

REPORT NUMBER: NCAP-KAR-19-022

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

TESLA INC.

2019 TESLA MODEL 3 LONG RANGE AWD 4-DOOR SEDAN

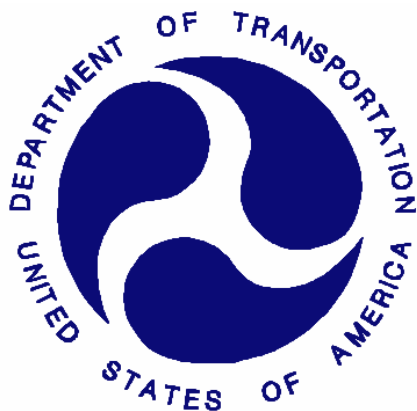
NHTSA NUMBER: O20195000

PREPARED BY:

APPLUS IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301



MAY 14, 2019


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**

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Approval Date: May 14, 2019

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NHTSA, Office of Crashworthiness Standards

Date: _____

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract <p>A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2019 Tesla Model 3 Long Range AWD 4-door sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on April 30, 2019.</p> <p>The impact velocity of the vehicle was 56.48 km/h and the ambient temperature at the barrier face at the time of impact was 21.7°C. The target vehicle's post-test maximum crush was 475 mm at DPD4 to the right of the vehicle's centerline. The test vehicle's performance is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <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>149.5</td> <td>700</td> <td>238.9</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-20</td> <td>52</td> <td>-12</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.26</td> <td>1</td> <td>0.32</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>795.8</td> <td>2620</td> <td>831.1</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-292.4</td> <td>2520</td> <td>-328.0</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-1618.7</td> <td>6800</td> <td>-176.1</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-2659.7</td> <td>6800</td> <td>-193.0</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	149.5	700	238.9	Maximum Chest Compression	mm	63	-20	52	-12	Nij	N/A	1	0.26	1	0.32	Neck Tension	N	4170	795.8	2620	831.1	Neck Compression	N	4000	-292.4	2520	-328.0	Left Femur Force	N	10000	-1618.7	6800	-176.1	Right Femur Force	N	10000	-2659.7	6800	-193.0
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

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

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

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2019 Tesla Model 3 Long Range AWD 4-door sedan at a velocity of 56.48 km/h. The test was performed at Applus IDIADA KARCO Engineering, LLC. on April 30, 2019. 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 475 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 airbag.

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.

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)	149.5	63.9	78.9	-20	0.26	795.8	-292.4	-1618.7	-2659.7
Passenger (5th)	238.9	63.2	78.2	-12	0.32	831.1	-328.0	-176.1	-193.0

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

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: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	O20195000
Model Year	2019
Make	Tesla
Model	Model 3
Body Style	4-Door Sedan
VIN	5YJ3E1EB7KF359414
Body Color	Midnight Silver Metallic
Odometer Reading (km / mi)	10 / 6
Engine Displacement (L)	N/A
Type / No. of Cylinders	Electric
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	1
Overdrive	No
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	Yes
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	Tesla, INC.
Date of Manufacture	Apr-19

GVWR (kg)	2265
GAWR Front (kg)	1110
GAWR Rear (kg)	1257

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

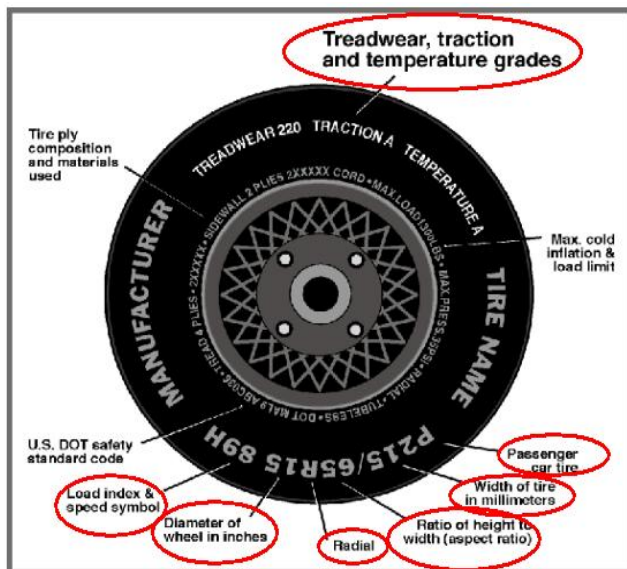
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				375.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)*				34.8

A
B
A-B

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	290	290
Recommended Tire Size	P235/45R18	P235/45R18
Tire Size on Vehicle	P235/45R18	P235/45R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy MXM4	Primacy MXM4
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 1 Polyamide, 2 Steel	2 Polyester, 1 Polyamide, 2 Steel
Load Index / Speed Symbol	98W	98W
Tire Material	Polyester, Polyamide, Steel	Polyester, Polyamide, Steel
DOT Safety Code Left	B9FL 04FX 4918	B9FL 04FX 4918
DOT Safety Code Right	B9FL 04FX 4918	B9FL 04FX 5018

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	457.0	465.5		494.0	524.0	
Right	kg	473.5	448.5		499.5	495.0	
Ratio	%	50.4%	49.6%	100.0%	49.4%	50.6%	100.0%
Total	kg	930.5	914.0	1844.5	993.5	1019.0	2012.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1844.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	34.8	C
Calculated Vehicle Target Weight (TVTW)	kg	2020.3	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	742	745	748	748	1432
As Tested	mm	725	729	721	729	1463
Post-Test	mm	785	764	725	725	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2890
Total Vehicle Length at Left Side	mm	4070
Total Vehicle Length at Centerline	mm	4693
Total Vehicle Length at Right Side	mm	4065
Weight of Ballast in Cargo Area	kg	74.0
Weight of Vehicle Components Removed	kg	47.0
Amount of Stoddard Solvent in Fuel Tank	L	N/A

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear Seat Assembly (22.0 kg), Rear Trim (13.0 kg), Taillights (2.0 kg), Bumper (10.0 kg)

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	4693
2	Total Width	1860
3	Bumper Top Height	615
4	Bumper Bottom Height	230
5	Longitudinal Member Top Height	527
6	Distance Between Longitudinal Members	790
7	Longitudinal Member Width	110
8	Engine Top Height	N/A
9	Engine Bottom Height	N/A
10	Engine and Gearbox Width	N/A
11	Front Bumper to Engine Distance	N/A
12	Front Shock Absorber Fixing Height	799
13	Bonnet Leading Edge Height	660
14	Front Shock Absorber Fixing Width	965
15	Front Bumper to Front Axle Distance	840
16	Front Axle to A-Pillar Distance	550
17	A-Pillar to B-Pillar Distance	986
18	B-Pillar to Rear Axle Distance	1200
19	B-Pillar to C-Pillar Distance	828
20	Roof Sill Bottom Height	1231
21	Roof Sill Top Height	1400
22	Floor Sill Bottom Height	450
23	Floor Sill Top Height	340

All measurements in millimeters.

DATA SHEET NO. 2

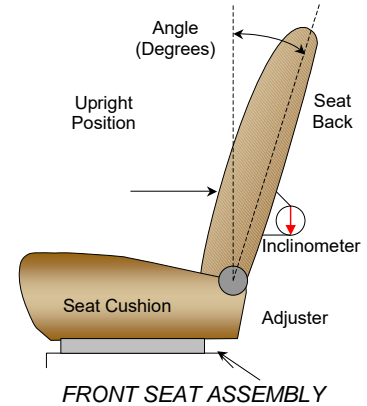
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

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 along the seatback.

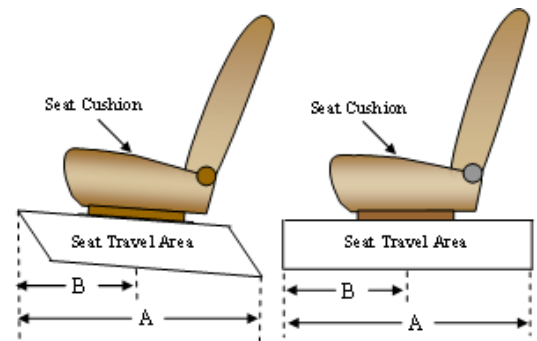


SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	19.9
Passenger Seat Back Angle	14.0

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	260 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 “M”. Position “L” is the lowermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	3	H
Passenger Seat	3	H

DATA SHEET NO. 2 ... (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

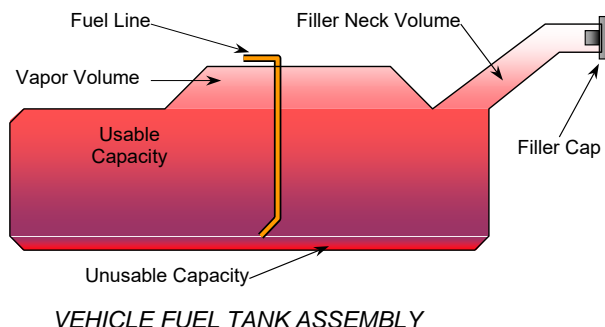
Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	N/A
Usable Capacity of "Optional Tank"	N/A
92 - 94% of Usable Capacity	N/A
Actual Amount of Stoddard Solvent Used	N/A
1/3 of Usable Capacity	N/A

FUEL PUMP

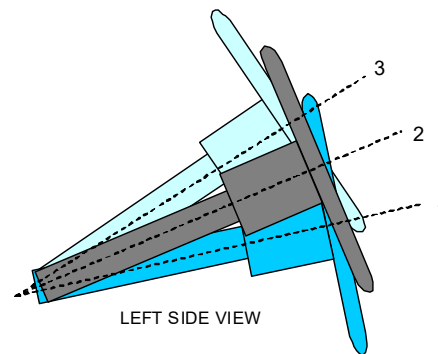
The vehicle is electric and is not equipped with a fuel system.



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

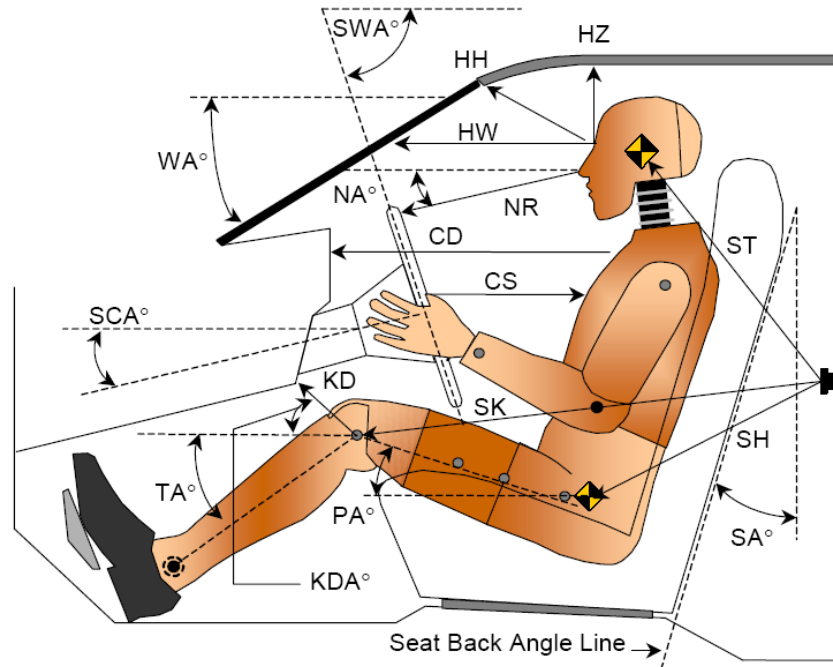
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	15.8	100
Geometric Center Position, No. 2	18.1	128
Uppermost Position, No. 3	20.5	156
Telescoping Steering Wheel Travel		56
Test Position	18.1	128

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



LEFT SIDE VIEW

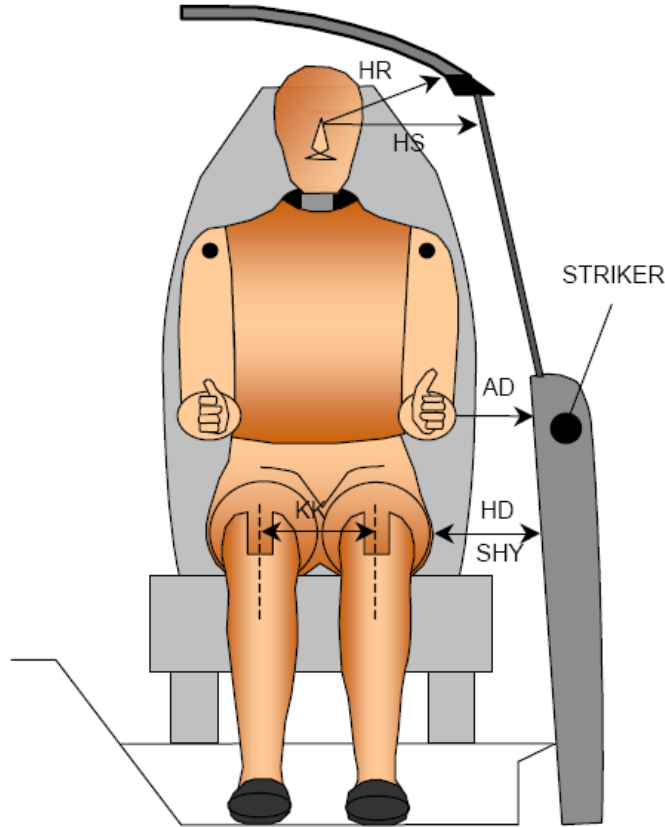
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		23.9		
SWA°	Steering Wheel Angle		70.9		
SCA°	Steering Column Angle		19.1		
SA°	Seat Back Angle (On Headrest Post)		19.9		14.0
HZ	Head to Roof	243	90.0	177	90.0
HH	Head to Header	365	22.5	238	52.7
HW	Head to Windshield	695	0.0	628	0.0
NR	Nose to Rim	386	10.0	486	27.5
CD	Chest to Dash	603	8.9	441	2.2
CS	Chest to Steering Hub	316	0.2		
RA	Rim to Abdomen	217	0.0		
KDL	Left Knee to Dash	244	32.1	179	40.0
KDR	Right Knee to Dash	246	31.9	196	40.3
PA°	Pelvic Angle		24.8		19.9
TA°	Tibia Angle		33.9		40.7
SK	Striker to Knee	547	2.3	648	2.4
ST	Striker to Head	497	86.4	502	67.7
SH	Striker to H-Point	225	41.2	337	17.4

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

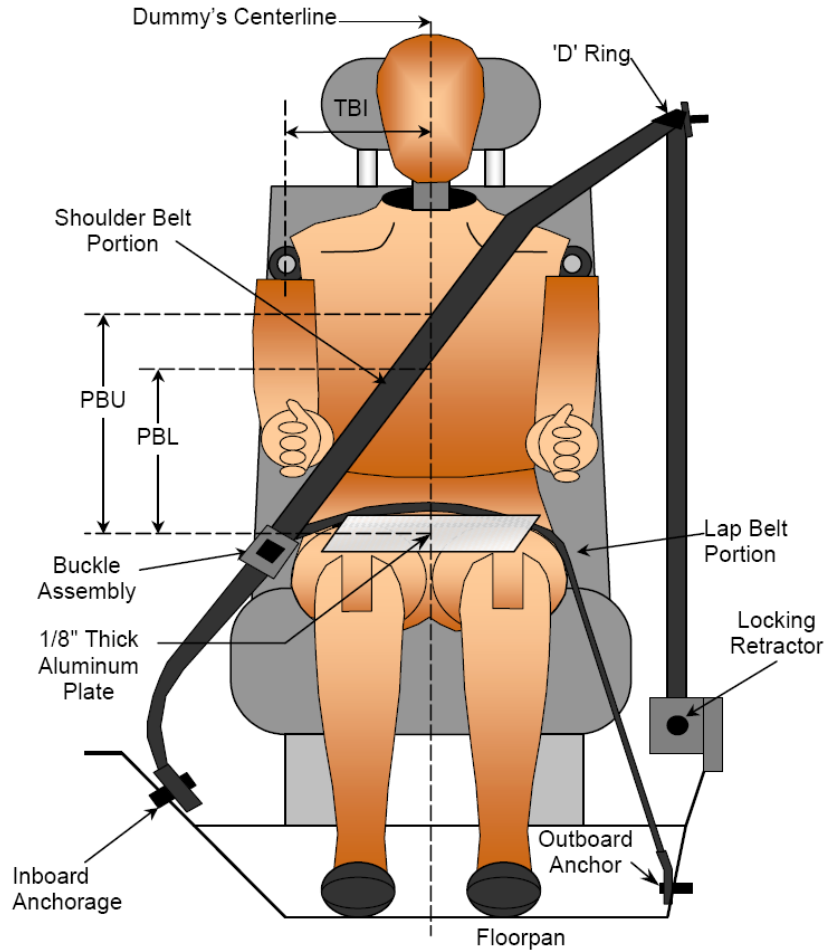
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	67	65
HD	H-Point to Door	146	169
HR	Head to Side Header	254	255
HS	Head to Side Window	365	376
KK	Knee to Knee	305	165
SHY	Striker to H-Point (Y-Direction)	251	283
AA	Ankle to Ankle	295	172

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	355	280
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	275	186

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	920	995
Lap Belt Length as Measured on ATD	mm	445	400
Remainder of Belt on Reel	mm	1120	980
Total Belt Length for Continuous Webbing Systems	mm	2485	2375

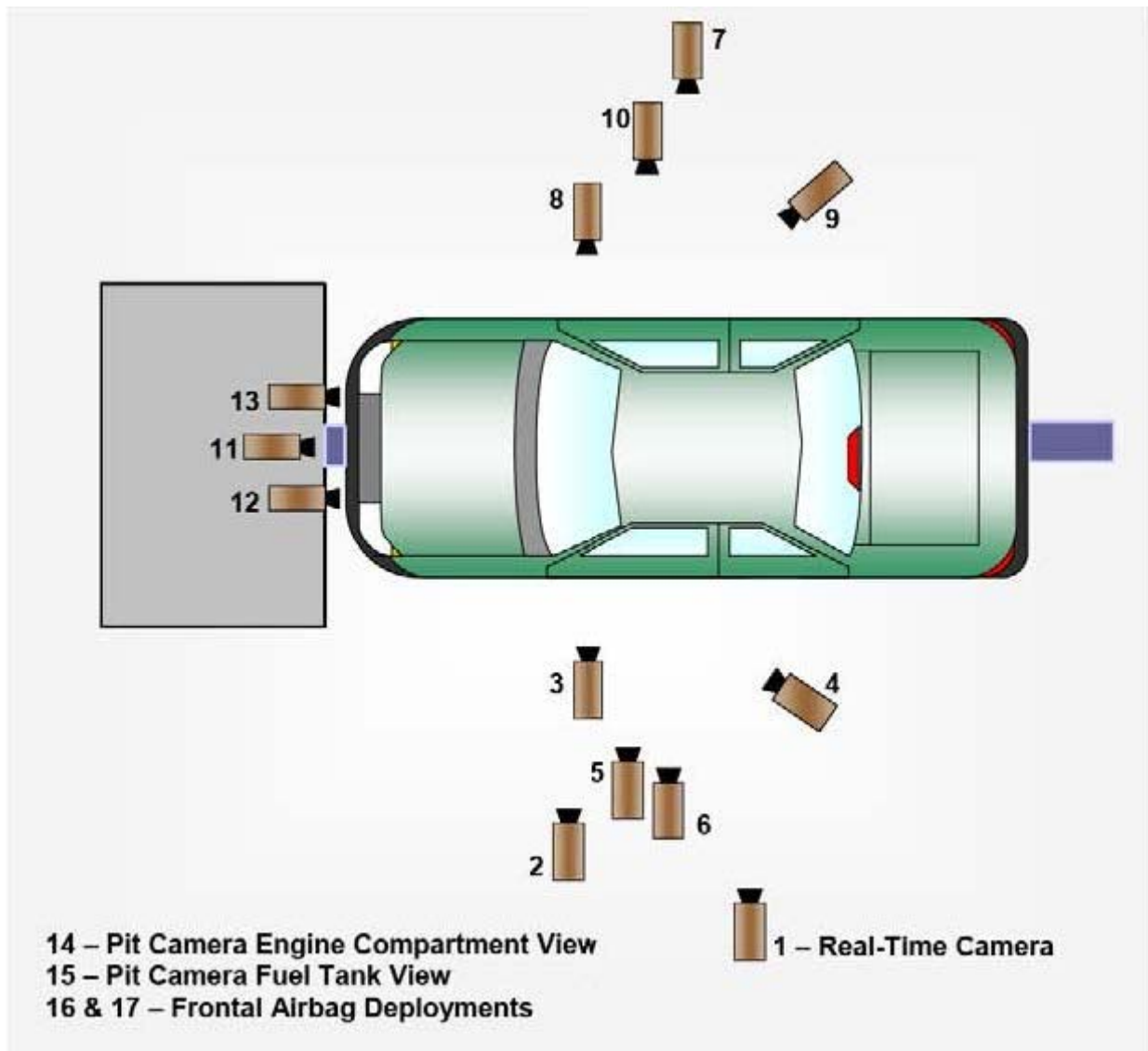
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 ... (CONTINUED)

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

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)	-1200	300	-1140	8	1000
17	Onboard Passenger Airbag (Optional)	-1200	-300	-1140	8	1000
18	Real-Time Left View of Impact					
19	Real-Time Right View of Impact					

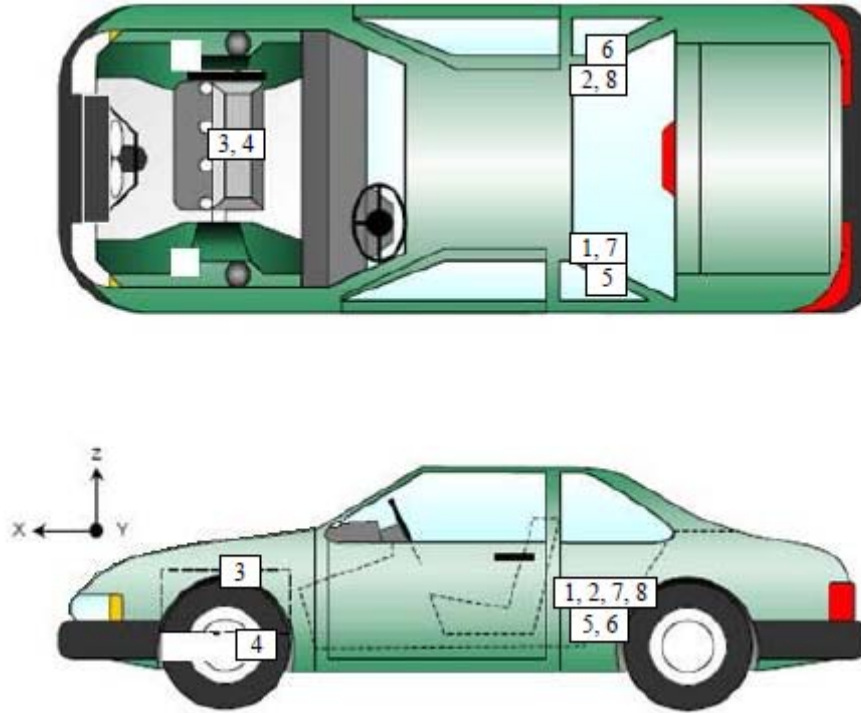
Coordinates: +X = forward impact plane
 +Y = right of monorail center
 +Z = into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1880	-725	-380
2	Right Rear Accelerometer X-Direction	1840	725	-380
3	Engine Top X	3880	200	-820
4	Engine Bottom X	3610	-350	-510
5	Left Rear Accelerometer Z-Direction	1880	-725	-380
6	Right Rear Accelerometer Z-Direction	1840	725	-380
7	Left Rear Accelerometer X-Direction Redundant	1880	-725	-380
8	Right Rear Accelerometer X-Direction Redundant	1840	725	-380

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

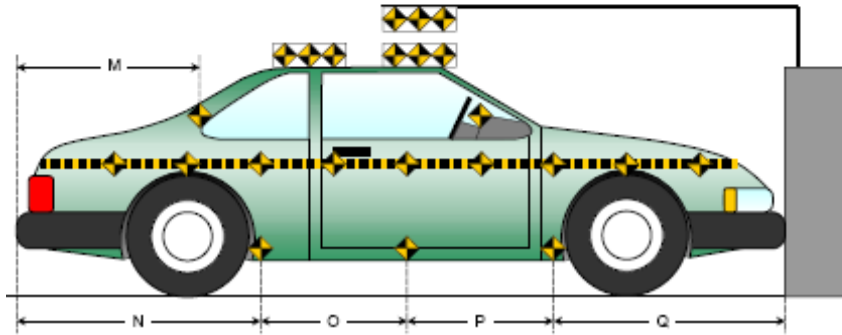
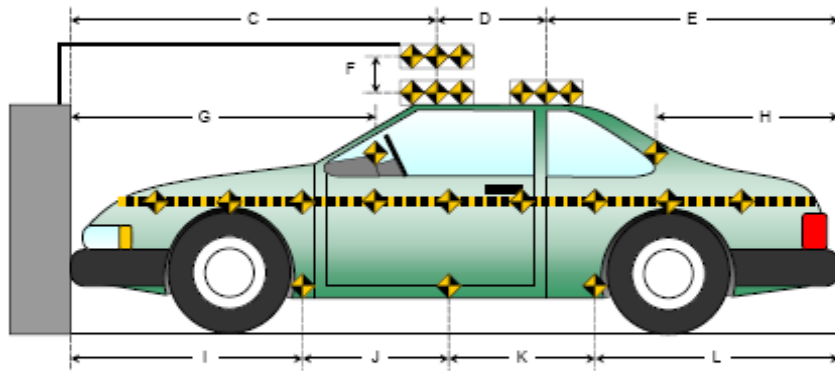
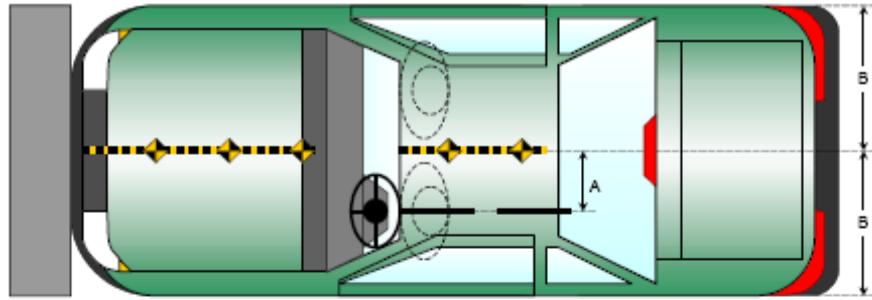
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

Item	Value
A	N/A
B	930
C	2310
D	610
E	1770
F	305
G	1780
H	770
I	1300
J	985
K	985
L	1435
M	772
N	1435
O	985
P	985
Q	1300



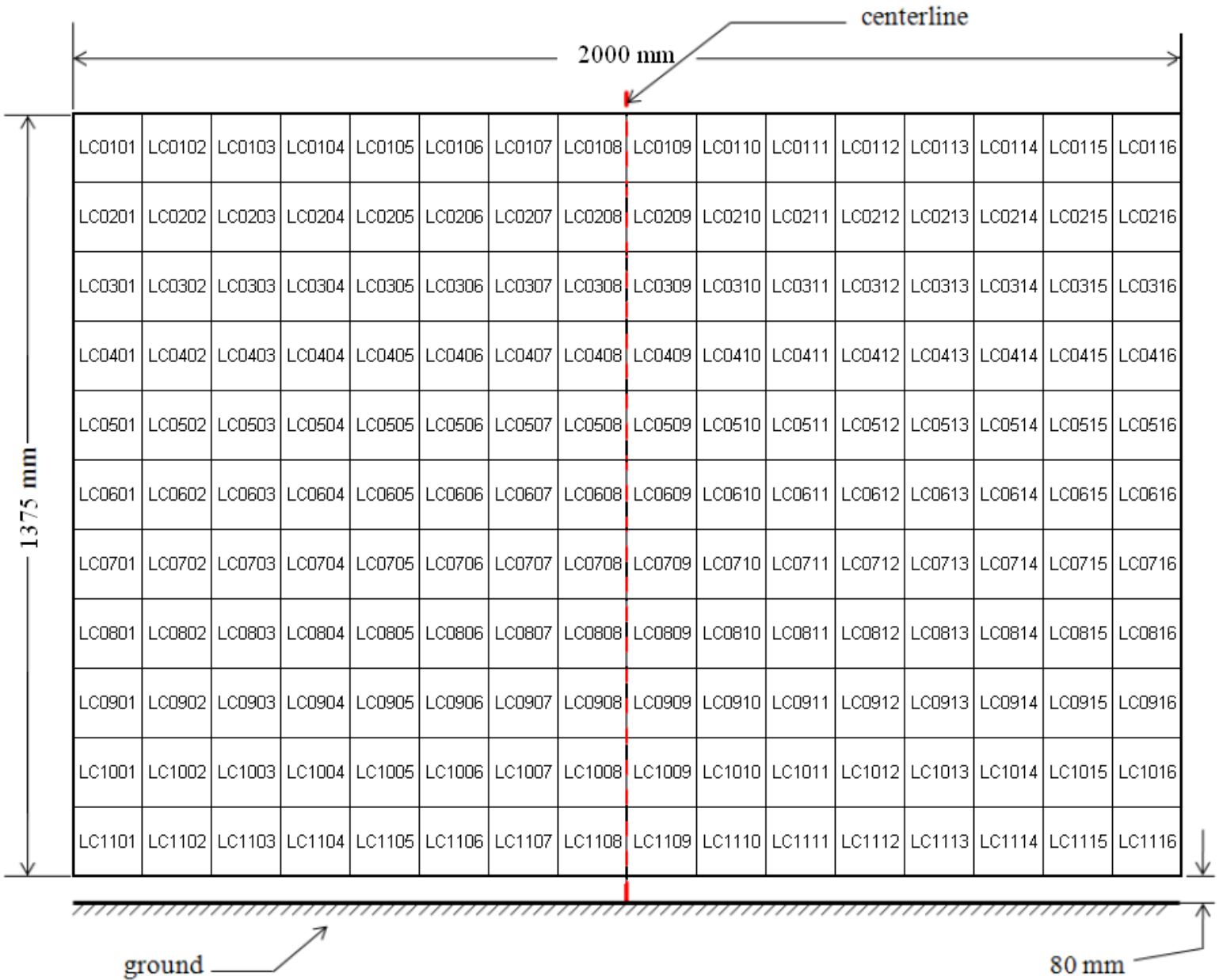
All measurements in millimeters.

DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

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: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

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 Airbag	None
Right Knee Contact	Knee Airbag	None

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)	0	14
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	629
Center	mm	609
Right Side	mm	664
Average	mm	634

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

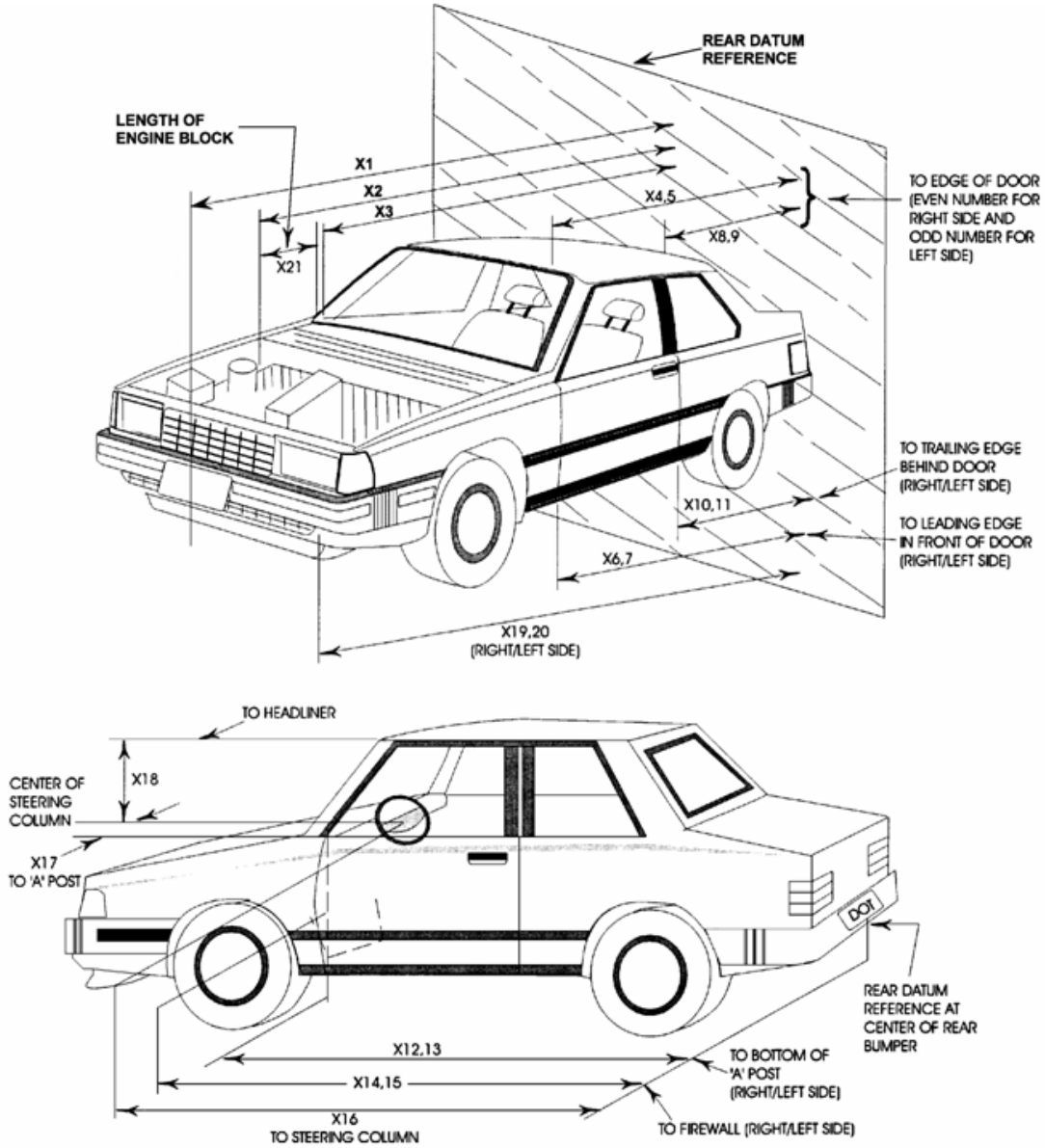
*Passenger knee airbag is not designed to deploy for 5th percentile female.

DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



DATA SHEET NO. 12 ... (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4693	4390	-303
2	Rear Surface of Vehicle to Front of Engine	N/A	N/A	N/A
3	RSOV to Firewall	3688	3685	-3
4	RSOV to Upper Leading Edge of Right Door	3324	3290	-34
5	RSOV to Upper Leading Edge of Left Door	3325	3285	-40
6	RSOV to Lower Leading Edge of Right Door	3291	3285	-6
7	RSOV to Lower Leading Edge of Left Door	3290	3280	-10
8	RSOV to Upper Trailing Edge of Right Door	2134	2120	-14
9	RSOV to Upper Trailing Edge of Left Door	2135	2120	-15
10	RSOV to Lower Trailing Edge of Right Door	2182	2175	-7
11	RSOV to Lower Trailing Edge of Left Door	2180	2175	-5
12	RSOV to Bottom of A-Pillar, Right Side	3190	3150	-40
13	RSOV to Bottom of A-Pillar, Left Side	3191	3136	-55
14	RSOV to Firewall, Right Side	3440	3440	0
15	RSOV to Firewall, Left Side	3598	3600	2
16	RSOV to Steering Column	2930	2800	-130
17	Center of Steering Column to A-Pillar	415	438	23
18	Center of Steering Column to Headliner	520	510	-10
19	RSOV to Right Side of Front Bumper	4065	3923	-142
20	RSOV to Left Side of Front Bumper	4070	3843	-227
21	Length of Engine Block	N/A	N/A	N/A
RD	RSOV to Right Side of Dash Panel	3000	2980	-20
CD	RSOV to Center of Dash Panel	2850	2830	-20
LD	RSOV to Left Side of Dash Panel	2190	3000	810

All measurements in millimeters.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

VEHICLE INFORMATION

VIN: 5YJ3E1EB7KF359414
 Vehicle Size Category: Passenger Car

Wheelbase (mm): 2890
 Test Weight (kg): 2012.5

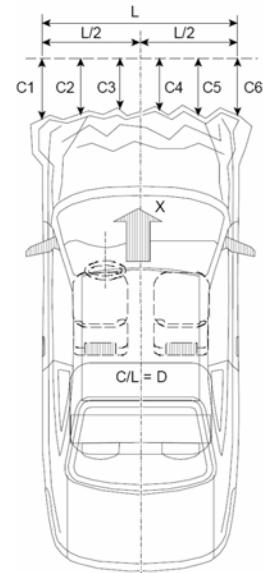
ACCELEROMETER DATA

Accelerometer Locations: Left Rear Crossmember
 Cal. Procedure/Interval: Vibration Test / 6 months
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 56.48
 Velocity Change (km/h): 65.0
 Time of Separation (msec): 77.7

Linearity: Good

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
 Midpoint of Damage: Vehicle Centerline
 Damage Region Length (mm): 1550
 Impact Mode: Full Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	320	540	220
C2	Crush Zone 2 at Left Side	mm	115	510	395
C3	Crush Zone 3 at Left Side	mm	20	480	460
C4	Crush Zone 4 at Right Side	mm	20	495	475
C5	Crush Zone 5 at Right Side	mm	115	510	395
C6	Crush Zone 6 at Right Side	mm	320	535	215
L	C1 to C6	mm	1550		

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

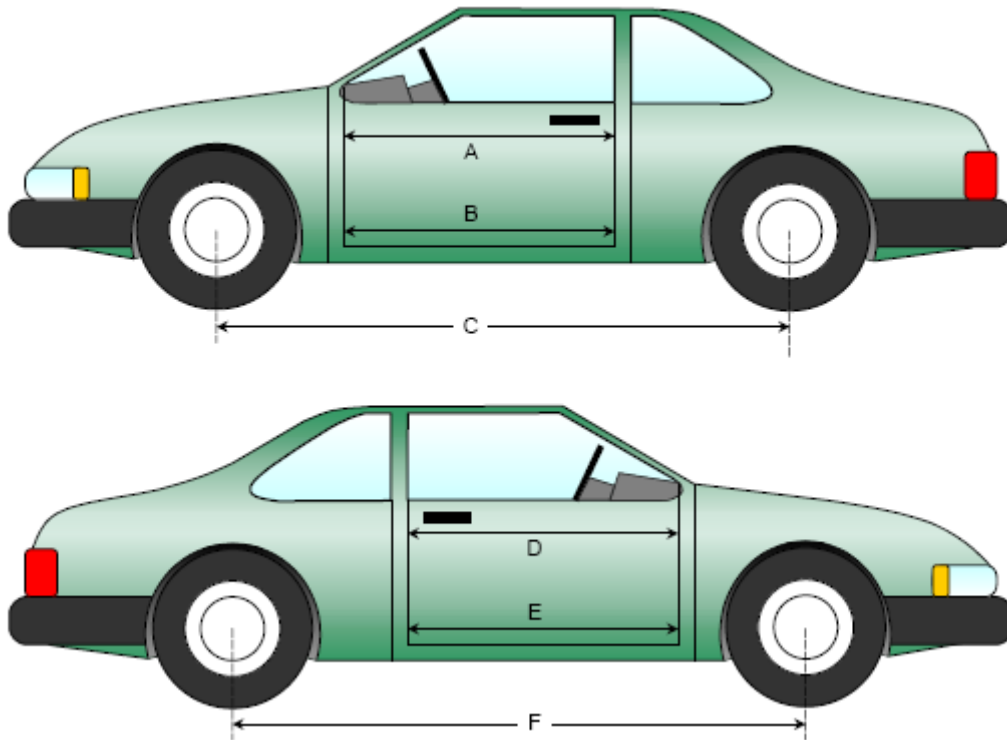
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	989	991	-2
B	Left Side Lower	mm	968	971	-3
D	Right Side Upper	mm	992	991	1
E	Right Side Lower	mm	982	972	10

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2890	2785	105
F	Right Side Wheelbase	mm	2890	2800	90



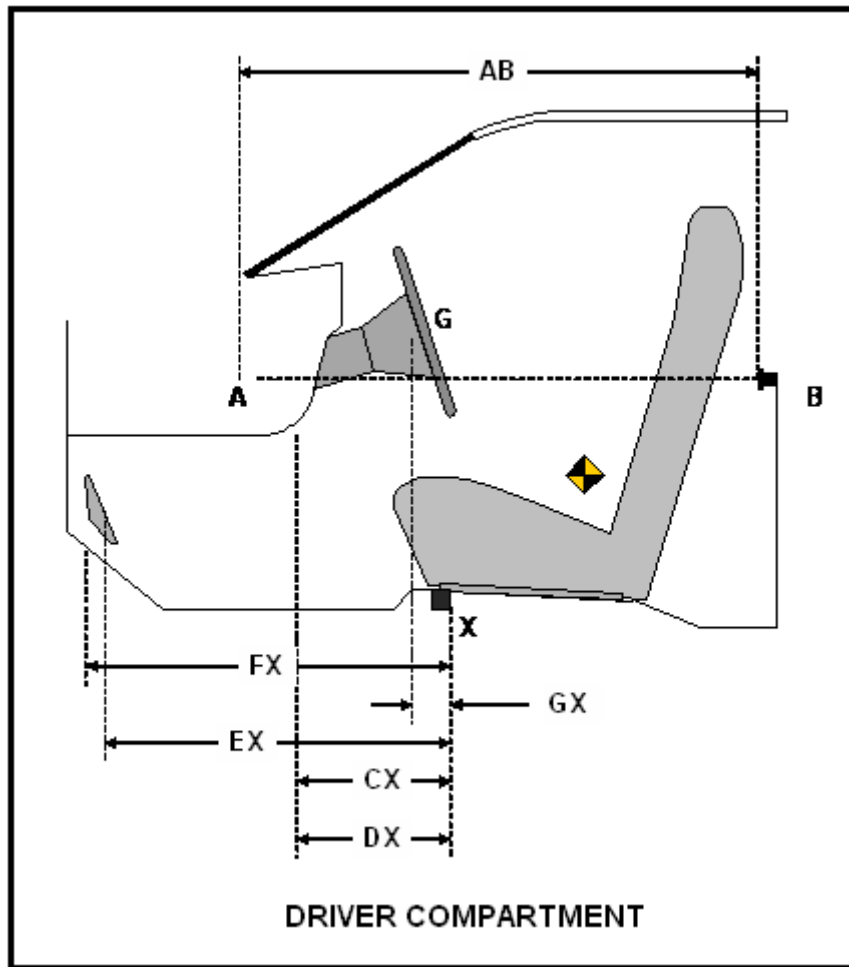
DATA SHEET NO. 14 ... (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	823	908	-85
CX	Left Knee Bolster to X	mm	380	330	50
DX	Right Knee Bolster to X	mm	380	340	40
EX	Brake Pedal to X	mm	580	550	30
FX	Foot Rest to X	mm	625	590	35
GX	Center of Steering Wheel Hub to X	mm	140	140	0

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

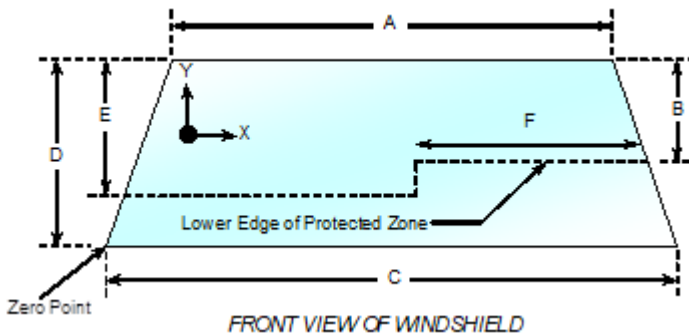
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber molding and rubber cement.

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	2495	2495	100.0%
Right Side	2495	2495	100.0%
Total	4990	4990	100.0%



Item	Units	Value
A	mm	1270
B	mm	700
C	mm	1470
D	mm	1125
E	mm	700
F	mm	507

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: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.3° C Test Time: 1:15 PM

Stoddard Solvent Spillage Measurements

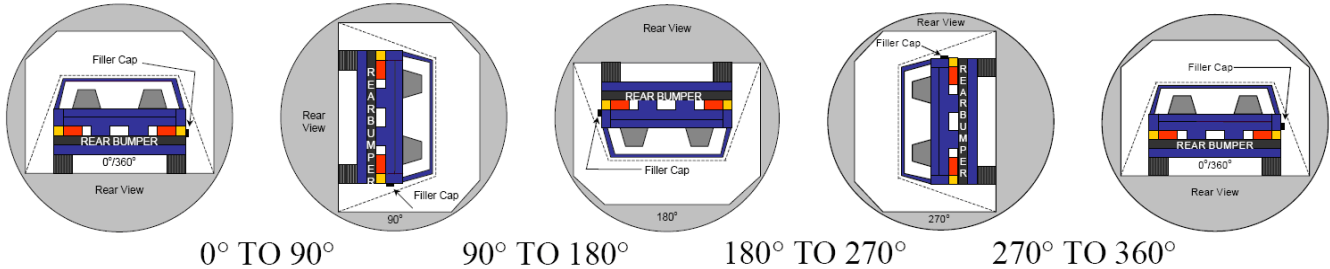
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: The vehicle is electric and did not contain Stoddard solvent.

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



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: The vehicle is electric and did not contain Stoddard Solvent.

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°			
90° To 180°			
180° To 270°			
270° To 360°			

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

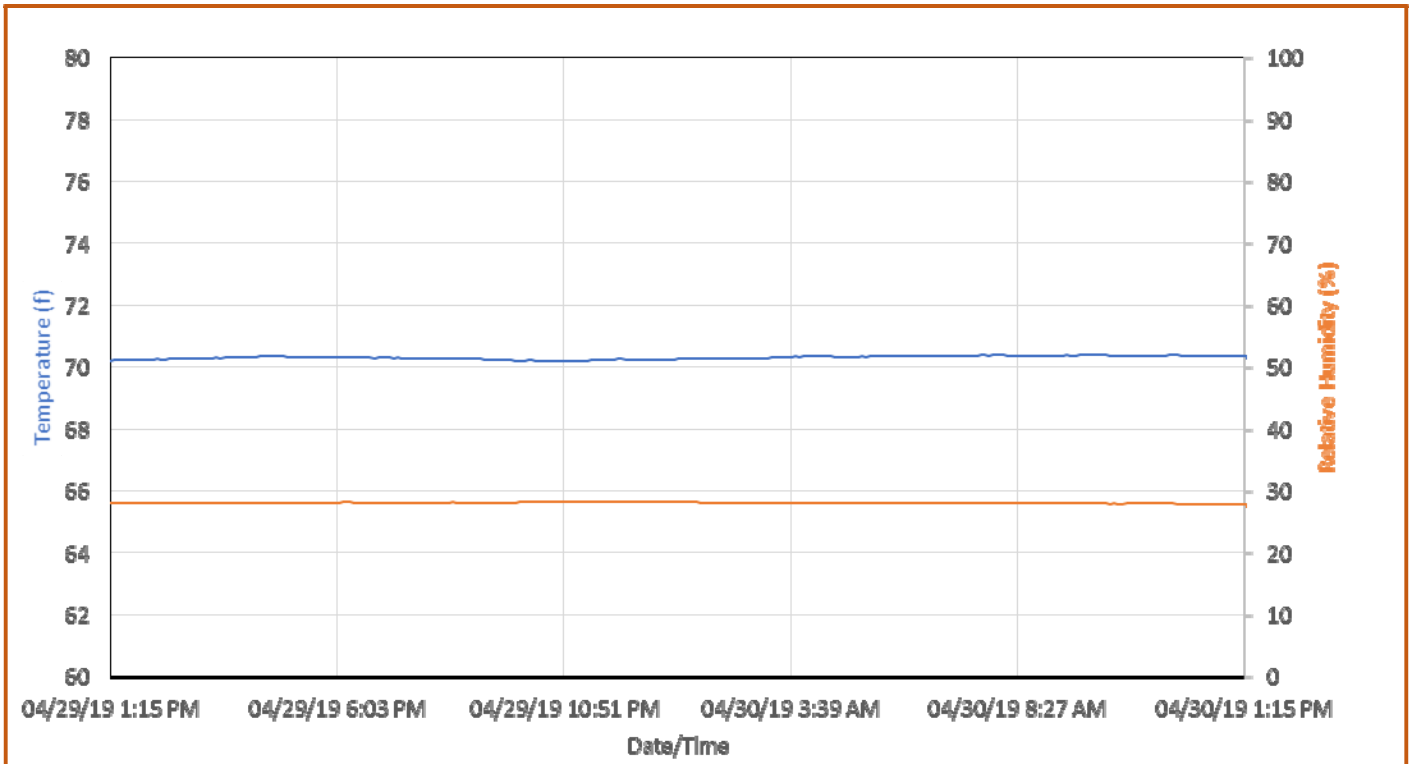
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 04/30/19



**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. Load Cell Location



FIGURE 2. Pre-Test Load Cell Wall

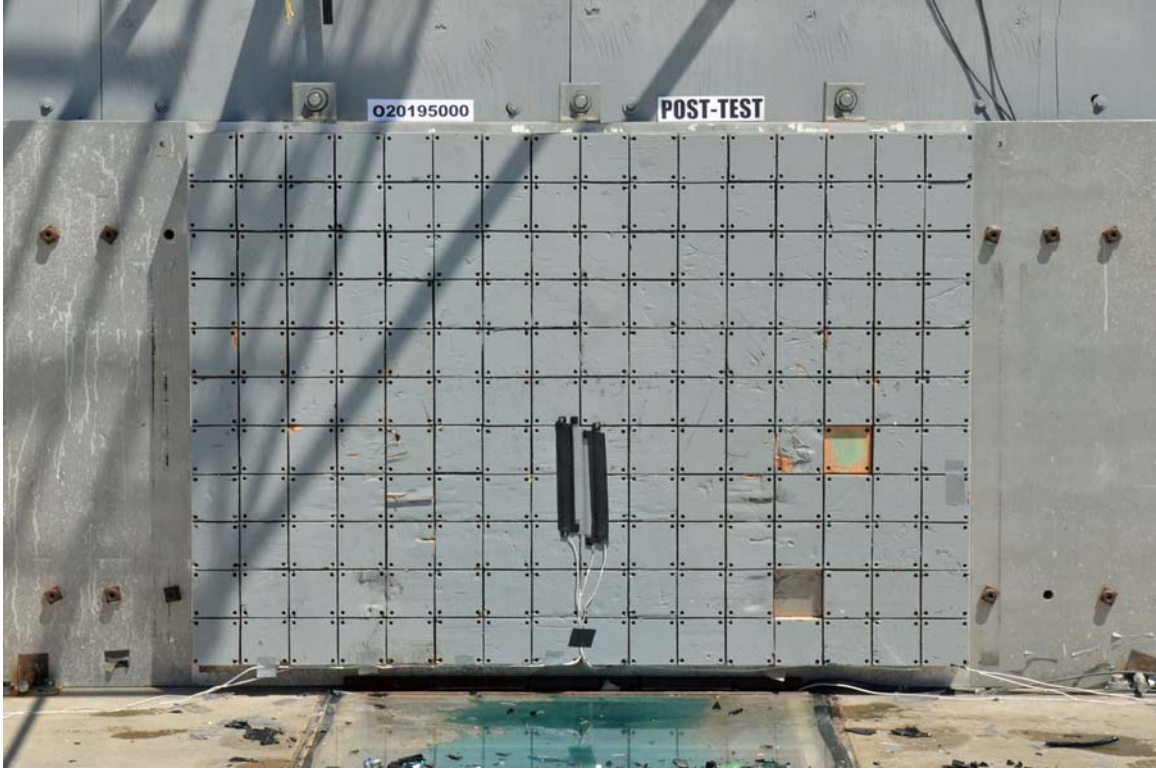


FIGURE 3. Post-Test Load Cell Wall



FIGURE 4. Manufacturer's Label

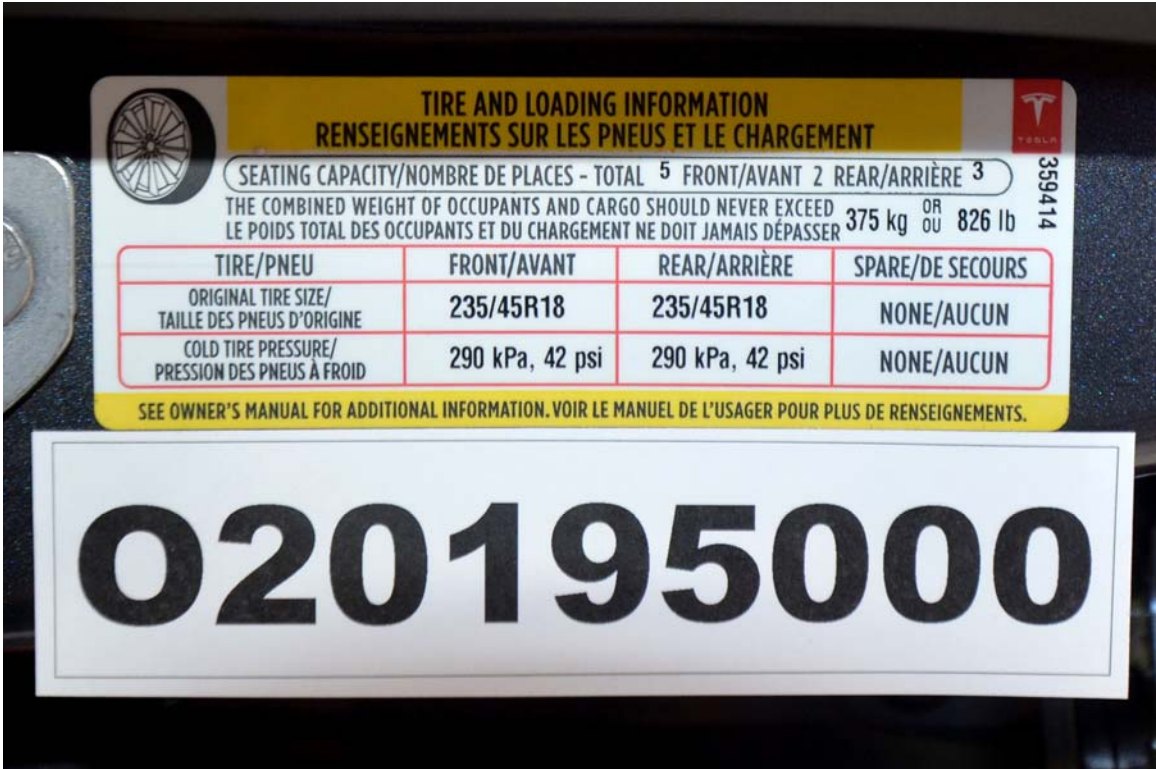


FIGURE 5. Tire Placard



FIGURE 6. 2019 Tesla Model 3 Long Range AWD 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 3/4 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

Photograph Not Available

FIGURE 20. Pre-Test Front Storage Compartment View



FIGURE 21. Post-Test Front Storage Compartment View



FIGURE 22. Pre-Test Fuel Filler Cap – Charge Port View



FIGURE 23. Post-Test Fuel Filler Cap – Charge Port View



FIGURE 24. Pre-Test Front Underbody View



FIGURE 25. Post-Test Front Underbody View

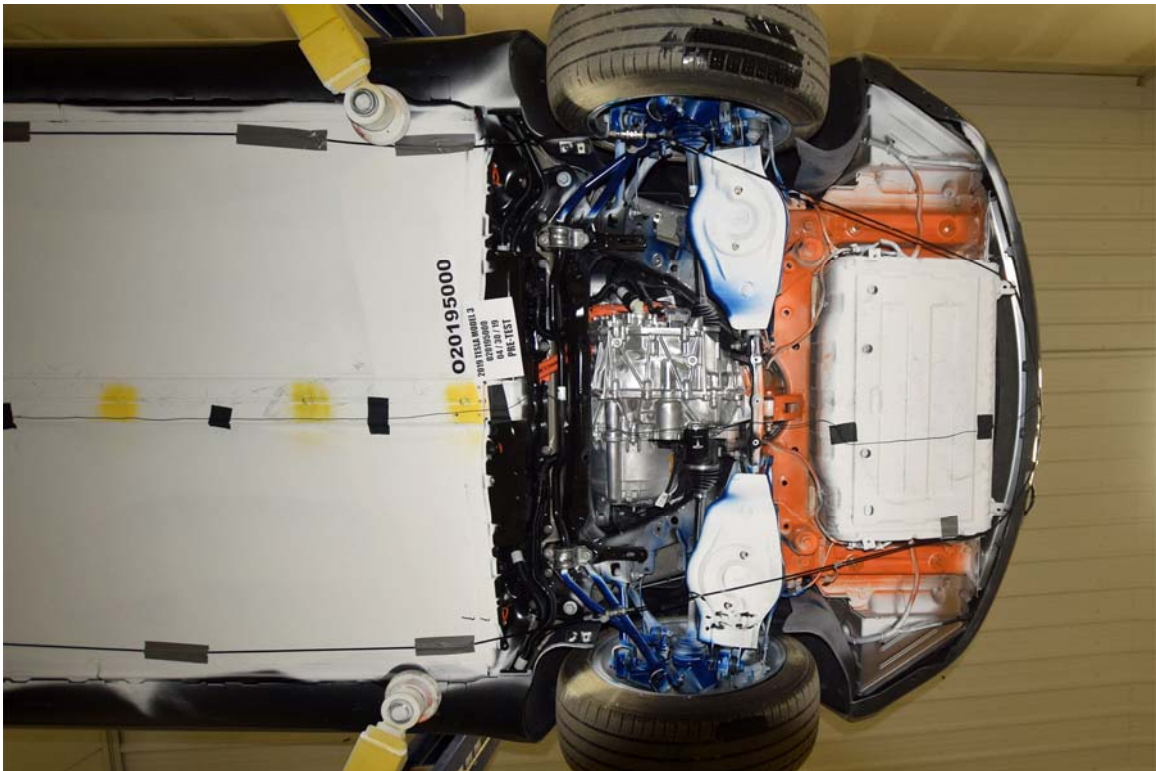


FIGURE 26. Pre-Test Rear Underbody View



FIGURE 27. Post-Test Rear Underbody View



FIGURE 28. Pre-Test Dummy Cable Routing



FIGURE 29. Post-Test Dummy Cable Routing



FIGURE 30. Pre-Test Driver Dummy Front View



FIGURE 31. Post-Test Driver Dummy Front View



FIGURE 32. Pre-Test Driver Dummy Window View



FIGURE 33. Post-Test Driver Dummy Window View



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



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



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



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



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



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



FIGURE 40. Pre-Test Driver Dummy Feet



FIGURE 41. Post-Test Driver Dummy Feet



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



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



FIGURE 44. Pre-Test Driver's Side Floorpan



FIGURE 45. Post-Test Driver's Side Floorpan



FIGURE 46. Post-Test Driver Dummy Face



FIGURE 47. Post-Test Driver Dummy Contact with Airbag



FIGURE 48. Post-Test Driver Dummy Contact with Headrest



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



FIGURE 49. Pre-Test View of the Steering Wheel



FIGURE 50. Post-Test View of the Steering Wheel



FIGURE 51. Pre-Test Passenger Dummy Front View



FIGURE 52. Post-Test Passenger Dummy Front View



FIGURE 53. Pre-Test Passenger Dummy Window View



FIGURE 54. Post-Test Passenger Dummy Window View



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



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



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



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



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



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



FIGURE 61. Pre-Test Passenger Dummy Feet



FIGURE 62. Post-Test Passenger Dummy Feet



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



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



FIGURE 65. Pre-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger's Side Floorpan



FIGURE 67. Post-Test Passenger Dummy Face



FIGURE 68. Post-Test Passenger Dummy Contact with Airbag



FIGURE 69. Post-Test Passenger Dummy Contact with Headrest



FIGURE 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

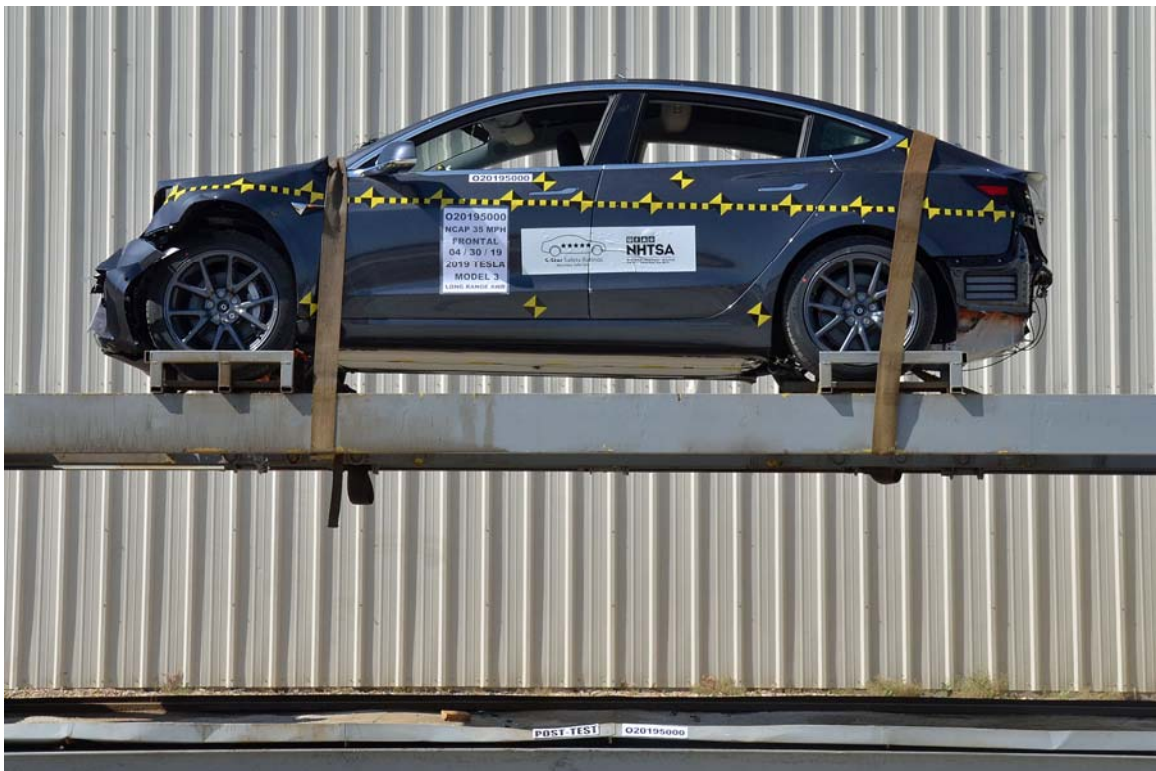


FIGURE 73. Vehicle at 0° on Static Rollover Device



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

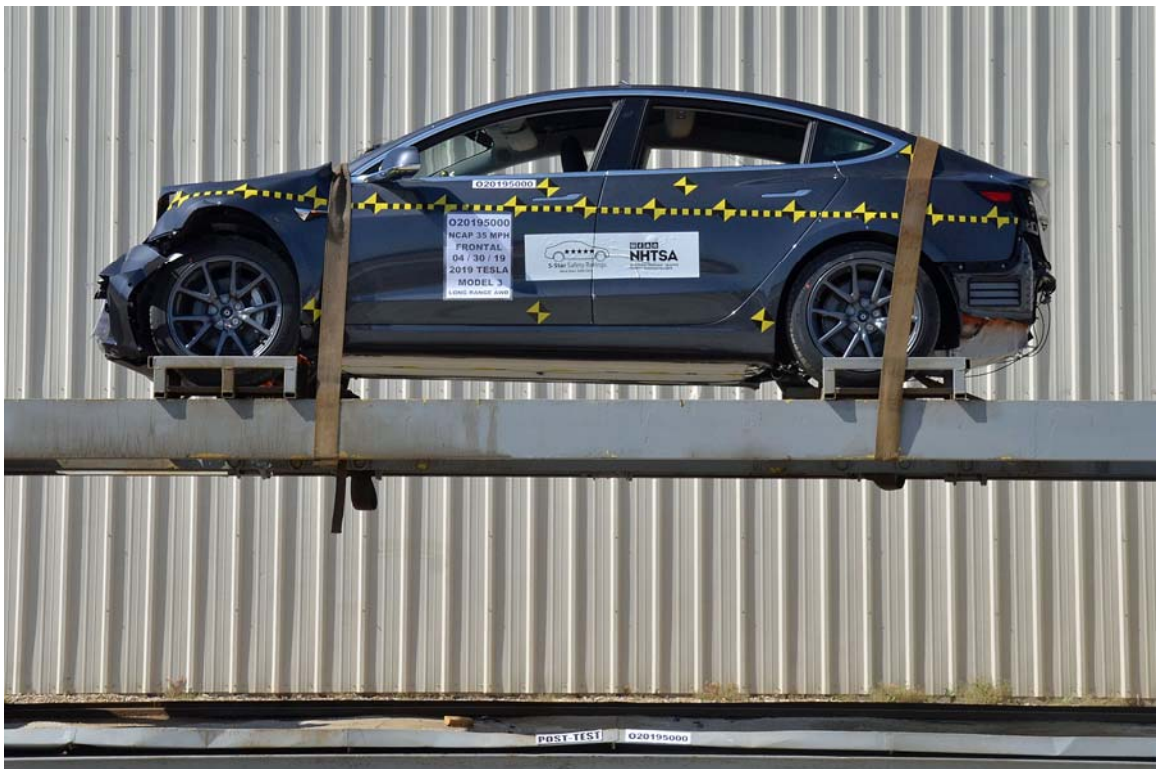


FIGURE 77. Vehicle at 360° on Static Rollover Device



FIGURE 78. 2019 Tesla Model 3 Long Range AWD Frontal Impact Event

TESLA MODEL 3 Long Range AWD

Vehicle Identification Number: 5YJ3E1EB7KF359414
 Date of Manufacture: 04/2019
 Transportation Method: Truck
 Delivered to: TESLA MOTORS, INC. Fremont, California, USA

STANDARD FEATURES		AS CONFIGURED	
TECHNICAL	INTERIOR	Model 3	\$36,000
Three phase, four pole, induction motor (Front)	15 inch capacitive touchscreen	Long Range Dual Motor All-Wheel Drive	\$14,500
Three phase, six pole, internal permanent magnet motor (Rear)	Onboard maps and navigation	Premium Interior	INCLUDED
Drive inverter with regenerative braking system	WiFi and Mobile network connectivity	Metallic Silver Metallic Paint	\$1,000
Microprocessor controlled, lithium-ion battery	FM and Internet streaming radio	18" Wheels	INCLUDED
Onboard charger and mobile connector	Hands free talking with Bluetooth	Base Autopilot	INCLUDED
120 volt and J1772 charging adapters	Voice activated controls	Premium Black	INCLUDED
SAFETY	High definition backup camera		
Seven cameras, forward radar and twelve ultrasonic sensors	One touch power windows		
Six front row and two side curtain airbags	Dual zone climate control		
Three point safety belts with belt-reminders for driver and four passengers	12 volt power outlet and four USB ports		
Two LATCH (Lower Anchors and Tethers for Children) attachments in second row	EXTERIOR		
Electronic stability and traction control	Full LED lighting		
Four wheel antilock disc brakes with electronic parking brake			
Child safety locks and manual cargo door release mechanisms			
Anti-Theft Alarm System			
		Destination and Regulatory Doc Fee	\$1,200
		Total vehicle price	\$51,700

GOVERNMENT 5-STAR SAFETY RATINGS			PARTS CONTENT INFORMATION		EPA DOT Fuel Economy and Environment	
Overall Vehicle Score	Not Rated		FOR THIS VEHICLE:		116 MPGe	
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.			US/CANADIAN PARTS CONTENT: 50%		These estimates reflect new EPA methods beginning with 2017 models. Midsize cars range from 14 to 136 MPGe. The best vehicle rates 136 MPGe.	
Crash	Driver	Not Rated	MAJOR SOURCES OF FOREIGN PARTS CONTENT MEXICO: 20%		You save \$4,250 in fuel costs over 5 years compared to the average new vehicle.	
	Passenger	Not Rated	Note: Parts content does not include final assembly, distribution or other non-parts costs.		120 city 112 highway 29 kW/hr per 100 miles	
	Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		FOR THIS VEHICLE:		Driving Range: 310 miles	
Side	Front seat	★★★★★	FINAL ASSEMBLY POINT: FREMONT, CA		Annual fuel cost: \$550	
Crash	Rear seat	★★★★★	COUNTRY OF ORIGIN: USA		Fuel Economy & Greenhouse Gas Rating: 10	
	Based on the risk of injury in a side impact.		MOTOR ASSEMBLY: USA		Smog Rating: 10	
Rollover	★★★★★		GEARBOX/TRANSMISSION: USA		This vehicle emits 0 grams CO ₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.	
	Based on the risk of rollover in a single-vehicle crash.		ADDITIONAL ASSEMBLY INFORMATION		Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPGe and costs \$ 2000 to fuel over 5 years. Cost estimates are based on 10,000 miles per year at 6.11 per kWh. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.	
Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236			FOR THIS VEHICLE:		fueleconomy.gov	
			BATTERY FINAL ASSEMBLY POINT: FREMONT, CA, USA		Calculate personalized estimates and compare vehicles.	
			ON-BOARD CHARGER FINAL ASSEMBLY POINT: FREMONT, CA, USA		QR code for fueleconomy.gov	

FIGURE 79. Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

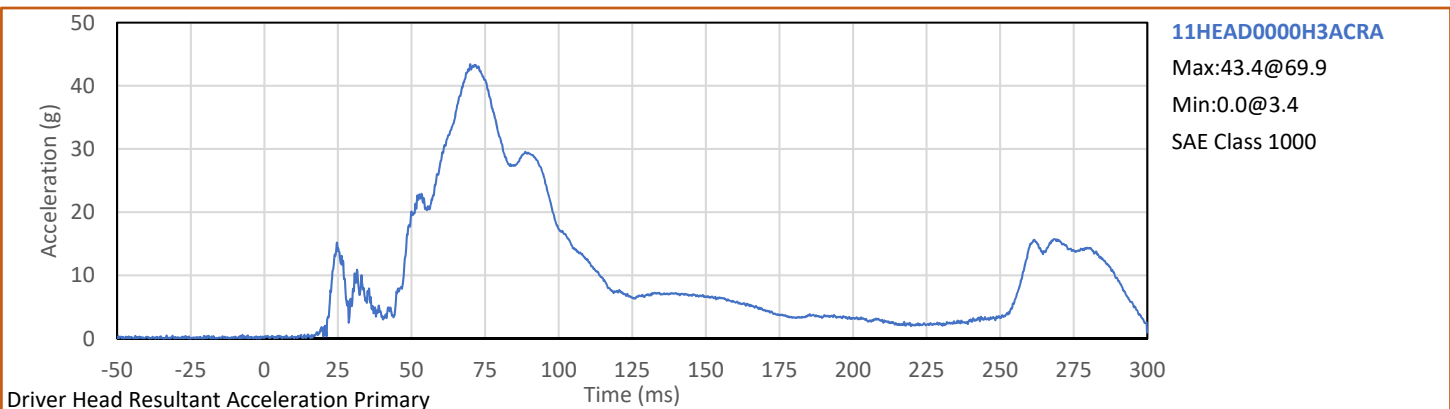
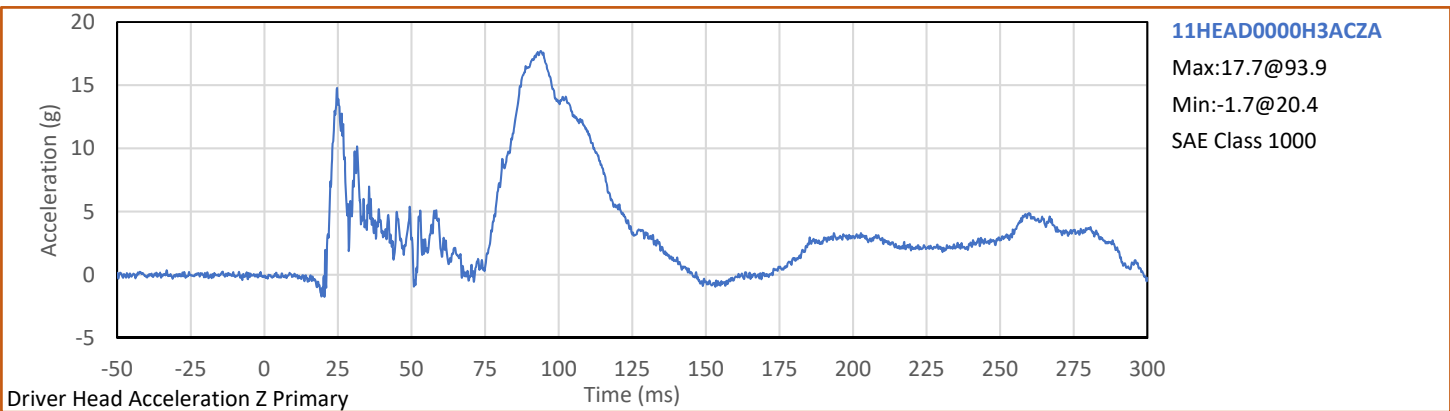
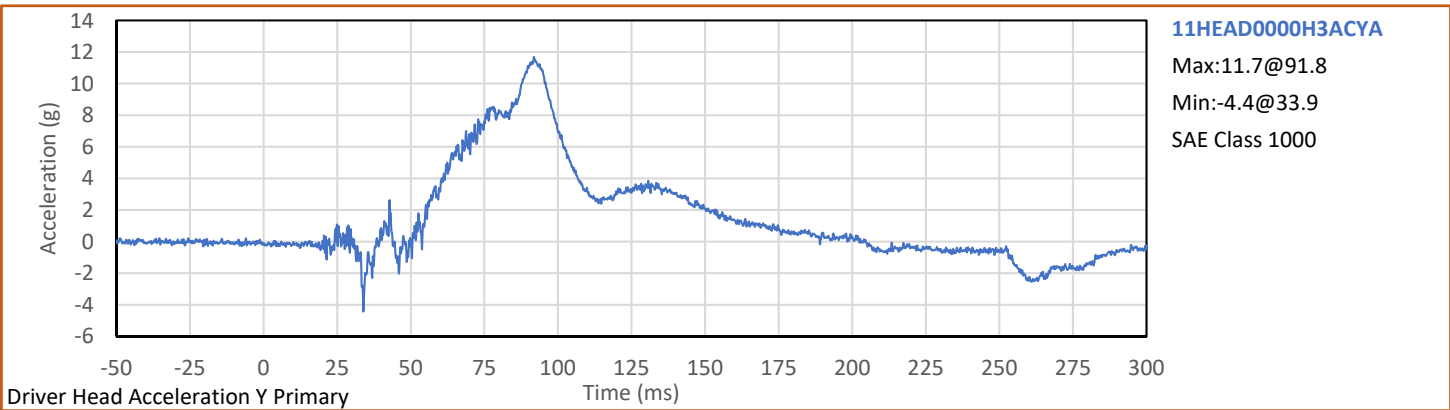
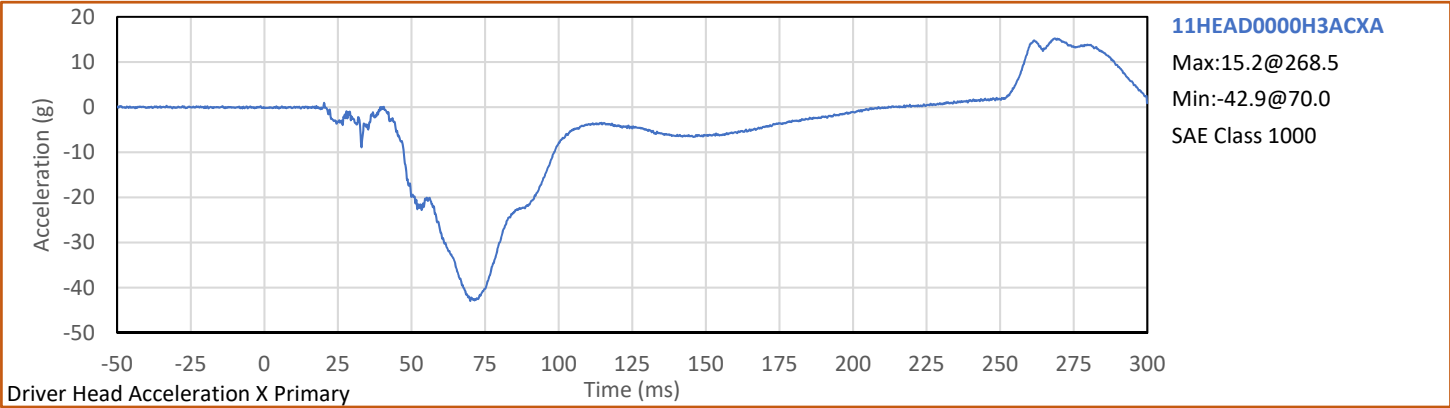
TABLE OF DATA PLOTS

