

**REPORT NUMBER: NCAP-KAR-20-028**

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

**TESLA INC.  
2020 TESLA MODEL Y 5-DOOR MPV**

**NHTSA NUMBER: O20205000**

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



**DECEMBER 3, 2020**

**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**

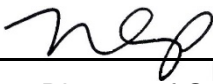
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By:  \_\_\_\_\_

Mr. Neeraj N. Patel, Project Engineer  
Applus+ IDIADA KARCO Engineering, LLC.

Reviewed By:  \_\_\_\_\_

Mr. Steven D. Matsusaka, Engineering Manager  
Applus+ IDIADA KARCO Engineering, LLC.

Approved By:  \_\_\_\_\_

Mr. Michael L. Dunlap, Director of Operations  
Applus+ IDIADA KARCO Engineering, LLC.

Approval Date: \_\_\_\_\_ December 3, 2020 \_\_\_\_\_

FINAL REPORT ACCEPTANCE BY OCWS:

\_\_\_\_\_  
Division Chief, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

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

Date: \_\_\_\_\_

## TECHNICAL REPORT DOCUMENTATION PAGE

<b>1. Report No.</b> NCAP-KAR-20-028	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>																																																					
<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Frontal Impact Testing and FMVSS No. 305 testing of 2020 Tesla Model Y 5-Door MPV NHTSA No. O20205000		<b>5. Report Date</b> December 3, 2020																																																					
		<b>6. Performing Organization Code</b> KAR																																																					
<b>7. Authors</b> Mr. Neeraj N. Patel, Project Engineer, Applus+ IDIADA KARCO Mr. Steven D. Matsusaka, Engineering Manager, Applus+ IDIADA KARCO		<b>8. Performing Organization Report No.</b> TR-P40343-01-NC																																																					
<b>9. Performing Organization Name and Address</b> Applus+ IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		<b>10. Work Unit No.</b>																																																					
		<b>11. Contract or Grant No.</b> 693JJ919D000004																																																					
<b>12. Sponsoring Agency Name and Address</b> U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		<b>13. Type of Report and Period Covered</b> Final Test Report, November 17 - December 3, 2020																																																					
		<b>14. Sponsoring Agency Code</b> NRM-110																																																					
<b>15. Supplementary Notes</b>																																																							
<b>16. Abstract</b> A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2020 Tesla Model Y 5-Door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. The test was conducted at the Applus+ IDIADA KARCO Engineering, LLC. facility in Adelanto, California on November 17, 2020.  The impact velocity of the vehicle was 56.63 km/h and the ambient temperature at the barrier face at the time of impact was 24.4°C. The target vehicle's post-test maximum crush was 425 mm on the DPD3 to the left of the vehicle's centerline. The test vehicle's performance is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700</td> <td>67.3</td> <td>700</td> <td>210.8</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-18</td> <td>52</td> <td>-11</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.25</td> <td>1</td> <td>0.28</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>934.8</td> <td>2620</td> <td>731.8</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-301.7</td> <td>2520</td> <td>-841.2</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-1326.6</td> <td>6800</td> <td>-297.8</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-1900.9</td> <td>6800</td> <td>-133.5</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC <sub>15</sub> )	N/A	700	67.3	700	210.8	Maximum Chest Compression	mm	63	-18	52	-11	Nij	N/A	1	0.25	1	0.28	Neck Tension	N	4170	934.8	2620	731.8	Neck Compression	N	4000	-301.7	2520	-841.2	Left Femur Force	N	10000	-1326.6	6800	-297.8	Right Femur Force	N	10000	-1900.9	6800	-133.5
Measurement Description	Units	Driver ATD				Passenger ATD																																																	
		Threshold	Result	Threshold	Result																																																		
Head Injury Criteria (HIC <sub>15</sub> )	N/A	700	67.3	700	210.8																																																		
Maximum Chest Compression	mm	63	-18	52	-11																																																		
Nij	N/A	1	0.25	1	0.28																																																		
Neck Tension	N	4170	934.8	2620	731.8																																																		
Neck Compression	N	4000	-301.7	2520	-841.2																																																		
Left Femur Force	N	10000	-1326.6	6800	-297.8																																																		
Right Femur Force	N	10000	-1900.9	6800	-133.5																																																		
<b>17. Key Words</b> 56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP)		<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave., SE Washington, DC 20590																																																					
<b>19. Security Classification of this report</b> UNCLASSIFIED	<b>20. Security Classification of this page</b> UNCLASSIFIED	<b>21. No. of Pages</b> 170	<b>22. Price</b>																																																				

## TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of Indicant FMVSS 212 and 219 (Partial) Data	25
16	FMVSS 301 Barrier Impact and Static Rollover Results	26
17	Dummy / Vehicle Temperature Stabilization Chart	28
305-1	General Test and Vehicle Parameter Data for Indicant FMVSS No. 305 Testing	29
305-2	Pre-Impact Data for Indicant FMVSS No. 305 Testing	31
305-3	Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing	32
305-4	Post-Impact Data for Indicant FMVSS No. 305 Testing	33
305-5	Static Rollover Test Data for Indicant FMVSS No. 305 Testing	34
<u>Appendix</u>		<u>Page No.</u>
A	Photographic Documentation	A
B	Dummy Response Data Traces	B
C	Dummy Qualification and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration	D

## **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 693JJ919D000004. 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 Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

#### **SUMMARY**

A load cell barrier consisting of 176 load cells was impacted by a 2020 Tesla Model Y 5-Door MPV at a velocity of 56.63 km/h. The test was performed at Applus+ IDIADA KARCO Engineering, LLC. on November 17, 2020. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

One (1) 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 HIII 50<sup>th</sup> percentile male anthropomorphic test device (ATD) was placed in the driver seating position and one Part HIII 5<sup>th</sup> percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

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 qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 106 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces. Appendix D contains a complete list of instrumentation used for dummies and the vehicle.

There was 100 percent windshield retention and intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the test vehicle was 425 mm at the DPD3 to the left 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 <sub>15</sub>	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50th Male)	67.3	0.25	934.8	-301.7	35	-18	-1326.6	-1900.9
Passenger (5th Female)	210.8	0.28	731.8	-841.2	40	-11	-297.8	-133.5

**GENERAL COMMENTS:**

- Driver left femur FZ primary, CF at 99.8 ms.
- Passenger head AZR, CF at 87.2 ms
- Passenger left upper tibia MX, CF at 85.1 ms
- Passenger right upper tibia MX, CF at 83.5 ms
- Engine top AX, channel failed at 44.5 ms
- Driver lap belt force was not installed
- Passenger lap belt force was not installed
- Knee airbag is designed to not deploy for 5<sup>th</sup> female
- Some pre-test photos have a test date of 11/16/20, the test was run on 11/17/20

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

### CONVERSION FACTORS

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

**DATA SHEET NO. 1**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	O20205000
Model Year	2020
Make	Tesla
Model	Model Y
Body Style	5-Door MPV
VIN	5YJYGDEE1LF058327
Body Color	Midnight Silver Metallic
Odometer Reading (km / mi)	8/5
Engine Displacement (L)	NA
Type / No. of Cylinders	NA
Engine Placement	NA
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	Oct-20

GVWR (kg)	2405
GAWR Front (kg)	1363
GAWR Rear (kg)	1500

**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	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				34.8	A-B





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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UWV)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	484.0	500.5		524.0	568.5	
Right	kg	510.0	500.5		518.0	553.0	
Ratio	%	49.8%	50.2%	100.0%	48.2%	51.8%	100.0%
Total	kg	994.0	1001.0	1995.0	1042.0	1121.5	2163.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UWV)	kg	1995.0	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 (TVTWT)	kg	2170.8	A+B+C

**TEST VEHICLE ATTITUDES**

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	820	822	838	835	1445
As Tested	mm	812	810	825	822	1493
Post-Test	mm	810	860	810	845	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2880
Total Vehicle Length at Left Side	mm	4184
Total Vehicle Length at Centerline	mm	4759
Total Vehicle Length at Right Side	mm	4168
Weight of Ballast in Cargo Area	kg	49.1
Weight of Vehicle Components Removed	kg	12.7
Amount of Stoddard Solvent in Fuel Tank	L	NA

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

Rear trim (6.8 kg), charging cables (3.6 kg), tow hook (1.0 kg), rear floormats (1.3 kg)

---



---

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

No.	Description	Pre-Test
1	Total Length	4759
2	Total Width	1920
3	Bumper Top Height	720
4	Bumper Bottom Height	415
5	Longitudinal Member Top Height	570
6	Distance Between Longitudinal Members	795
7	Longitudinal Member Width	112
8	Engine Top Height	
9	Engine Bottom Height	
10	Engine and Gearbox Width	
11	Front Bumper to Engine Distance	
12	Front Shock Absorber Fixing Height	853
13	Bonnet Leading Edge Height	863
14	Front Shock Absorber Fixing Width	950
15	Front Bumper to Front Axle Distance	913
16	Front Axle to A-Pillar Distance	508
17	A-Pillar to B-Pillar Distance	1035
18	B-Pillar to Rear Axle Distance	1223
19	B-Pillar to C-Pillar Distance	840
20	Roof Sill Bottom Height	1475
21	Roof Sill Top Height	1582
22	Floor Sill Bottom Height	180
23	Floor Sill Top Height	365

All measurements in millimeters.

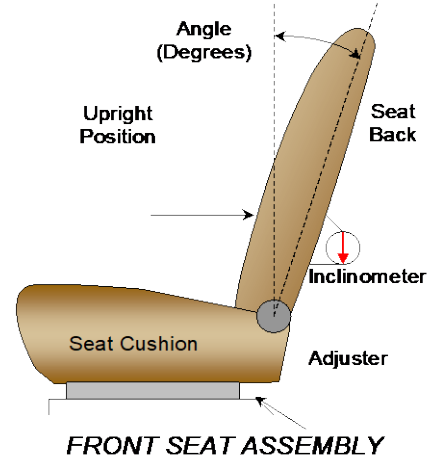
## DATA SHEET NO. 2

### SEAT ADJUSTMENT AND STEERING WHEEL DATA

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

#### 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 with a flat edge along the seat back.

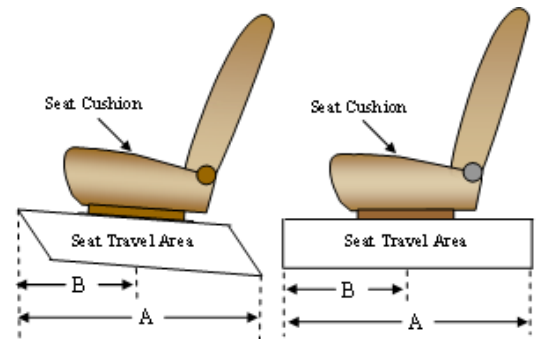


#### SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	16.5
Passenger Seat Back Angle	15.6

#### 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	320 mm	160 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 50<sup>th</sup> percentile adult male ATD for the driver, and a 5<sup>th</sup> percentile adult female ATD for the passenger. Position “L” is the lowermost position, followed by position “M1”. Position “H” is the uppermost 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 AND STEERING WHEEL DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV

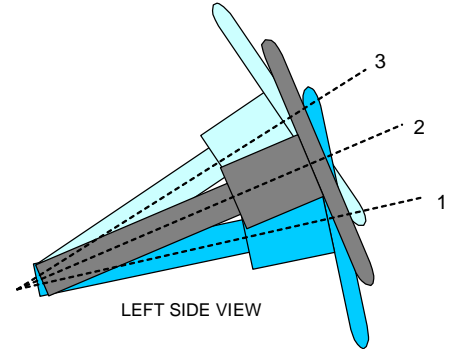
NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 11/17/20

**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.



LEFT SIDE VIEW  
STEERING COLUMN ASSEMBLY

**STEERING COLUMN POSITIONING**

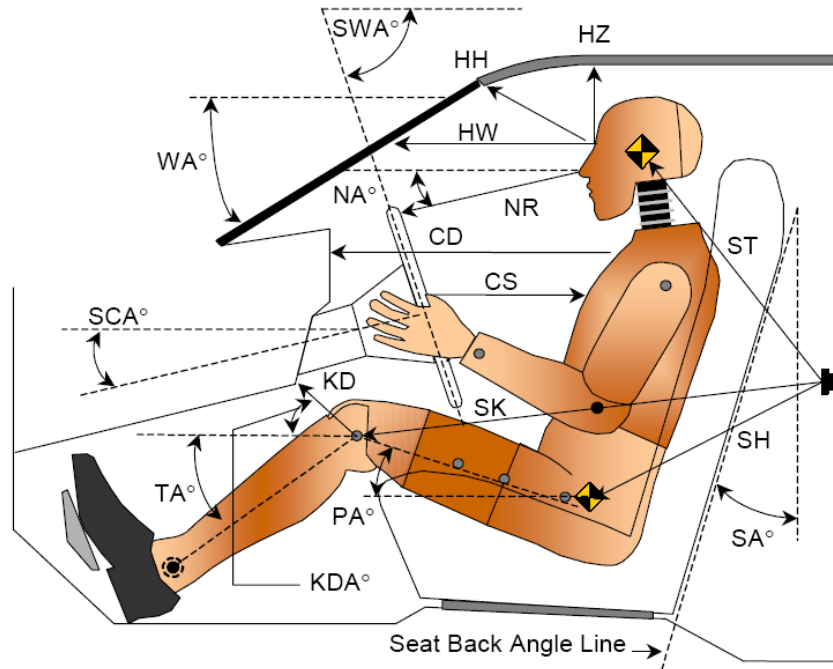
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	16.3	93
Geometric Center Position, No. 2	18.7	122
Uppermost Position, No. 3	21.1	150
Telescoping Steering Wheel Travel		57
Test Position	18.7	122

### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20



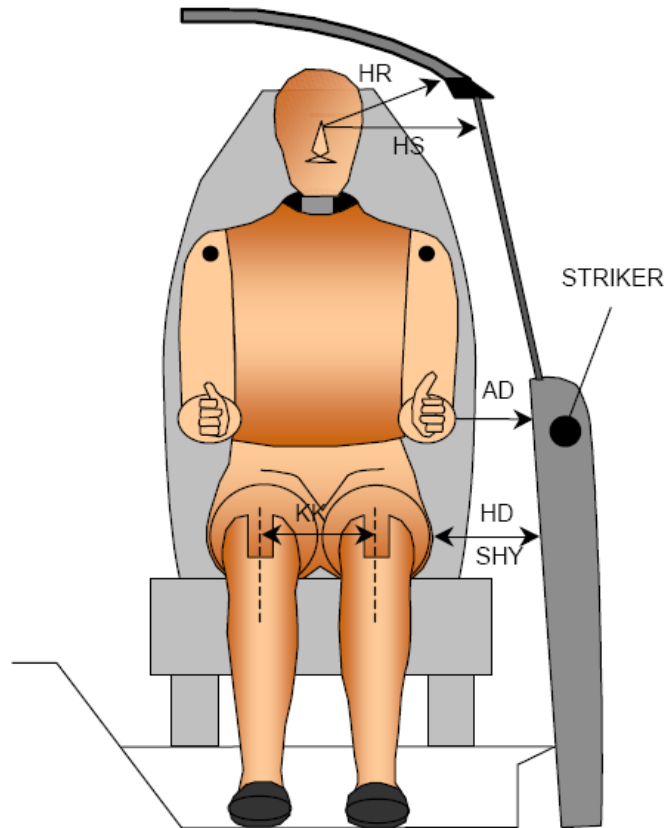
**LEFT SIDE VIEW**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		23.7		
SWA°	Steering Wheel Angle		18.5		
SCA°	Steering Column Angle		71.5		
SA°	Seat Back Angle (On Headrest Post)		16.5		17.3
HZ	Head to Roof	245	90.0	202	90.0
HH	Head to Header	302	27.0	301	46.3
HW	Head to Windshield	674	0.0	655	0.0
NR	Nose to Rim	323	12.4	489	26.9
CD	Chest to Dash	NA	NA	444	7.3
CS	Chest to Steering Hub	258	0.0		
RA	Rim to Abdomen	164	0.0		
KDL	Left Knee to Dash	232	10.2	180	43.0
KDR	Right Knee to Dash	212	8.1	191	44.6
PA°	Pelvic Angle		25.0		19.9
TA°	Tibia Angle		52.9		53.6
SK	Striker to Knee	593	6.8	669	2.2
ST	Striker to Head	588	79.8	563	70.4
SH	Striker to H-Point	216	18.5	342	6.2

## DATA SHEET NO. 4

### DUMMY LATERAL CLEARANCE DIMENSIONS

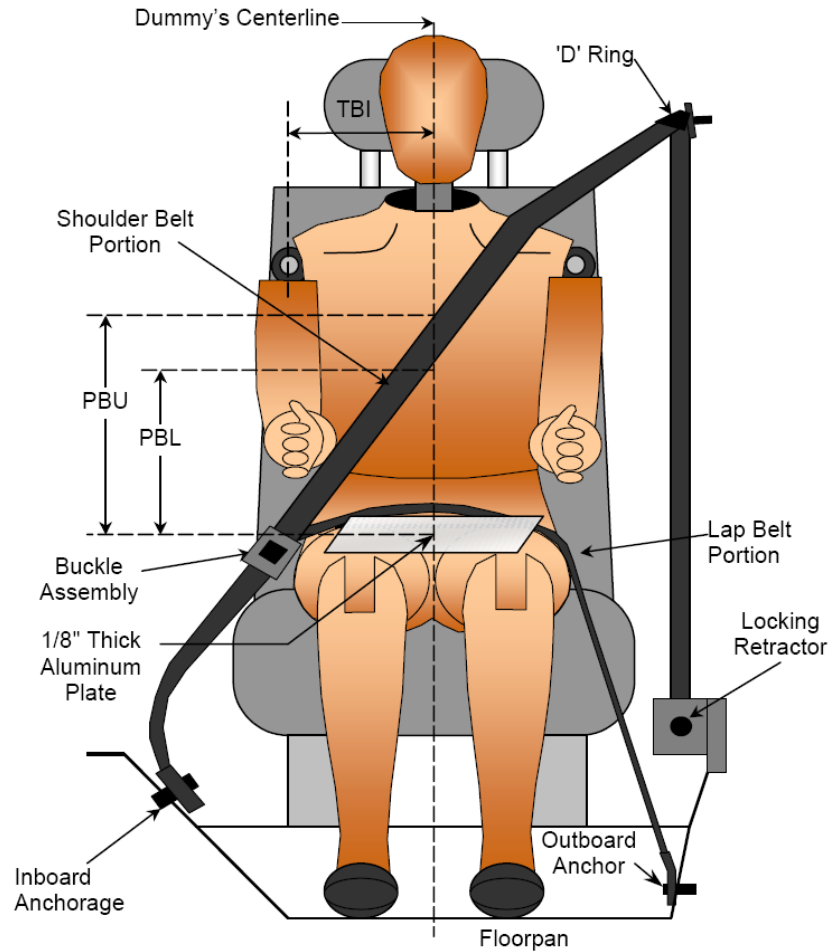
Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	27	81
HD	H-Point to Door	152	175
HR	Head to Side Header	241	283
HS	Head to Side Window	358	372
KK	Knee to Knee	367	266
SHY	Striker to H-Point (Y-Direction)	248	279
AA	Ankle to Ankle	300	200

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

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20



**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	348	320
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	283	220

**BELT LENGTH DATA**

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	954	1020
Lap Belt Length as Measured on ATD	mm	459	402
Remainder of Belt on Reel	mm	904	970
Total Belt Length for Continuous Webbing Systems	mm	2317	2392



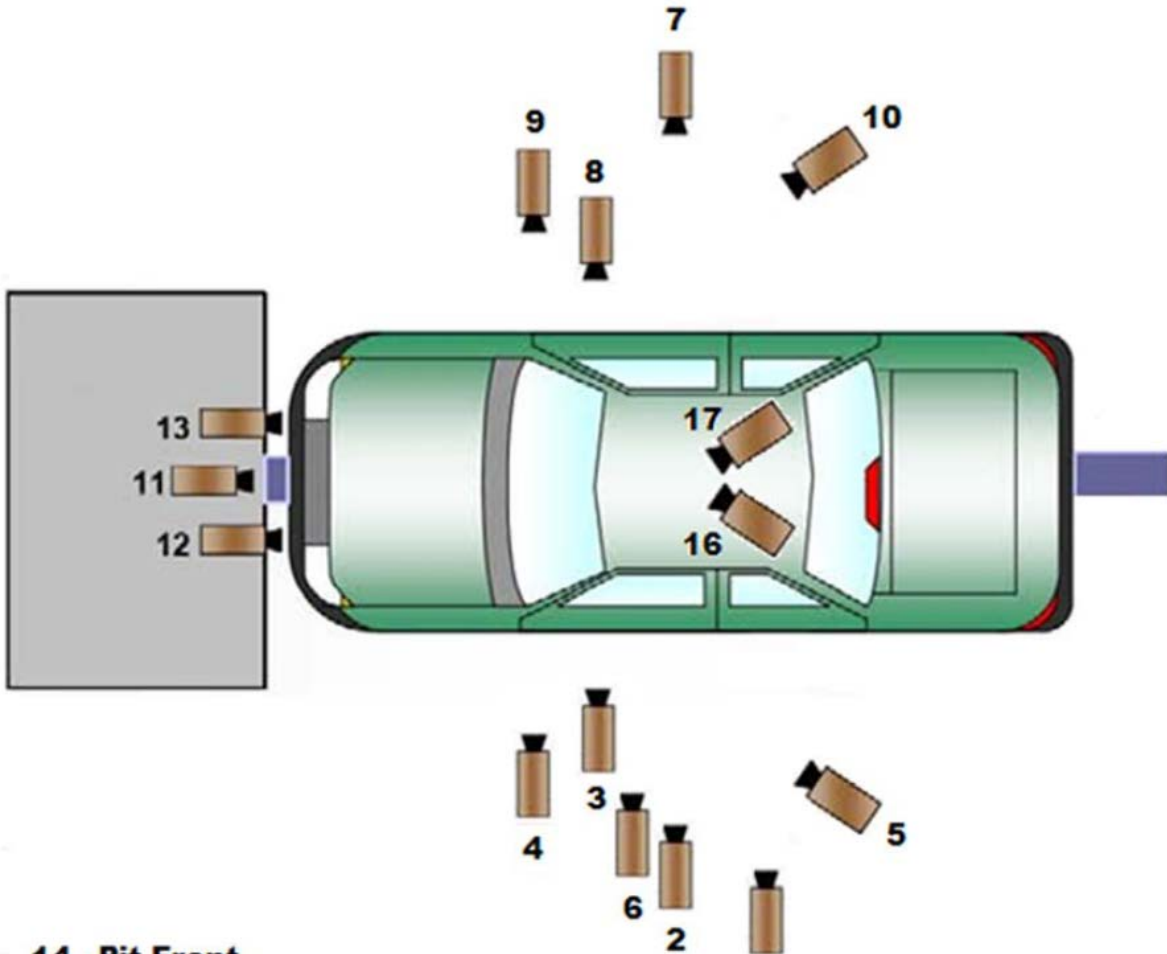
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

CAMERA POSITIONS FOR FRONTAL IMPACTS



14 - Pit Front

15 - Pit Rear

16 & 17 - Driver and Passenger Onboard

1- Real Time Camera

*\*\*Camera locations are approximate and not to scale*

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

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**CAMERA LOCATIONS**

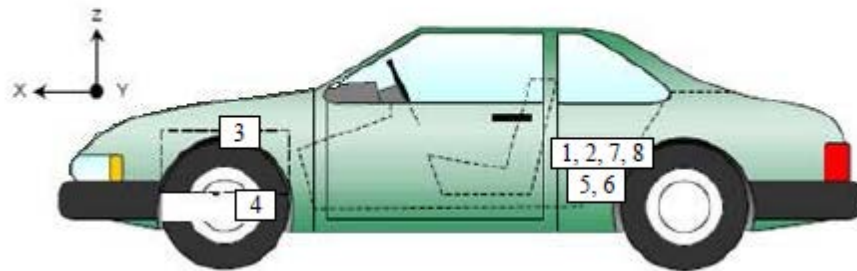
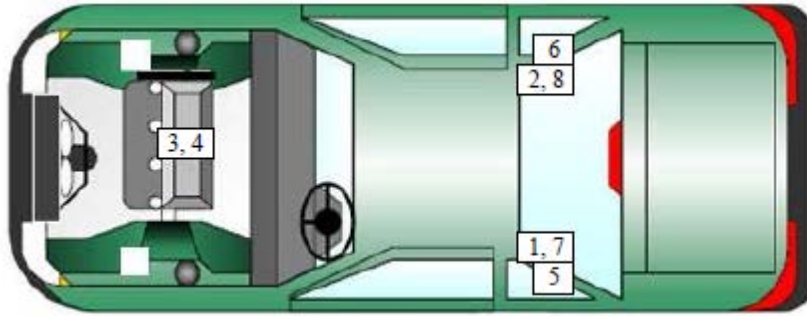
No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Left Overall	-2456	-7975	-1025	20	1000
3	Driver Close-Up	-2590	-7950	-1371	50	1000
4	Left Front Half	-1701	-6197	-1701	35	1000
5	Left Angle	-6696	-10308	-3211	105	1000
6	Steering Column	-1966	-10412	-3688	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	21	1000
15	Pit Rear	-3398	0	1495	14	1000
16	Driver Onboard	1080	-350	-1420	6	1000
17	Passenger Onboard	1080	350	-1420	6	1000

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

**DATA SHEET NO. 7**

**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1765	-730	325
2	Right Rear Accelerometer X-Direction	1765	730	325
3	Engine Top X	3855	0	405
4	Engine Bottom X	3810	-50	240
5	Left Rear Accelerometer Z-Direction	1765	-730	325
6	Right Rear Accelerometer Z-Direction	1765	730	325
7	Left Rear Accelerometer X-Direction Redundant	1765	-730	325
8	Right Rear Accelerometer X-Direction Redundant	1765	730	325

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

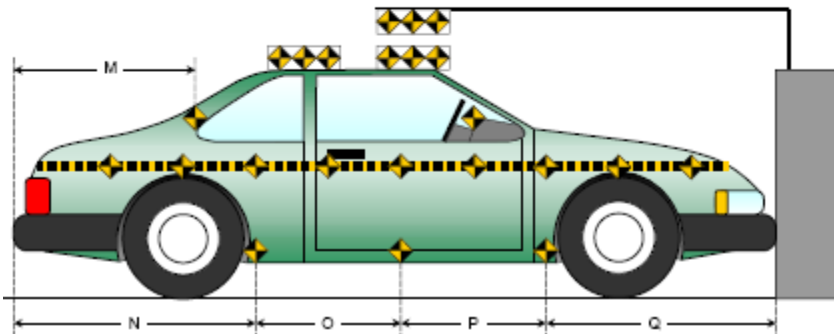
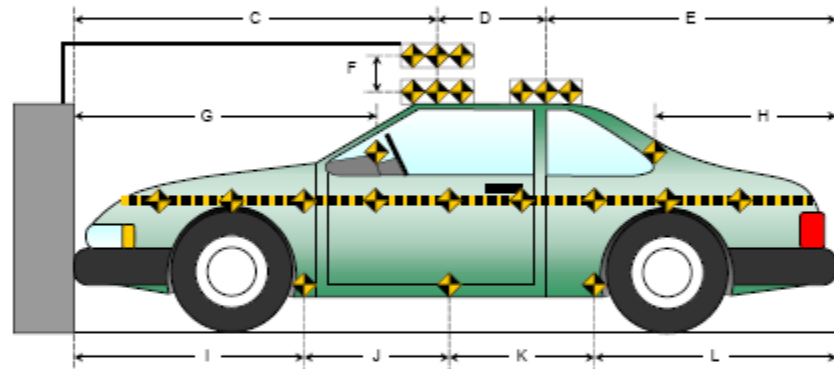
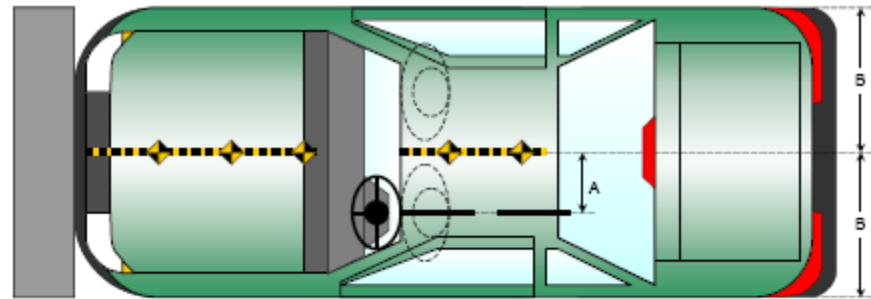
**DATA SHEET NO. 8**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

Item	Value
A	NA
B	1920
C	2840
D	610
E	1900
F	305
G	2425
H	780
I	1432
J	895
K	895
L	1537
M	780
N	1537
O	895
P	895
Q	1432



All measurements in millimeters.

**DATA SHEET NO. 9**

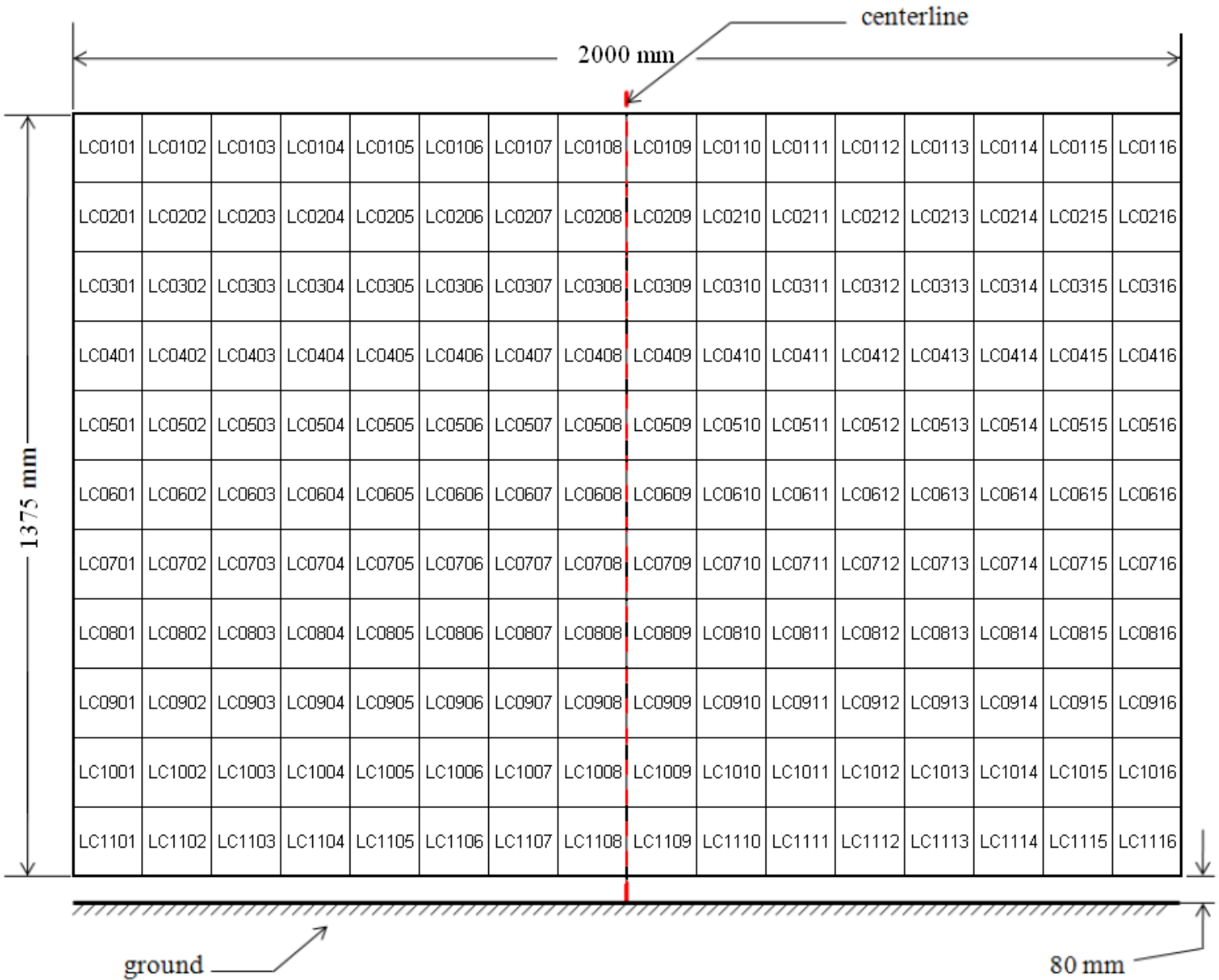
**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV

NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 11/17/20



**DATA SHEET NO. 10**

**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**INSTRUMENTATION**

Driver Dummy Accelerometers	49
Passenger Dummy Accelerometers	49
Vehicle Structure Accelerometers	8
Load Cell Barrier	528
Total	634

**CAMERA COVERAGE**

High-Speed Vehicle On Board	2
High-Speed Off Board	14
Real Time	1
Total	17

**DATA SHEET NO. 11**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**TEST DUMMY INFORMATION AND CONTACT LOCATIONS**

Description	Driver	Passenger
Dummy Type/Serial No.	HIII 50th Percentile Male ATD / 360	HIII 5th Percentile Female ATD / 141
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	Frontal Airbag	Frontal Aibag
Left Knee Contact	Knee Airbag	None
Right Knee Contact	Knee Airbag	None

**DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked / Unlocked Doors	Locked	Locked
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
Trunk/Hatch/Tailgate Opening	None	
Seat Track Shift (mm)	0	0
Seat Back Movement from Initial Position	None	None

**OTHER VEHICLE POST-TEST 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	1074
Center	mm	1023
Right Side	mm	1123
Average	mm	1073

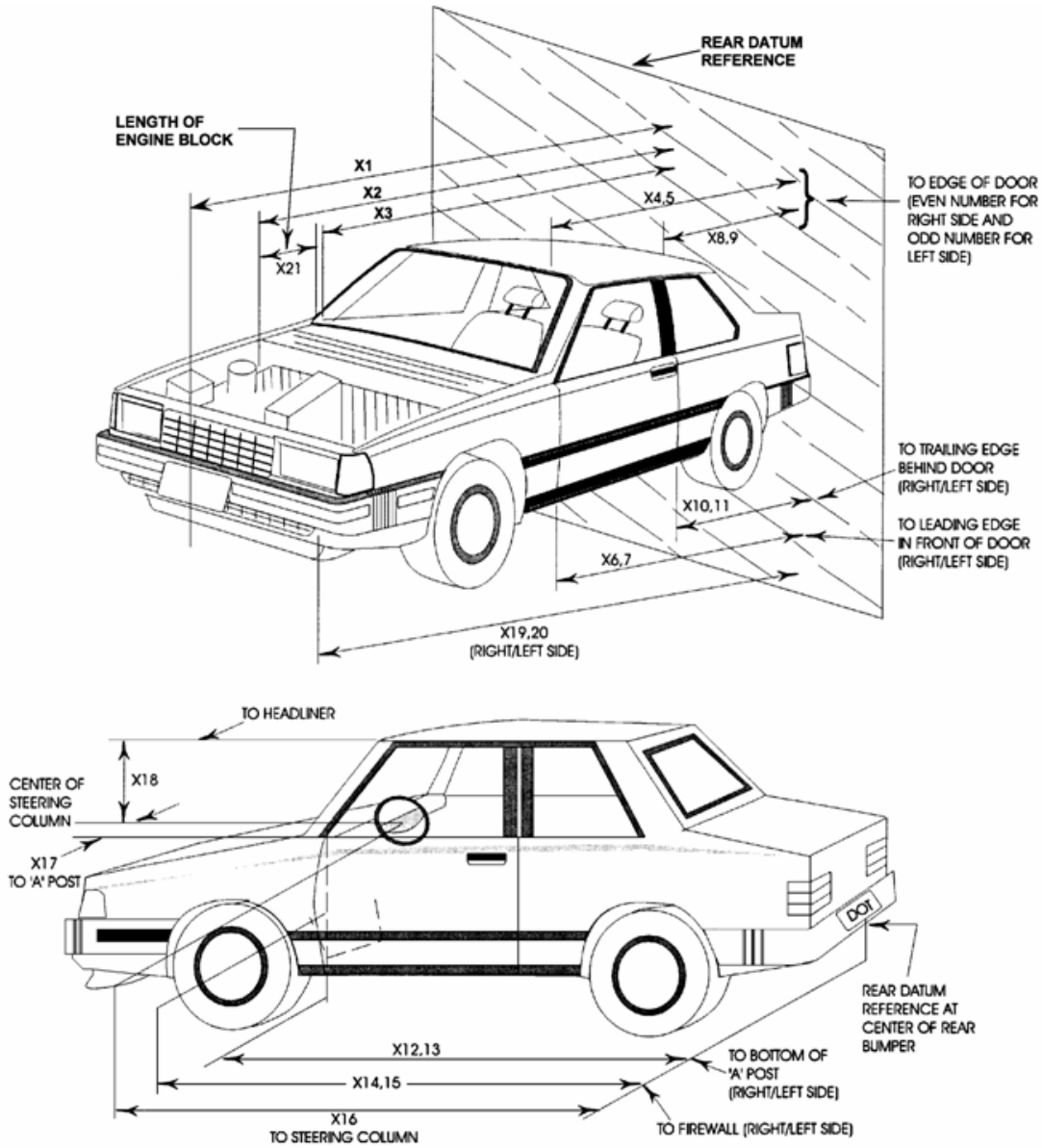
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

\*Note: Knee Airbag is designed to *not* deploy for the 5<sup>th</sup> female.

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

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20





**DATA SHEET NO. 12 ... (CONTINUED)**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4759	4450	-309
2	Rear Surface of Vehicle to Front of Engine	0	0	0
3	RSOV to Firewall	3772	3776	4
4	RSOV to Upper Leading Edge of Right Door	3381	3379	-2
5	RSOV to Upper Leading Edge of Left Door	3380	3378	-2
6	RSOV to Lower Leading Edge of Right Door	3410	3412	2
7	RSOV to Lower Leading Edge of Left Door	3413	3400	-13
8	RSOV to Upper Trailing Edge of Right Door	2142	2140	-2
9	RSOV to Upper Trailing Edge of Left Door	2145	2143	-2
10	RSOV to Lower Trailing Edge of Right Door	2264	2265	1
11	RSOV to Lower Trailing Edge of Left Door	2265	2255	-10
12	RSOV to Bottom of A-Pillar, Right Side	3271	3271	0
13	RSOV to Bottom of A-Pillar, Left Side	3270	3272	2
14	RSOV to Firewall, Right Side	3626	3627	1
15	RSOV to Firewall, Left Side	3624	3620	-4
16	RSOV to Steering Column	2720	2970	250
17	Center of Steering Column to A-Pillar	425	420	-5
18	Center of Steering Column to Headliner	415	480	65
19	RSOV to Right Side of Front Bumper	4168	3958	-210
20	RSOV to Left Side of Front Bumper	4184	3950	-234
21	Length of Engine Block	0	0	0
RD	RSOV to Right Side of Dash Panel	3068	3070	2
CD	RSOV to Center of Dash Panel	2960	2964	4
LD	RSOV to Left Side of Dash Panel	3070	3073	3

All measurements in millimeters.

**DATA SHEET NO. 13**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

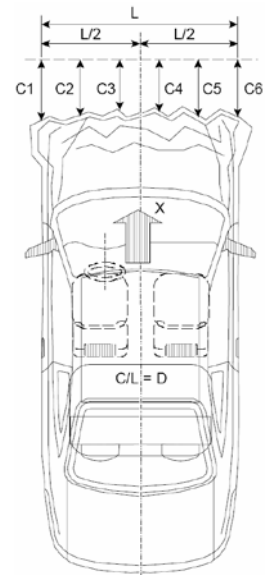
**VEHICLE INFORMATION**

VIN: 5YJYGDEE1LF058327 Wheelbase (mm): 2880  
 Vehicle Size Category: 5-Door MPV Test Weight (kg): 2163.5

**ACCELEROMETER DATA**

Accelerometer Locations: Left Rear Crossmember  
 Cal. Procedure/Interval: Vibration Test / 6 months  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 56.63  
 Velocity Change (km/h): 69.4  
 Time of Separation (msec): 65.1

Linearity: Good



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW2  
 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1390  
 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	155	500	345
C2	Crush Zone 2 at Left Side	mm	60	480	420
C3	Crush Zone 3 at Left Side	mm	25	450	425
C4	Crush Zone 4 at Right Side	mm	25	440	415
C5	Crush Zone 5 at Right Side	mm	60	481	421
C6	Crush Zone 6 at Right Side	mm	155	535	380
L	C1 to C6	mm	1390		

**DATA SHEET NO. 14**

**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

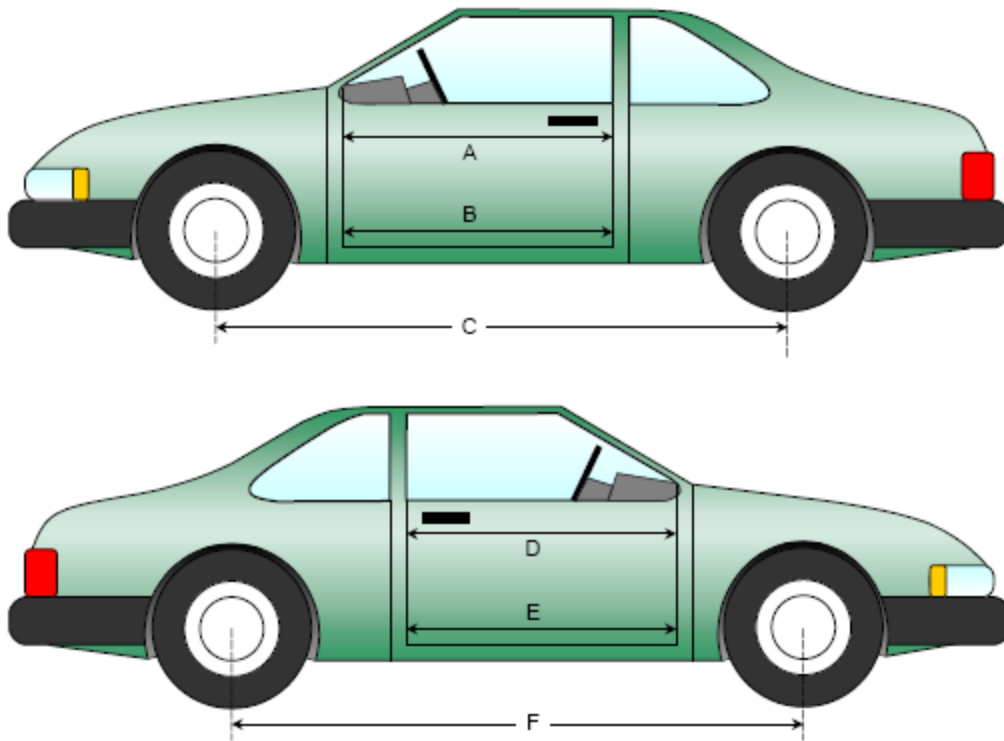
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1035	1036	-1
B	Left Side Lower	mm	985	989	-4
D	Right Side Upper	mm	1035	1035	0
E	Right Side Lower	mm	983	984	-1

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2880	2770	110
F	Right Side Wheelbase	mm	2880	2800	80



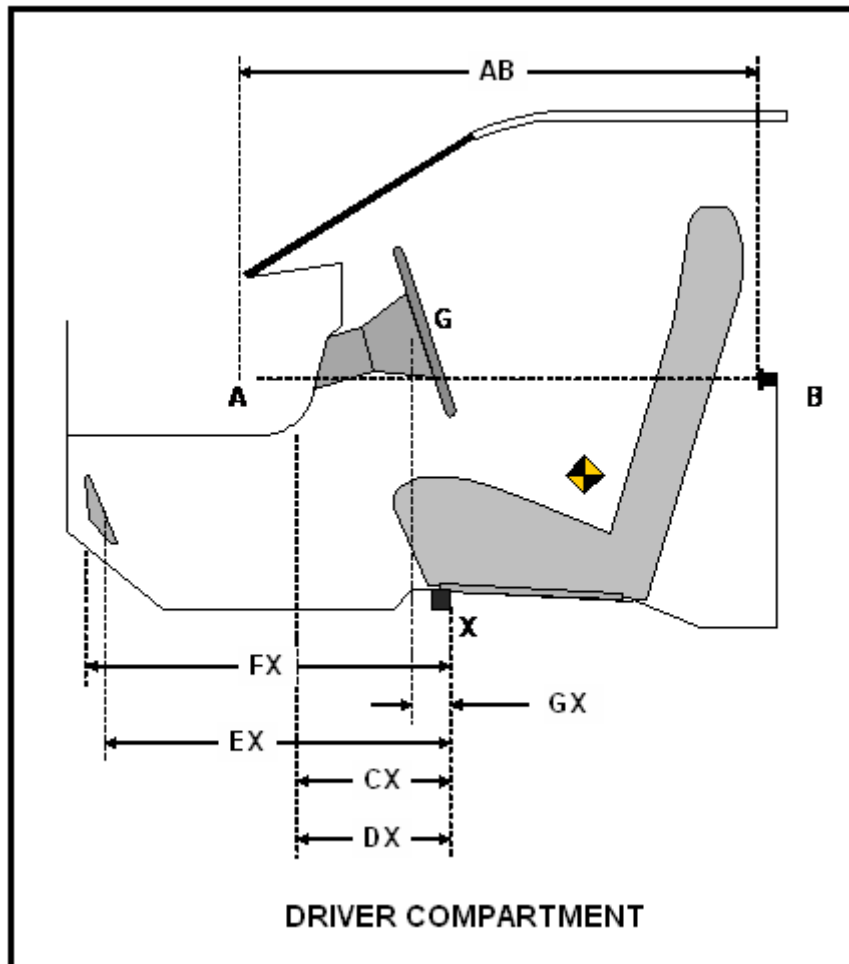
**DATA SHEET NO. 14 ... (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	940	943	-3
CX	Left Knee Bolster to X	mm	360	320	40
DX	Right Knee Bolster to X	mm	360	320	40
EX	Brake Pedal to X	mm	550	520	30
FX	Foot Rest to X	mm	603	595	8
GX	Center of Steering Wheel Hub to X	mm	55	135	-80

X = Front of Seat Track (Stationary)



**DATA SHEET NO. 15**

**SUMMARY OF INDICANT FMVSS 212 AND 219 (PARTIAL) DATA**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

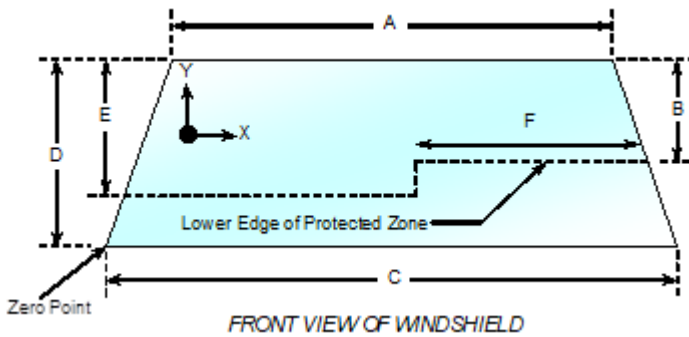
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber molding and rubber cement.

