

REPORT NUMBER: NCAP-KAR-19-010

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

**SUBARU CORPORATION
2019 SUBARU FORESTER 5-DOOR MPV**

NHTSA NUMBER: O20195500

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



DECEMBER 28, 2018

FINAL REPORT

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

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Prepared By: 
Mr. Robert S. Ramos, Program Manager
Applus IDIADA KARCO Engineering, LLC.

Reviewed By: 
Mr. Michael L. Dunlap, Director of Operations
Applus IDIADA KARCO Engineering, LLC.

Approved By: 
Mr. Steven D. Matsusaka, Engineering Manager
Applus IDIADA KARCO Engineering, LLC.

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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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Date: _____

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2019 Subaru Forester 5-door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on December 28, 2018. The impact velocity of the vehicle was 56.14 km/h and the ambient temperature at the barrier face at the time of impact was 21.1°C. The target vehicle's post-test maximum crush was 390 mm at C4 right of the vehicle's centerline. The test vehicle's performance is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>186.0</td> <td>700</td> <td>292.9</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-23</td> <td>52</td> <td>-19</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.23</td> <td>1</td> <td>0.31</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1452.2</td> <td>2620</td> <td>947.1</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-98.8</td> <td>2520</td> <td>-458.4</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-1101.8</td> <td>6800</td> <td>-467.5</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-1636.2</td> <td>6800</td> <td>-412.3</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	186.0	700	292.9	Maximum Chest Compression	mm	63	-23	52	-19	Nij	N/A	1	0.23	1	0.31	Neck Tension	N	4170	1452.2	2620	947.1	Neck Compression	N	4000	-98.8	2520	-458.4	Left Femur Force	N	10000	-1101.8	6800	-467.5	Right Femur Force	N	10000	-1636.2	6800	-412.3
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

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

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

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2019 Subaru Forester 5-door MPV at a velocity of 56.14 km/h. The test was performed at Applus IDIADA KARCO Engineering, LLC. on December 13, 2018. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 360) and the right-front passenger (position 2) ATD (Serial No. 141) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 105 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% windshield retention and no intrusion into the protected zone of the windshield during the event.

The maximum static crush was 390 mm at C4 right of the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below:

ATD Position	HIC ₁₅	T ¹ (ms)	T ² (ms)	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	186.0	73.0	88.0	-23	0.23	1452.2	-98.8	-1101.8	-1636.2
Passenger (5th)	292.9	65.0	80.0	-19	0.31	947.1	-458.4	-467.5	-412.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

CONVERSION FACTORS

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	O20195500
Model Year	2019
Make	Subaru
Model	Forester
Body Style	5-Door MPV
VIN	JF2SKAAC4KH403969
Body Color	Ice Silver Metallic
Odometer Reading (km / mi)	11 / 7
Engine Displacement (L)	2.5
Type / No. of Cylinders	4 Cylinder
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	No
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Subaru Corporation
Date of Manufacture	Aug-18

GVWR (kg)	2223
GAWR Front (kg)	1165
GAWR Rear (kg)	1130

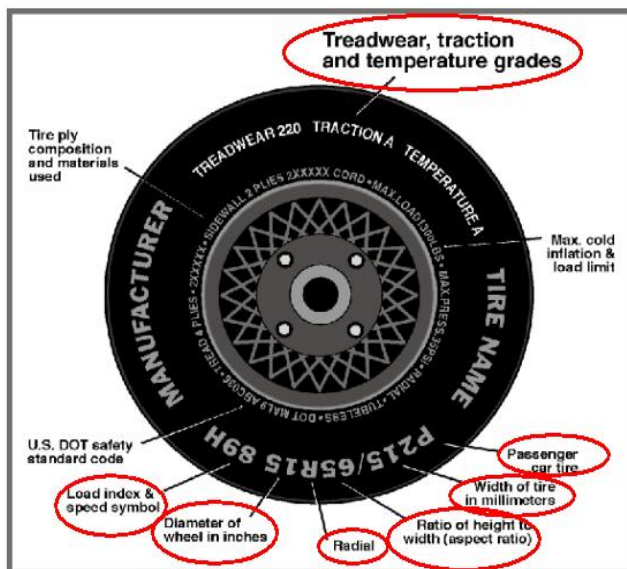
VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Split Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				408.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				67.8	A-B

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
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VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	360	360
Cold Pressure (kPa)	230	220
Recommended Tire Size	P225/60R17	P225/60R17
Tire Size on Vehicle	P225/60R17	P225/60R17
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Ecopia	Ecopia
Treadwear	600	600
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	99H	99H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	ELFC DMM 2818	ELFC DMM 2818
DOT Safety Code Right	ELFC DMM 2818	ELFC DMM 2818

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	460.5	338.5		484.0	416.0	
Right	kg	447.0	322.5		472.0	398.0	
Ratio	%	57.9%	42.1%	100.0%	54.0%	46.0%	100.0%
Total	kg	907.5	661.0	1568.5	956.0	814.0	1770.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1568.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	67.8	C
Calculated Vehicle Target Weight (TVTW)	kg	1777.3	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	850	852	878	881	1128
As Tested	mm	824	830	846	849	1231
Post-Test	mm	849	857	844	842	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2677
Total Vehicle Length at Left Side	mm	3963
Total Vehicle Length at Centerline	mm	4635
Total Vehicle Length at Right Side	mm	3963
Weight of Ballast in Cargo Area	kg	72.5
Weight of Vehicle Components Removed	kg	18.6
Amount of Stoddard Solvent in Fuel Tank	L	58.44

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear Trim (5.0 kg), Spare Tire and Tools (13.6 kg)

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	4635
2	Total Width	1810
3	Bumper Top Height	674
4	Bumper Bottom Height	364
5	Longitudinal Member Top Height	570
6	Distance Between Longitudinal Members	865
7	Longitudinal Member Width	65
8	Engine Top Height	895
9	Engine Bottom Height	230
10	Engine and Gearbox Width	700
11	Front Bumper to Engine Distance	470
12	Front Shock Absorber Fixing Height	930
13	Bonnet Leading Edge Height	775
14	Front Shock Absorber Fixing Width	1155
15	Front Bumper to Front Axle Distance	963
16	Front Axle to A-Pillar Distance	495
17	A-Pillar to B-Pillar Distance	1038
18	B-Pillar to Rear Axle Distance	1125
19	B-Pillar to C-Pillar Distance	881
20	Roof Sill Bottom Height	1535
21	Roof Sill Top Height	1665
22	Floor Sill Bottom Height	330
23	Floor Sill Top Height	415

All measurements in millimeters.