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

The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.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: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan

NHTSA No.: O20195000

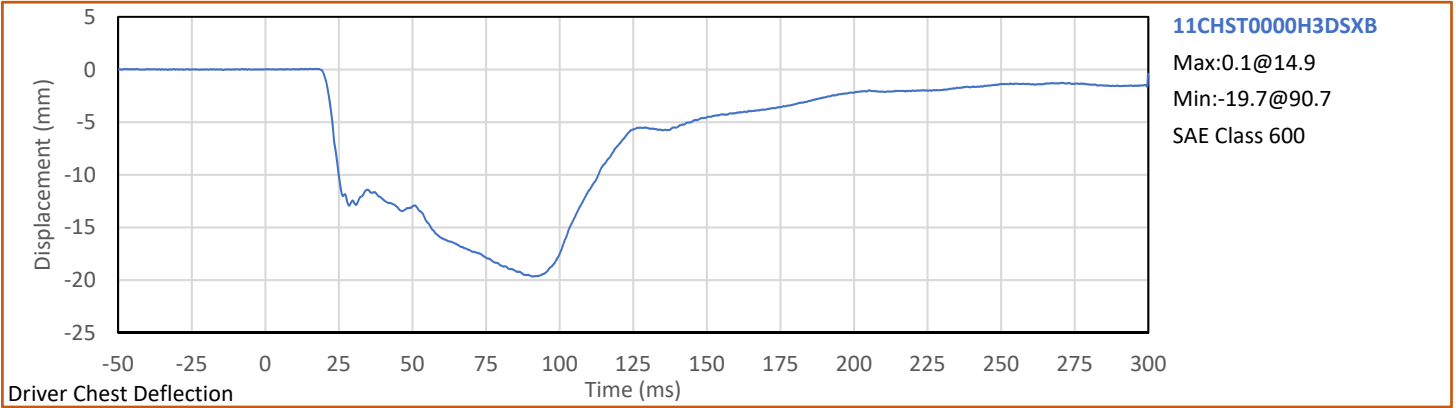
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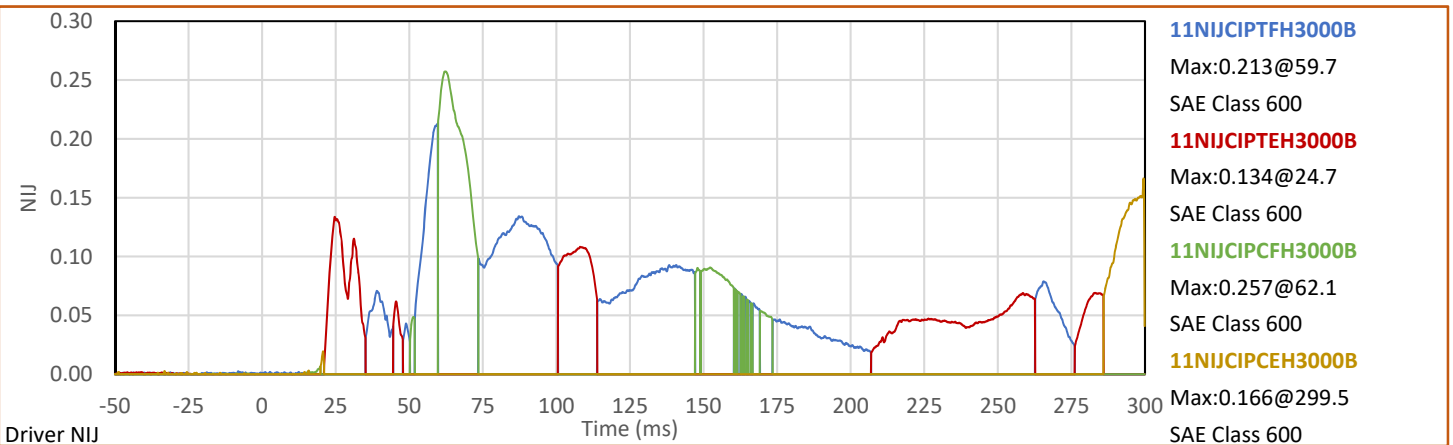
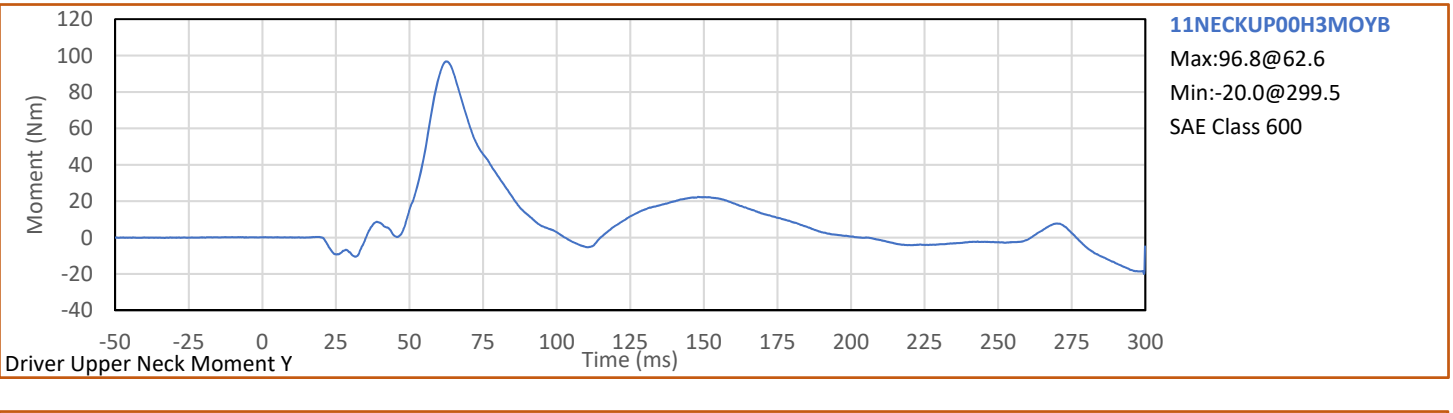
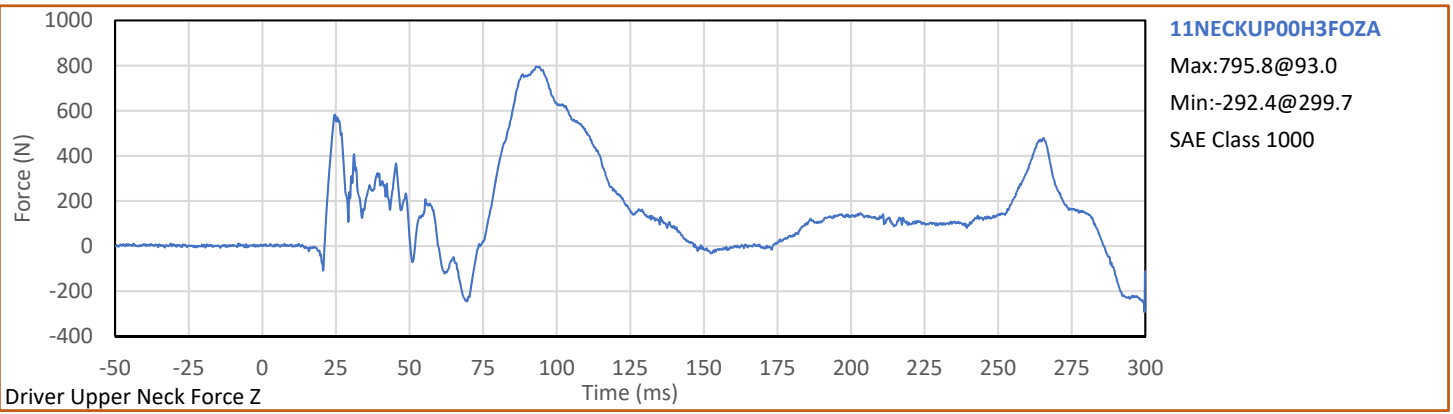
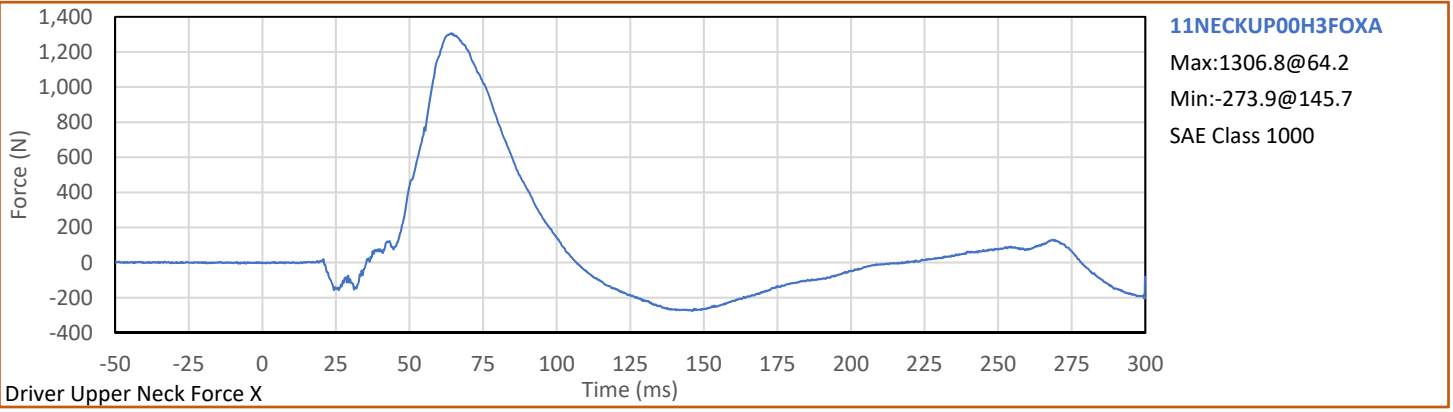
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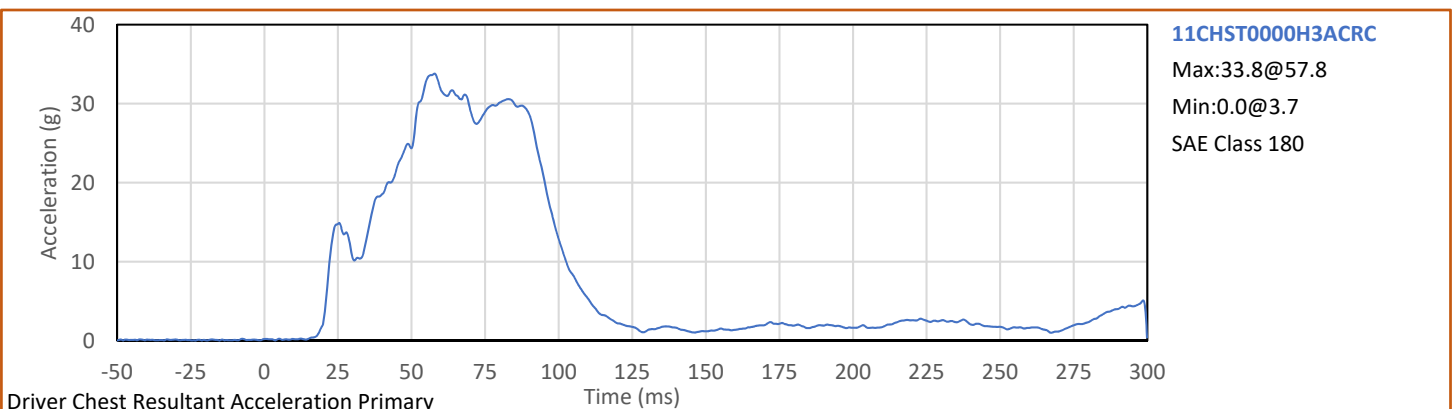
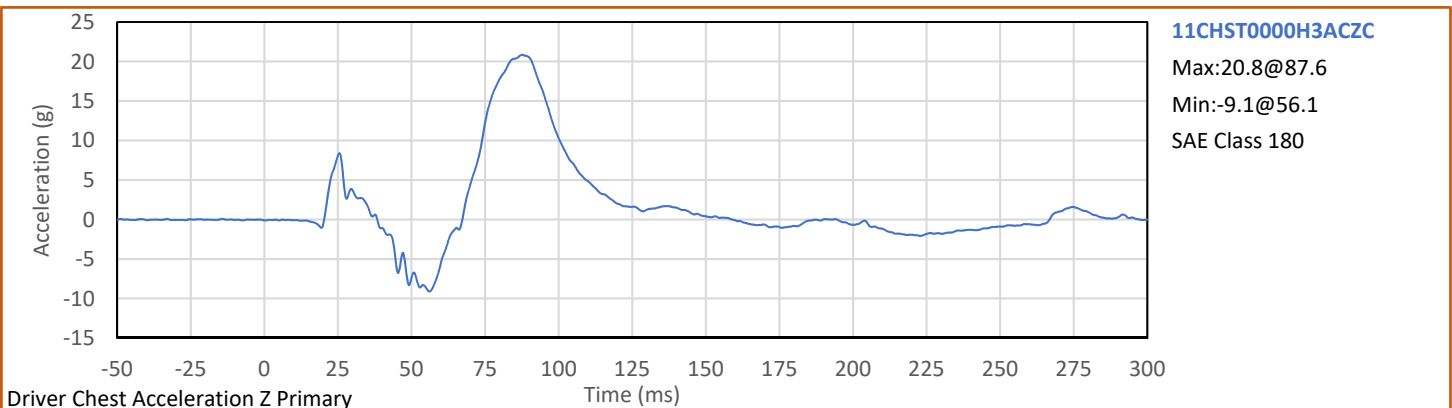
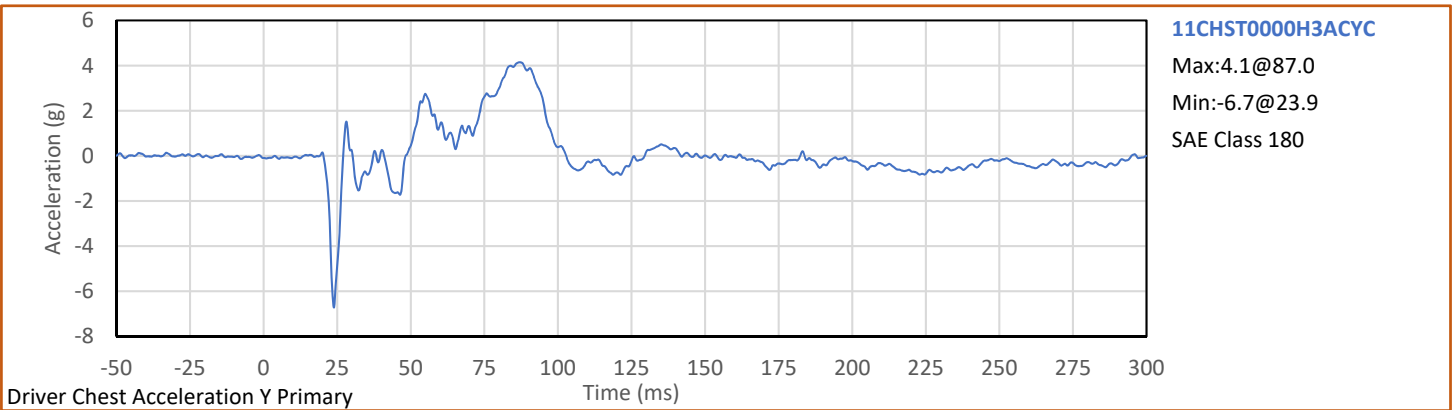
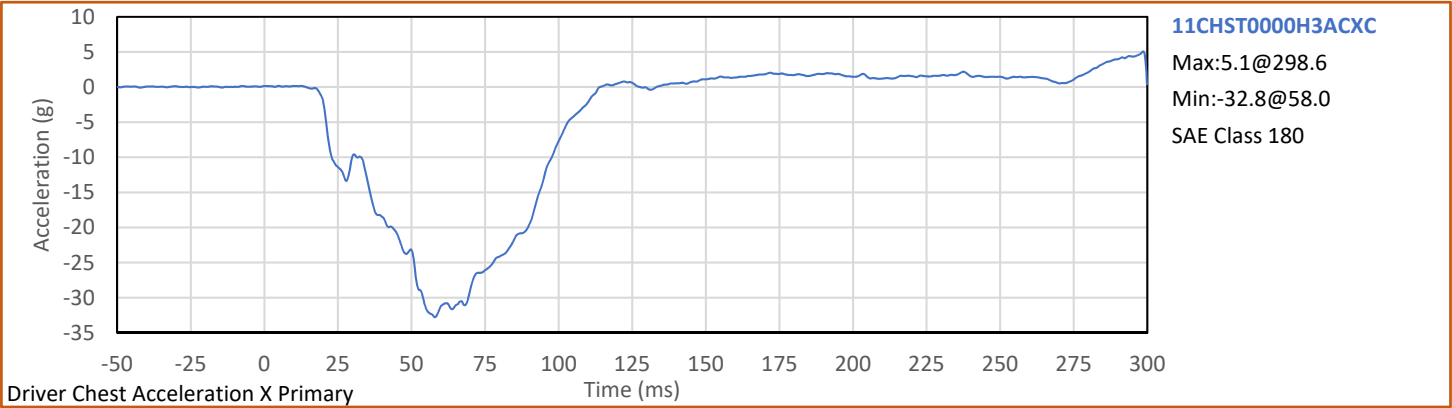
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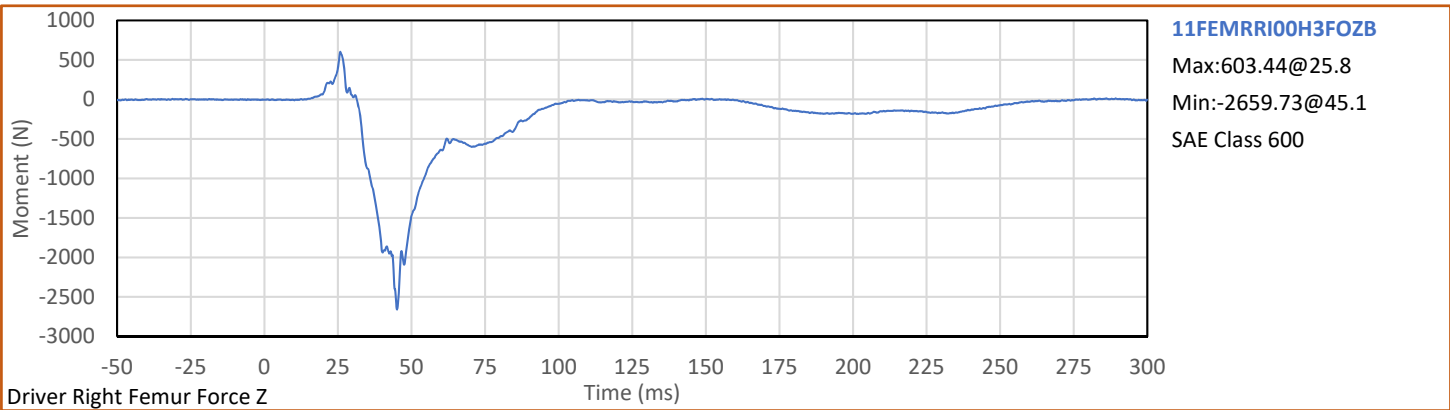
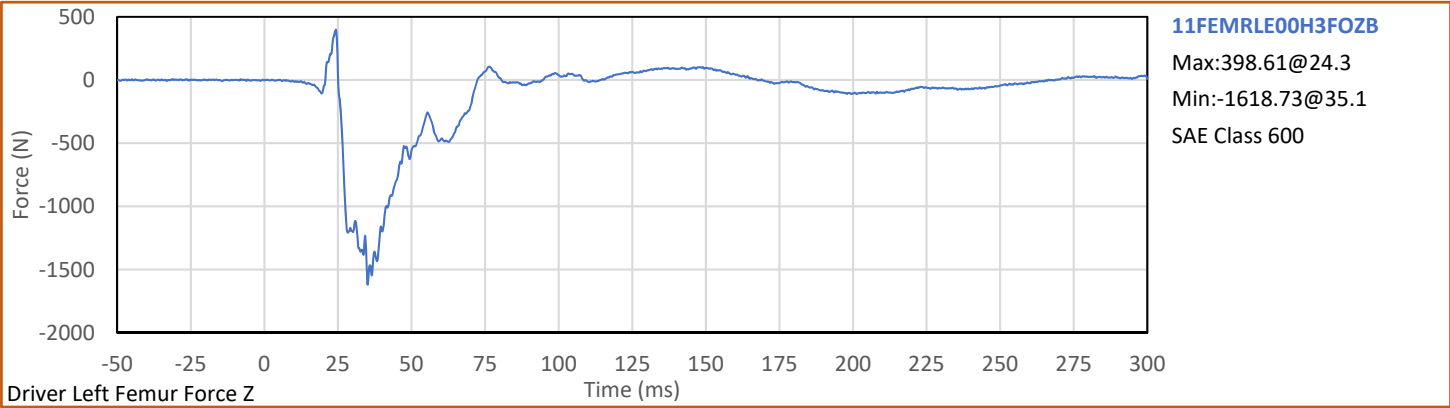


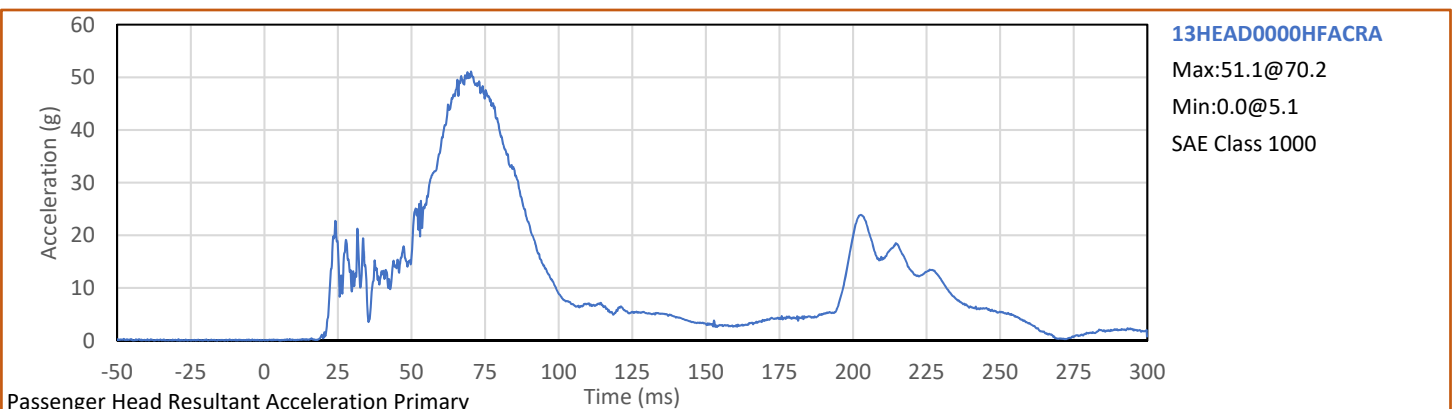
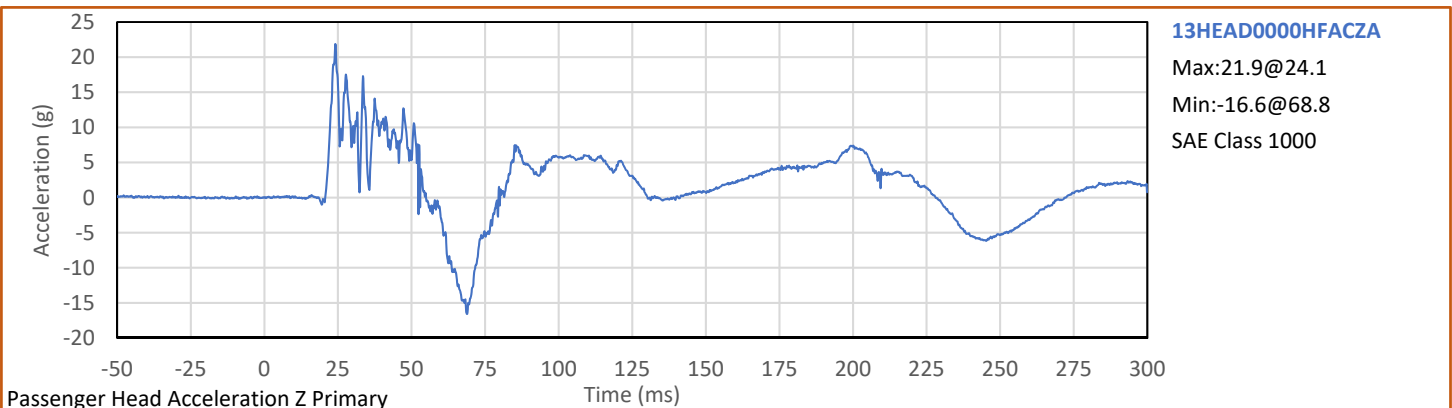
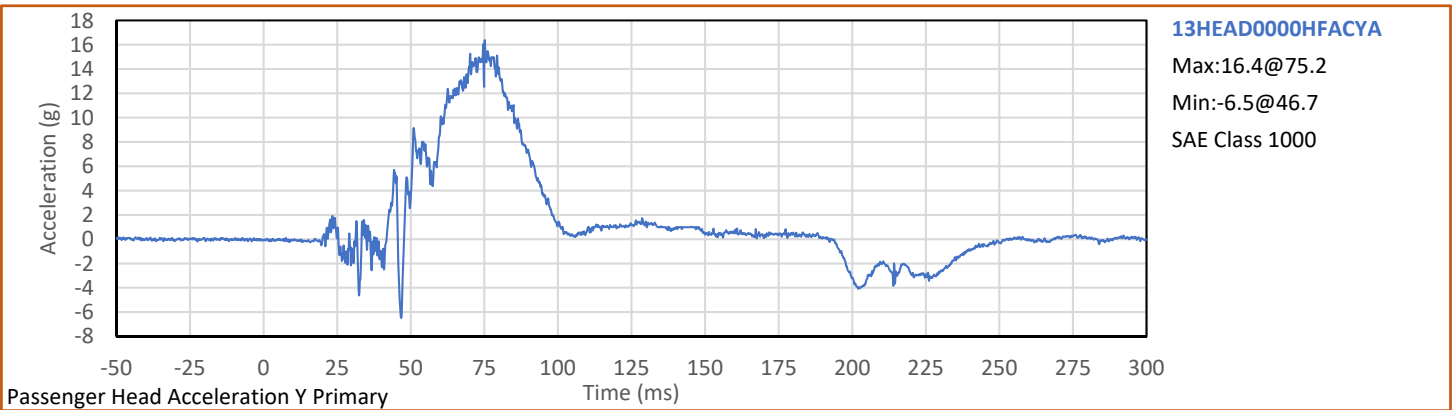
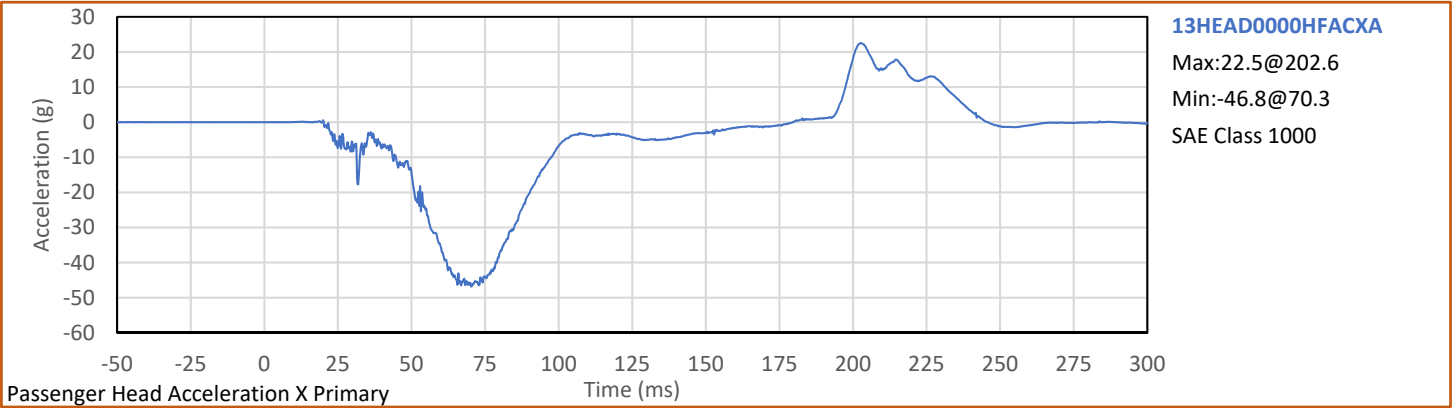




Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan
Test Program: 56.3 km/h Frontal Impact NCAP Test

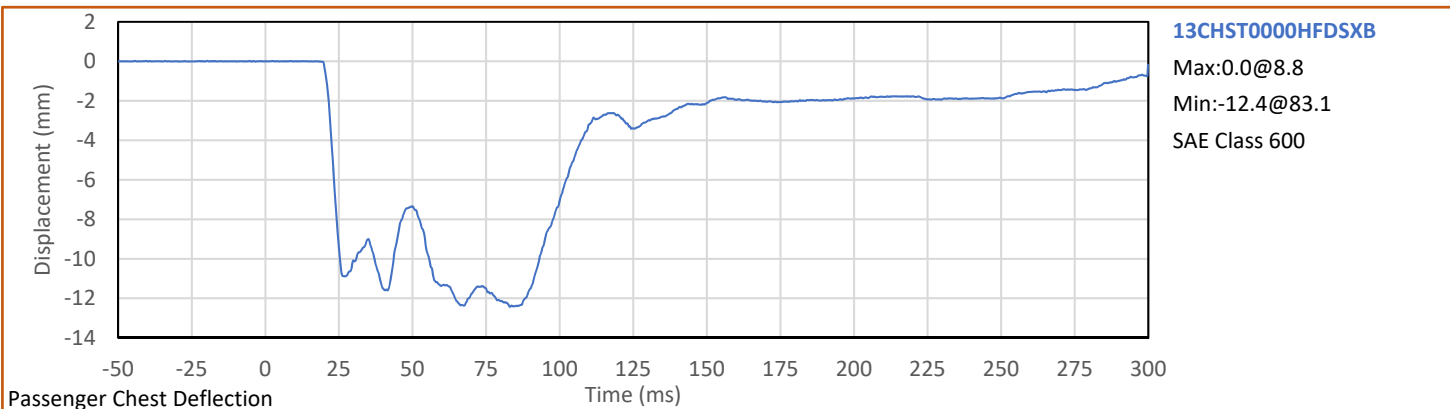
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Test Date: 4/30/2019