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: 21.3° C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2605	2605	100.0%
Right Side	2605	2605	100.0%
Total	5210	5210	100.0%



Item	Units	Value
A	mm	1275
B	mm	710
C	mm	1455
D	mm	1240
E	mm	705
F	mm	560

**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. 16**

**FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

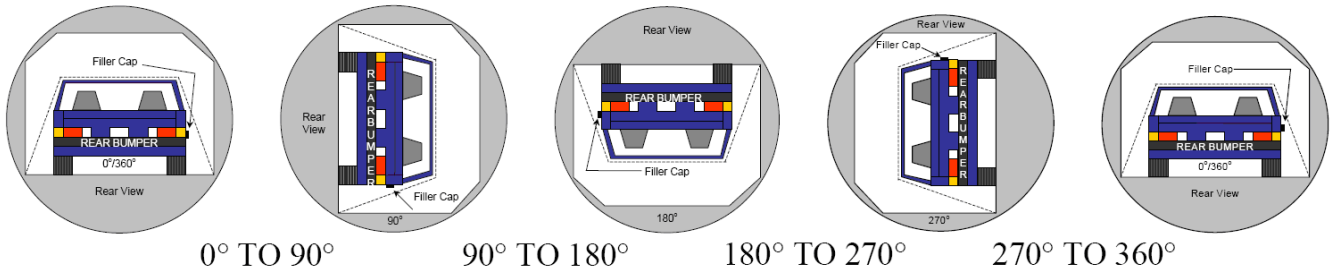
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

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

Temperature at Time of Impact: 24.4°C Test Time: 2:39 PM

**Stoddard Solvent Spillage Measurements**

- A. From impact until vehicle motion ceases: N/A oz.  
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: N/A oz.  
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: N/A oz.  
(Maximum allowable = 1 oz./minute)
- D. Spillage: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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: N/A

**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°			

**DATA SHEET NO. 16 ... (CONTINUED)**

**FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**FMVSS 301 SPILLAGE TABLE**

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

**SOLVENT SPILLAGE LOCATION TABLE**

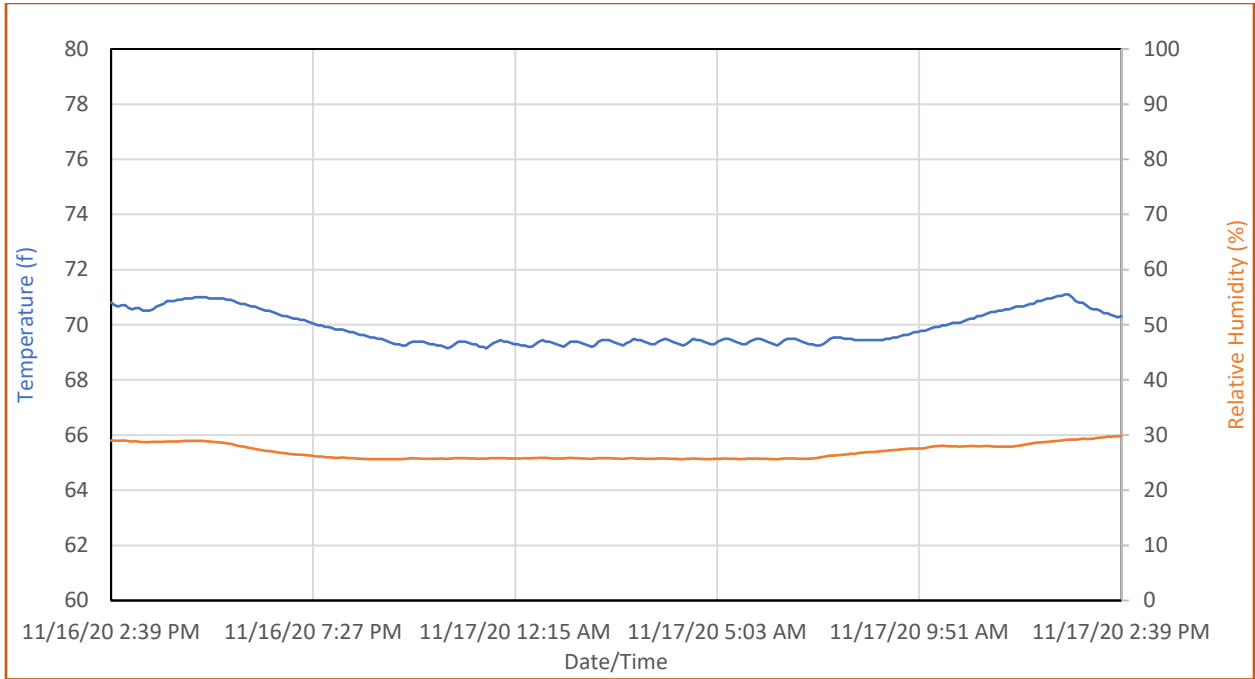
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

**DATA SHEET NO. 17**

**DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20





**DATA SHEET NO. 305-1****GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**TEST VEHICLE INFORMATION**

NHTSA Number	O20205000
Model Year	2020
Make	Tesla
Model	Model Y
Body Style	5-Door MPV
Body Color	Midnight Silver Metallic
Odometer Reading (km / mi)	8 / 5

**DATA FROM VEHICLE'S CERTIFICATION LABEL**

Manufactured By	Tesla Motors Inc.
Date of Manufacture	Oct-20
VIN	5YJYGDEE1LF058327
GVWR (kg)	2405

**ELECTRIC VEHICLE PROPULSION SYSTEM**

Type of Electrical Vehicle	Electric
Propulsion Battery Type	Lithium-Ion
Nominal Voltage (V)	350
Automatic Propulsion Battery Disconnect	Yes
Physical Location of Automatic Propulsion Battery Disconnect	Internal to HV Battery
Auxiliary Battery Type	12 Volt

**PROPULSION BATTERY SYSTEM DATA**

Electrolyte Fluid Type	Organic Electrolyte
Electrolyte Fluid Specific Gravity (g/cc)	1.2
Electrolyte Fluid Dynamic Viscosity (mPa s)	2-6 cSt
Electrolyte Fluid Color	Clear
Propulsion Battery Coolant Type	G48 Ethylene Glycol
Propulsion Battery Coolant Color	Light Blue
Propulsion Battery Coolant Specific Gravity	1.122 / 1.0

**LOCATION OF BATTERY MODULES**

Location	Beneath the occupant compartment underneath the vehicle; floor-mounted HV battery
----------	---

**DATA SHEET NO. 305-1**

**GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

*For all battery types:*

<b>Description</b>	<b>Volts</b>
Minimum Operating Voltage	240.0
Maximum Operating Voltage	403.2
95% of Maximum Operating Voltage	383.0
Test Voltage (no less than 95% of Maximum)	399.7

*For batteries that are rechargeable ONLY by an energy source on the vehicle:*

<b>Description</b>	<b>Volts</b>
Minimum Operating Voltage	
Maximum Operating Voltage	
Test Voltage (Maximum practicable state of charge within normal operating range)	

**DATA SHEET NO. 305-2**

**PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)**

DETAILS OF VEHICLE CHASSIS GROUND POINT(S) AND LOCATION(S):

The FMVSS 305 ground terminal is located under the passenger side of the second row seat.

---

---

**PROPULSION BATTERY SYSTEM**

DETAILS OF PROPULSION BATTERY COMPONENTS:

The FMVSS 305 connections for high voltage battery positive and negative are located under the propulsion battery housing under the second row seat.

---

---

**DATA SHEET NO. 305-3**

**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR  
INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**VOLTMETER INFORMATION**

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedance Value	50 MΩ
Resolution	0.001

**HV BATTERY ELECTRICAL ISOLATION DATA**

Code	Units	Threshold	Pre-Test
$V_b$	V		399.20
$V_1$	V		209.80
$V_2$	V		180.30
$R_o$	Ω		219,400
$V_1'$	V		56.98
$V_2'$	V		65.01
$R_{i1}$	Ω		1,094,120
$R_{i2}$	Ω		841,838
$R_i$	Ω		841,838
$R_i/V_b$	Ω/V	500	2,109

Is the Measured Electrical Isolation Value $\geq$ 500 Ω/V?	Yes
--	-----

**DATA SHEET NO. 305-4**

**POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**VOLTMETER INFORMATION**

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedence Value	50 MΩ
Resolution	0.001

**HV BATTERY ELECTRICAL ISOLATION DATA**

Code	Units	Threshold	Post-Test
V <sub>b</sub>	V		8.12
V <sub>1</sub>	V		3.83
V <sub>2</sub>	V		4.08
R <sub>o</sub>	Ω		219,400
V <sub>1</sub> '	V		1.04
V <sub>2</sub> '	V		1.05
R <sub>i1</sub>	Ω		1,215,585
R <sub>i2</sub>	Ω		1,227,457
R <sub>i</sub>	Ω		1,215,585
R <sub>i</sub> /V <sub>b</sub>	Ω/V	500	149,703

\* "Zero Volts" is considered as being compliant.

Is the Measured Electrical Isolation Value ≥ 500 Ω/V?	Yes
---	-----

**PROPULSION BATTERY SYSTEM COMPONENTS**

Has the propulsion battery module moved within the passenger compartment?

No \_\_\_\_\_

Describe any movement: There was no movement of the propulsion battery within the passenger compartment.

Has an outside propulsion battery component intruded into the passenger compartment?

No \_\_\_\_\_

Describe any intrusion: There was no intrusion of the outside propulsion battery into the passenger compartment.

Is there propulsion battery electrolyte spillage visible in the passenger compartment?

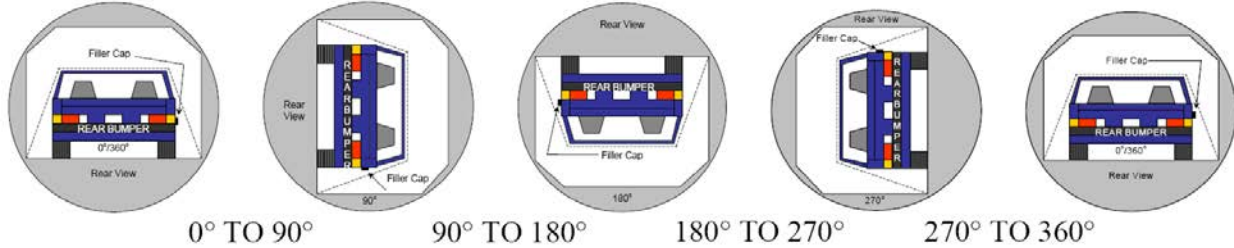
No \_\_\_\_\_

**DATA SHEET NO. 305-5**

**STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20



**PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD**

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	79	300	379
90° To 180°	81	300	381
180° To 270°	81	300	381
270° To 360°	80	300	380

**TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE**

**NOTE: The maximum allowable Propulsion Battery Electrolyte Spillage is 5.0 Liters.**

Test Phase	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0° To 90°	0.0	N/A
90° To 180°	0.0	N/A
180° To 270°	0.0	N/A
270° To 360°	0.0	N/A

Is the Total Propulsion Battery Electrolyte Spillage Greater Than 5.0 Liters?	No spillage occurred
Is the Propulsion Battery Electrolyte Spillage Visible in the Passenger Compartment?	N/A

**DATA SHEET NO. 305-5**

**STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2020 Tesla Model Y 5-Door MPV NHTSA No.: O20205000  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/17/20

**VOLTMETER INFORMATION**

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedence Value	50 MΩ
Nominal Propulsion Battery Voltage (Vb)	0.001

**HV BATTERY ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS**

Code	Units	Threshold	0°	90°	180°	270°	360°
V <sub>b</sub>	V		9.26	9.27	9.27	9.27	9.27
V <sub>1</sub>	V		4.23	5.17	4.36	4.26	4.35
V <sub>2</sub>	V		4.67	3.59	4.62	4.62	4.61
R <sub>o</sub>	Ω		219,400	219,400	219,400	219,400	219,400
V <sub>1</sub> '	V		1.16	1.18	1.16	1.16	1.16
V <sub>2</sub> '	V		1.23	0.78	1.24	1.12	1.24
R <sub>i1</sub>	Ω		1,221,706	1,257,017	1,246,575	1,222,204	1,242,762
R <sub>i2</sub>	Ω		1,169,400	1,928,670	1,162,428	1,317,825	1,158,916
R <sub>i</sub>	Ω		1,169,400	1,257,017	1,162,428	1,222,204	1,158,916
R <sub>i</sub> /V <sub>b</sub>	Ω/V	500	126,285	135,601	125,397	131,845	125,018

\* "Zero Volts" is considered as being compliant.

Is the Measured Electrical Isolation Value ≥ 500 Ω/V?	Yes
---	-----

**APPENDIX A**  
**PHOTOGRAPHIC DOCUMENTATION**



## TABLE OF PHOTOGRAPHS

Figure		Page
1	Load Cell Location	A-1
2	Pre-Test Load Cell Wall	A-1
3	Post-Test Load Cell Wall	A-2
4	Manufacturer's Label	A-2
5	Tire Placard	A-3
6	2020 Tesla Model Y Frontal as Delivered	A-3
7	Left Rear $\frac{3}{4}$ View, as Received	A-4
8	Pre-Test Front View of Test Vehicle	A-4
9	Post-Test Front View of Test Vehicle	A-5
10	Pre-Test Left View of Test Vehicle	A-5
11	Post-Test Left View of Test Vehicle	A-6
12	Pre-Test Right View of Test Vehicle	A-6
13	Post-Test Right View of Test Vehicle	A-7
14	Pre-Test Right Front $\frac{3}{4}$ View	A-7
15	Post-Test Right Front $\frac{3}{4}$ View	A-8
16	Pre-Test Left Rear $\frac{3}{4}$ View	A-8
17	Post-Test Left Rear $\frac{3}{4}$ View	A-9
18	Pre-Test Windshield View	A-9
19	Post-Test Windshield View	A-10
20	Pre-Test Engine Compartment View	A-10
21	Post-Test Engine Compartment View	A-11
22	Pre-Test Fuel Filler Cap View	A-11
23	Post-Test Fuel Filler Cap View	A-12
24	Pre-Test Front Underbody View	A-12
25	Post-Test Front Underbody View	A-13
26	Pre-Test Rear Underbody View	A-13
27	Post-Test Rear Underbody View	A-14
28	Pre-Test Dummy Cable Routing	A-14
29	Post-Test Dummy Cable Routing	A-15
30	Pre-Test Driver Dummy Front View	A-15
31	Post-Test Driver Dummy Front View	A-16
32	Pre-Test Driver Dummy Window View	A-16
33	Post-Test Driver Dummy Window View	A-17
34	Pre-Test Driver Dummy and Vehicle Interior View	A-17
35	Post-Test Driver Dummy and Vehicle Interior View	A-18
36	Pre-Test Driver's Seat Fore-Aft Markings	A-18

## TABLE OF PHOTOGRAPHS ... (CONTINUED)

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

## TABLE OF PHOTOGRAPHS ... (CONTINUED)

<u>Figure</u>		<u>Page</u>
72	Post-Test Passenger Dummy Contact with Airbag	A-37
73	Post-Test Passenger Dummy Contact with Headrest	A-37
74	Photograph of Ballast Installed in Vehicle	A-38
75	Post-Test Stoddard Solvent Spillage Location View	A-38
76	Post-Test Speed Trap Read-Out	A-39
77	Vehicle at 0° on Static Rollover Device	A-39
78	Vehicle at 90° on Static Rollover Device	A-40
79	Vehicle at 180° on Static Rollover Device	A-40
80	Vehicle at 270° on Static Rollover Device	A-41
81	Vehicle at 360° on Static Rollover Device	A-41
82	2020 Tesla Model Y Frontal Impact Event	A-42
83	Monroney Label Photograph	A-42
305-01	Auxiliary Power Module Warning Label	A-43
305-02	Power Inverter Warning Label	A-43
305-02a	Power Inverter Warning Label	A-44
305-02b	Power Inverter Warning Label	A-44
305-03	First Responder Warning Label	A-45
305-04	First Responder Warning Location	A-45
305-05	Other Vehicle Label(s) Related to Electrical Propulsion System	A-46
305-06	Manual High Voltage Service Disconnect in Place	A-46
305-07	Manual High Voltage Service Disconnect Removed	A-47
305-08	Manual High Voltage Service Disconnect Removed	A-47
305-09	Pre-Impact View of Propulsion Battery	A-48
305-10	Post-Impact Front View of Propulsion	A-48
305-11	Post-Impact Rear View of Propulsion Battery	A-49
305-12	Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-49
305-13	Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-50
305-14	Pre-Impact View of Propulsion Battery Module(s)	A-50
305-15	Post-Impact View of Propulsion Battery Module(s)	A-51
305-16	Pre-Impact View of Electric Propulsion Drive	A-51
305-17	Post-Impact View of Electric Propulsion Drive	A-52
305-18	Pre-Impact View of High Voltage Interconnect(s)	A-52
305-18a	Pre-Impact View of High Voltage Interconnect(s)	A-53
305-19	Pre-Impact View Propulsion Battery Venting System	A-53
305-20	Pre-Impact View of Other Visible Electric Propulsion Components	A-54
305-21	Pre-Impact View of Ground Lead Attached	A-54

## TABLE OF PHOTOGRAPHS ... (CONTINUED)

<u>Figure</u>		<u>Page</u>
305-21a	Pre-Impact View of Ground Lead Attached	A-55
305-22	Pre-Impact View of High Voltage Leads Attached	A-55
305-23	Pre-Impact Close-Up View of High Voltage Leads Attached	A-56
305-24	Pre-Impact View of Installed Test Interface Port	A-56
305-25	Post-Impact View of Installed Test Interface Port	A-57
305-26	Pre-Impact View of Other Test Devices	A-57
305-27	Post-Impact View of Other Test Devices	A-58
305-28	FMVSS No. 305 Static Rollover at 90°	A-58
305-29	FMVSS No. 305 Static Rollover at 180°	A-59
305-30	FMVSS No. 305 Static Rollover at 270°	A-59
305-31	FMVSS No. 305 Static Rollover at 360°	A-60
305-32	Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-60
305-33	Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-61
305-34	Post-Impact Propulsion Battery System Mounting and/or Intrusion Failure(s)	A-61
305-35	Post-Impact View of Battery Component Intrusion	A-62
305-36	Post-Impact View of Battery Module Movement or Retention Loss	A-62
305-37	Post-Impact View of Propulsion Battery Electrolyte Spillage Location	A-63
305-38	Post-Test View of Propulsion Battery Electrolyte Spillage Location	A-63

Note: Some pre-test photos have test date of 11/16/20 and post-test photos have test date of 11/17/20. The correct test date for this test is 11/17/20.



FIGURE 1. Load Cell Location

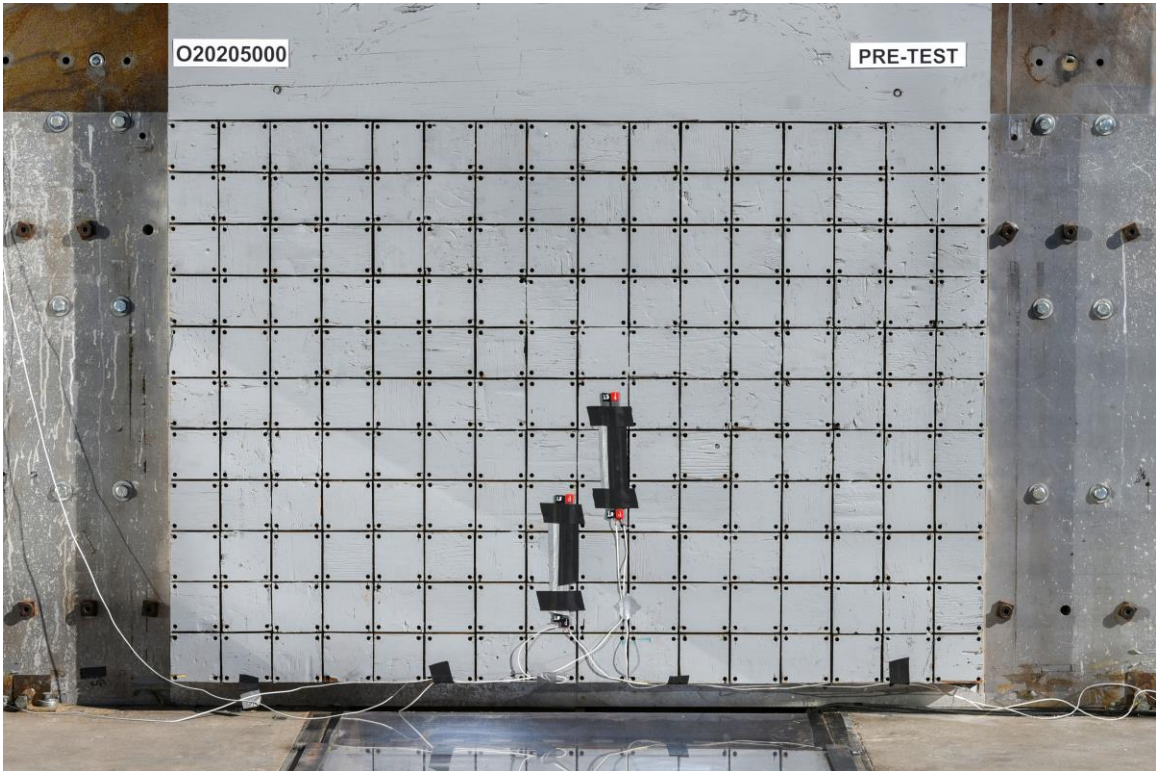


FIGURE 2. Pre-Test Load Cell Wall



FIGURE 3. Post-Test Load Cell Wall



FIGURE 4. Manufacturer's Label

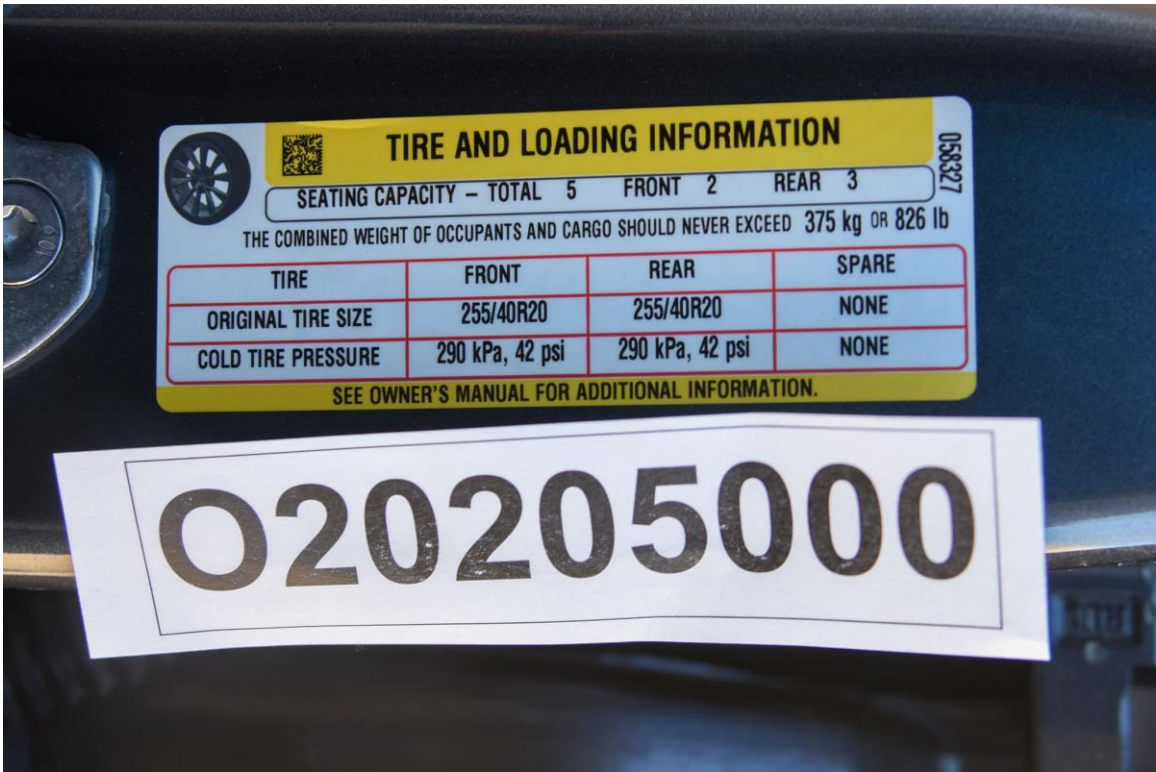


FIGURE 5. Tire Placard



FIGURE 6. 2020 Tesla Model Y Frontal as Delivered



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



FIGURE 8. Pre-Test Front View of Test Vehicle



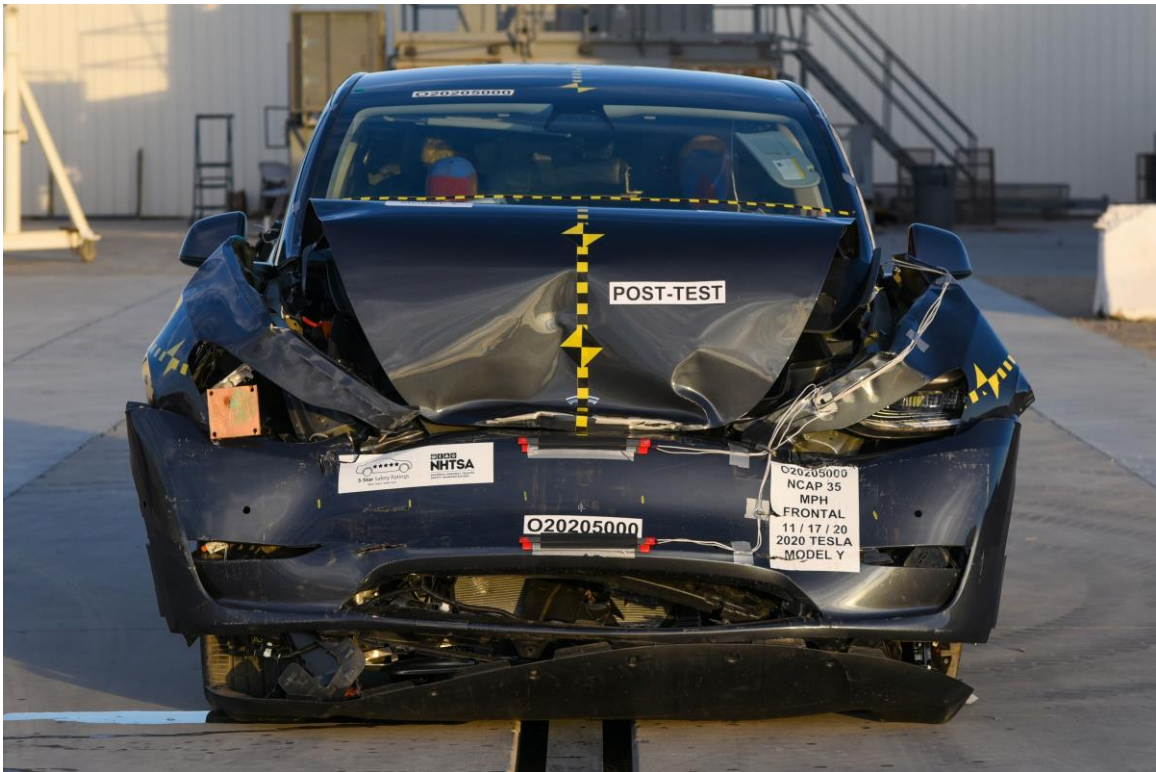


FIGURE 9. Post-Test Front View of Test Vehicle



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



FIGURE 20. Pre-Test Engine Compartment View



FIGURE 21. Post-Test Engine Compartment View



FIGURE 22. Pre-Test Fuel Filler Cap View



FIGURE 23. Post-Test Fuel Filler Cap View

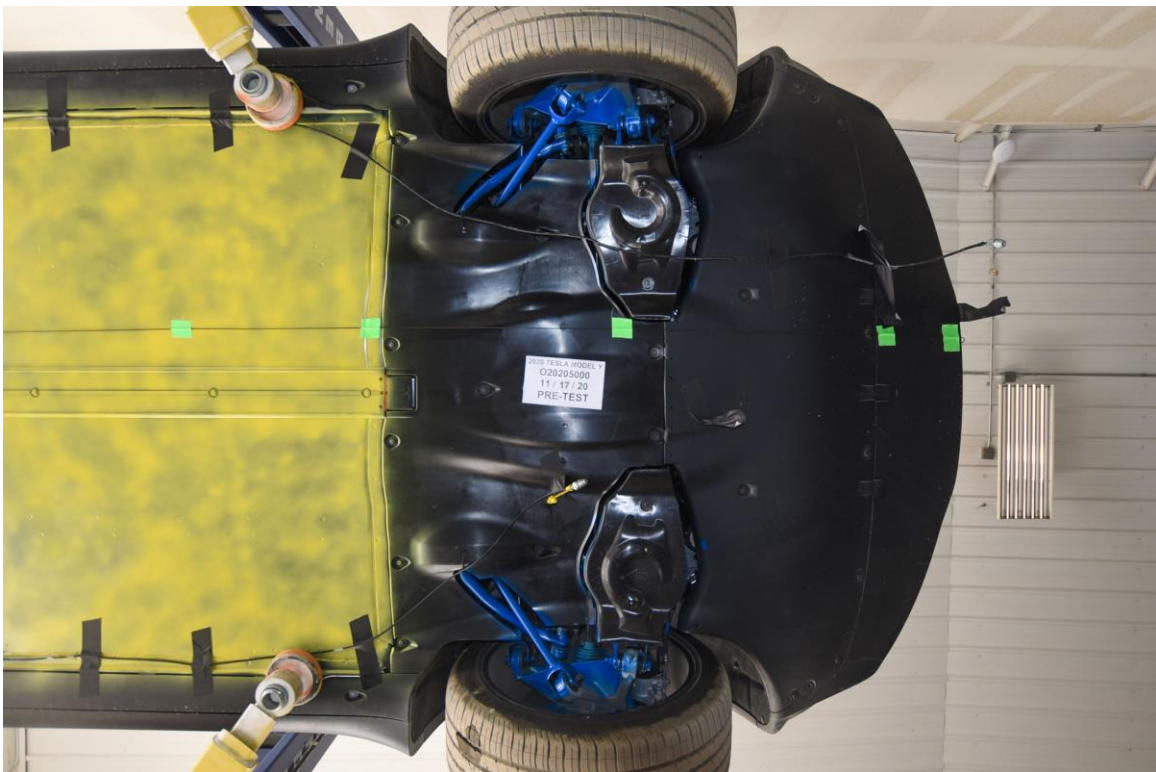


FIGURE 24. Pre-Test Front Underbody View  
(Incorrect Test Date; Should Read 11/17/20)



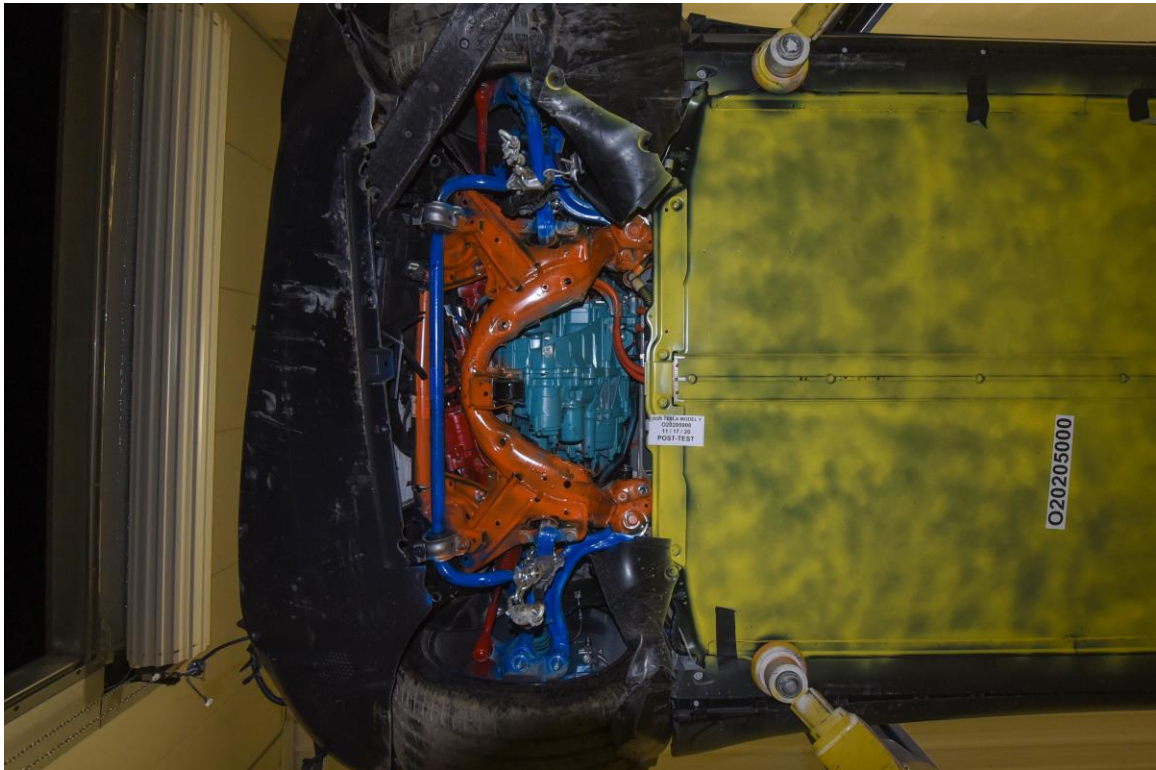


FIGURE 25. Post-Test Front Underbody View

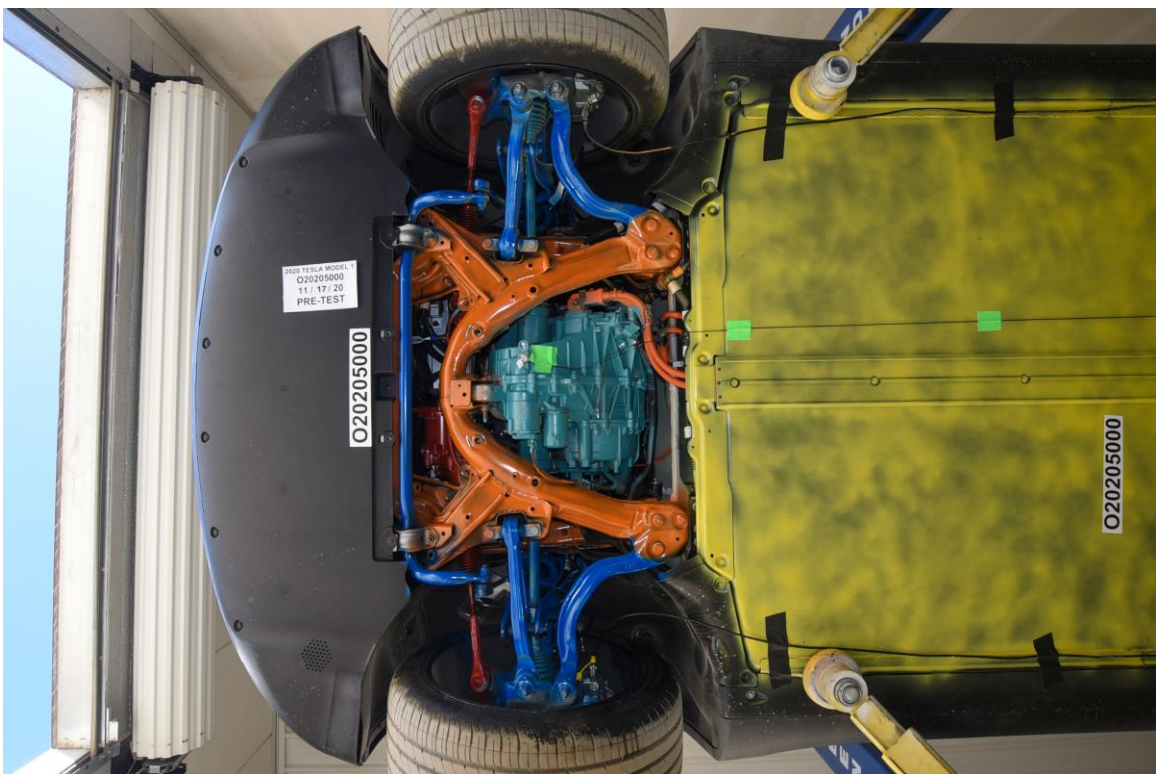


FIGURE 26. Pre-Test Rear Underbody View  
(Incorrect Test Date; Should Read 11/17/20)

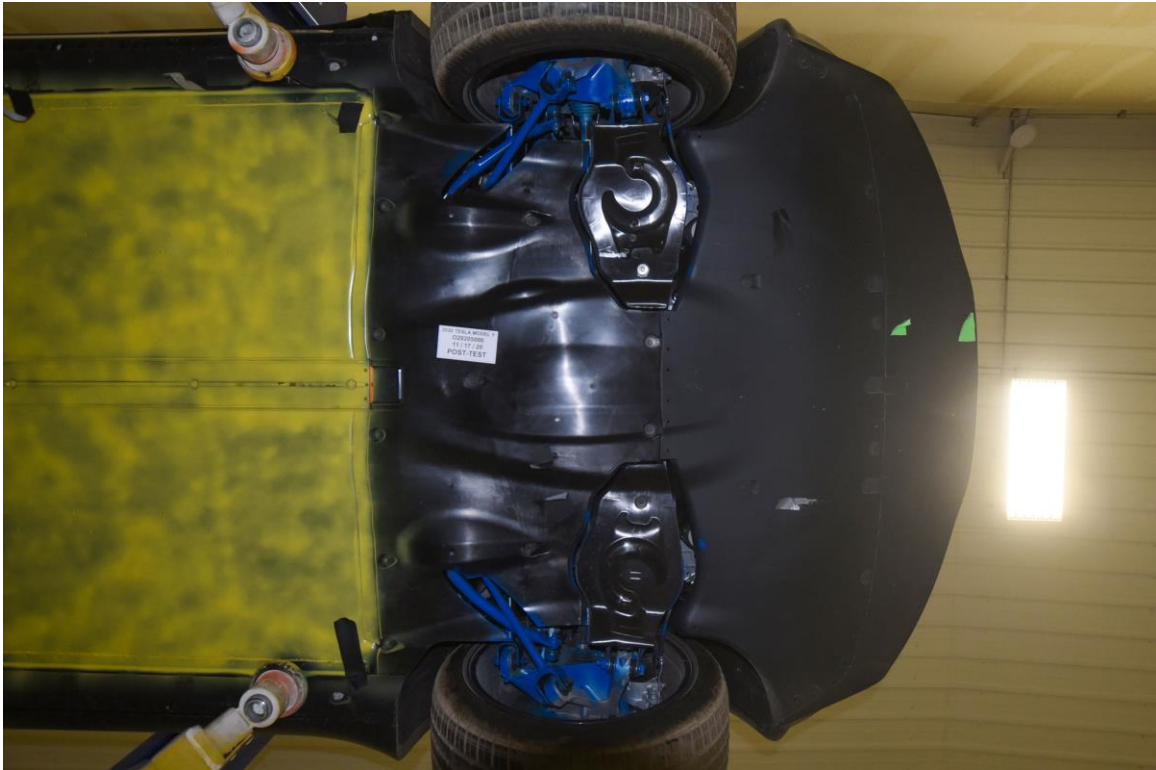


FIGURE 27. Post-Test Rear Underbody View



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 View of Belt Buckle and Latch Plate for Driver Dummy





FIGURE 41. Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



FIGURE 42. Pre-Test Driver Dummy Feet



FIGURE 43. Post-Test Driver Dummy Feet



FIGURE 44. Pre-Test Driver's Side Knee Bolster  
(Incorrect Test Date; Should Read 11/17/20)



FIGURE 45. Post-Test Driver's Side Knee Bolster



FIGURE 46. Pre-Test Driver's Side Floorpan



FIGURE 47. Post-Test Driver's Side Floorpan



FIGURE 48. Post-Test Driver Dummy Face



FIGURE 49. Post-Test Driver Dummy Contact with Airbag



FIGURE 50. Post-Test Driver Dummy Contact with Headrest



FIGURE 50a. Post-Test Driver Dummy Contact with Knee Airbag



FIGURE 51. Pre-Test View of the Steering Wheel



FIGURE 52. Post-Test View of the Steering Wheel



FIGURE 53. Pre-Test Passenger Dummy Front View



FIGURE 54. Post-Test Passenger Dummy Front View



FIGURE 55. Pre-Test Passenger Dummy Window View





FIGURE 56. Post-Test Passenger Dummy Window View



FIGURE 57. Pre-Test Passenger Dummy and Vehicle Interior View



FIGURE 58. Post-Test Passenger Dummy and Vehicle Interior View



FIGURE 59. Pre-Test Passenger's Seat Fore-Aft Markings



FIGURE 60. Post-Test Passenger's Seat Fore-Aft Markings



FIGURE 61. Pre-Test View of Belt Anchorage for Passenger Dummy



FIGURE 62. Post-Test View of Belt Anchorage for Passenger Dummy



FIGURE 63. Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy



FIGURE 64. Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy



FIGURE 65. Pre-Test Passenger Dummy Feet



FIGURE 66. Post-Test Passenger Dummy Feet

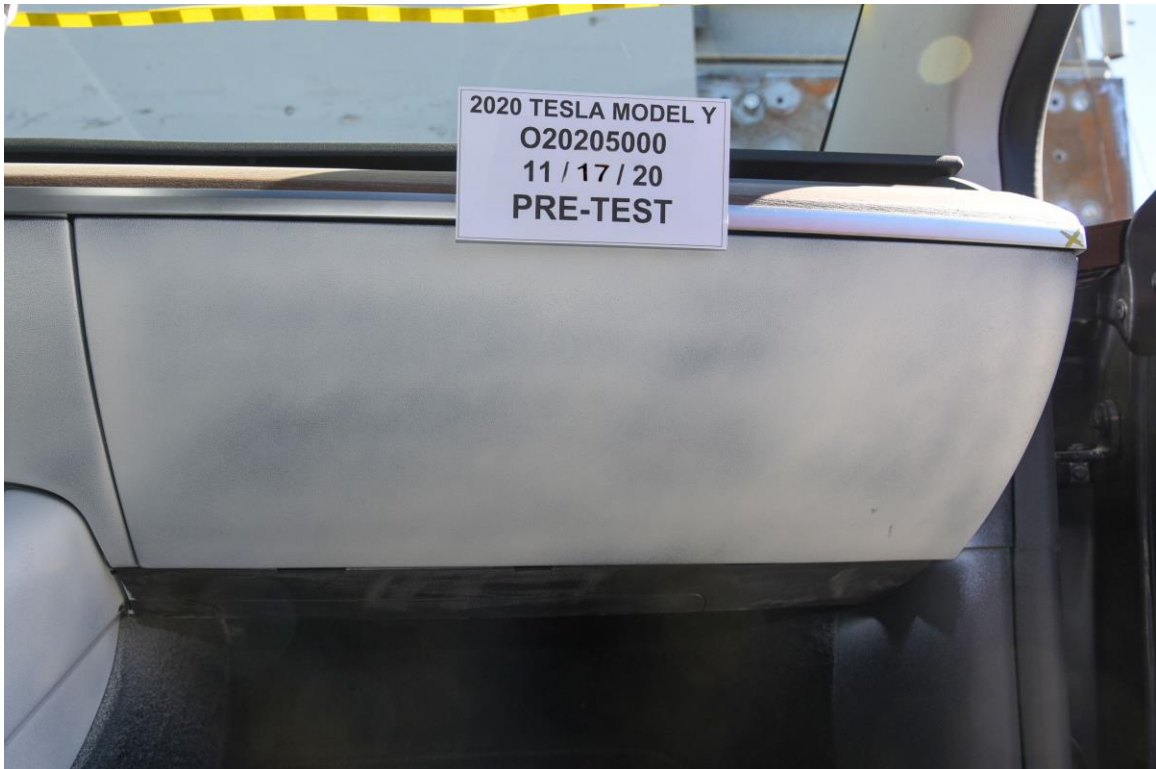


FIGURE 67. Pre-Test Passenger's Side Knee Bolster  
(Incorrect Test Date; Should Read 11/17/20)



FIGURE 68. Post-Test Passenger's Side Knee Bolster



FIGURE 69. Pre-Test Passenger's Side Floorpan



FIGURE 70. Post-Test Passenger's Side Floorpan



FIGURE 71. Post-Test Passenger Dummy Face





FIGURE 72. Post-Test Passenger Dummy Contact with Airbag

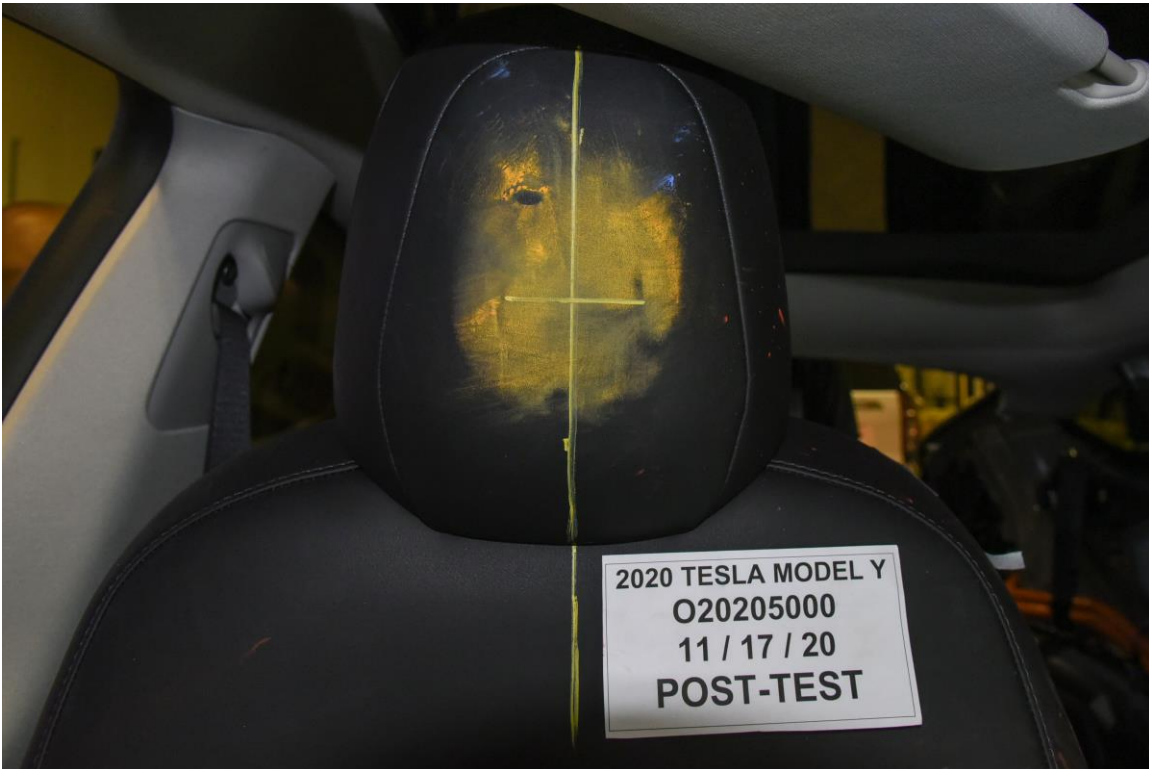


FIGURE 73. Post-Test Passenger Dummy Contact with Headrest



FIGURE 74. Photograph of Ballast Installed in Vehicle

**Photograph Not Applicable**

**No Stoddard  
Solvent Spillage**

FIGURE 75. Post-Test Stoddard Solvent Spillage Location View



FIGURE 76. Post-Test Speed Trap Read-Out

Photograph Not Applicable

FIGURE 77. Vehicle at 0° on Static Rollover Device

# Photograph Not Applicable

FIGURE 78. Vehicle at 90° on Static Rollover Device

# Photograph Not Applicable

FIGURE 79. Vehicle at 180° on Static Rollover Device

# Photograph Not Applicable

FIGURE 80. Vehicle at 270° on Static Rollover Device

# Photograph Not Applicable

FIGURE 81. Vehicle at 360° on Static Rollover Device



FIGURE 82. 2020 Tesla Model Y Frontal Impact Event

**TESLA** MODEL Y Long Range AWD

Vehicle Identification Number: 5YJYGDEE1F058327  
 Date of Manufacture: 10/2020  
 Transportation Method: Truck  
 Delivered to: TESLA MOTORS, INC., Fremont, California, USA