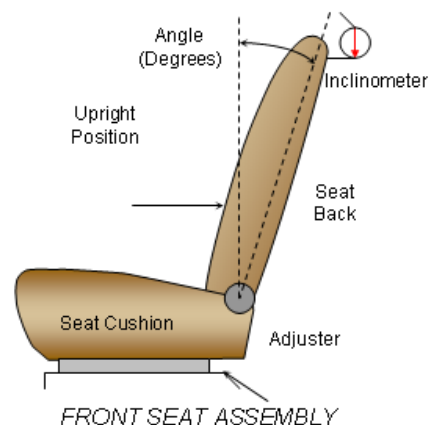
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at $0^\circ \pm 0.5^\circ$. Seat back angle is measured at the headrest post.

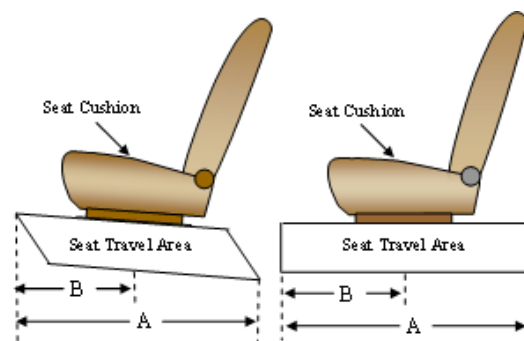


SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	5.2
Passenger Seat Back Angle	3.0

SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.



SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	308 mm	110 mm
Passenger Seat	260 mm	0 mm

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50th percentile adult male ATD for the driver, and a 5th percentile adult female ATD for the passenger. Position "H" is the uppermost position, followed by position "M2," and position "M1." Position "L" is the lowermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	M2
Passenger Seat	4	M2

DATA SHEET NO. 2 ... (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

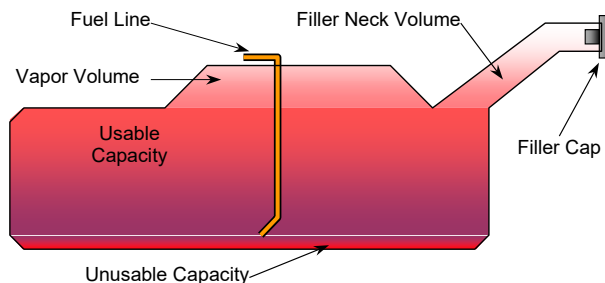
Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	62.83
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	57.8 to 59.06
Actual Amount of Stoddard Solvent Used	58.44
1/3 of Usable Capacity	20.94

FUEL PUMP

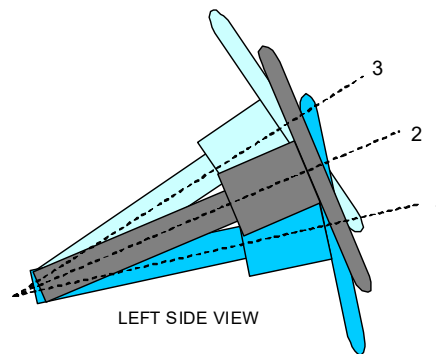
The vehicle is equipped with an electric fuel pump. The fuel pump operates a few seconds after the ignition switch is turned ON. After that, the pump operates only while the engine is running.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

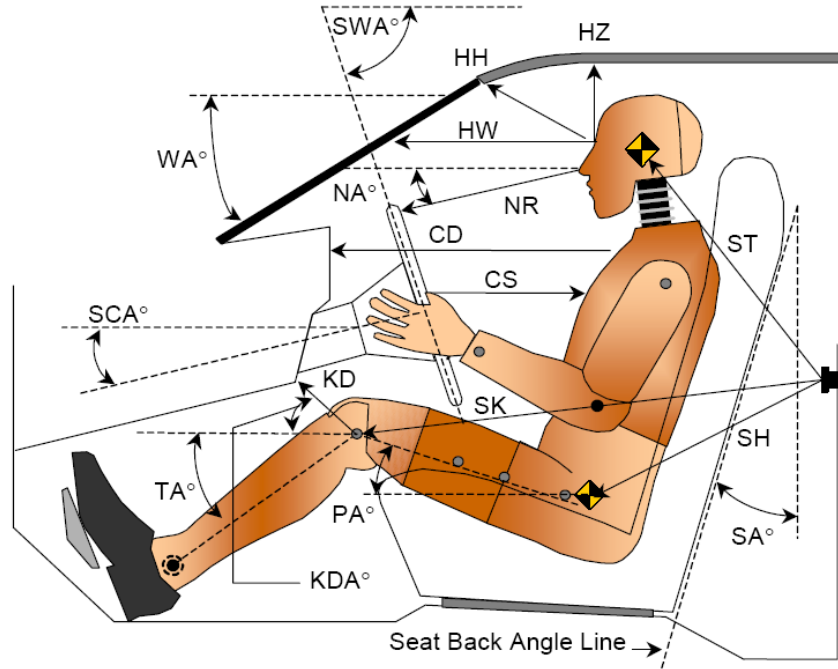
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	24.9	79
Geometric Center Position, No. 2	26.9	105
Uppermost Position, No. 3	28.8	130
Telescoping Steering Wheel Travel		51
Test Position	26.9	105

