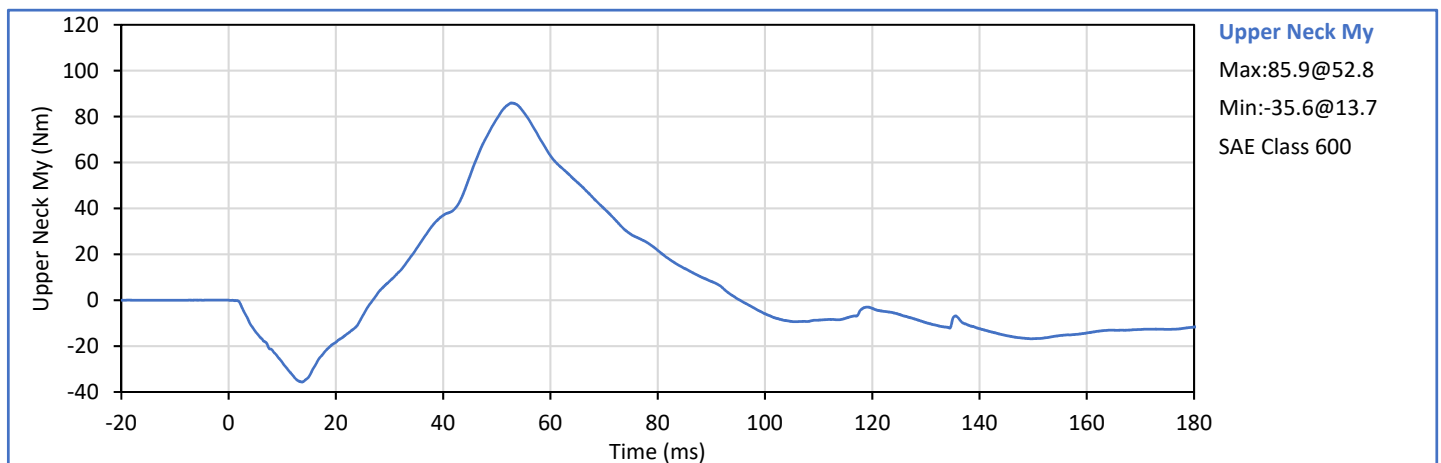
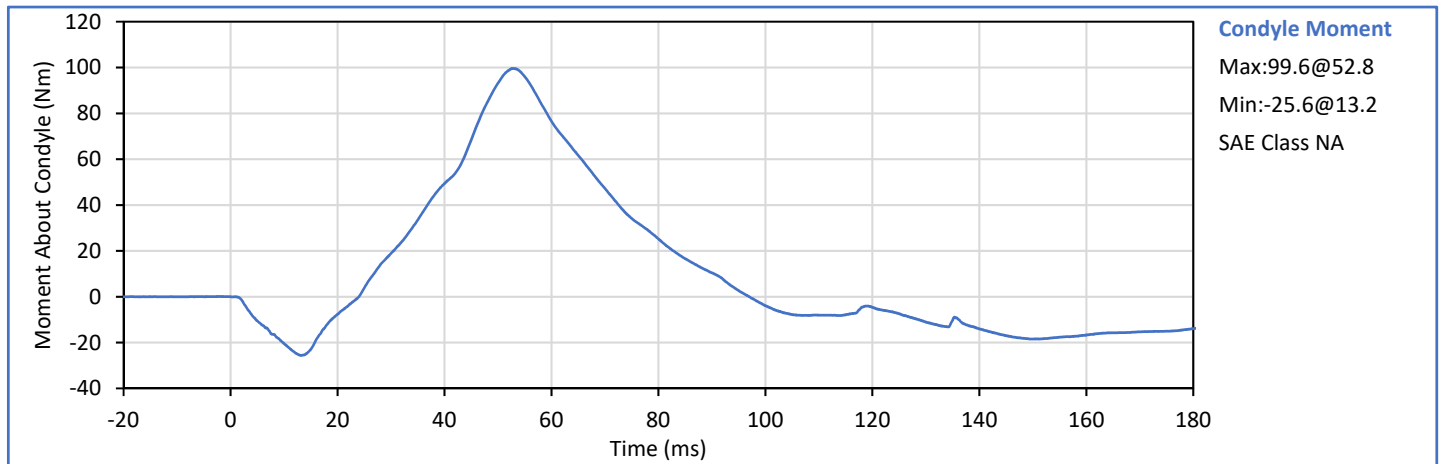
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-04-27



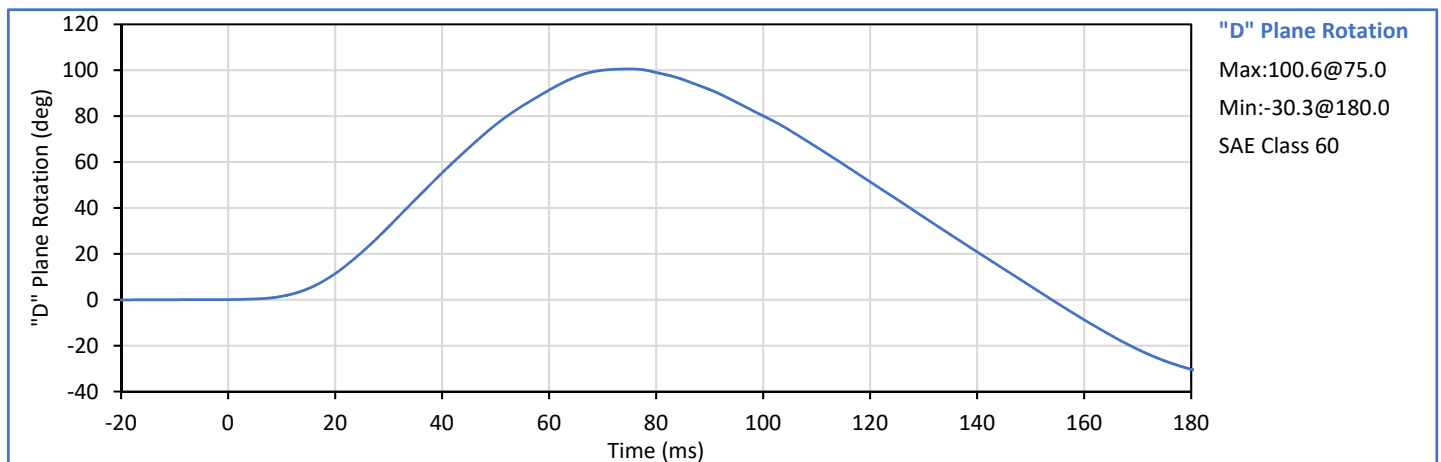
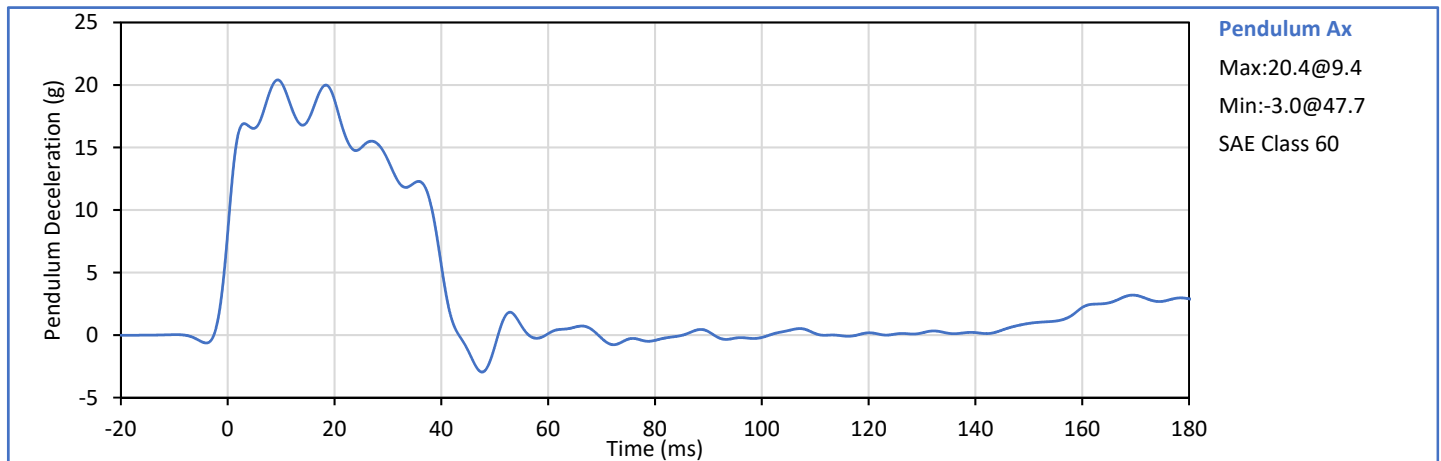


Hybrid III 50th Percentile Male
Neck Extension Test

ATD Serial No.: 360

Test Date: 2018-04-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	5.94	6.19	6.07	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	20.2	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	18.8	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	14.0	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	14.0	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	40.2	Pass
"D" Plane Rotation peak	deg	81.0	106.0	100.6	Pass
	ms	72.0	82.0	75.0	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	154.0	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-74.1	Pass
	ms	65.0	79.0	67.5	Pass
Moment Decay, Peak to Zero	deg	120.0	148.0	135.0	Pass
Overall Test Results					Pass



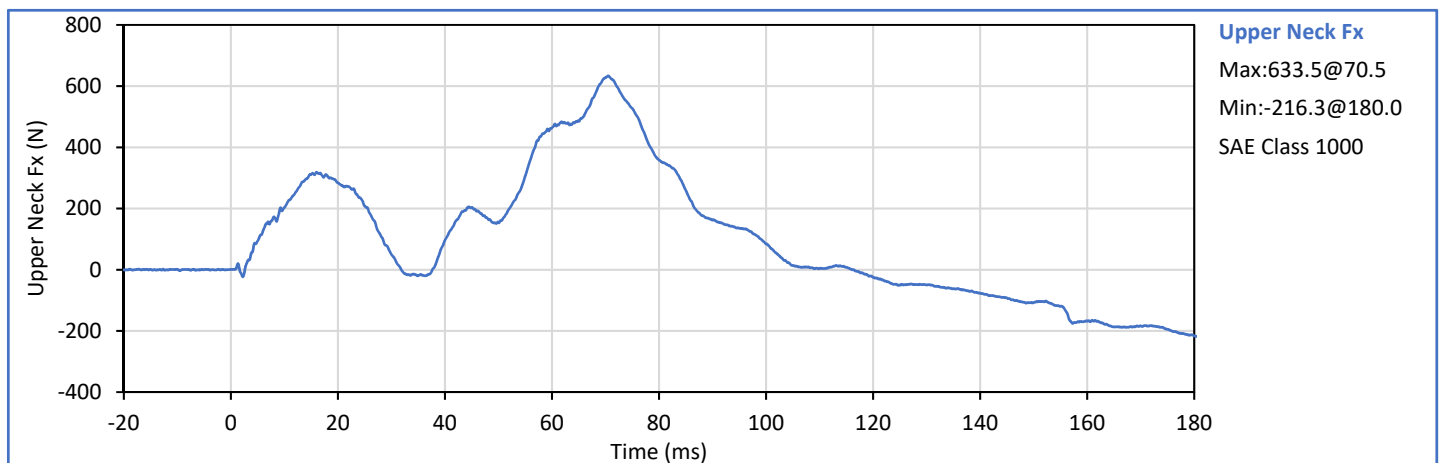
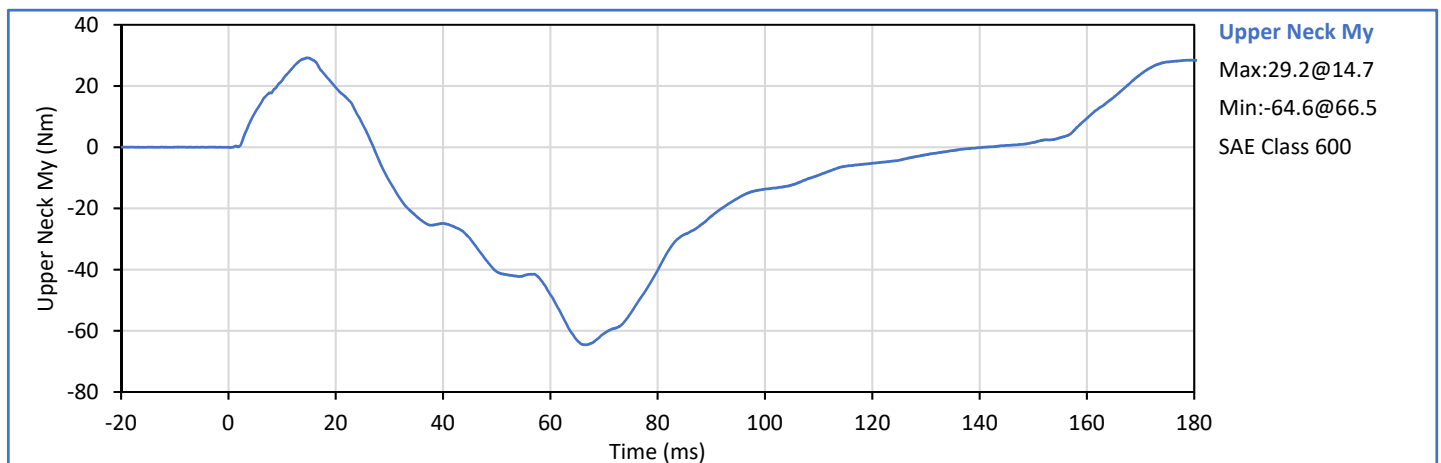
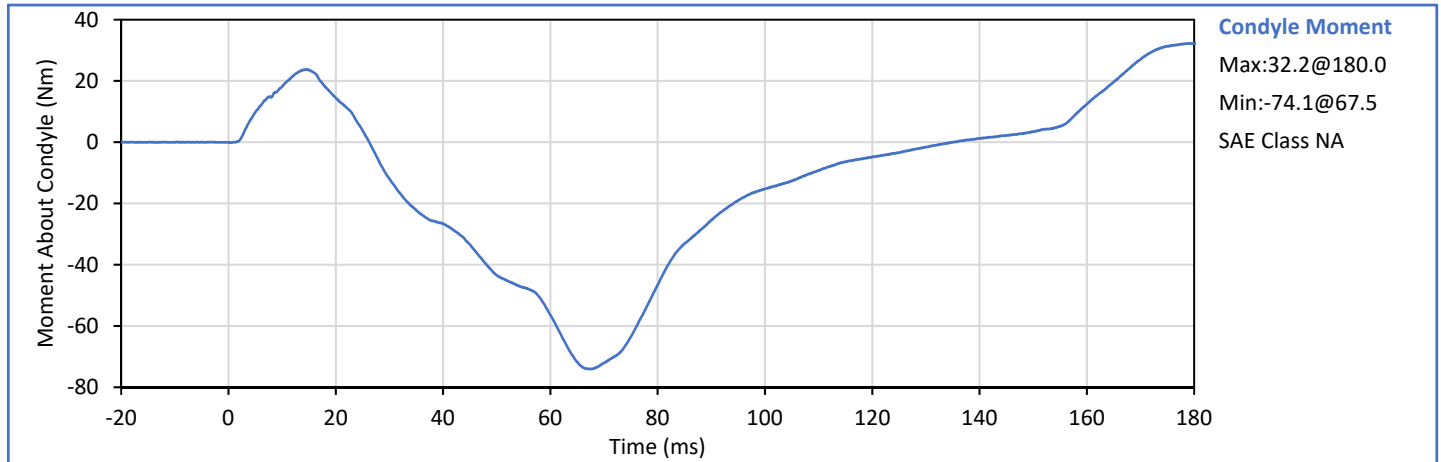
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-04-27





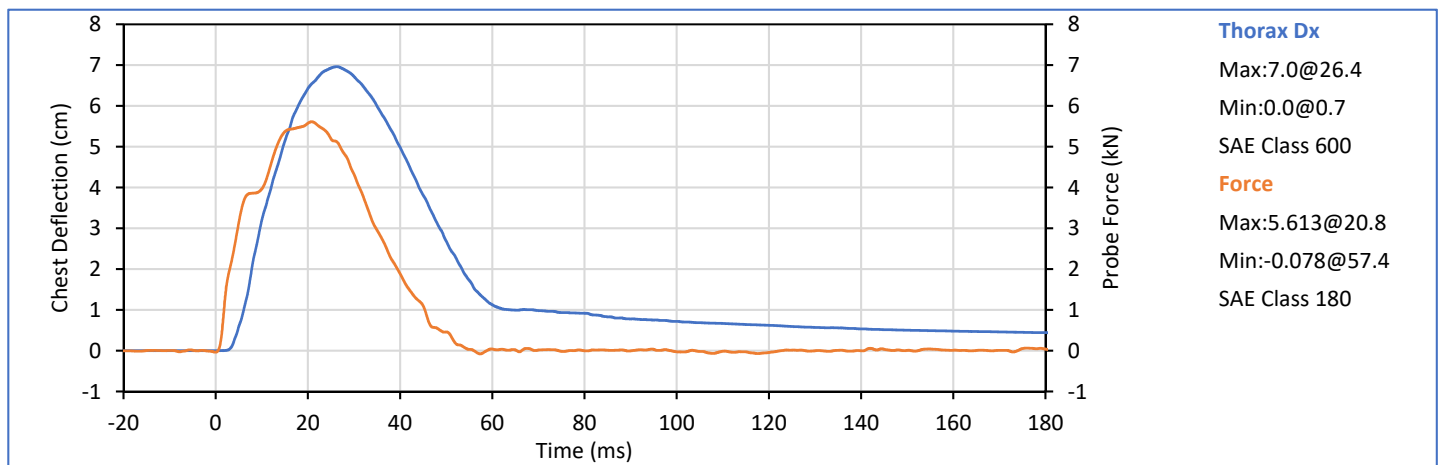
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Thorax Impact

ATD Serial No.: 360

Test Date: 2018-04-26

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	24	Pass
Probe Velocity	m/s	6.58	6.82	6.69	Pass
Peak Chest Deflection	cm	6.35	7.26	6.96	Pass
Peak Probe Force	kN	5.159	5.893	5.613	Pass
Internal Hysteresis	%	69.0	85.0	71.4	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