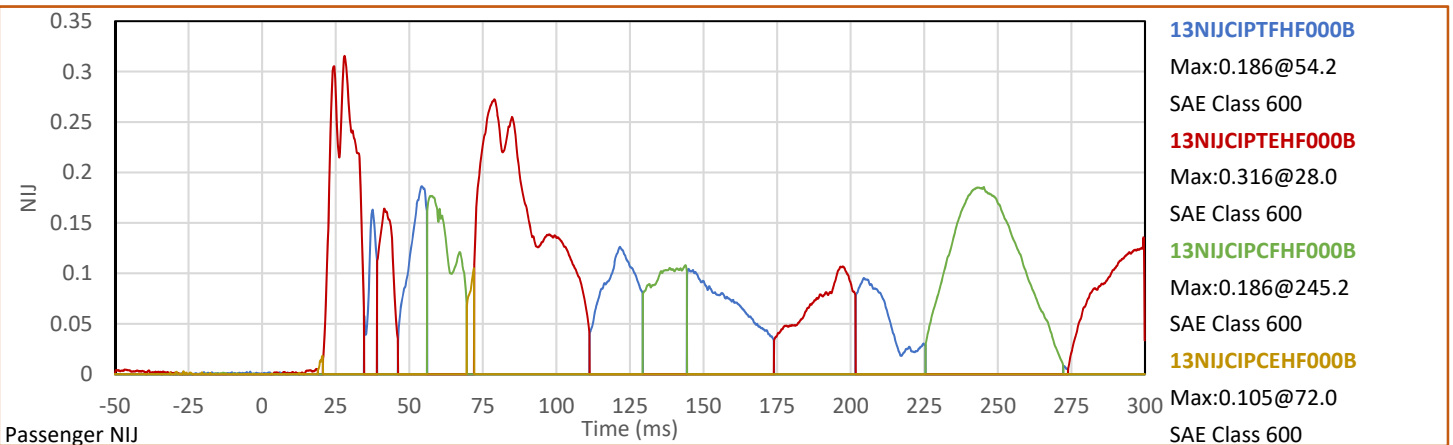
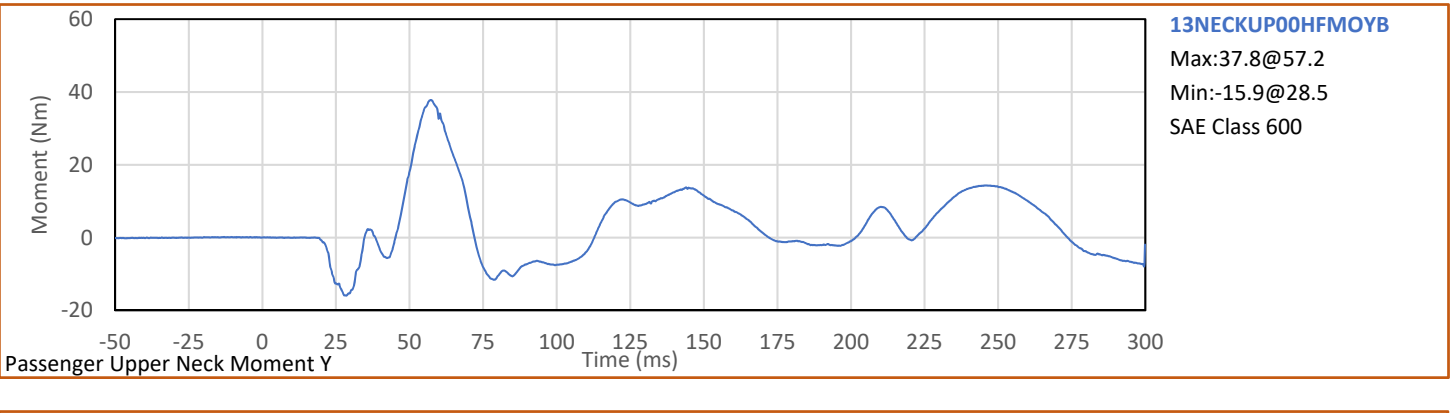
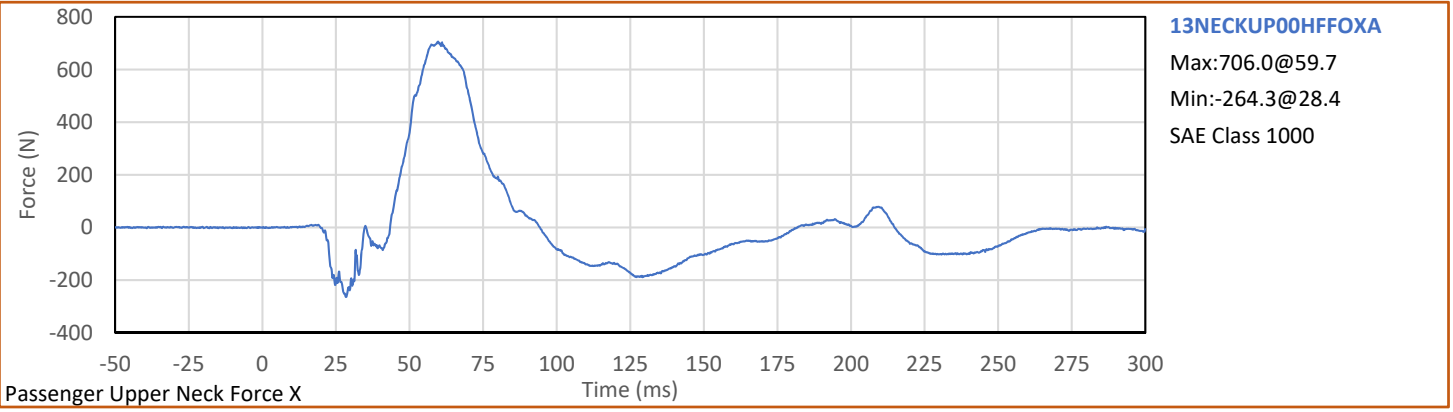


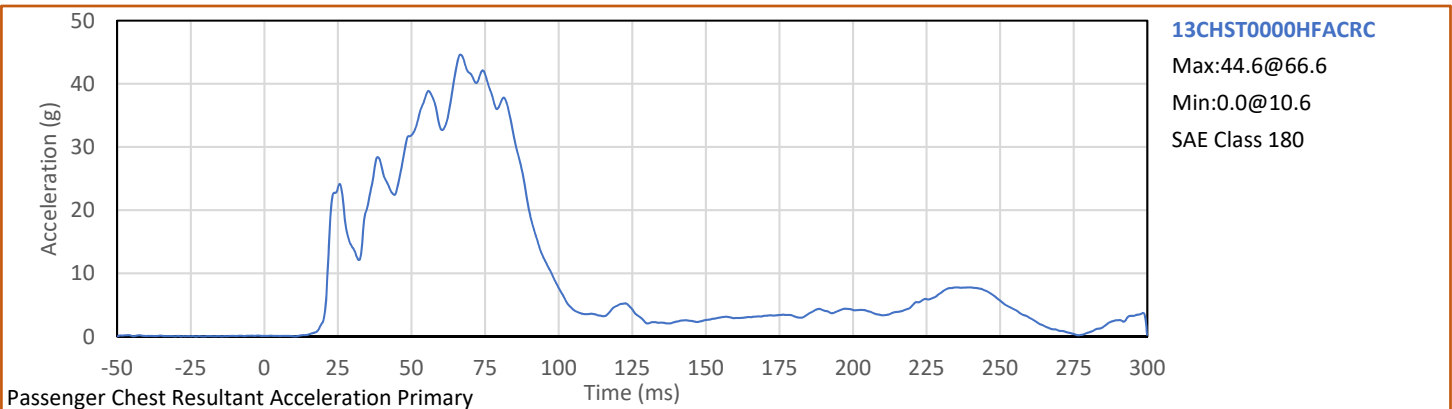
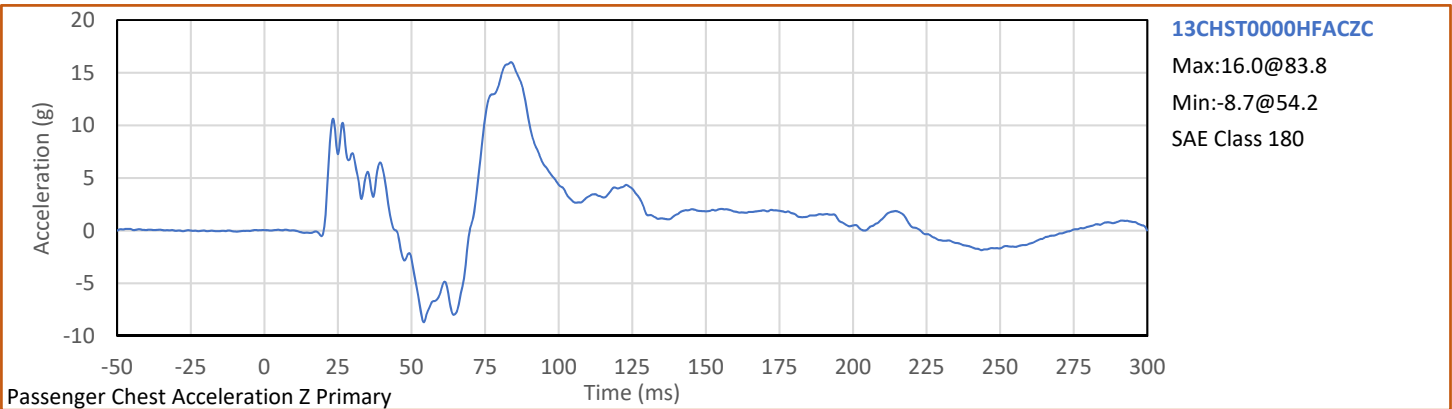
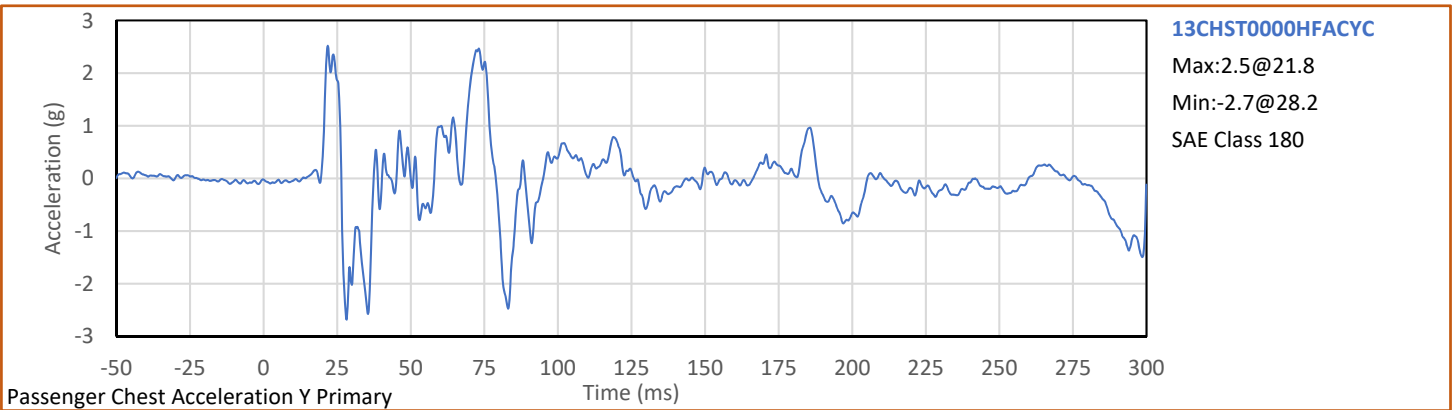
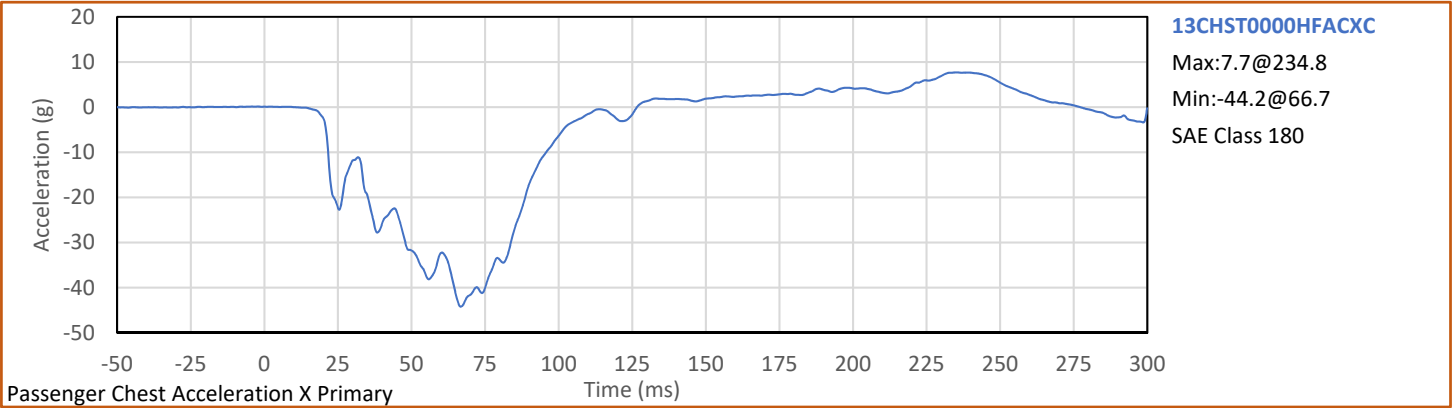


Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20195000
Test Date: 4/30/2019







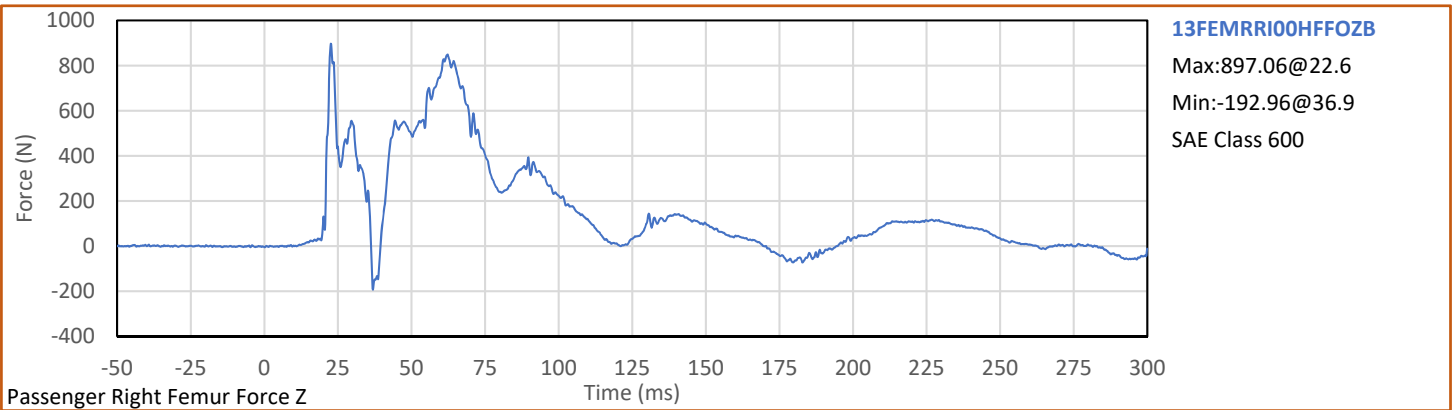
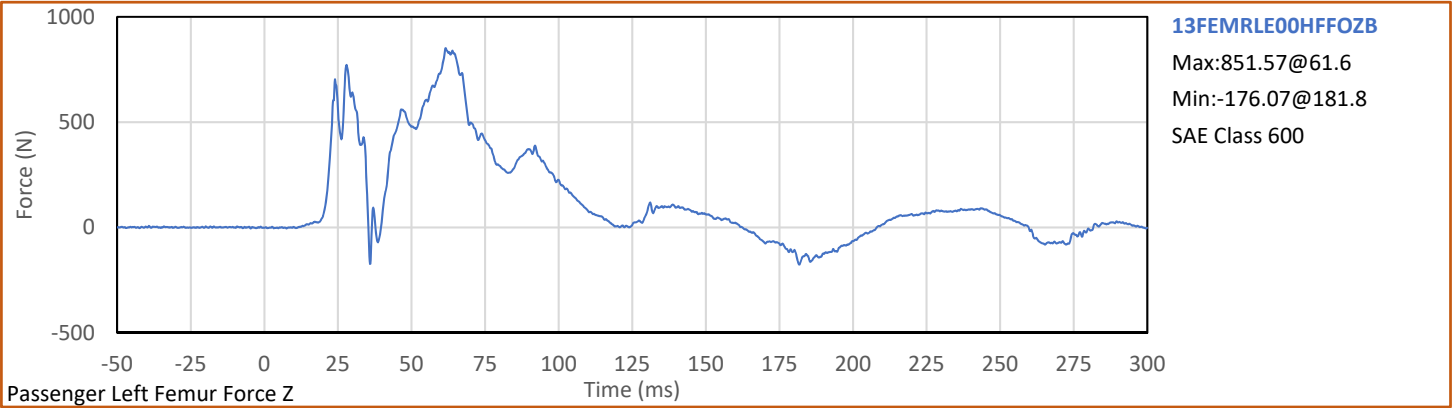
Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan

NHTSA No.: O20195000



Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 4/30/2019



APPENDIX C
ATD CALIBRATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
Pre-Test ATD Configuration And Performance Verification Data
Hybrid III 50th Percentile Male ATD
S/N: 360

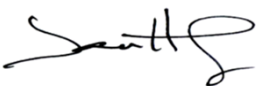
ATD Serial No.: 360


Test Date: 2019-03-13

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:

No Problems Found

Technician: 
J. Hernandez

Approved By: 
P. Puzutto TR-P39134-01-NC

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	882	Pass
B - Shoulder pivot height	mm	505	521	516	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	93	Pass
F - Thigh clearance	mm	140	155	150	Pass
G - Back of elbow to wrist pivot	mm	290	305	298	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	330	345	341	Pass
J - Elbow rest height	mm	190	211	204	Pass
K - Buttock to knee length	mm	579	604	596	Pass
L - Popliteal length	mm	429	455	448	Pass
M - Knee pivot height	mm	485	500	491	Pass
N - Buttock popliteal length	mm	452	477	458	Pass
O - Chest depth without jacket	mm	213	229	224	Pass
P - Foot length	mm	251	267	259	Pass
V - Shoulder breadth	mm	422	437	426	Pass
W - Foot breadth	mm	91	107	97	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	982	Pass
Z - Waist circum.	mm	836	866	856	Pass
AA - Location for chest circum.	mm	429	434	430	Pass
BB - Location for waist circum.	mm	226	231	229	Pass
Overall Test Results					Pass

Technician: _____



J. Hernandez

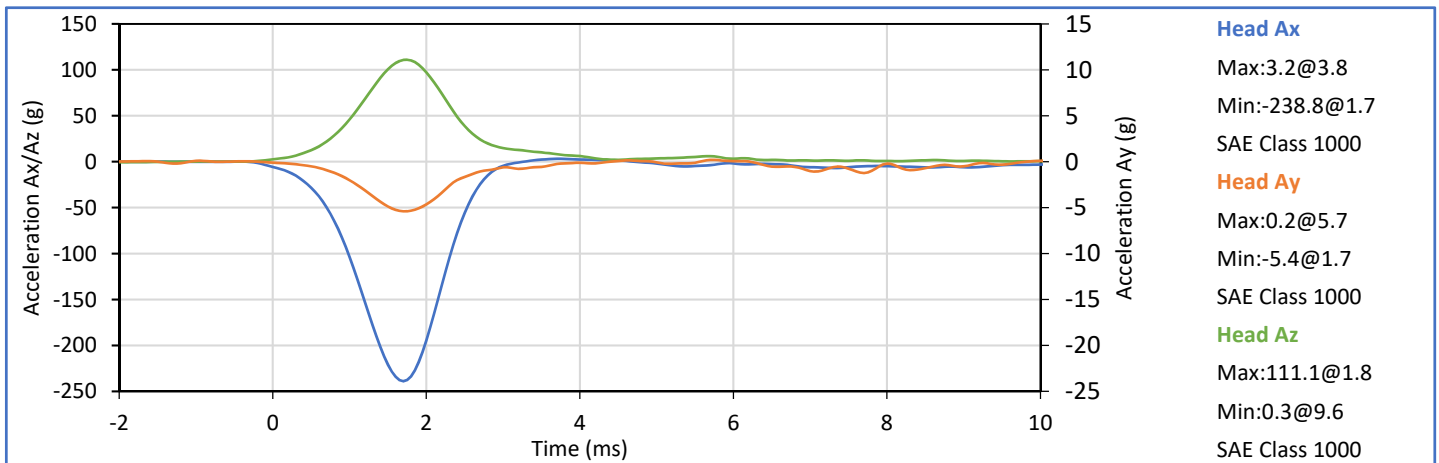
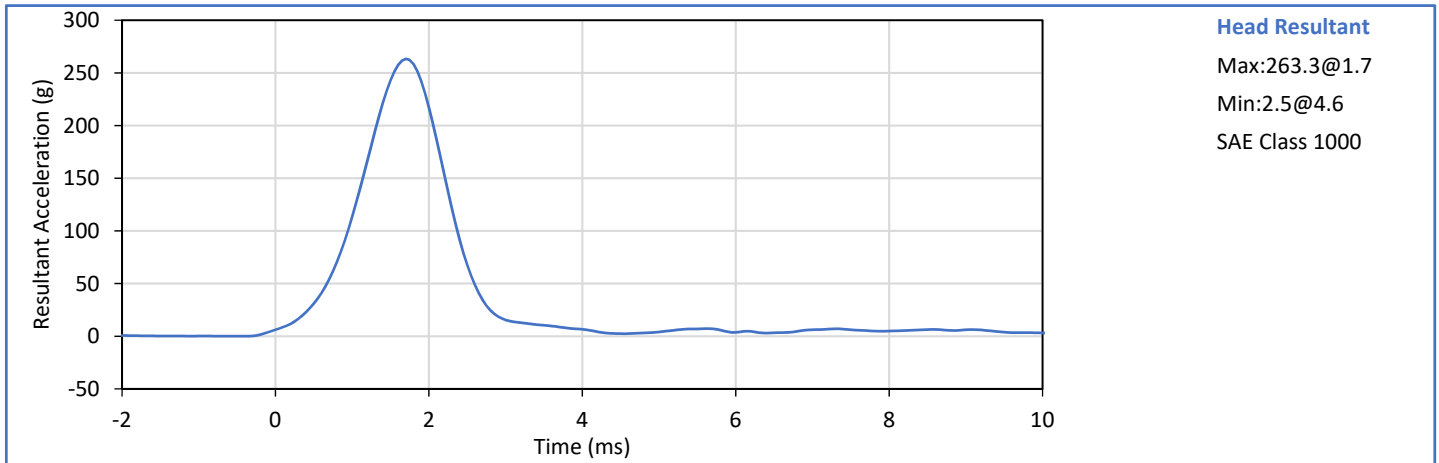
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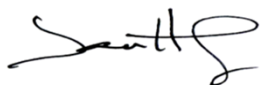



P. Puzzuto

TR-P39134-01-NC

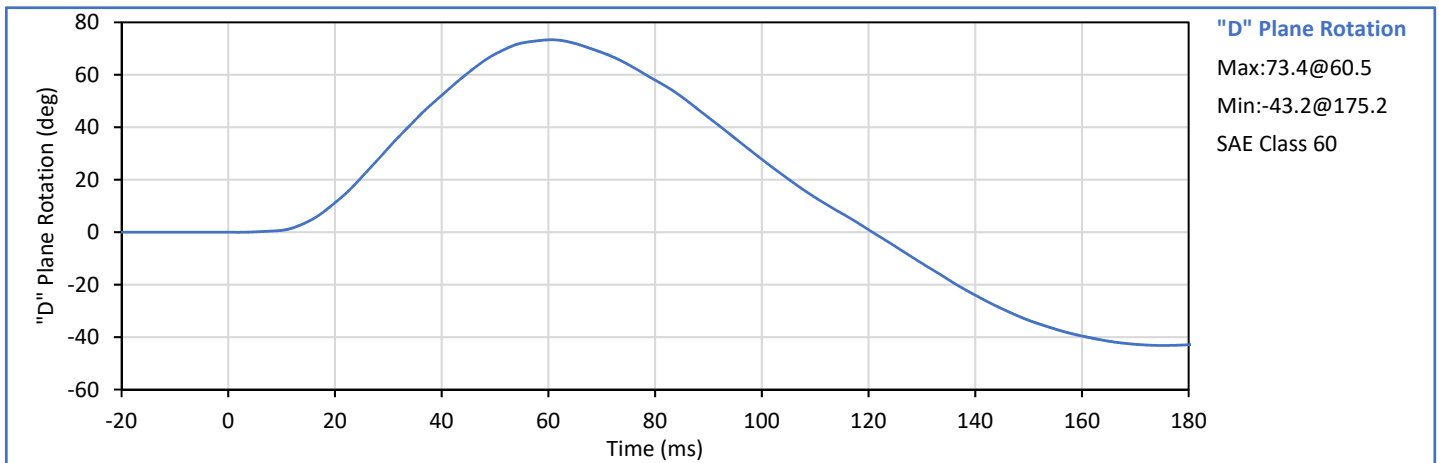
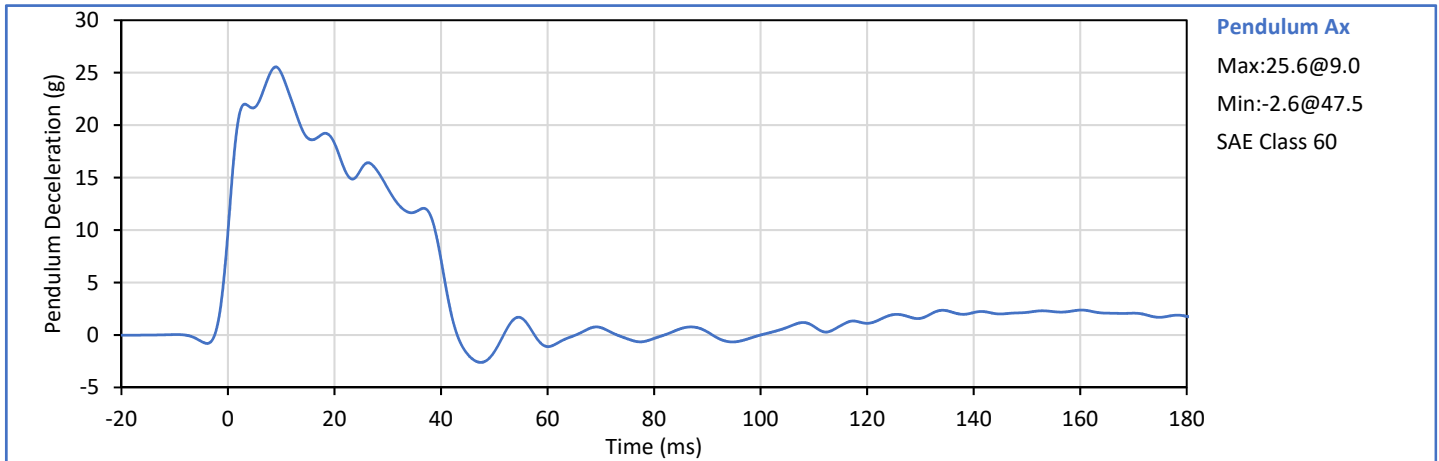
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Humidity	%	10	70	25	Pass
Peak Resultant Acceleration	g	225.0	275.0	263.3	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-5.4	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass

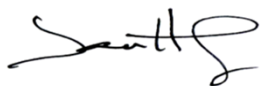


Technician: 
J. Hernandez

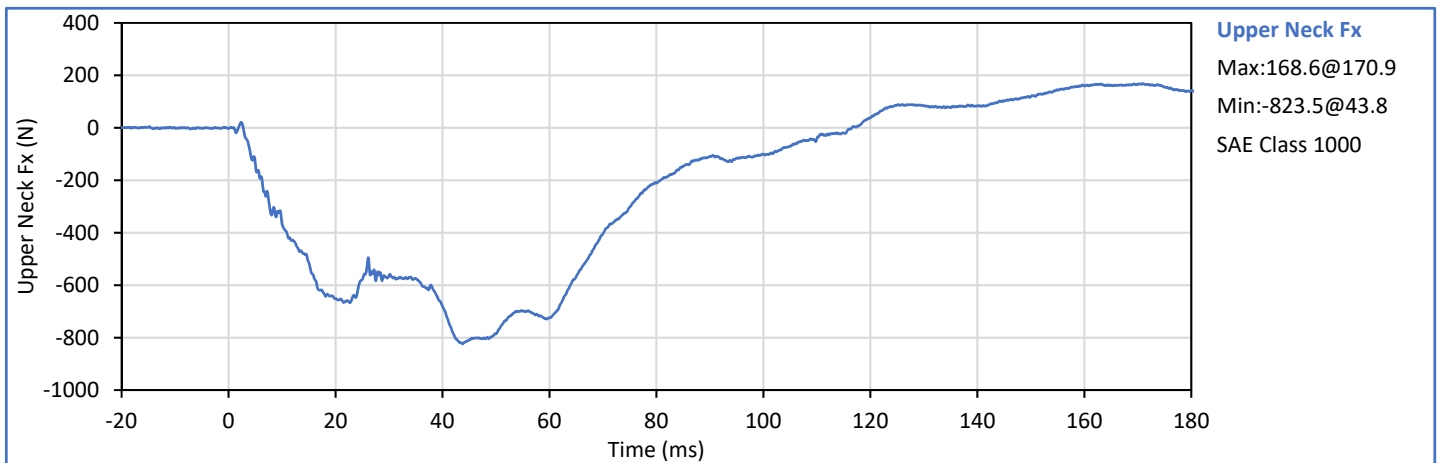
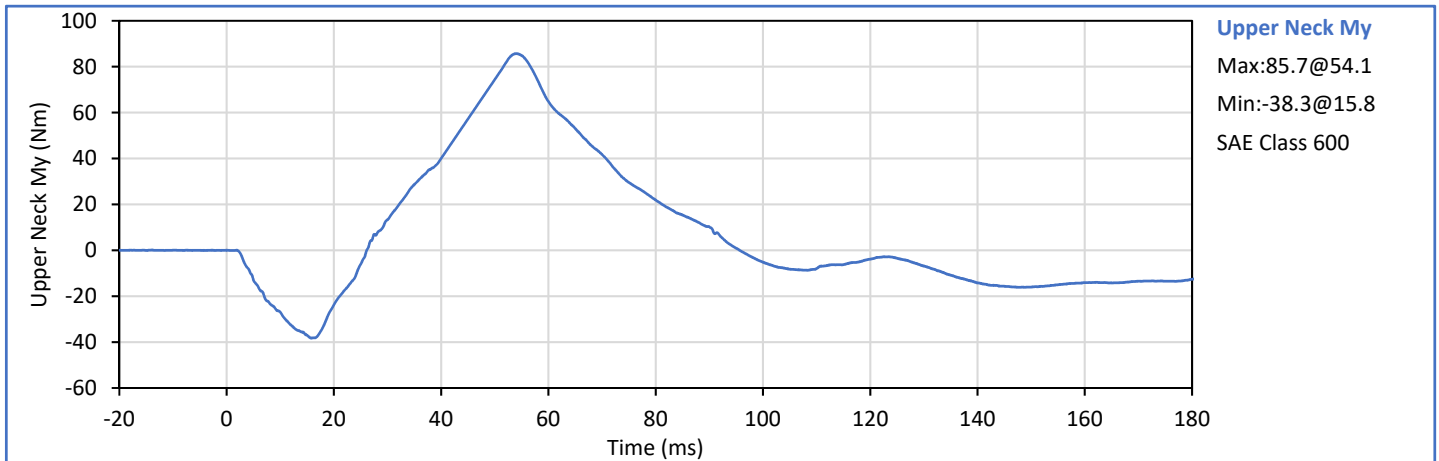
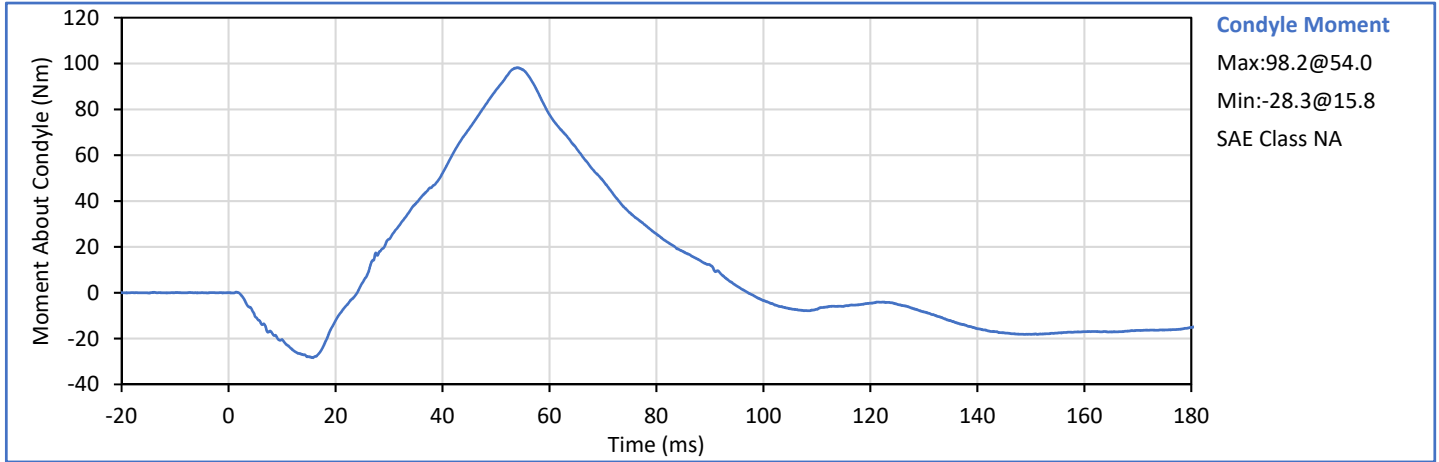
Approved By: 
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	6.89	7.13	6.99	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.0	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	18.3	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	14.0	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	14.0	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	40.8	Pass
"D" Plane Rotation peak	deg	64.0	78.0	73.4	Pass
	ms	57.0	64.0	60.5	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	120.8	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	98.2	Pass
	ms	47.0	58.0	54.0	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	97.1	Pass
Overall Test Results					Pass

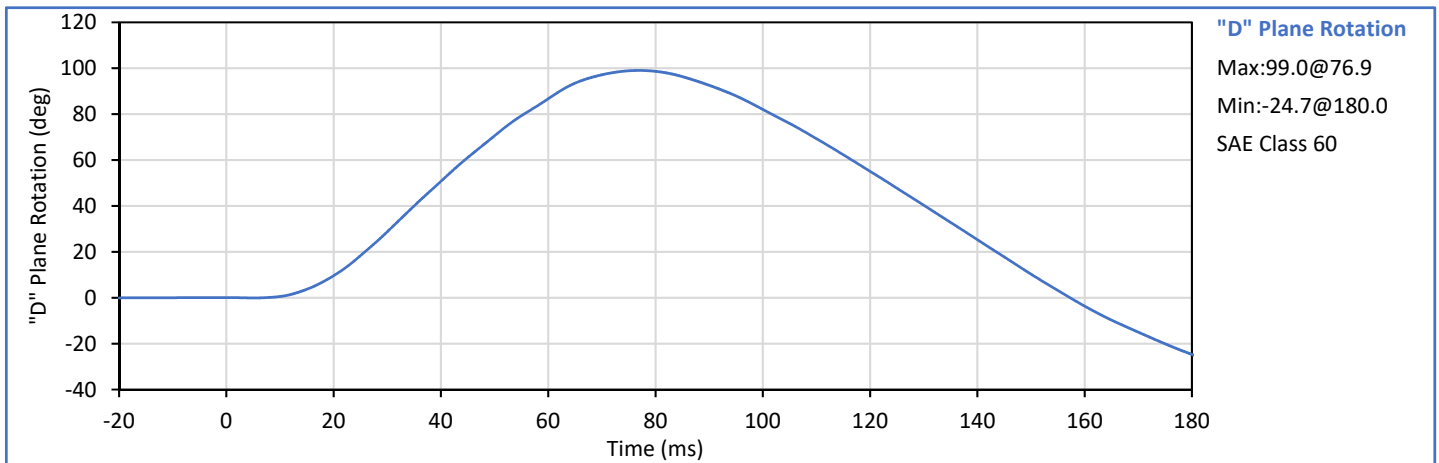
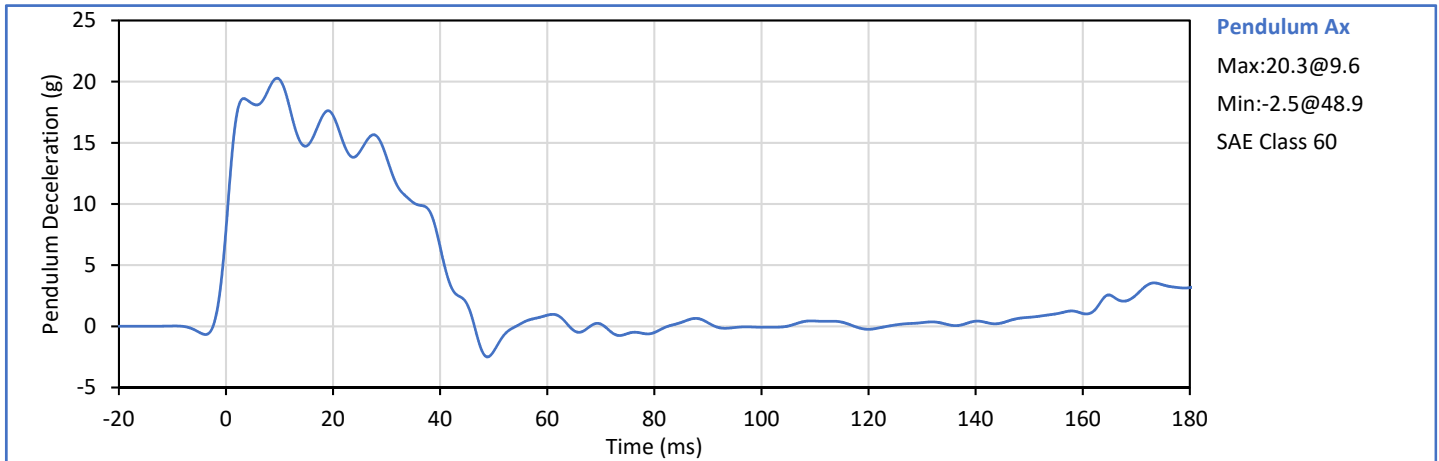