STANDARD FEATURES		AS CONFIGURED	
<b>TECHNICAL</b>	<b>INTERIOR</b>	Model Y	\$41,000
Three phase, four pole, induction motor (Front)	15 inch capacitive touchscreen	All Black Premium Interior	INCLUDED
Three phase, six pole, internal permanent magnet motor (Rear)	Onboard maps and navigation	Base Autopilot	INCLUDED
Drive inverter with regenerative braking system	WiFi and Mobile network connectivity	Long Range Dual Motor All-Wheel Drive	\$8,990
Microprocessor controlled, lithium-ion battery	FM radio	20" Induction Wheels	\$2,000
Onboard charger and mobile connector	Hands free talking with Bluetooth	Mirrored Silver Metallic Paint	\$1,000
120 volt and J1772 charging adapters	Voice activated controls	Dual Motor All-Wheel Drive	INCLUDED
<b>SAFETY</b>	High definition backup camera	Premium Interior	INCLUDED
Seven cameras, forward radar and twelve ultrasonic sensors	One touch power windows	Pay-as-you-go Supercharging	INCLUDED
Six front row and two side curtain airbags	Dual zone climate control	Five Seat Interior	INCLUDED
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) in second row	<b>EXTERIOR</b>		
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			
OFF-ROAD ASSIST			
		Destination and Regulatory Doc Fee	\$1,200
		<b>Total vehicle price</b>	<b>\$54,190</b>

GOVERNMENT 5-STAR SAFETY RATINGS	PARTS CONTENT INFORMATION	EPA DOT Fuel Economy and Environment
This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash, or rollover risk. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236	FOR THIS VEHICLE: US/CANADIAN PARTS CONTENT: 55% MAJOR SOURCES OF FOREIGN PARTS CONTENT MEXICO: 20% Note: Parts content does not include final assembly, distribution or other non-parts costs. FOR THIS VEHICLE: FINAL ASSEMBLY POINT: FREMONT, CA COUNTRY OF ORIGIN: MOTOR ASSEMBLY: USA GEARBOX/TRANSMISSION: USA	<b>121</b> MPGe combined city/hwy 28 kWh/100 miles 316 miles Charge Time: 10 hours (wall)
	<b>ADDITIONAL ASSEMBLY INFORMATION</b> FOR THIS VEHICLE: BATTERY FINAL ASSEMBLY POINT: FREMONT, CA, USA ON-BOARD CHARGER FINAL ASSEMBLY POINT: FREMONT, CA, USA	<b>\$550</b> Annual fuel cost Fuel Economy & Greenhouse Gas Rating: 10 (out of 10) Smog Rating: 10 (out of 10) This vehicle emits 0 grams CO <sub>2</sub> per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions. Learn more at fueleconomy.gov

FIGURE 83. Monroney Label Photograph

Photograph Not Applicable

# No Auxiliary Power Module Warning Label

FIGURE 305-01. Auxiliary Power Module Warning Label



FIGURE 305-02. Power Inverter Warning Label

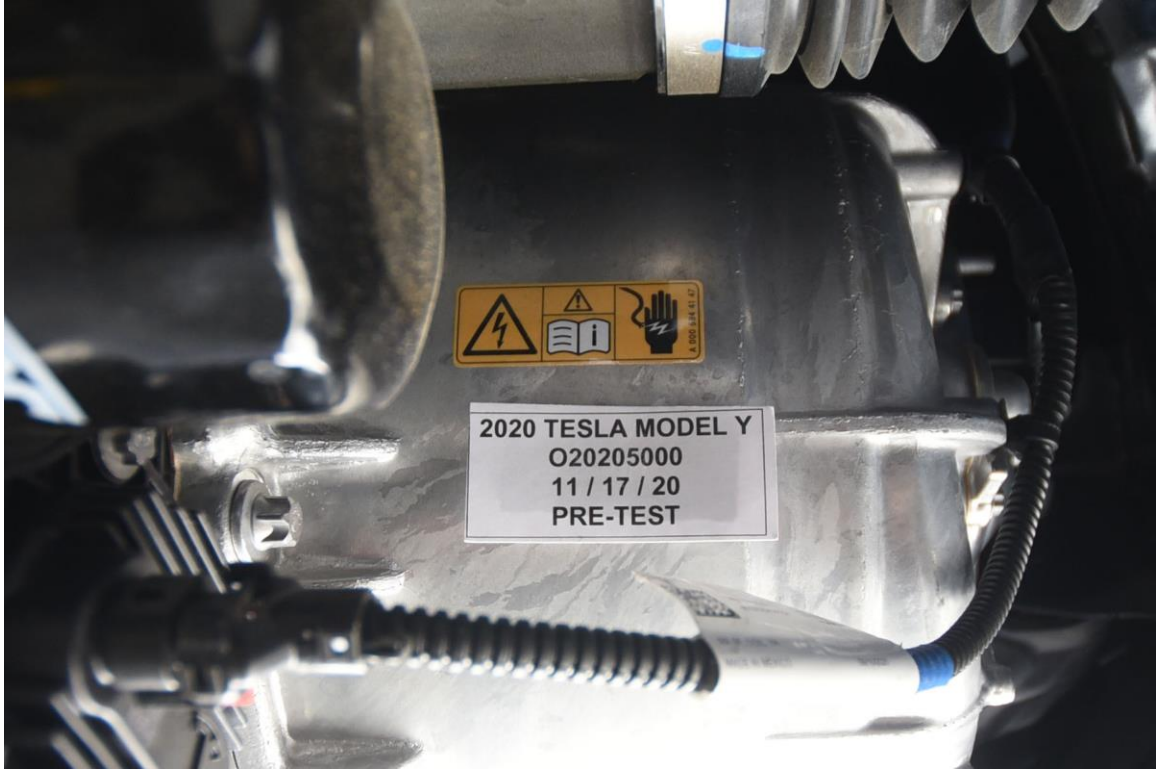


FIGURE 305-02a. Power Inverter Warning Label

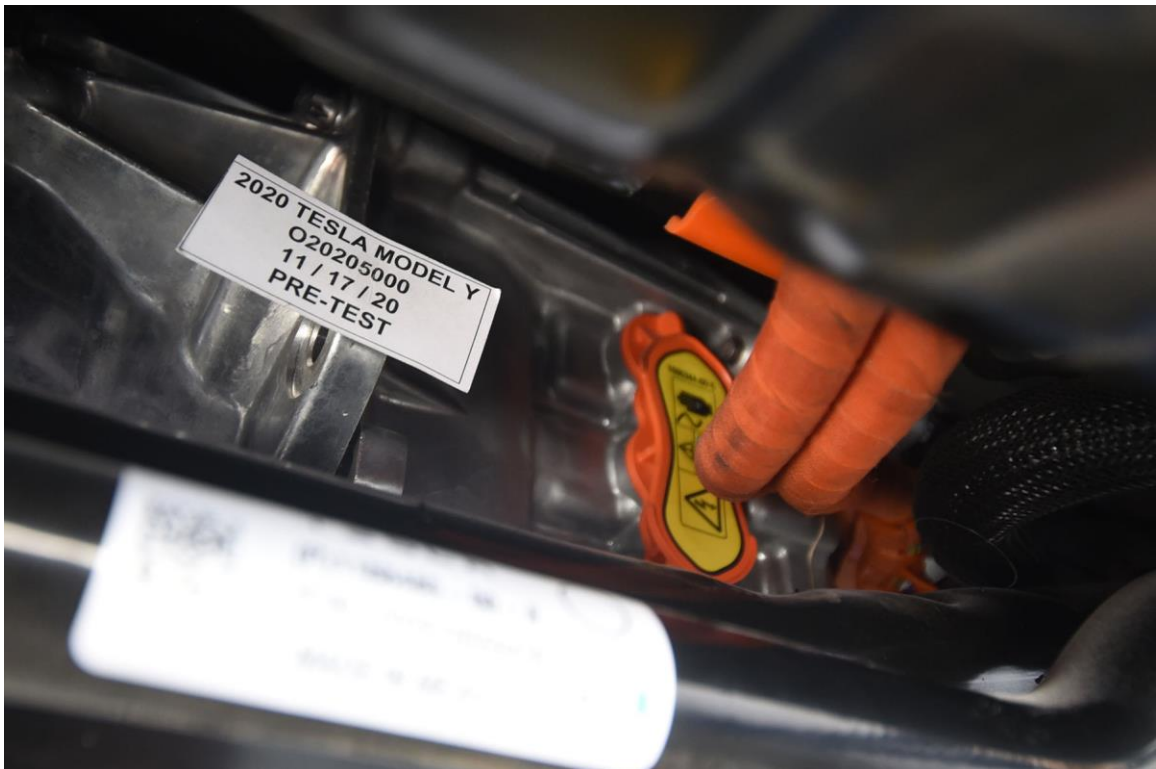


FIGURE 305-02b. Power Inverter Warning Label





FIGURE 305-03. First Responder Warning Label

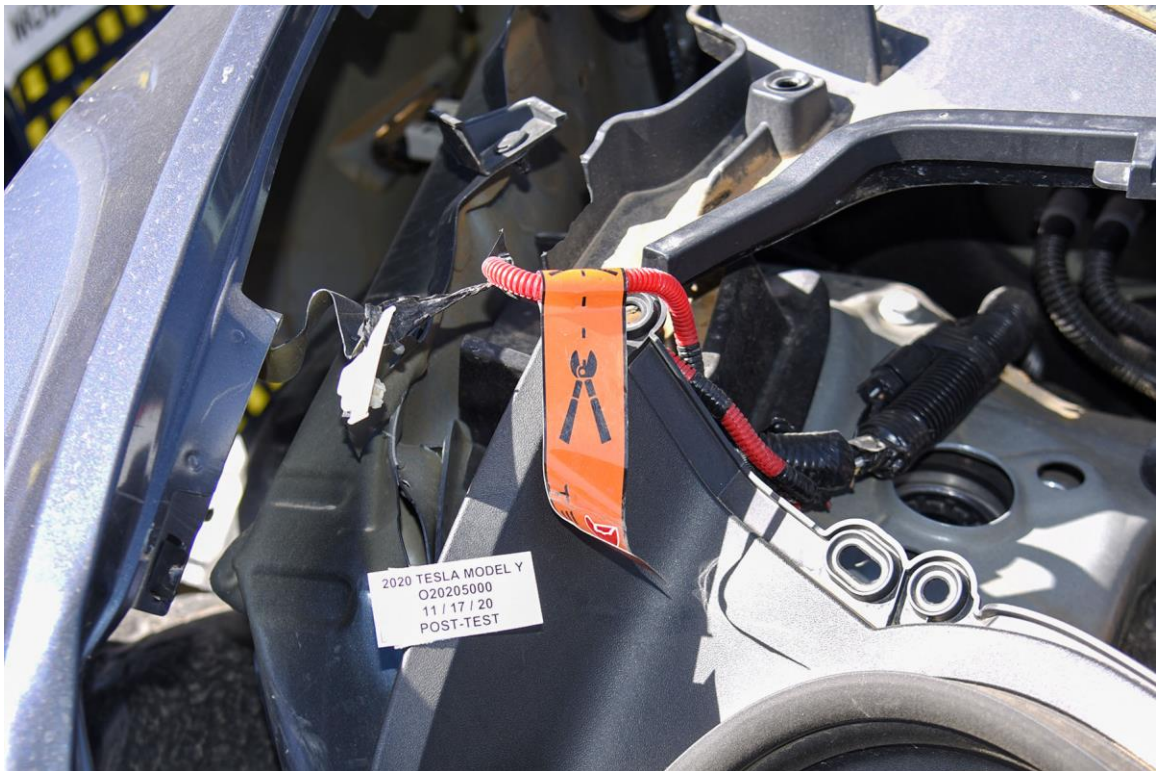


FIGURE 305-04. First Responder Warning Location

**Photograph Not Applicable**

**No Other Vehicle Label  
Related to Electric  
Propulsion System**

FIGURE 305-05. Other Vehicle Label(s) Related to Electrical Propulsion System

**Photograph Not Applicable**

**Vehicle Not Equipped with  
Manual High Voltage  
Service Disconnect**

FIGURE 305-06. Manual High Voltage Service Disconnect in Place

Photograph Not Applicable

Vehicle Not Equipped with  
Manual High Voltage  
Service Disconnect

FIGURE 305-07. Manual High Voltage Service Disconnect Removed

Photograph Not Applicable

Vehicle Not Equipped with  
Manual High Voltage  
Service Disconnect

FIGURE 305-08. Manual High Voltage Service Disconnect Removed

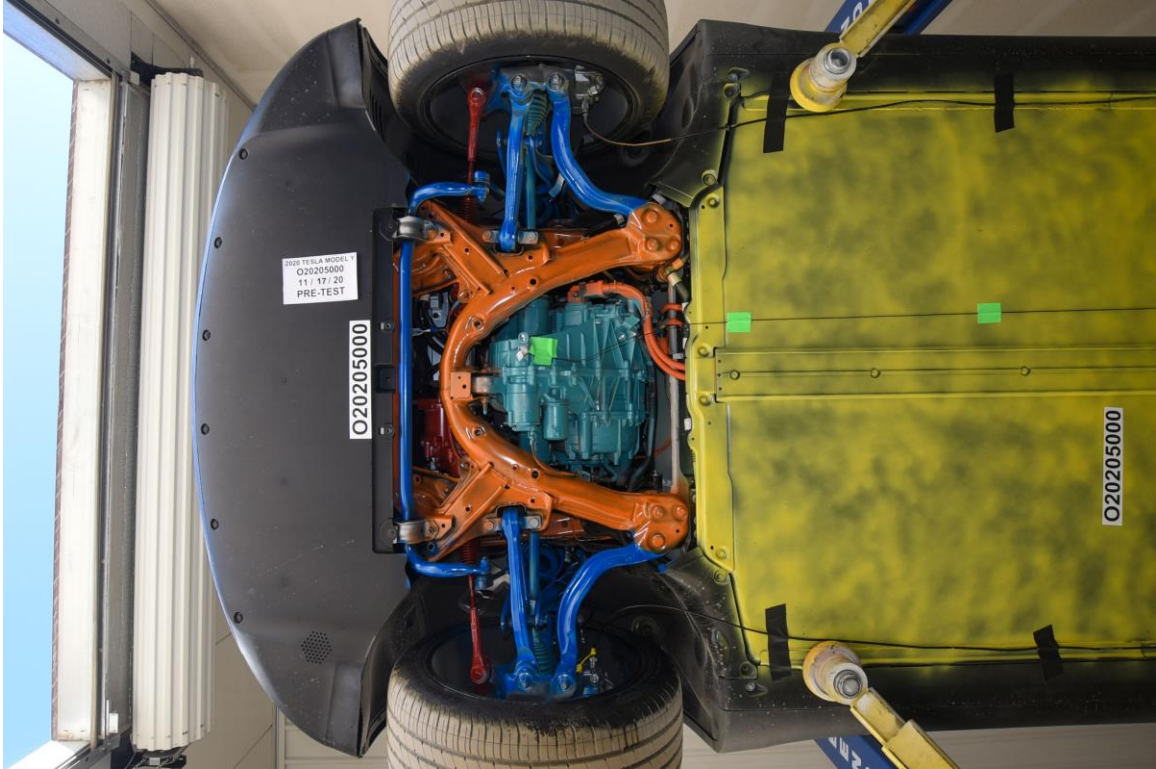


FIGURE 305-09. Pre-Impact View of Propulsion Battery  
(Incorrect Test Date; Should Read 11/17/20)



FIGURE 305-010. Post-Impact Front View of Propulsion Battery

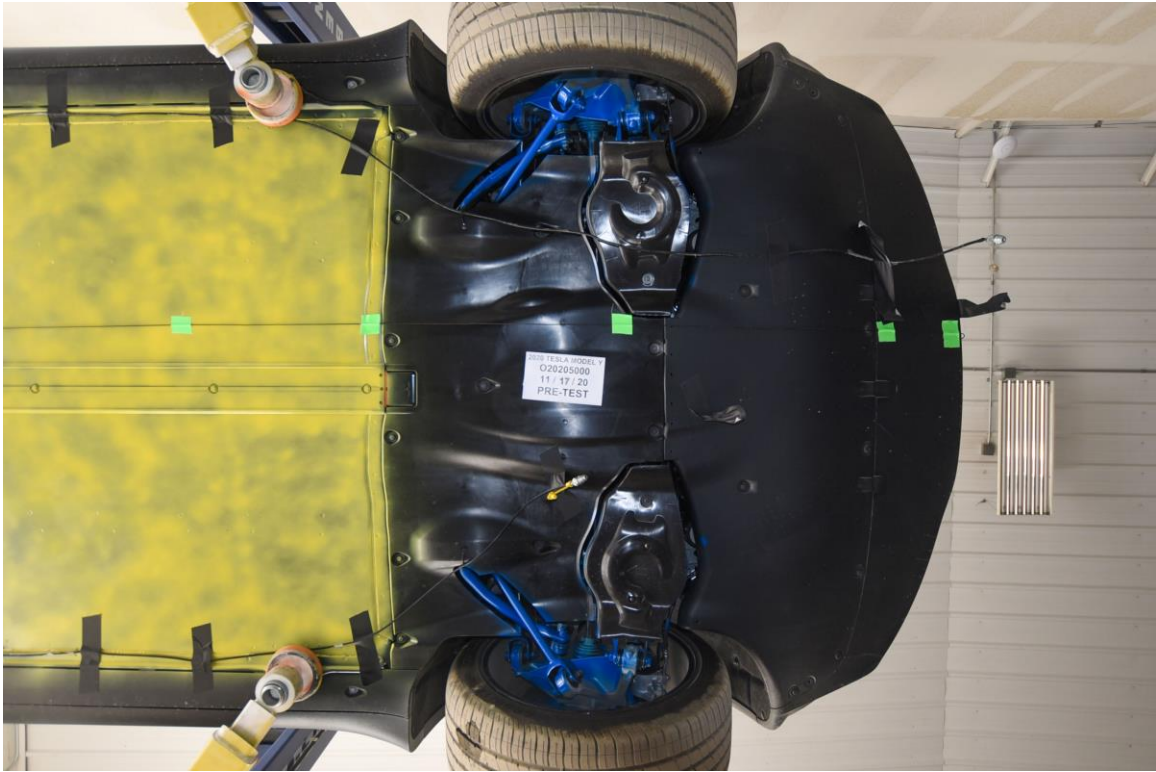


FIGURE 305-011. Post-Impact Rear View of Propulsion Battery  
(Incorrect Test Date; Should Read 11/17/20)

# Photograph Not Available

FIGURE 305-012. Pre-Impact View of Battery Box(s) or Container(s)  
Which Holds Individual Battery Modules

# Photograph Not Available

FIGURE 305-013. Post-Impact View of Battery Box(s) or Container(s)  
Which Holds Individual Battery Modules

# Photograph Not Applicable

# Battery Not Removed From Vehicle

FIGURE 305-014. Pre-Impact View of Propulsion Battery Module(s)

Photograph Not Applicable

Battery Not Removed  
From Vehicle

FIGURE 305-015. Post-Impact View of Propulsion Battery Module(s)

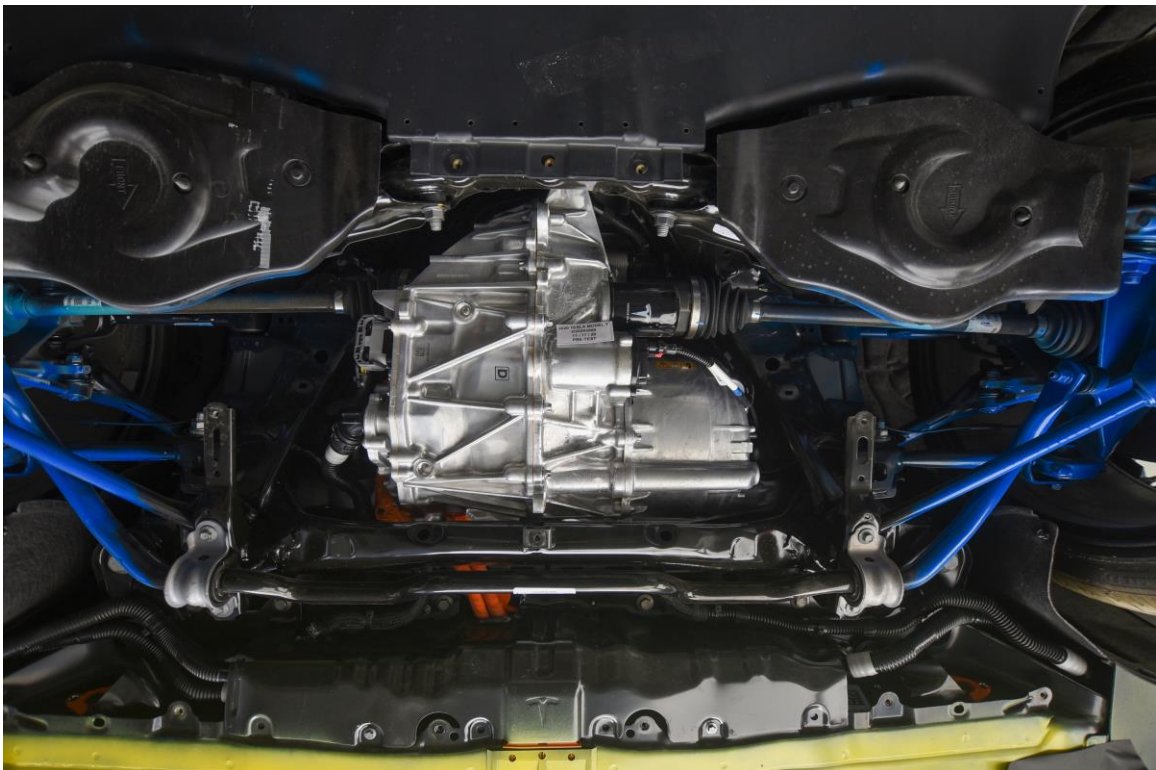


FIGURE 305-016. Pre-Impact View of Electric Propulsion Drive

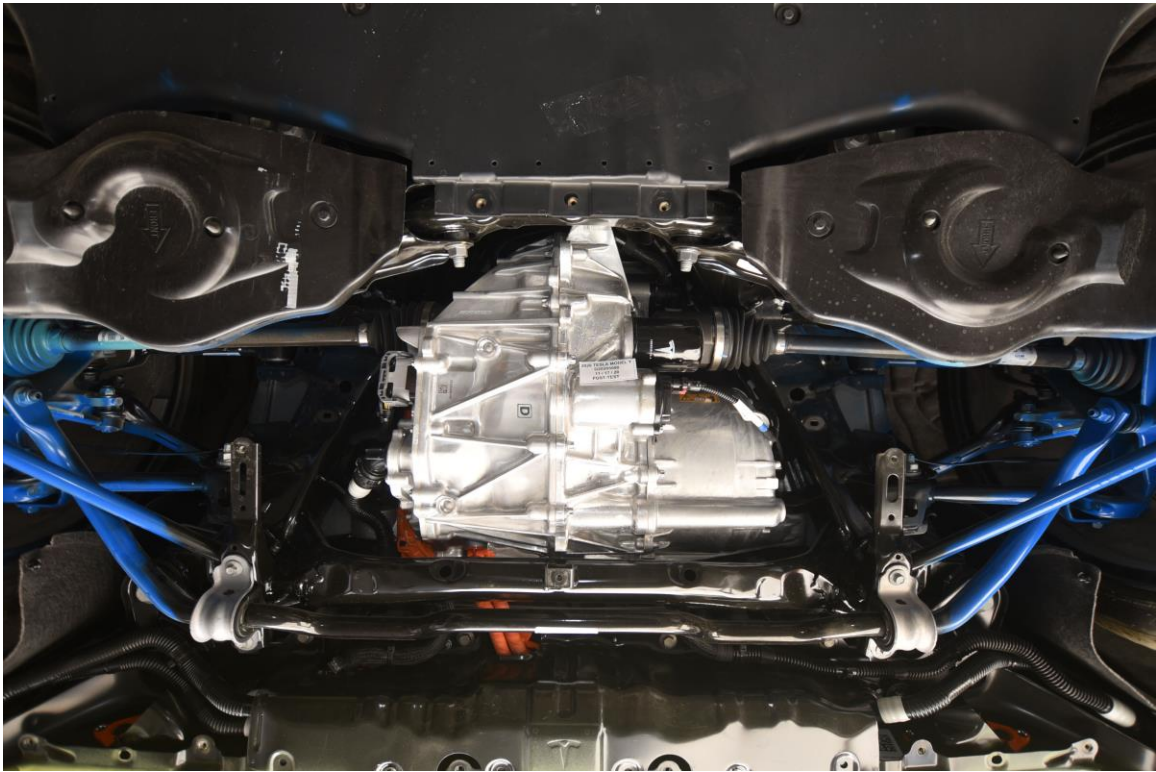


FIGURE 305-017. Post-Impact View of Electric Propulsion Drive

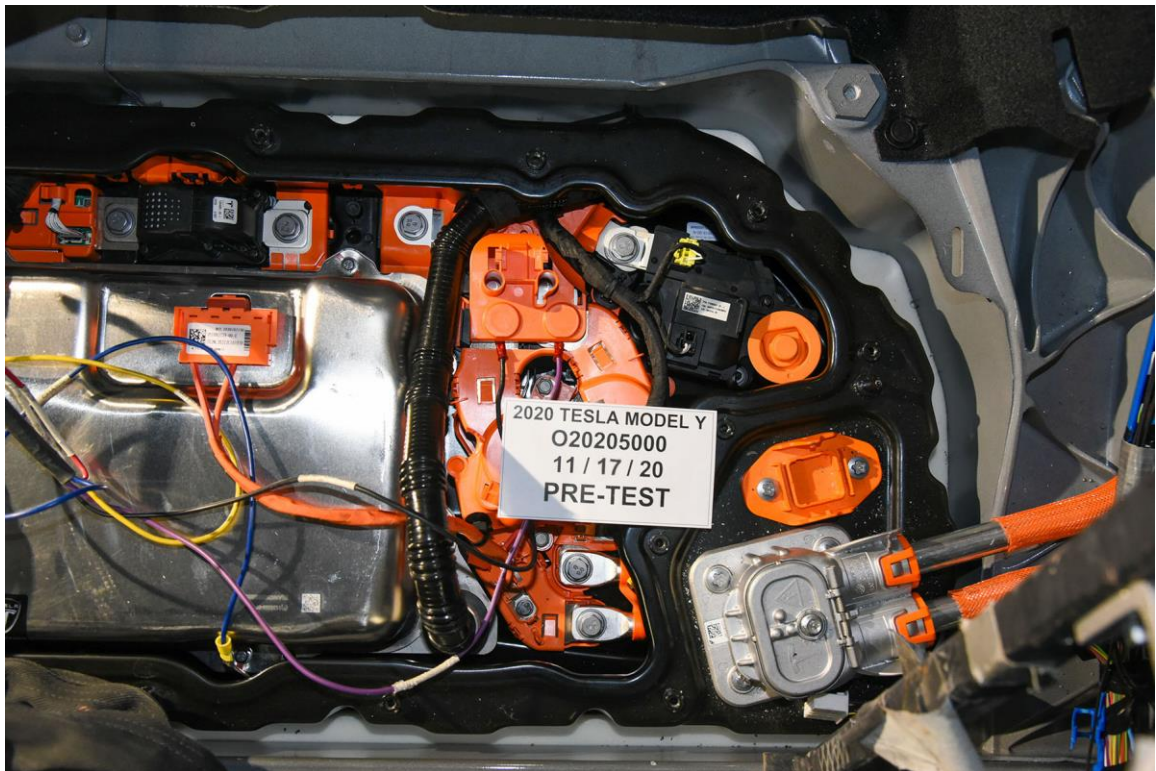


FIGURE 305-018. Pre-Impact View of High Voltage Interconnect(s)  
Incorrect Test Date; Should Read 11/17/20





FIGURE 305-018a. Pre-Impact View of High Voltage Interconnect(s)

# Photograph Not Available

FIGURE 305-019. Pre-Impact View Propulsion Battery Venting System(s)



FIGURE 305-020. Pre-Impact View of Other Visible Electric Propulsion Components

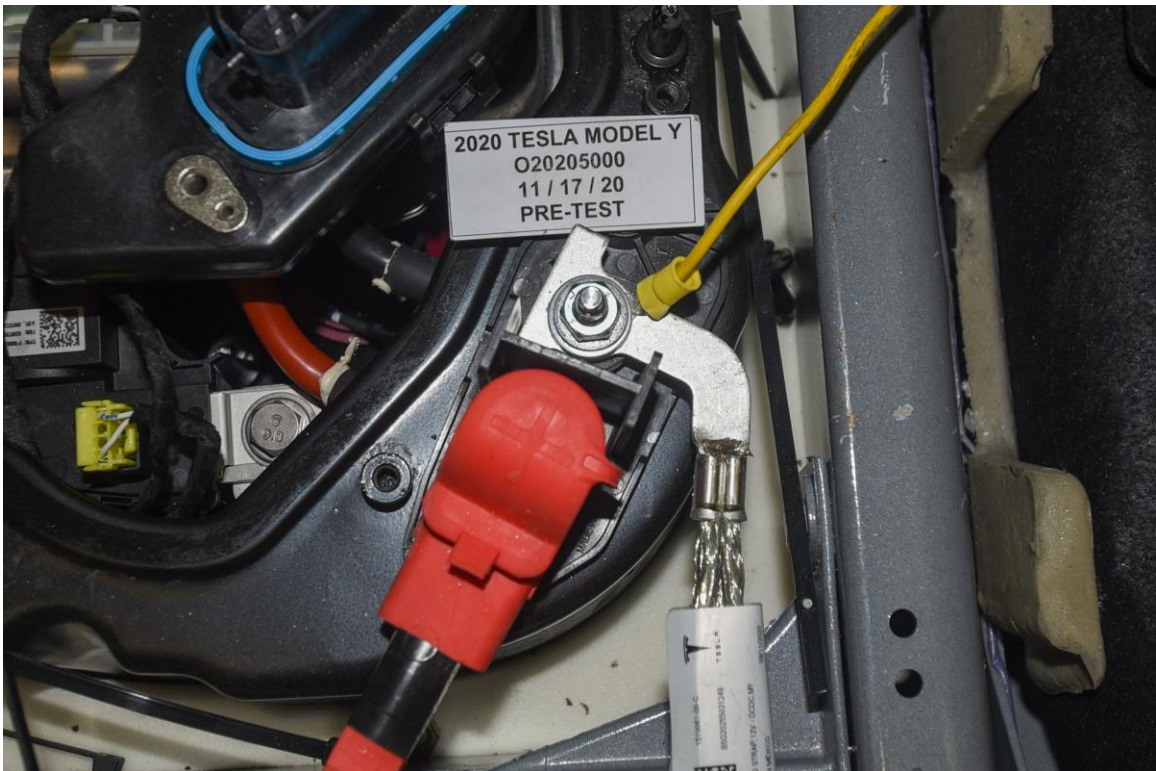


FIGURE 305-021. Pre-Impact View of Ground Lead Attached

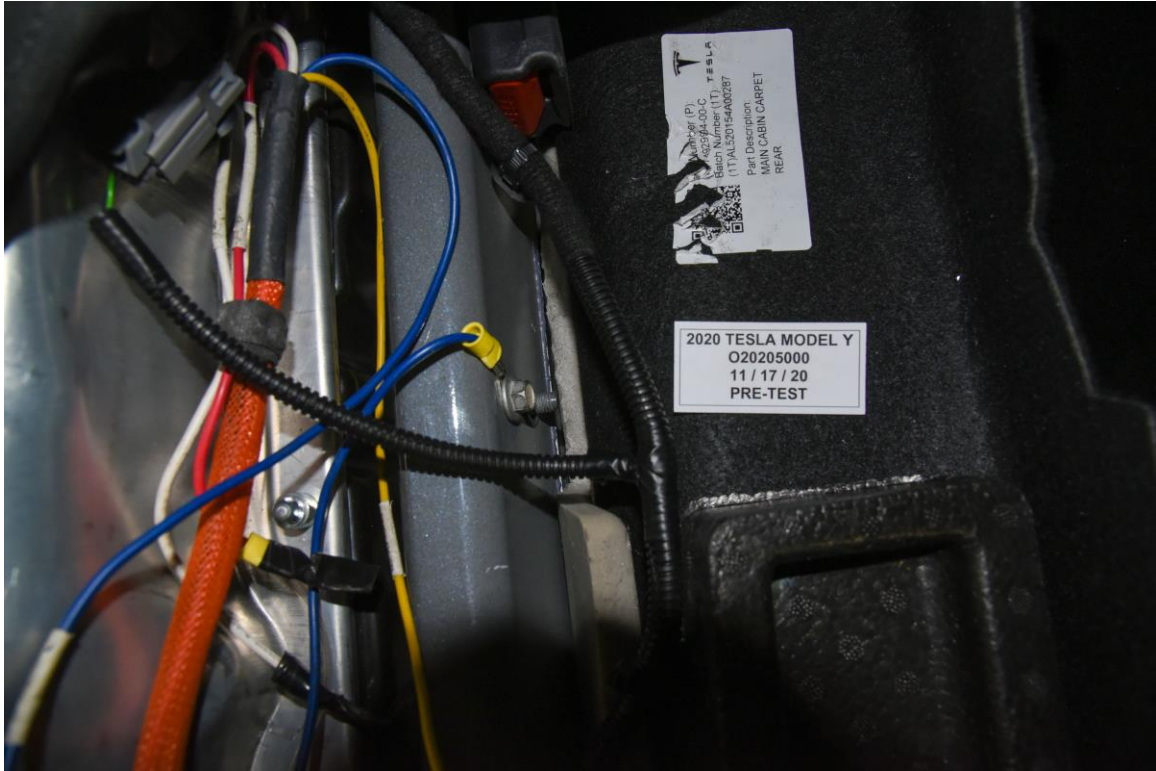


FIGURE 305-021a. Pre-Impact View of Ground Lead Attached



FIGURE 305-022. Pre-Impact View of High Voltage Leads Attached

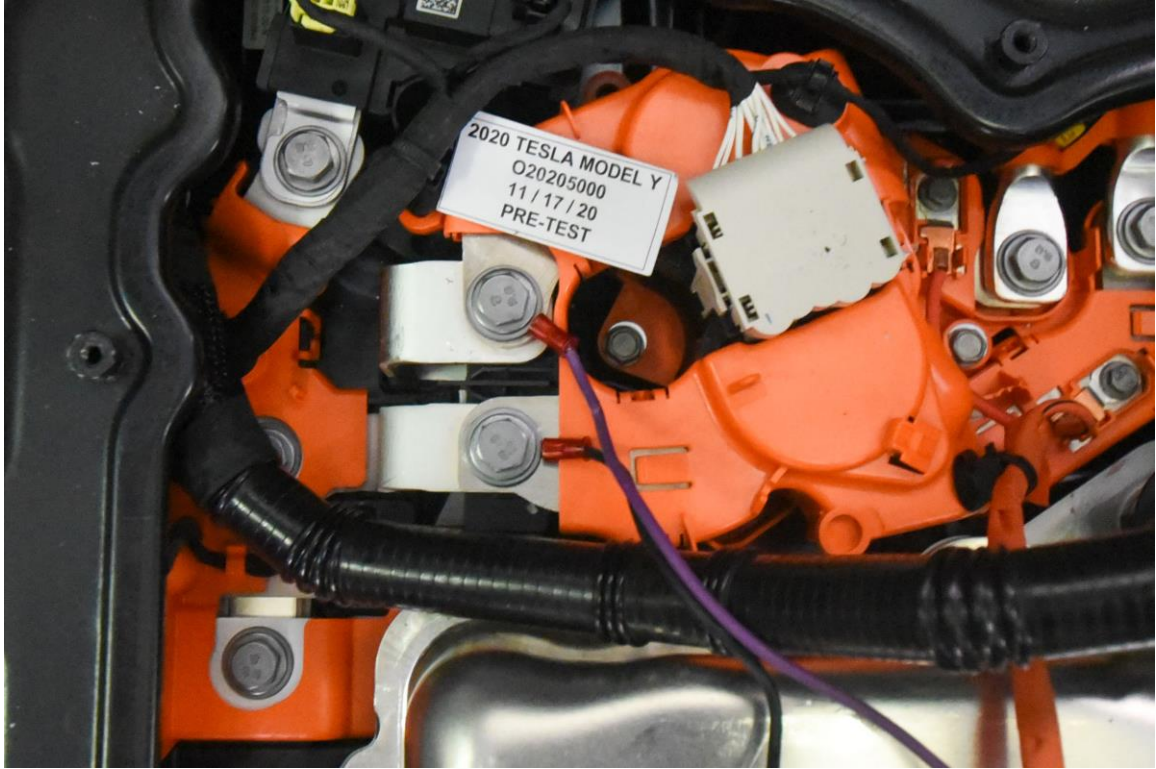


FIGURE 305-023. Pre-Impact Close-Up View of High Voltage Leads Attached



FIGURE 305-024. Pre-Impact View of Installed Test Interface Port



FIGURE 305-025. Post-Impact View of Installed Test Interface Port



FIGURE 305-026. Pre-Impact View of Other Test Devices



FIGURE 305-027. Post-Impact View of Other Test Devices (Placard Not Available; Should Read Post-Test 11/17/20)

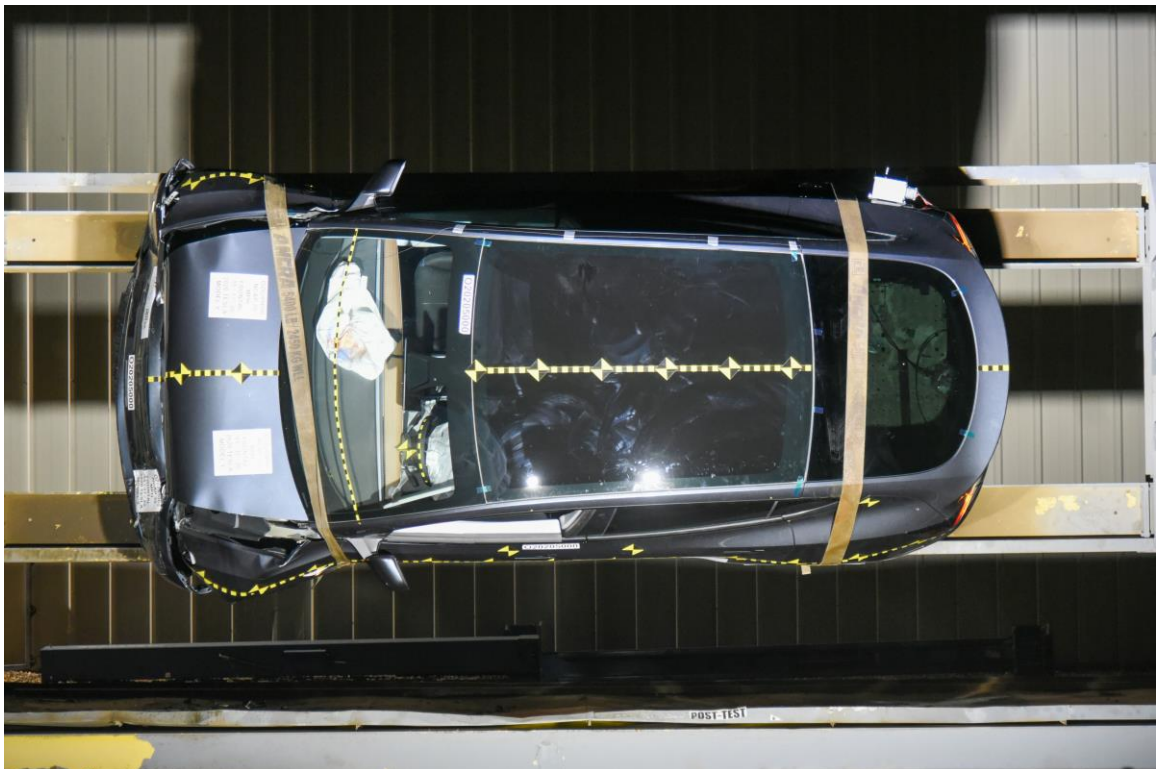


FIGURE 305-028. FMVSS No. 305 Static Rollover at 90°



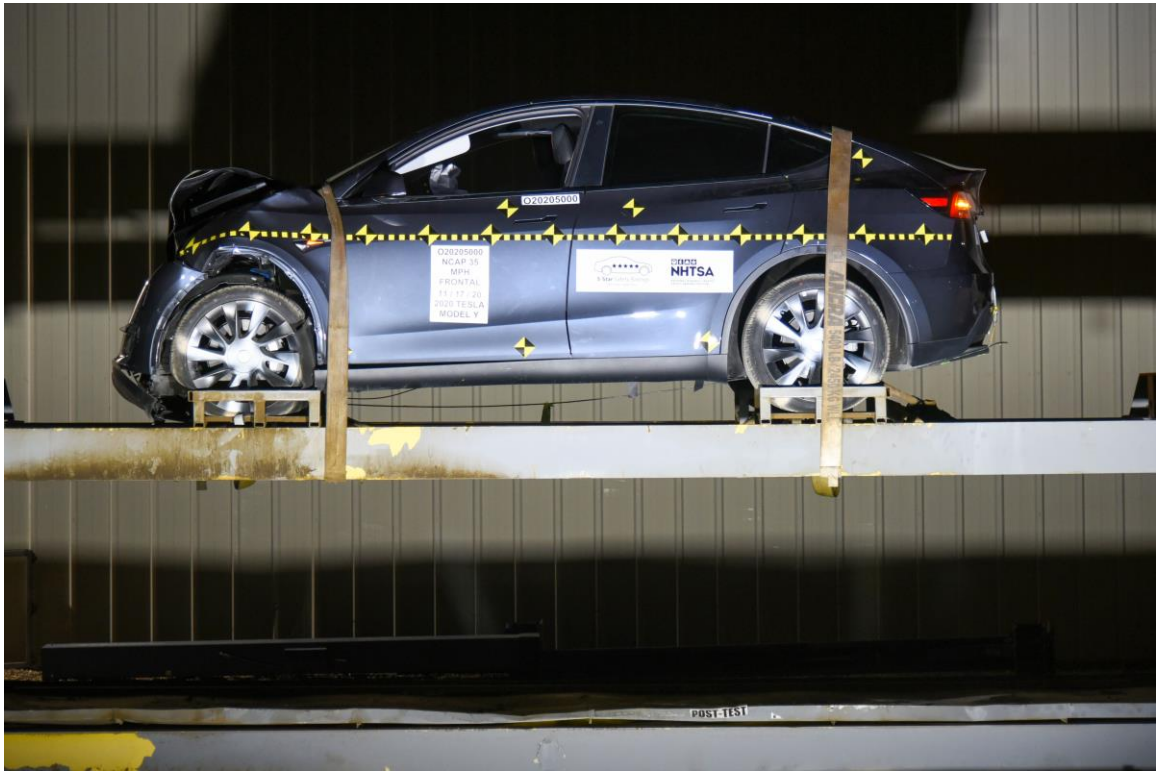


FIGURE 305-031. FMVSS No. 305 Static Rollover at 360°

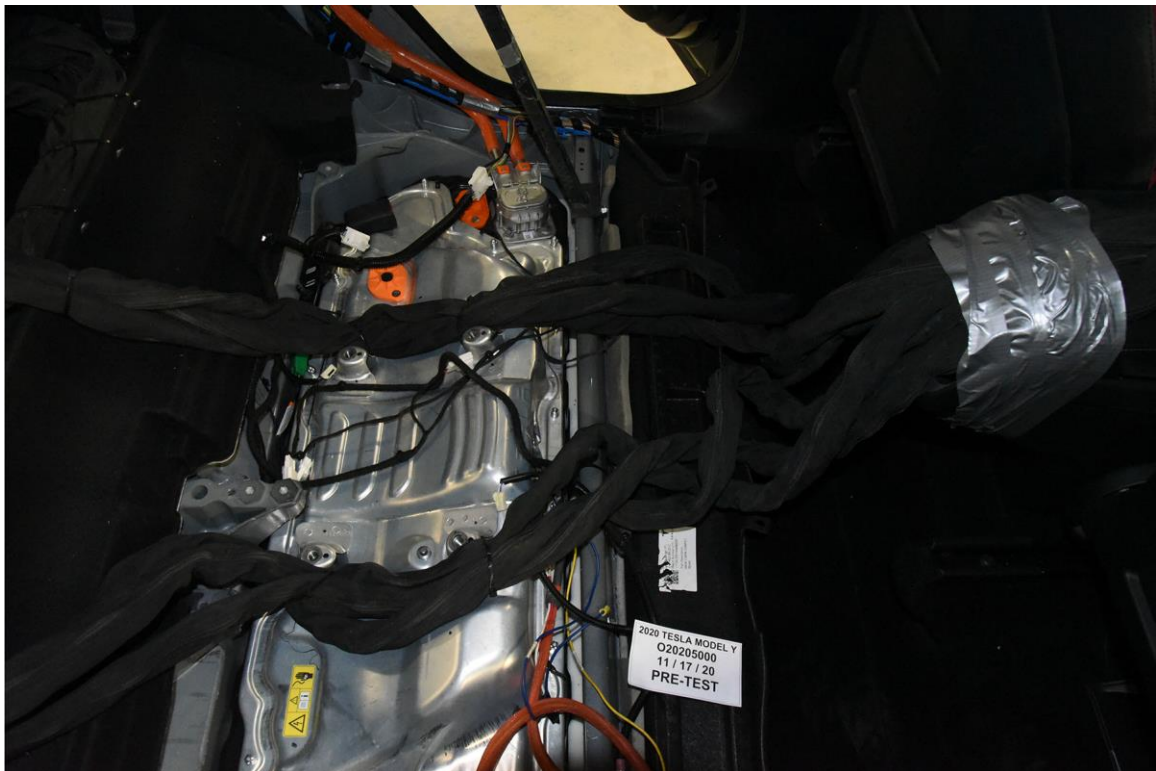


FIGURE 305-032. Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery





FIGURE 305-033. Post-Impact View of the Vehicle Passenger Compartment  
Adjacent to Propulsion Battery