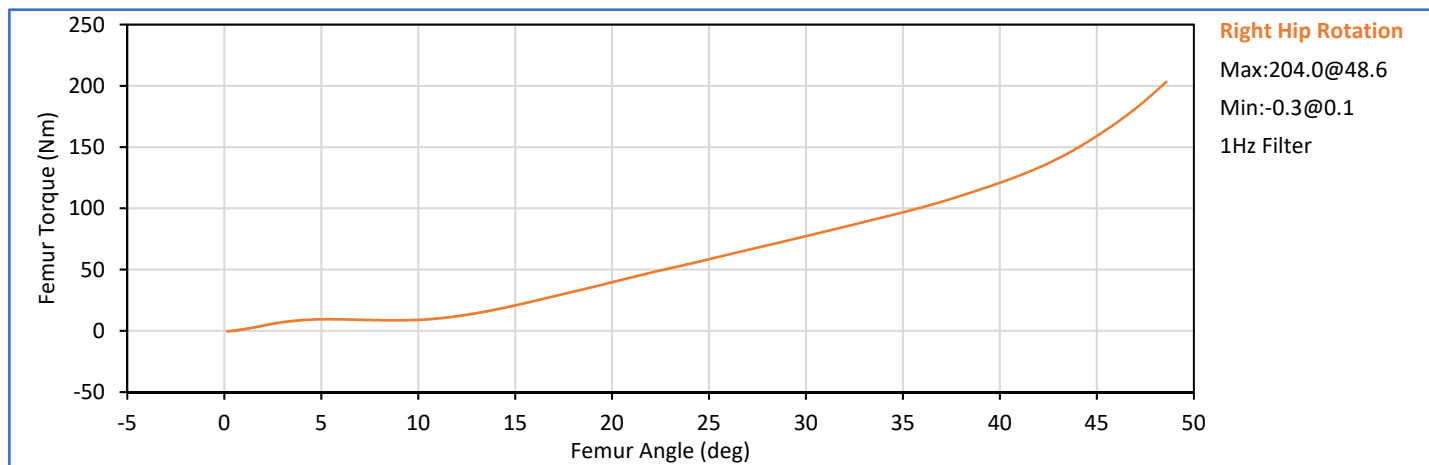
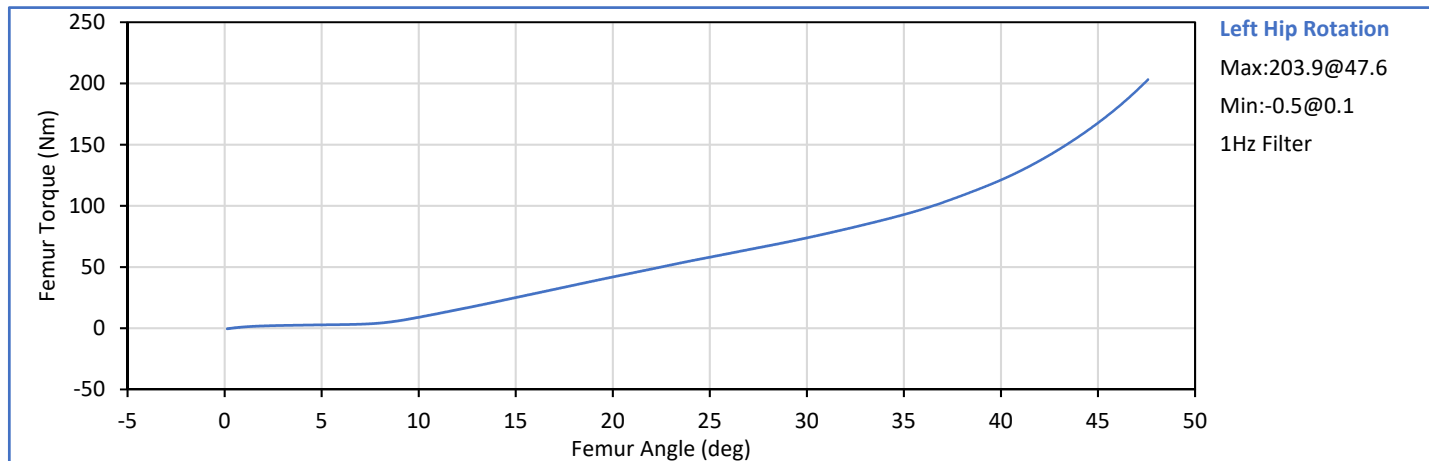


Hybrid III 50th Percentile Male
Hip Flexion (Left/Right)

ATD Serial No.: 360

Test Date: 2018-04-27

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Humidity	%	10	70	21	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	73.9	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	47.6	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.9	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	77.4	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	48.5	Pass
Overall Test Results						Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



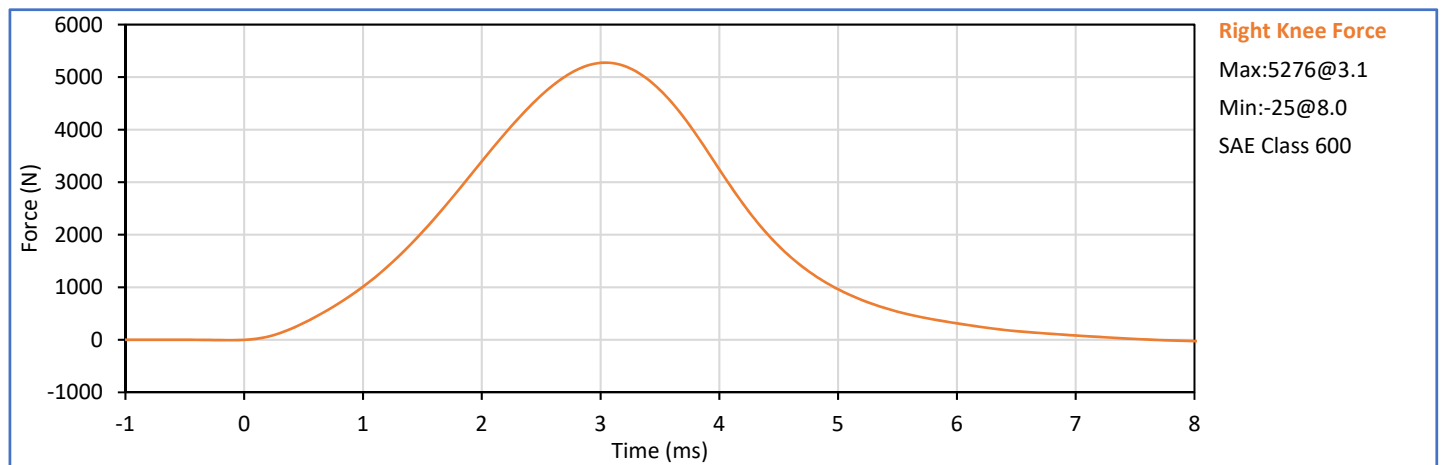
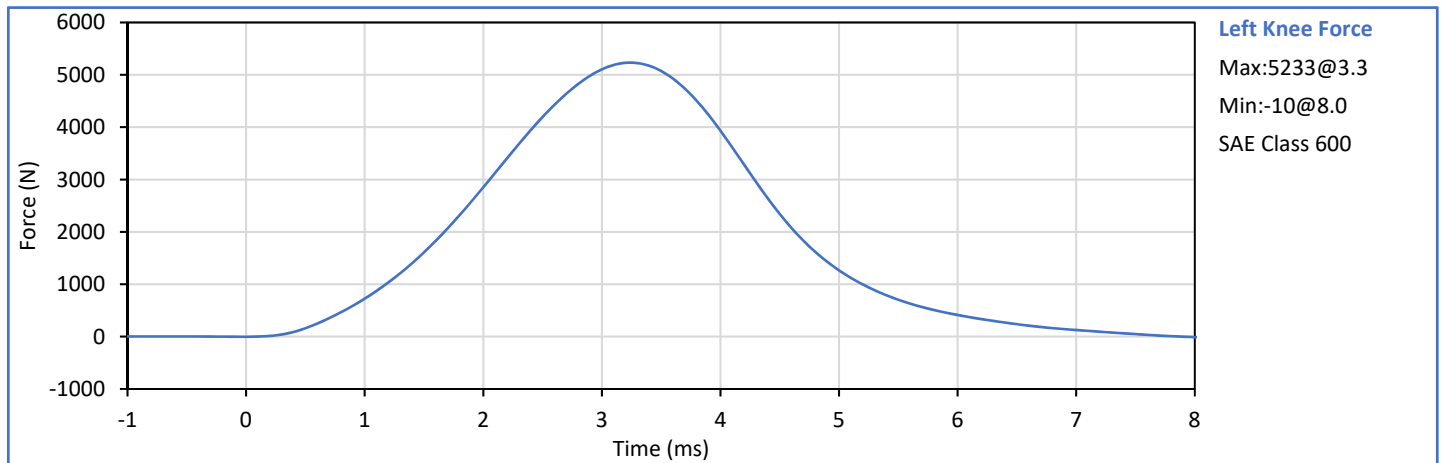
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Knee Impact (Left/Right)

ATD Serial No.: 360

Test Date: 2018-04-26

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	20.7	Pass
	Laboratory Humidity	%	10	70	26	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.105	Pass
Knee	Peak Resistive Force	N	4715	5782	5233	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.109	Pass
Knee	Peak Resistive Force	N	4715	5782	5276	Pass
Overall Test Results						Pass



Technician: T. Lowman

Approved By: P. Puzzuto



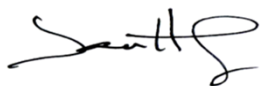
Hybrid III 5th Percentile Female Damage Checklist

ATD Serial No.: 141

Test Date: 2018-05-01

Dummy Item	Inspect for	Comments	Damage	Okay
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ.	Bent shaft			✓
Assembly	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

Technician: 
J. Hernandez

Approved By: 
P. Puzzuto



**Hybrid III 5th Percentile Female
External Measurements**

ATD Serial No.: 141

Test Date: 2018-05-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	34	Pass
A - Total sitting height	mm	775	800	789	Pass
B - Shoulder pivot height	mm	432	457	455	Pass
C - 'H' point height	mm	81	86	85	Pass
D - 'H' point location from backline	mm	145	150	147	Pass
E - Shoulder pivot from backline	mm	69	84	80	Pass
F - Thigh clearance	mm	119	135	126	Pass
G - Back of elbow to wrist pivot	mm	244	259	255	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	277	297	289	Pass
J - Elbow rest height	mm	183	203	191	Pass
K - Buttock to knee length	mm	521	546	527	Pass
L - Popliteal length	mm	356	376	362	Pass
M - Knee pivot height	mm	394	419	403	Pass
N - Buttock popliteal length	mm	414	439	423	Pass
O - Chest depth without jacket	mm	175	191	182	Pass
P - Foot length	mm	219	234	229	Pass
R - Buttock to Knee Pivot Length	mm	457	483	468	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	185	Pass
U - Hip Breadth	mm	300	315	311	Pass
V - Shoulder breadth	mm	351	366	356	Pass
W - Foot breadth	mm	79	94	86	Pass
X - Head circum.	mm	528	549	533	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	863	Pass
Z - Waist circum.	mm	760	790	771	Pass
AA - Location for chest circum.	mm	333	358	338	Pass
BB - Location for waist circum.	mm	160	170	165	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



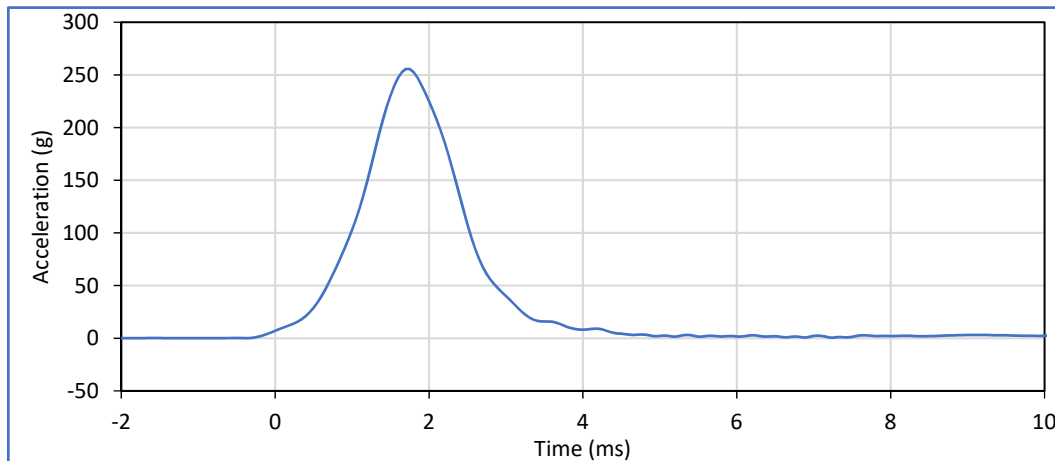
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Head Drop

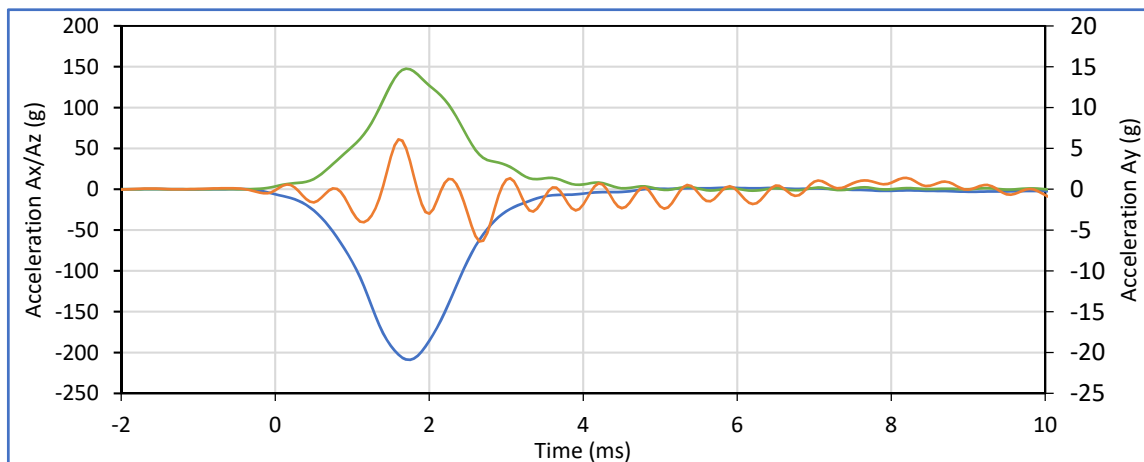
ATD Serial No.: 141

Test Date: 2018-04-04

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Humidity	%	10	70	34	Pass
Peak Resultant Acceleration	g	250.0	300.0	255.6	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-6.4	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass



Head Resultant
 Max:255.6@1.7
 Min:0.5@7.3
 SAE Class 1000



Head Ax
 Max:1.8@5.9
 Min:-208.9@1.8
 SAE Class 1000
Head Ay
 Max:6.1@1.6
 Min:-6.4@2.7
 SAE Class 1000
Head Az
 Max:147.8@1.7
 Min:-1.8@6.2
 SAE Class 1000

Technician: T. Lowman

Approved By: P. Puzzuto

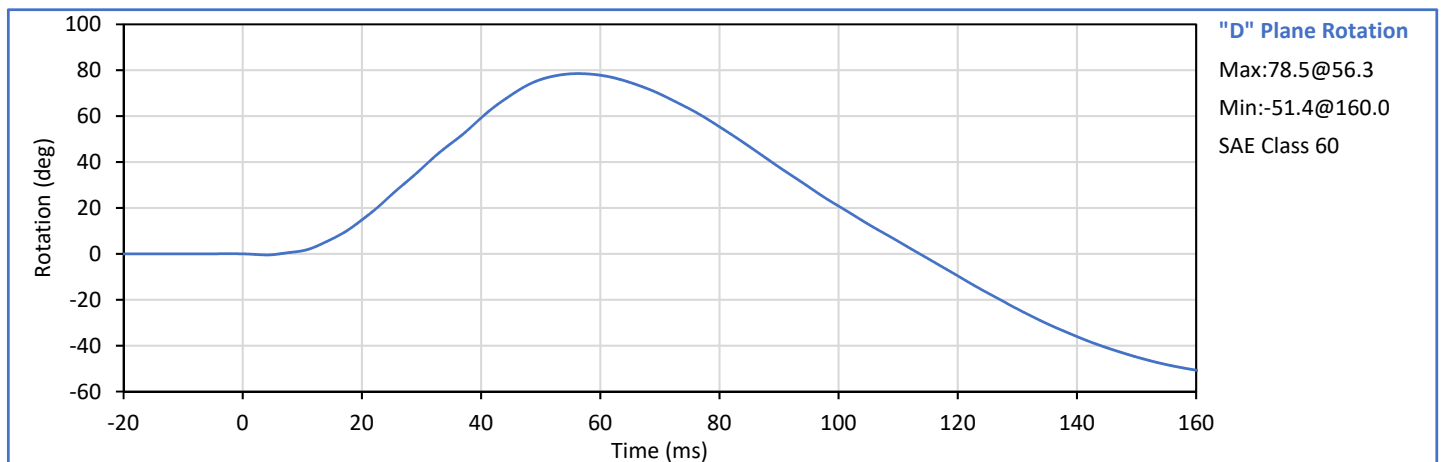
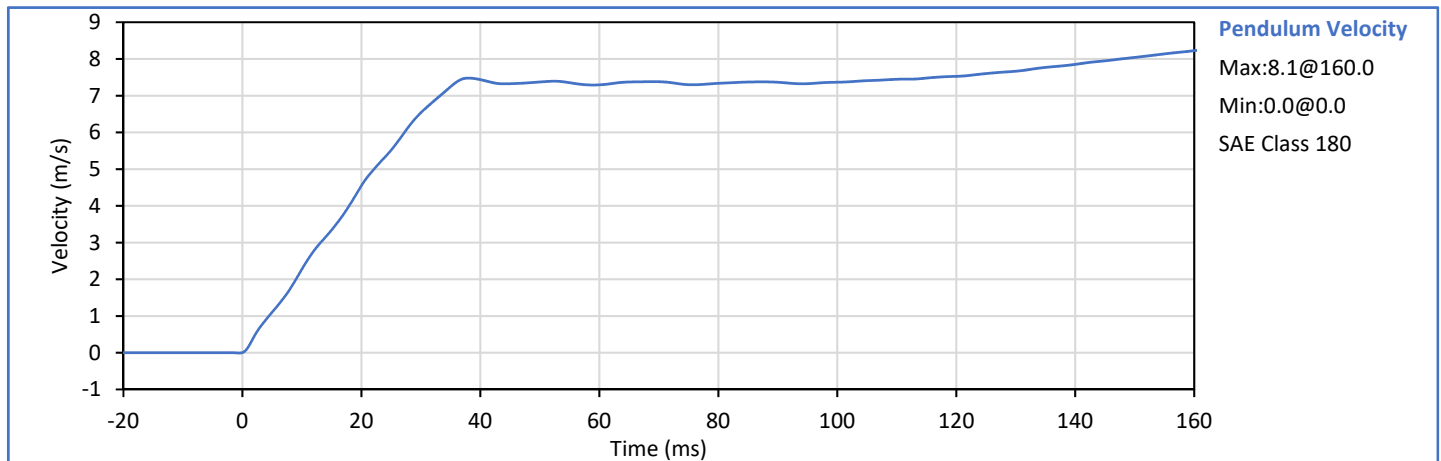


Hybrid III 5th Percentile Female Neck Flexion Test

ATD Serial No.: 141

Test Date: 2018-04-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	6.89	7.13	6.98	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.28	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.55	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.54	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	78.5	Pass
Peak Moment in Rotation	Nm	69.0	83.0	75.2	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	82.6	Pass
Overall Test Results				Pass	Pass