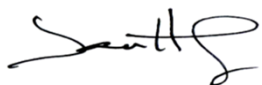
Technician: 
J. Hernandez

Approved By:  TR-P39134-01-NC
P. Puzzuto

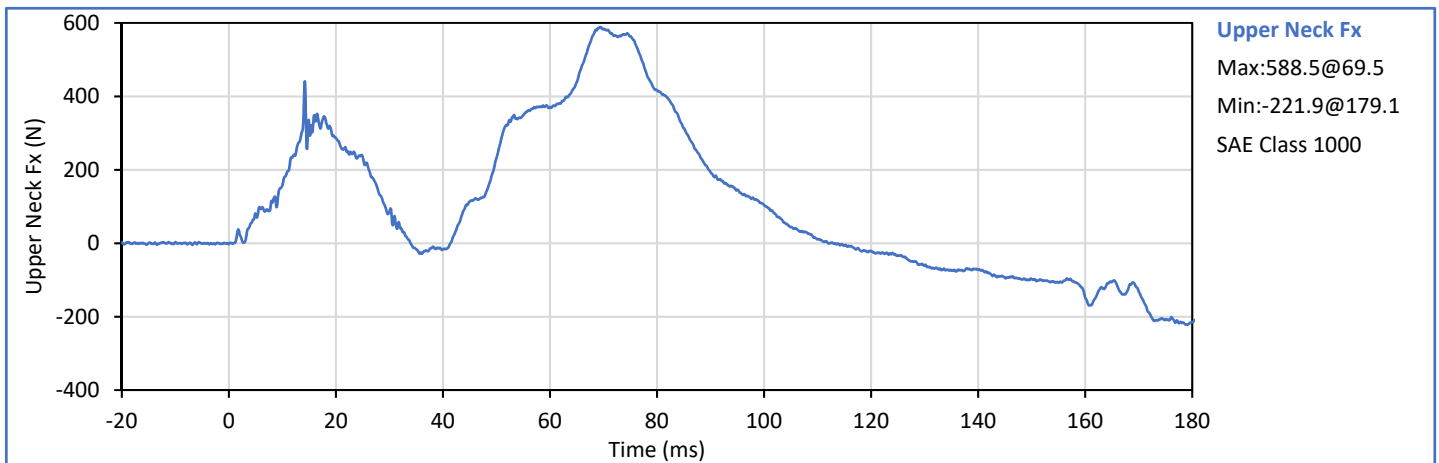
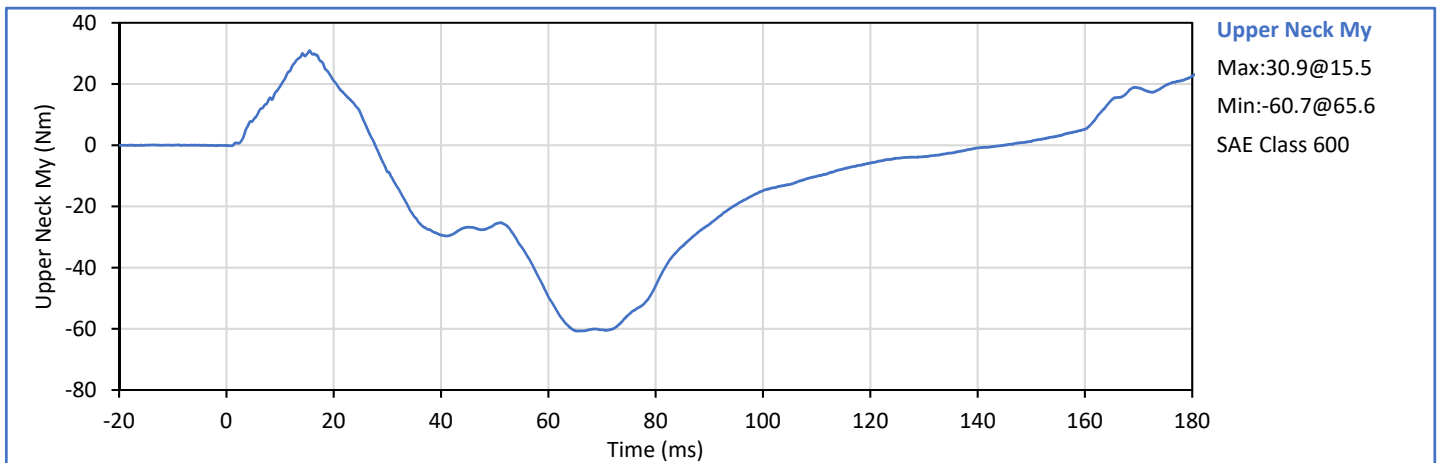
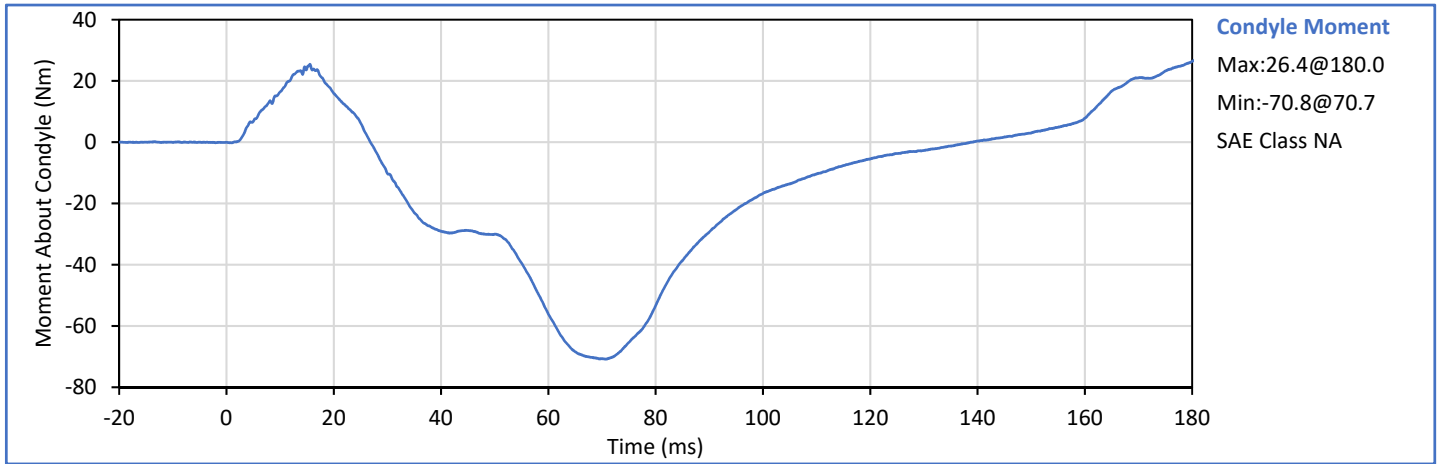


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	5.94	6.19	5.99	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	20.2	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	17.2	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	13.8	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	13.8	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	40.8	Pass
"D" Plane Rotation peak	deg	81.0	106.0	99.0	Pass
	ms	72.0	82.0	76.9	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	157.4	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-70.8	Pass
	ms	65.0	79.0	70.7	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	138.8	Pass
Overall Test Results					Pass

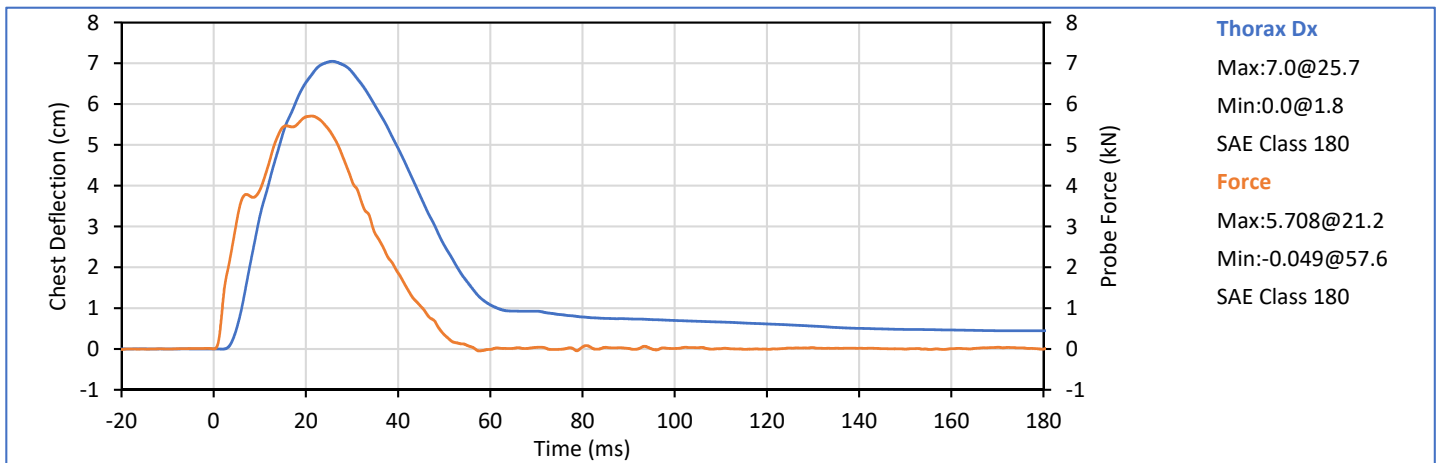
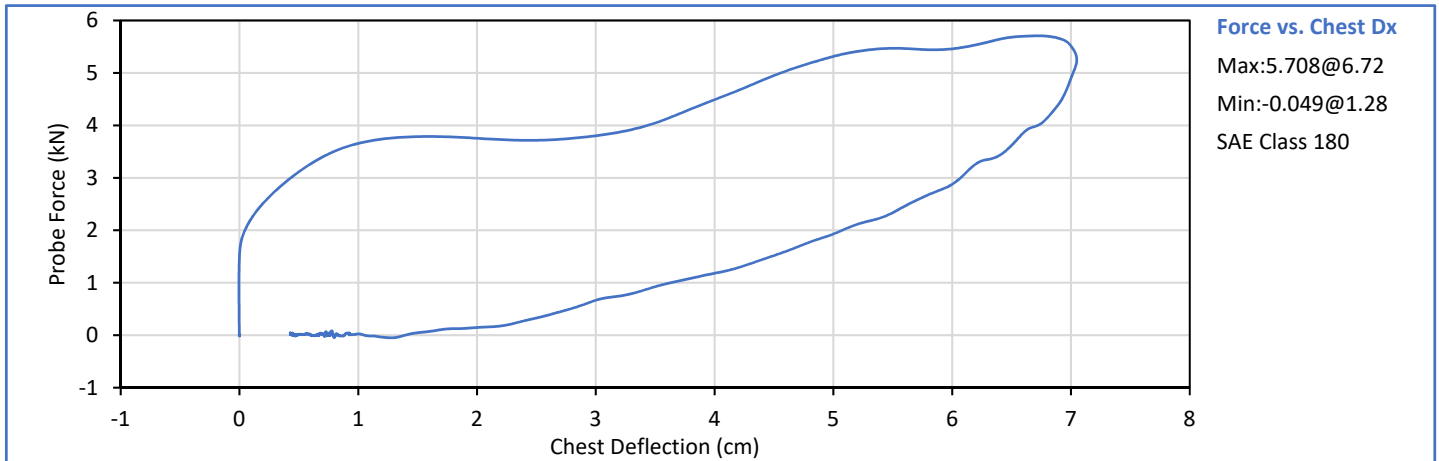


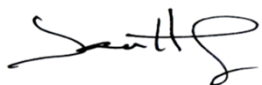
Technician: 
J. Hernandez


Approved By:  TR-P39134-01-NC
P. Puzzuto



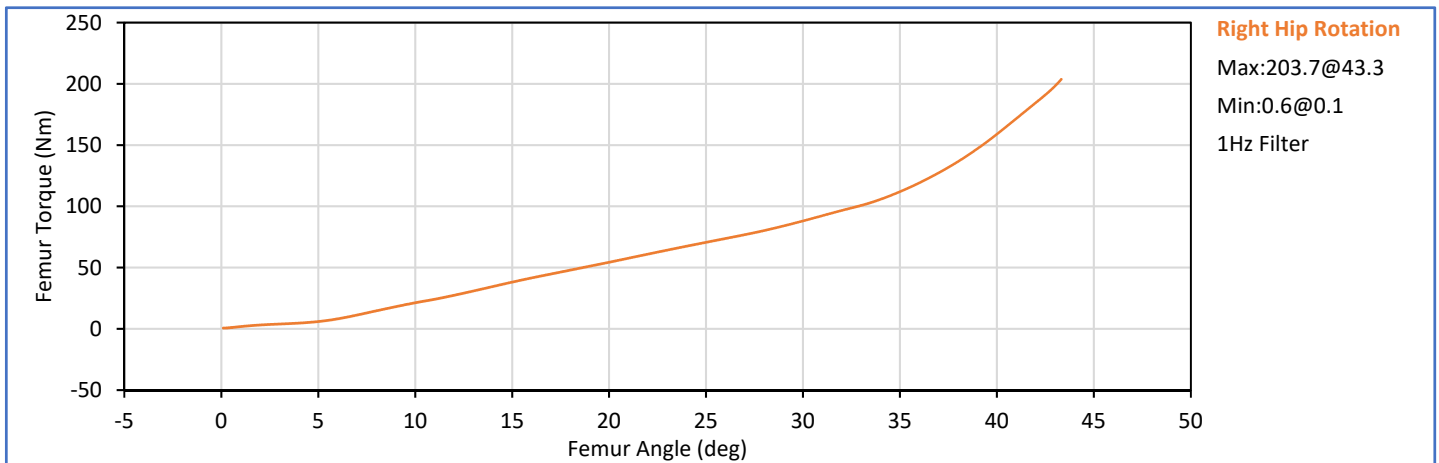
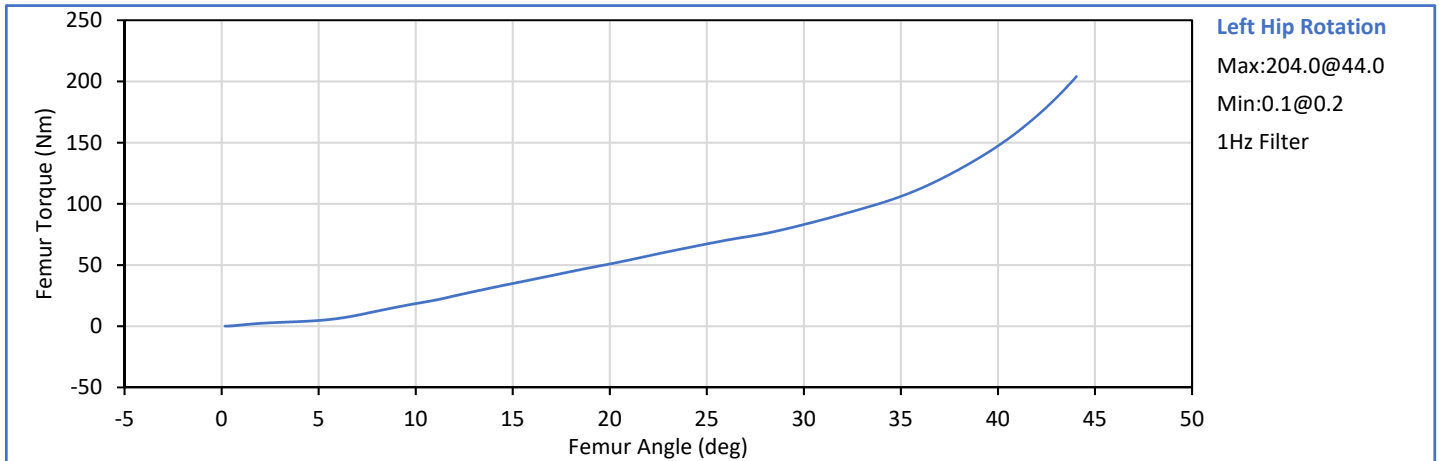
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	24	Pass
Probe Velocity	m/s	6.58	6.82	6.63	Pass
Peak Chest Deflection	cm	6.35	7.26	7.05	Pass
Peak Probe Force	kN	5.159	5.893	5.708	Pass
Internal Hysteresis	%	69.0	85.0	70.2	Pass
Overall Test Results					Pass

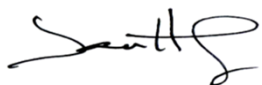


Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

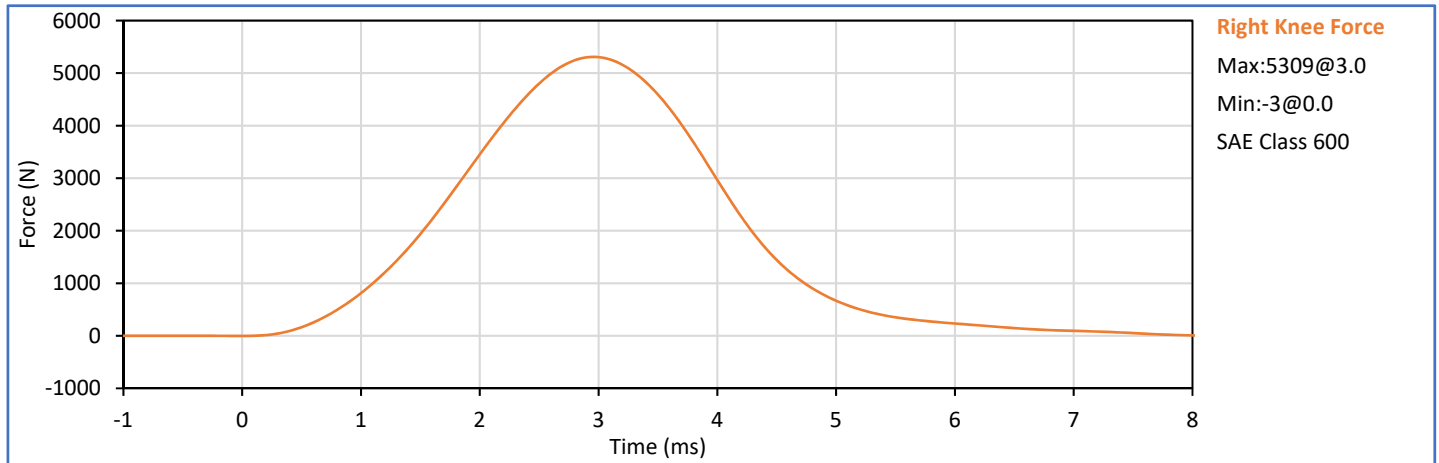
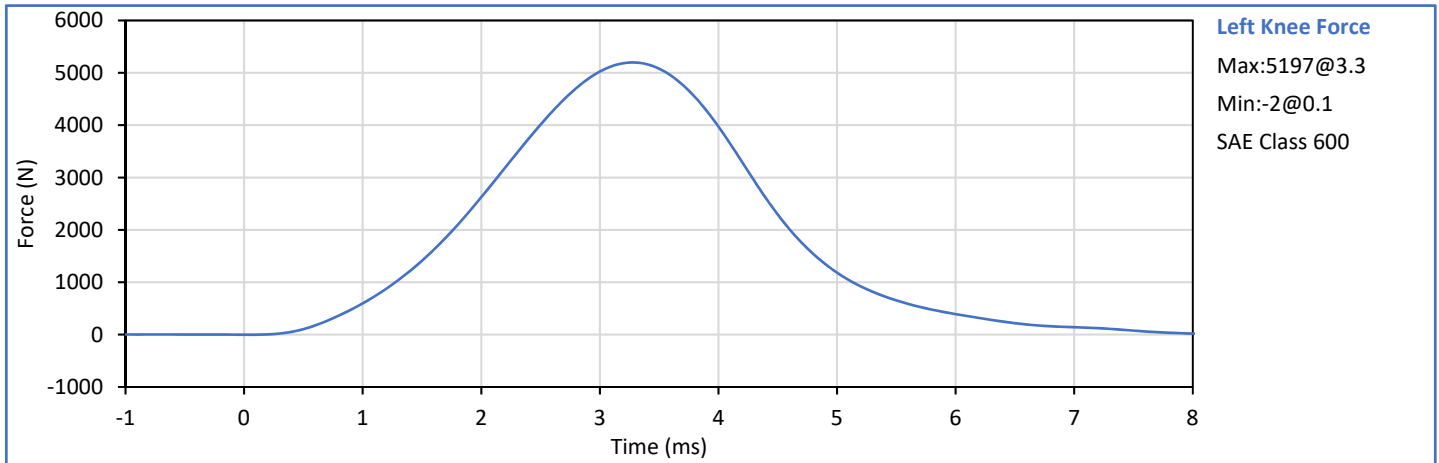
	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.6	Pass
	Laboratory Humidity	%	10	70	24	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	83.1	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	44.0	Pass
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	88.2	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	43.3	Pass
Overall Test Results						Pass

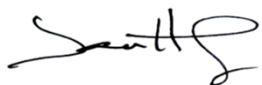



Technician: 
J. Hernandez

Approved By: 
P. Puzzuto

	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	Probe Velocity	m/s	2.070	2.130	2.093	Pass
Knee	Peak Resistive Force	N	4715	5782	5197	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.095	Pass
Knee	Peak Resistive Force	N	4715	5782	5309	Pass
Overall Test Results						Pass



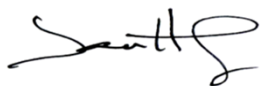
Technician: 
J. Hernandez

Approved By:  TR-P39134-01-NC
P. Puzzuto

Pre-Test ATD Configuration And Performance Verification Data
Hybrid III 5th Percentile Female ATD
S/N: 141

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. 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:  TR-P39134-01-NC
P. Puzzuto

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	796	Pass
B - Shoulder pivot height	mm	432	457	441	Pass
C - 'H' point height	mm	81	86	84	Pass
D - 'H' point location from backline	mm	145	150	147	Pass
E - Shoulder pivot from backline	mm	69	84	73	Pass
F - Thigh clearance	mm	119	135	126	Pass
G - Back of elbow to wrist pivot	mm	244	259	249	Pass
H - Head back to backline	mm	41	46	43	Pass
I - Shoulder to elbow length	mm	277	297	289	Pass
J - Elbow rest height	mm	183	203	194	Pass
K - Buttock to knee length	mm	521	546	531	Pass
L - Popliteal length	mm	356	376	365	Pass
M - Knee pivot height	mm	394	419	407	Pass
N - Buttock popliteal length	mm	414	439	428	Pass
O - Chest depth without jacket	mm	175	191	185	Pass
P - Foot length	mm	219	234	226	Pass
R - Buttock to Knee Pivot Length	mm	457	483	475	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	187	Pass
U - Hip Breadth	mm	300	315	303	Pass
V - Shoulder breadth	mm	351	366	361	Pass
W - Foot breadth	mm	79	94	82	Pass
X - Head circum.	mm	528	549	537	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	875	Pass
Z - Waist circum.	mm	760	790	772	Pass
AA - Location for chest circum.	mm	333	358	338	Pass
BB - Location for waist circum.	mm	160	170	164	Pass
Overall Test Results					Pass

Technician: _____



J. Hernandez

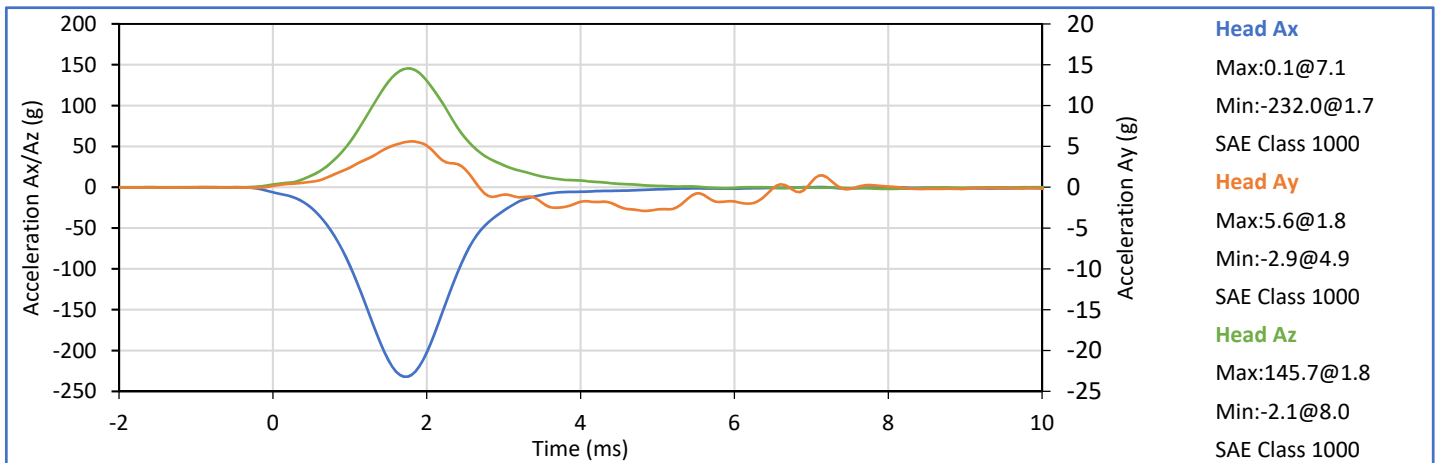
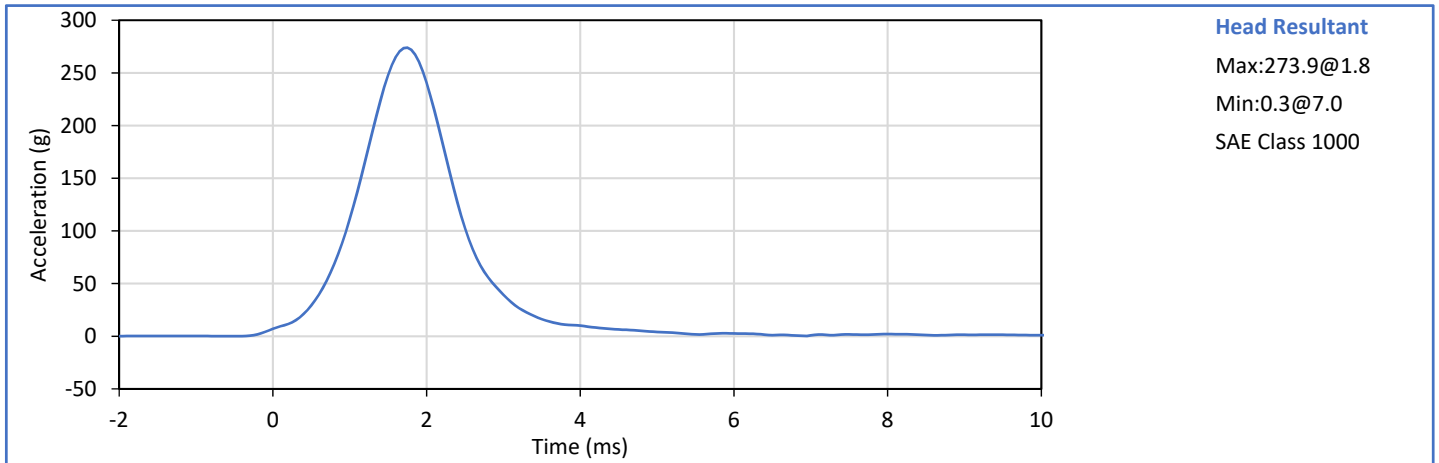
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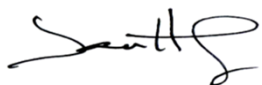



P. Puzzuto

TR-P39134-01-NC

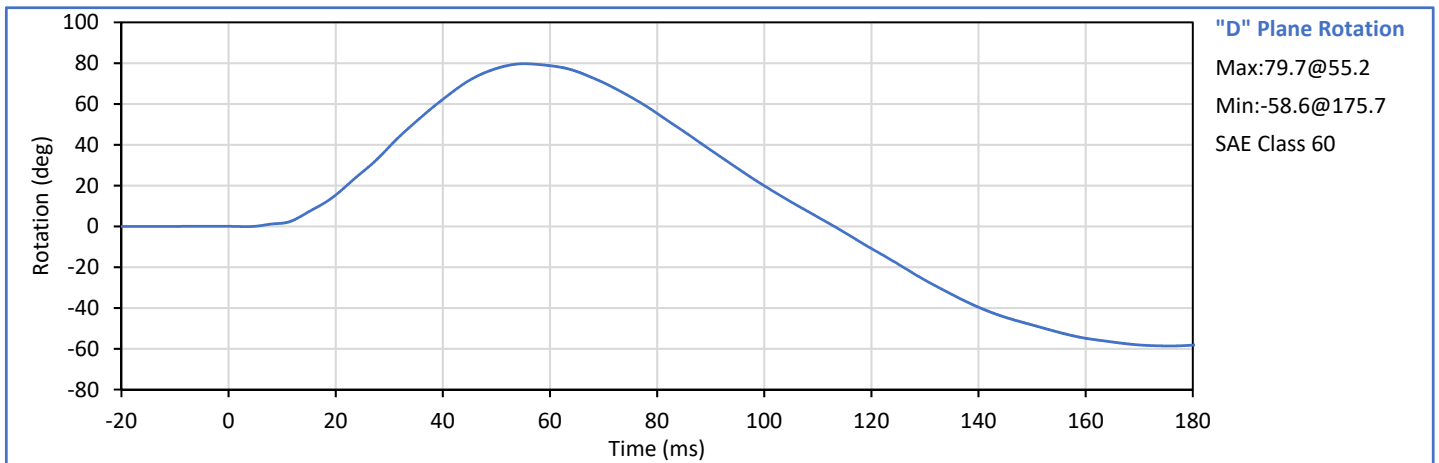
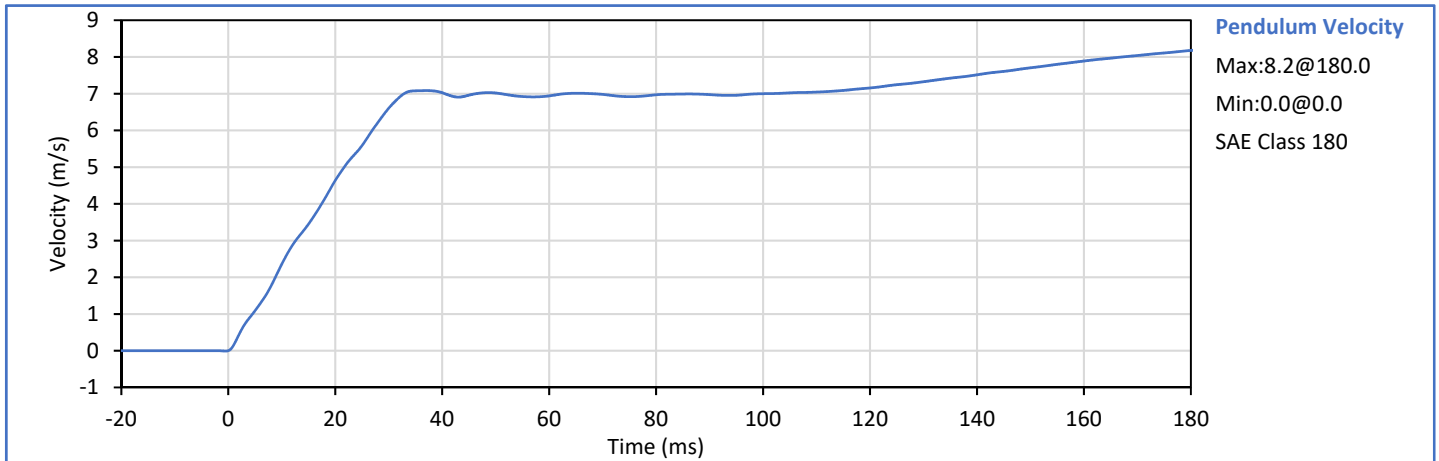
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.9	Pass
Laboratory Humidity	%	10	70	25	Pass
Peak Resultant Acceleration	g	250.0	300.0	273.9	Pass
Peak Lateral Acceleration	g	-15.0	15.0	5.6	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass

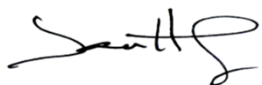


Technician: 
J. Hernandez

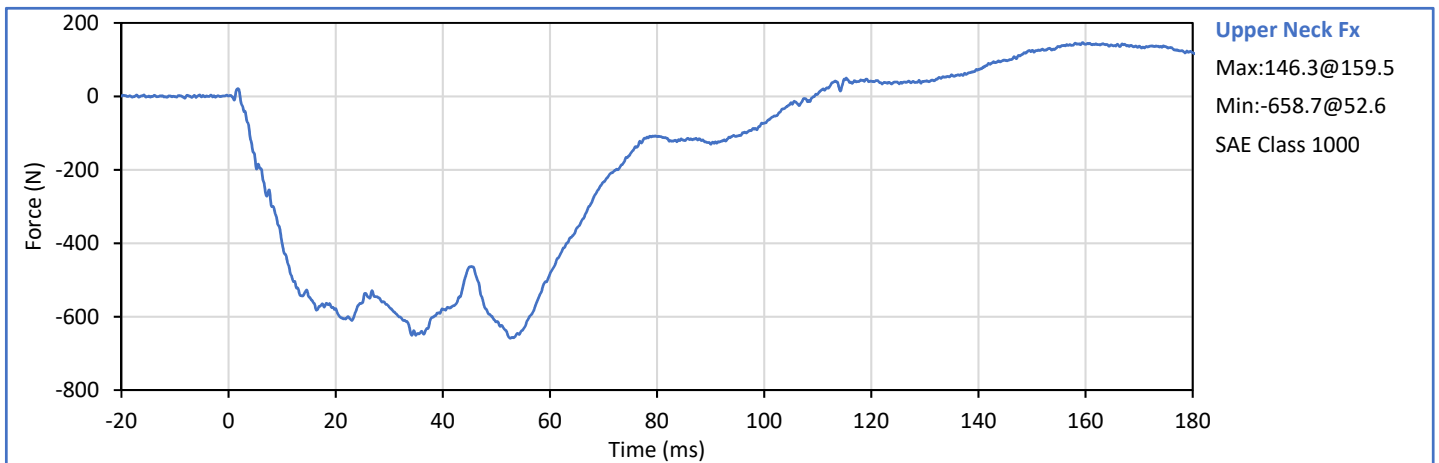
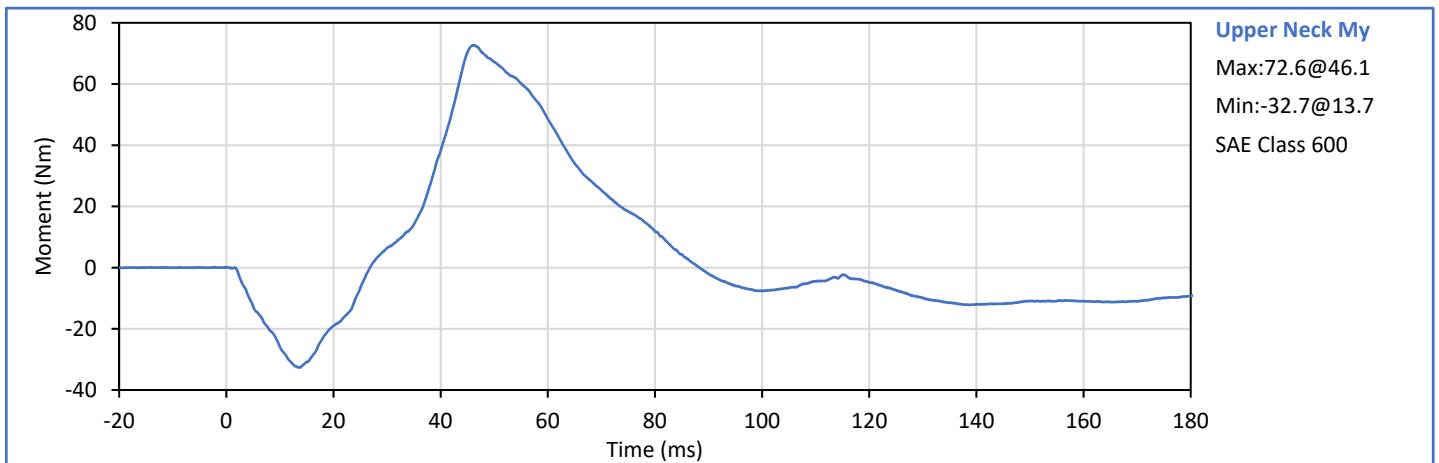
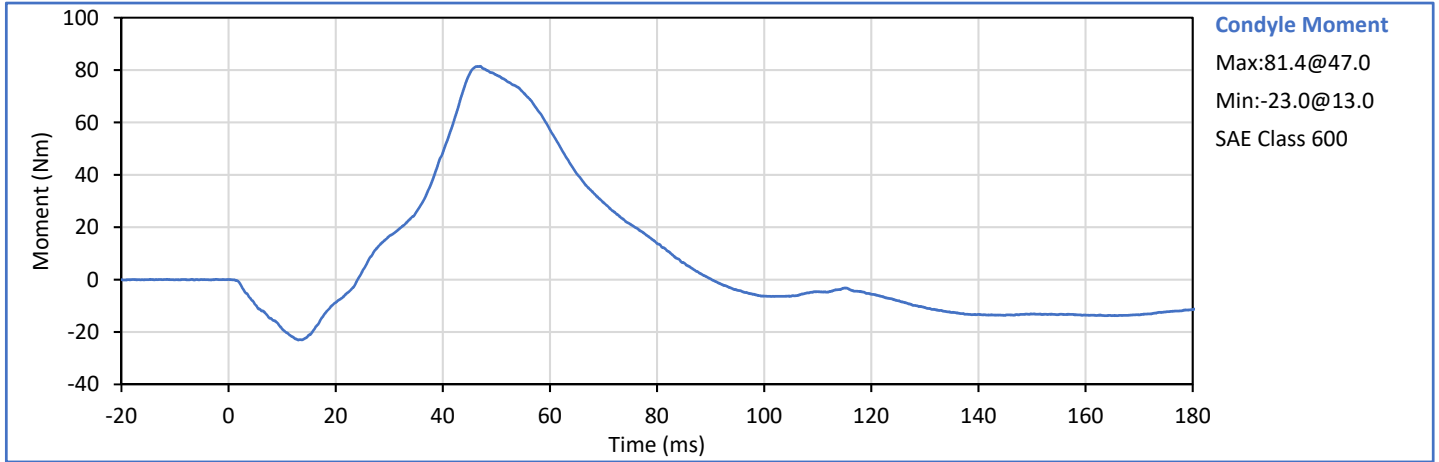
Approved By: 
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	6.89	7.13	6.91	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.36	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.64	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.60	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	79.7	Pass
Peak Moment in Rotation	Nm	69.0	83.0	81.4	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	82.6	Pass
Overall Test Results					Pass