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



LEFT SIDE VIEW

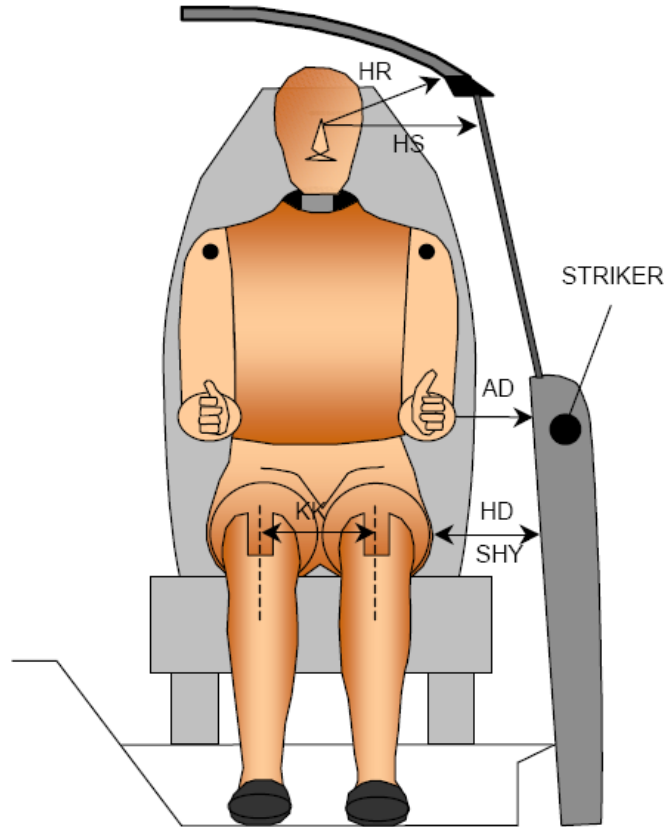
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		31.2		
SWA°	Steering Wheel Angle		62.6		
SCA°	Steering Column Angle		27.4		
SA°	Seat Back Angle (On Headrest Post)		5.2		3.0
HZ	Head to Roof	270	90.0	271	90.0
HH	Head to Header	414	26.3	320	56.0
HW	Head to Windshield	697	0.0	677	0.0
NR	Nose to Rim	417	10.2	494	32.0
CD	Chest to Dash	545	11.8	440	7.5
CS	Chest to Steering Hub	320	4.0		
RA	Rim to Abdomen	202	0.0		
KDL	Left Knee to Dash	186	24.7	119	38.6
KDR	Right Knee to Dash	138	38.5	120	39.6
PA°	Pelvic Angle		24.2		20.6
TA°	Tibia Angle		45.3		53.2
SK	Striker to Knee	625	12.2	721	12.2
ST	Striker to Head	438	76.8	434	56.6
SH	Striker to H-Point	310	46.3	423	28.8

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

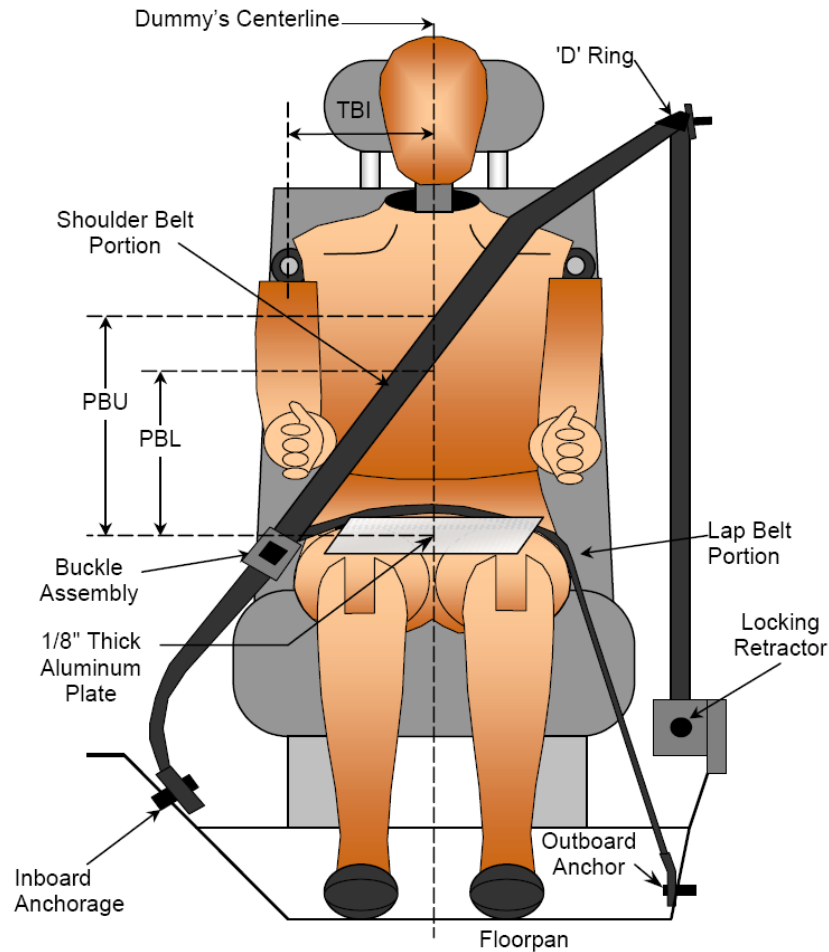
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	145	106
HD	H-Point to Door	142	176
HR	Head to Side Header	270	286
HS	Head to Side Window	367	420
KK	Knee to Knee	378	200
SHY	Striker to H-Point (Y-Direction)	257	290
AA	Ankle to Ankle	305	175