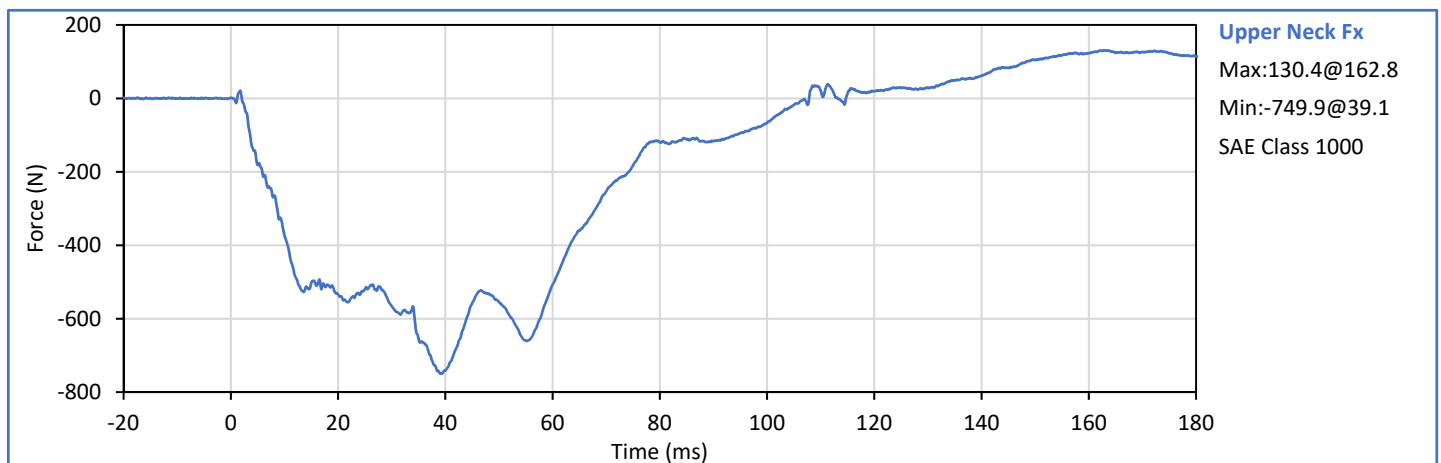
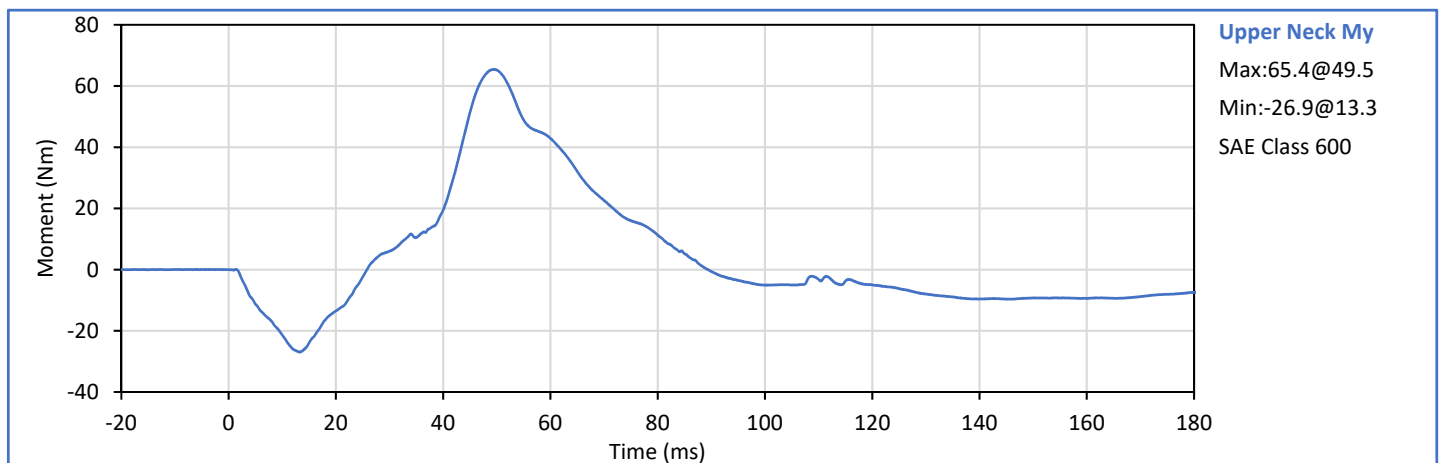
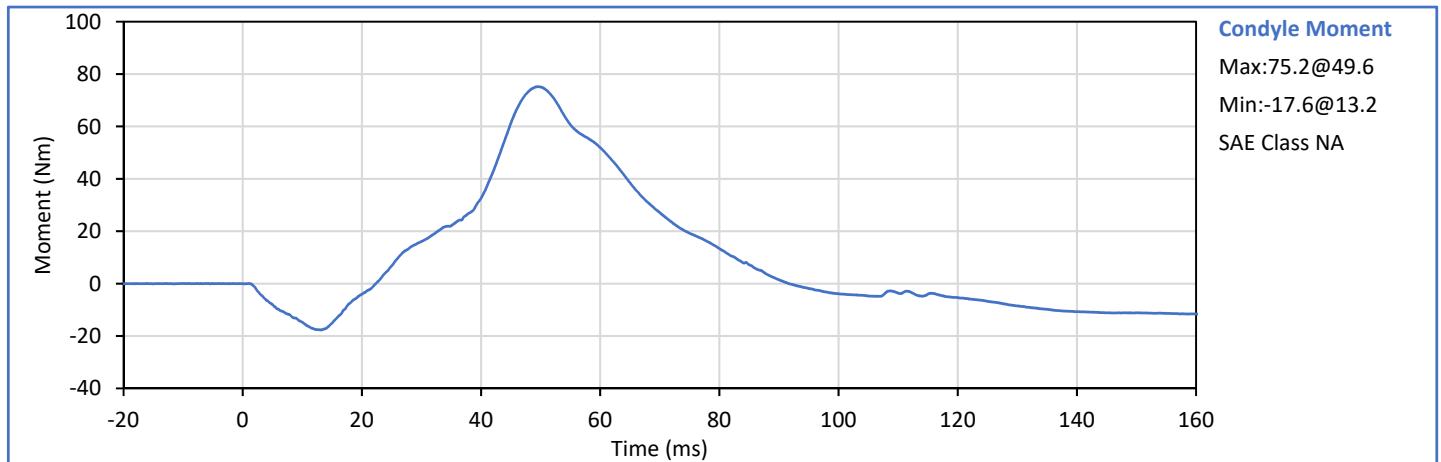
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-04-03



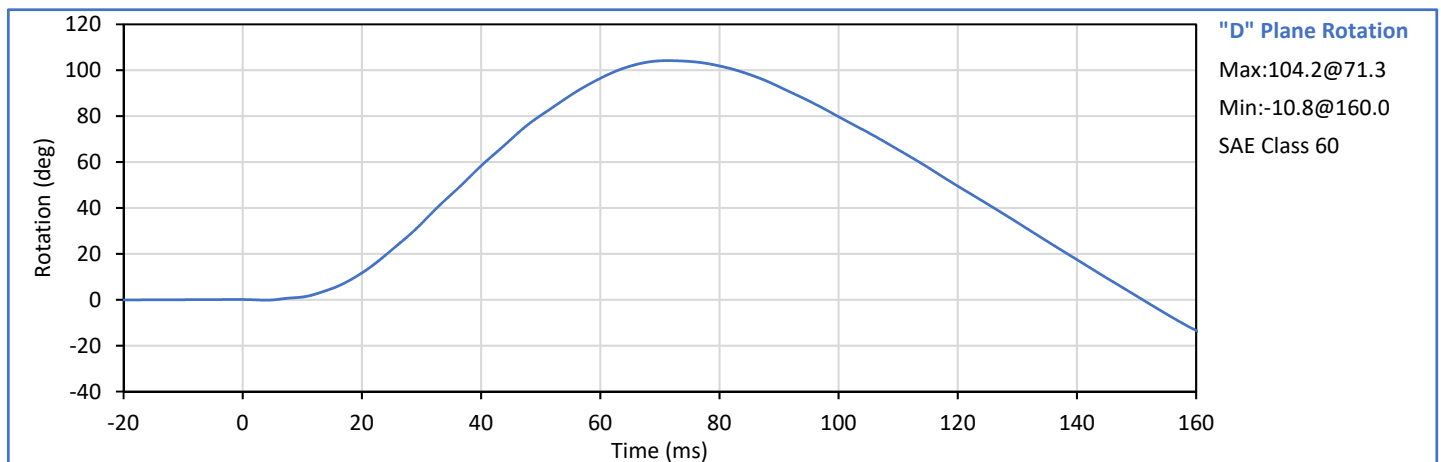
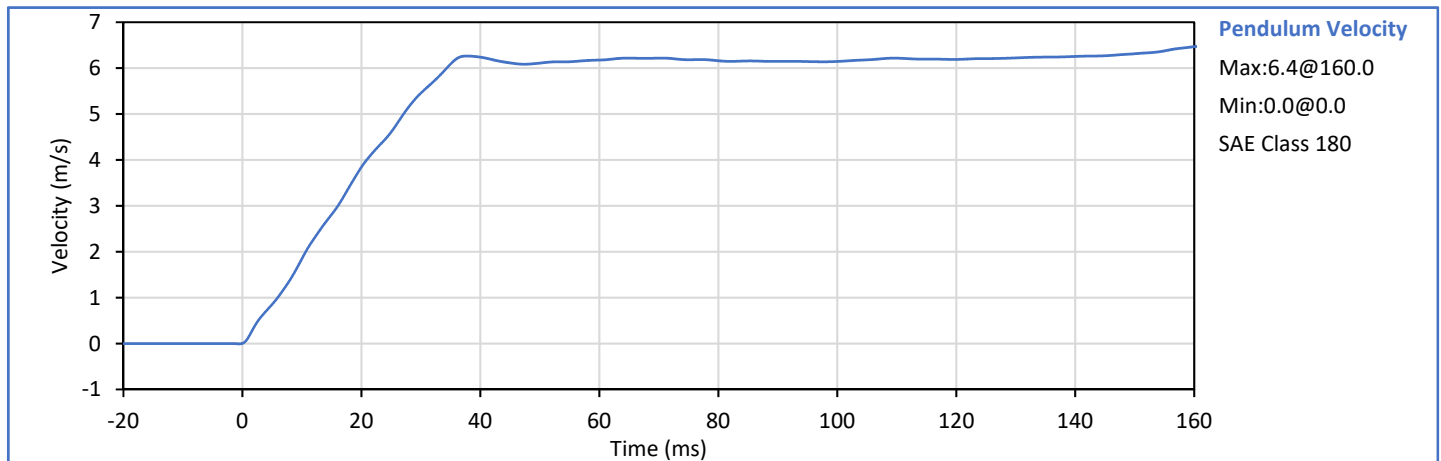


**Hybrid III 5th Percentile Female
Neck Extension Test**

ATD Serial No.: 141

Test Date: 2018-04-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Pendulum Velocity	m/s	5.95	6.19	6.15	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.85	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.84	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.46	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	104.2	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-58.3	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	99.6	Pass
Overall Test Results				Pass	Pass



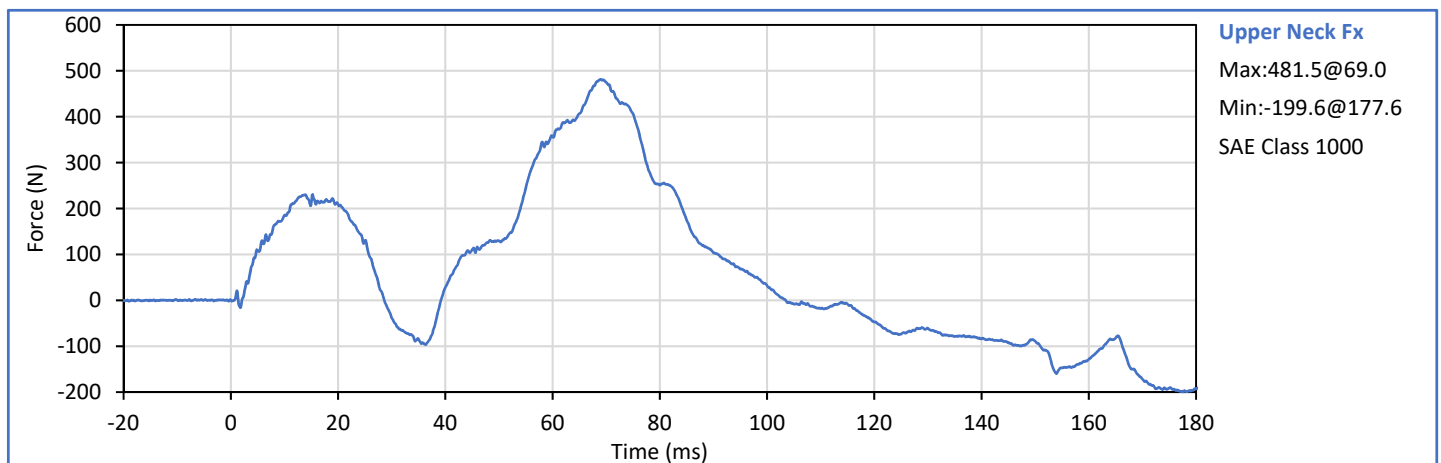
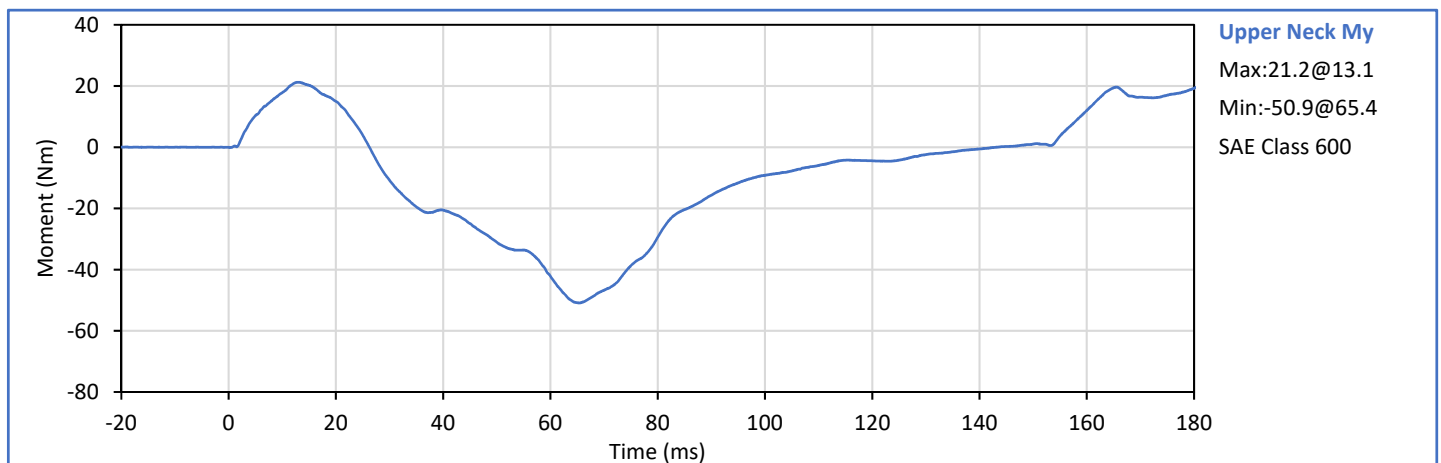
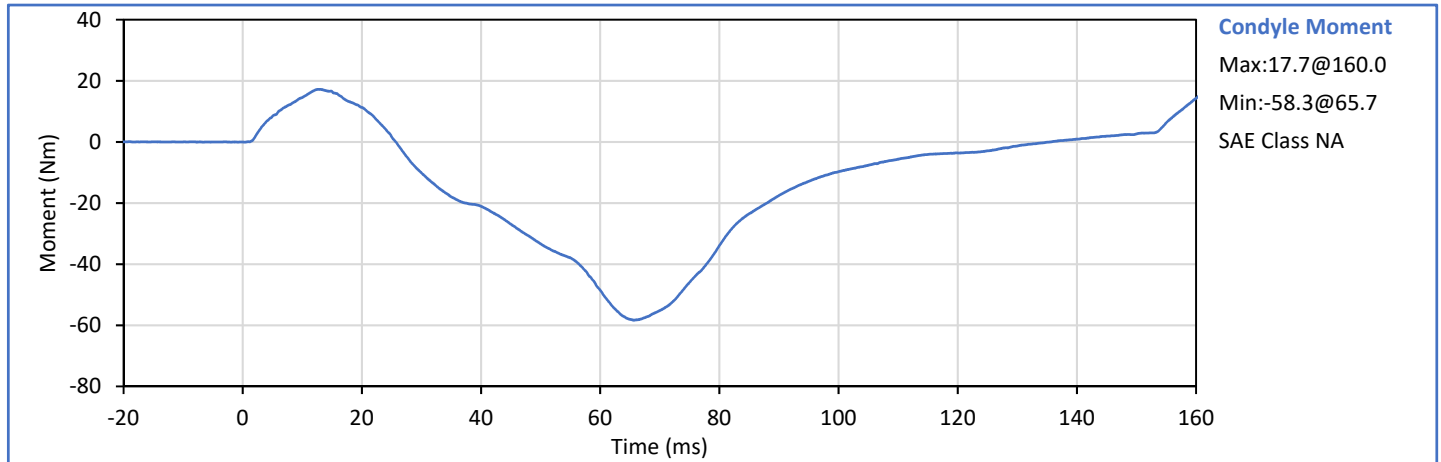
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-04-03





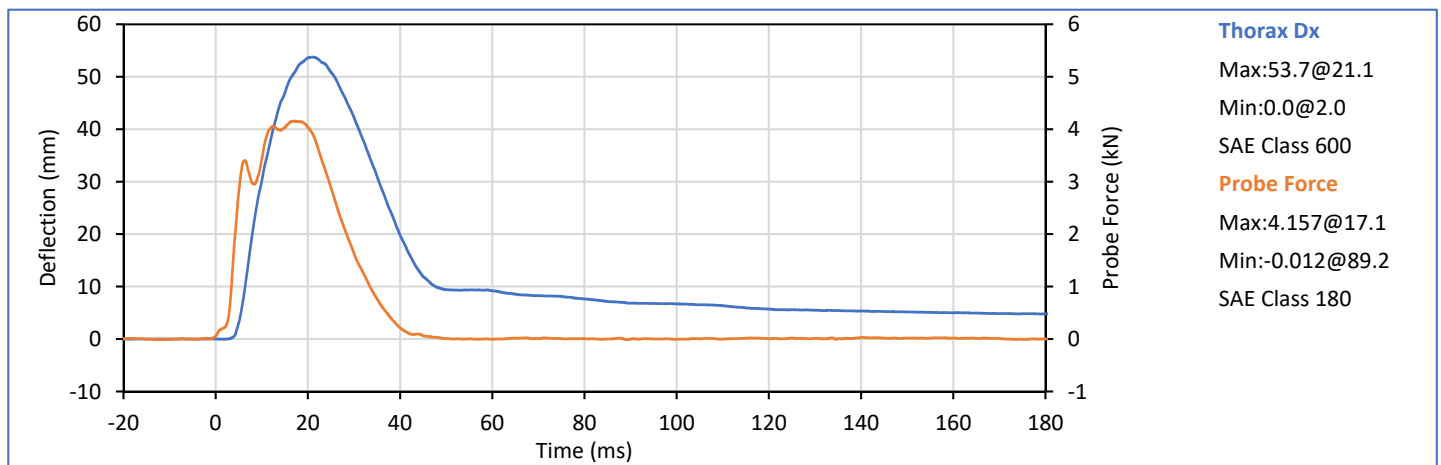
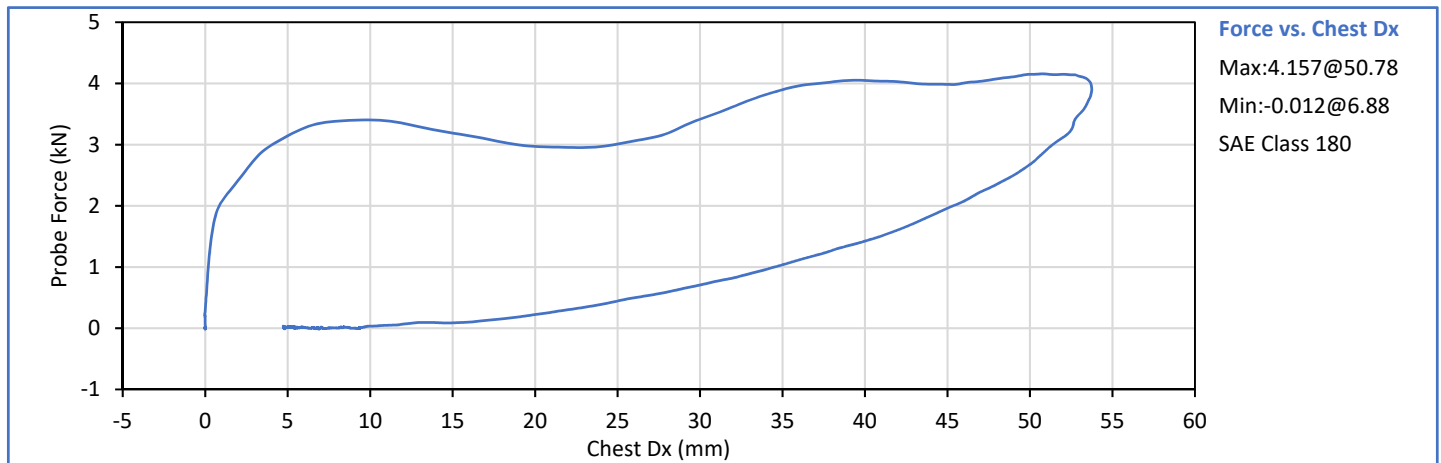
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Thorax Impact