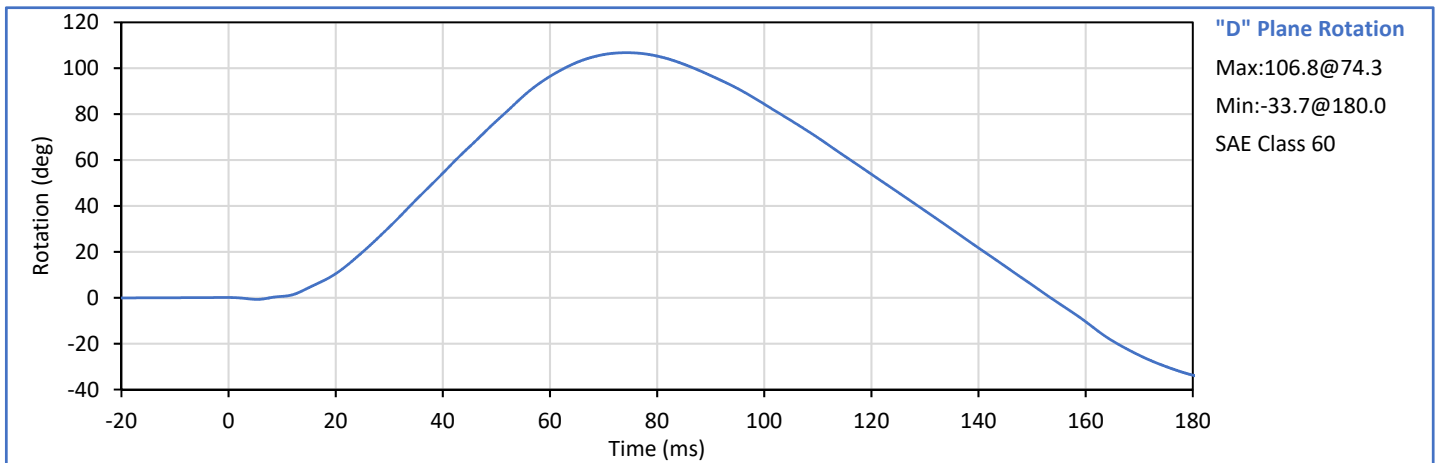
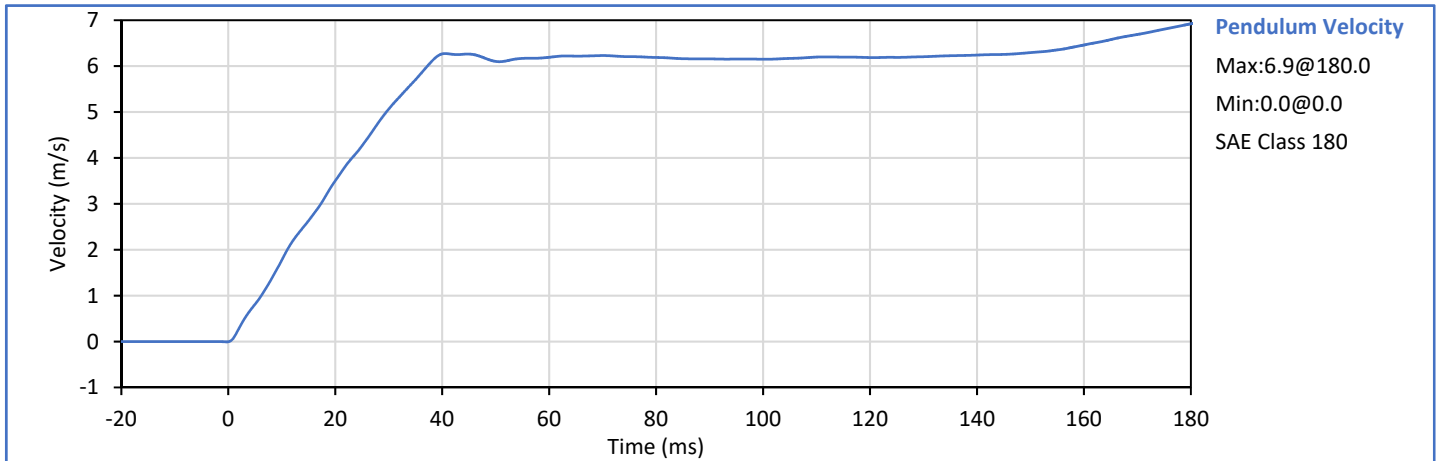


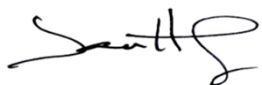
Technician: 
J. Hernandez


Approved By:  TR-P39134-01-NC
P. Puzzuto

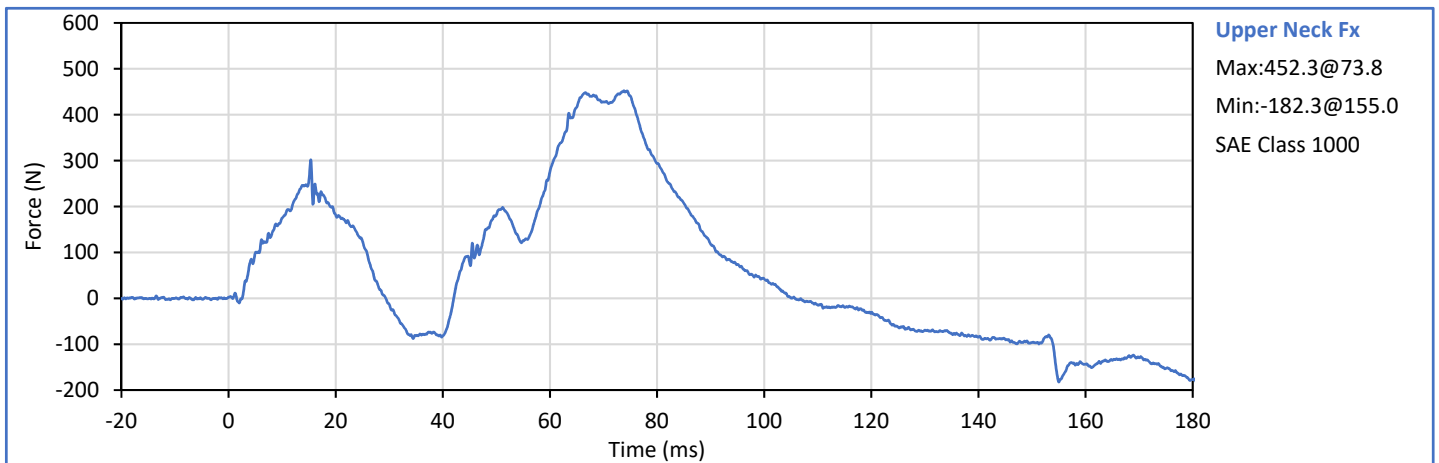
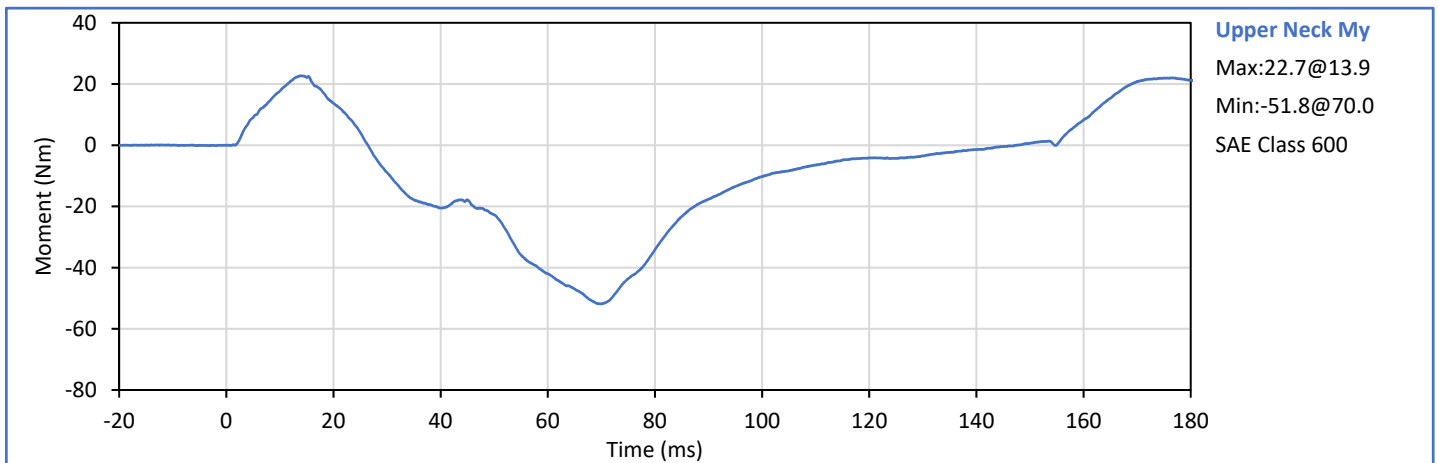
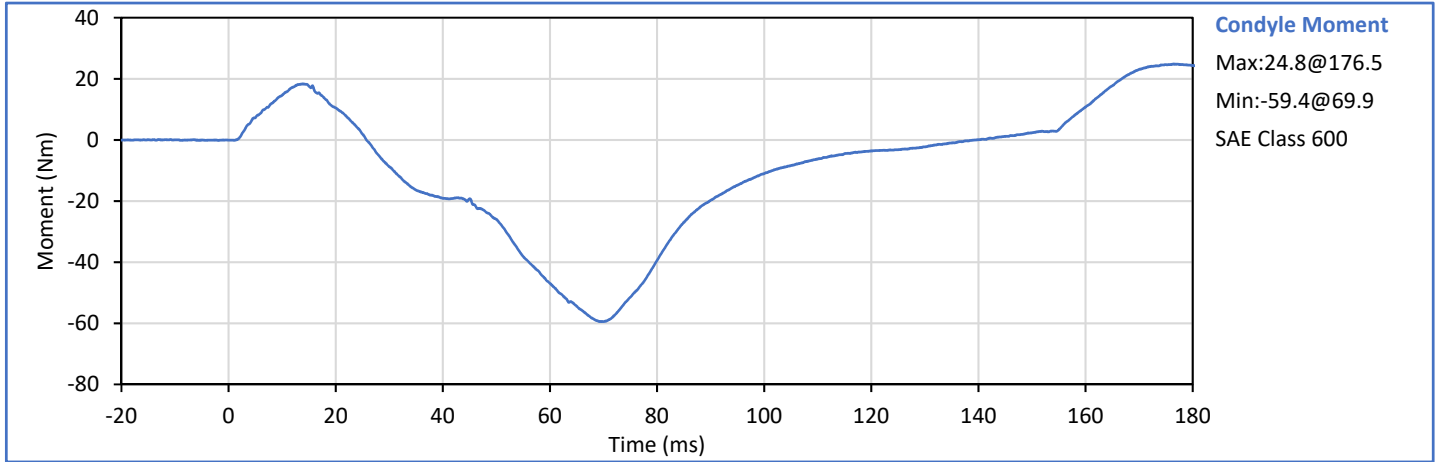


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	25	Pass
Pendulum Velocity	m/s	5.95	6.19	6.08	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.77	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.50	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.07	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	106.8	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-59.4	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	101.7	Pass
Overall Test Results					Pass

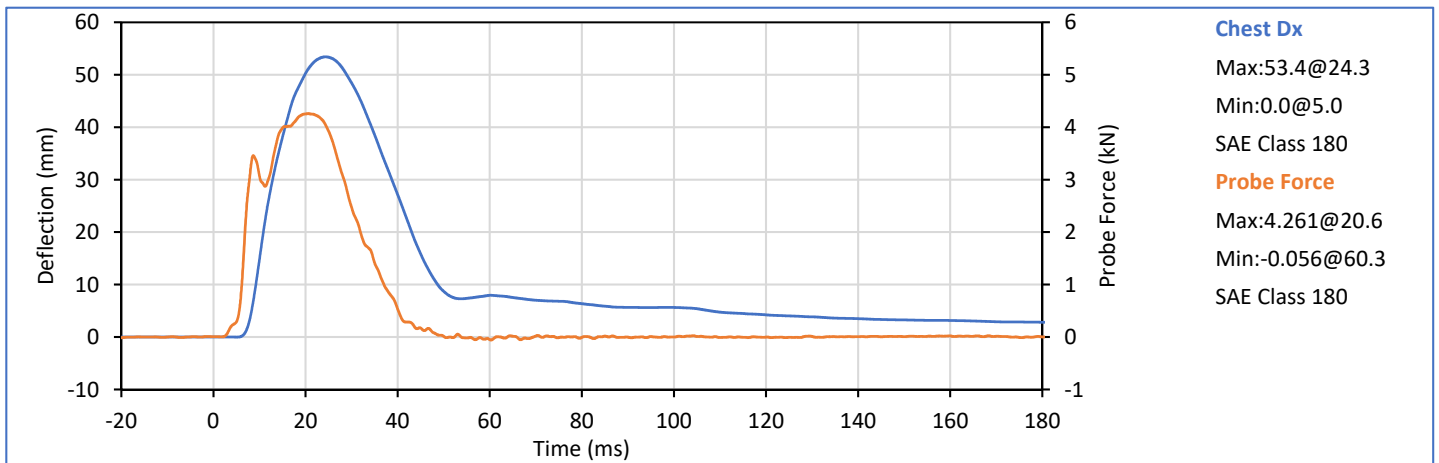
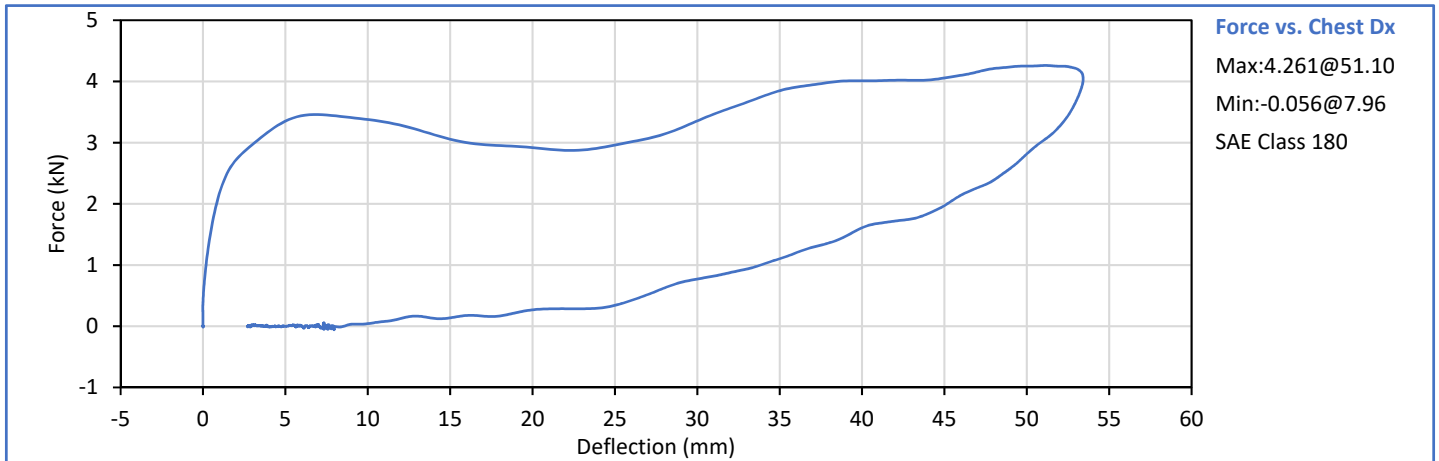


Technician: 
J. Hernandez

Approved By:  TR-P39134-01-NC
P. Puzzuto



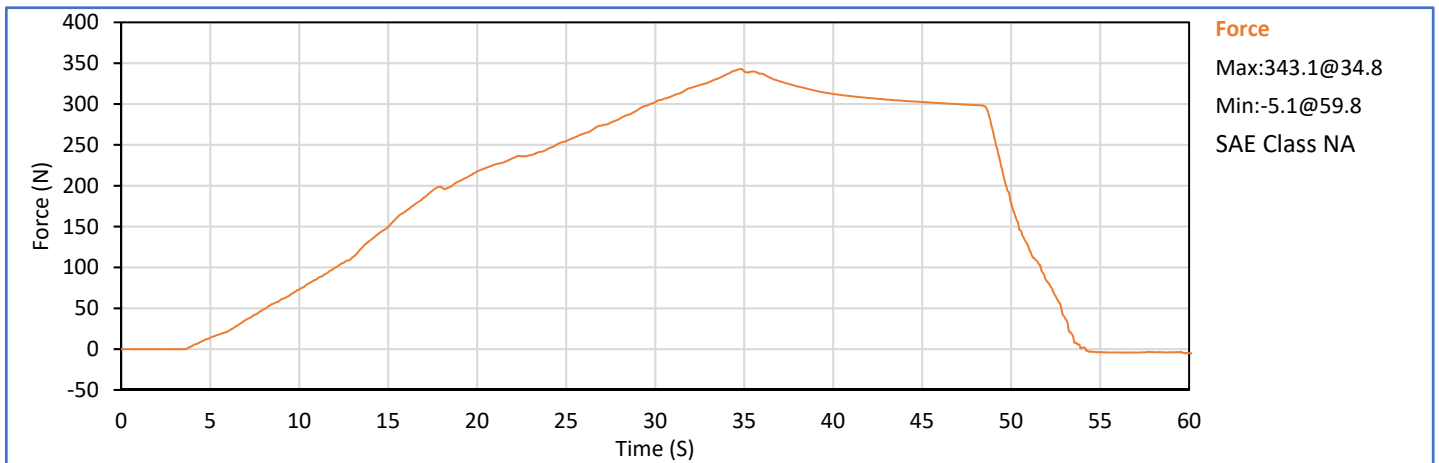
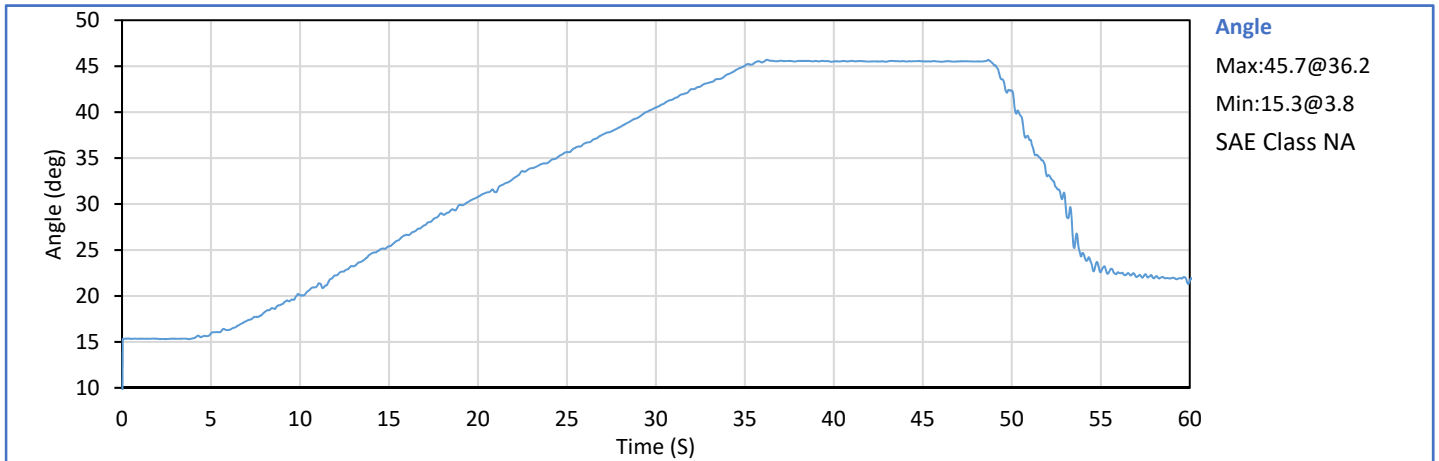
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	23	Pass
Probe Velocity	m/s	6.59	6.83	6.66	Pass
Peak Chest Deflection	mm	50.0	58.0	53.4	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.261	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.251	Pass
Internal Hysterisis	%	69.0	85.0	73.6	Pass
Overall Test Results					Pass

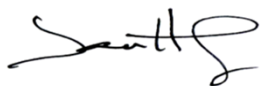



Technician: J. Hernandez

Approved By: P. Puzzuto

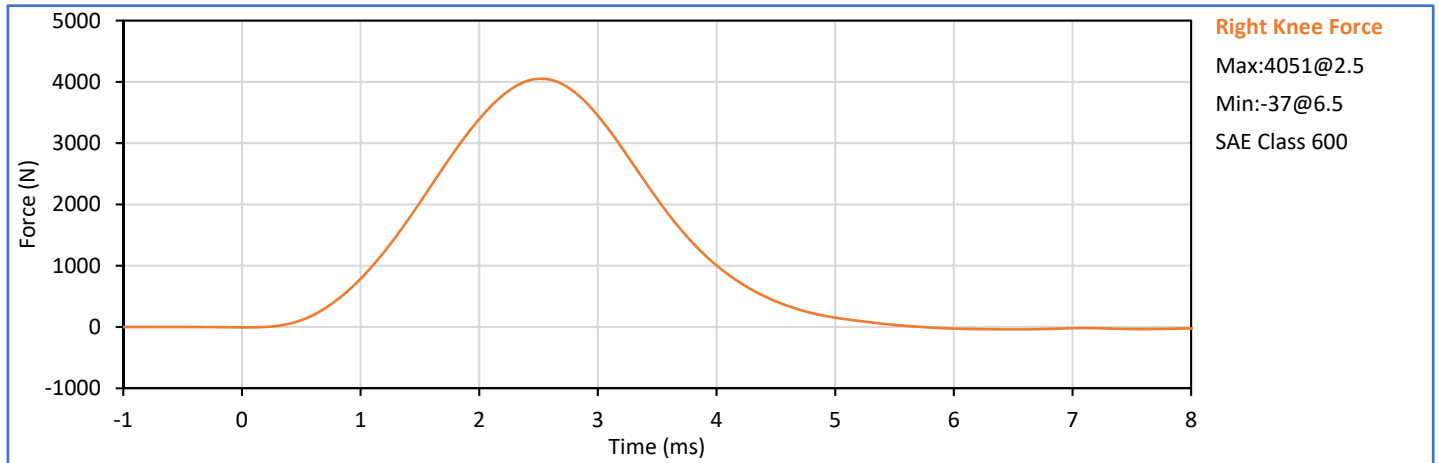
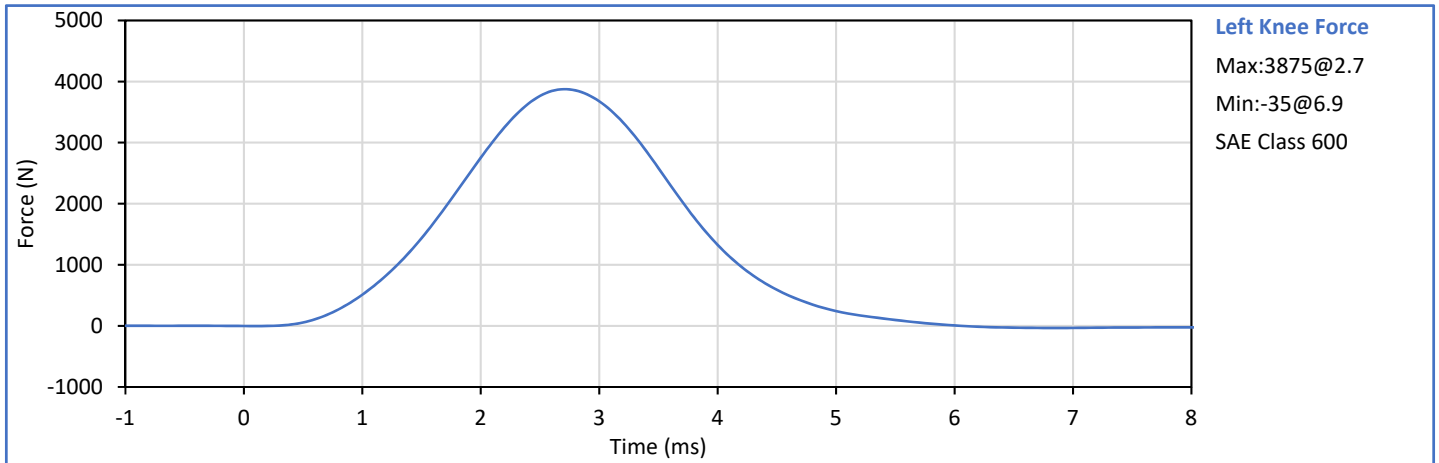
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	23	Pass
Orientation Angle	deg	0.0	20.0	14.5	Pass
Test Initial Angle	deg	11.0	19.0	15.3	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	341.1	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.00	Pass
Final Reference Plane Angle	deg	-8.0	8.0	4.6	Pass
Overall Test Results					Pass




Technician: 
J. Hernandez

Approved By:  TR-P39134-01-NC
P. Puzzuto

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.6	Pass
	Laboratory Humidity	%	10	70	34	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.085	Pass
Knee	Peak Resistive Force	N	3450	4060	3875	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.079	Pass
Knee	Peak Resistive Force	N	3450	4060	4051	Pass
Overall Test Results						Pass



Technician: 
J. Hernandez

Approved By:  TR-P39134-01-NC
P. Puzzuto

Post-Test ATD Configuration And Performance Verification Data
Hybrid III 50th Percentile Male ATD
S/N: 360

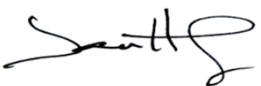
ATD Serial No.: 360


Test Date: 2019-05-01

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:

No Problems Found

Technician: 
J. Hernandez

Approved By: 
P. Puzutto TR-P39134-01-NC

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	30	Pass
A - Total sitting height	mm	879	889	886	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	140	Pass
E - Shoulder pivot from backline	mm	84	94	90	Pass
F - Thigh clearance	mm	140	155	147	Pass
G - Back of elbow to wrist pivot	mm	290	305	301	Pass
H - Head back to backline	mm	41	46	45	Pass
I - Shoulder to elbow length	mm	330	345	342	Pass
J - Elbow rest height	mm	190	211	204	Pass
K - Buttock to knee length	mm	579	604	591	Pass
L - Popliteal length	mm	429	455	450	Pass
M - Knee pivot height	mm	485	500	489	Pass
N - Buttock popliteal length	mm	452	477	471	Pass
O - Chest depth without jacket	mm	213	229	220	Pass
P - Foot length	mm	251	267	256	Pass
V - Shoulder breadth	mm	422	437	427	Pass
W - Foot breadth	mm	91	107	103	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	983	Pass
Z - Waist circum.	mm	836	866	852	Pass
AA - Location for chest circum.	mm	429	434	431	Pass
BB - Location for waist circum.	mm	226	231	228	Pass
Overall Test Results					Pass

Technician: _____



J. Hernandez

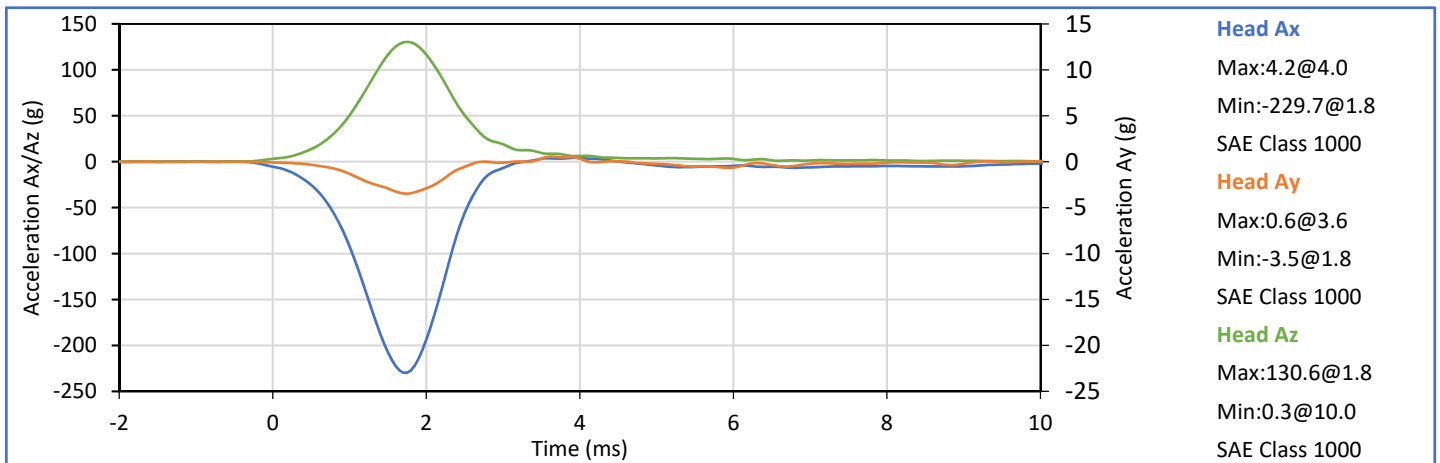
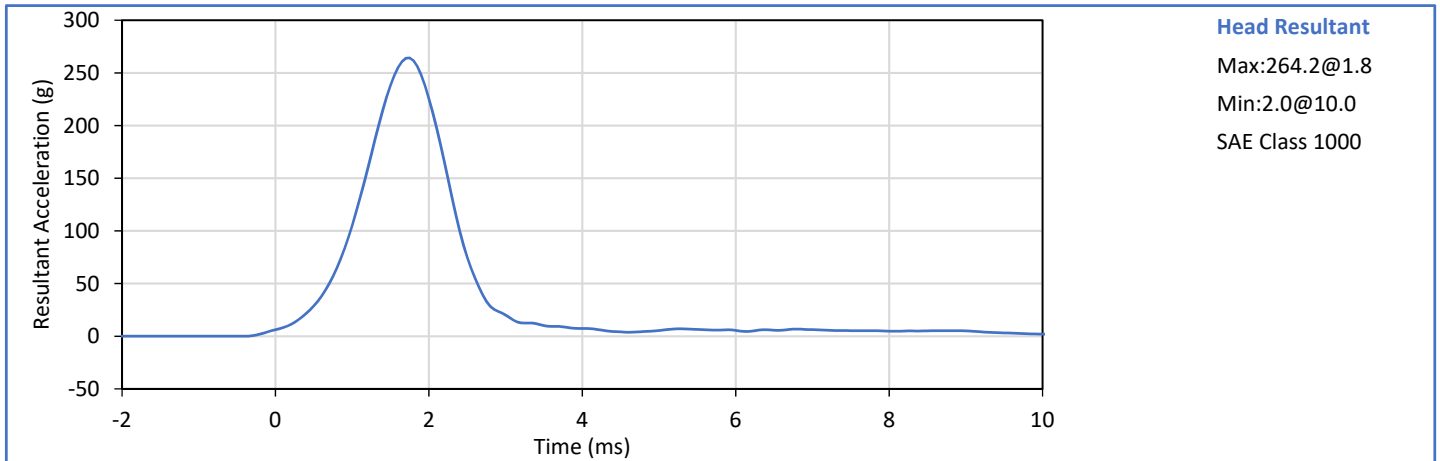
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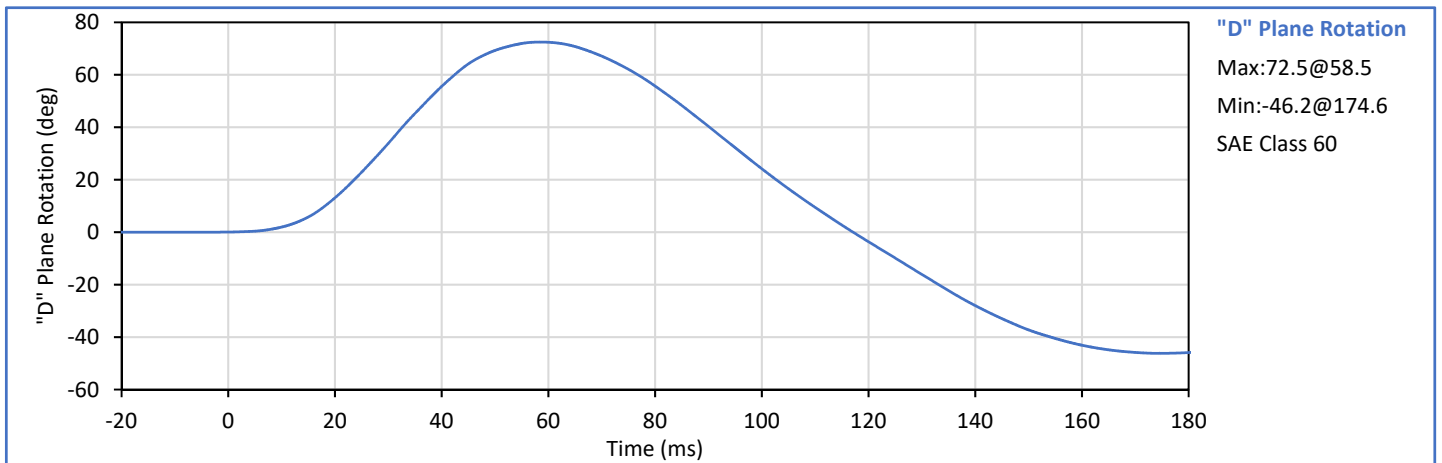
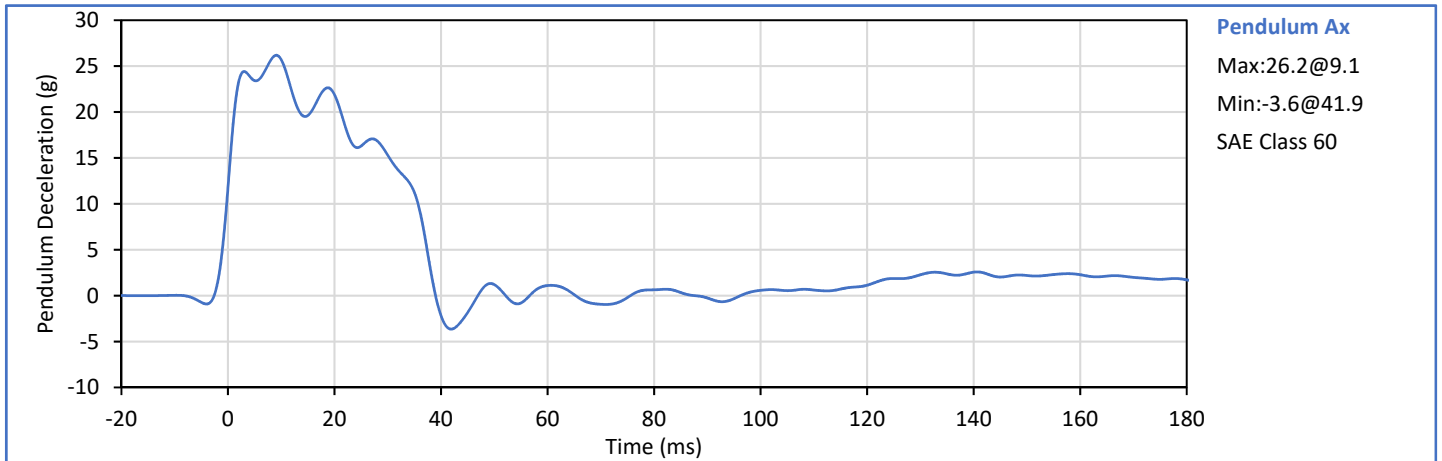
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.5	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	225.0	275.0	264.2	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-3.5	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass