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	340	285
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	265	195

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	881	928
Lap Belt Length as Measured on ATD	mm	721	790
Remainder of Belt on Reel	mm	902	783
Total Belt Length for Continuous Webbing Systems	mm	2504	2501

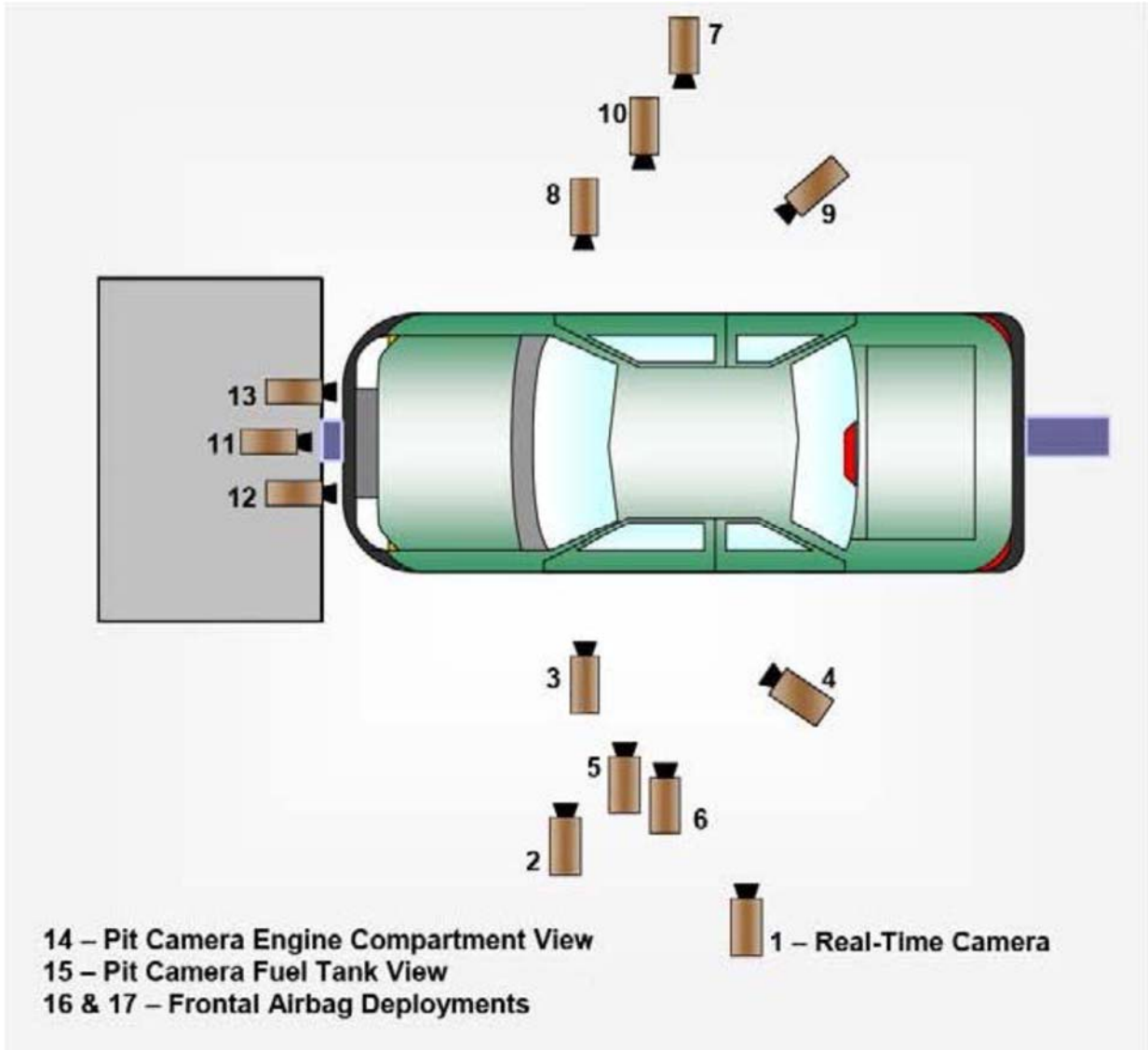
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 ... (CONTINUED)

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

CAMERA LOCATIONS

No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	50	1000
3	Left Front Half	-1701	-6197	-1701	35	1000
4	Left Angle	-6696	-10308	-3211	105	1000
5	Steering Column - Top	-1966	-10412	-3688	35	1000
6	Steering Column - Bottom	-1972	-10412	-3379	35	1000
7	Right Overall	-2336	7569	-1012	20	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	35	1000
10	Right Angle	-6217	9516	-4830	85	1000
11	Windshield	-354	0	-5749	28	1000
12	Driver Windshield	297	-366	-2460	24	1000
13	Passenger Windshield	297	366	-2460	24	1000
14	Pit Front	-756	0	-1495	20	1000
15	Pit Rear	-3398	0	-1495	20	1000
16	Onboard Driver Airbag (Optional)	-1200	-250	-1540	8	1000
17	Onboard Passenger Airbag (Optional)	-1200	250	-1540	8	1000
18	Real-Time Left View of Impact					
19	Real-Time Right View of Impact					