**Photograph Not Applicable**

**No Propulsion Battery  
Mounting and/or  
Intrusion Failure**

FIGURE 305-034. Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)

**Photograph Not Applicable**

**No Battery Component  
Intrusion**

FIGURE 305-035. Post-Impact View of Battery Component Intrusion

**Photograph Not Applicable**

**No Propulsion  
Battery Movement or  
Retention loss**

FIGURE 305-036. Post-Impact View of Battery Module Movement or Retention Loss

**Photograph Not Applicable**

**No Propulsion Battery  
Electrolyte Spillage**

FIGURE 305-037. Post-Impact View of Propulsion Battery Electrolyte Spillage Location

**Photograph Not Applicable**

**No Propulsion Battery  
Electrolyte Spillage**

FIGURE 305-038. Post-Test View of Propulsion Battery Electrolyte Spillage Location

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

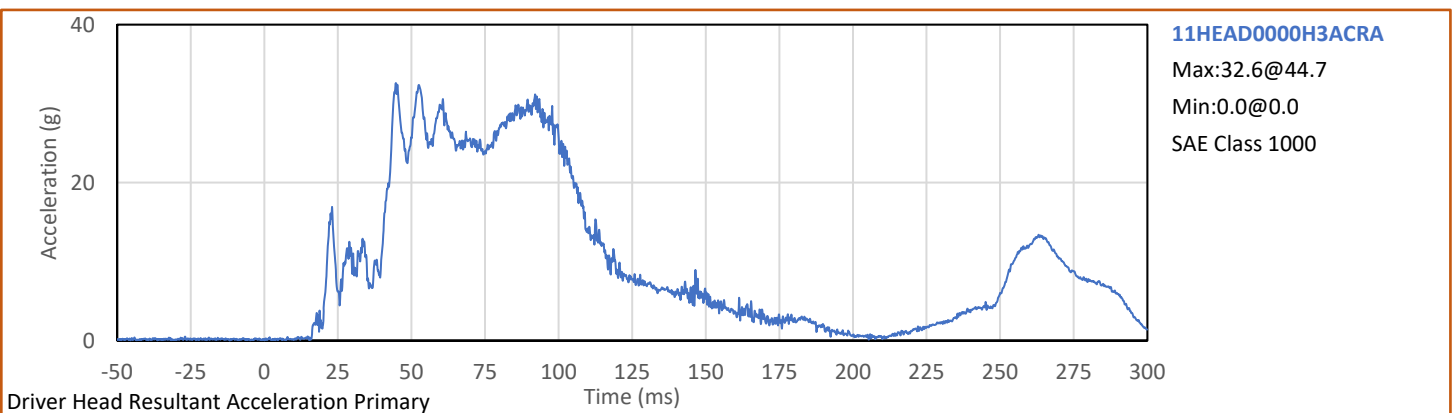
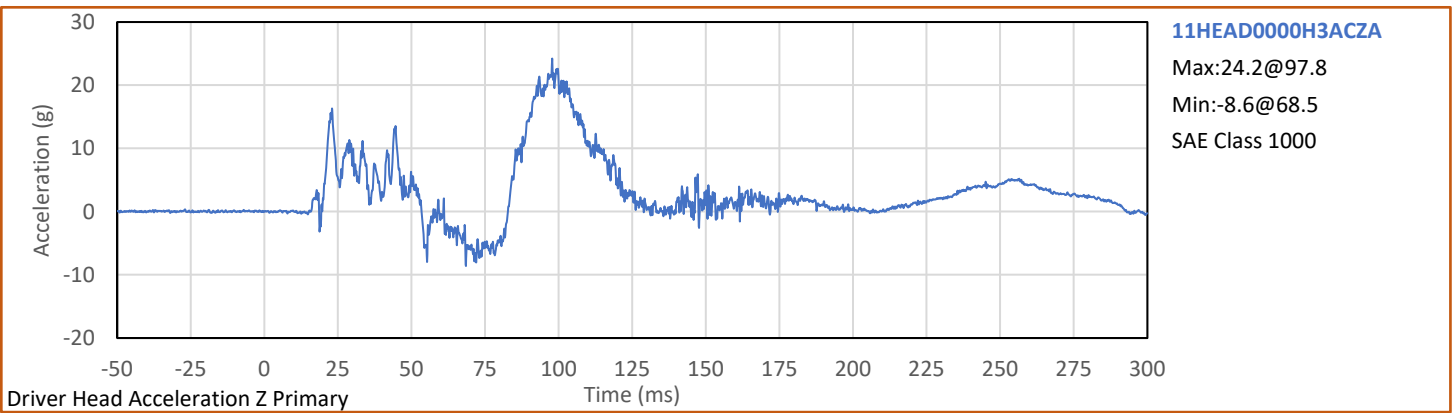
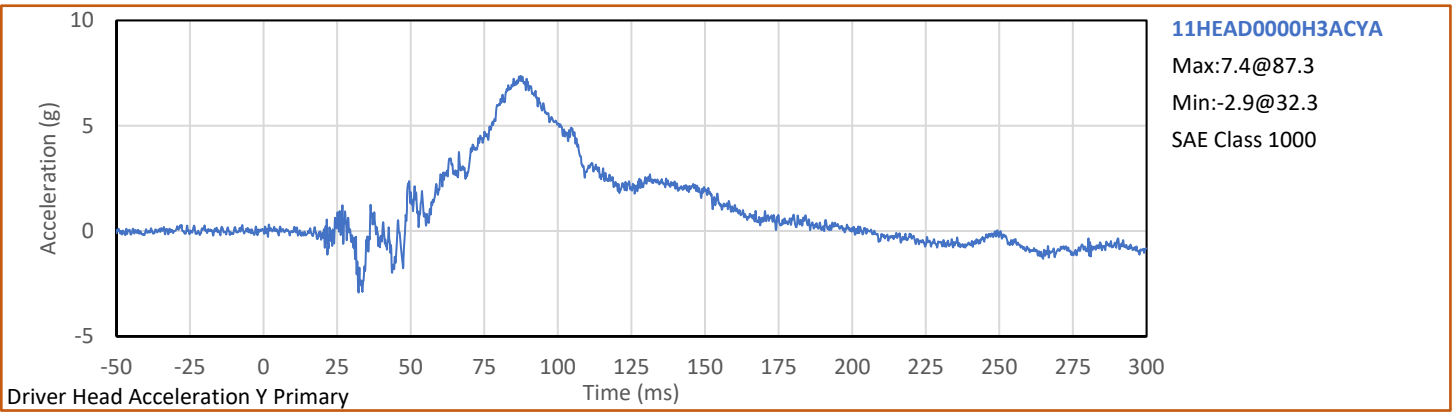
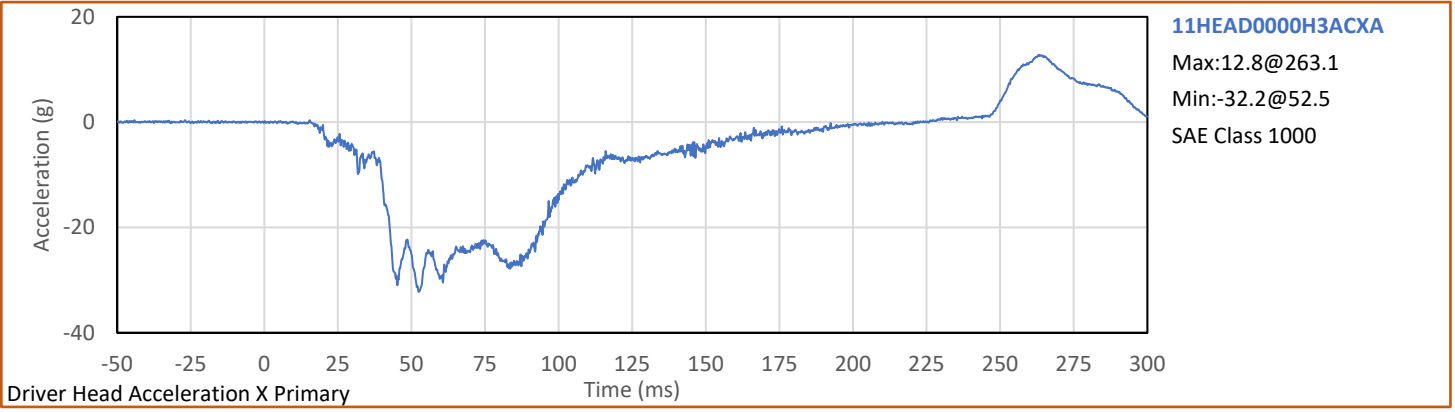
## TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration X Primary	B-1
2	Driver Head Acceleration Y Primary	B-1
3	Driver Head Acceleration Z Primary	B-1
4	Driver Head Resultant Acceleration Primary	B-1
5	Driver Chest X Deflection	B-2
6	Driver Upper Neck Force X	B-3
7	Driver Upper Neck Force Z	B-3
8	Driver Upper Neck Moment Y	B-3
9	Driver Nij	B-3
10	Driver Chest Acceleration X Primary	B-4
11	Driver Chest Acceleration Y Primary	B-4
12	Driver Chest Acceleration Z Primary	B-4
13	Driver Chest Resultant Acceleration Primary	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 Upper Neck Force X	B-8
22	Passenger Upper Neck Force Z	B-8
23	Passenger Upper Neck Moment Y	B-8
24	Passenger Nij	B-8
25	Passenger Chest Acceleration X Primary	B-9
26	Passenger Chest Acceleration Y Primary	B-9
27	Passenger Chest Acceleration Z Primary	B-9
28	Passenger Chest Resultant Acceleration Primary	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](http://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  
Driver Head Angular Velocity X  
Driver Head Angular Velocity Y  
Driver Head Angular Velocity Z  
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  
Passenger Head Angular Velocity X  
Passenger Head Angular Velocity Y  
Passenger Head Angular Velocity Z  
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





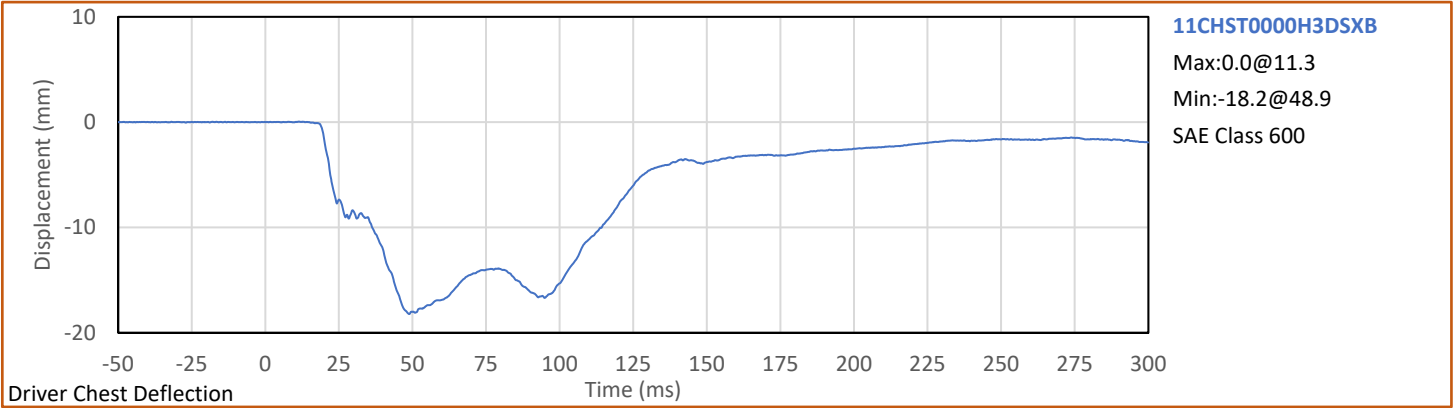
Test Vehicle: 2020 Tesla Model Y 5-Door MPV

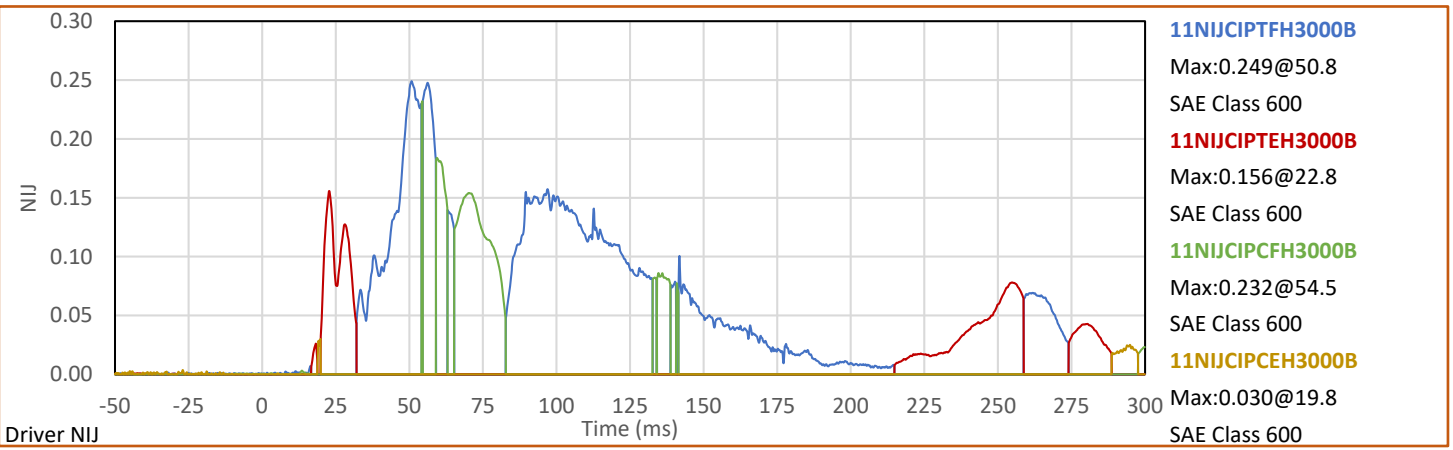
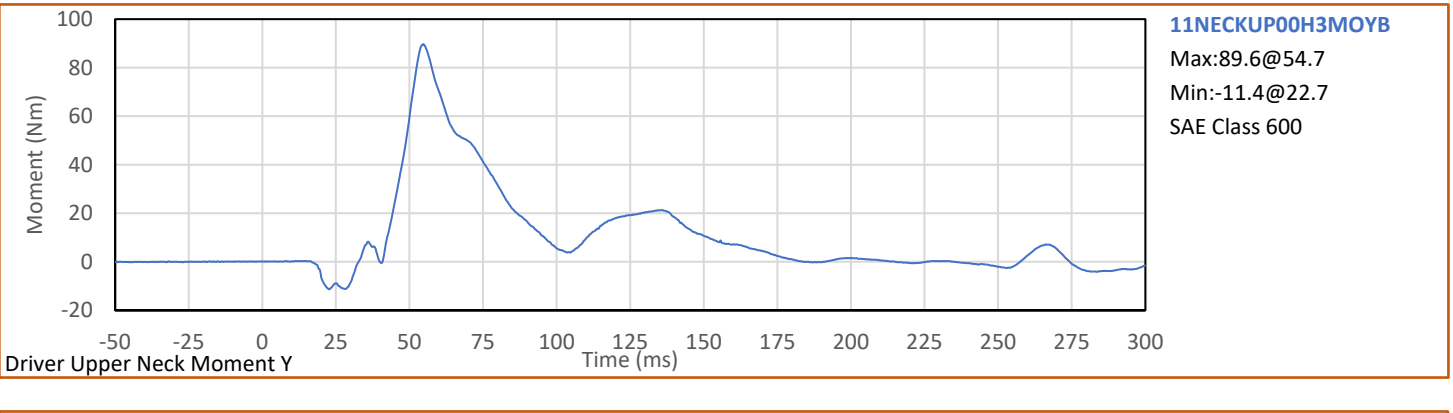
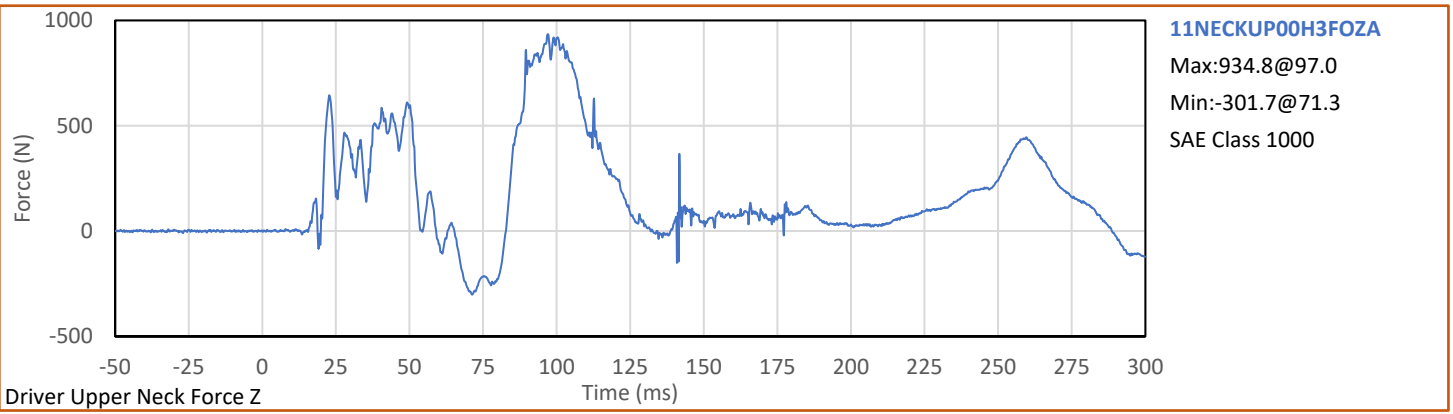
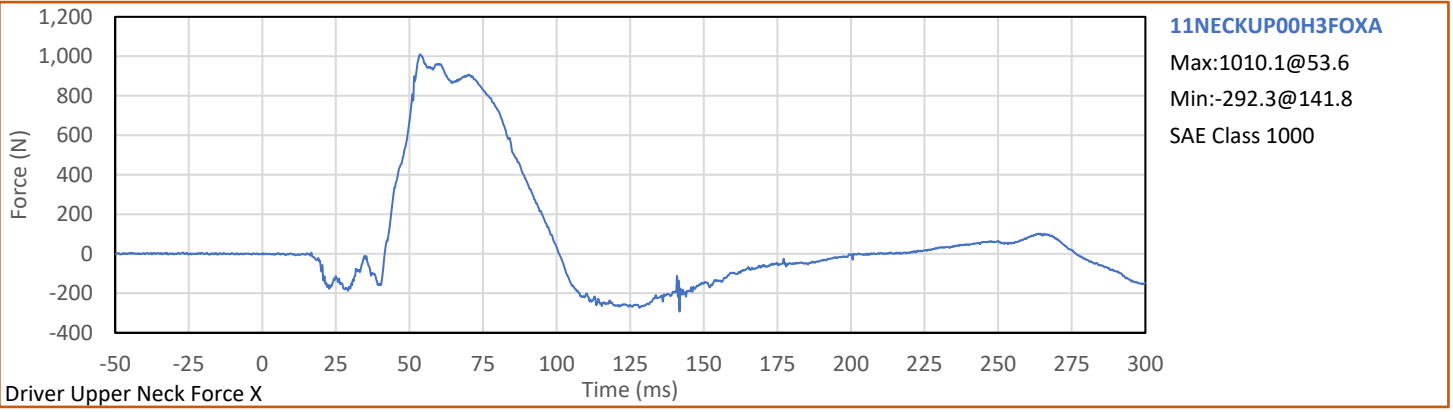
NHTSA No.: O20205000

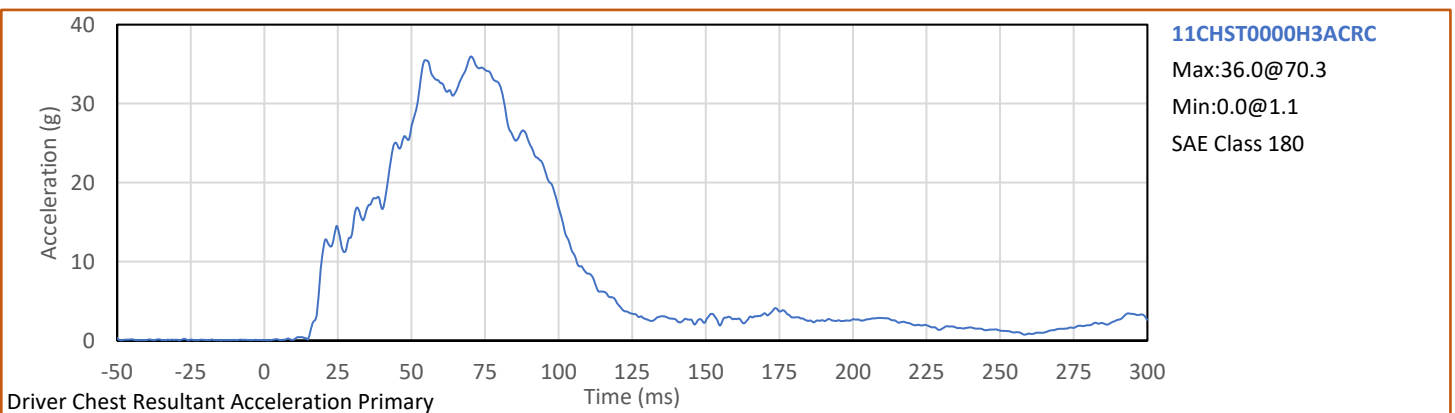
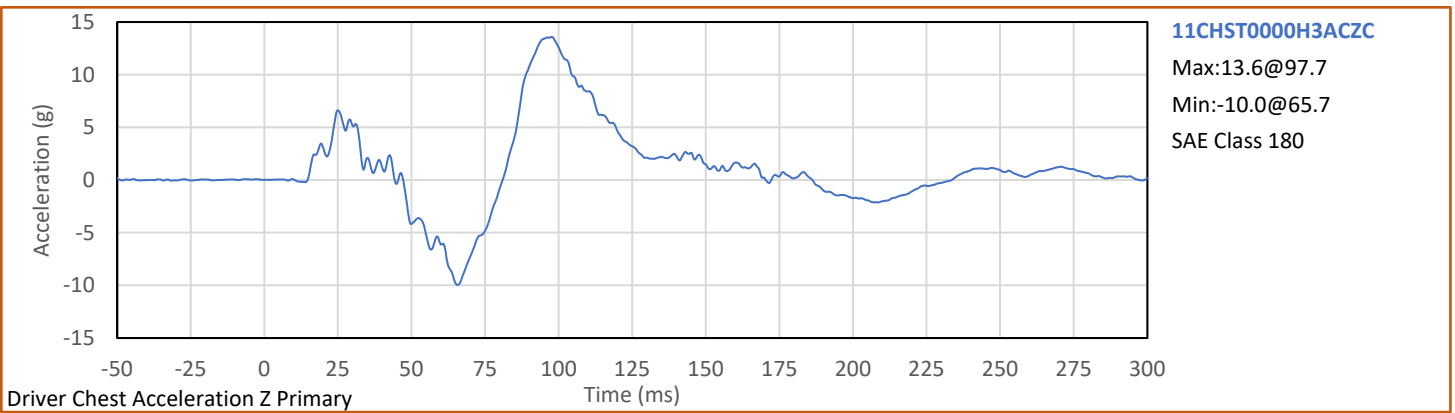
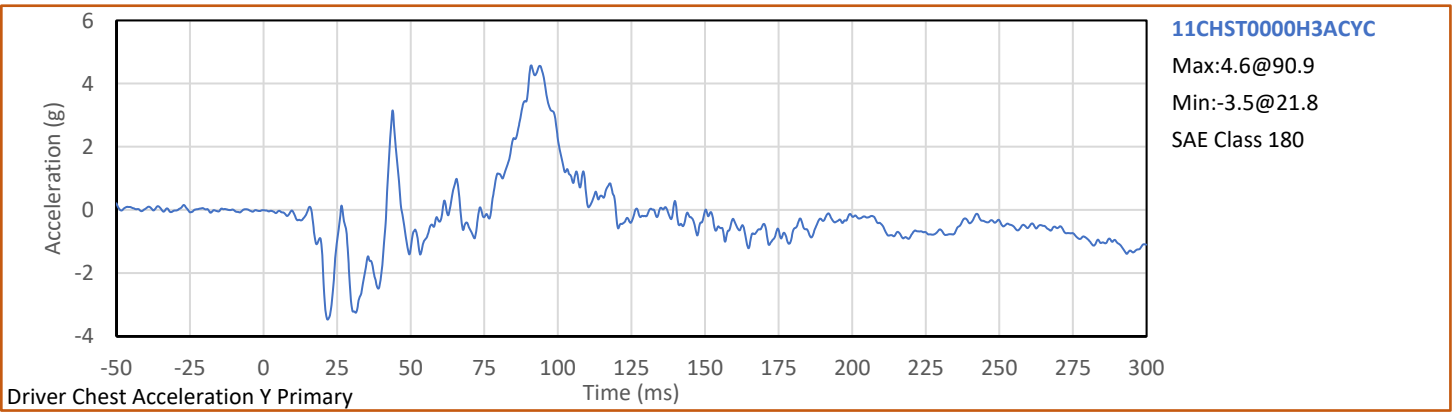
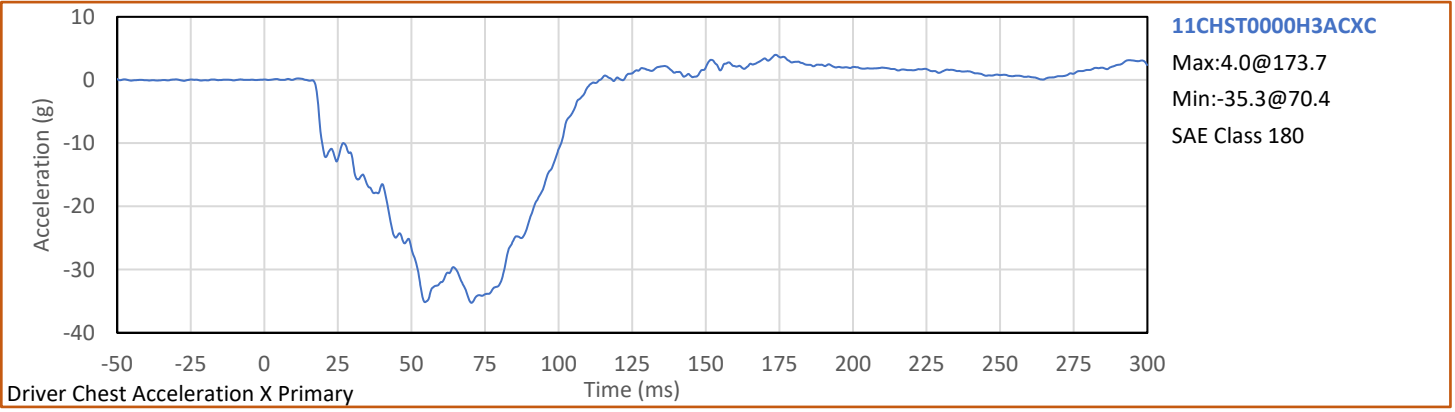


Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 11/17/2020

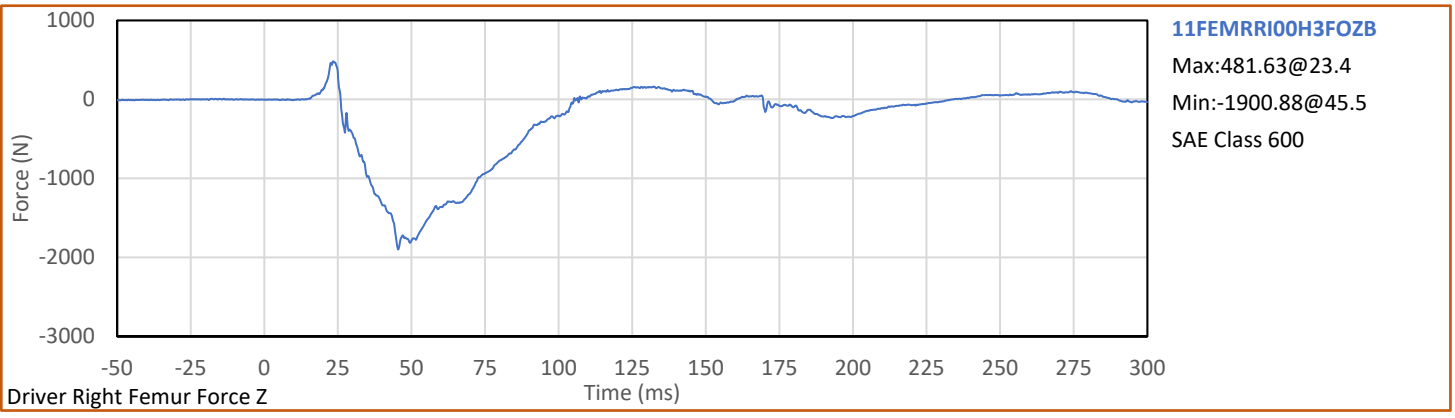
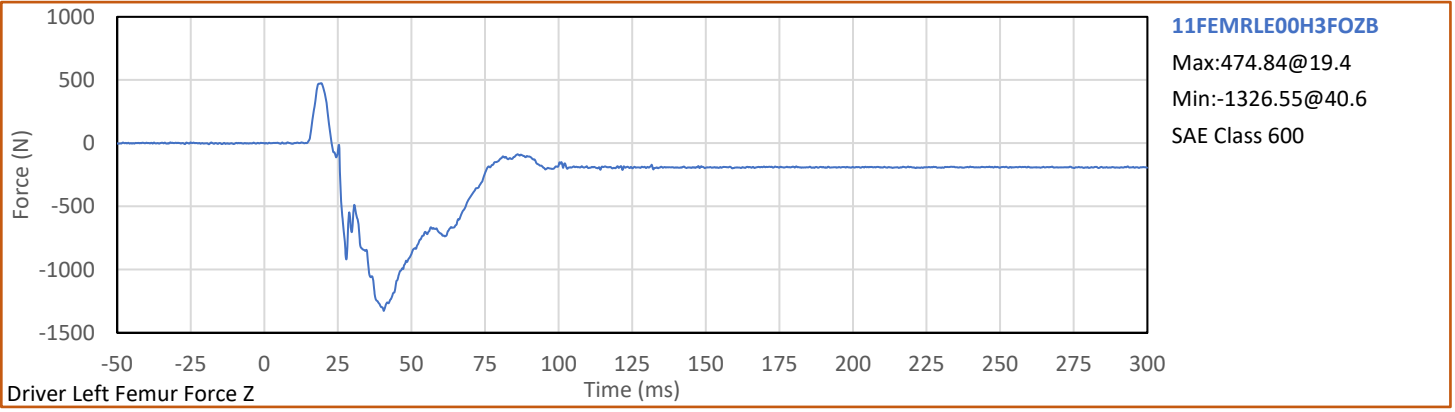


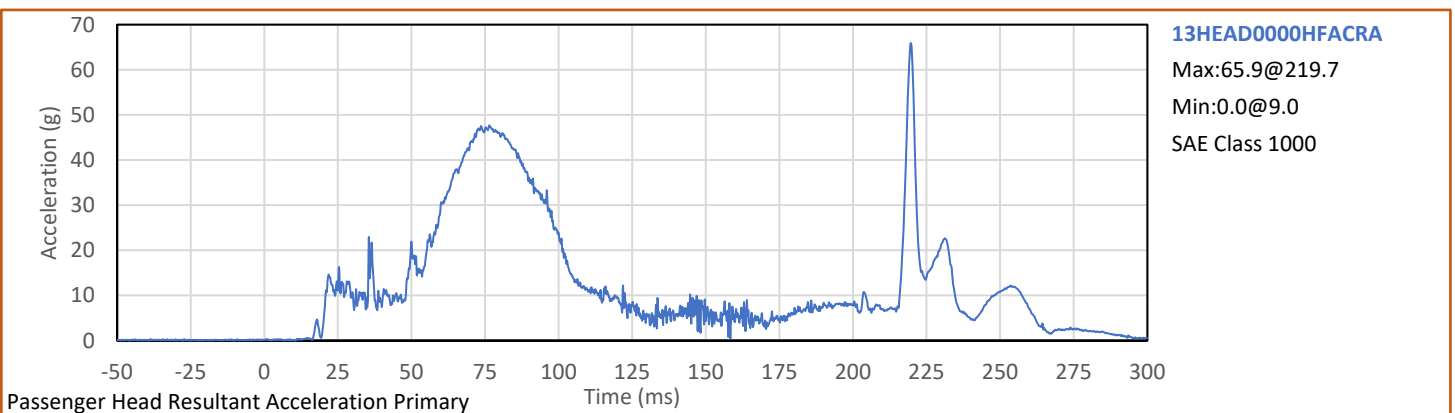
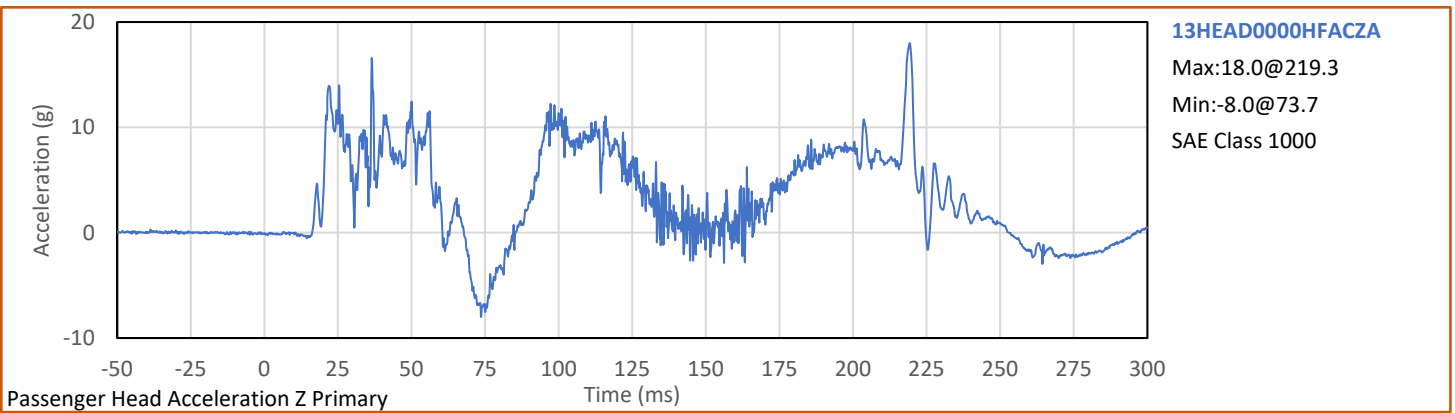
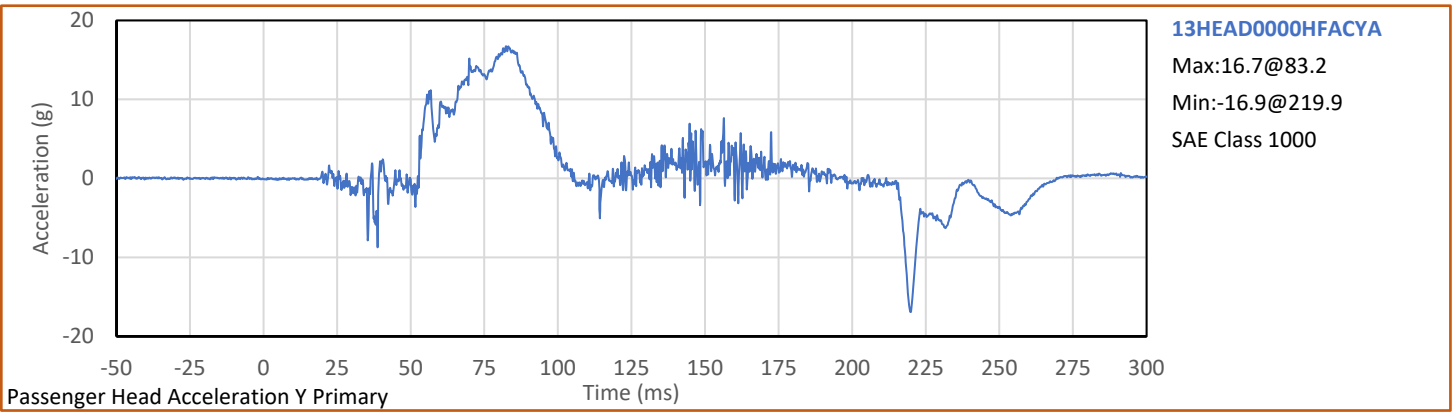
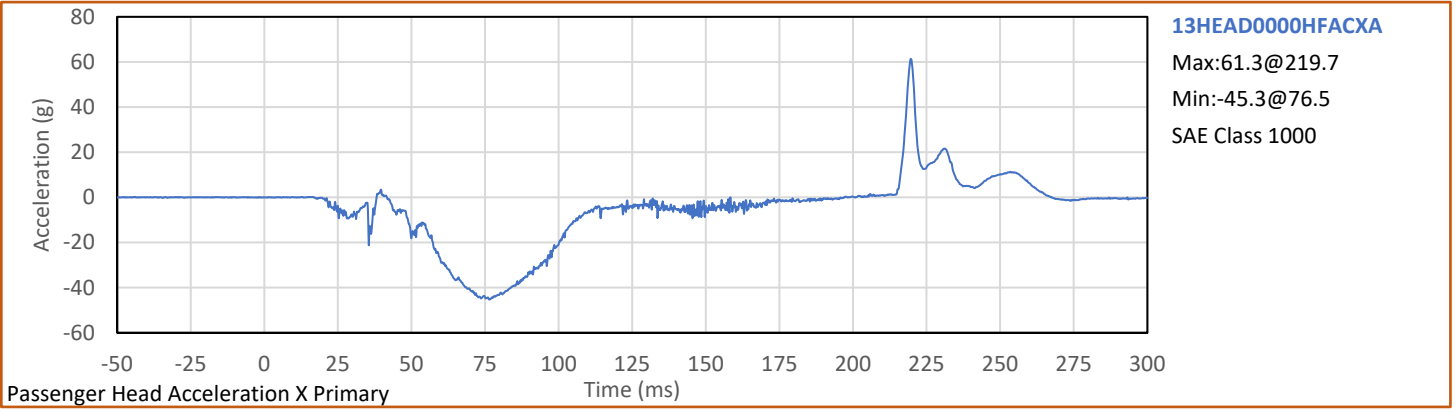




Test Vehicle: 2020 Tesla Model Y 5-Door MPV  
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20205000  
Test Date: 11/17/2020





Test Vehicle: 2020 Tesla Model Y 5-Door MPV

NHTSA No.: O20205000

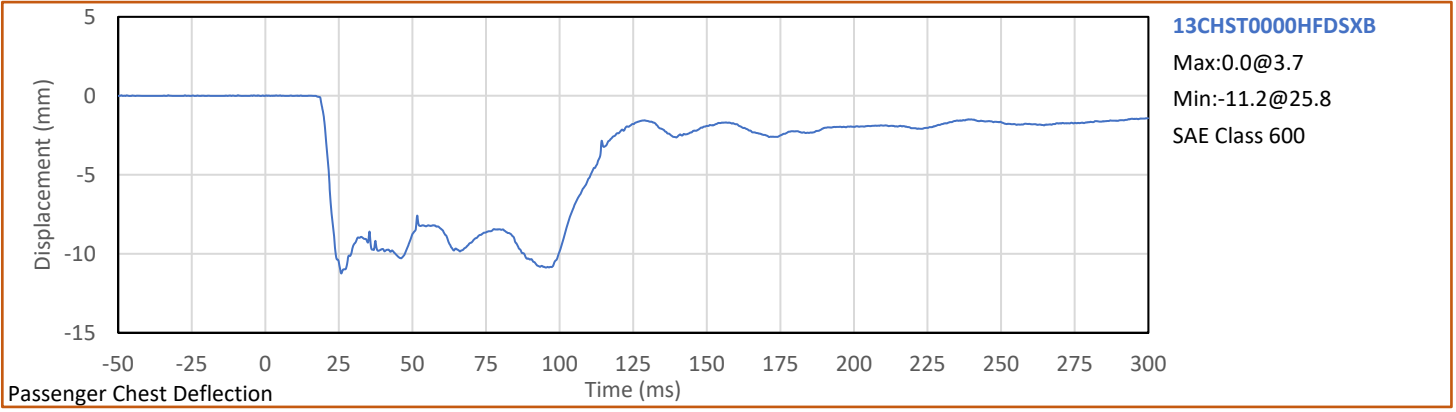
Applus®

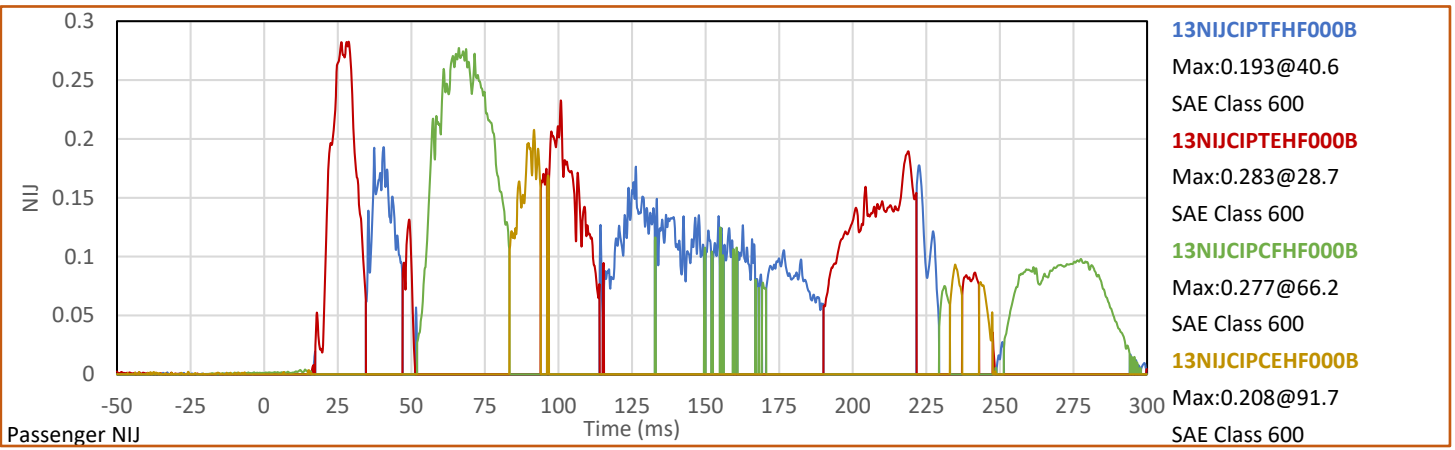
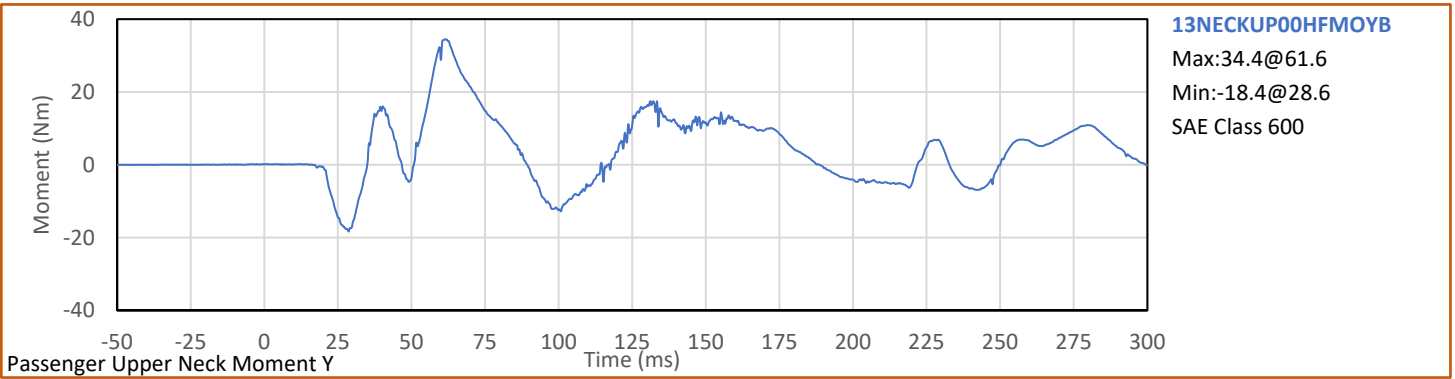
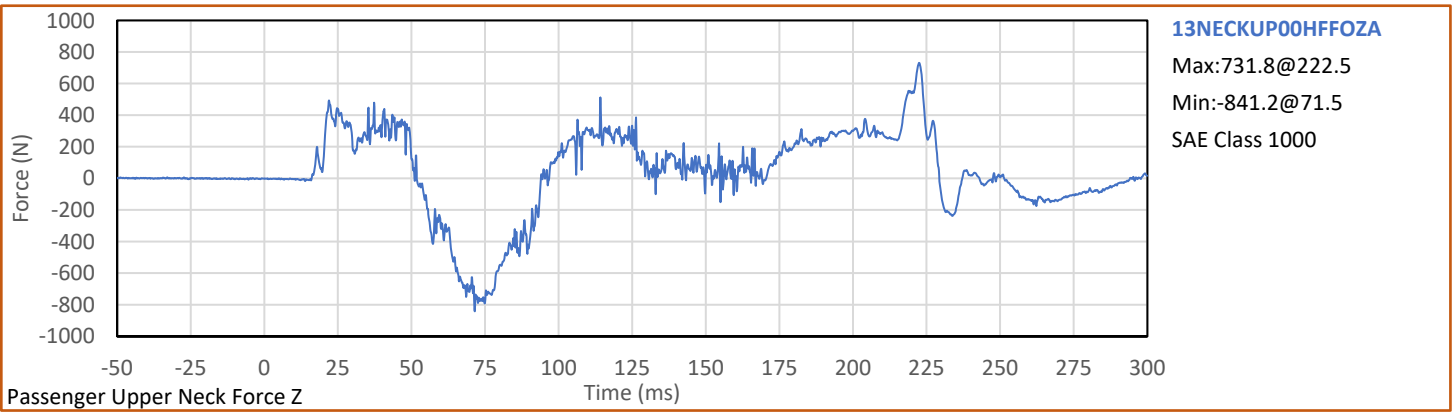
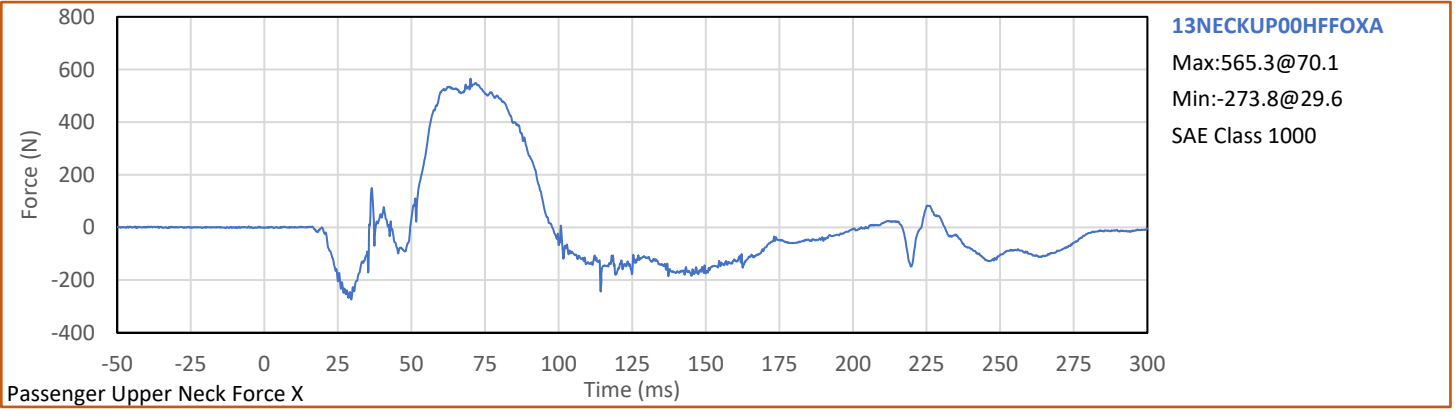
Test Program: 56.3 km/h Frontal Impact NCAP Test