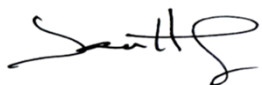


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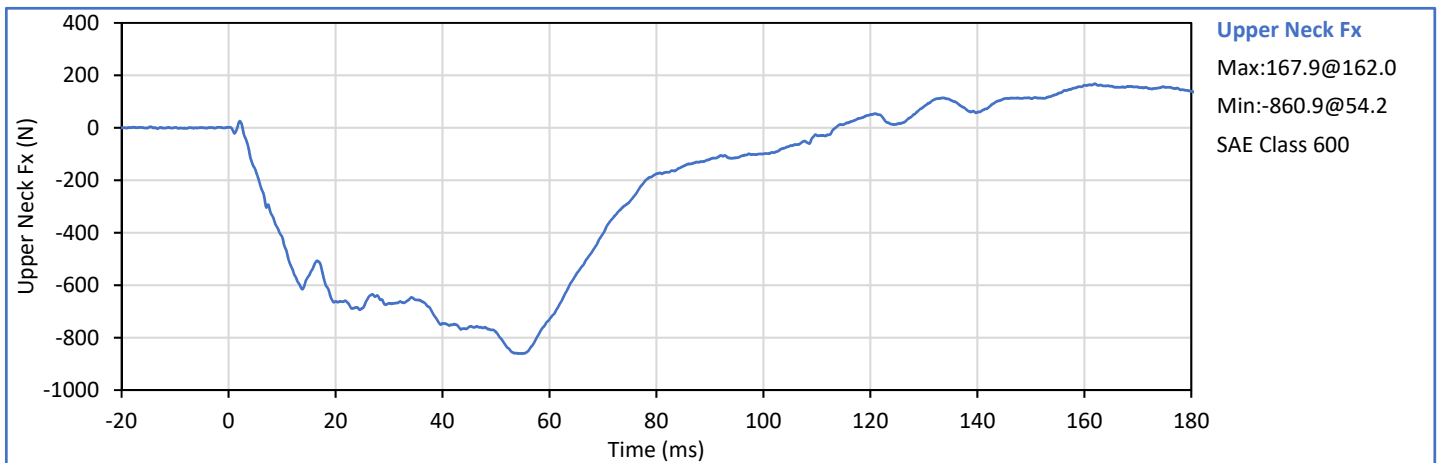
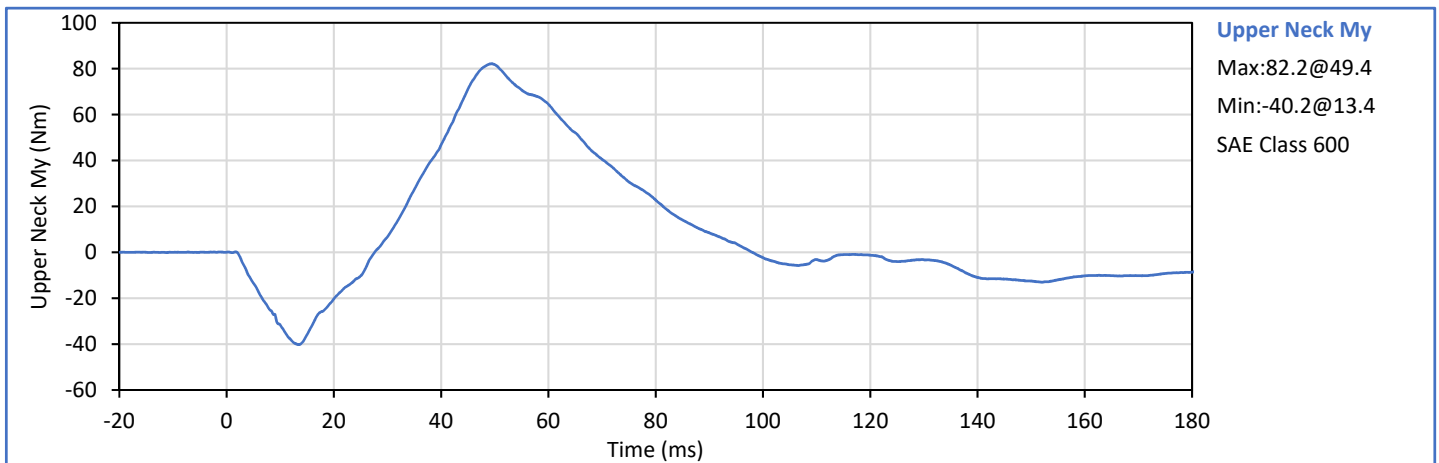
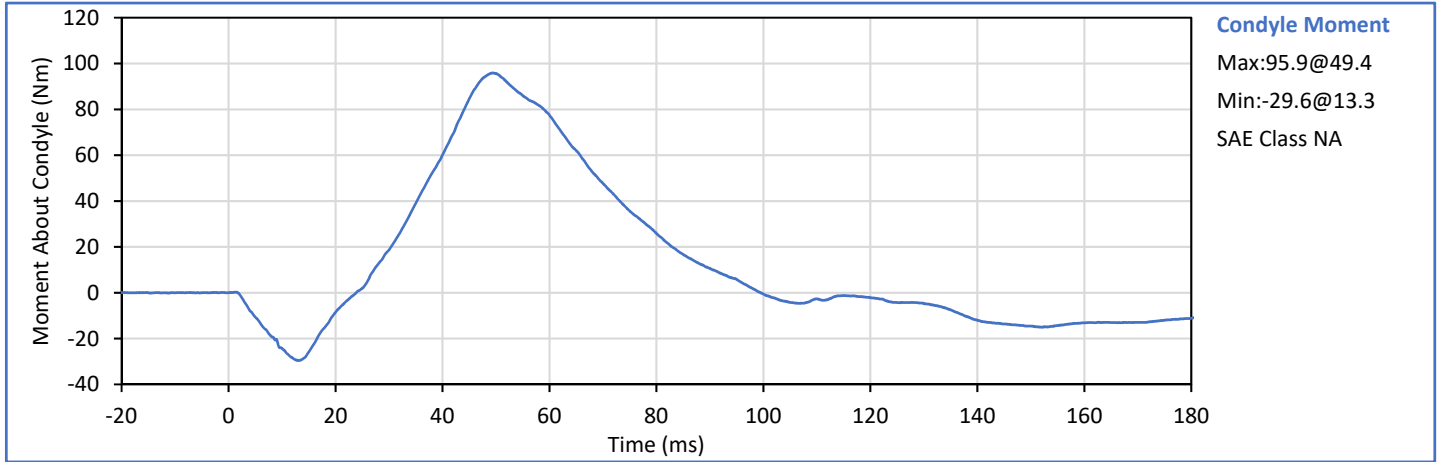
Approved By: P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	6.95	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.7	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	21.9	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.3	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.3	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	37.4	Pass
"D" Plane Rotation peak	deg	64.0	78.0	72.5	Pass
	ms	57.0	64.0	58.5	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	117.2	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	95.9	Pass
	ms	47.0	58.0	49.4	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	99.5	Pass
Overall Test Results					Pass

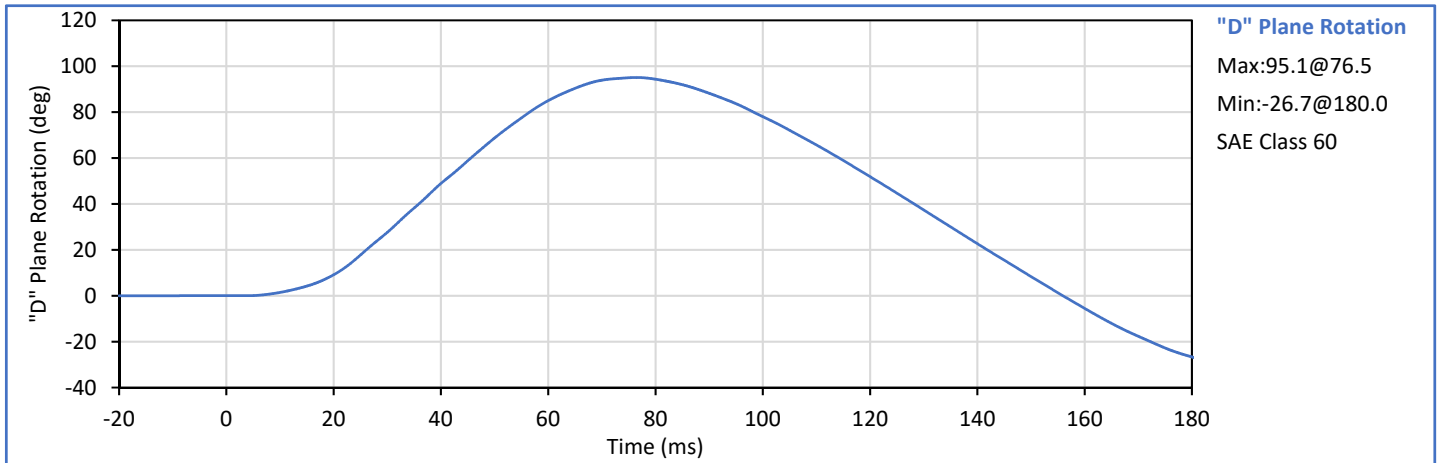
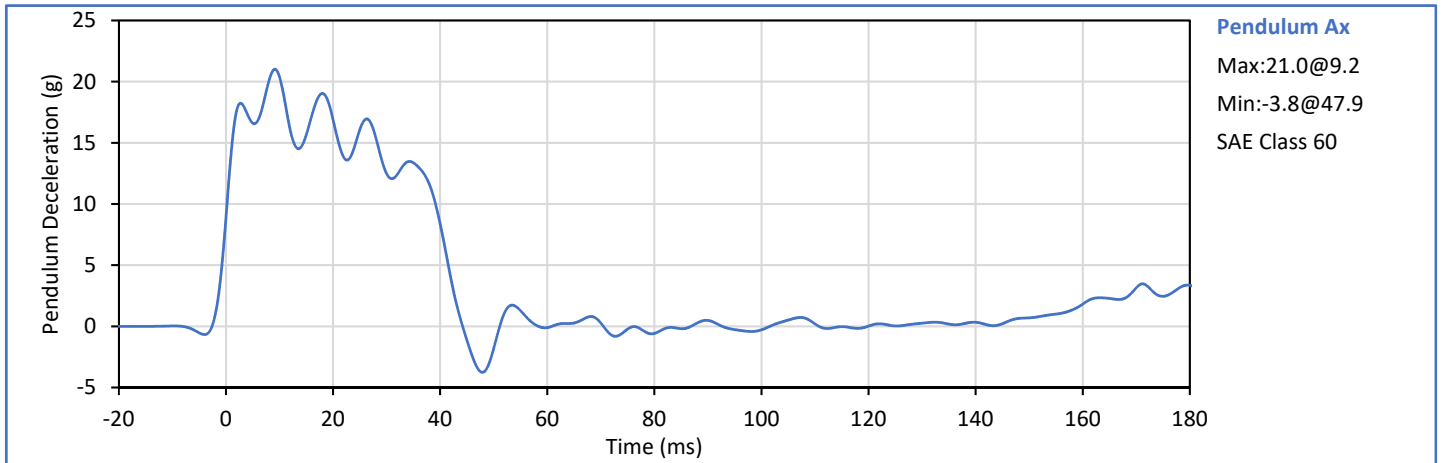


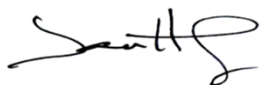
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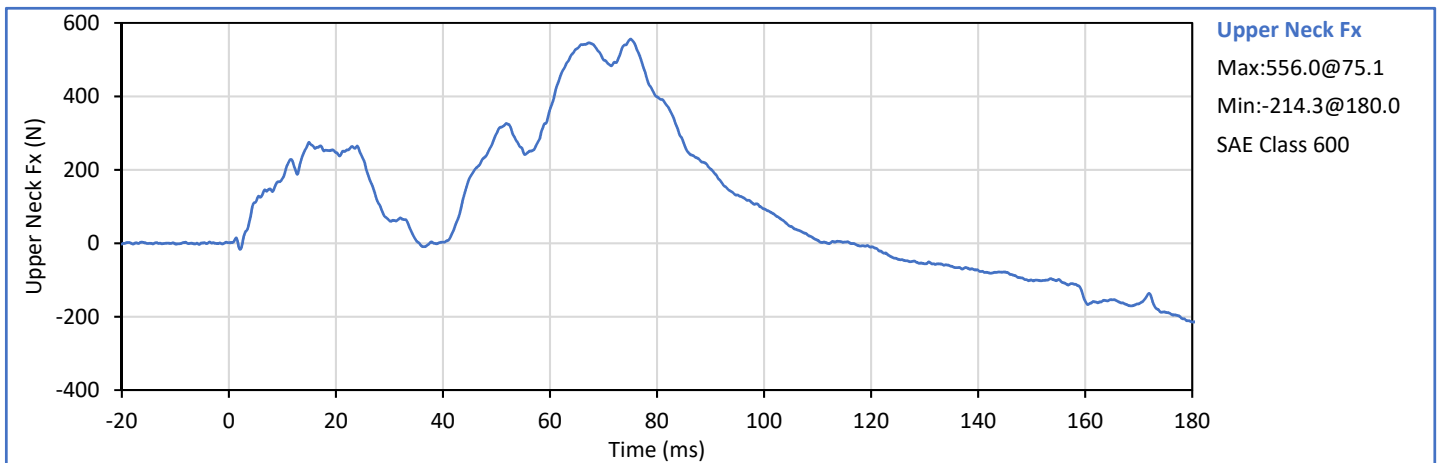
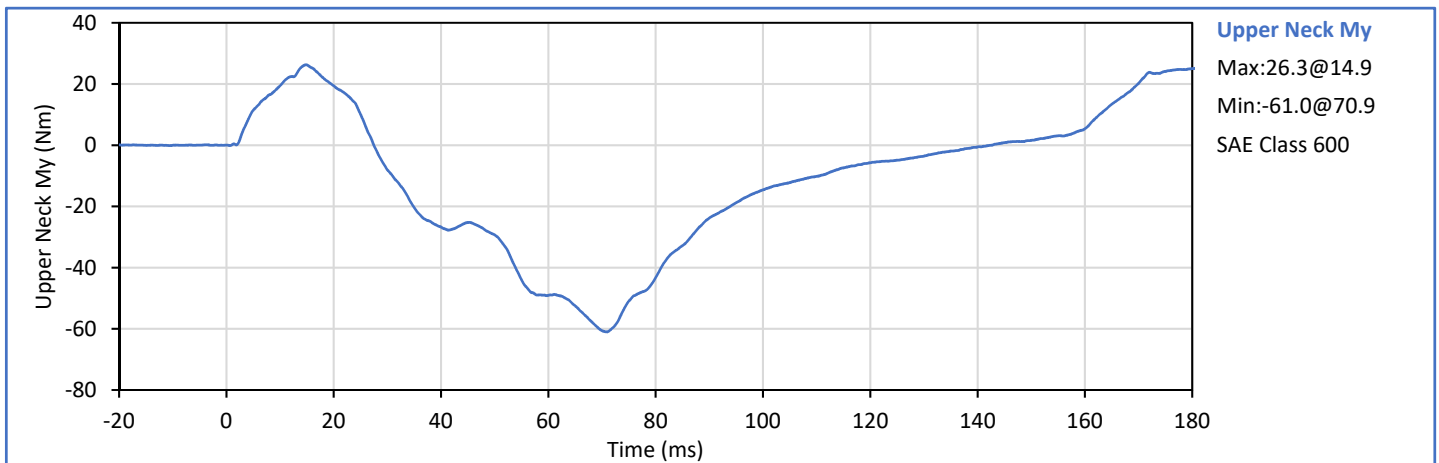
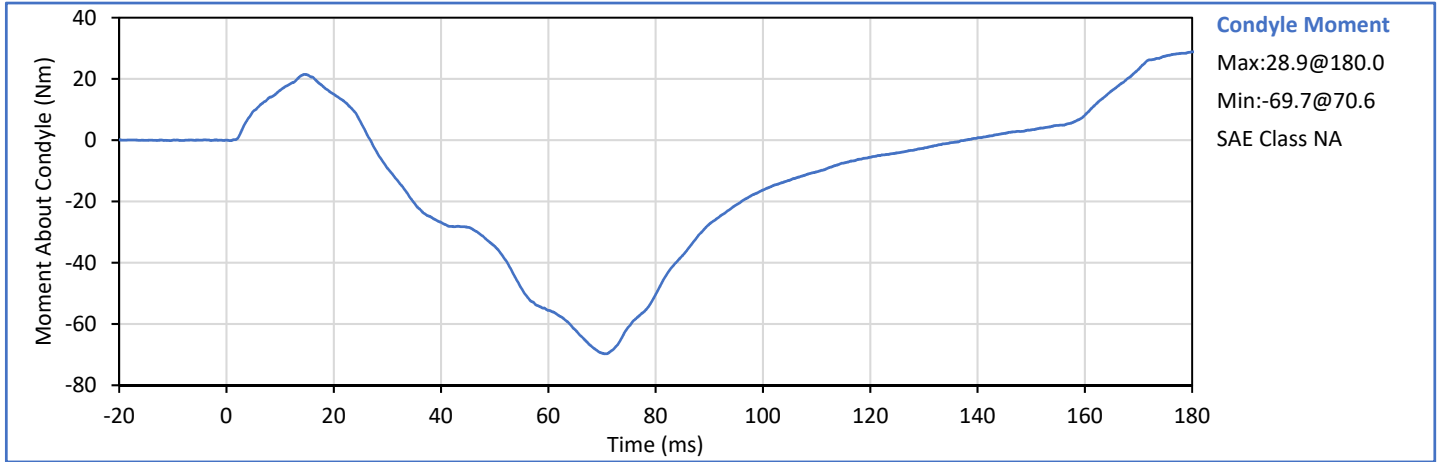


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.94	6.19	6.01	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	20.4	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	16.9	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	12.5	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	13.5	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	41.5	Pass
"D" Plane Rotation peak	deg	81.0	106.0	95.1	Pass
	ms	72.0	82.0	76.5	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	156.0	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-69.7	Pass
	ms	65.0	79.0	70.6	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	137.7	Pass
Overall Test Results					Pass

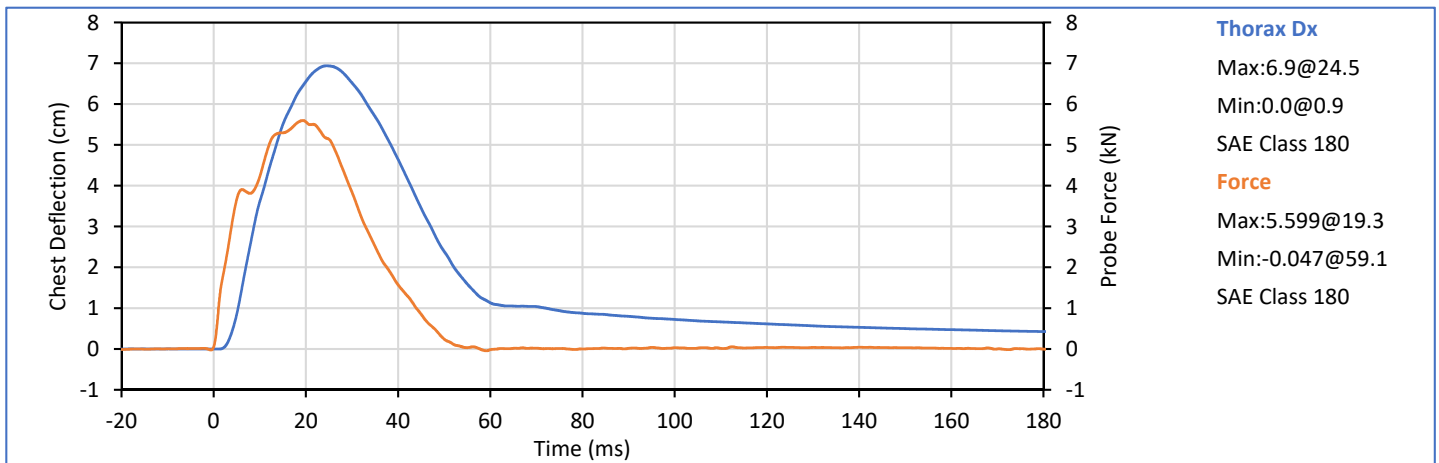
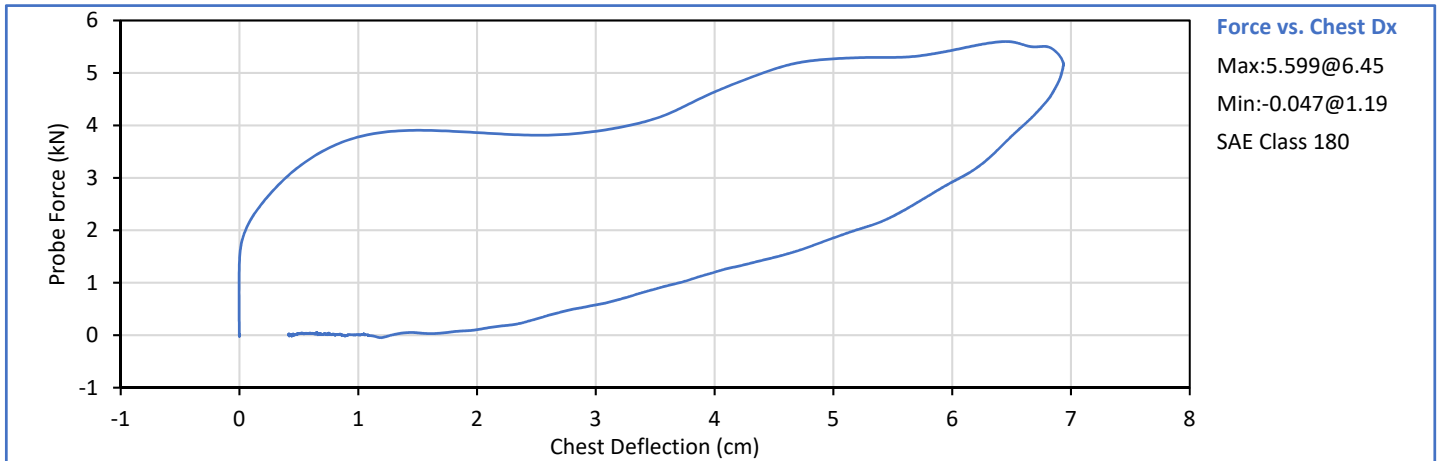


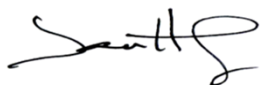
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J. Hernandez

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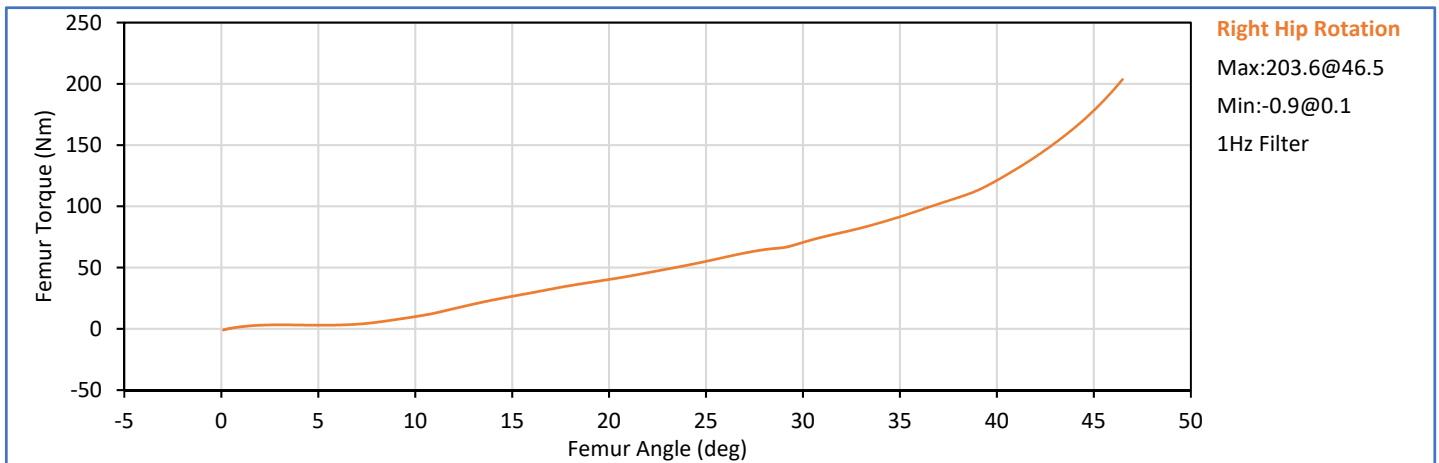
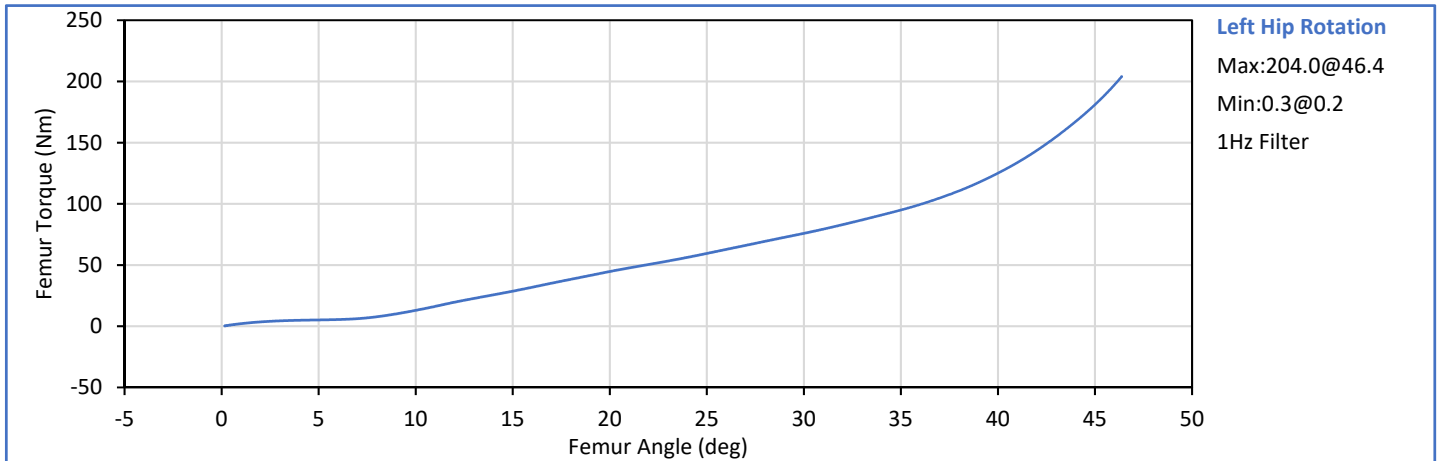
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.58	6.82	6.71	Pass
Peak Chest Deflection	cm	6.35	7.26	6.94	Pass
Peak Probe Force	kN	5.159	5.893	5.599	Pass
Internal Hysteresis	%	69.0	85.0	71.8	Pass
Overall Test Results					Pass

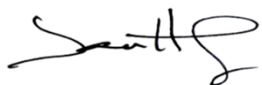


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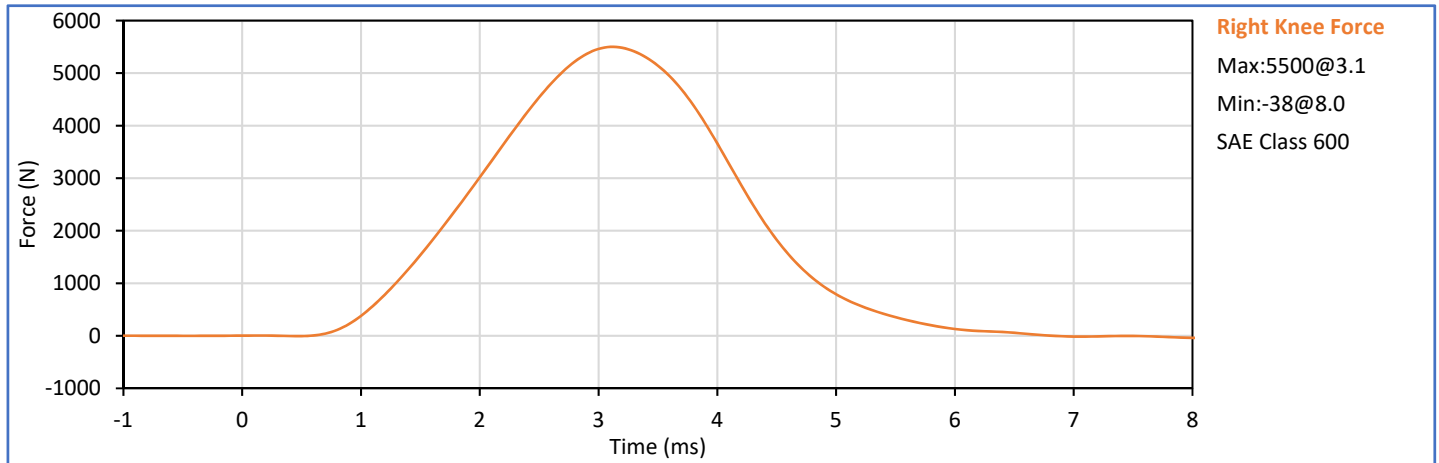
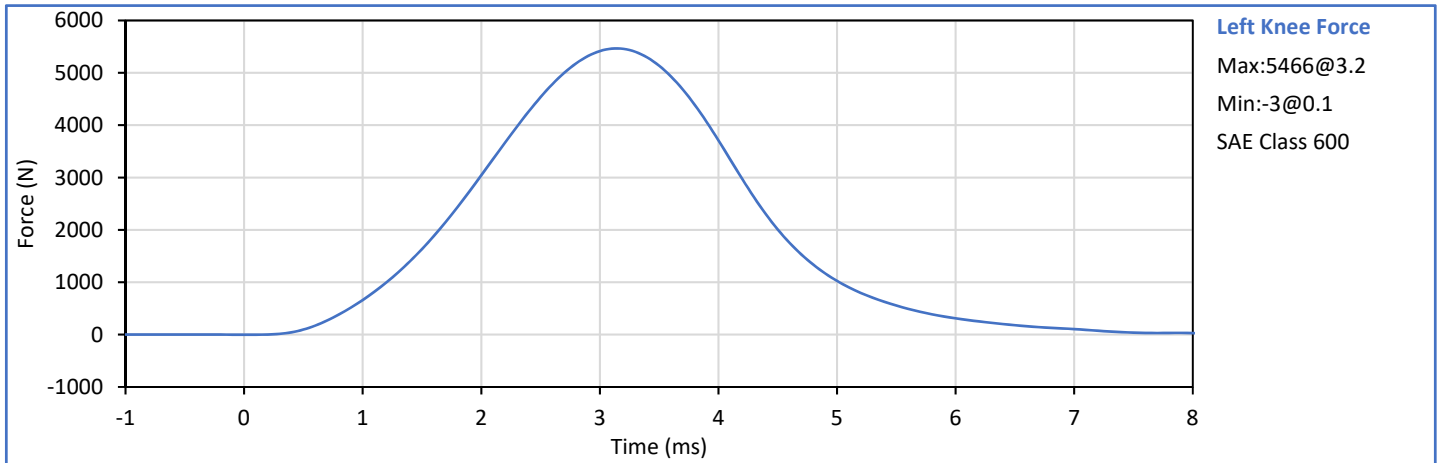
	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.1	Pass
	Laboratory Humidity	%	10	70	30	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	75.9	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	46.3	Pass
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	70.6	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	46.4	Pass
Overall Test Results						Pass

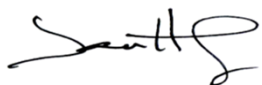



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	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.4	Pass
	Laboratory Humidity	%	10	70	30	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.103	Pass
Knee	Peak Resistive Force	N	4715	5782	5466	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.106	Pass
Knee	Peak Resistive Force	N	4715	5782	5500	Pass
Overall Test Results						Pass



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Post-Test ATD Configuration And Performance Verification Data
Hybrid III 5th Percentile Female ATD
S/N: 141

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. 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:

No Problems Found

Technician: _____

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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	30	Pass
A - Total sitting height	mm	775	800	790	Pass
B - Shoulder pivot height	mm	432	457	446	Pass
C - 'H' point height	mm	81	86	85	Pass
D - 'H' point location from backline	mm	145	150	148	Pass
E - Shoulder pivot from backline	mm	69	84	81	Pass
F - Thigh clearance	mm	119	135	124	Pass
G - Back of elbow to wrist pivot	mm	244	259	250	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	277	297	291	Pass
J - Elbow rest height	mm	183	203	194	Pass
K - Buttock to knee length	mm	521	546	536	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	422	Pass
O - Chest depth without jacket	mm	175	191	181	Pass
P - Foot length	mm	219	234	231	Pass
R - Buttock to Knee Pivot Length	mm	457	483	468	Pass
S - Head Breadth	mm	137	147	141	Pass
T - Head Depth	mm	178	188	186	Pass
U - Hip Breadth	mm	300	315	311	Pass
V - Shoulder breadth	mm	351	366	357	Pass
W - Foot breadth	mm	79	94	90	Pass
X - Head circum.	mm	528	549	539	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	862	Pass
Z - Waist circum.	mm	760	790	769	Pass
AA - Location for chest circum.	mm	333	358	342	Pass
BB - Location for waist circum.	mm	160	170	167	Pass
Overall Test Results					Pass

Technician: _____



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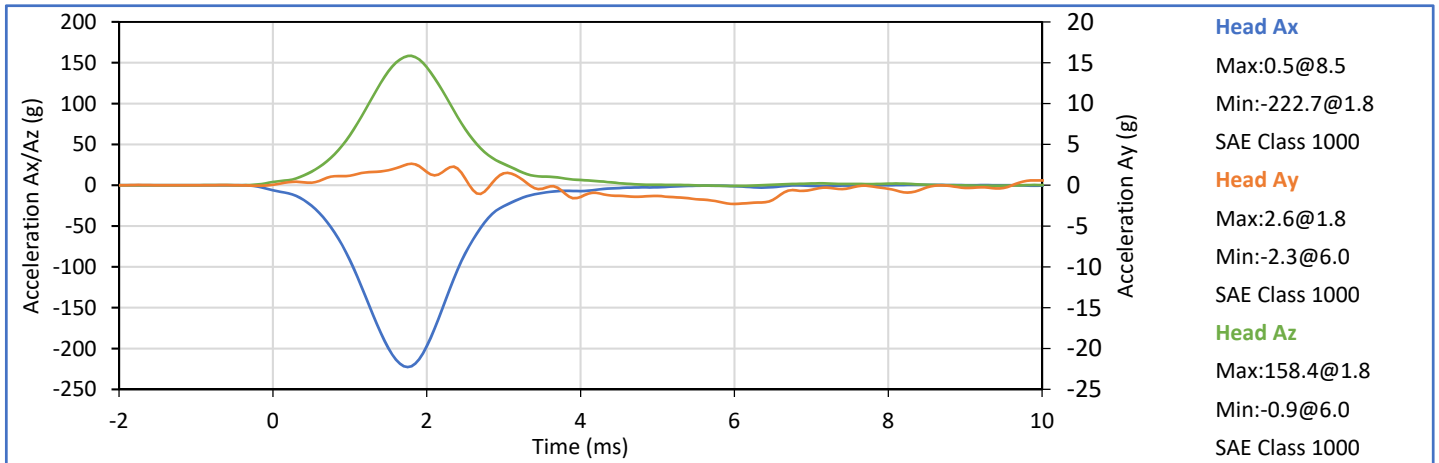
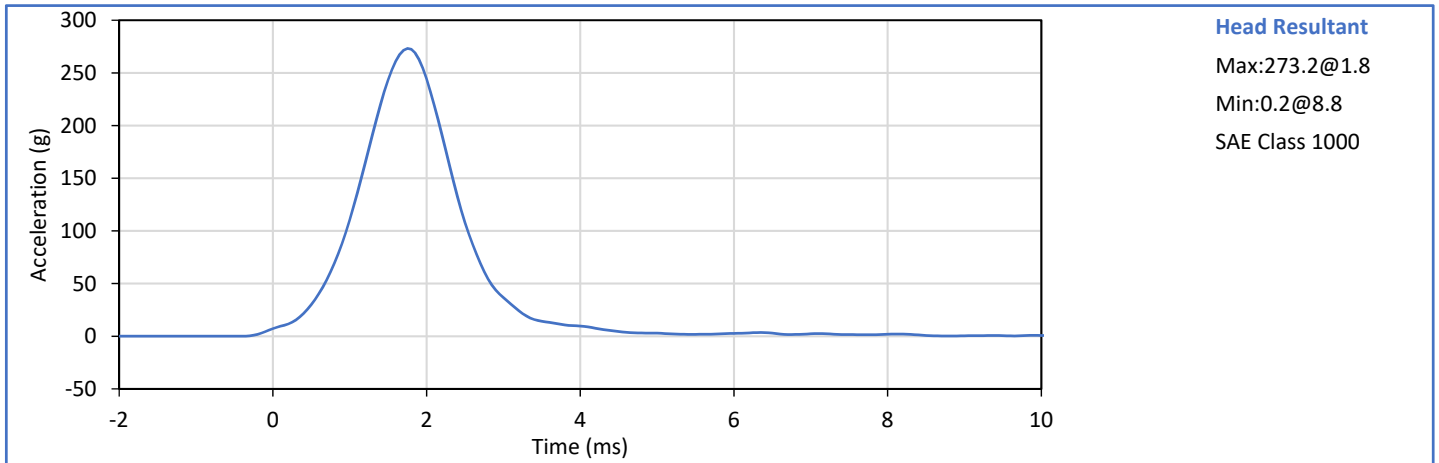
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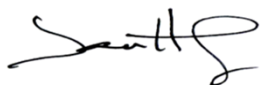