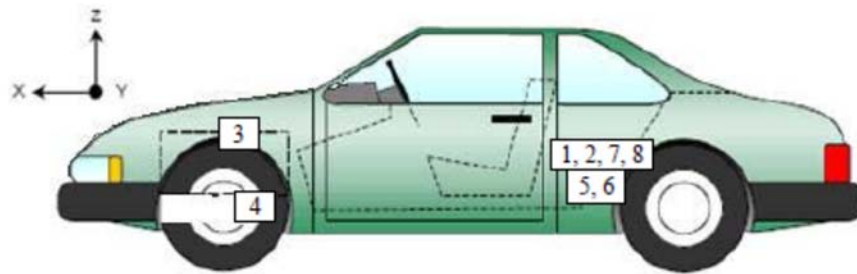
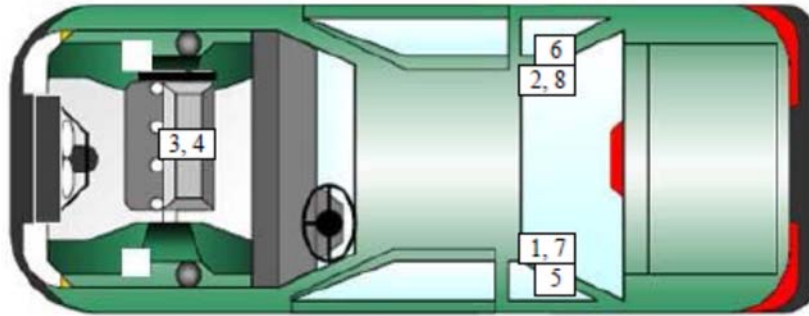
Coordinates: +X = forward impact plane
 +Y = right of monorail center
 +Z = into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1760	-725	-450
2	Right Rear Accelerometer X-Direction	1760	725	-450
3	Engine Top X	4110	0	-820
4	Engine Bottom X	3720	420	-410
5	Left Rear Accelerometer Z-Direction	1760	-725	-450
6	Right Rear Accelerometer Z-Direction	1760	725	-450
7	Left Rear Accelerometer X-Direction Redundant	1760	-725	-450
8	Right Rear Accelerometer X-Direction Redundant	1760	725	-450

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

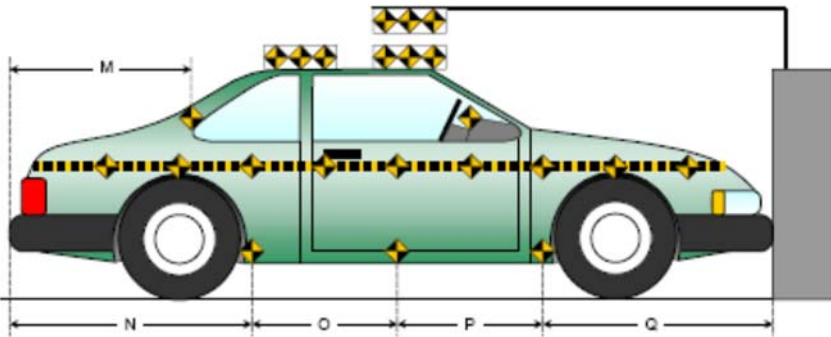
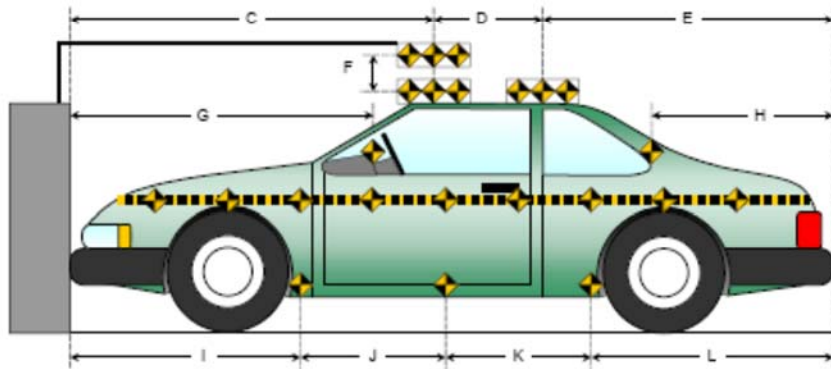
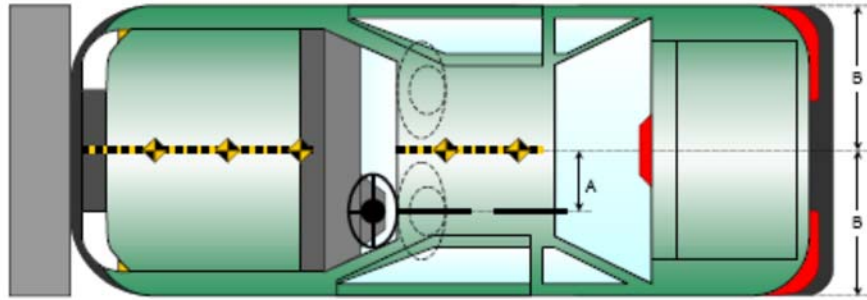
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

Item	Value
A	400
B	905
C	2200
D	610
E	1815
F	305
G	1745
H	525
I	1440
J	865
K	865
L	1475
M	525
N	1475
O	865
P	865
Q	1440