ATD Serial No.: 141

Test Date: 2018-05-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Humidity	%	10	70	34	Pass
Probe Velocity	m/s	6.59	6.83	6.74	Pass
Peak Chest Deflection	mm	50.0	58.0	53.7	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.157	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.157	Pass
Internal Hysterisis	%	69.0	85.0	74.3	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



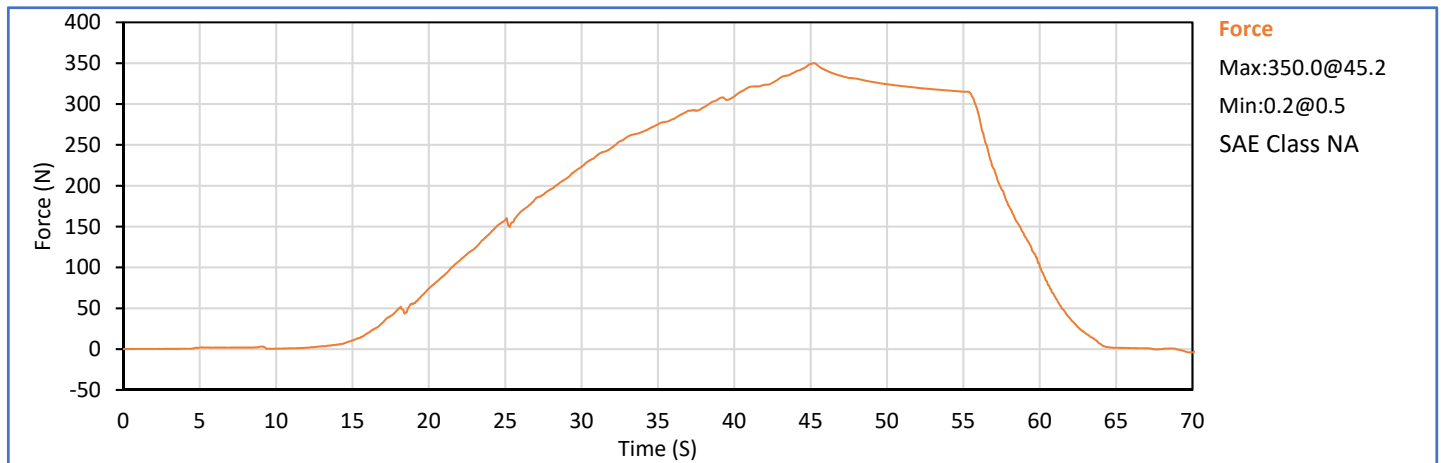
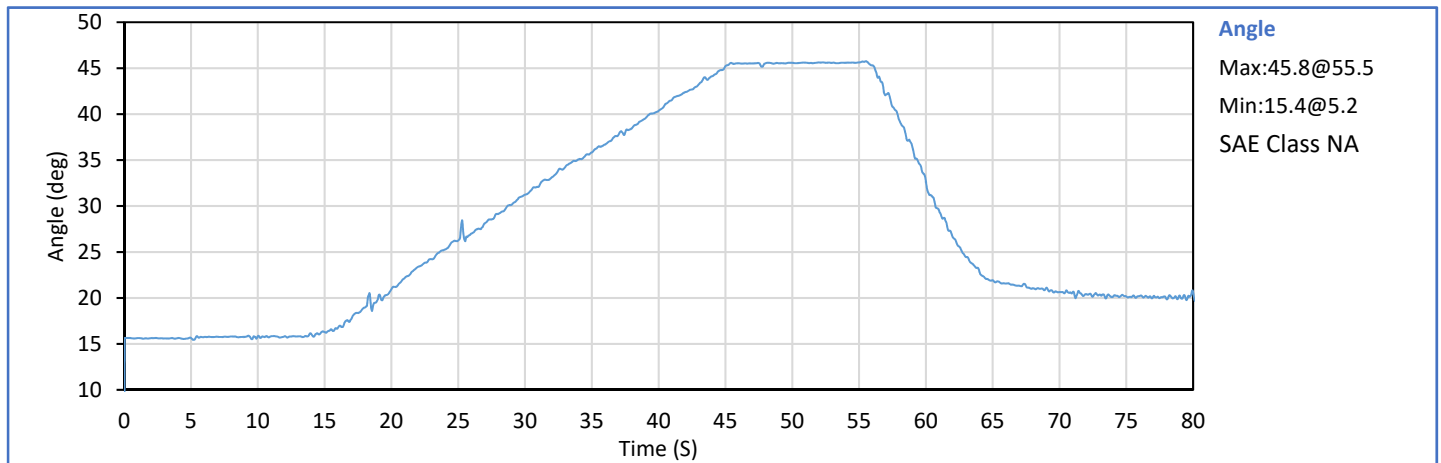
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Torso Flexion Test

ATD Serial No.: 141

Test Date: 2018-04-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Orientation Angle	deg	0.0	20.0	14.2	Pass
Test Initial Angle	deg	11.0	19.0	15.6	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	348.5	Pass
Torso Flexion Rate	deg/s	0.50	1.50	0.97	Pass
Final Reference Plane Angle	deg	-8.0	8.0	3.8	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto



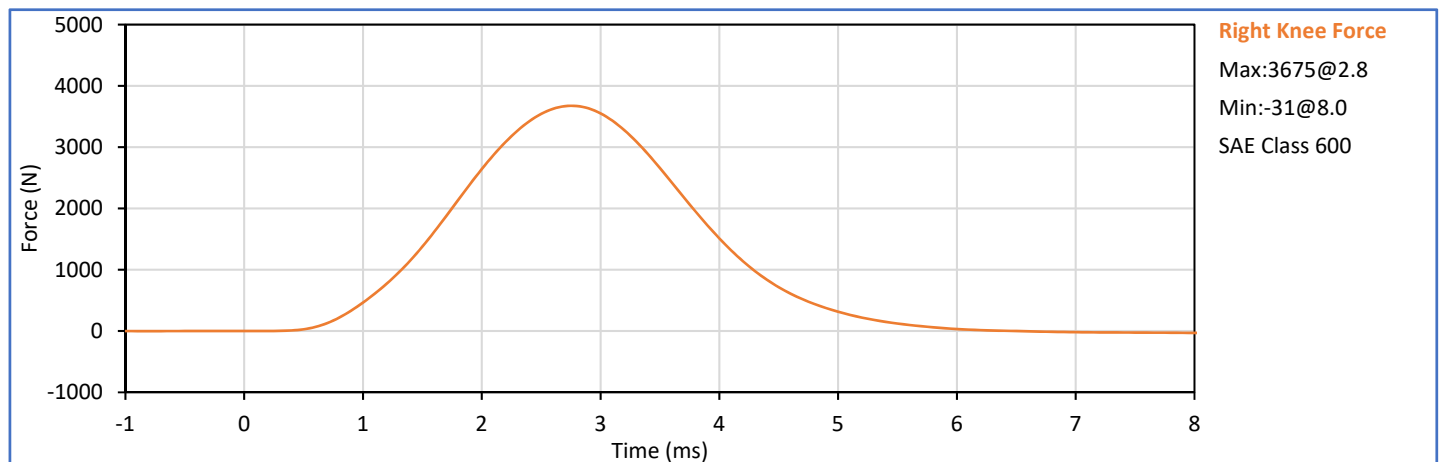
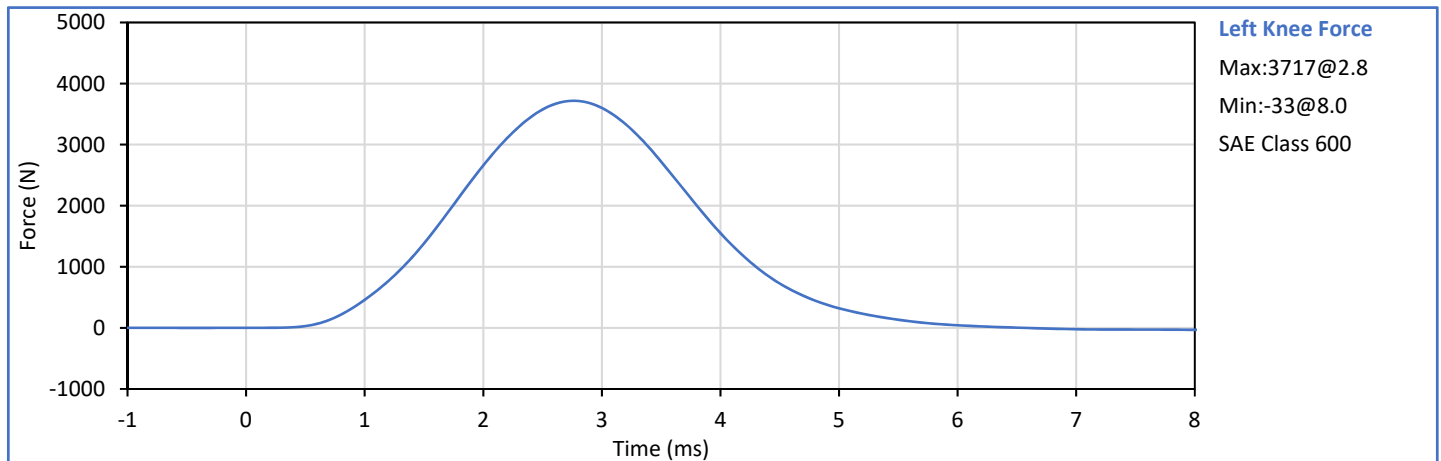
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Knee Impact (Left/Right)

ATD Serial No.: 141

Test Date: 2018-04-04

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	20.3	Pass
	Laboratory Humidity	%	10	70	33	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.130	Pass
Knee	Peak Resistive Force	N	3450	4060	3717	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.130	Pass
Knee	Peak Resistive Force	N	3450	4060	3675	Pass
Overall Test Results						Pass



Technician: T. Lowman

Approved By: P. Puzzuto

APPENDIX C
POST-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA



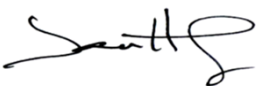
**Hybrid III 50th Percentile Male
ATD Damage Checklist**

ATD Serial No.: 360

Test Date: 2018-05-05

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

Technician: 
J. Hernandez

Approved By: 
P. Puzzuto



Hybrid III 50th Percentile Male
External Measurements

ATD Serial No.: 360

Test Date: 2018-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
A - Total sitting height	mm	879	889	887	Pass
B - Shoulder pivot height	mm	505	521	517	Pass
C - 'H' point height	mm	84	89	87	Pass
D - 'H' point location from backline	mm	135	140	139	Pass
E - Shoulder pivot from backline	mm	84	94	91	Pass
F - Thigh clearance	mm	140	155	151	Pass
G - Back of elbow to wrist pivot	mm	290	305	297	Pass
H - Head back to backline	mm	41	46	46	Pass
I - Shoulder to elbow length	mm	330	345	343	Pass
J - Elbow rest height	mm	190	211	204	Pass
K - Buttock to knee length	mm	579	604	589	Pass
L - Popliteal length	mm	429	455	440	Pass
M - Knee pivot height	mm	485	500	495	Pass
N - Buttock popliteal length	mm	452	477	464	Pass
O - Chest depth without jacket	mm	213	229	220	Pass
P - Foot length	mm	251	267	258	Pass
V - Shoulder breadth	mm	422	437	431	Pass
W - Foot breadth	mm	91	107	103	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	980	Pass
Z - Waist circum.	mm	836	866	851	Pass
AA - Location for chest circum.	mm	429	434	432	Pass
BB - Location for waist circum.	mm	226	231	228	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

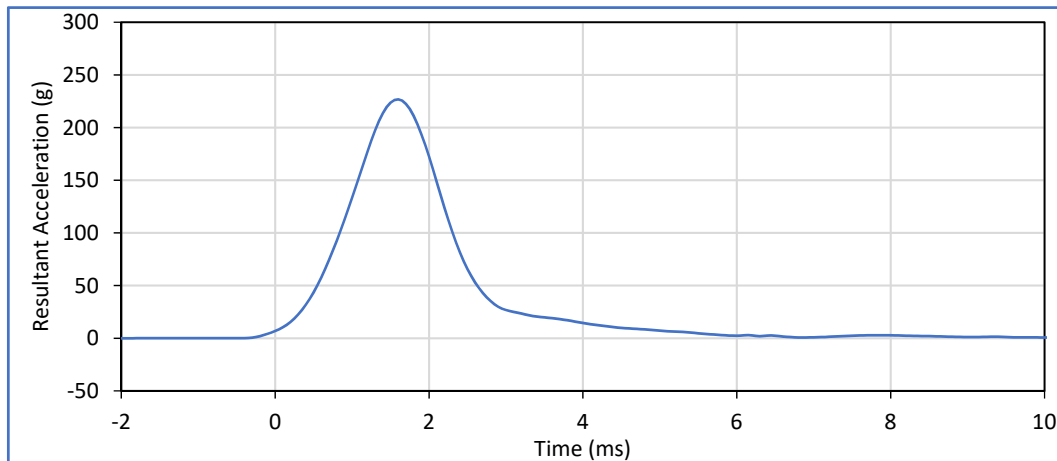


Hybrid III 50th Percentile Male
Head Drop

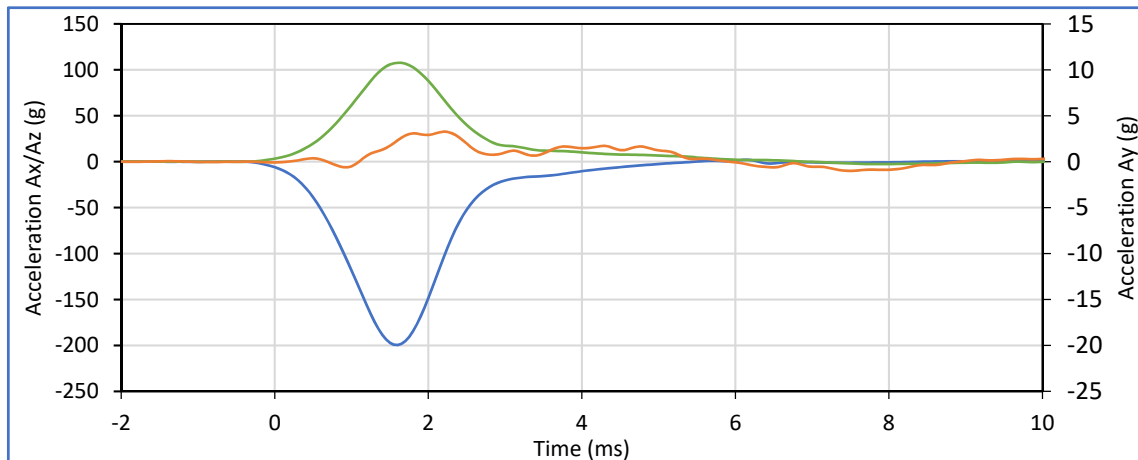
ATD Serial No.: 360

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.8	Pass
Laboratory Humidity	%	10	70	26	Pass
Peak Resultant Acceleration	g	225.0	275.0	226.8	Pass
Peak Lateral Acceleration	g	-15.0	15.0	3.3	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:226.8@1.6
Min:0.7@10.0
SAE Class 1000



Head Ax
Max:2.2@6.2
Min:-199.5@1.6
SAE Class 1000
Head Ay
Max:3.3@2.2
Min:-1.0@7.5
SAE Class 1000
Head Az
Max:107.8@1.6
Min:-2.6@7.9
SAE Class 1000

Technician:

T. Lowman

Approved By:

P. Puzzuto

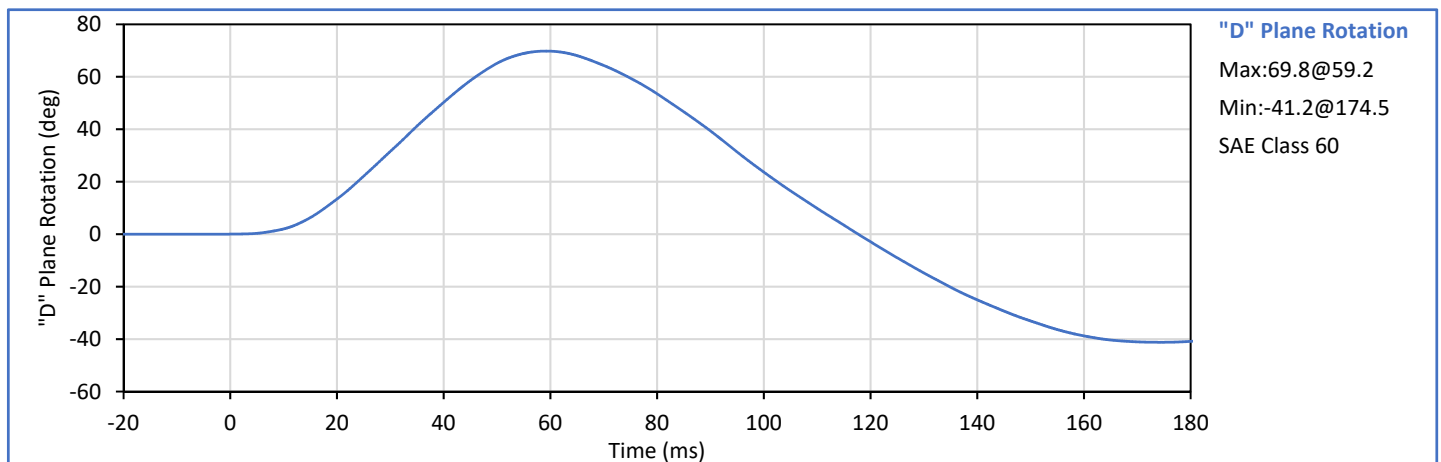
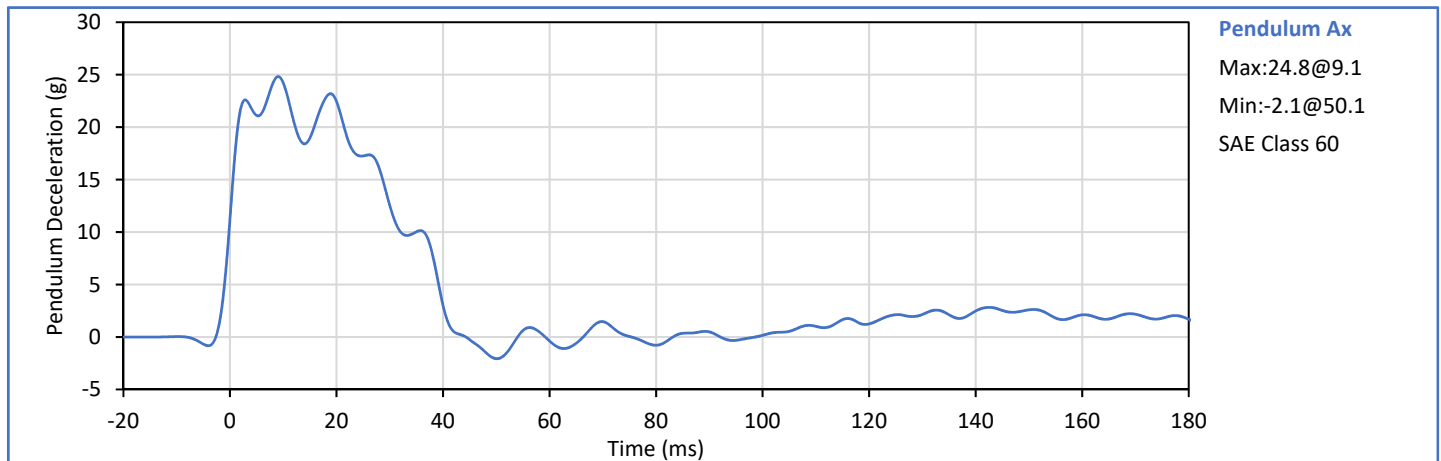


**Hybrid III 50th Percentile Male
Neck Flexion Test**

ATD Serial No.: 360

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	6.89	7.13	6.94	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	24.2	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	22.4	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	12.5	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	12.5	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	39.2	Pass
"D" Plane Rotation peak	deg	64.0	78.0	69.8	Pass
	ms	57.0	64.0	59.2	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	117.7	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	93.1	Pass
	ms	47.0	58.0	54.9	Pass
Moment Decay, Peak to Zero	deg	97.0	107.0	98.3	Pass
Overall Test Results					Pass



Technician: J. Hernandez

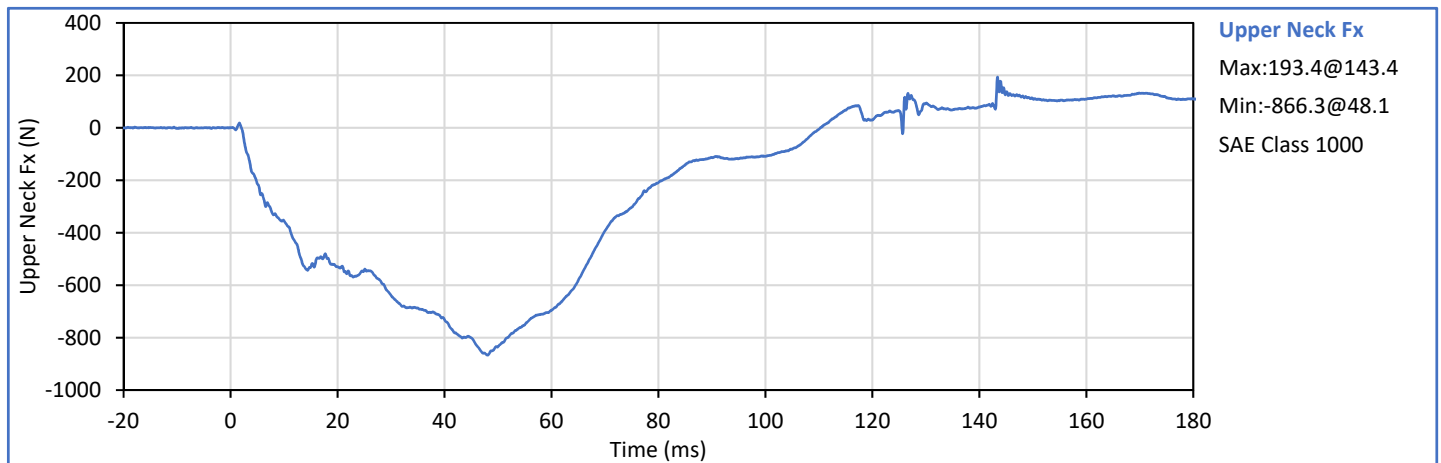
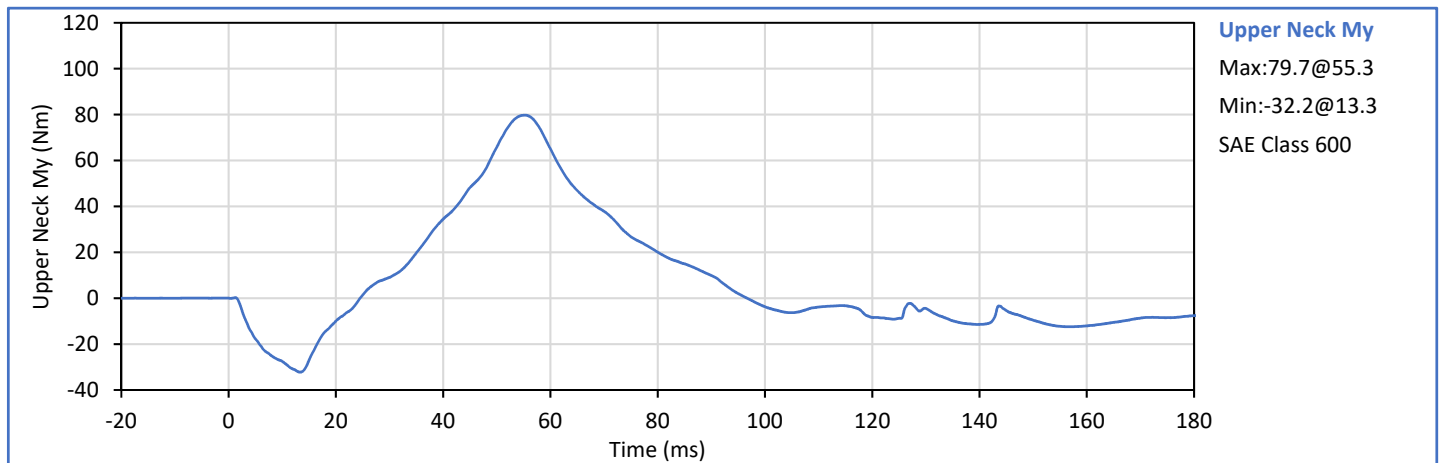
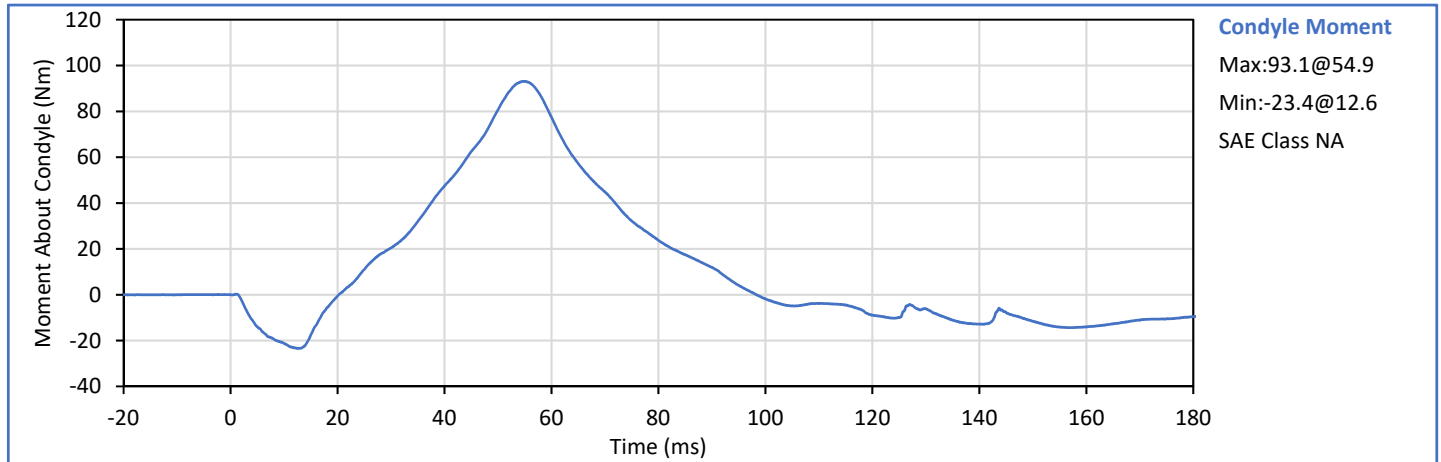
Approved By: P. Puzzuto



Hybrid III 50th Percentile Male Neck Flexion Test

ATD Serial No.: 360

Test Date: 2018-05-07



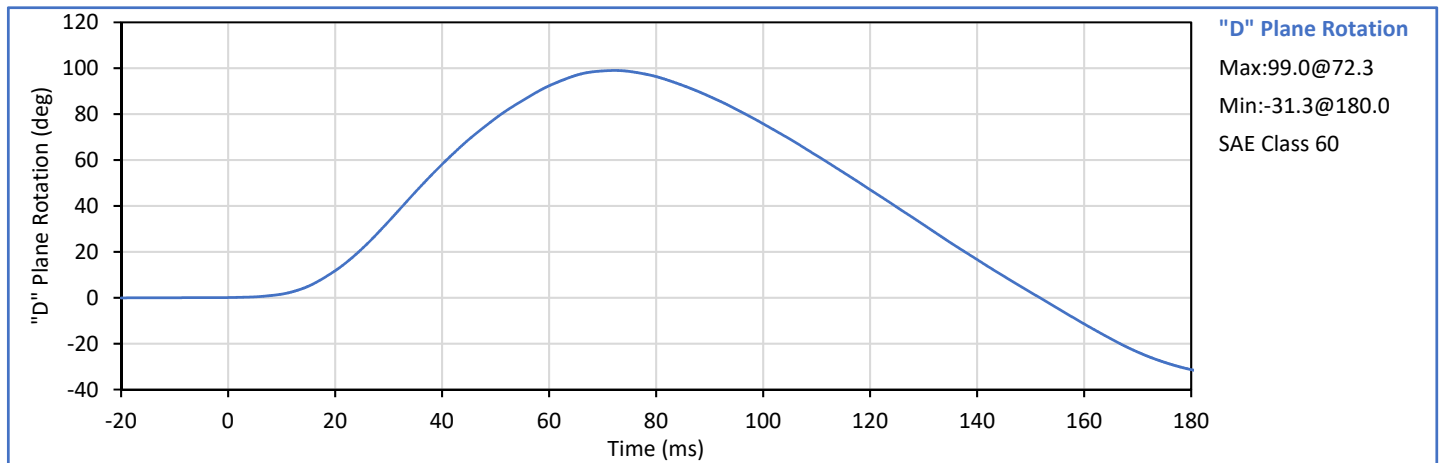
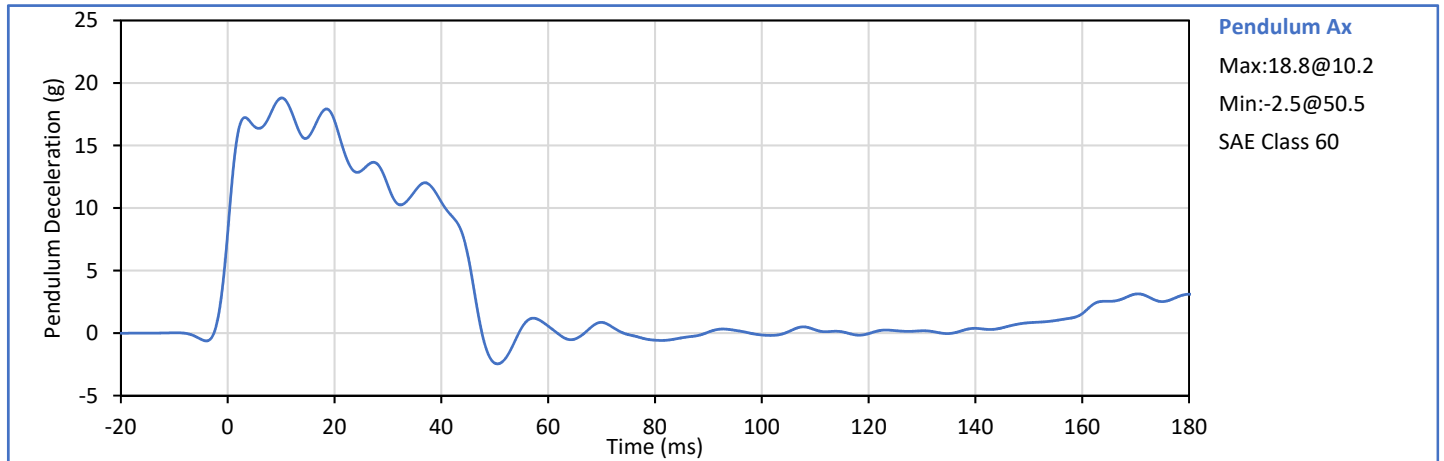


**Hybrid III 50th Percentile Male
 Neck Extension Test**

ATD Serial No.: 360

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	5.94	6.19	5.99	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	18.8	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	17.0	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	11.8	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	12.0	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	45.5	Pass
"D" Plane Rotation peak	deg	81.0	106.0	99.0	Pass
	ms	72.0	82.0	72.3	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	151.8	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-74.2	Pass
	ms	65.0	79.0	65.9	Pass
Moment Decay, Peak to Zero	deg	120.0	148.0	132.9	Pass
Overall Test Results					Pass



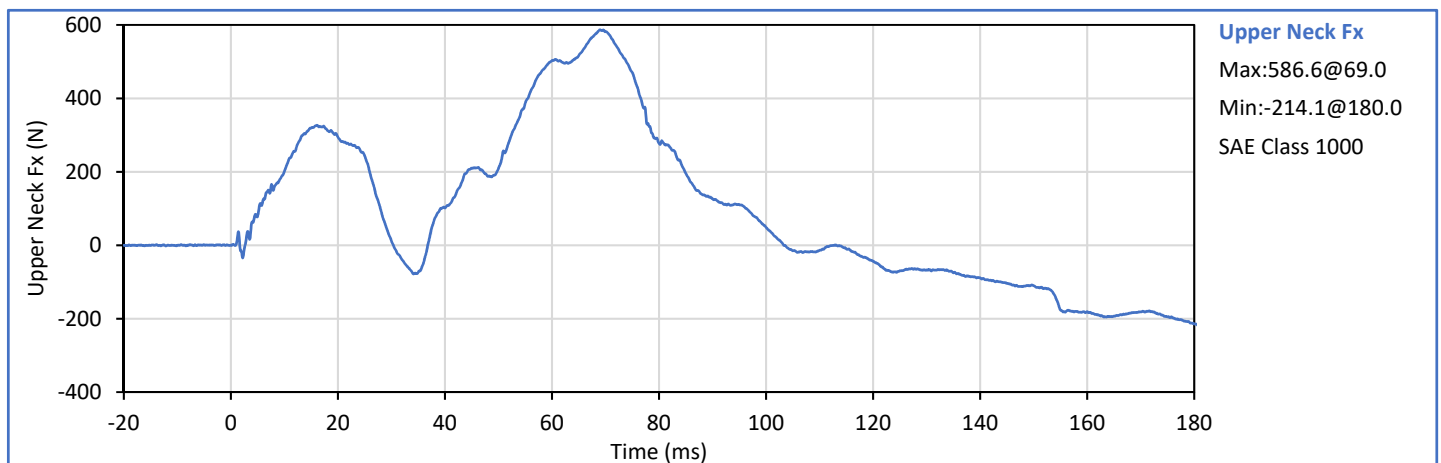
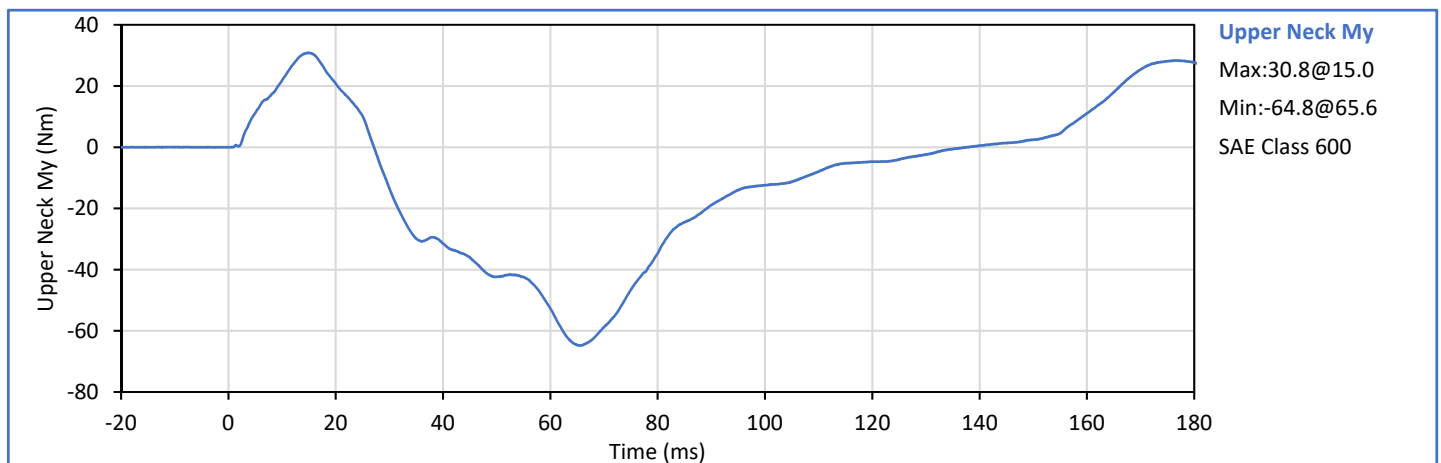
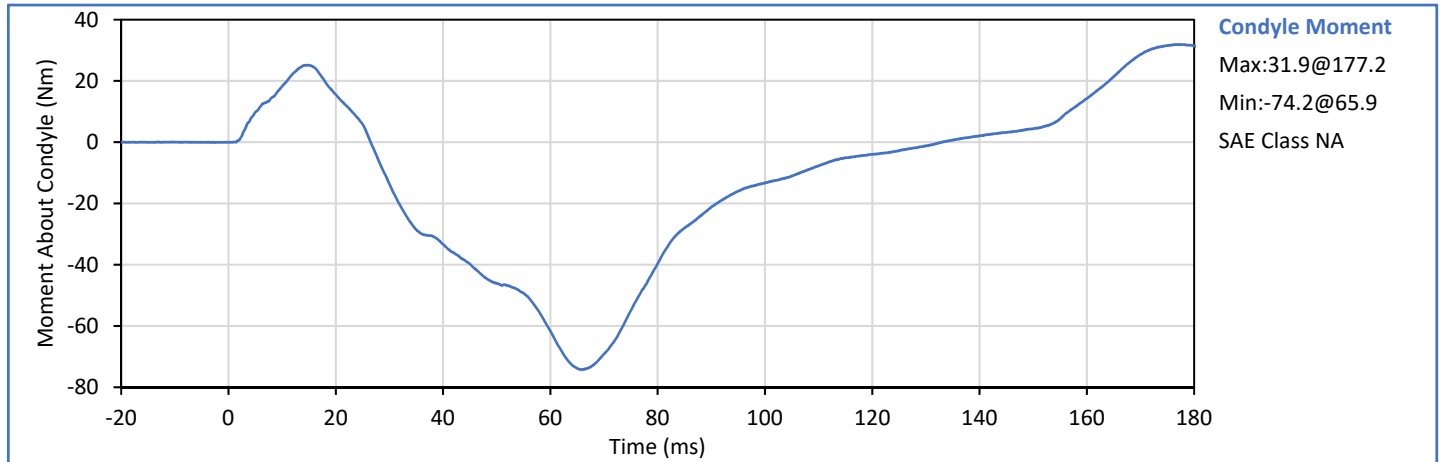
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-05-07