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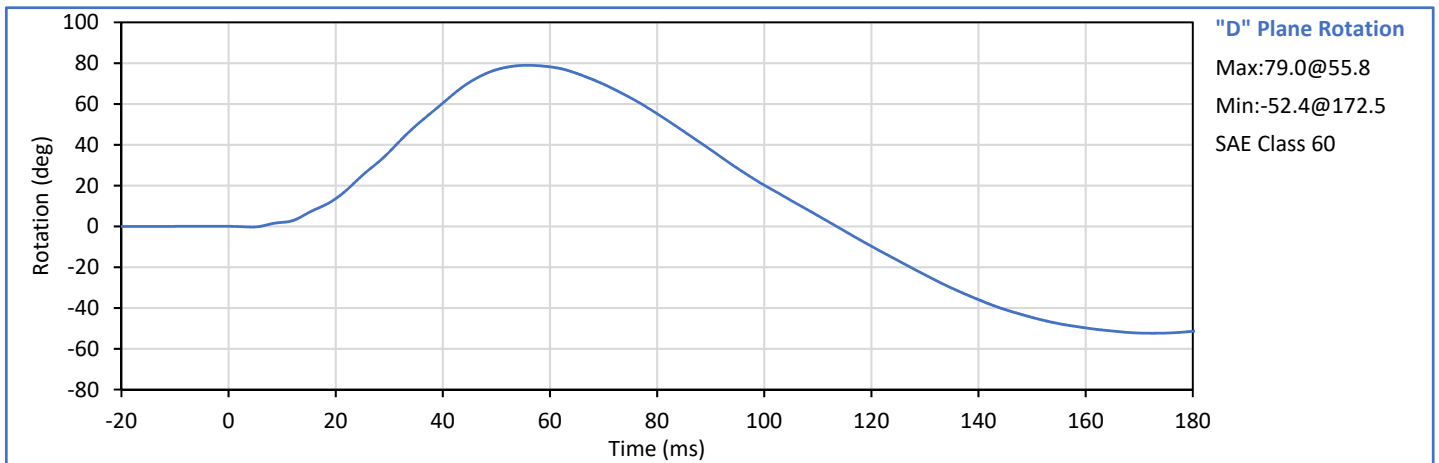
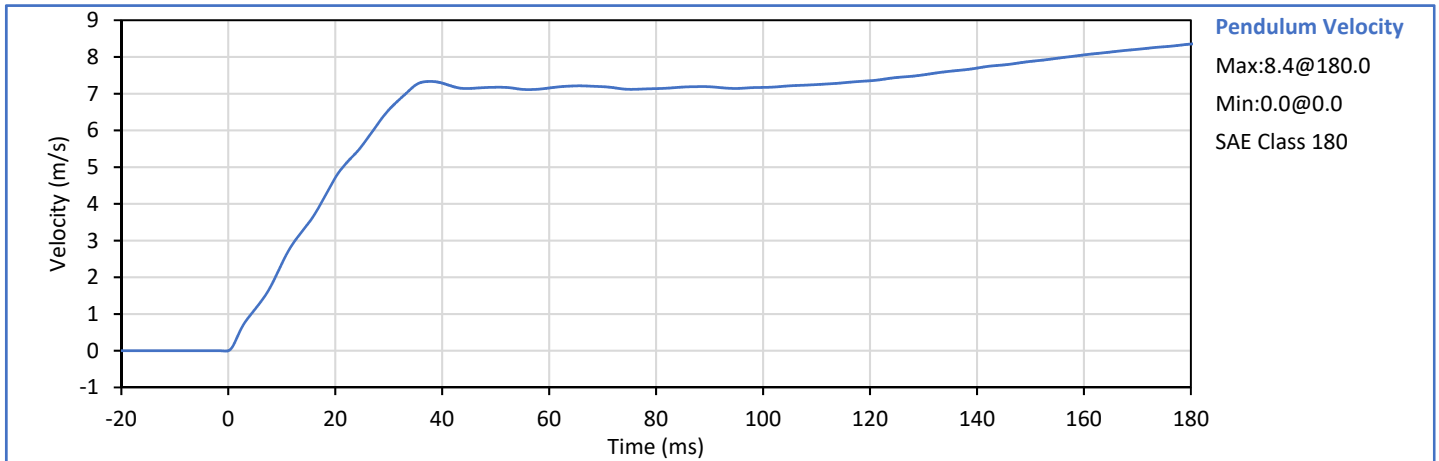
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.3	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	250.0	300.0	273.2	Pass
Peak Lateral Acceleration	g	-15.0	15.0	2.6	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass

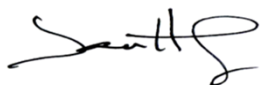


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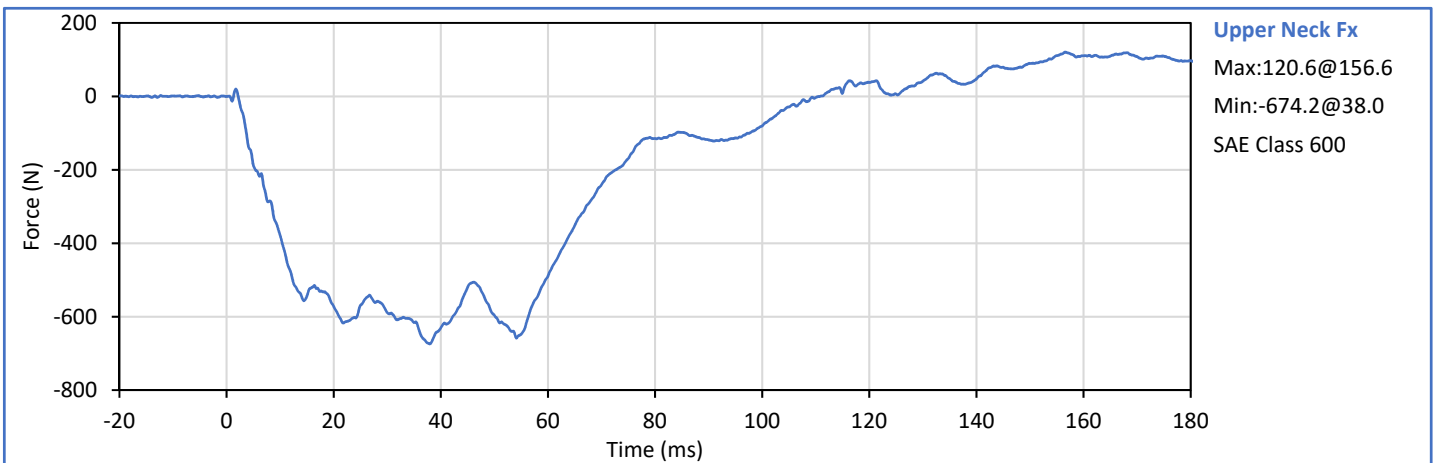
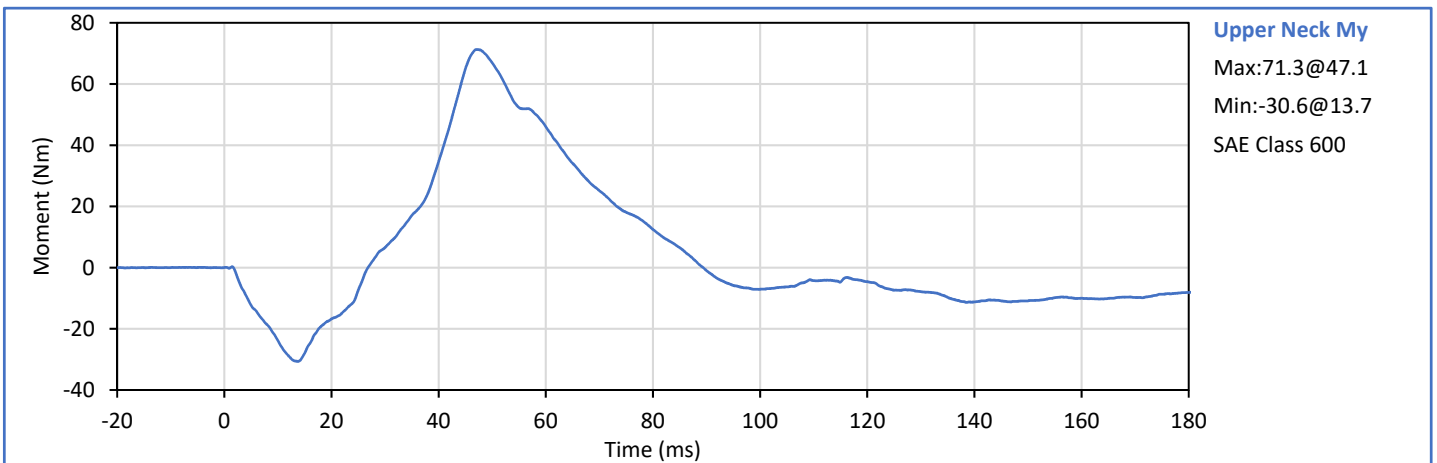
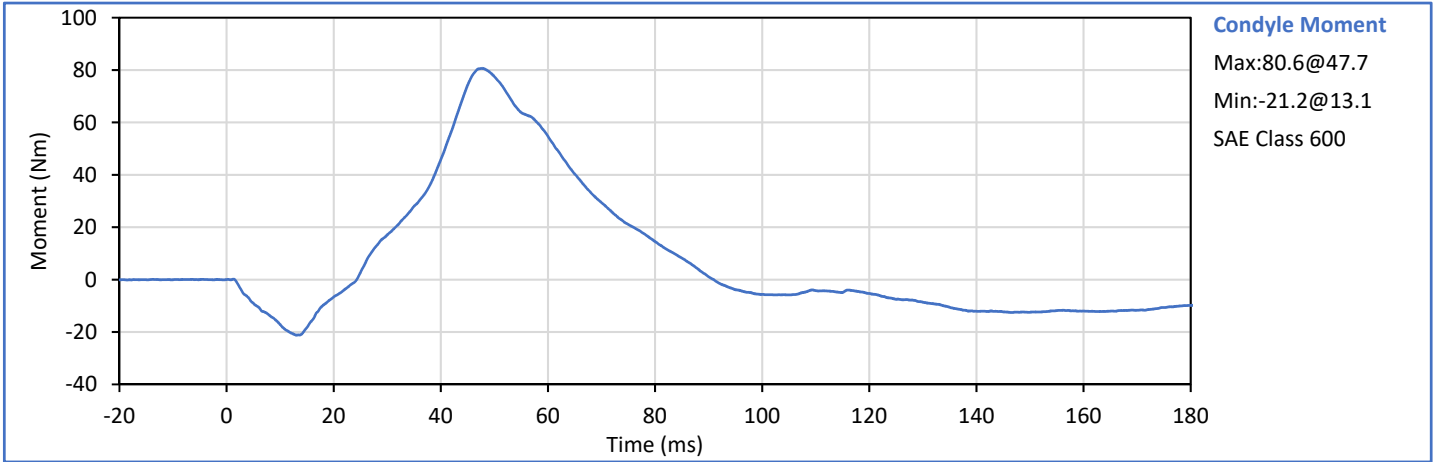
Approved By: 
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	6.93	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.37	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.71	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.56	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	79.0	Pass
Peak Moment in Rotation	Nm	69.0	83.0	80.6	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	83.6	Pass
Overall Test Results					Pass

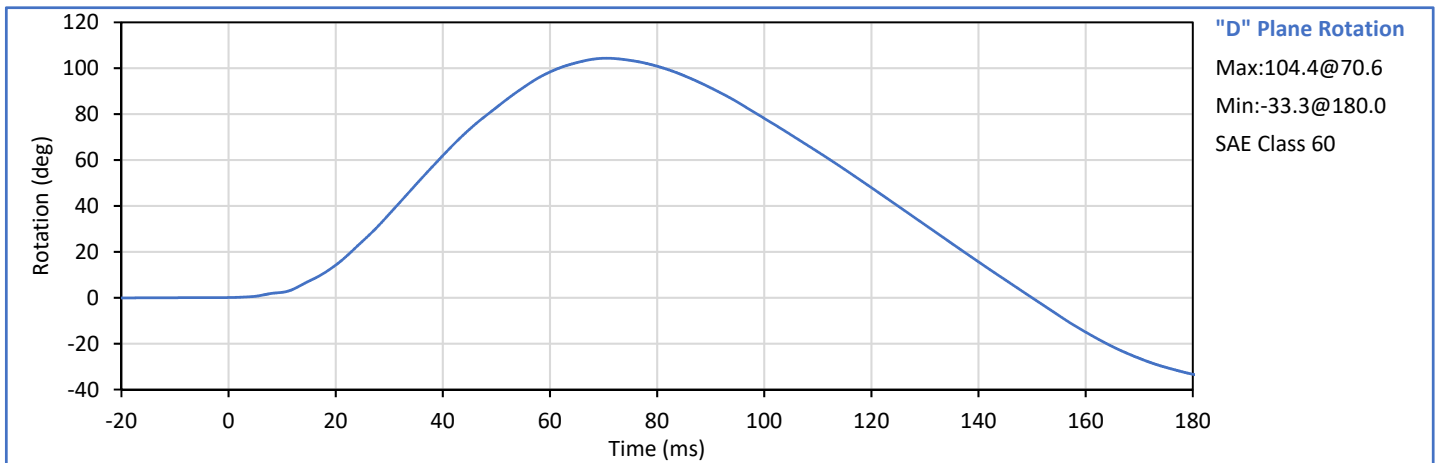
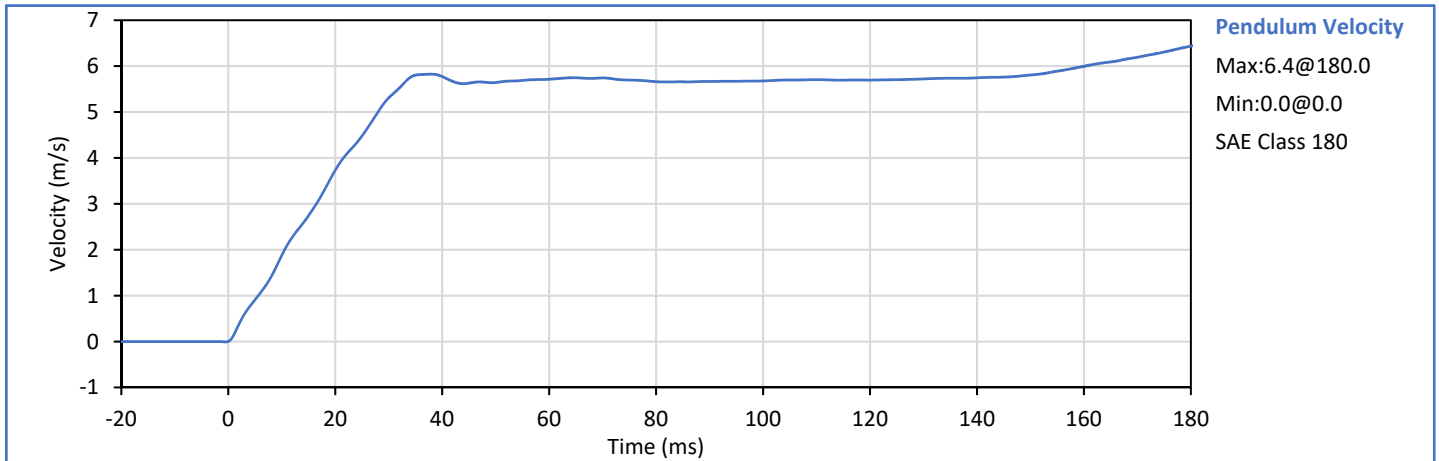


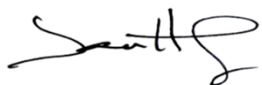
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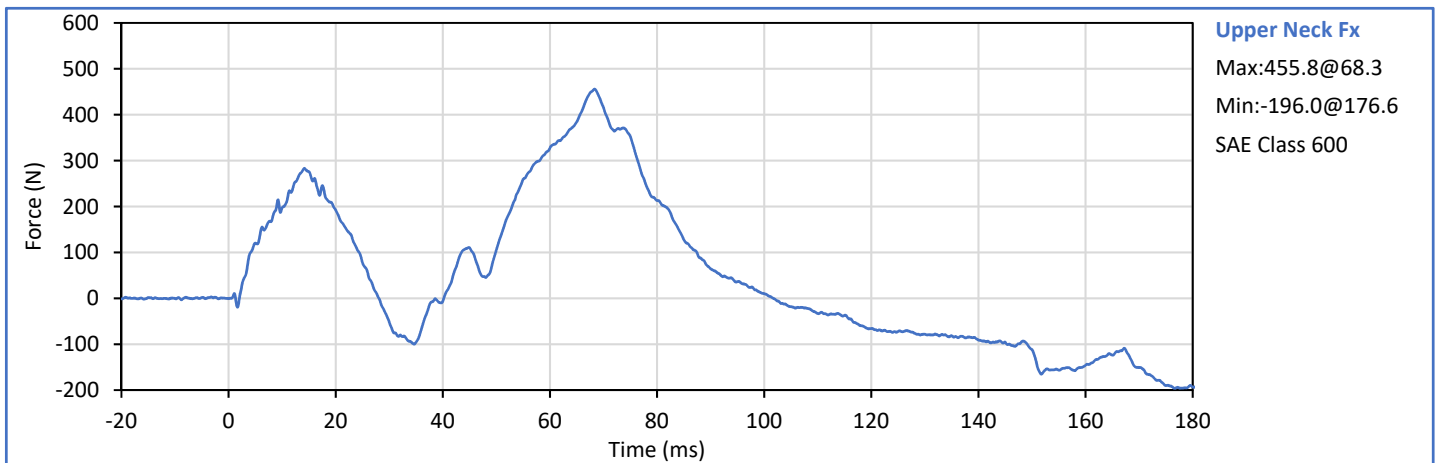
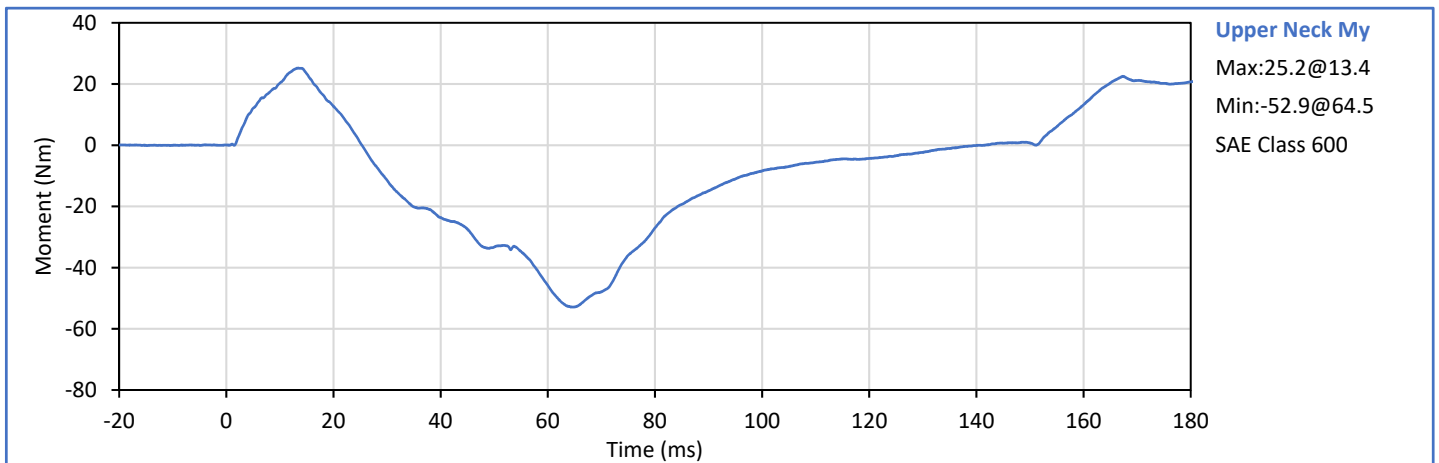
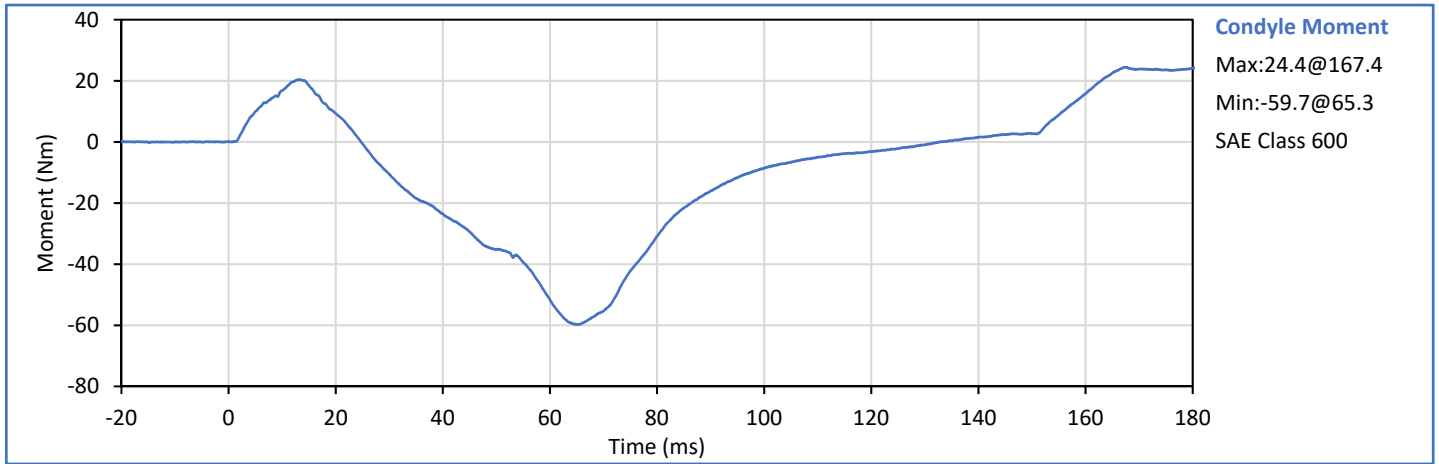


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.95	6.19	6.09	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.88	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.73	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.31	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	104.4	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-59.7	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	97.6	Pass
Overall Test Results					Pass

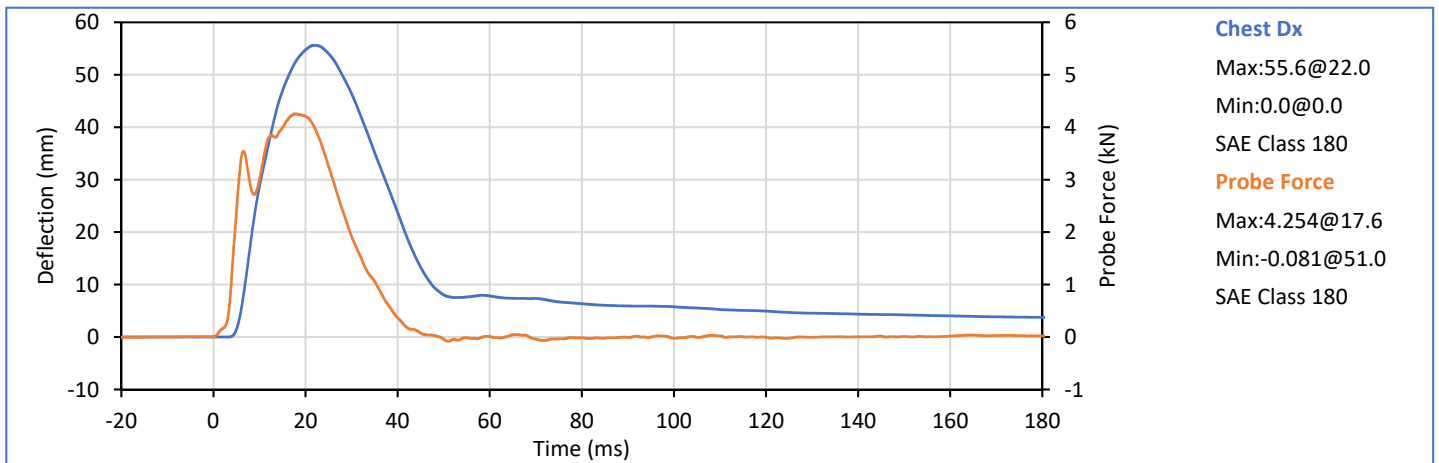
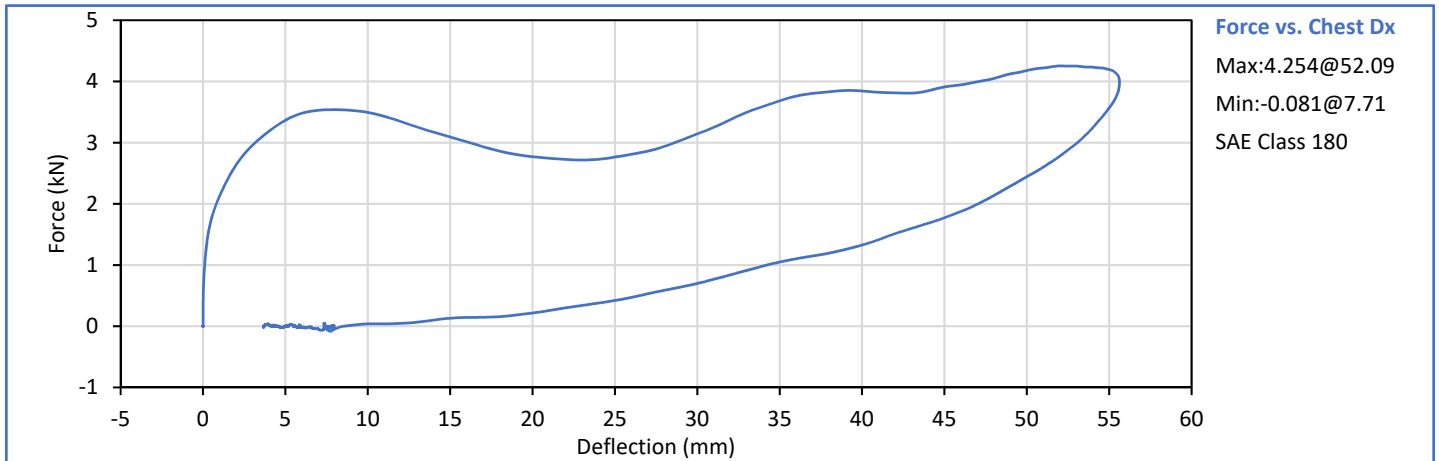


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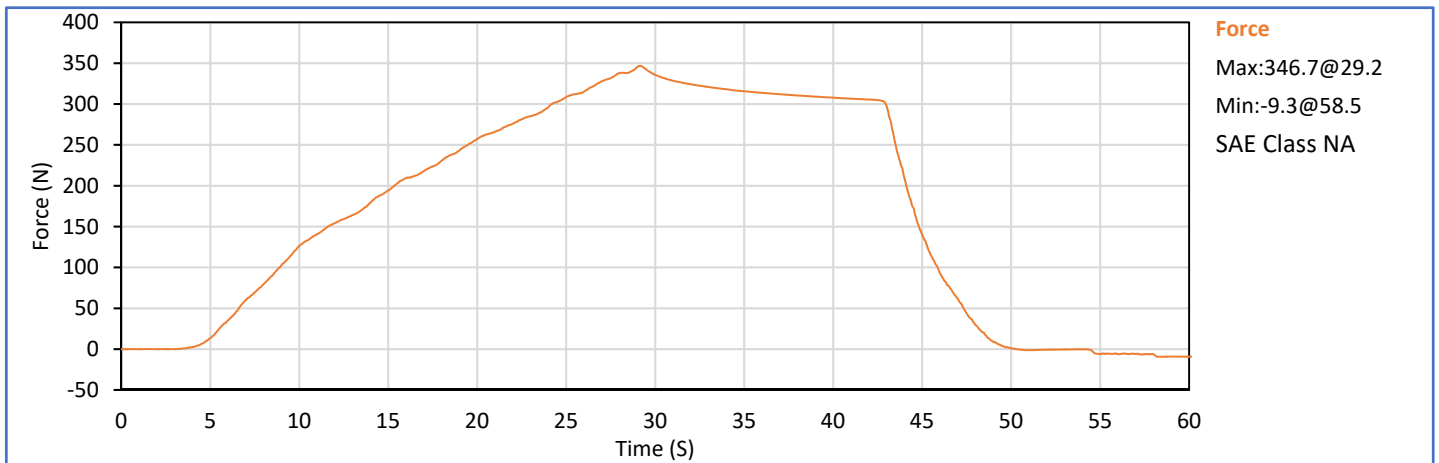
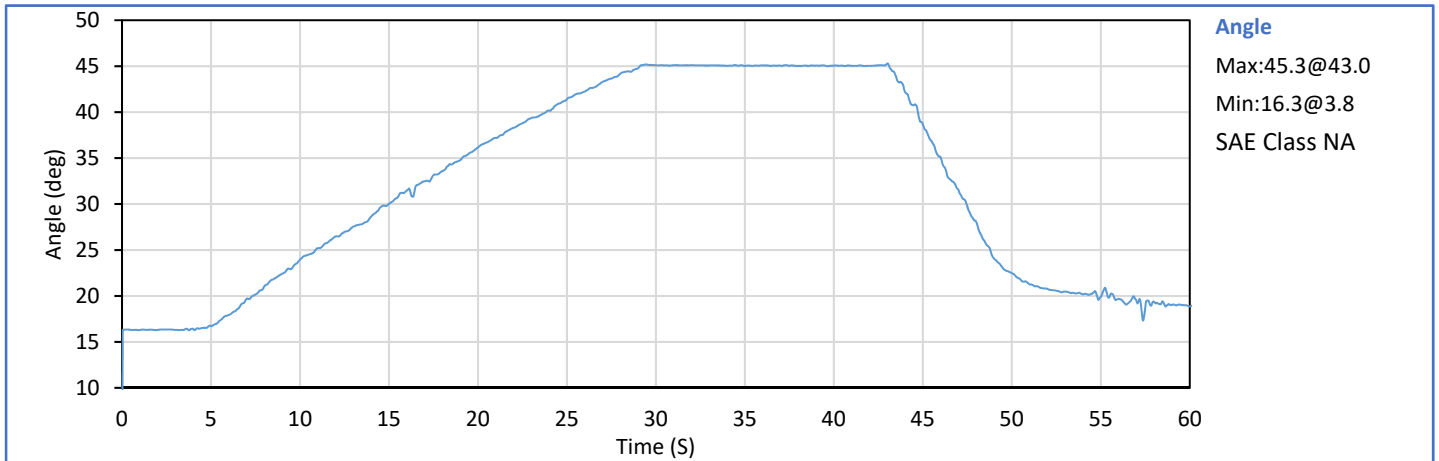
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	31	Pass
Probe Velocity	m/s	6.59	6.83	6.68	Pass
Peak Chest Deflection	mm	50.0	58.0	55.6	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.254	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.179	Pass
Internal Hysterisis	%	69.0	85.0	73.1	Pass
Overall Test Results					Pass

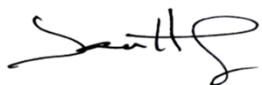


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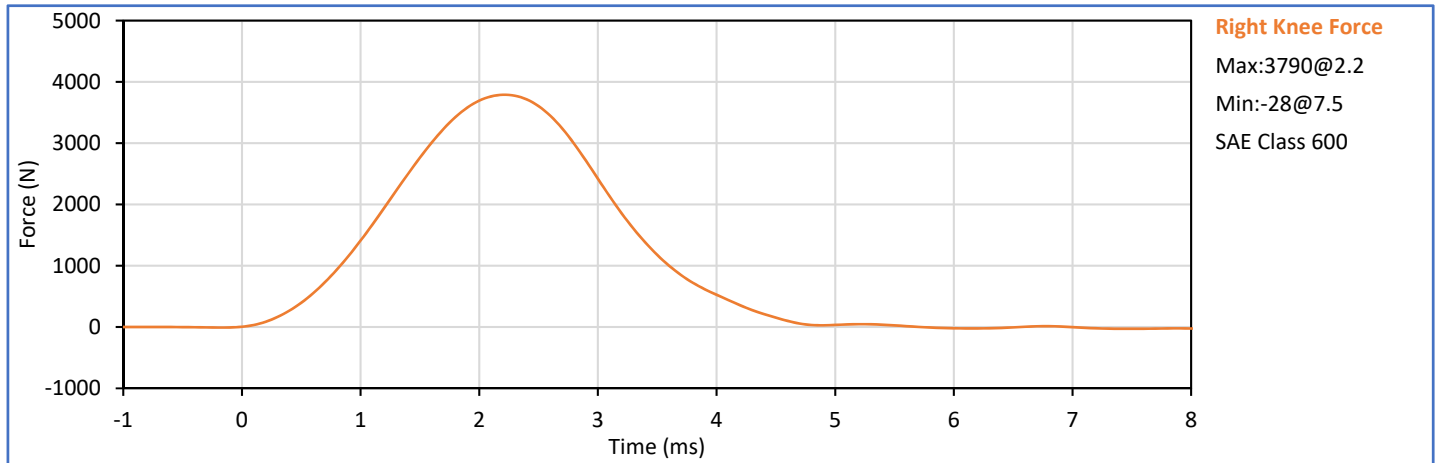
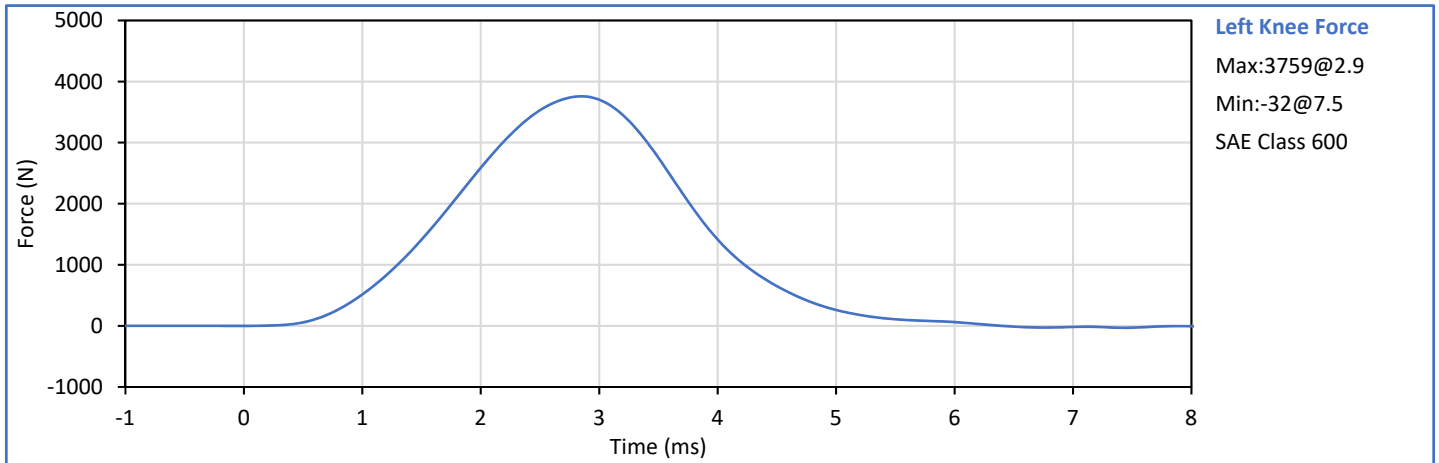
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.8	Pass
Laboratory Humidity	%	10	70	36	Pass
Orientation Angle	deg	0.0	20.0	14.5	Pass
Test Initial Angle	deg	11.0	19.0	16.3	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	346.7	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.17	Pass
Final Reference Plane Angle	deg	-8.0	8.0	3.6	Pass
Overall Test Results					Pass

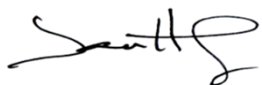



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	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.1	Pass
	Laboratory Humidity	%	10	70	31	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.101	Pass
Knee	Peak Resistive Force	N	3450	4060	3759	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.103	Pass
Knee	Peak Resistive Force	N	3450	4060	3790	Pass
Overall Test Results						Pass



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