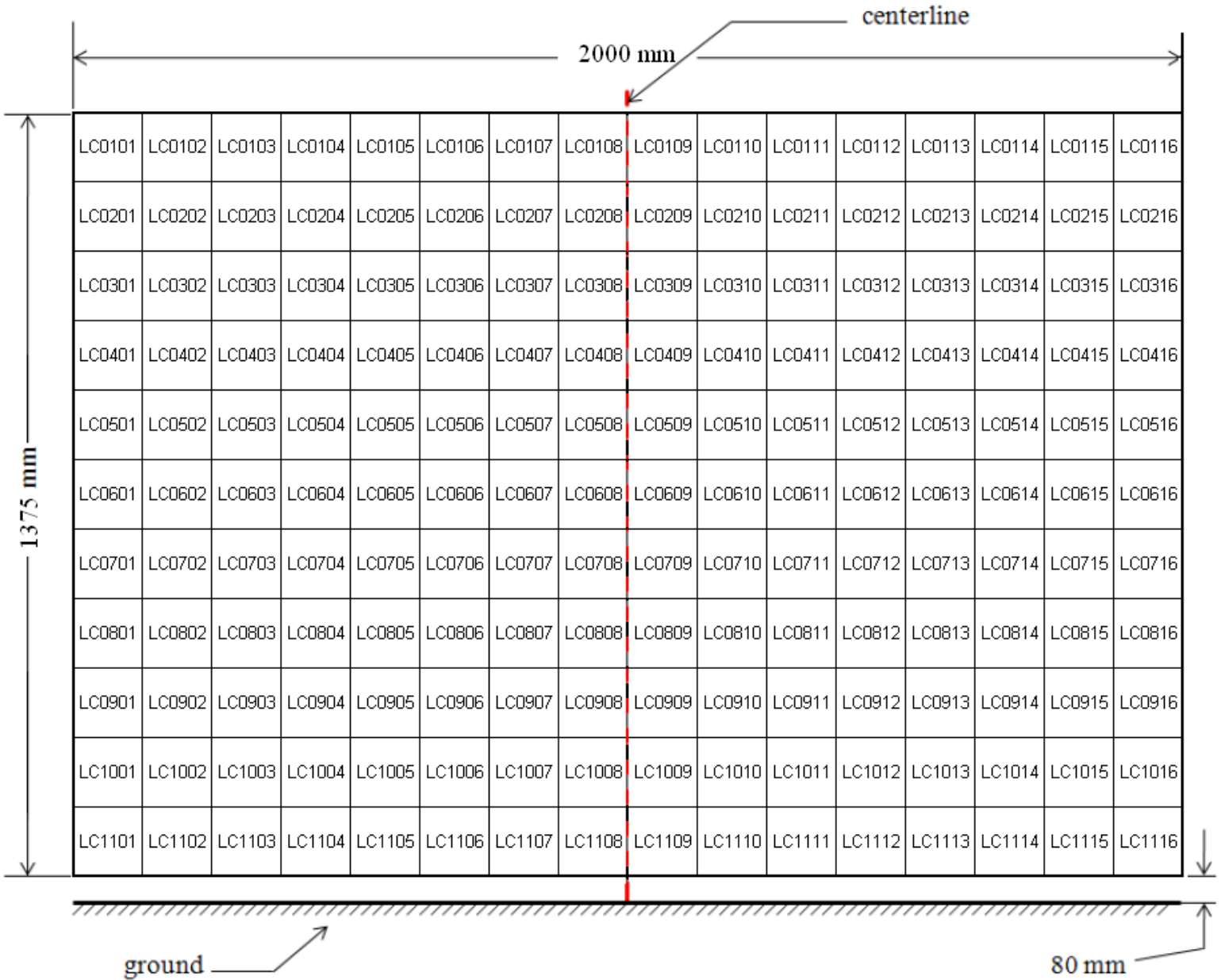
All measurements in millimeters.

DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

INSTRUMENTATION

Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	3
Load Cell Barrier	528
Total	633

CAMERA COVERAGE

High-Speed Vehicle On Board	2
High-Speed Off Board	14
Real Time	3
Total	19

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type/Serial No.	P572E 50th Percentile Male ATD / 360	P572O 5th Percentile Female ATD / 141
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Bolster
Right Knee Contact	Knee Airbag	Knee Bolster

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST-TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

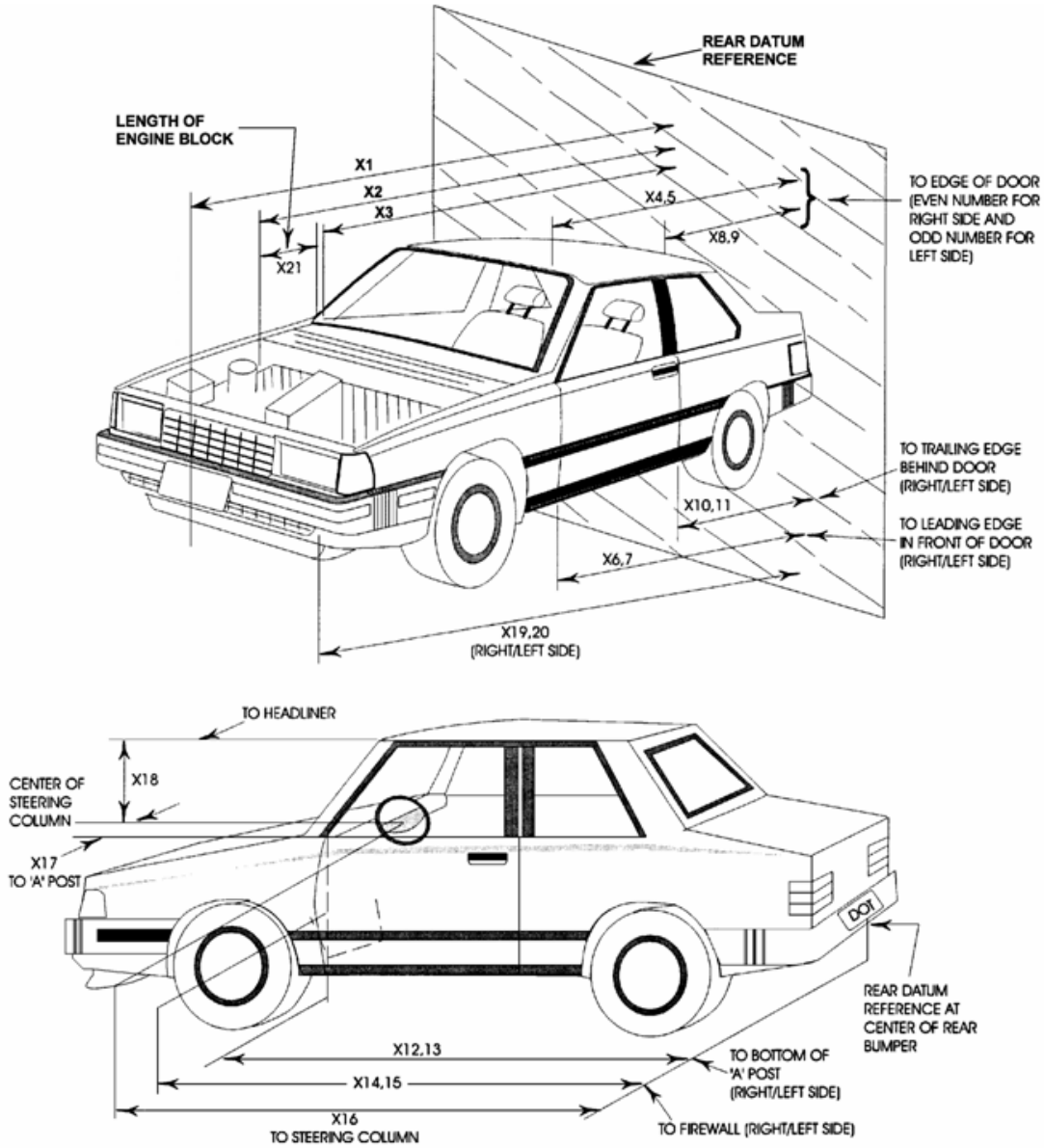
Measured Parameter	Units	Value
Left Side	mm	1840
Center	mm	1855
Right Side	mm	1850
Average	mm	1848