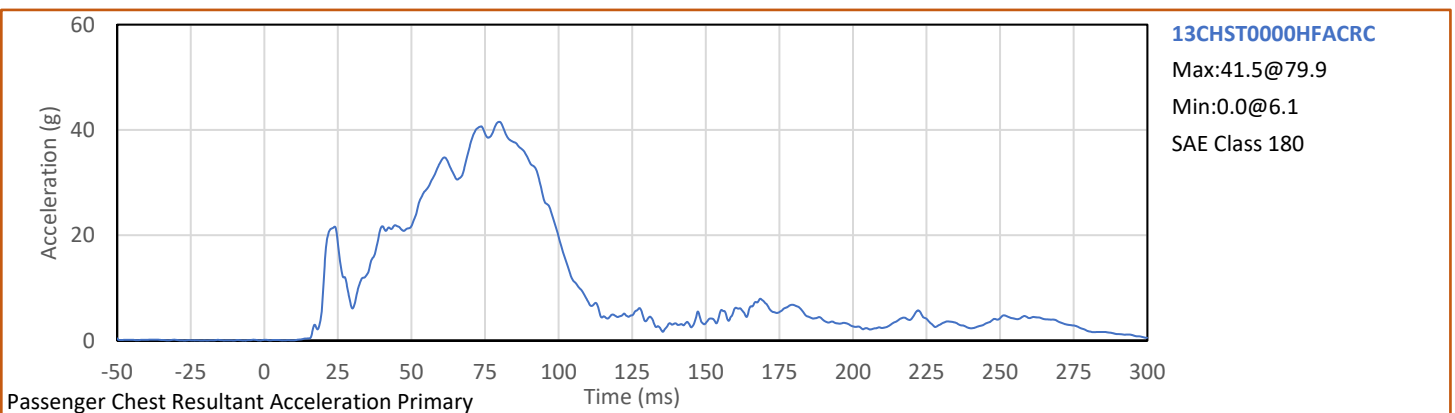
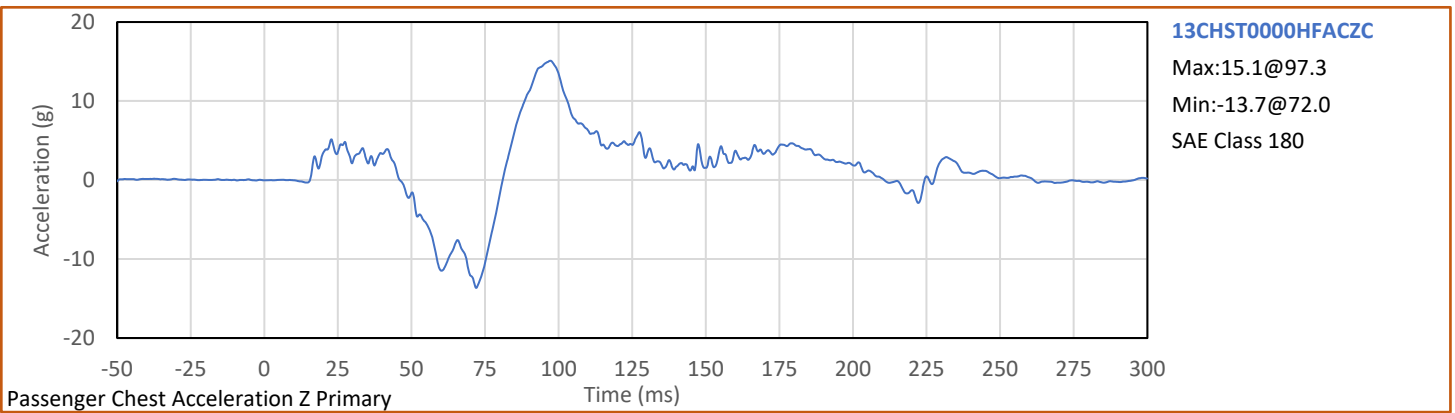
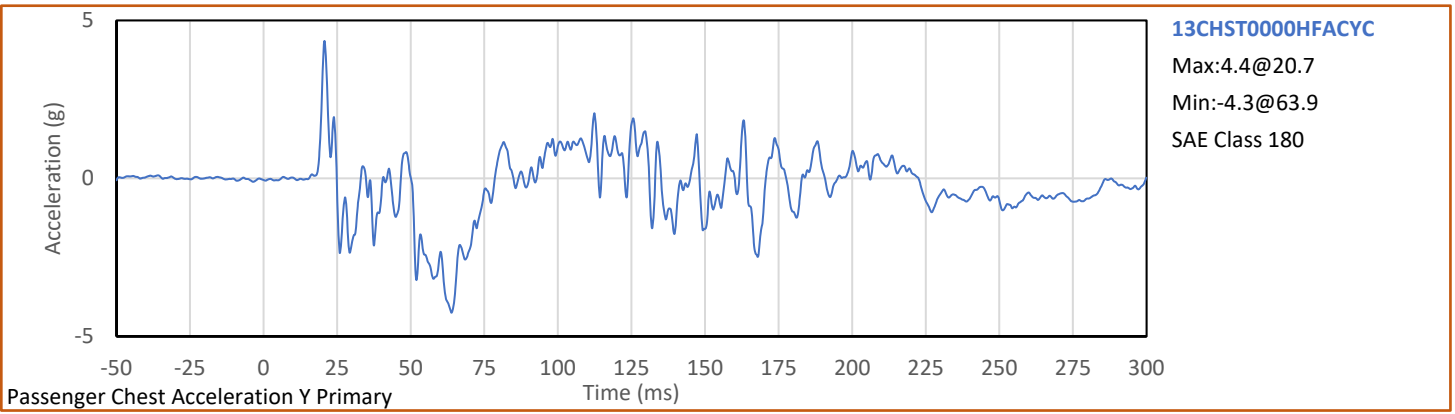
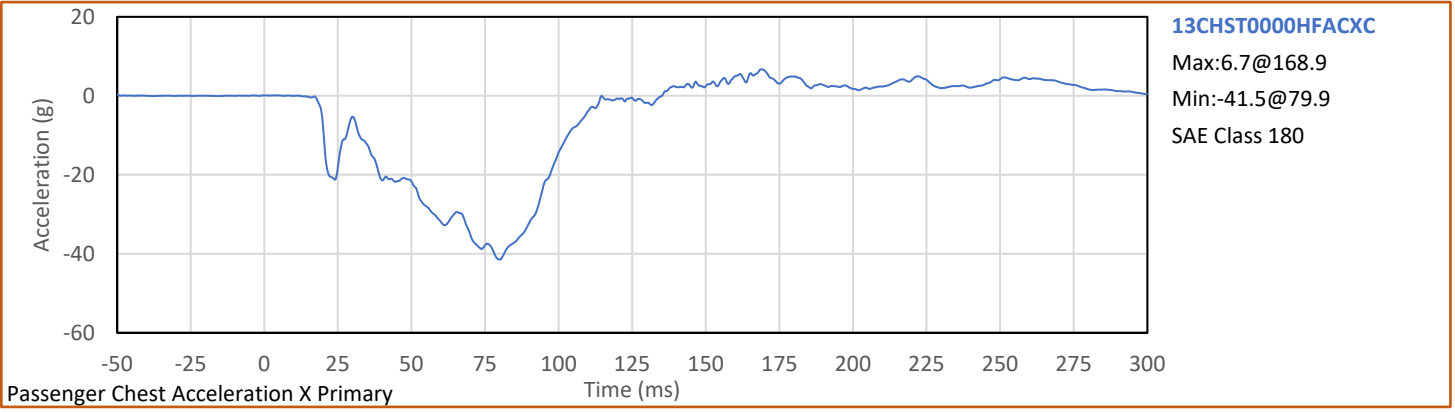
Test Date: 11/17/2020

IDIADA

KARCO



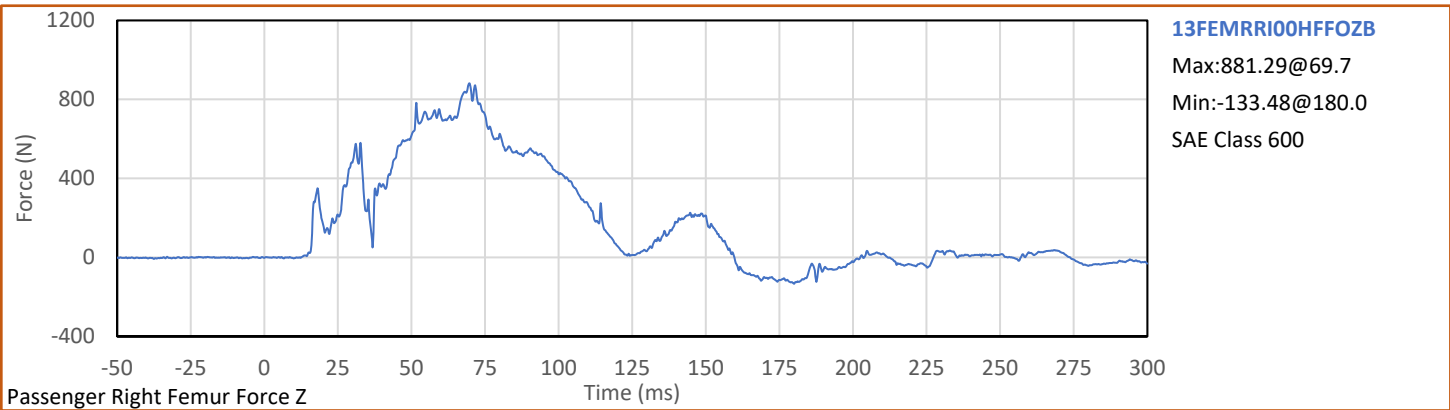
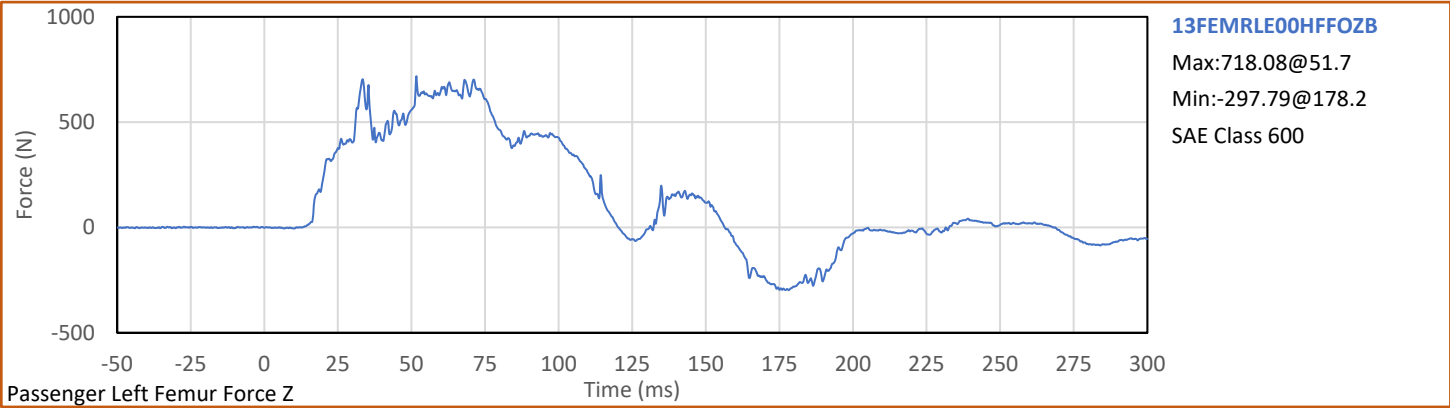






Test Vehicle: 2020 Tesla Model Y 5-Door MPV  
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20205000  
Test Date: 11/17/2020



**APPENDIX C**  
**DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION DATA**

**APPENDIX C**  
**Pre-Test ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**S/N: 360**

ATD Serial No.: 360


Test Date: 2020-10-02

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. Puzzuto

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	886	Pass
B - Shoulder pivot height	mm	505	521	519	Pass
C - 'H' point height	mm	84	89	88	Pass
D - 'H' point location from backline	mm	135	140	139	Pass
E - Shoulder pivot from backline	mm	84	94	91	Pass
F - Thigh clearance	mm	140	155	151	Pass
G - Back of elbow to wrist pivot	mm	290	305	297	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	330	345	338	Pass
J - Elbow rest height	mm	190	211	206	Pass
K - Buttock to knee length	mm	579	604	595	Pass
L - Popliteal length	mm	429	455	437	Pass
M - Knee pivot height	mm	485	500	496	Pass
N - Buttock popliteal length	mm	452	477	464	Pass
O - Chest depth without jacket	mm	213	229	222	Pass
P - Foot length	mm	251	267	259	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	980	Pass
Z - Waist circum.	mm	836	866	846	Pass
AA - Location for chest circum.	mm	429	434	432	Pass
BB - Location for waist circum.	mm	226	231	228	Pass
Overall Test Results					Pass

Technician:



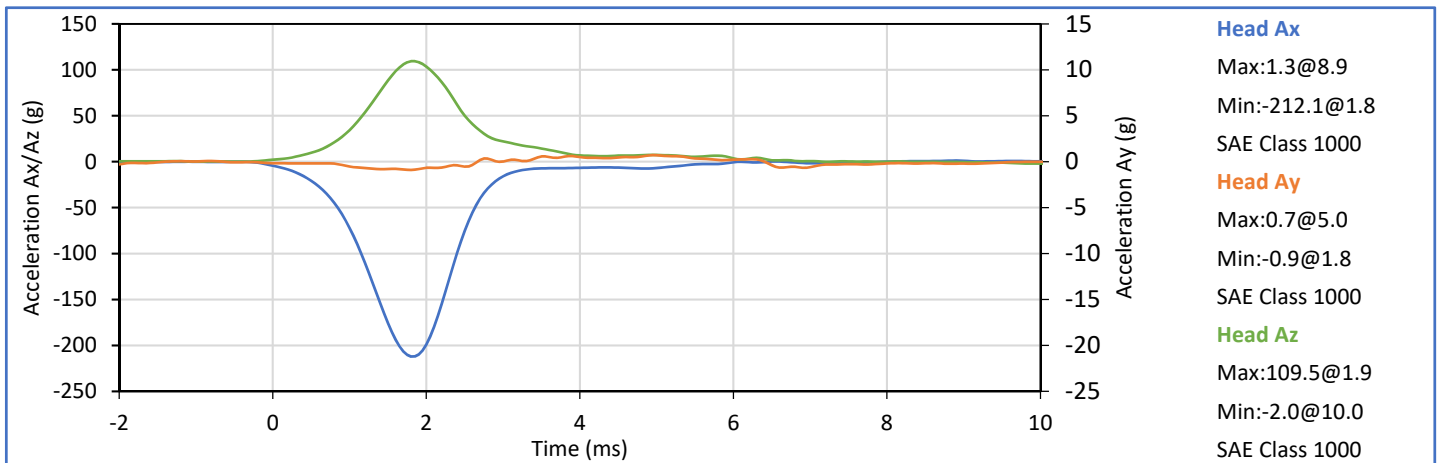
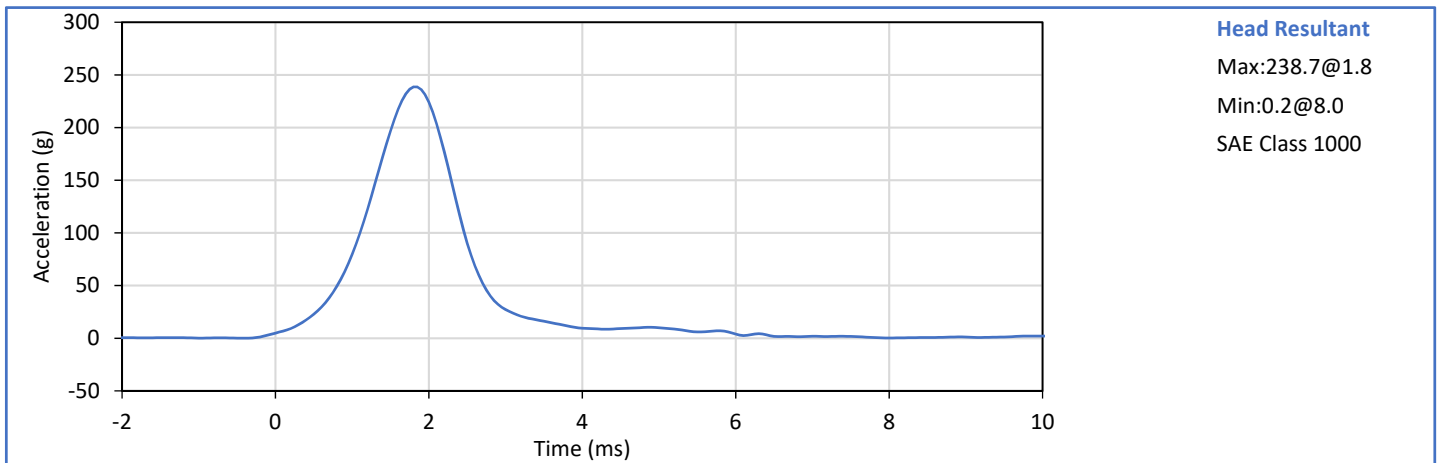
J. Hernandez


Approved By:




P. Puzzuto

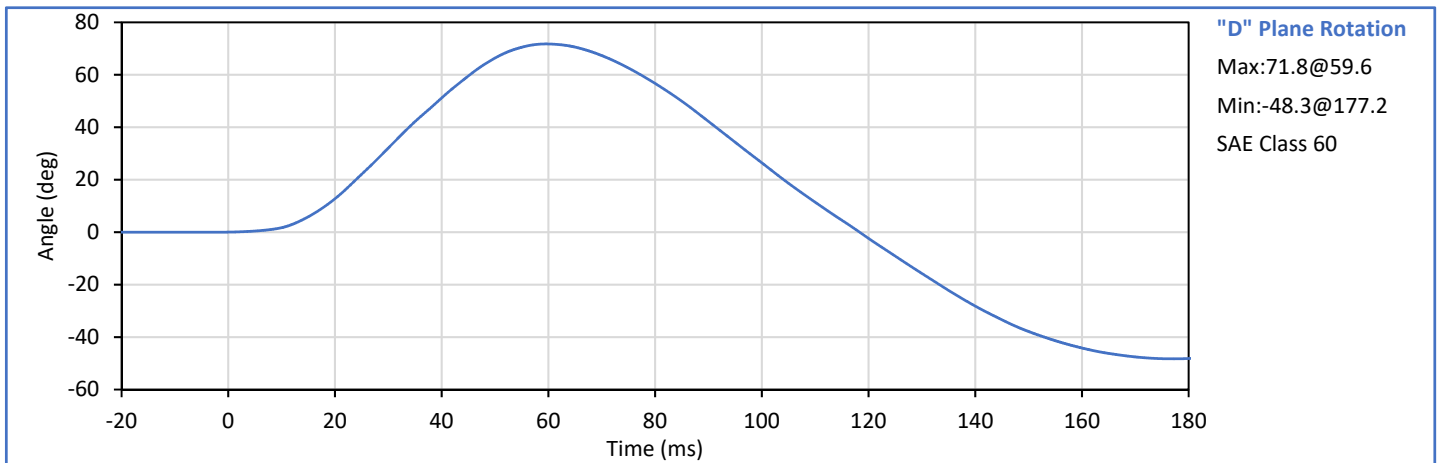
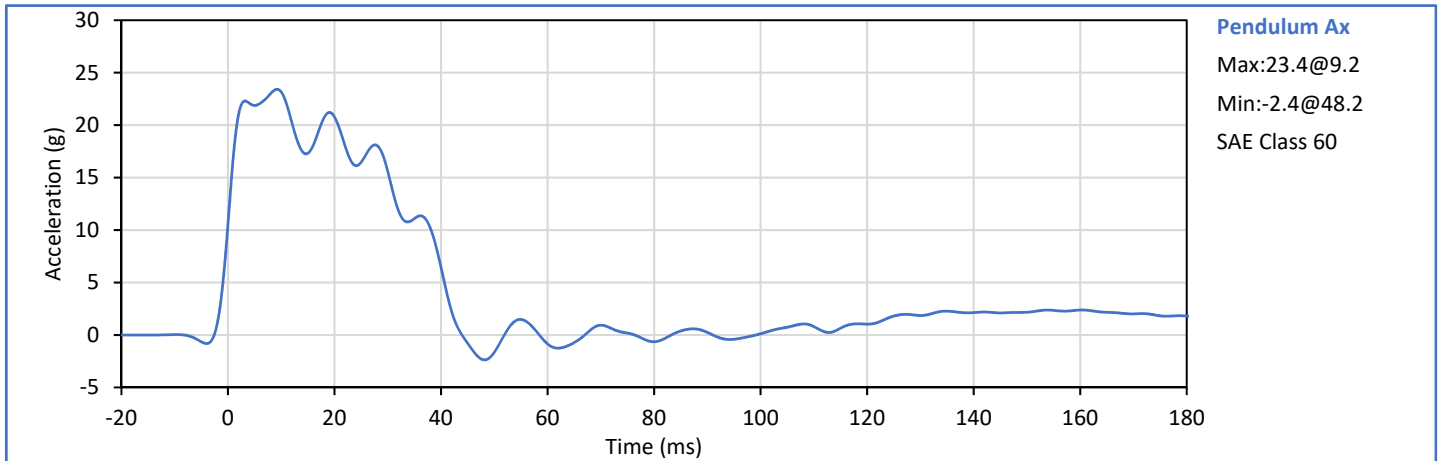
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
Peak Resultant Acceleration	g	225.0	275.0	238.7	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-0.9	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

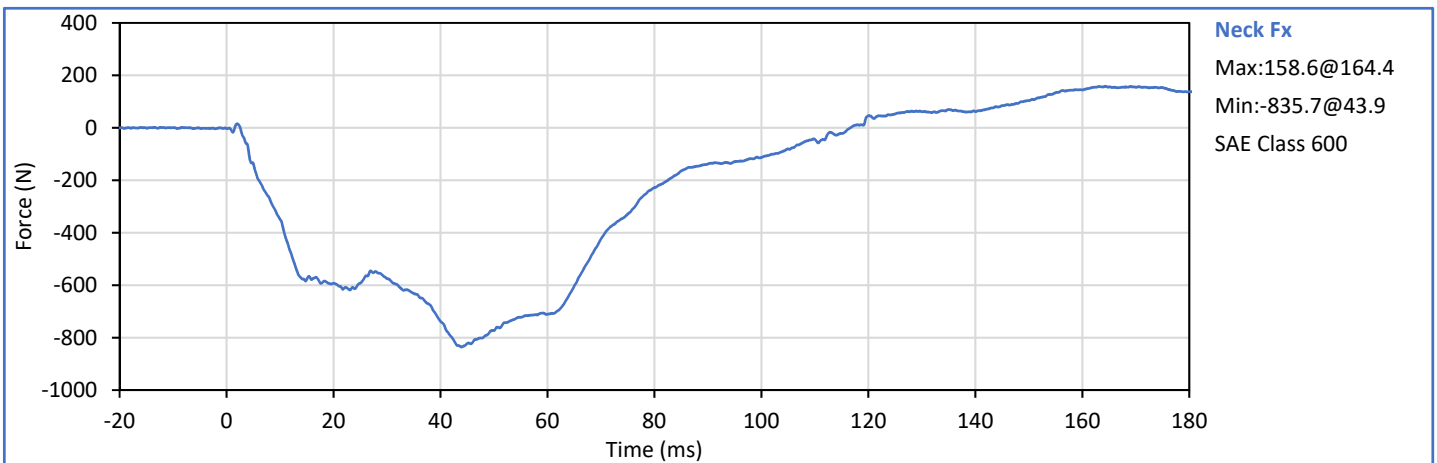
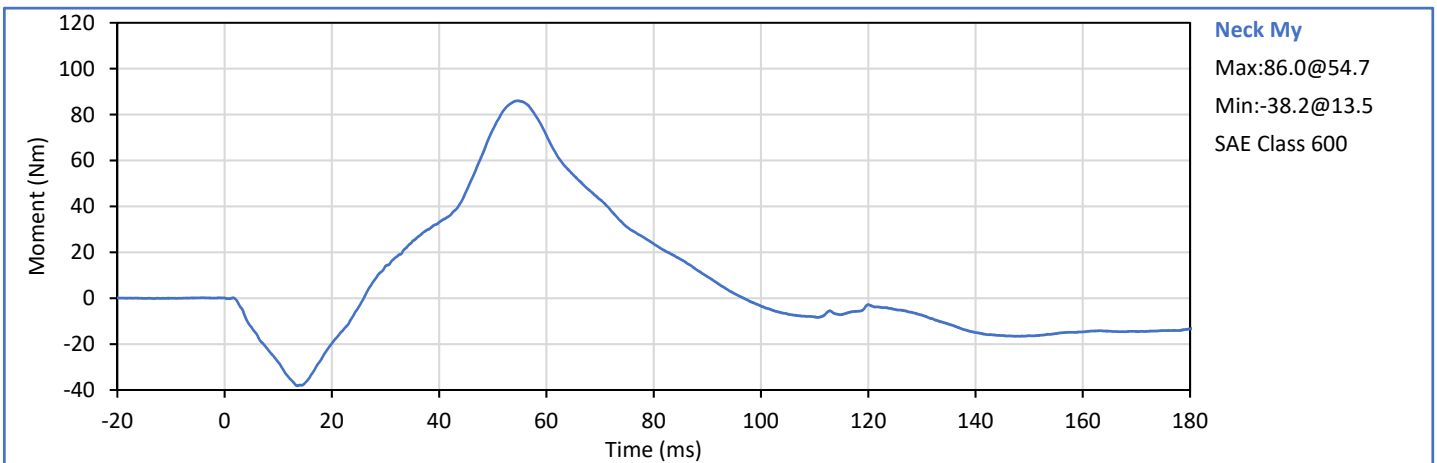
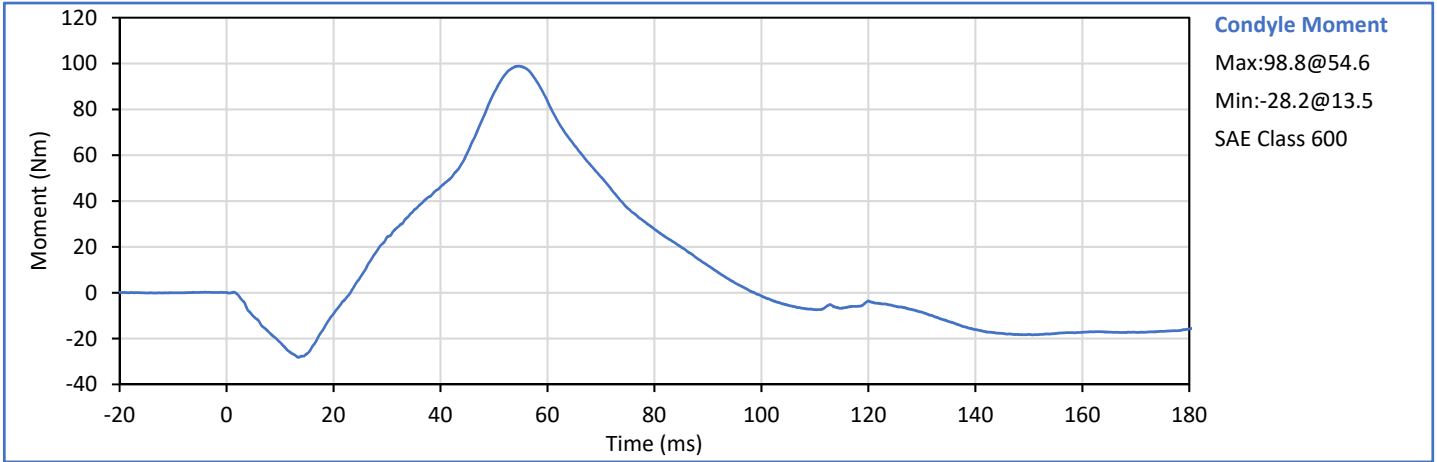
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	6.92	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	23.2	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	20.8	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.6	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.6	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	40.6	Pass
"D" Plane Rotation peak	deg	64.0	78.0	71.8	Pass
	ms	57.0	64.0	59.6	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	118.4	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	98.8	Pass
	ms	47.0	58.0	54.6	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	98.7	Pass
<b>Overall Test Results</b>					<b>Pass</b>



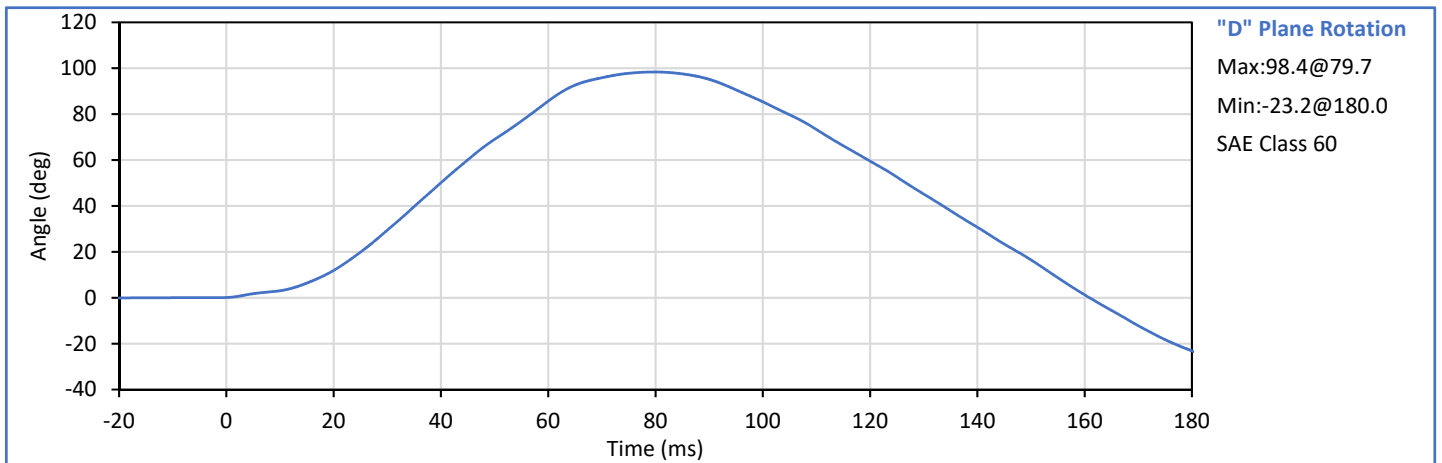
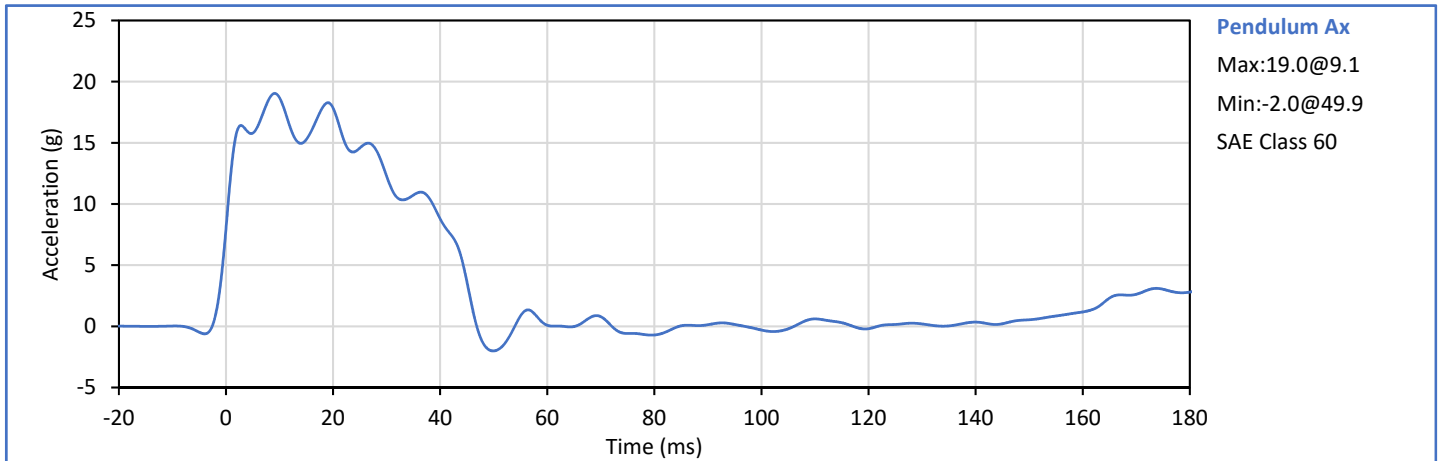
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto




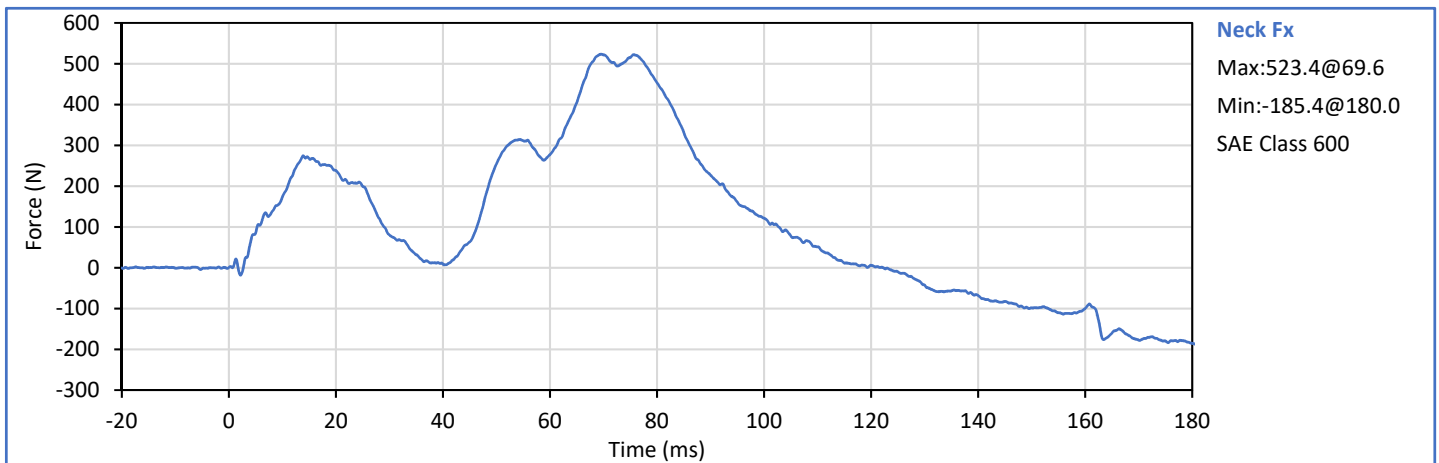
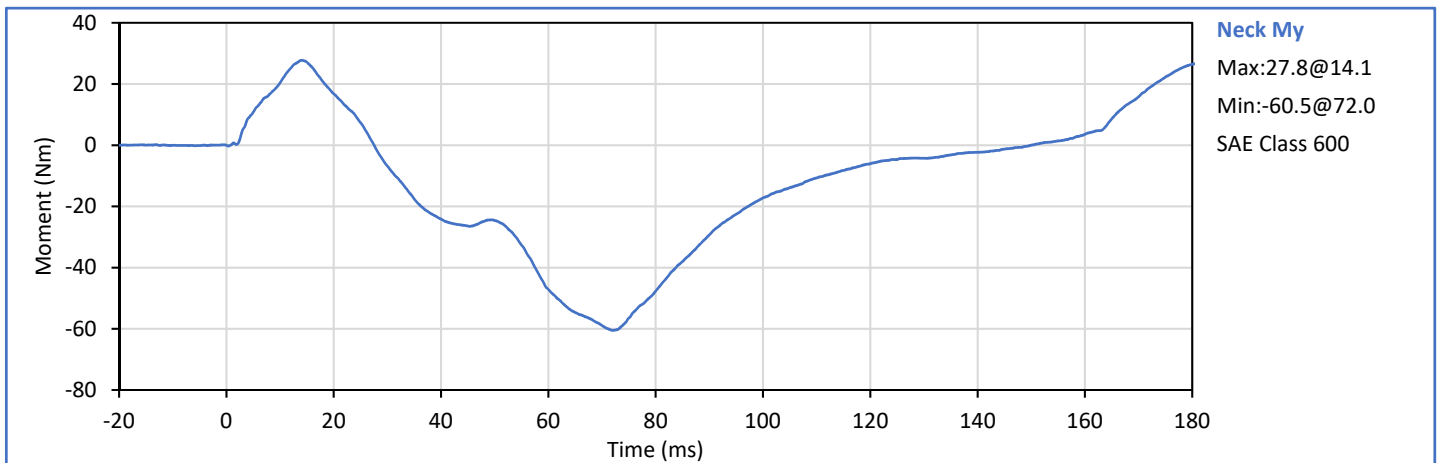
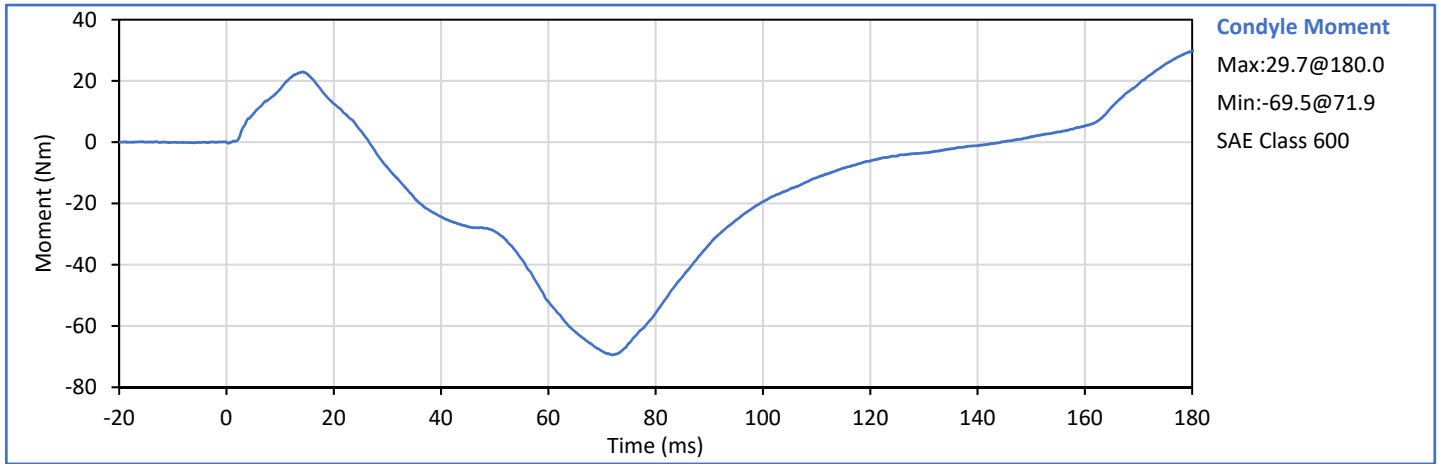


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.94	6.19	6.09	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	18.7	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	17.8	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	12.3	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	12.3	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	44.3	Pass
"D" Plane Rotation peak	deg	81.0	106.0	98.4	Pass
	ms	72.0	82.0	79.7	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	161.0	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-69.5	Pass
	ms	65.0	79.0	71.9	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	144.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>

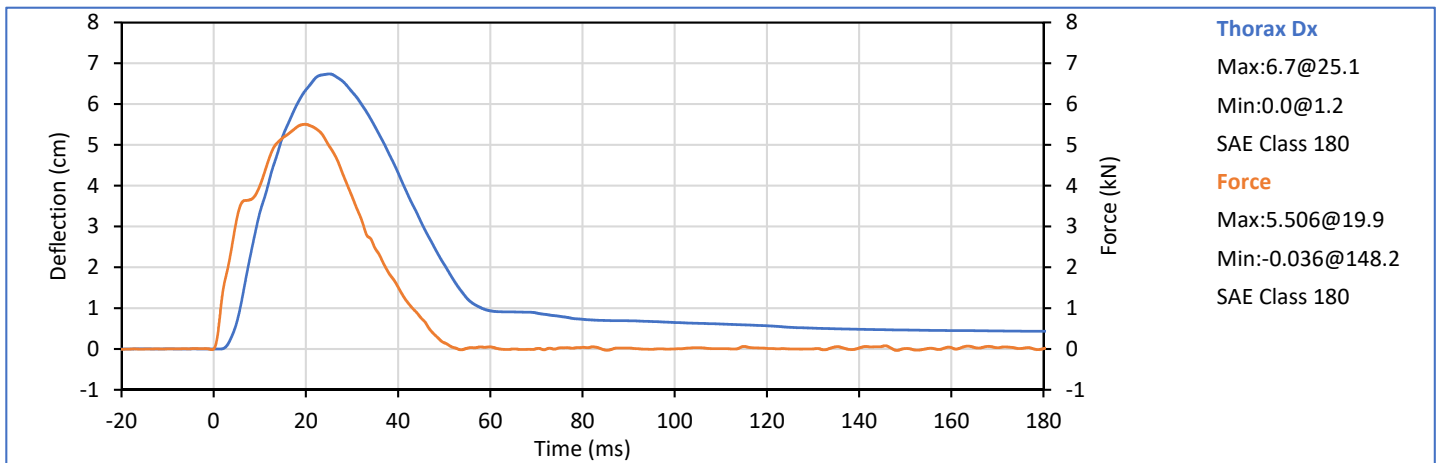
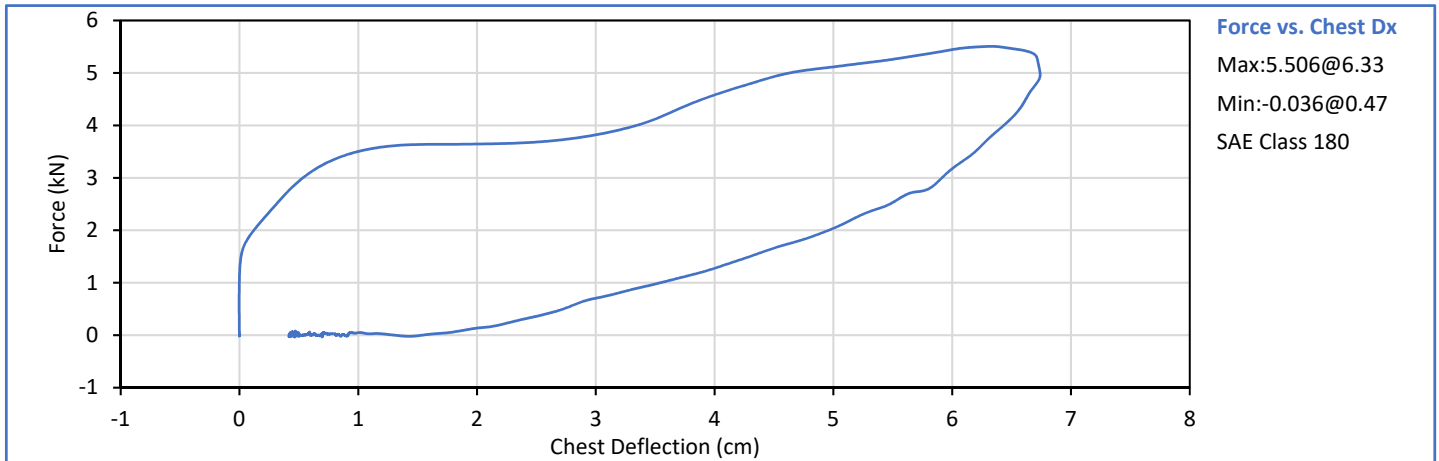