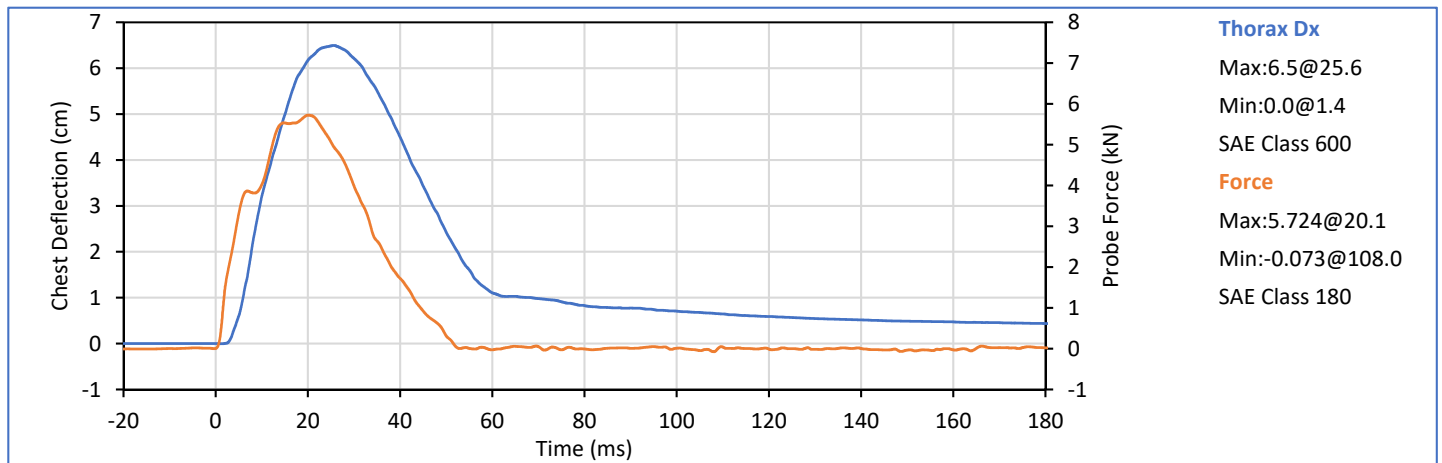
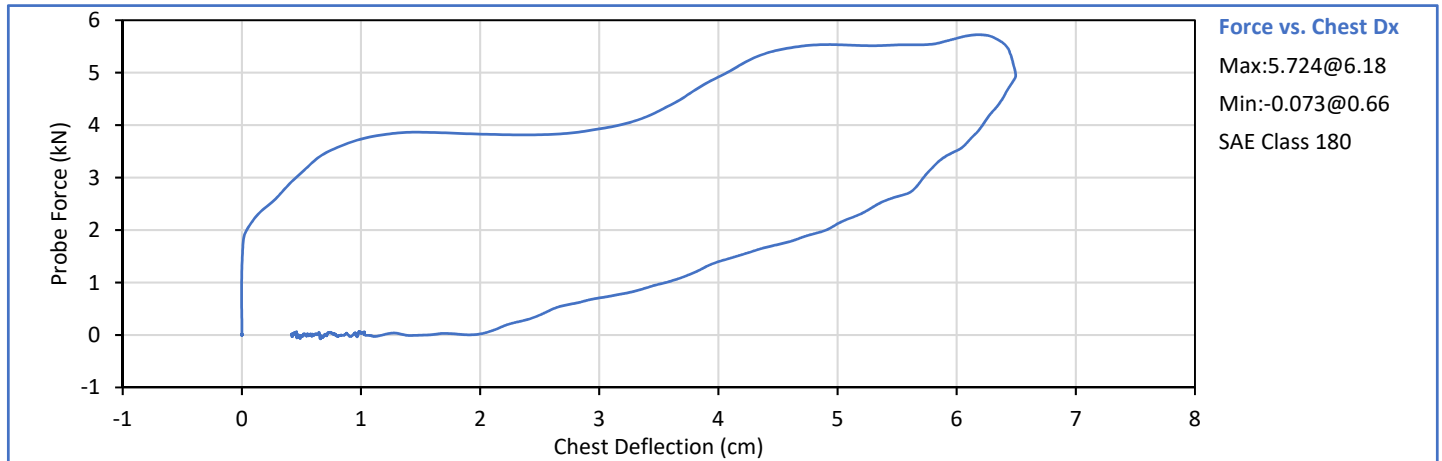
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Thorax Impact

ATD Serial No.: 360

Test Date: 2018-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Probe Velocity	m/s	6.58	6.82	6.62	Pass
Peak Chest Deflection	cm	6.35	7.26	6.50	Pass
Peak Probe Force	kN	5.159	5.893	5.724	Pass
Internal Hysteresis	%	69.0	85.0	72.5	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



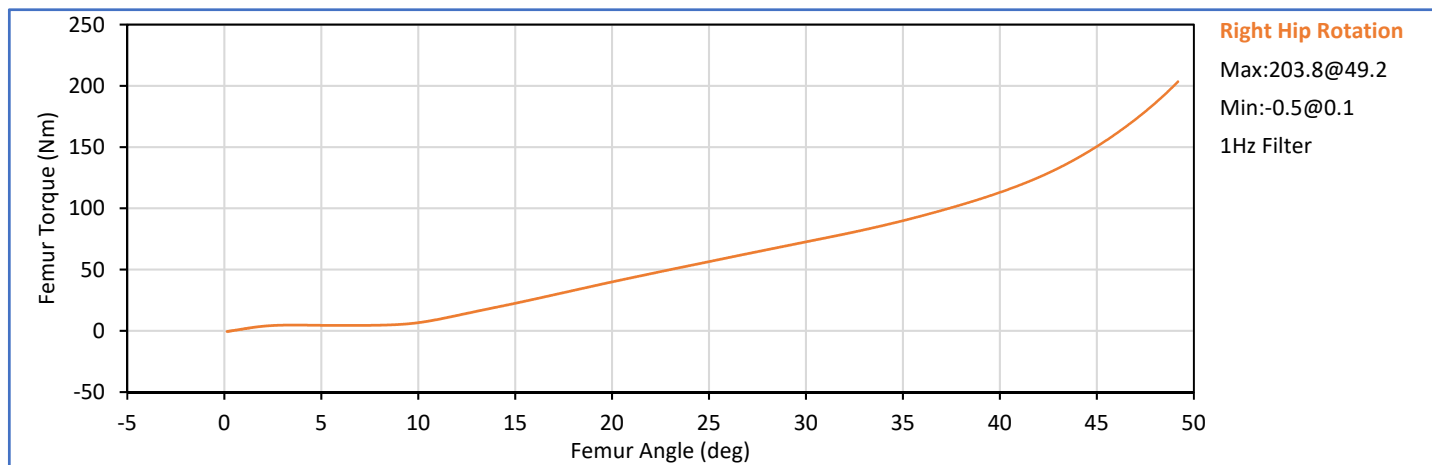
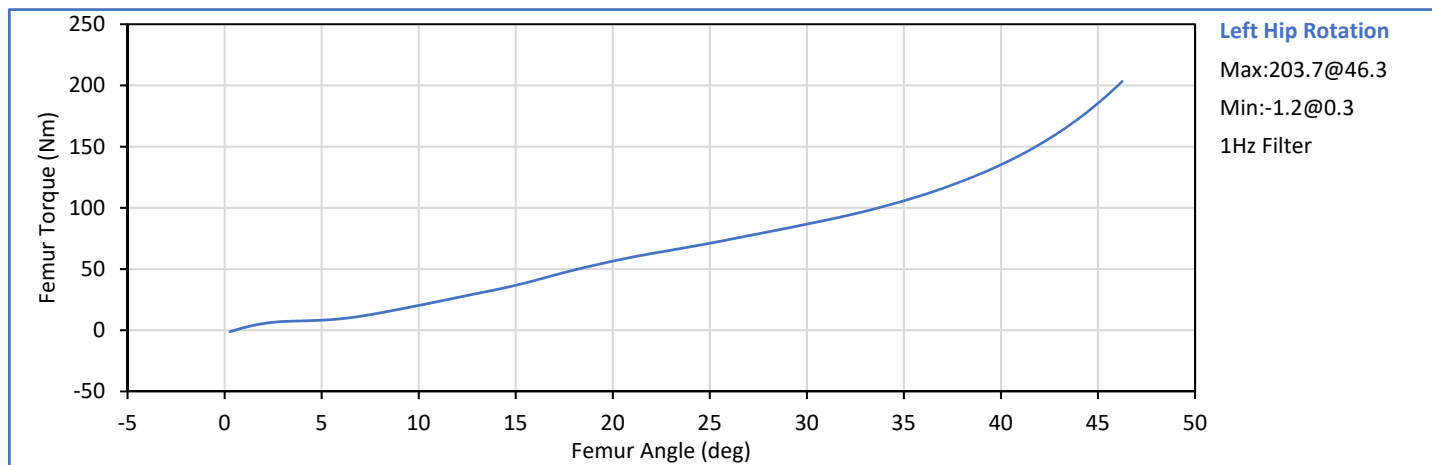
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Hip Flexion (Left/Right)

ATD Serial No.: 360

Test Date: 2018-05-08

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.1	Pass
	Laboratory Humidity	%	10	70	25	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.7	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	86.8	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	46.2	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	72.7	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	49.2	Pass
Overall Test Results						Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



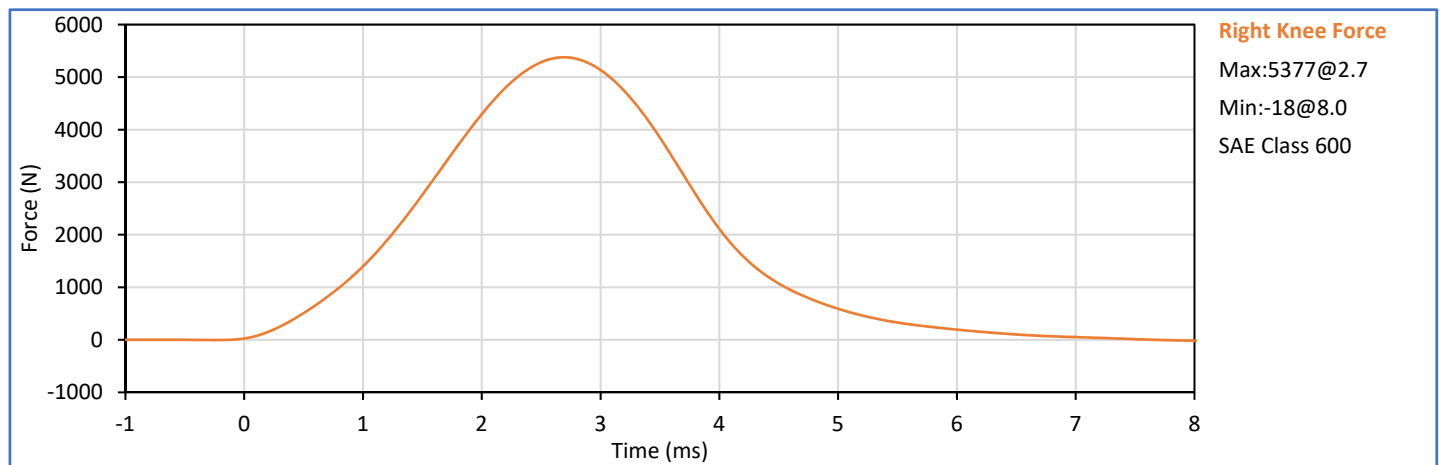
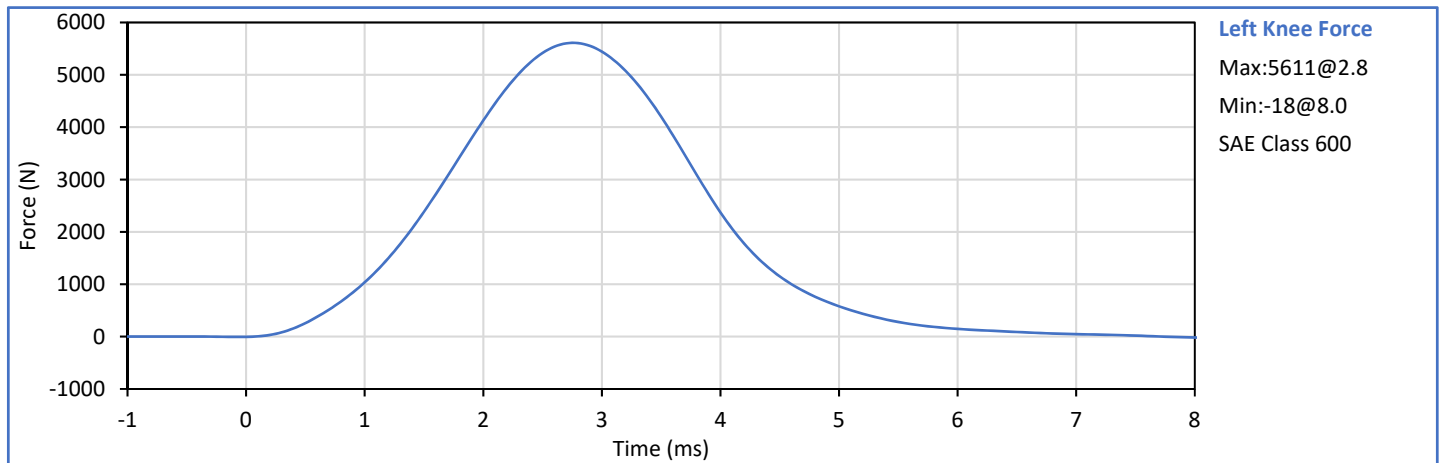
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 50th Percentile Male Knee Impact (Left/Right)

ATD Serial No.: 360

Test Date: 2018-05-07

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	20.7	Pass
	Laboratory Humidity	%	10	70	26	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.109	Pass
Knee	Peak Resistive Force	N	4715	5782	5611	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.112	Pass
Knee	Peak Resistive Force	N	4715	5782	5377	Pass
Overall Test Results						Pass



Technician: T. Lowman

Approved By: P. Puzzuto



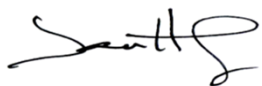
Hybrid III 5th Percentile Female Damage Checklist

ATD Serial No.: 141

Test Date: 2018-05-04

Dummy Item	Inspect for	Comments	Damage	Okay
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ.	Bent shaft			✓
Assembly	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

Technician: 
J. Hernandez

Approved By: 
P. Puzzuto



**Hybrid III 5th Percentile Female
External Measurements**

ATD Serial No.: 141

Test Date: 2018-05-04

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
A - Total sitting height	mm	775	800	787	Pass
B - Shoulder pivot height	mm	432	457	455	Pass
C - 'H' point height	mm	81	86	85	Pass
D - 'H' point location from backline	mm	145	150	147	Pass
E - Shoulder pivot from backline	mm	69	84	75	Pass
F - Thigh clearance	mm	119	135	129	Pass
G - Back of elbow to wrist pivot	mm	244	259	254	Pass
H - Head back to backline	mm	41	46	42	Pass
I - Shoulder to elbow length	mm	277	297	292	Pass
J - Elbow rest height	mm	183	203	191	Pass
K - Buttock to knee length	mm	521	546	529	Pass
L - Popliteal length	mm	356	376	368	Pass
M - Knee pivot height	mm	394	419	412	Pass
N - Buttock popliteal length	mm	414	439	432	Pass
O - Chest depth without jacket	mm	175	191	185	Pass
P - Foot length	mm	219	234	228	Pass
R - Buttock to Knee Pivot Length	mm	457	483	472	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	186	Pass
U - Hip Breadth	mm	300	315	307	Pass
V - Shoulder breadth	mm	351	366	362	Pass
W - Foot breadth	mm	79	94	86	Pass
X - Head circum.	mm	528	549	534	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	859	Pass
Z - Waist circum.	mm	760	790	782	Pass
AA - Location for chest circum.	mm	333	358	341	Pass
BB - Location for waist circum.	mm	160	170	169	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



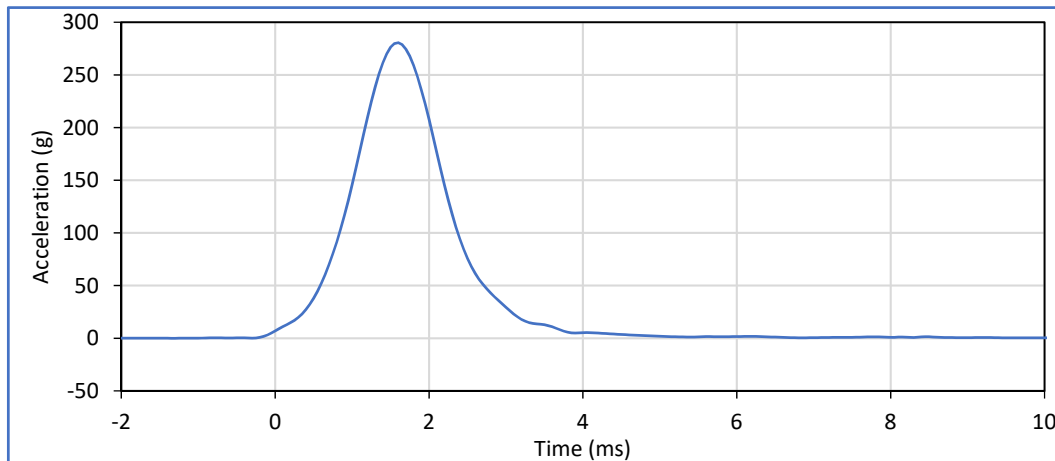
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Head Drop