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



DATA SHEET NO. 12 ... (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4635	4245	-390
2	Rear Surface of Vehicle to Front of Engine	4165	4171	6
3	RSOV to Firewall	3475	3470	-5
4	RSOV to Upper Leading Edge of Right Door	3212	3210	-2
5	RSOV to Upper Leading Edge of Left Door	3212	3206	-6
6	RSOV to Lower Leading Edge of Right Door	3165	3162	-3
7	RSOV to Lower Leading Edge of Left Door	3165	3165	0
8	RSOV to Upper Trailing Edge of Right Door	2077	2076	-1
9	RSOV to Upper Trailing Edge of Left Door	2077	2071	-6
10	RSOV to Lower Trailing Edge of Right Door	2133	2131	-2
11	RSOV to Lower Trailing Edge of Left Door	2133	2132	-1
12	RSOV to Bottom of A-Pillar, Right Side	3186	3184	-2
13	RSOV to Bottom of A-Pillar, Left Side	3186	3182	-4
14	RSOV to Firewall, Right Side	3535	3533	-2
15	RSOV to Firewall, Left Side	3535	3531	-4
16	RSOV to Steering Column	2710	2790	80
17	Center of Steering Column to A-Pillar	430	420	-10
18	Center of Steering Column to Headliner	470	485	15
19	RSOV to Right Side of Front Bumper	3963	3709	-254
20	RSOV to Left Side of Front Bumper	3963	3752	-211
21	Length of Engine Block	600	600	0
RD	RSOV to Right Side of Dash Panel	2943	2941	-2
CD	RSOV to Center of Dash Panel	2810	2813	3
LD	RSOV to Left Side of Dash Panel	2940	2943	3

All measurements in millimeters.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

VEHICLE INFORMATION

VIN: JF2SKAAC4KH403969 Wheelbase (mm): 2677
 Vehicle Size Category: MPV Test Weight (kg): 1770.0

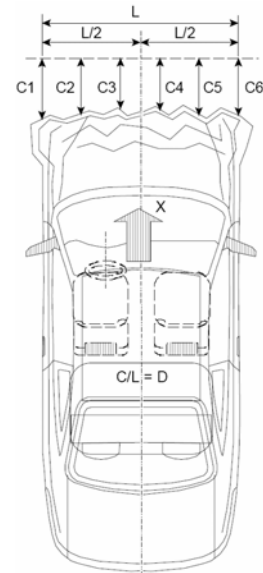
ACCELEROMETER DATA

Accelerometer Locations: Left Rear Crossmember
 Cal. Procedure/Interval: Vibration Test / 6 months
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 56.14
 Velocity Change (km/h): 65.6
 Time of Separation (msec): 66.4

Linearity: Good

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
 Midpoint of Damage: Vehicle Centerline
 Damage Region Length (mm): 1385
 Impact Mode: Full Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	140	487	347
C2	Crush Zone 2 at Left Side	mm	13	382	369
C3	Crush Zone 3 at Left Side	mm	0	382	382
C4	Crush Zone 4 at Right Side	mm	0	390	390
C5	Crush Zone 5 at Right Side	mm	13	380	367
C6	Crush Zone 6 at Right Side	mm	140	490	350
L	C1 to C6	mm	1385		