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



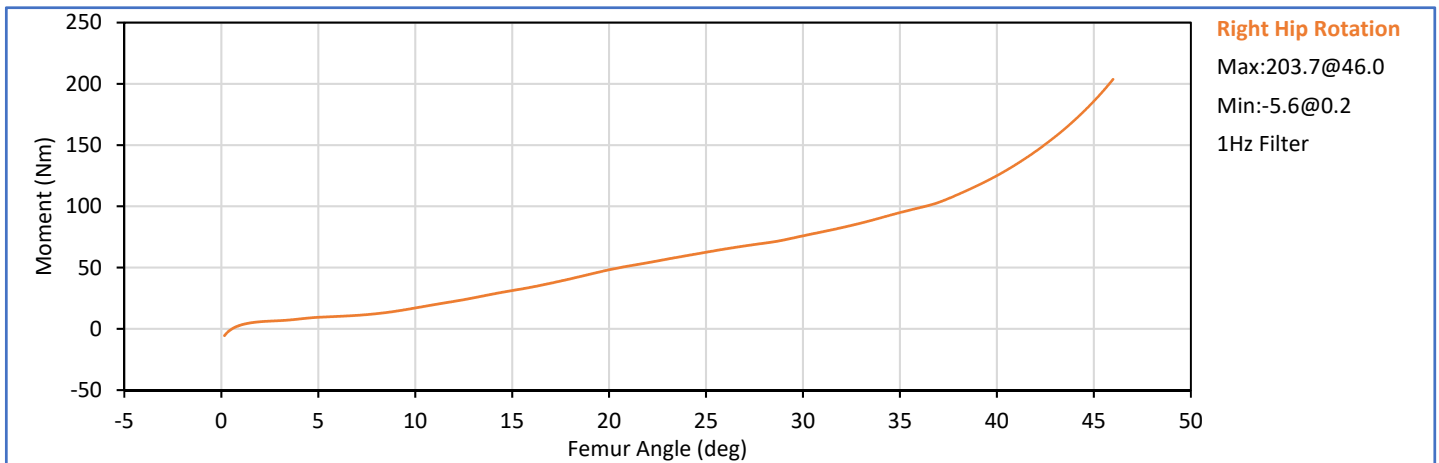
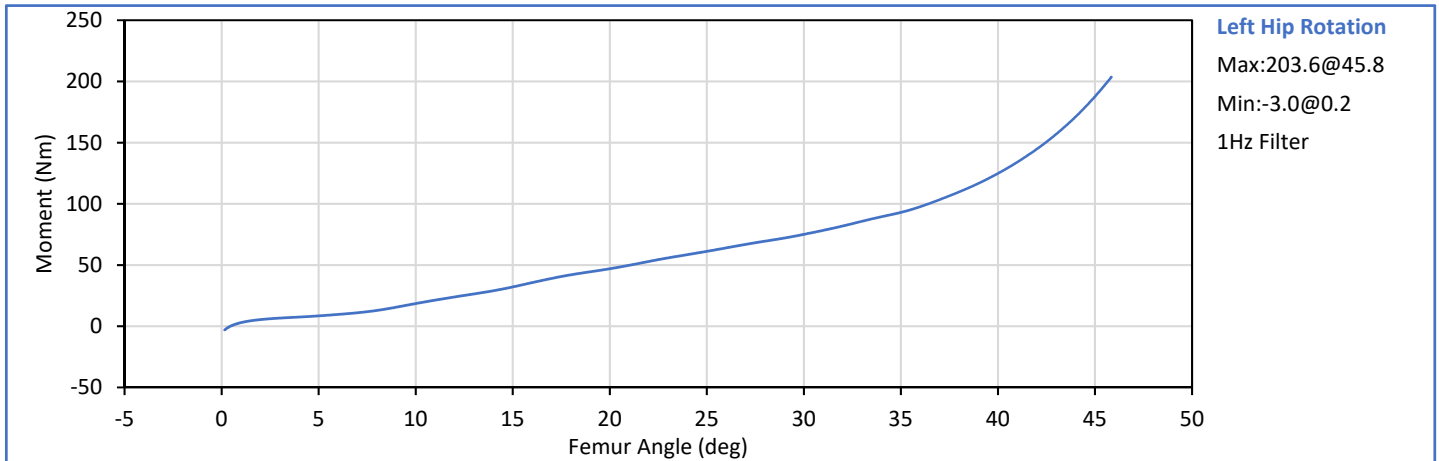
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Relative Humidity	%	10	70	23	Pass
Probe Velocity	m/s	6.58	6.82	6.75	Pass
Peak Chest Deflection	cm	6.35	7.26	6.74	Pass
Peak Probe Force	kN	5.159	5.893	5.506	Pass
Internal Hysteresis	%	69.0	85.0	70.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>





Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

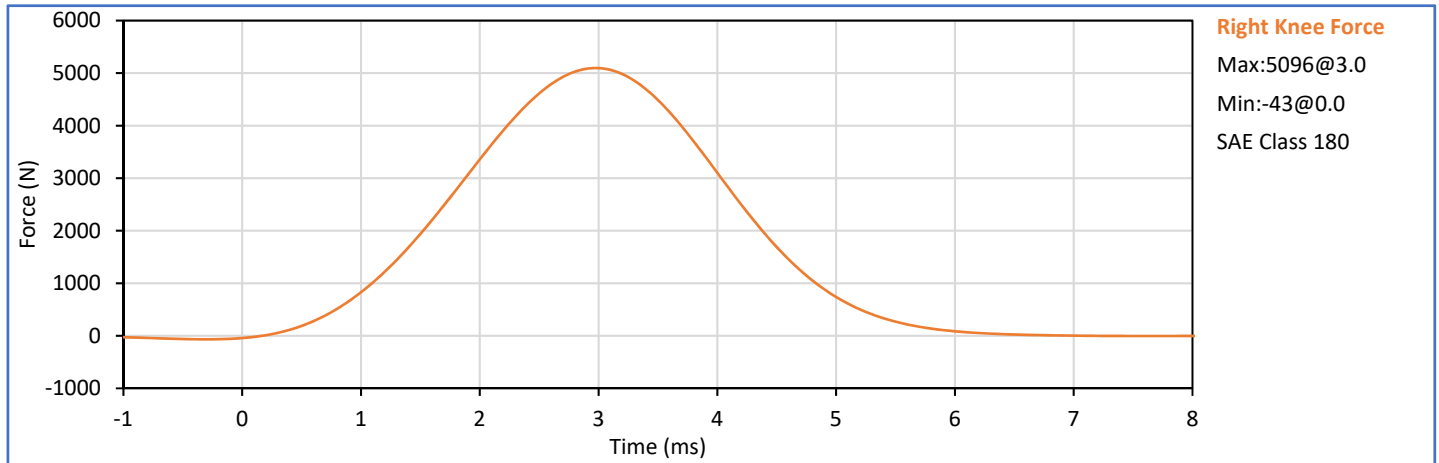
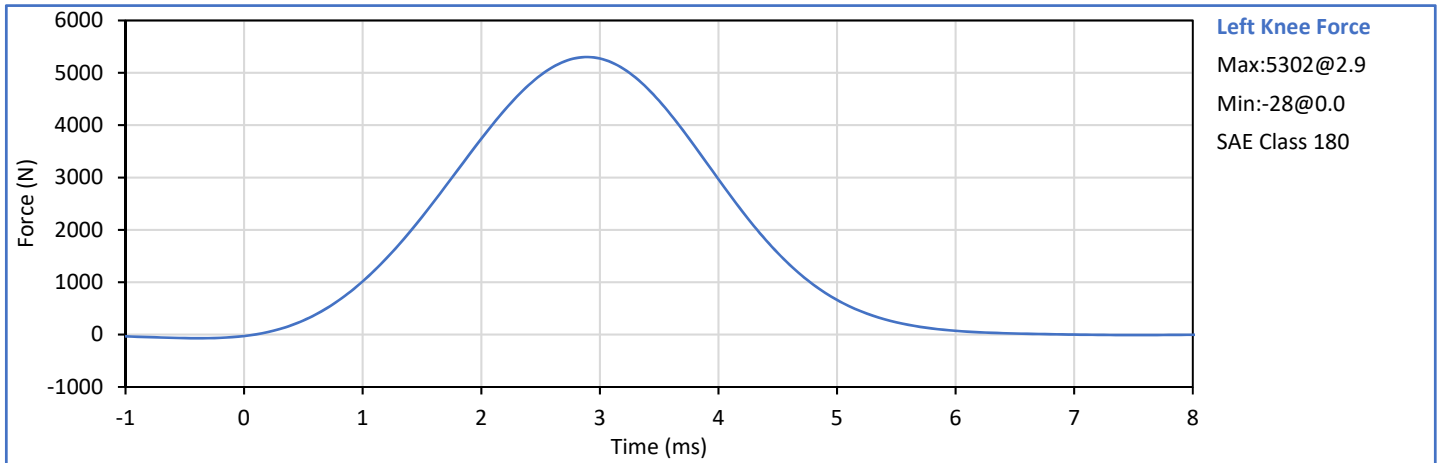
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail	
Laboratory Temperature	°C	18.9	25.6	21.2	Pass	
Laboratory Relative Humidity	%	10	70	21	Pass	
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	75.1	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	45.8	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	76.0	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.9	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	20.9	Pass
	Laboratory Relative Humidity	%	10	70	23	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.105	Pass
Knee	Peak Resistive Force	N	4715	5782	5302	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.106	Pass
Knee	Peak Resistive Force	N	4715	5782	5096	Pass
<b>Overall Test Results</b>						<b>Pass</b>



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX C**  
**Pre-Test ATD Qualification and Performance Verification**  
**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	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

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 Relative Humidity	%	10	70	17	Pass
A - Total sitting height	mm	775	800	791	Pass
B - Shoulder pivot height	mm	432	457	448	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	77	Pass
F - Thigh clearance	mm	119	135	128	Pass
G - Back of elbow to wrist pivot	mm	244	259	248	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	277	297	281	Pass
J - Elbow rest height	mm	183	203	199	Pass
K - Buttock to knee length	mm	521	546	535	Pass
L - Popliteal length	mm	356	376	368	Pass
M - Knee pivot height	mm	394	419	405	Pass
N - Buttock popliteal length	mm	414	439	433	Pass
O - Chest depth without jacket	mm	175	191	188	Pass
P - Foot length	mm	219	234	228	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	181	Pass
U - Hip Breadth	mm	300	315	310	Pass
V - Shoulder breadth	mm	351	366	359	Pass
W - Foot breadth	mm	79	94	87	Pass
X - Head circum.	mm	528	549	539	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	868	Pass
Z - Waist circum.	mm	760	790	772	Pass
AA - Location for chest circum.	mm	333	358	341	Pass
BB - Location for waist circum.	mm	160	170	168	Pass
Overall Test Results					Pass

Technician:



J. Hernandez

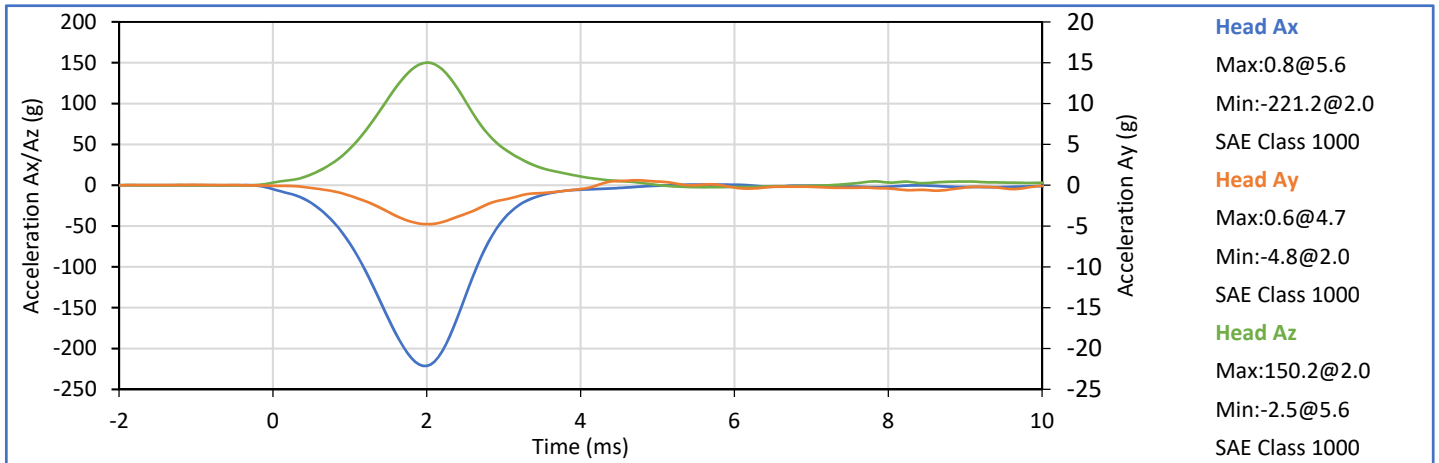
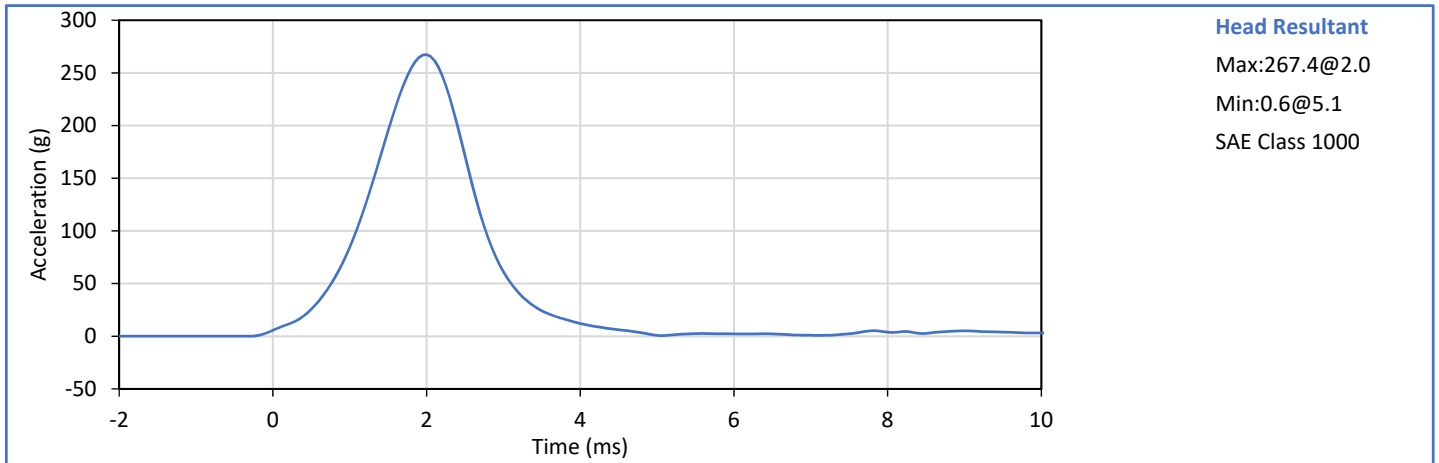
Approved By:




P. Puzzuto



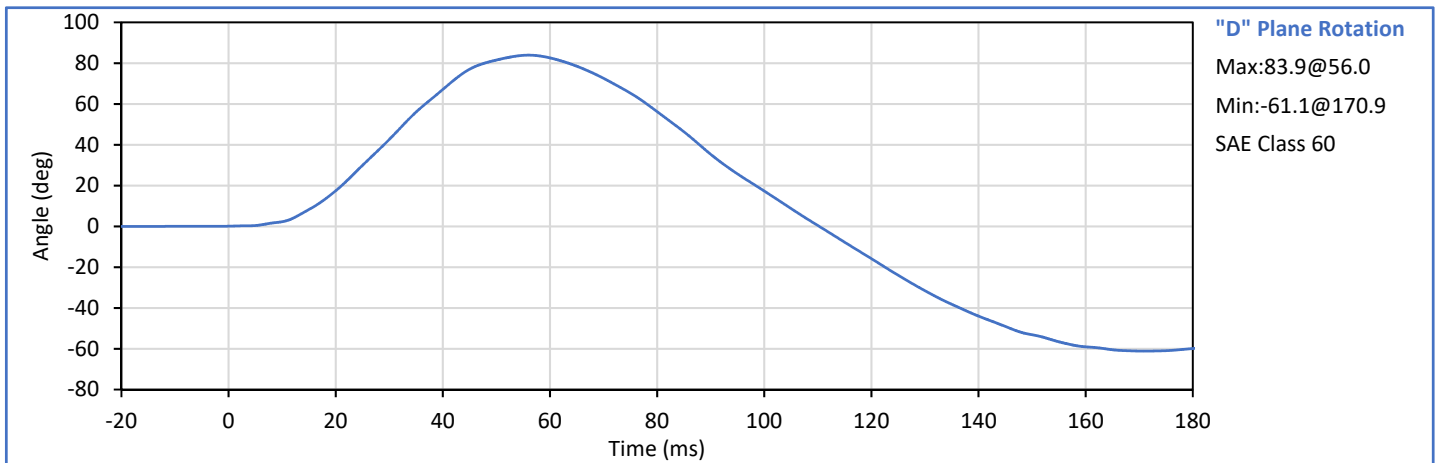
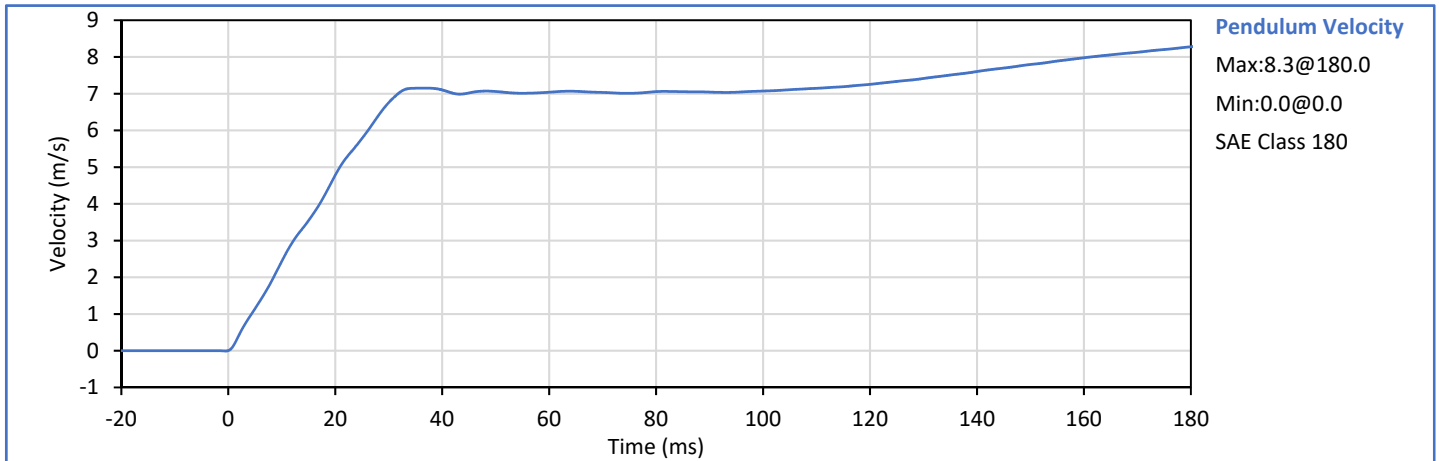
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Humidity	%	10	70	17	Pass
Peak Resultant Acceleration	g	250.0	300.0	267.4	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-4.8	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

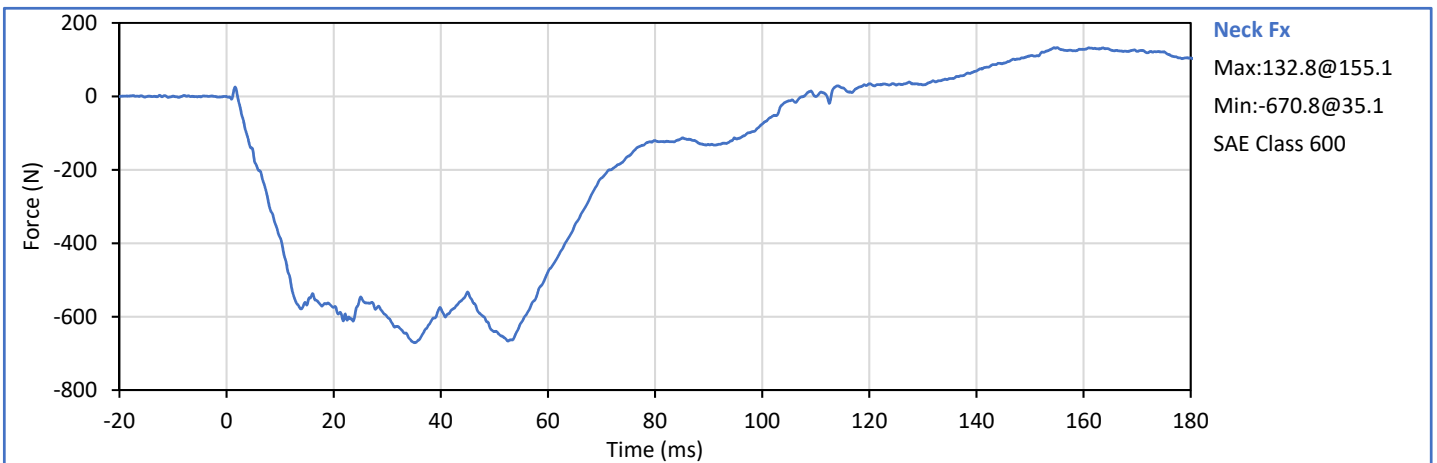
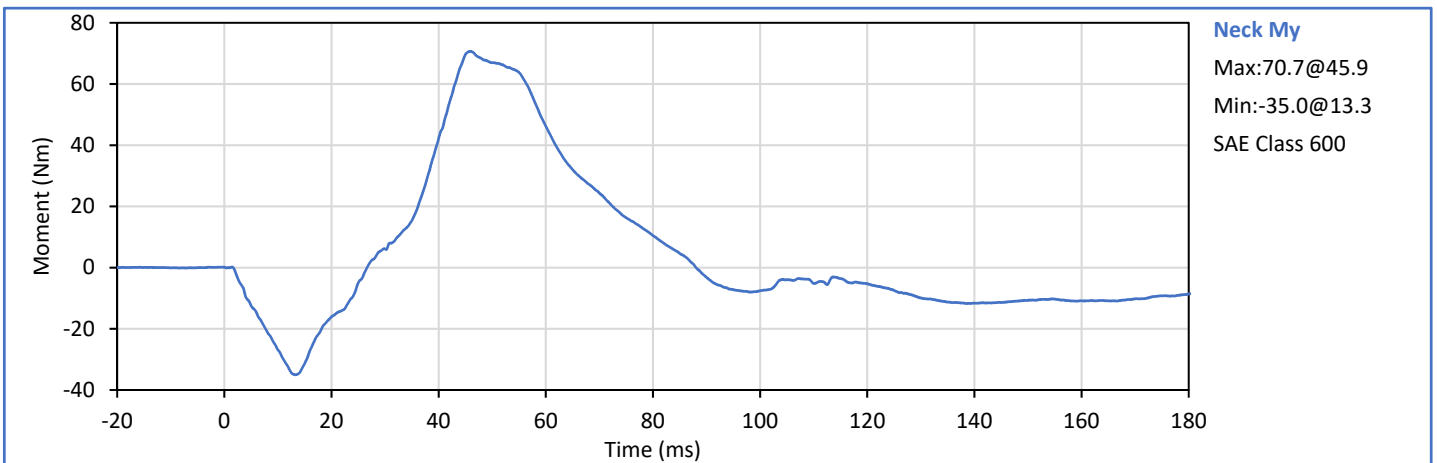
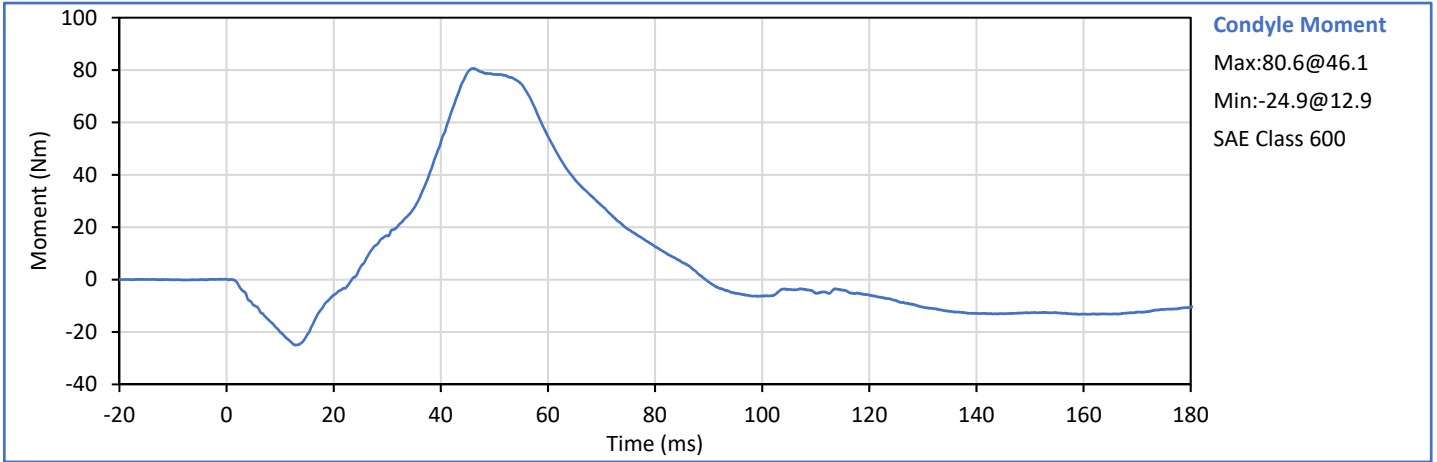
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Humidity	%	10	70	18	Pass
Pendulum Velocity	m/s	6.89	7.13	7.03	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.44	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.78	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.76	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	83.9	Pass
Peak Moment in Rotation	Nm	69.0	83.0	80.6	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	82.3	Pass
<b>Overall Test Results</b>					<b>Pass</b>

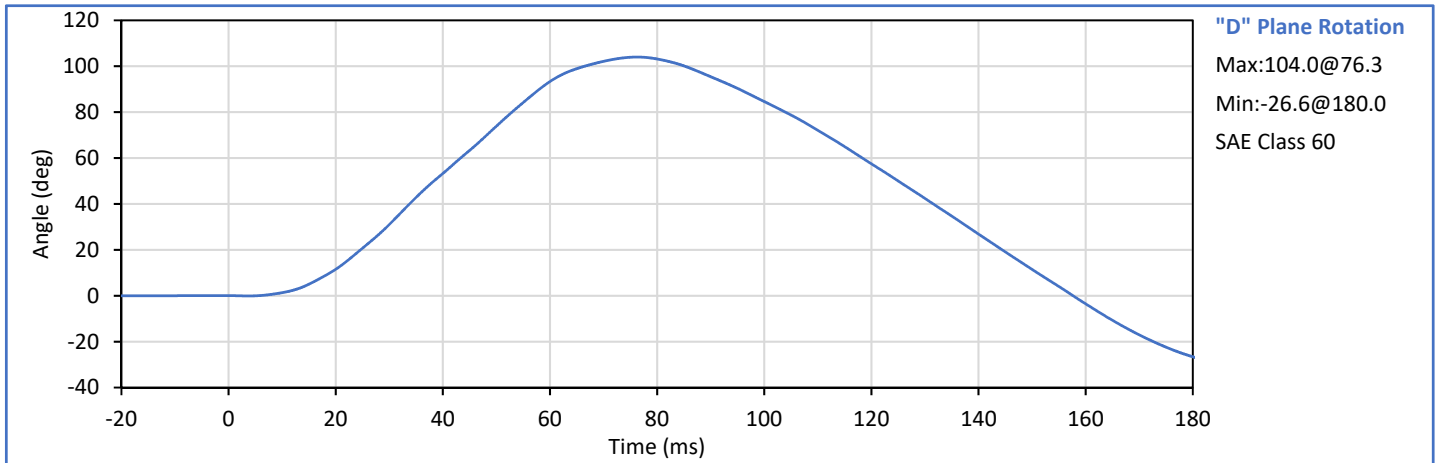
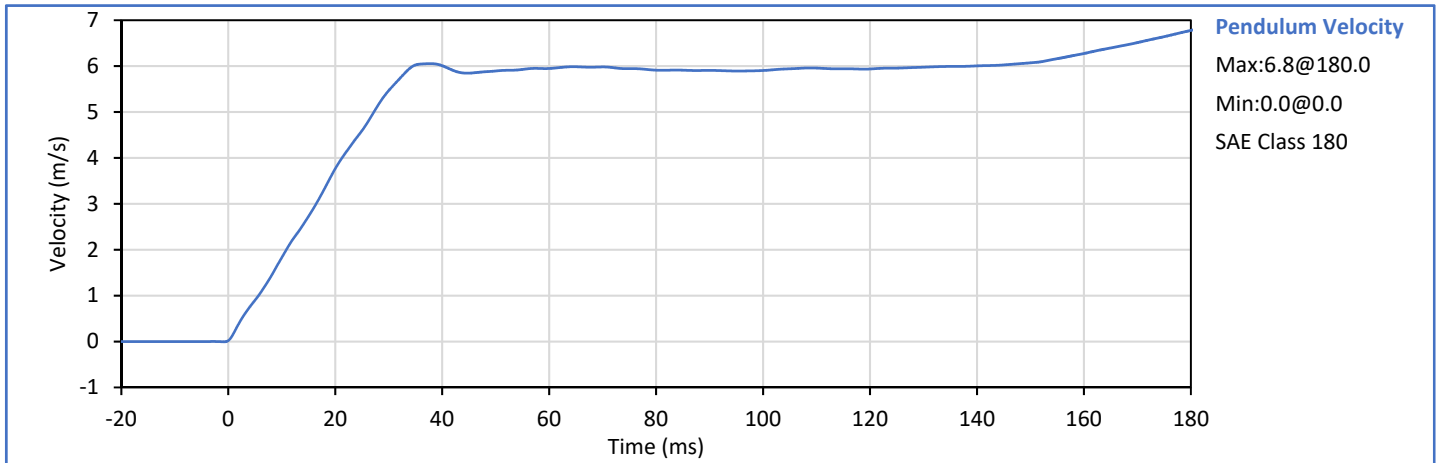



Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

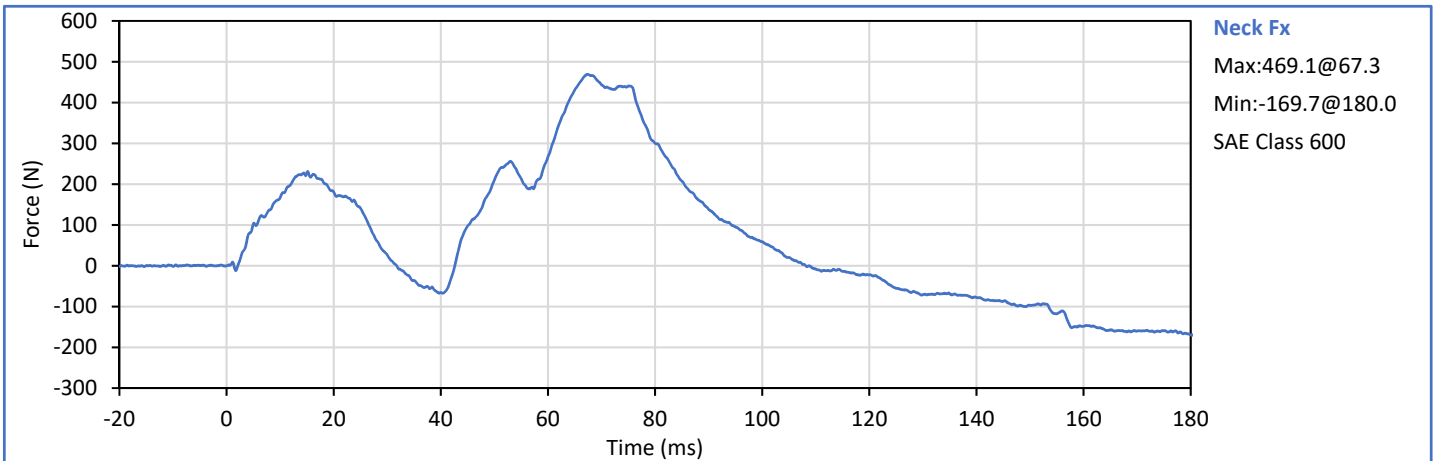
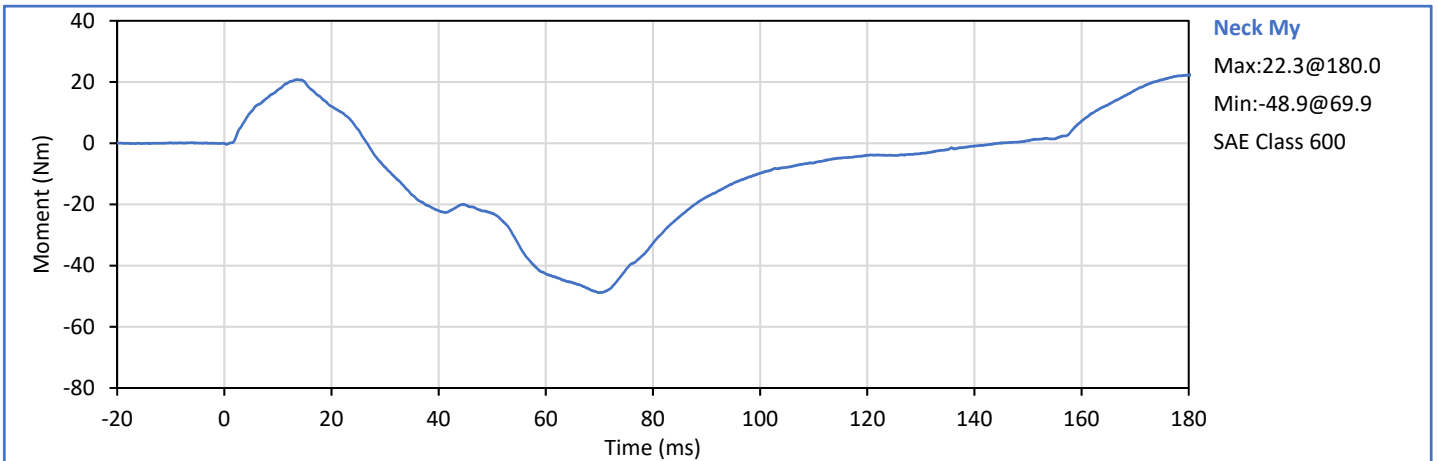
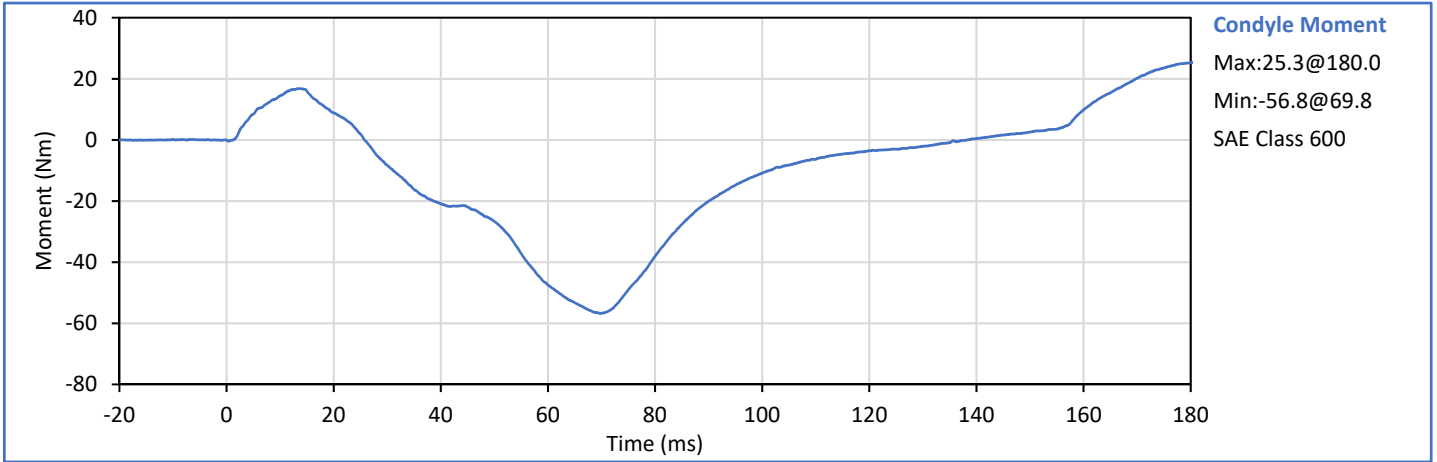


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Humidity	%	10	70	18	Pass
Pendulum Velocity	m/s	5.95	6.19	6.05	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.83	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.77	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.47	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	104.0	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-56.8	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	101.5	Pass
<b>Overall Test Results</b>					<b>Pass</b>

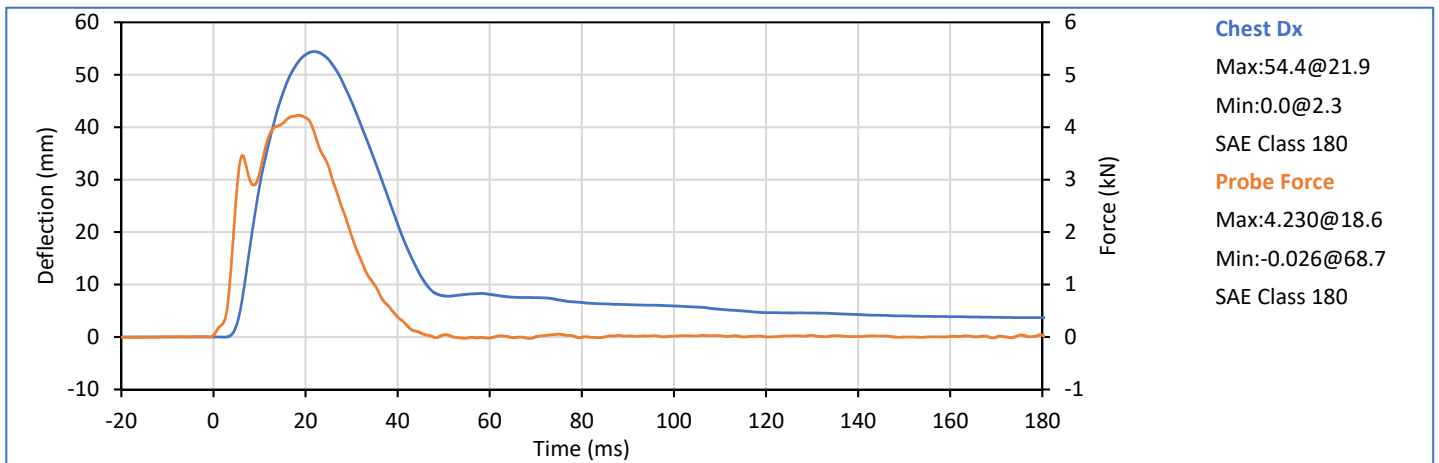
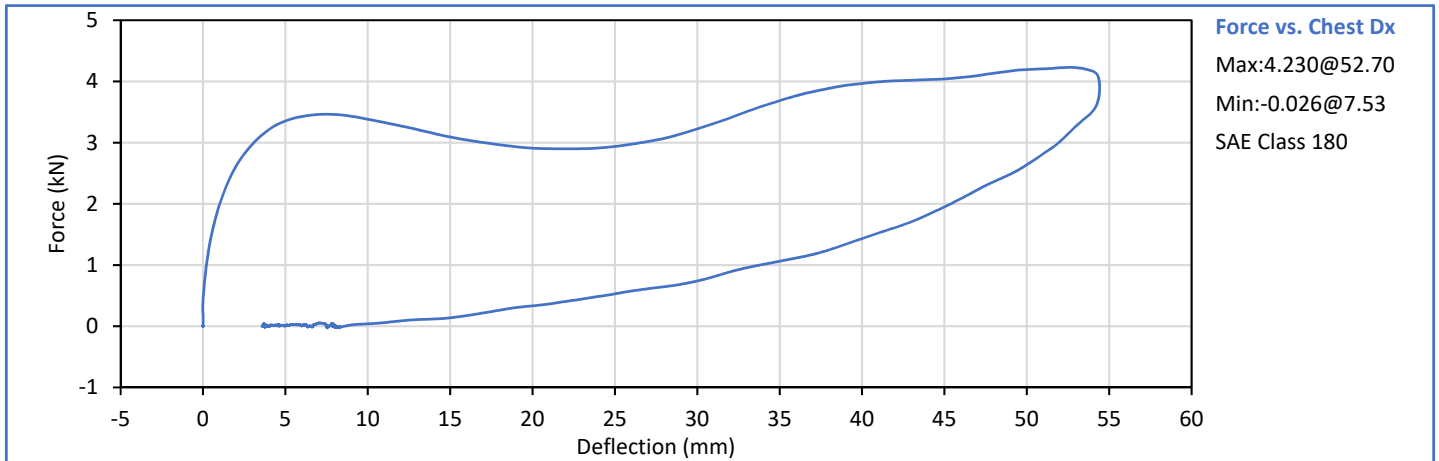


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Humidity	%	10	70	18	Pass
Probe Velocity	m/s	6.59	6.83	6.72	Pass
Peak Chest Deflection	mm	50.0	58.0	54.4	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.230	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.194	Pass
Internal Hysterisis	%	69.0	85.0	72.6	Pass
Overall Test Results					Pass



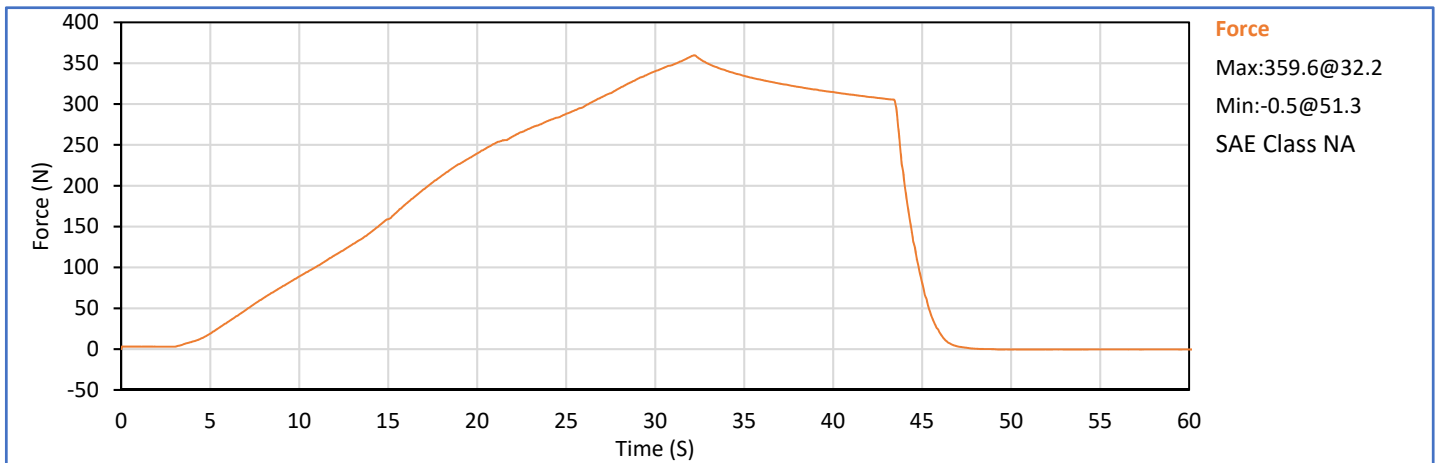
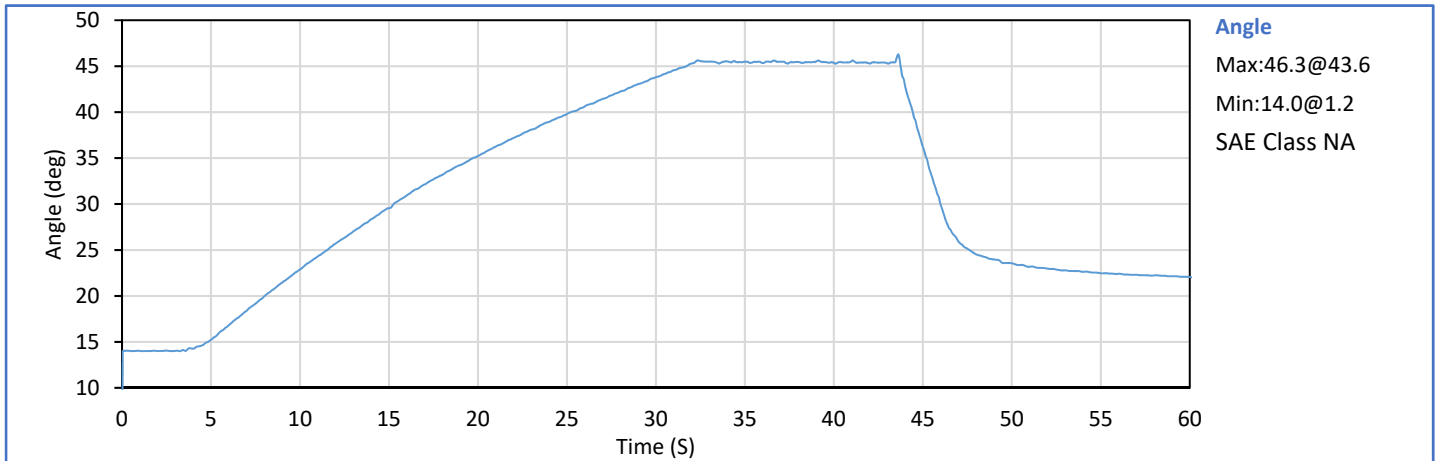
Technician:   
 J. Hernandez