ATD Serial No.: 141

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.8	Pass
Laboratory Humidity	%	10	70	26	Pass
Peak Resultant Acceleration	g	250.0	300.0	280.6	Pass
Peak Lateral Acceleration	g	-15.0	15.0	10.5	Pass
Oscillations After Main Pulse	%	0.0	10.0	0.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	

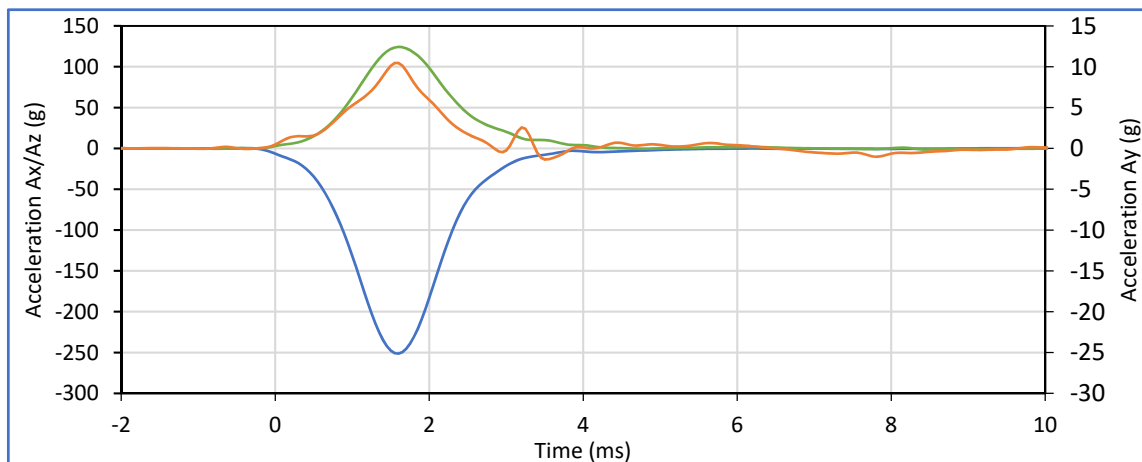


Head Resultant

Max:280.6@1.6

Min:0.4@9.7

SAE Class 1000



Head Ax

Max:0.3@10.0

Min:-251.3@1.6

SAE Class 1000

Head Ay

Max:10.5@1.6

Min:-1.4@3.5

SAE Class 1000

Head Az

Max:124.3@1.6

Min:-1.4@8.5

SAE Class 1000

Technician: T. Lowman

T. Lowman

Approved By: P. Puzzuto

P. Puzzuto



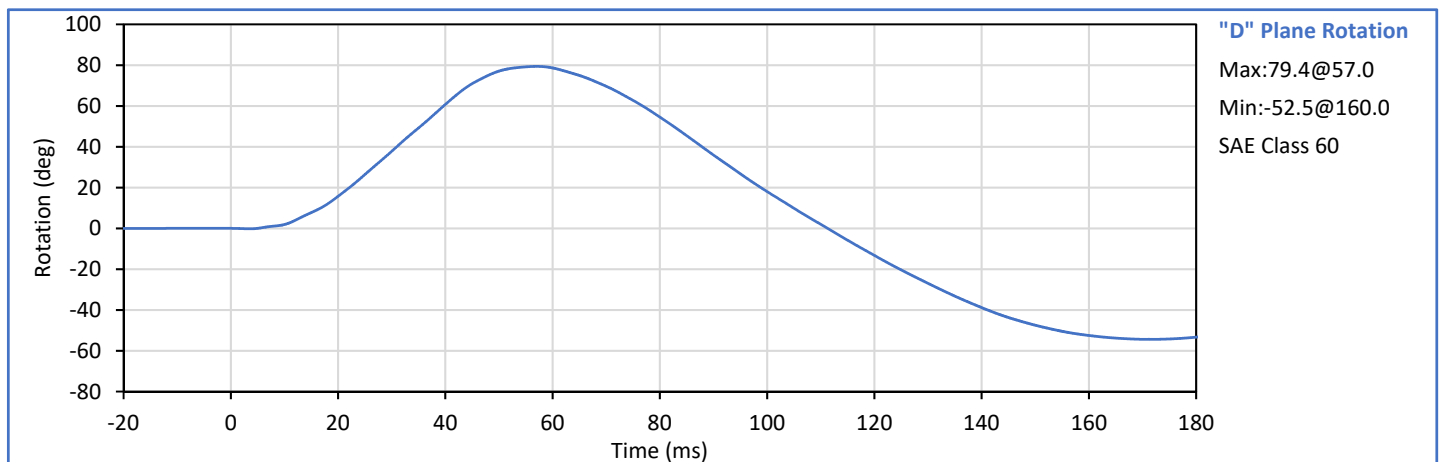
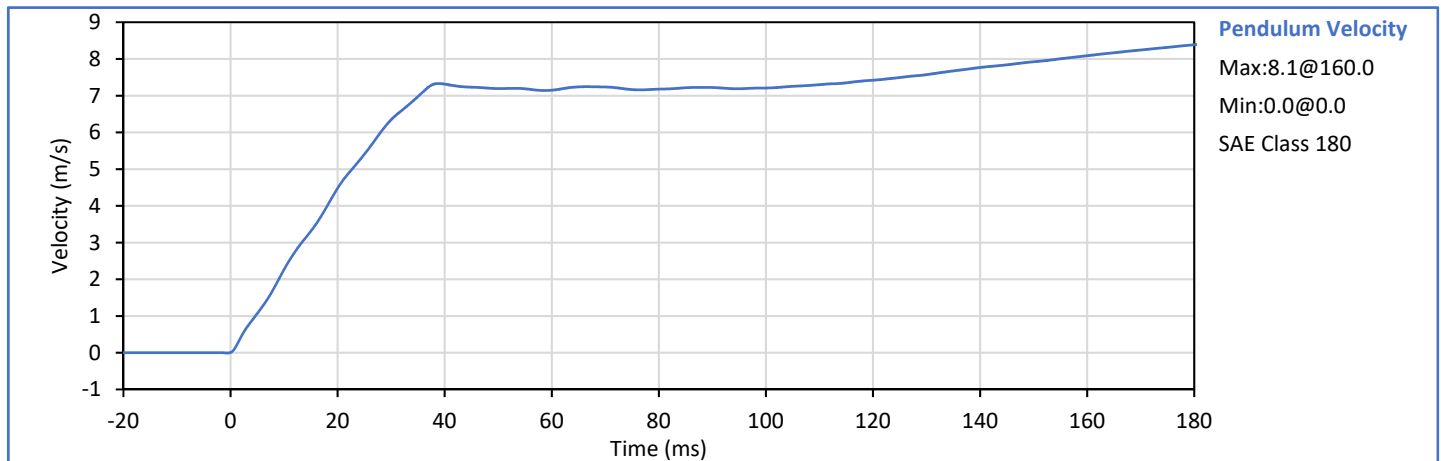
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Neck Flexion Test

ATD Serial No.: 141

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	6.89	7.13	7.06	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.27	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.48	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.34	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	79.4	Pass
Peak Moment in Rotation	Nm	69.0	83.0	80.6	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	83.5	Pass
Overall Test Results				Pass	

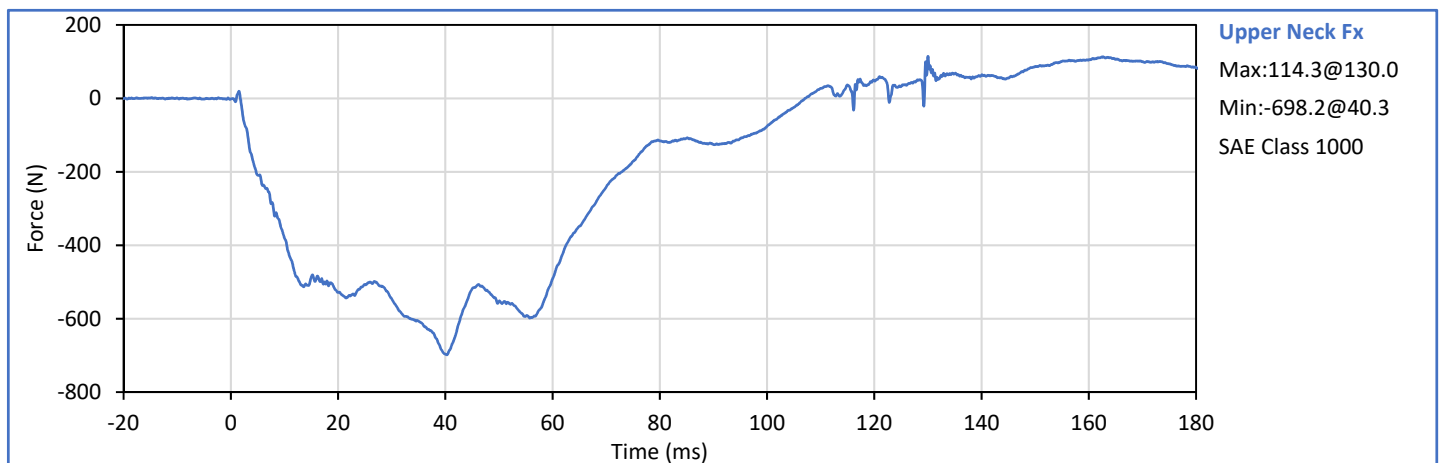
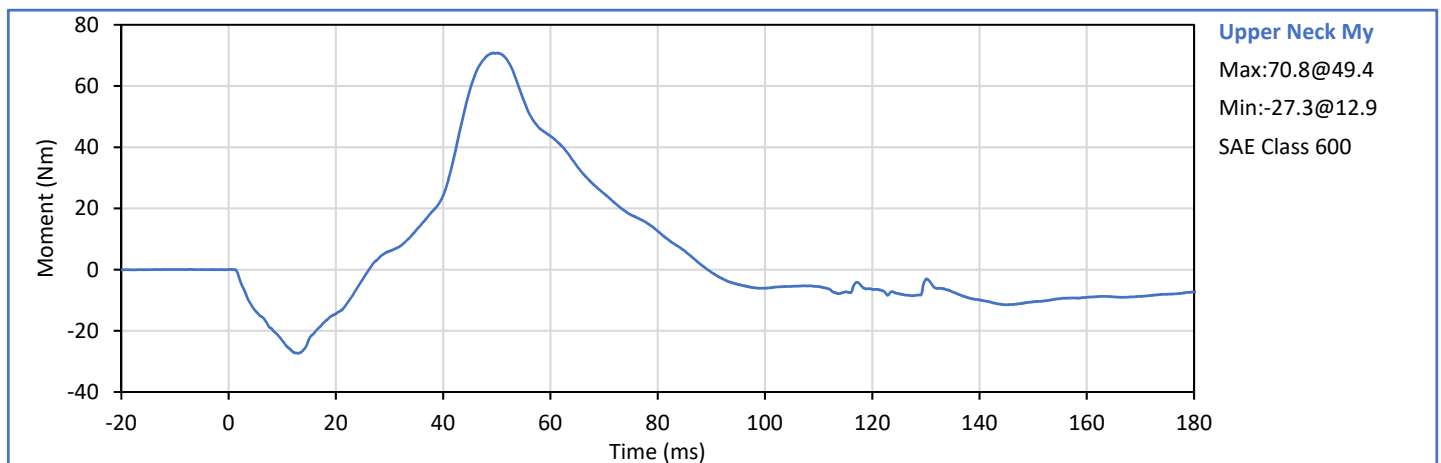
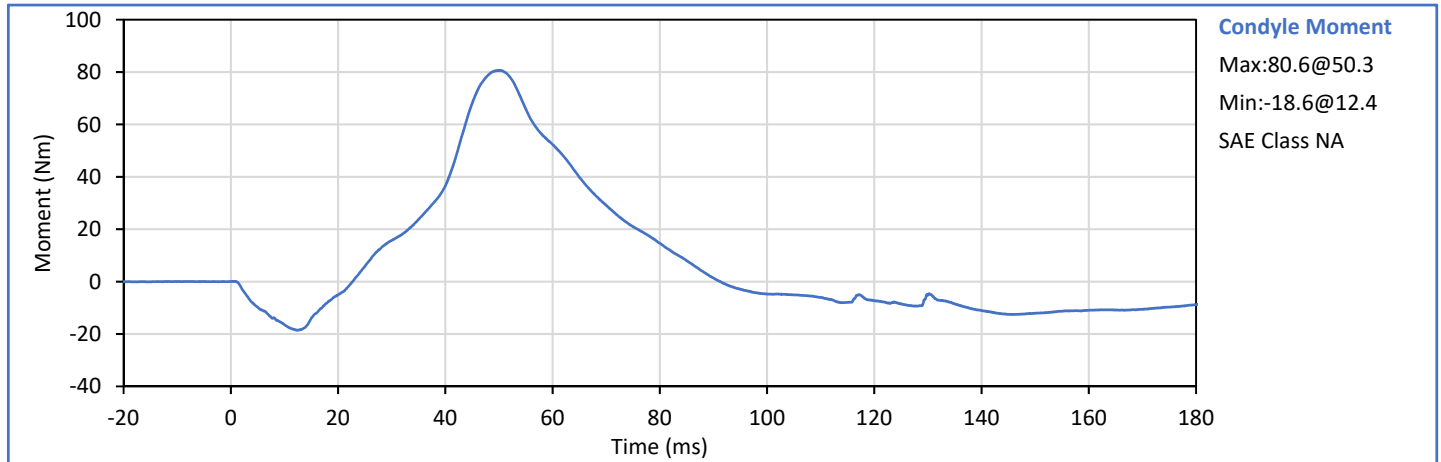


Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 141

Test Date: 2018-05-07



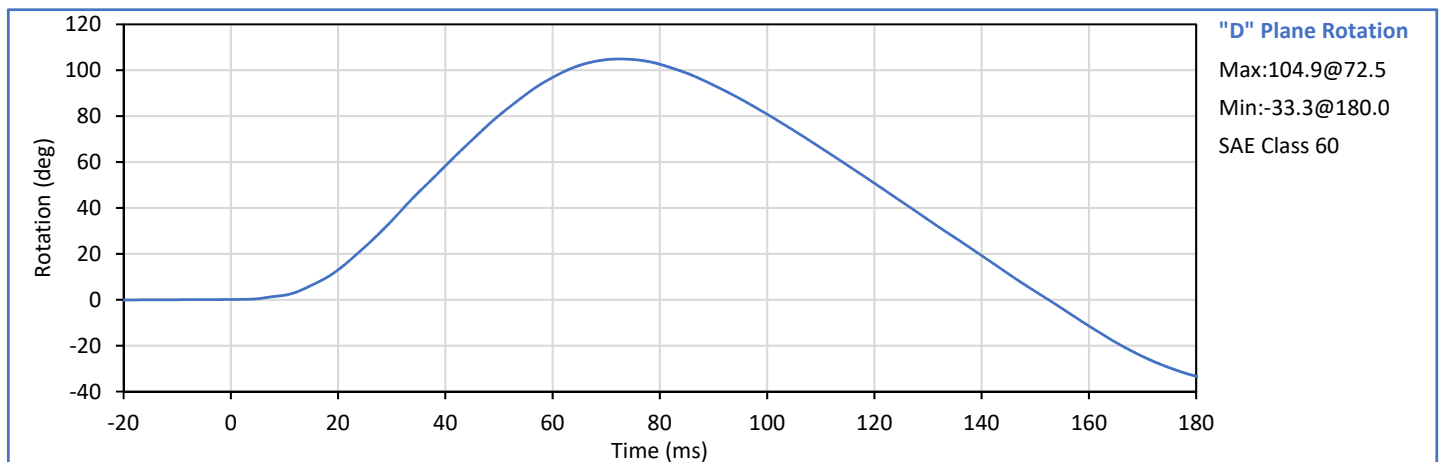
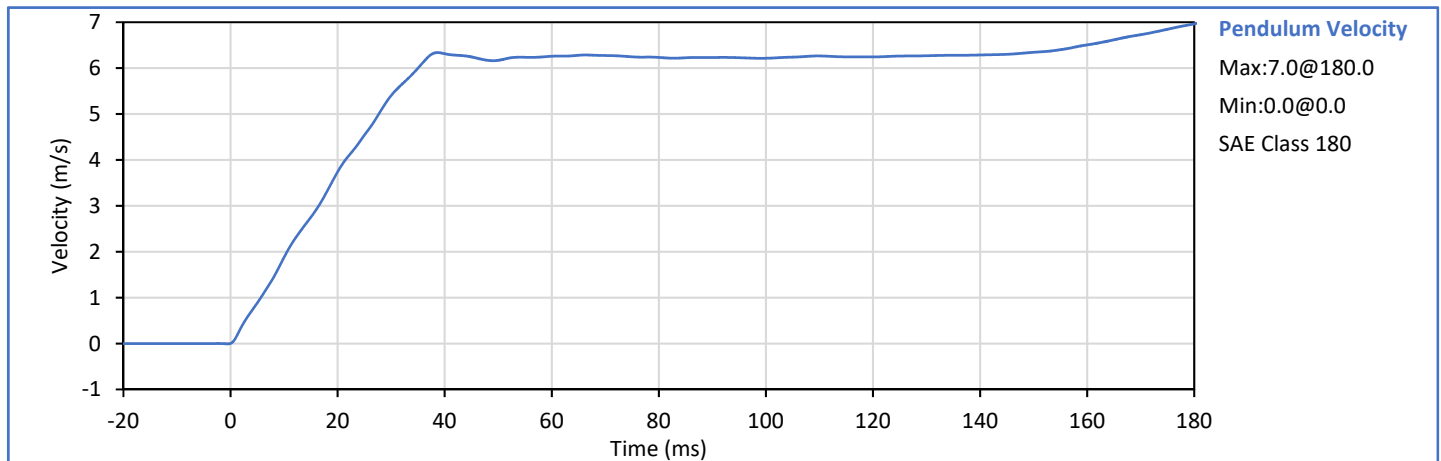


**Hybrid III 5th Percentile Female
Neck Extension Test**

ATD Serial No.: 141

Test Date: 2018-05-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	5.95	6.19	6.15	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.88	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.74	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.40	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	104.9	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-54.7	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	99.9	Pass
Overall Test Results				Pass	Pass