Approved By:   
 P. Puzzuto


ATD Serial No.: 141

Test Date: 2020-10-01

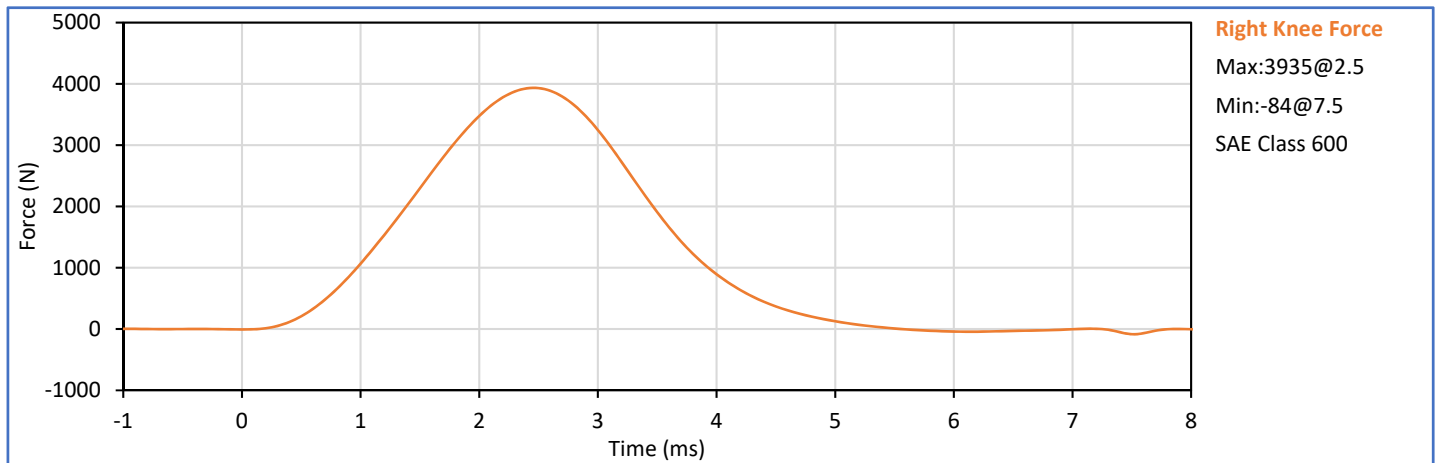
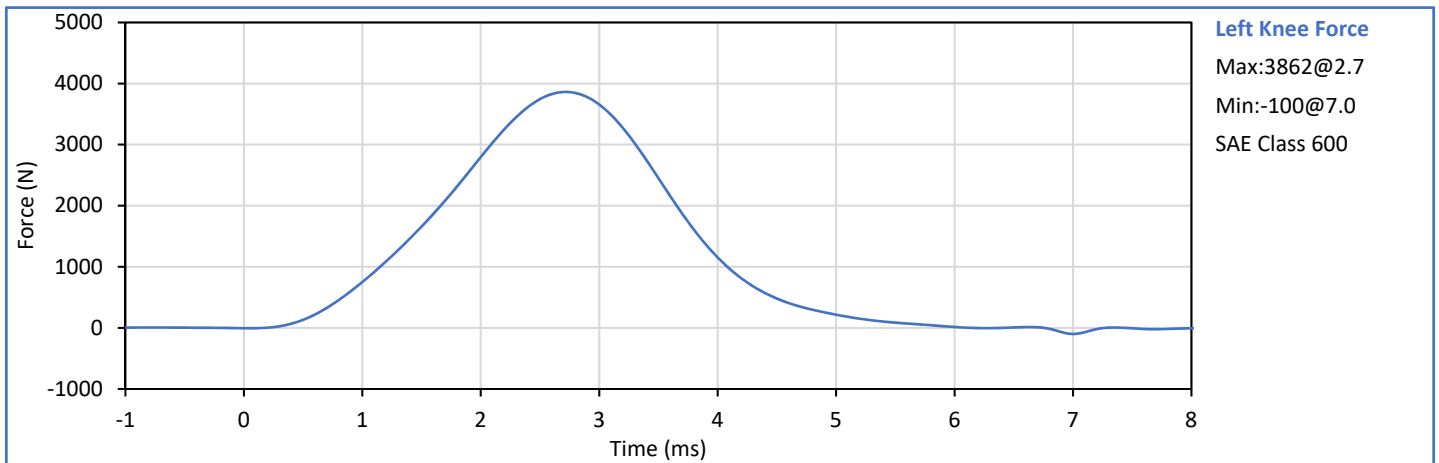
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	34	Pass
Orientation Angle	deg	0.0	20.0	15.1	Pass
Test Initial Angle	deg	11.0	19.0	14.0	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	355.8	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.12	Pass
Final Reference Plane Angle	deg	-8.0	8.0	5.9	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	34	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.105	Pass
Knee	Peak Resistive Force	N	3450	4060	3862	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.102	Pass
Knee	Peak Resistive Force	N	3450	4060	3935	Pass
<b>Overall Test Results</b>						<b>Pass</b>



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



**APPENDIX C**  
**Post-Test ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**S/N: 360**

ATD Serial No.: 360


Test Date: 2020-11-20

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. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
A - Total sitting height	mm	879	889	887	Pass
B - Shoulder pivot height	mm	505	521	513	Pass
C - 'H' point height	mm	84	89	87	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	150	Pass
G - Back of elbow to wrist pivot	mm	290	305	294	Pass
H - Head back to backline	mm	41	46	46	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	594	Pass
L - Popliteal length	mm	429	455	435	Pass
M - Knee pivot height	mm	485	500	491	Pass
N - Buttock popliteal length	mm	452	477	463	Pass
O - Chest depth without jacket	mm	213	229	221	Pass
P - Foot length	mm	251	267	258	Pass
V - Shoulder breadth	mm	422	437	428	Pass
W - Foot breadth	mm	91	107	102	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	984	Pass
Z - Waist circum.	mm	836	866	845	Pass
AA - Location for chest circum.	mm	429	434	433	Pass
BB - Location for waist circum.	mm	226	231	229	Pass
Overall Test Results					Pass

Technician: \_\_\_\_\_



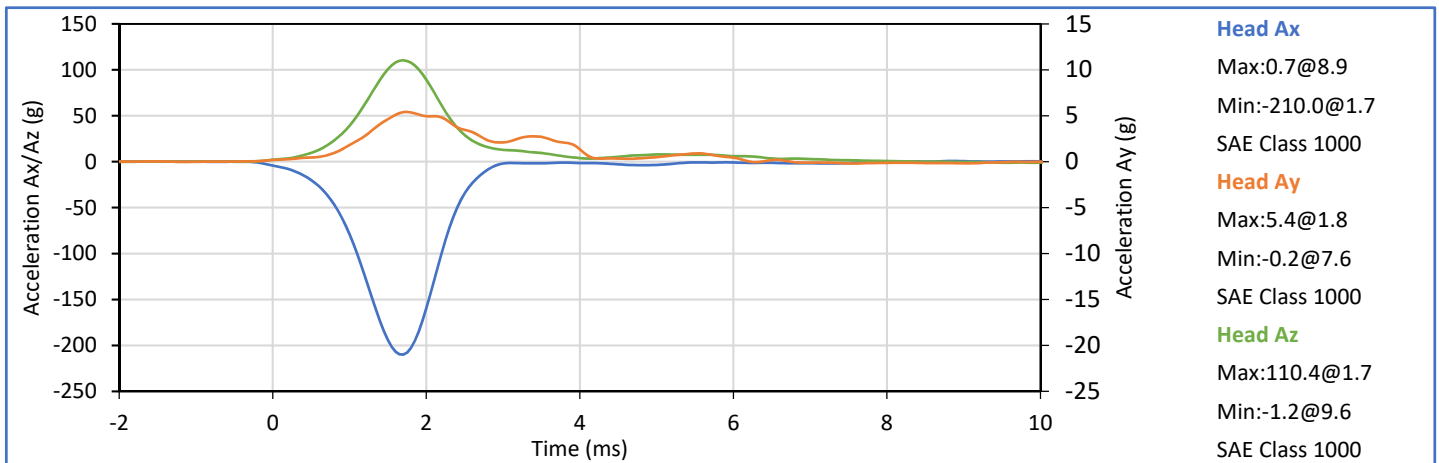
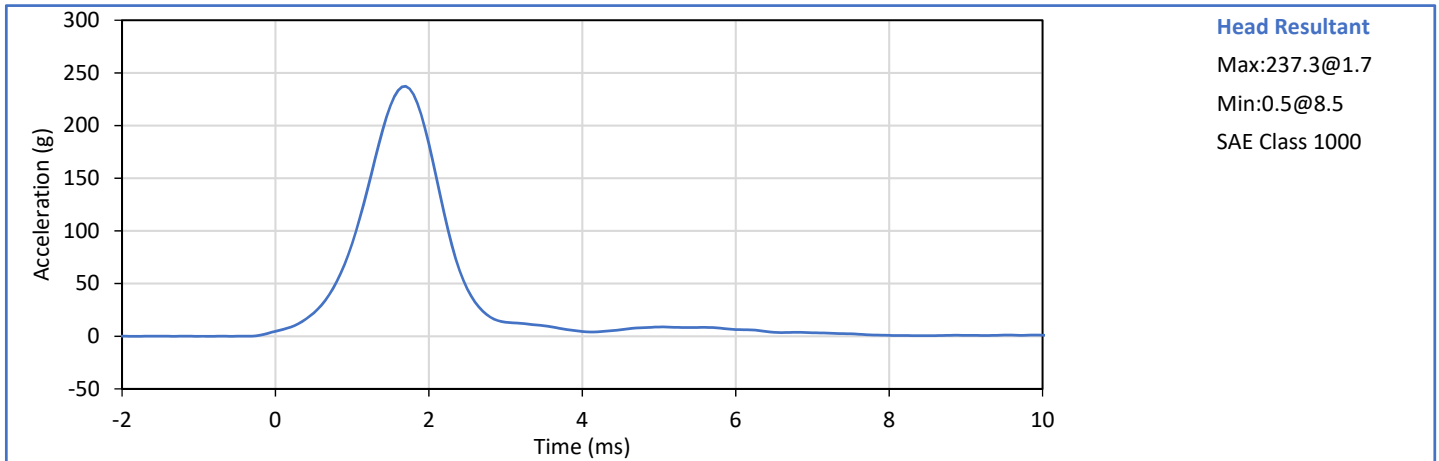
J. Hernandez


Approved By: \_\_\_\_\_




P. Puzzuto

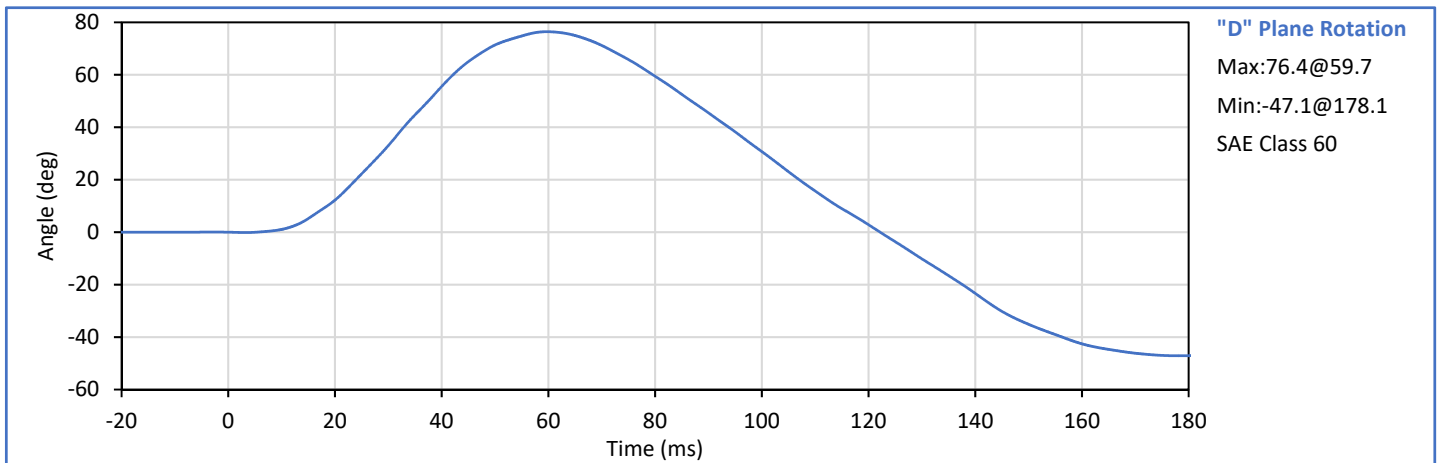
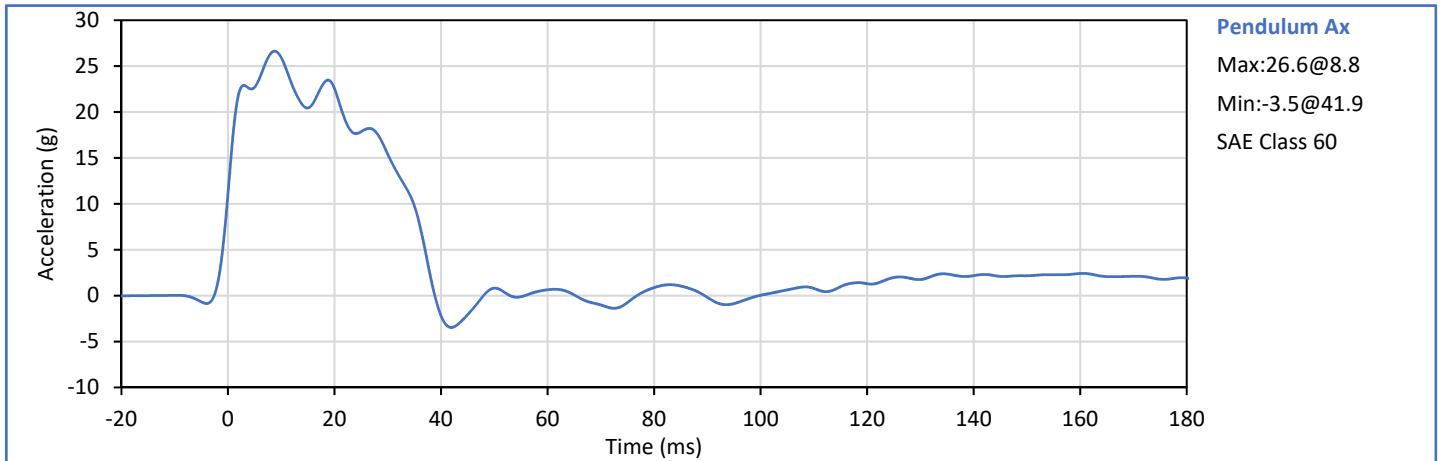
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Relative Humidity	%	10	70	33	Pass
Peak Resultant Acceleration	g	225.0	275.0	237.3	Pass
Peak Lateral Acceleration	g	-15.0	15.0	5.4	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

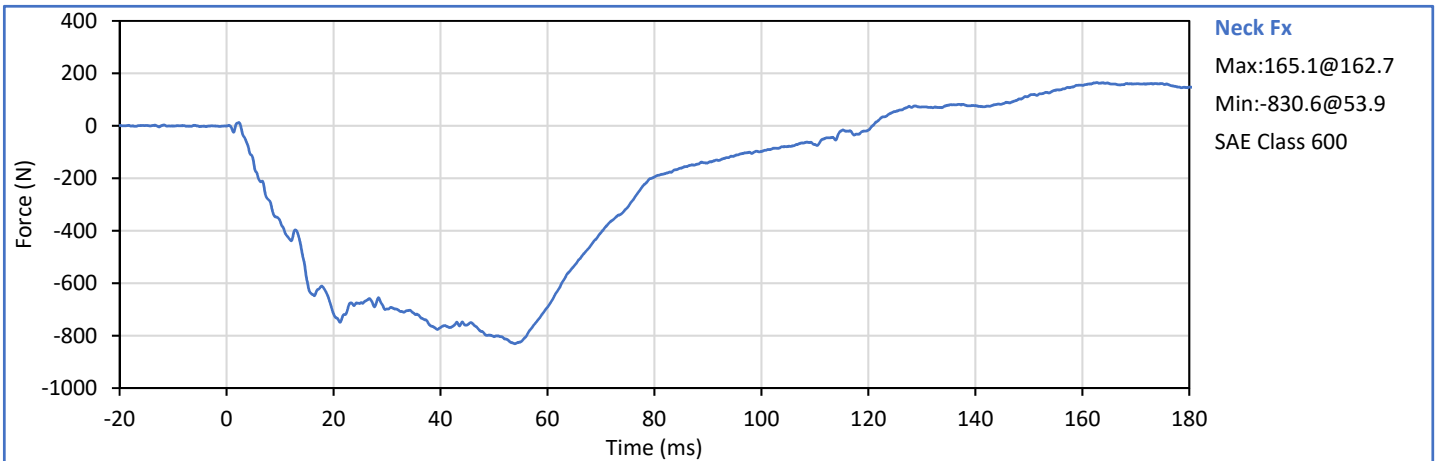
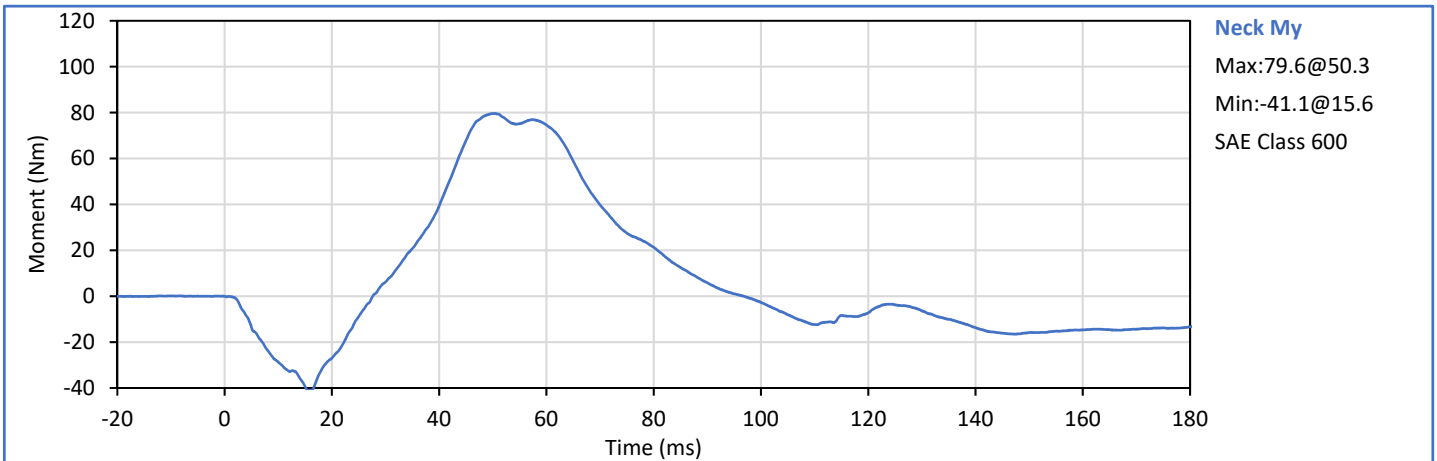
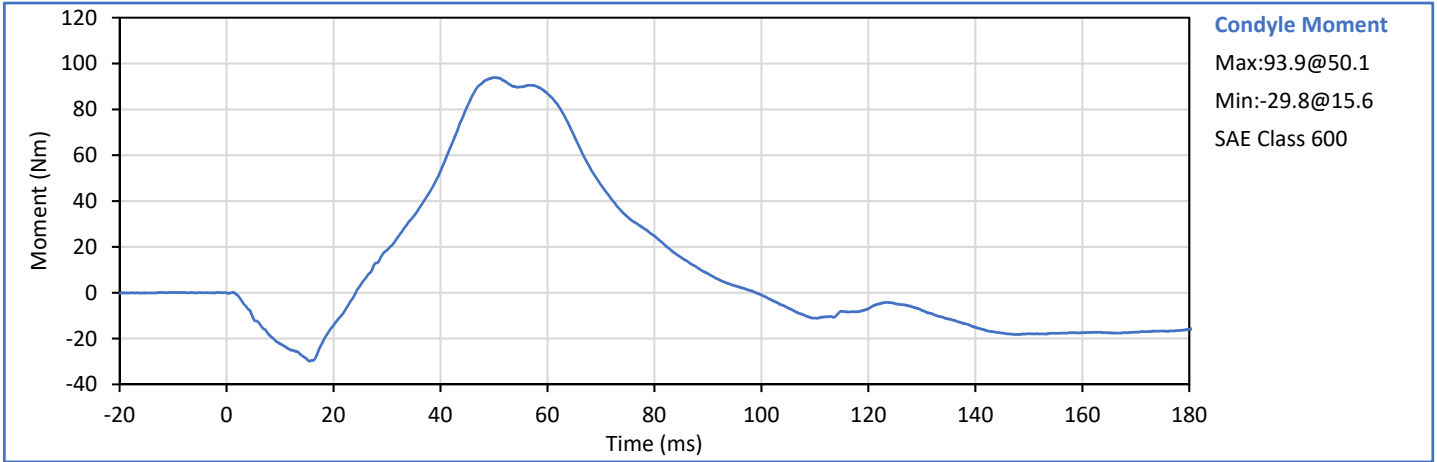
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	6.89	7.13	7.02	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.9	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	22.5	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.4	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.4	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	37.0	Pass
"D" Plane Rotation peak	deg	64.0	78.0	76.4	Pass
	ms	57.0	64.0	59.7	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	122.2	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	93.9	Pass
	ms	47.0	58.0	50.1	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	99.0	Pass
<b>Overall Test Results</b>					<b>Pass</b>

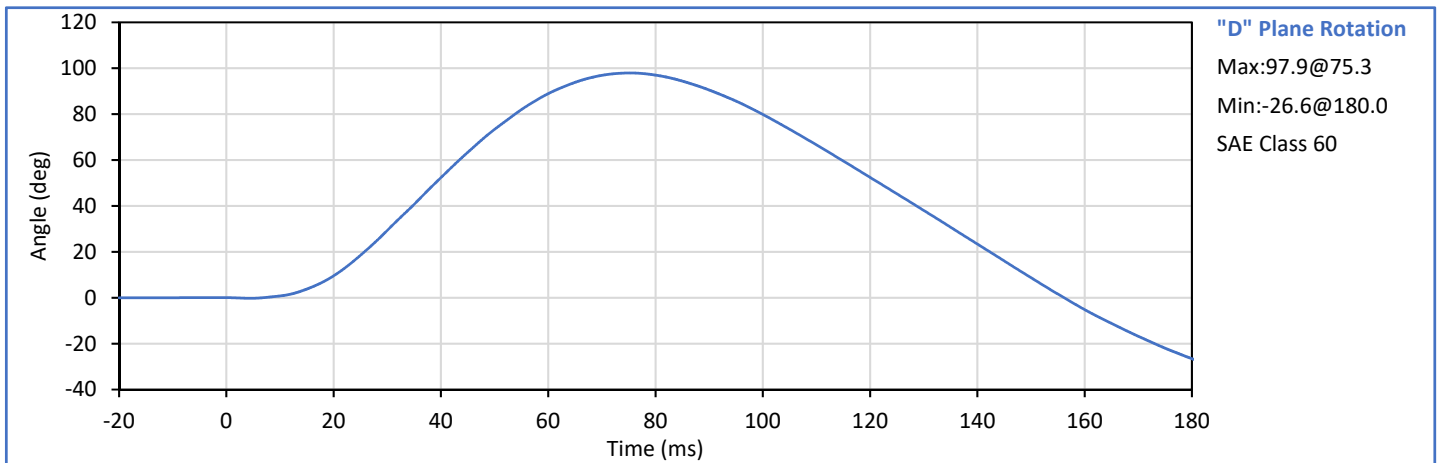
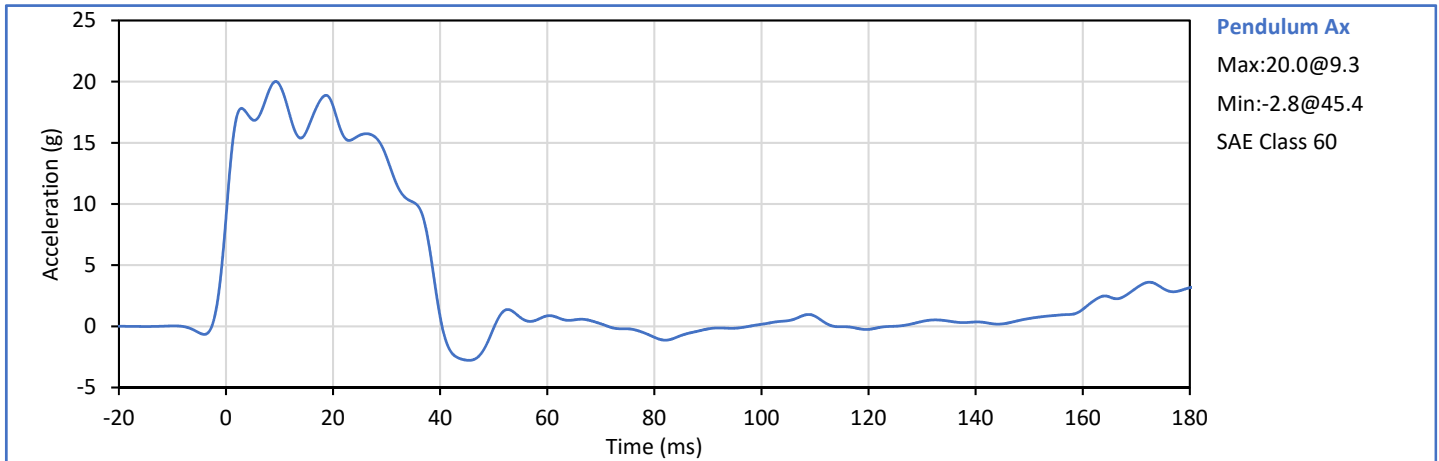


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

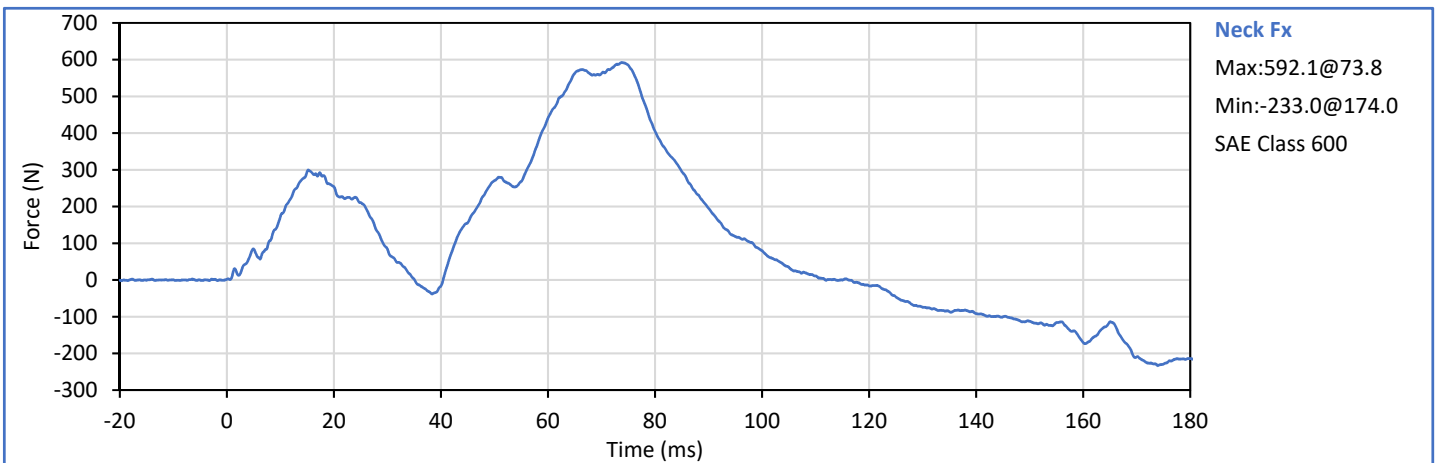
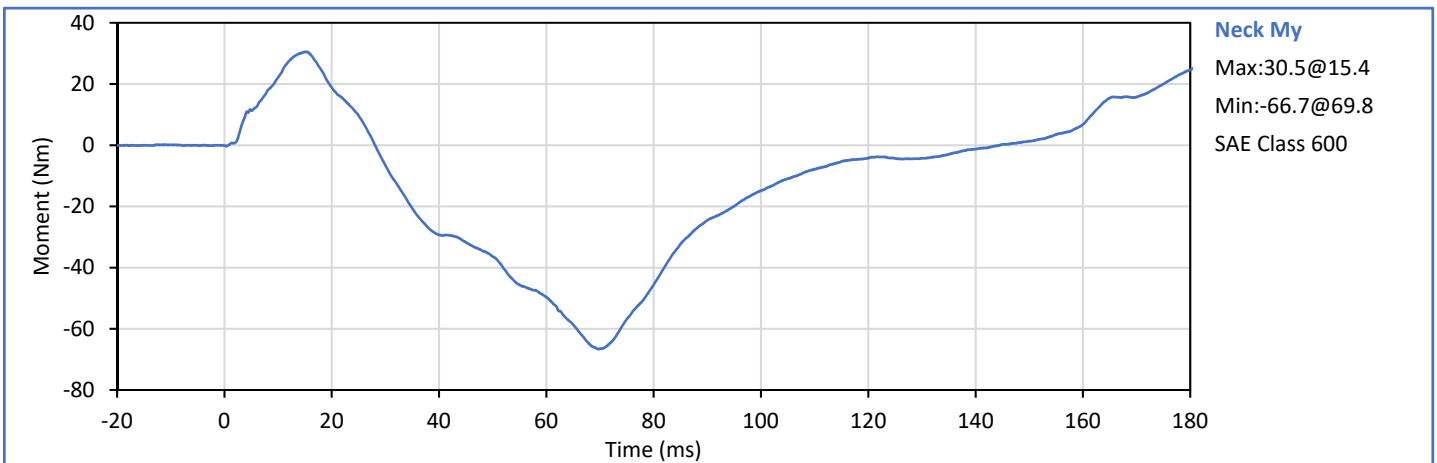
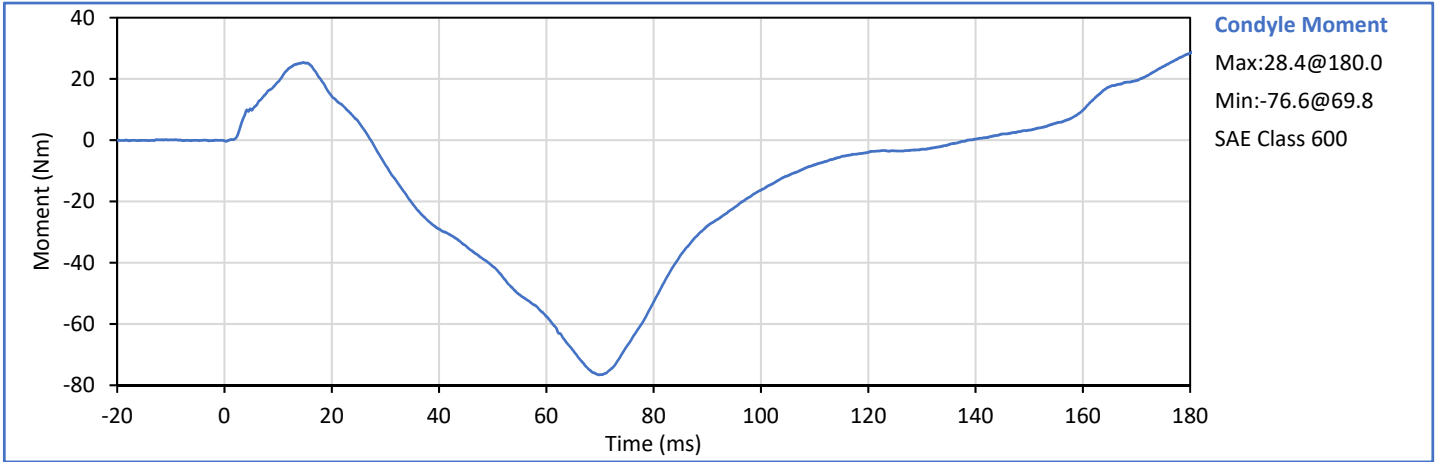


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.94	6.19	6.09	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	19.8	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	18.0	Pass
Pendulum 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	38.5	Pass
"D" Plane Rotation peak	deg	81.0	106.0	97.9	Pass
	ms	72.0	82.0	75.3	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	156.2	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-76.6	Pass
	ms	65.0	79.0	69.8	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	138.5	Pass
<b>Overall Test Results</b>					<b>Pass</b>



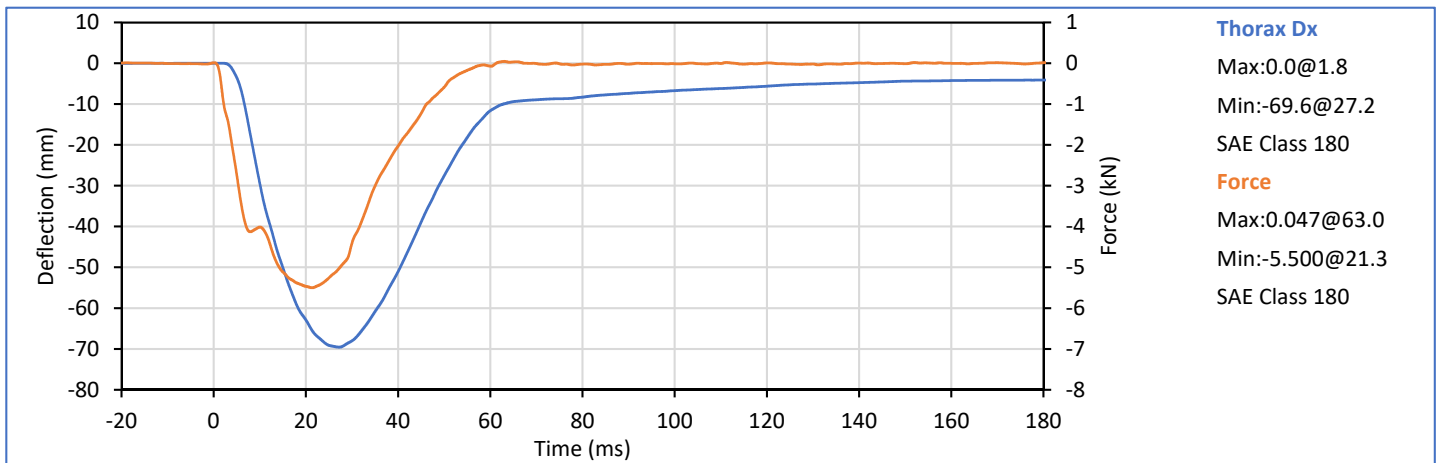
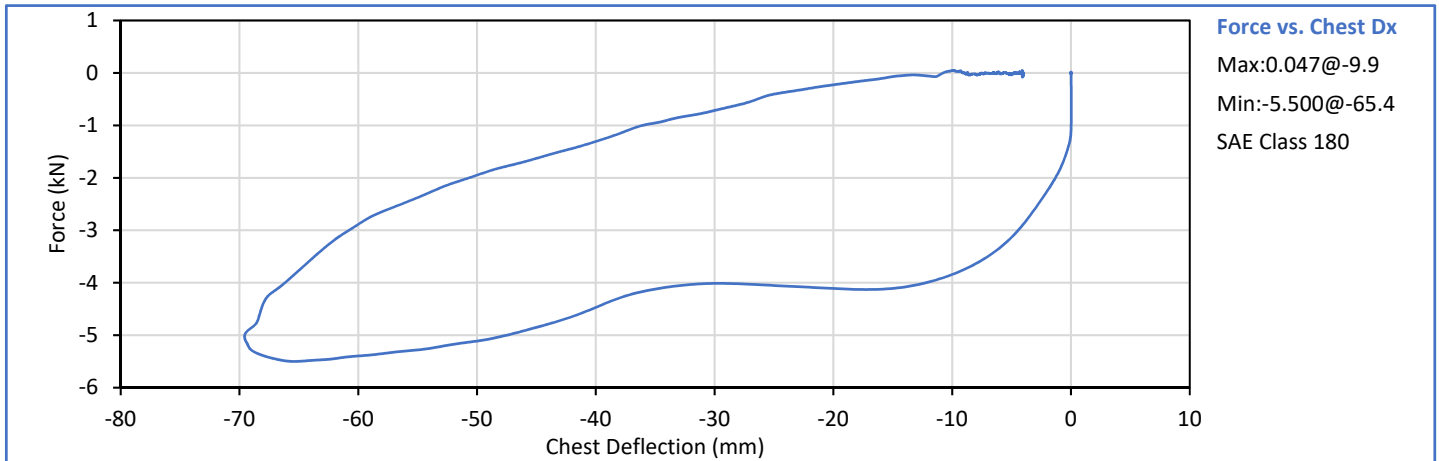
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto






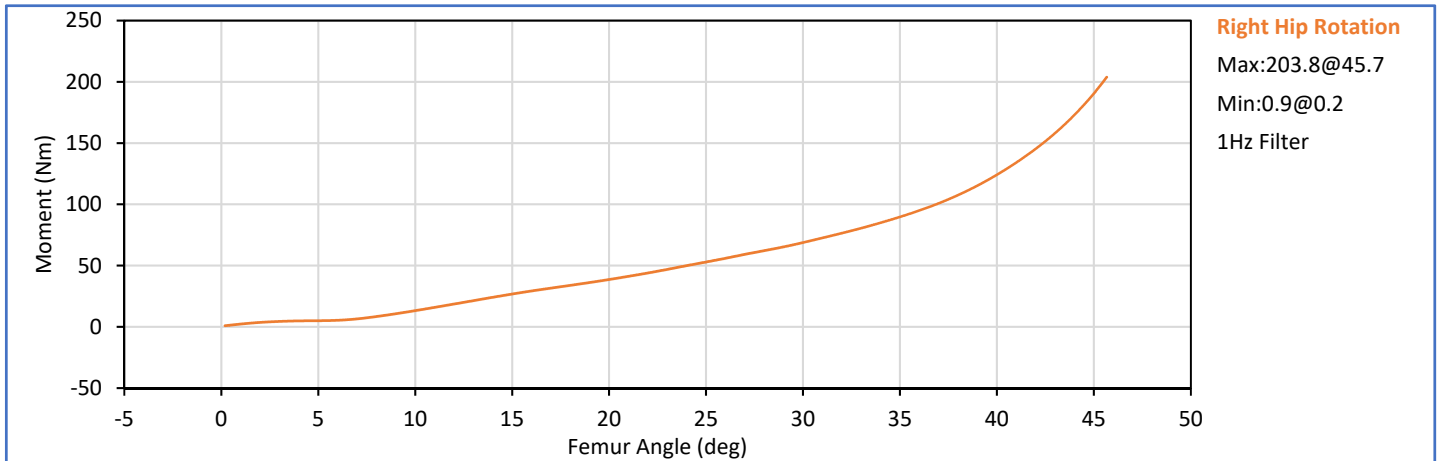
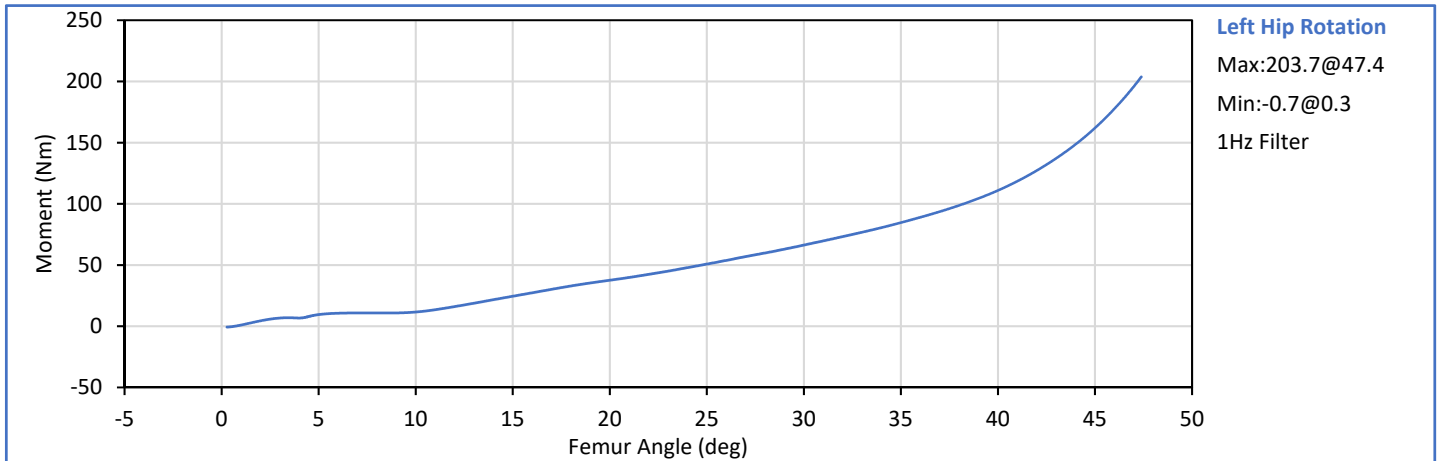
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.58	6.82	6.73	Pass
Peak Chest Deflection	mm	-72.6	-63.5	-69.6	Pass
Peak Probe Force	kN	-5.893	-5.159	-5.500	Pass
Internal Hysteresis	%	69.0	85.0	70.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

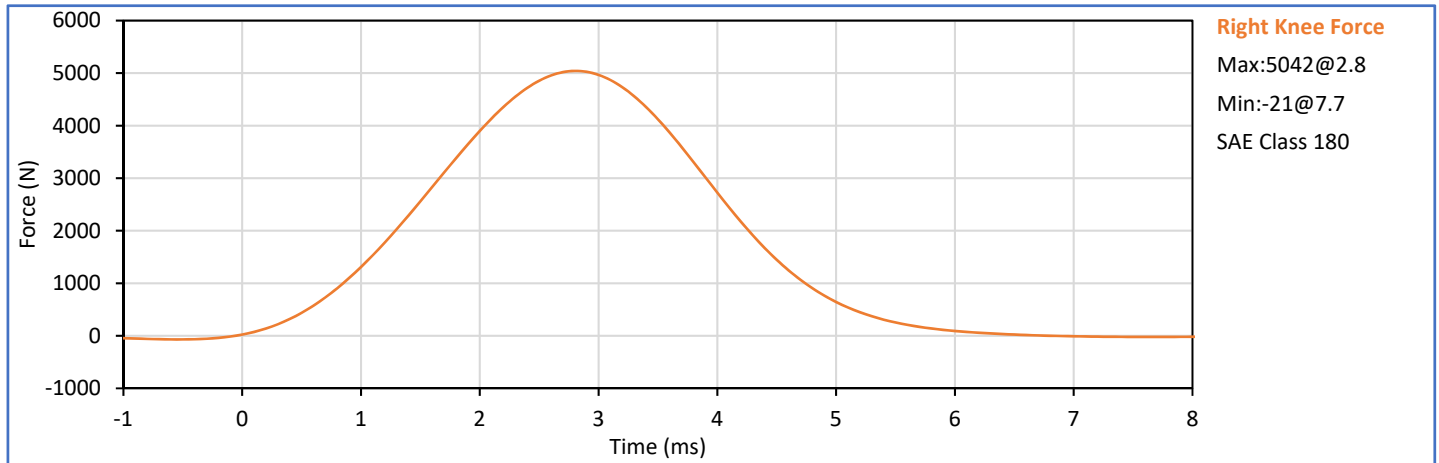
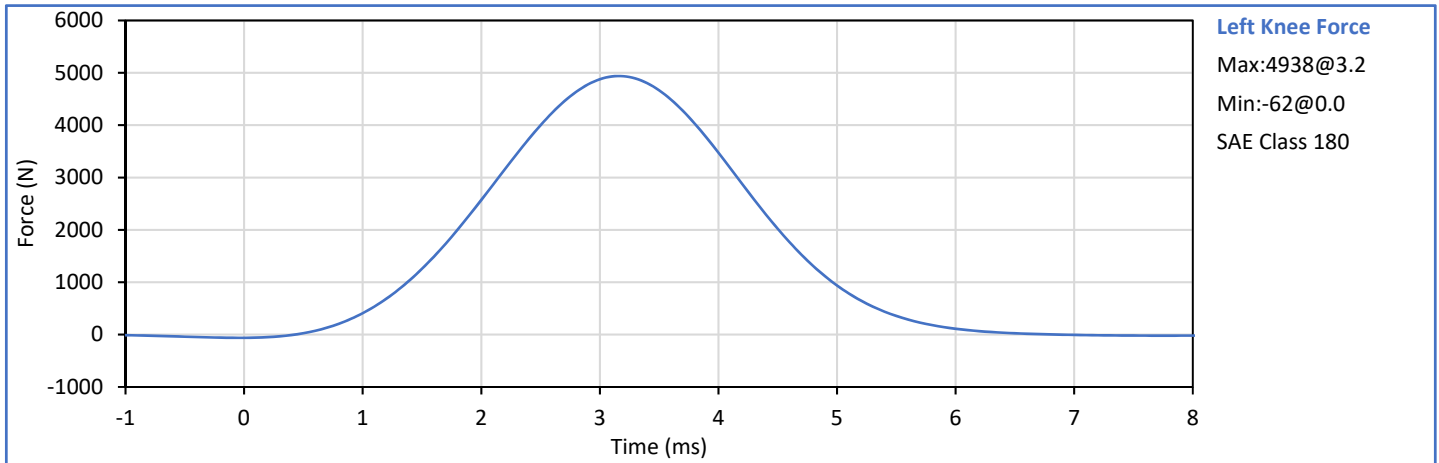
	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Relative Humidity	%	10	70	21	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.7	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	66.4	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	47.3	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.7	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	68.8	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.6	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	21.1	Pass
	Laboratory Relative Humidity	%	10	70	32	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.102	Pass
Knee	Peak Resistive Force	N	4715	5782	4938	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.122	Pass
Knee	Peak Resistive Force	N	4715	5782	5042	Pass
<b>Overall Test Results</b>						<b>Pass</b>



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX C**  
**Post-Test ATD Qualification and Performance Verification**  
**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	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
A - Total sitting height	mm	775	800	788	Pass
B - Shoulder pivot height	mm	432	457	453	Pass
C - 'H' point height	mm	81	86	86	Pass
D - 'H' point location from backline	mm	145	150	148	Pass
E - Shoulder pivot from backline	mm	69	84	78	Pass
F - Thigh clearance	mm	119	135	128	Pass
G - Back of elbow to wrist pivot	mm	244	259	254	Pass
H - Head back to backline	mm	41	46	43	Pass
I - Shoulder to elbow length	mm	277	297	287	Pass
J - Elbow rest height	mm	183	203	197	Pass
K - Buttock to knee length	mm	521	546	531	Pass
L - Popliteal length	mm	356	376	367	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	183	Pass
P - Foot length	mm	219	234	231	Pass
R - Buttock to Knee Pivot Length	mm	457	483	473	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	184	Pass
U - Hip Breadth	mm	300	315	308	Pass
V - Shoulder breadth	mm	351	366	360	Pass
W - Foot breadth	mm	79	94	88	Pass
X - Head circum.	mm	528	549	535	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	868	Pass
Z - Waist circum.	mm	760	790	776	Pass
AA - Location for chest circum.	mm	333	358	339	Pass
BB - Location for waist circum.	mm	160	170	168	Pass
Overall Test Results					Pass

Technician: \_\_\_\_\_



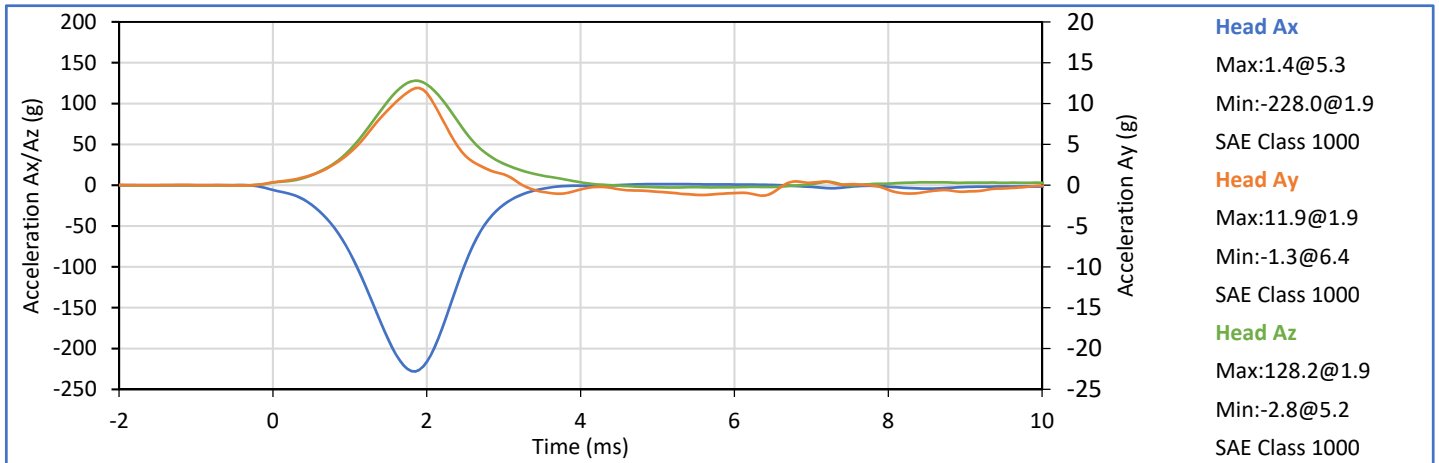
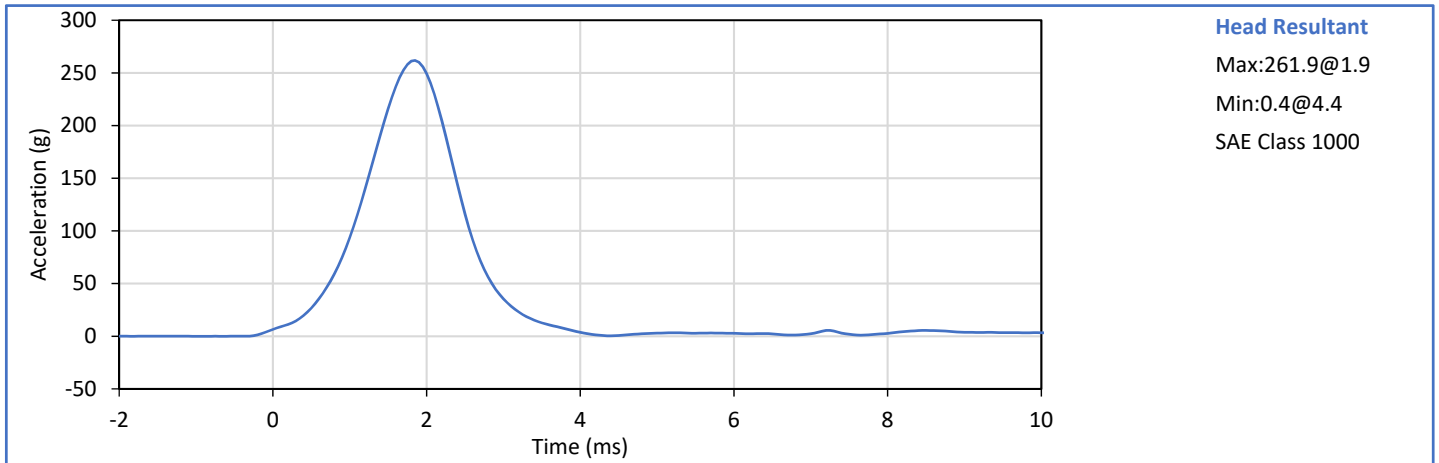
J. Hernandez


Approved By: \_\_\_\_\_




P. Puzzuto

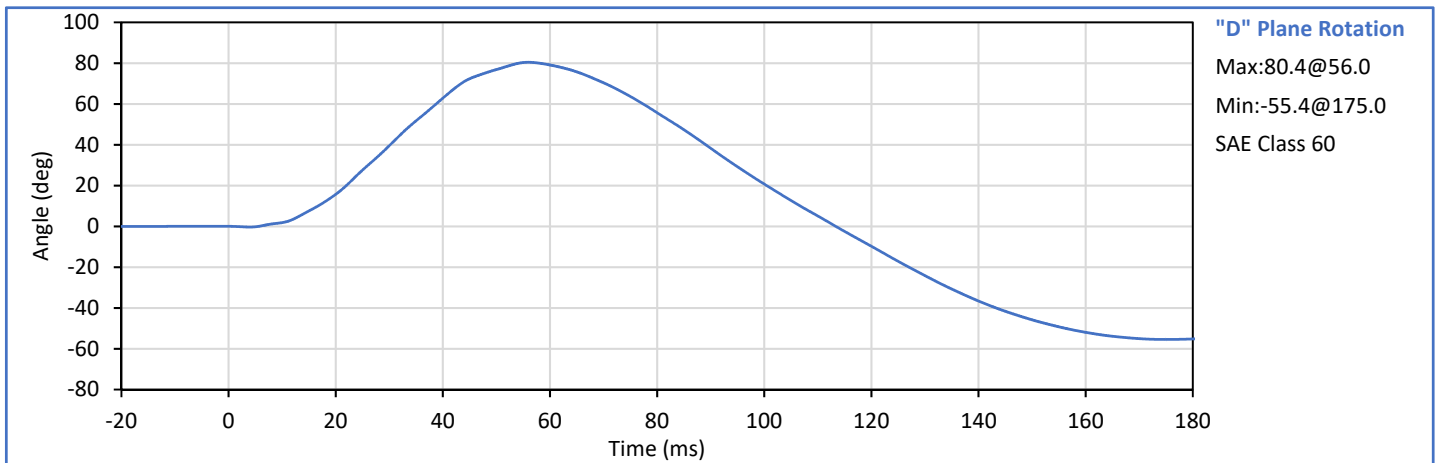
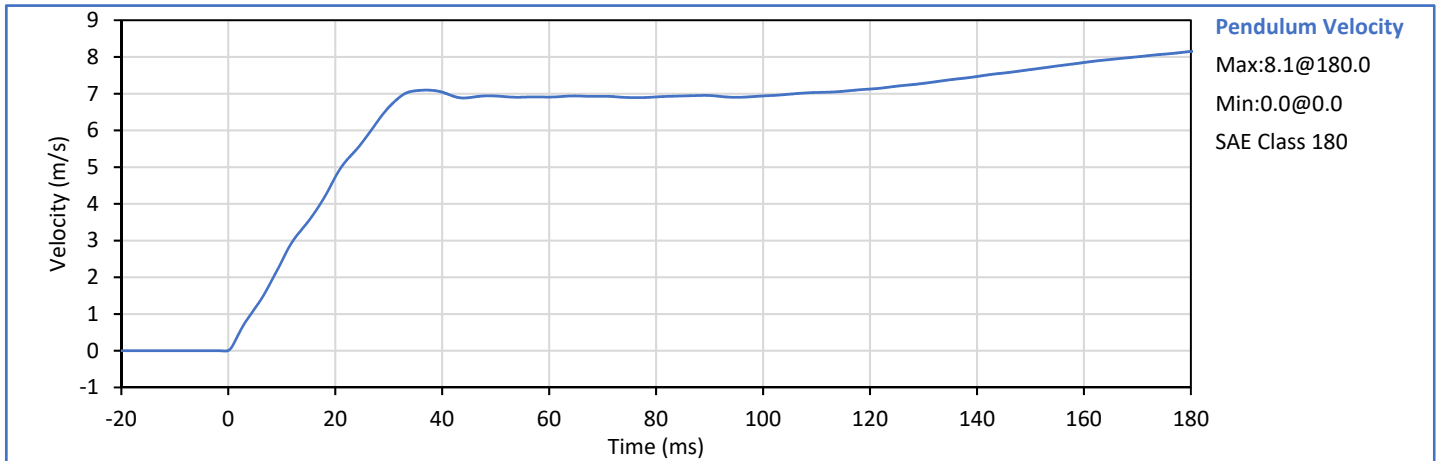
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Peak Resultant Acceleration	g	250.0	300.0	261.9	Pass
Peak Lateral Acceleration	g	-15.0	15.0	11.9	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

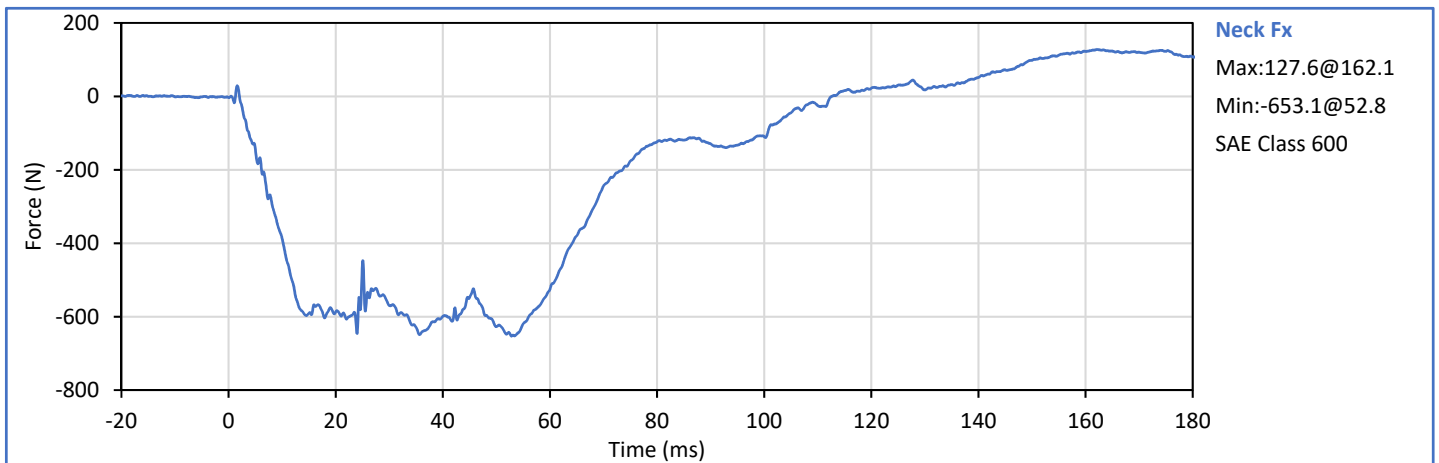
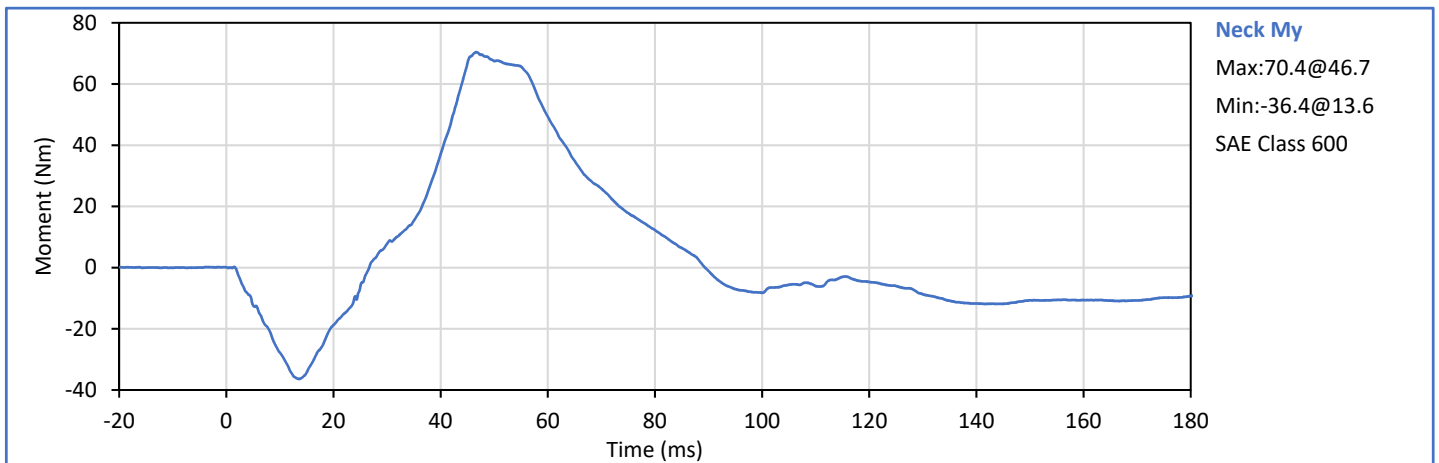
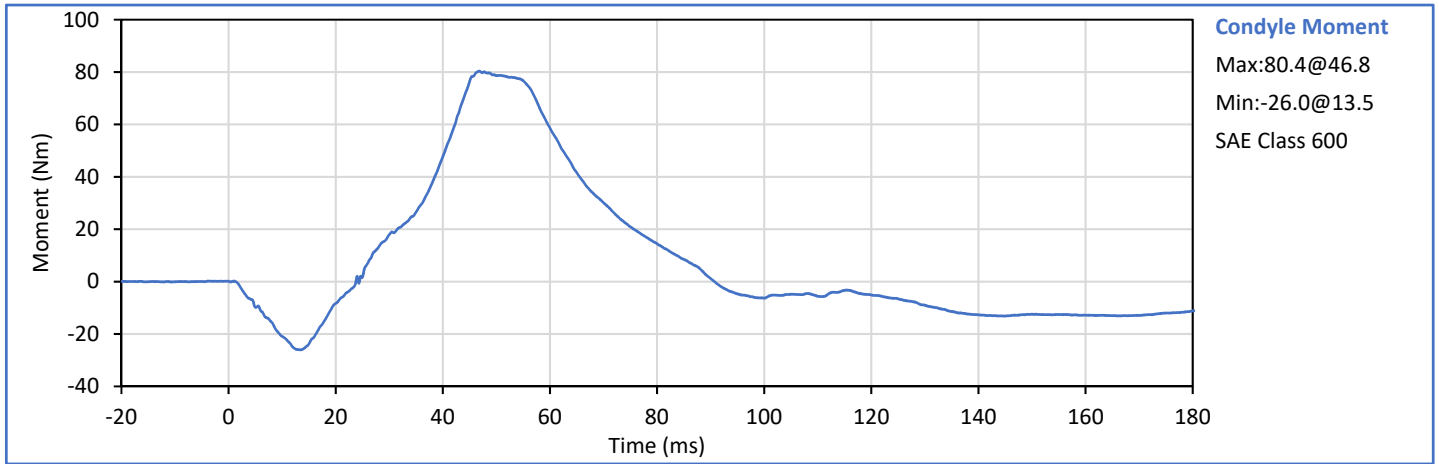
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	6.89	7.13	7.00	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.43	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.73	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.63	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	80.4	Pass
Peak Moment in Rotation	Nm	69.0	83.0	80.4	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	83.8	Pass
<b>Overall Test Results</b>					<b>Pass</b>



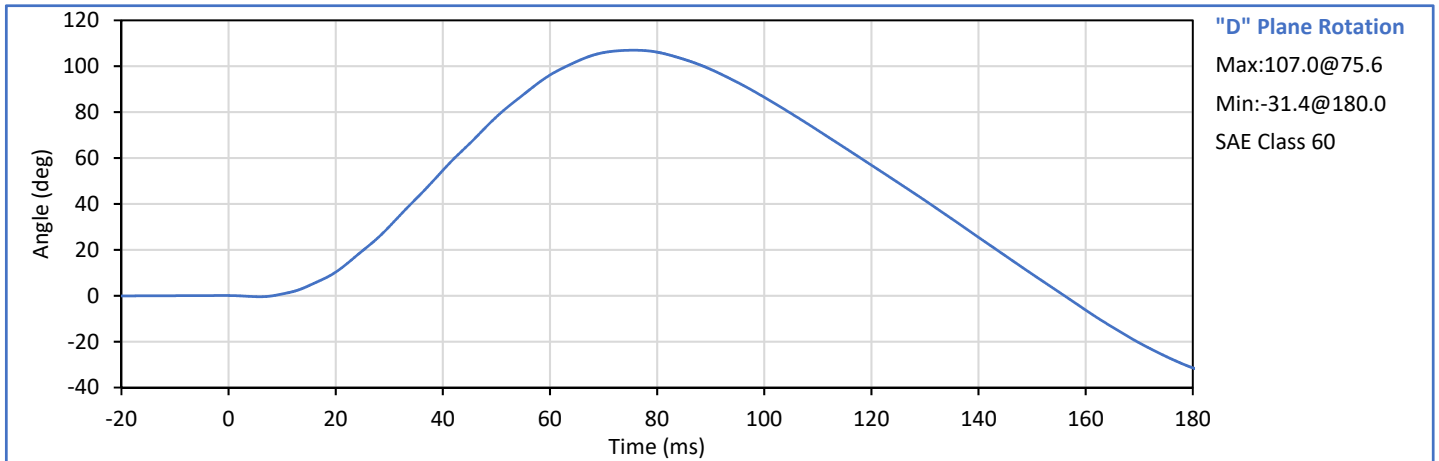
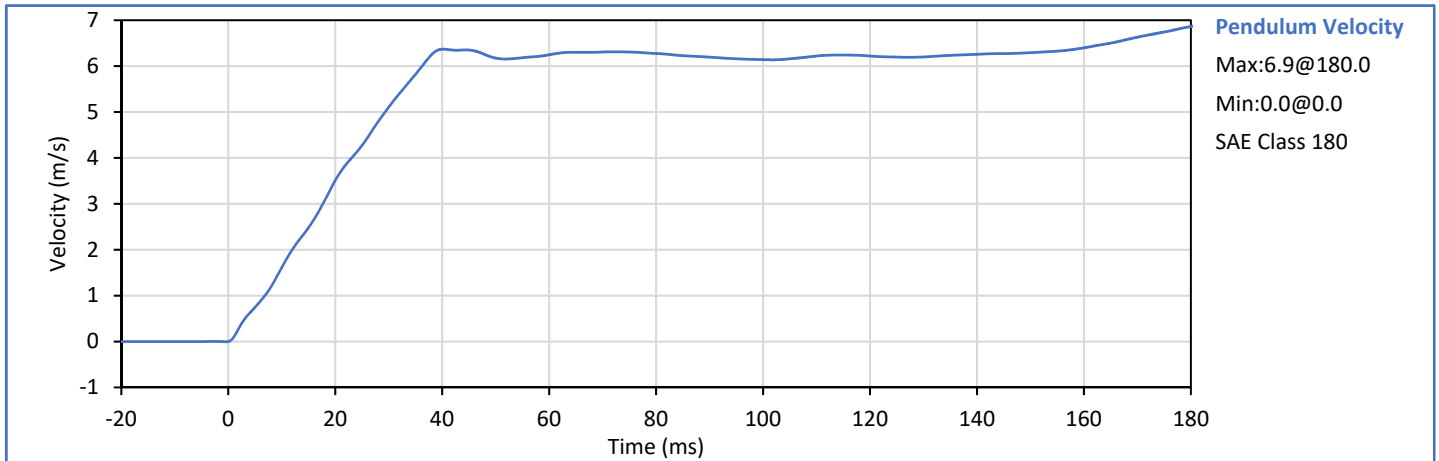
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto




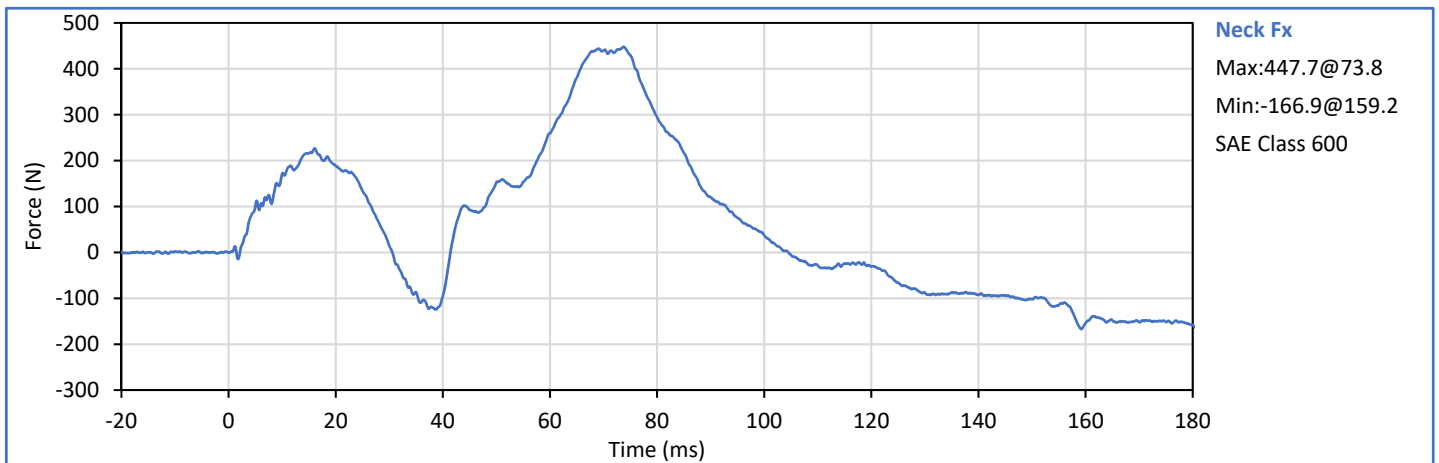
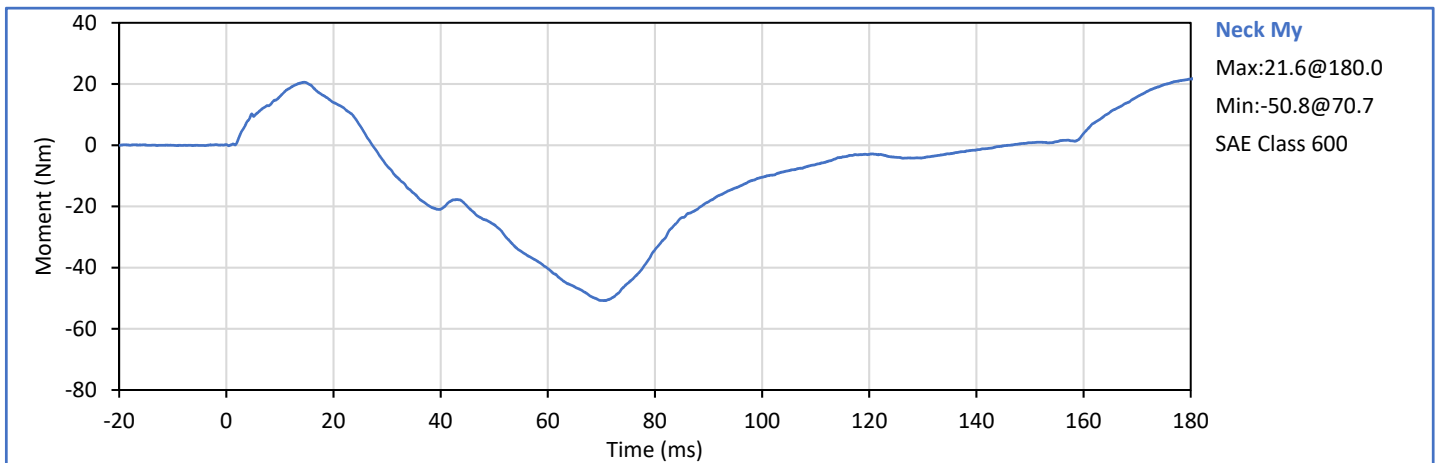
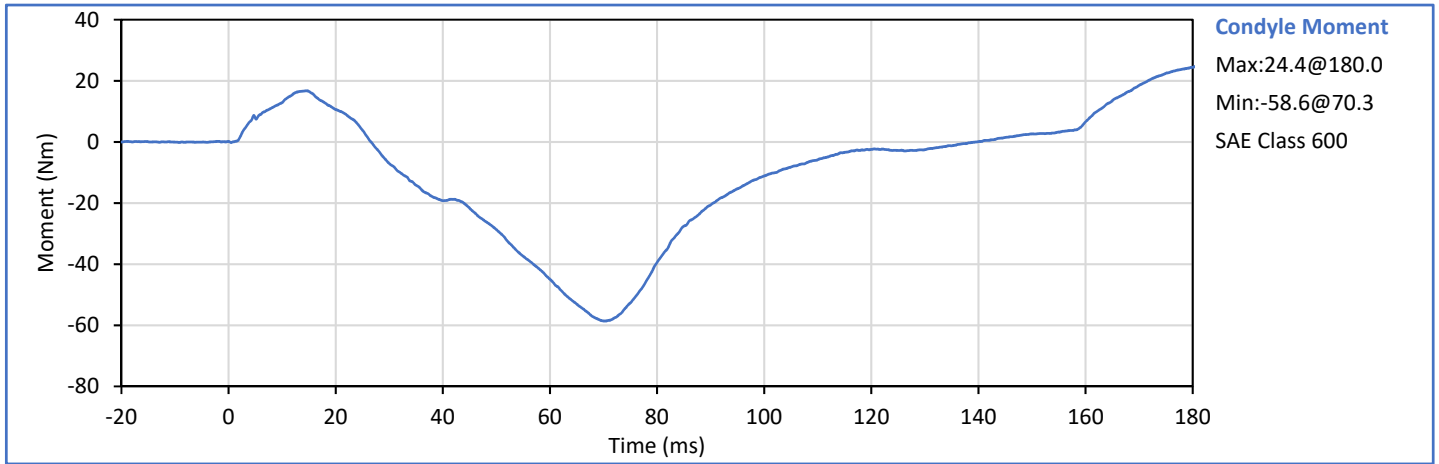


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.95	6.19	6.18	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.61	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.51	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.11	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	107.0	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-58.6	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	102.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>

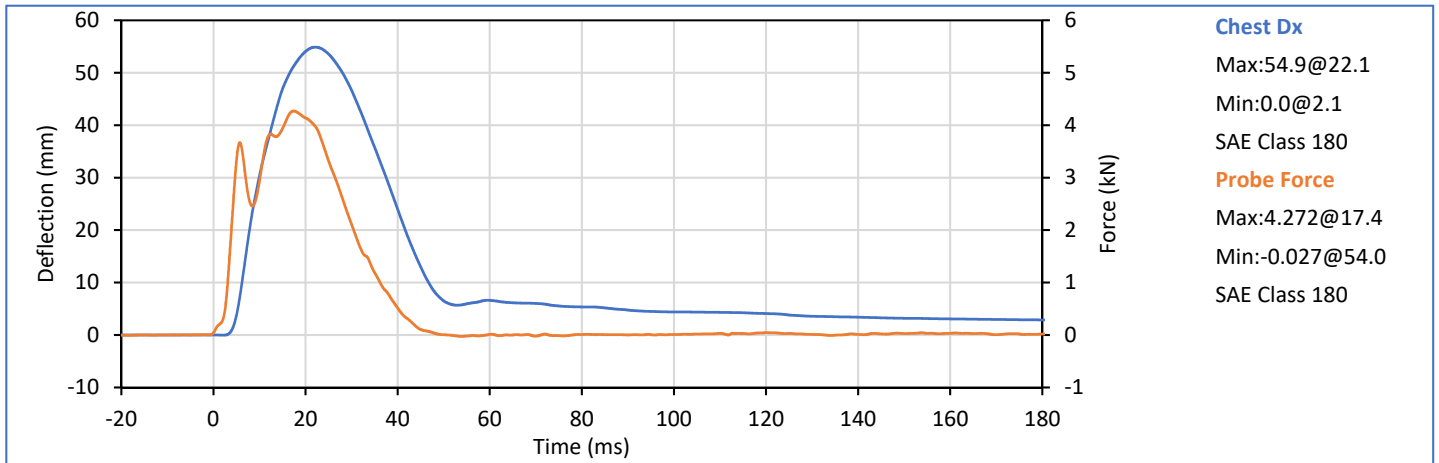
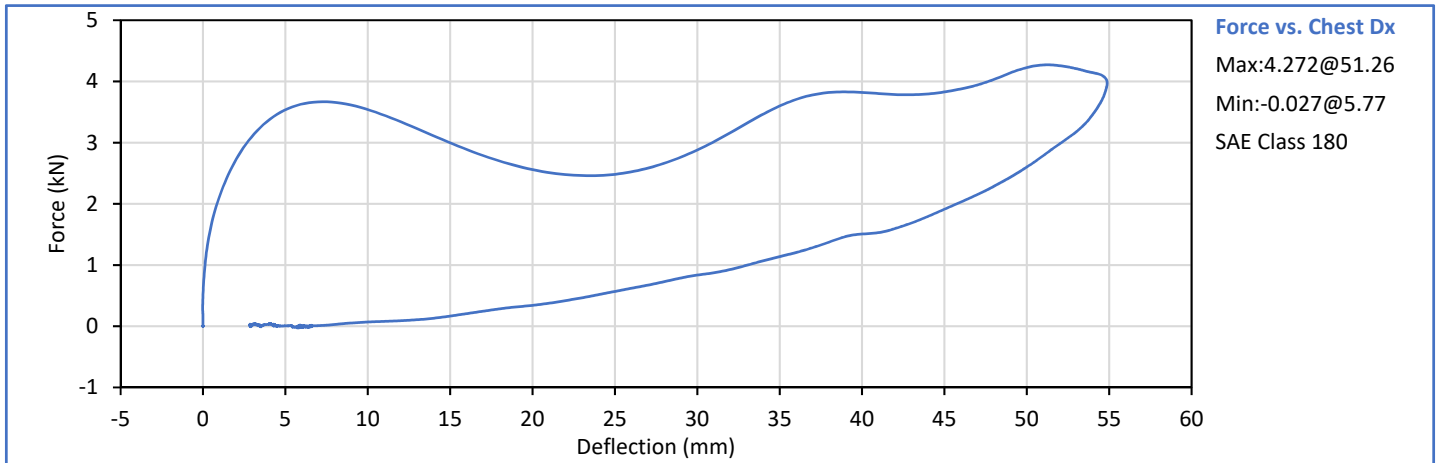



Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



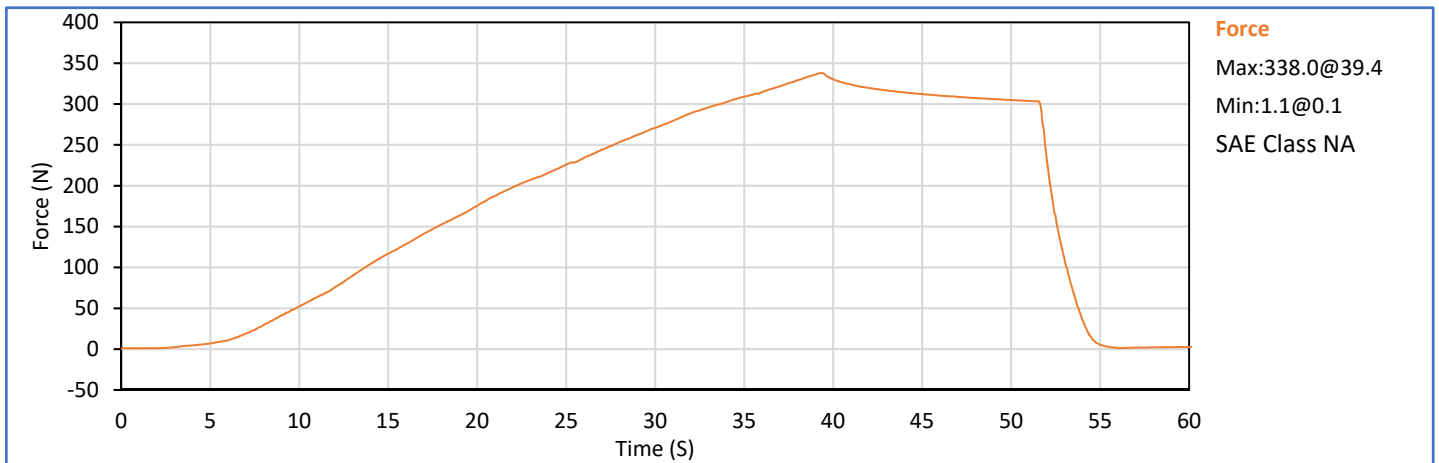
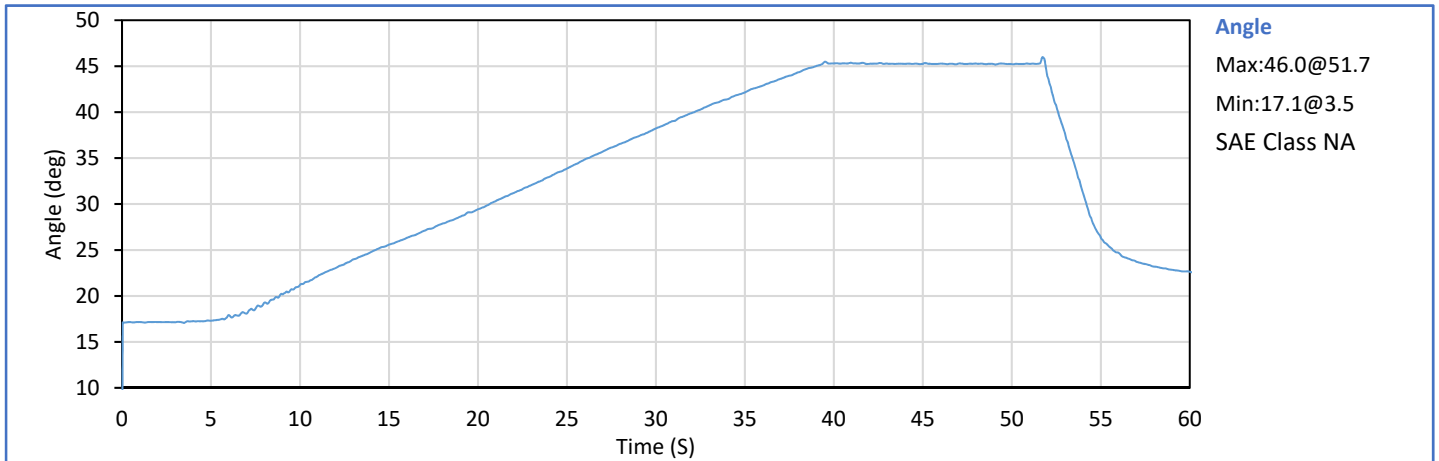
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.59	6.83	6.72	Pass
Peak Chest Deflection	mm	50.0	58.0	54.9	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.272	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.225	Pass
Internal Hysterisis	%	69.0	85.0	70.4	Pass
Overall Test Results					Pass




Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

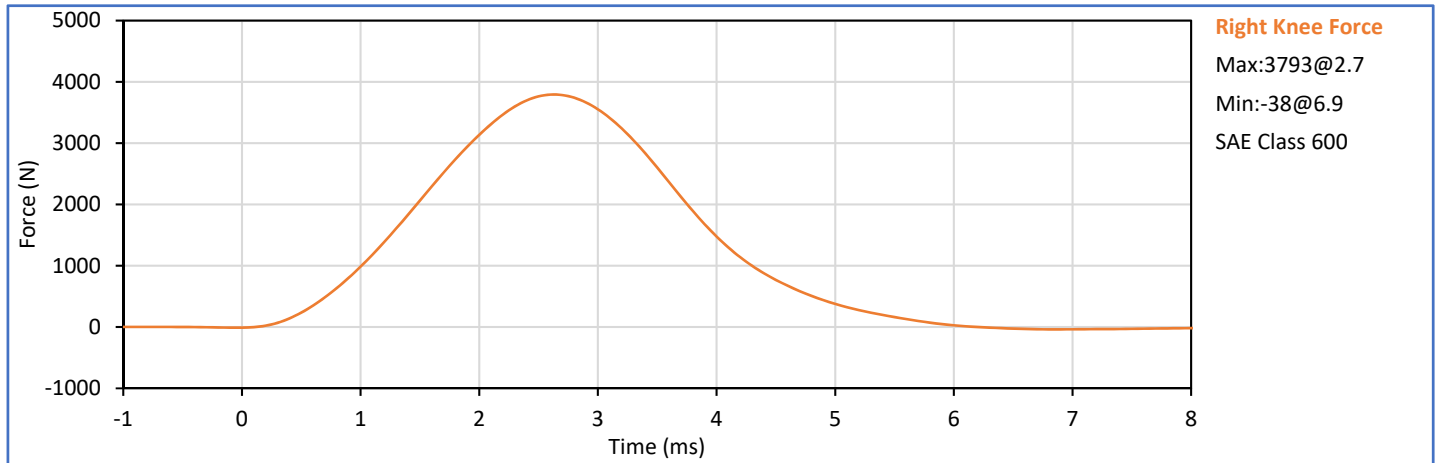
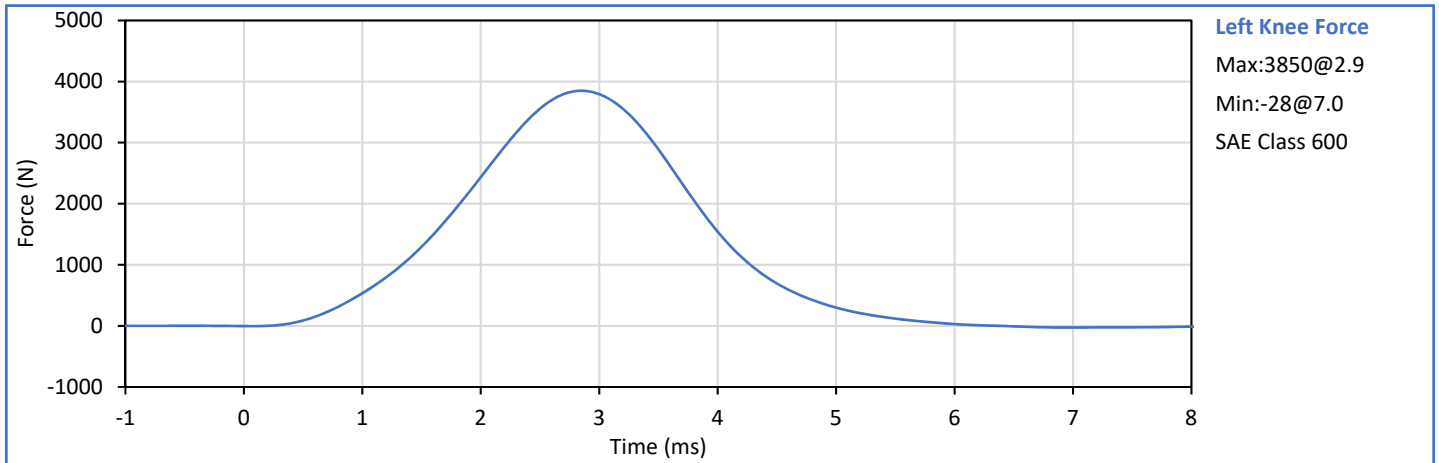
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	34	Pass
Orientation Angle	deg	0.0	20.0	15.1	Pass
Test Initial Angle	deg	11.0	19.0	17.1	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	337.1	Pass
Torso Flexion Rate	deg/s	0.50	1.50	0.83	Pass
Final Reference Plane Angle	deg	-8.0	8.0	4.2	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	21.1	Pass
	Laboratory Humidity	%	10	70	33	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.110	Pass
Knee	Peak Resistive Force	N	3450	4060	3850	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.101	Pass
Knee	Peak Resistive Force	N	3450	4060	3793	Pass
Overall Test Results						Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX D**  
**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION**

**Table 1 - Driver ATD Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P49209	Endevco	7264C-2k	2020-08-20
Head Acceleration Y Primary	P49228	Endevco	7264C-2k	2020-08-20
Head Acceleration Z Primary	P50101	Endevco	7264C-2k	2020-08-20
Head Acceleration X Redundant	P50103	Endevco	7264C-2k	2020-08-20
Head Acceleration Y Redundant	P49210	Endevco	7264C-2k	2020-08-20
Head Acceleration Z Redundant	P58713	Endevco	7264C-2k	2020-08-20
Head Rotation Rate X	ARS15066	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Y	ARS15067	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Z	ARS15068	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Upper Neck Force X	1633 Fx	R.A. Denton	1716A	2020-07-20
Upper Neck Force Y	1633 Fy	R.A. Denton	1716A	2020-07-20
Upper Neck Force Z	1633 Fz	R.A. Denton	1716A	2020-07-20
Upper Neck Moment X	1633 Mx	R.A. Denton	1716A	2020-07-20
Upper Neck Moment Y	1633 My	R.A. Denton	1716A	2020-07-20
Upper Neck Moment Z	1633 Mz	R.A. Denton	1716A	2020-07-20
Chest Acceleration X Primary	P52112	Endevco	7264C-2k	2020-08-20
Chest Acceleration Y Primary	P49208	Endevco	7264C-2k	2020-08-20
Chest Acceleration Z Primary	P51264	Endevco	7264C-2k	2020-08-20
Chest Acceleration X Redundant	P49461	Endevco	7264C-2k	2020-08-20
Chest Acceleration Y Redundant	P58774	Endevco	7264C-2k	2020-08-20
Chest Acceleration Z Redundant	P49168	Endevco	7264C-2k	2020-08-20
Chest Deflection	0606 (H3)	Servo	14CBI-3615	2020-08-27
Pelvis Acceleration X	P49238	Endevco	7264C-2k	2020-08-20
Pelvis Acceleration Y	P58877	Endevco	7264C-2k	2020-08-20
Pelvis Acceleration Z	P50087	Endevco	7264C-2k	2020-08-20
Left Femur Force Z	120 (pri)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z	130 (pri)	R.A. Denton	3821JTF	2020-01-06
Left Femur Force Z Redundant	120 (red)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z Redundant	130 (red)	R.A. Denton	3821JTF	2020-01-06
Left Upper Tibia Moment X	DH3054 Mx	R.A. Denton	IF-857	2020-02-18
Left Upper Tibia Moment Y	DH3054 My	R.A. Denton	IF-857	2020-02-18
Left Upper Tibia Force Z	DH3054 Fz	R.A. Denton	IF-857	2020-02-18
Left Lower Tibia Moment X	494 Mx	R.A. Denton	3644	2020-02-18
Left Lower Tibia Moment Y	494 My	R.A. Denton	3644	2020-02-18
Left Lower Tibia Force Z	494 Fz	R.A. Denton	3644	2020-02-18
Right Upper Tibia Moment X	482 Mx	R.A. Denton	3643	2020-02-18
Right Upper Tibia Moment Y	482 My	R.A. Denton	3643	2020-02-18
Right Upper Tibia Force Z	482 Fz	R.A. Denton	3643	2020-02-18
Right Lower Tibia Moment X	499 Mx	R.A. Denton	3644	2020-02-18
Right Lower Tibia Moment Y	499 My	R.A. Denton	3644	2020-02-18
Right Lower Tibia Force Z	499 Fz	R.A. Denton	3644	2020-02-18
Left Ankle Acceleration X	03E20-N09	Entran	EGEB6Q-2k	2020-08-24
Left Ankle Acceleration Z	03D30-N13	Entran	EGEB6Q-2k	2020-08-24
Left Toe Acceleration Z	03H07-Z10	Entran	EGEB6Q-2k	2020-08-24
Right Ankle Acceleration X	03E29-N20	Entran	EGEB6Q-2k	2020-08-24
Right Ankle Acceleration Z	03E18-F02	Entran	EGEB6Q-2k	2020-08-24
Right Toe Acceleration Z	05H31-Z04	Entran	EGEB6Q-2k	2020-08-24
Seat Belt Outside Lap Force	263	FTSS	IF-964	2020-10-02
Seat Belt Upper Diagonal Force	315	FTSS	IF-964	2020-10-02



**Table 2 - Right Front Passenger ATD Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58902	Endevco	7264C-2k	2020-08-25
Head Acceleration Y Primary	P58900	Endevco	7264C-2k	2020-08-25
Head Acceleration Z Primary	P58989	Endevco	7264C-2k	2020-08-25
Head Acceleration X Redundant	P58906	Endevco	7264C-2k	2020-08-25
Head Acceleration Y Redundant	P58983	Endevco	7264C-2k	2020-08-25
Head Acceleration Z Redundant	P58901	Endevco	7264C-2k	2020-08-25
Head Rotation Rate X	ARS15060	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Y	ARS15061	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Z	ARS15062	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Upper Neck Force X	284 Fx	FTSS	IF-205	2020-01-07
Upper Neck Force Y	284 Fy	FTSS	IF-205	2020-01-07
Upper Neck Force Z	284 Fz	FTSS	IF-205	2020-01-07
Upper Neck Moment X	284 Mx	FTSS	IF-205	2020-01-07
Upper Neck Moment Y	284 My	FTSS	IF-205	2020-01-07
Upper Neck Moment Z	284 Mz	FTSS	IF-205	2020-01-07
Chest Acceleration X Primary	P58742	Endevco	7264C-2k	2020-08-26
Chest Acceleration Y Primary	P51640	Endevco	7264C-2k	2020-08-26
Chest Acceleration Z Primary	P58988	Endevco	7264C-2k	2020-08-26
Chest Acceleration X Redundant	P51632	Endevco	7264C-2k	2020-08-26
Chest Acceleration Y Redundant	P58793	Endevco	7264C-2k	2020-08-26
Chest Acceleration Z Redundant	P58790	Endevco	7264C-2k	2020-08-26
Chest Deflection	2527 (HF)	Servo	14CBI-3615	2020-08-27
Pelvis Acceleration X	P50076	Endevco	7264C-2k	2020-08-25
Pelvis Acceleration Y	P58897	Endevco	7264C-2k	2020-08-25
Pelvis Acceleration Z	P51724	Endevco	7264C-2k	2020-08-25
Left Femur Force Z	114 (pri)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z	125 (pri)	R.A. Denton	3821JTF	2020-01-06
Left Femur Force Z Redundant	114 (red)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z Redundant	125 (red)	R.A. Denton	3821JTF	2020-01-06
Left Upper Tibia Moment X	468 Mx	R.A. Denton	3643	2020-02-18
Left Upper Tibia Moment Y	468 My	R.A. Denton	3643	2020-02-18
Left Upper Tibia Force Z	468 Fz	R.A. Denton	3643	2020-02-18
Left Lower Tibia Moment X	91 Mx	R.A. Denton	3644	2020-02-18
Left Lower Tibia Moment Y	91 My	R.A. Denton	3644	2020-02-18
Left Lower Tibia Force Z	91 Fz	R.A. Denton	3644	2020-02-18
Right Upper Tibia Moment X	477 Mx	R.A. Denton	3643	2020-02-18
Right Upper Tibia Moment Y	477 My	R.A. Denton	3643	2020-02-18
Right Upper Tibia Force Z	477 Fz	R.A. Denton	3643	2020-02-18
Right Lower Tibia Moment X	399 Mx	R.A. Denton	3644	2020-02-11
Right Lower Tibia Moment Y	399 My	R.A. Denton	3644	2020-02-11
Right Lower Tibia Force Z	399 Fz	R.A. Denton	3644	2020-02-11
Left Ankle Acceleration X	A199899	MSI	64C-2k	2020-07-20
Left Ankle Acceleration Z	A199908	MSI	64C-2k	2020-07-20
Left Toe Acceleration Z	A199930	MSI	64C-2k	2020-07-20
Right Ankle Acceleration X	A202287	MSI	64C-2k	2020-07-20
Right Ankle Acceleration Z	A201195	MSI	64C-2k	2020-07-20
Right Toe Acceleration Z	A201202	MSI	64C-2k	2020-07-20
Seat Belt Outside Lap Force	313	FTSS	IF-964	2020-10-02
Seat Belt Upper Diagonal Force	251	FTSS	IF-964	2020-10-02

**Table 3 - Vehicle Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Left Rear Primary Ax	A356313	MSI	52F-2k	2020-09-15
Right Rear Primary Ax	A356497	MSI	52F-2k	2020-09-16
Engine Top Ax	A354816	MSI	52F-2k	2020-09-11
Engine Bottom Ax	A356509	MSI	52F-2k	2020-09-16
Left Rear Az	A354813	MSI	52F-2k	2020-09-11
Right Rear Az	A354846	MSI	52F-2k	2020-09-08
Left Rear Redundant Ax	A356488	MSI	52F-2k	2020-09-16
Right Rear Redundant Ax	A354884	MSI	52F-2k	2020-09-08