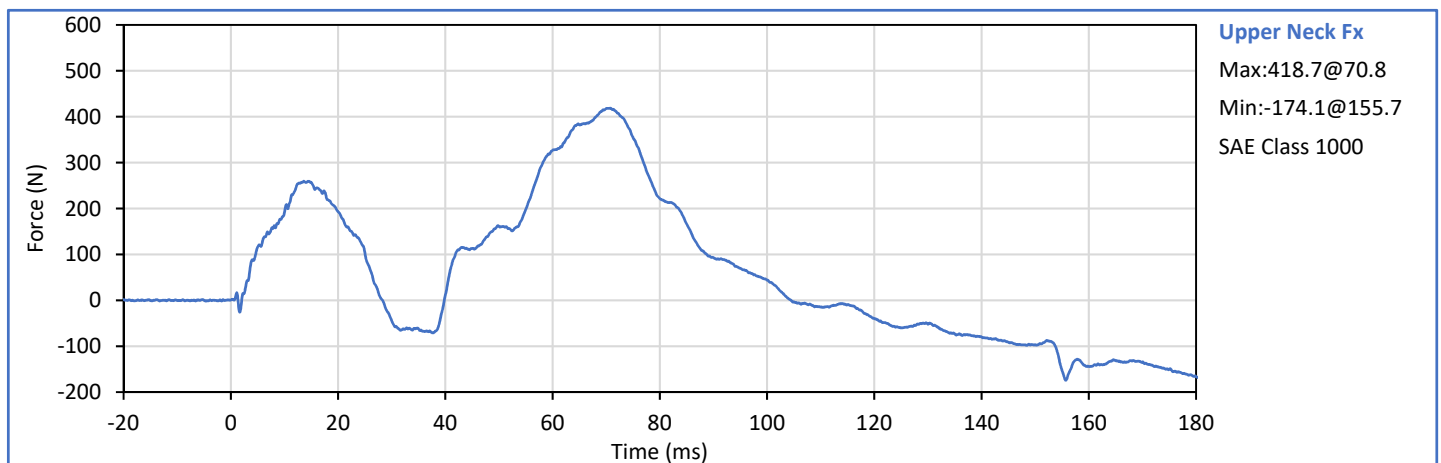
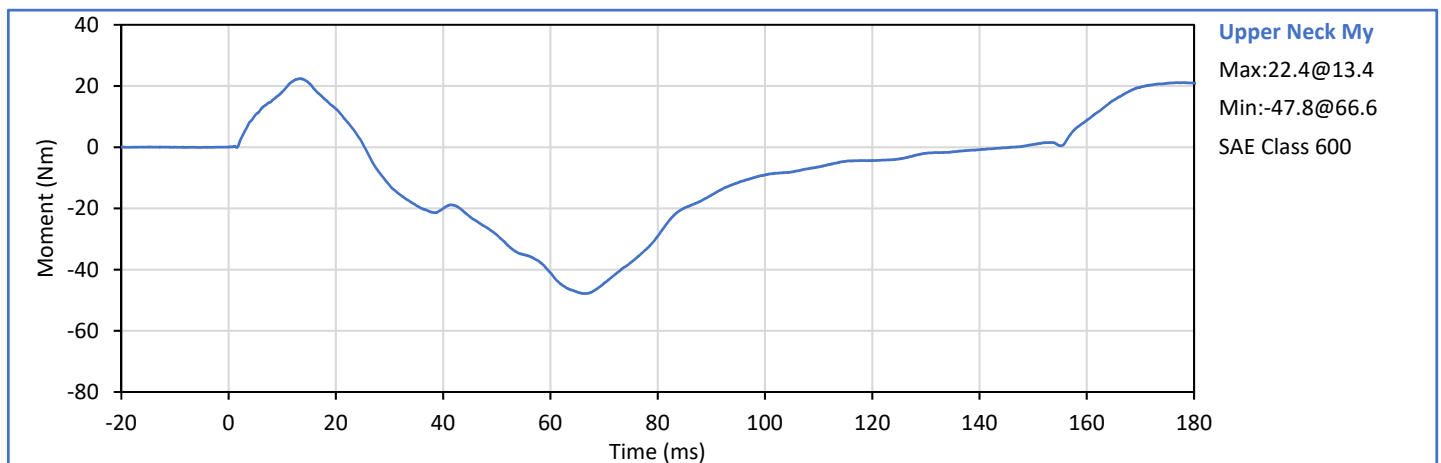
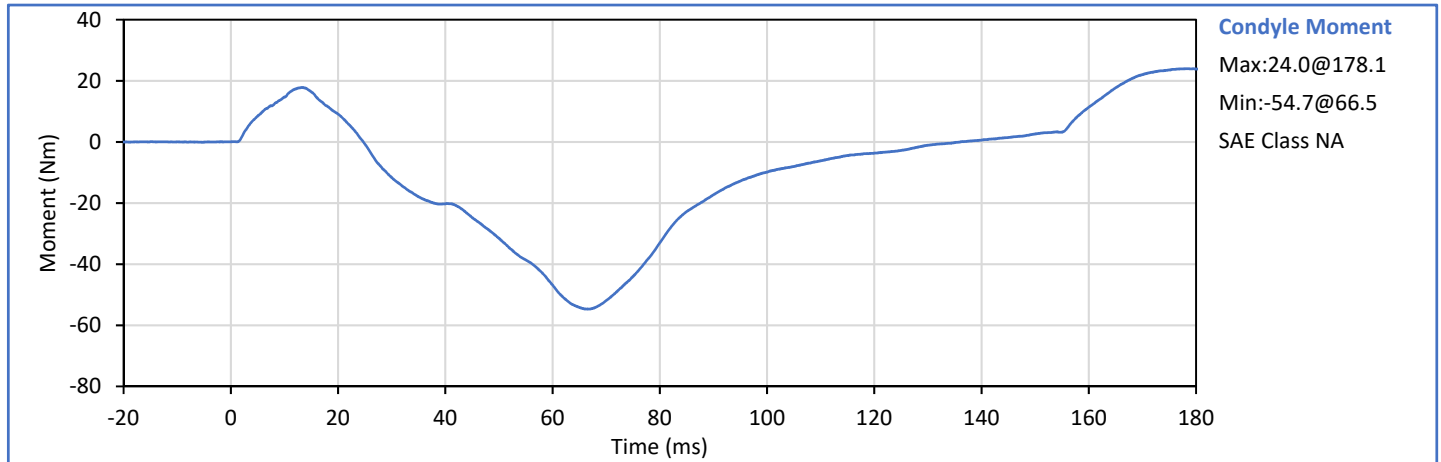
Technician: J. Hernandez

Approved By: P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-05-07





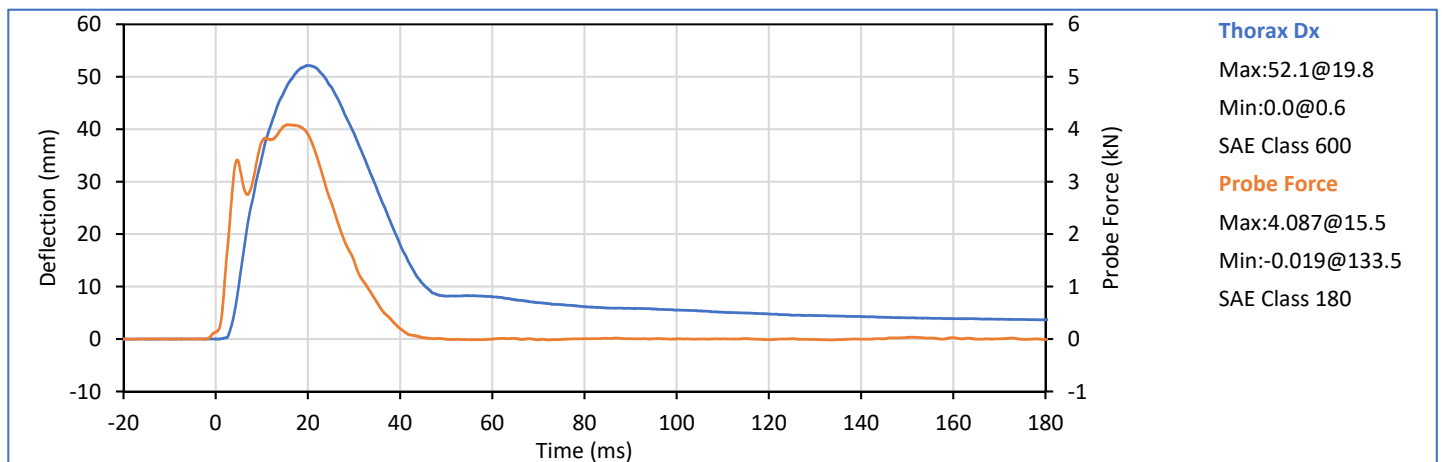
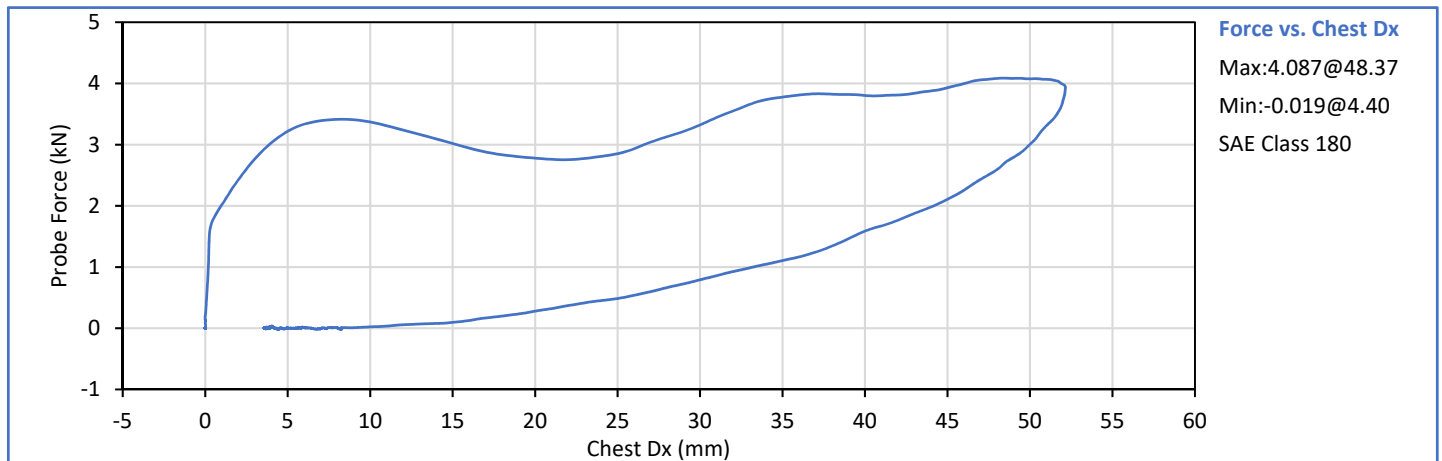
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Thorax Impact

ATD Serial No.: 141

Test Date: 2018-05-06

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	20	Pass
Probe Velocity	m/s	6.59	6.83	6.65	Pass
Peak Chest Deflection	mm	50.0	58.0	52.1	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.087	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.087	Pass
Internal Hysteresis	%	69.0	85.0	73.2	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



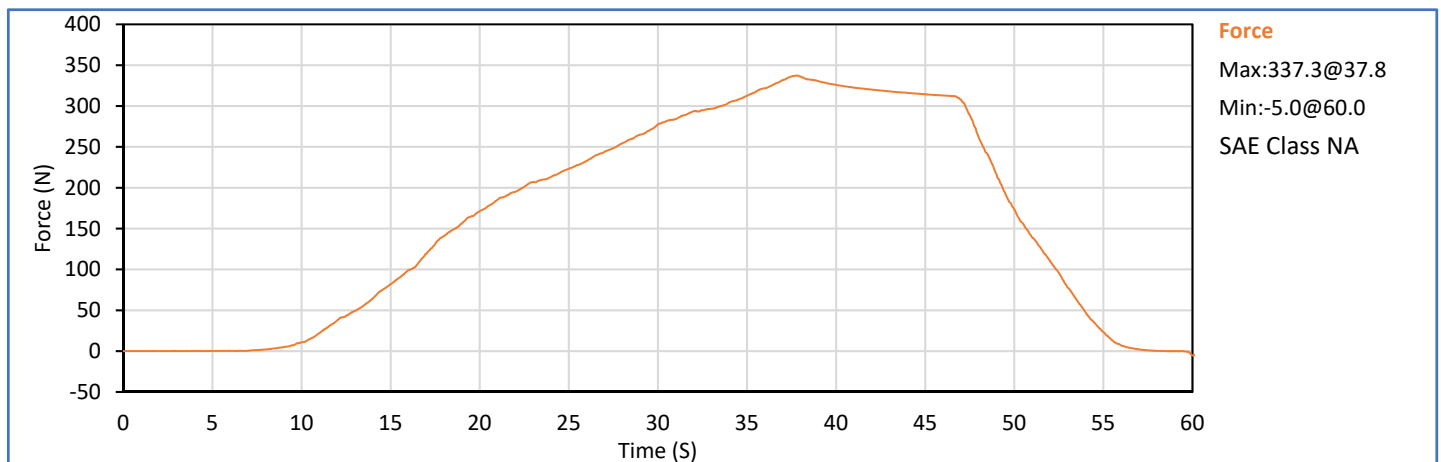
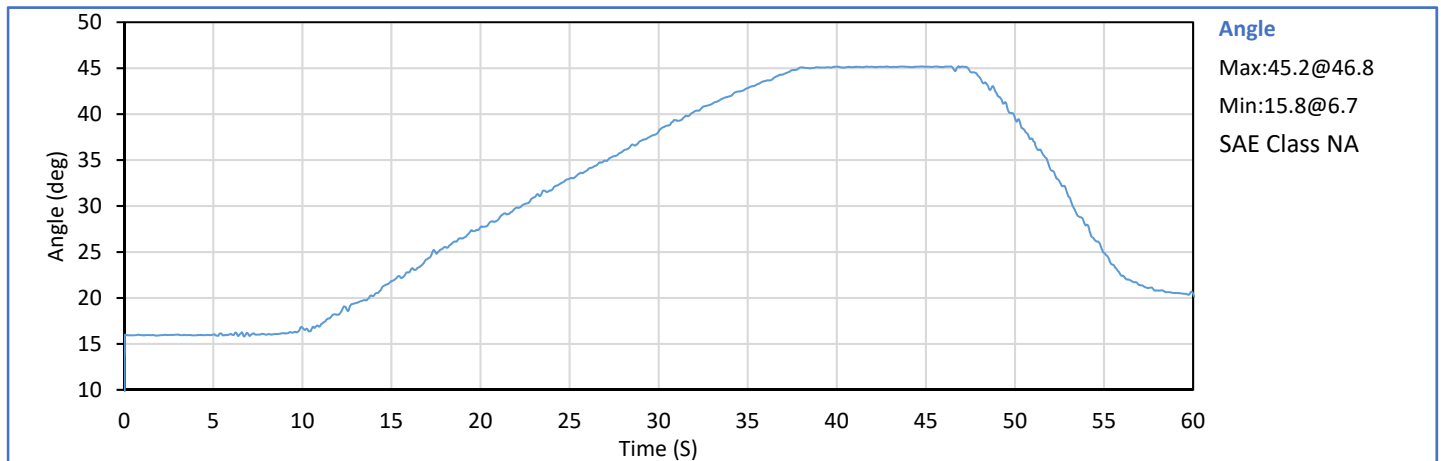
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Torso Flexion Test

ATD Serial No.: 141

Test Date: 2018-05-08

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	25	Pass
Orientation Angle	deg	0.0	20.0	14.5	Pass
Test Initial Angle	deg	11.0	19.0	16.0	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	337.3	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.03	Pass
Final Reference Plane Angle	deg	-8.0	8.0	2.5	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto



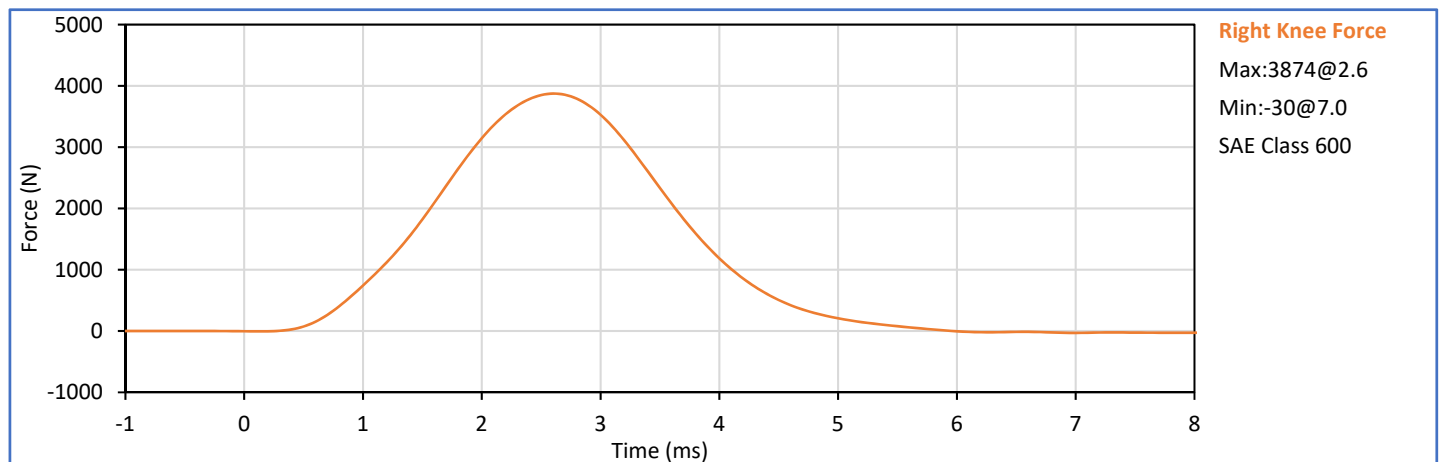
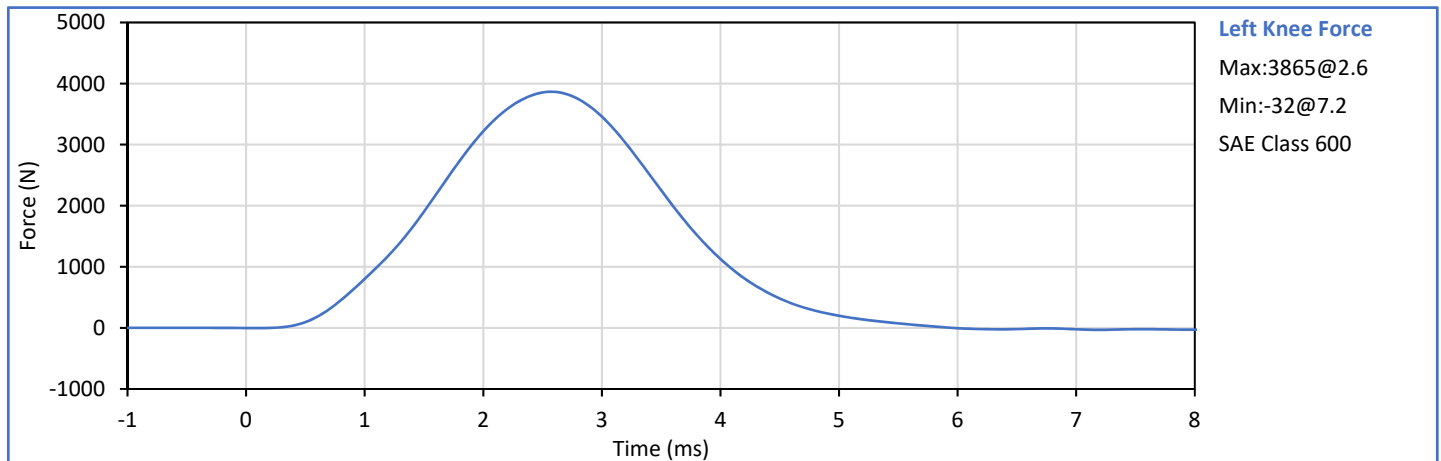
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

Hybrid III 5th Percentile Female Knee Impact (Left/Right)

ATD Serial No.: 141

Test Date: 2018-05-04

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.1	Pass
	Laboratory Humidity	%	10	70	30	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.120	Pass
Knee	Peak Resistive Force	N	3450	4060	3865	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.122	Pass
Knee	Peak Resistive Force	N	3450	4060	3874	Pass
Overall Test Results					Pass	



Technician: T. Lowman

Approved By: P. Puzzuto