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

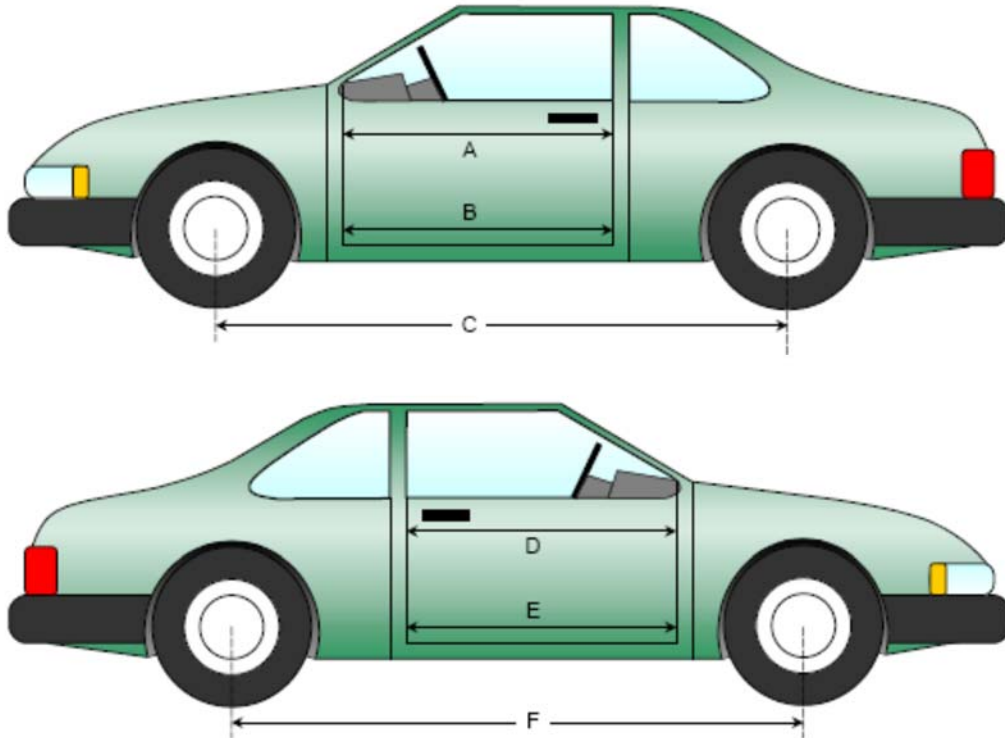
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1038	1039	-1
B	Left Side Lower	mm	899	896	3
D	Right Side Upper	mm	1041	1041	0
E	Right Side Lower	mm	873	871	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2677	2630	47
F	Right Side Wheelbase	mm	2677	2640	37



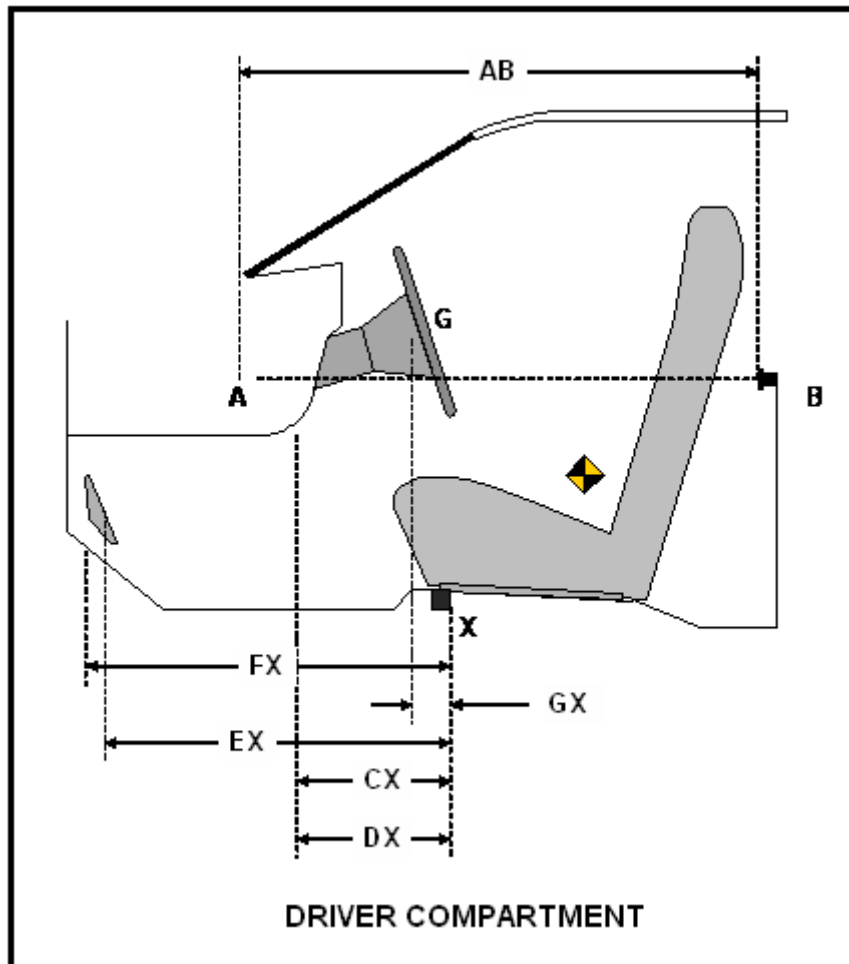
DATA SHEET NO. 14 ... (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	981	976	5
CX	Left Knee Bolster to X	mm	325	300	25
DX	Right Knee Bolster to X	mm	320	310	10
EX	Brake Pedal to X	mm	545	568	-23
FX	Foot Rest to X	mm	545	552	-7
GX	Center of Steering Wheel Hub to X	mm	90	120	-30

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

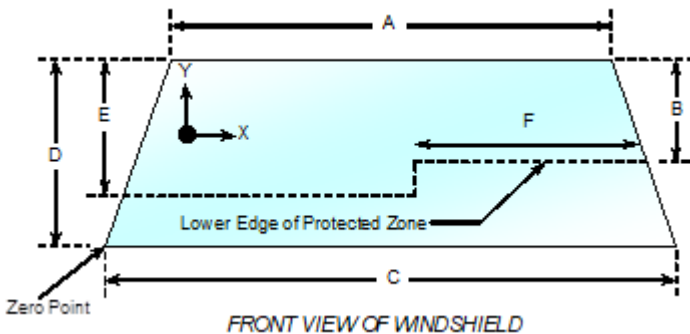
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber molding and rubber cement.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 20.9° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2152.5	2152.5	100.0%
Right Side	2152.5	2152.5	100.0%
Total	4305	4305	100.0%



Item	Units	Value
A	mm	1210
B	mm	590
C	mm	1455
D	mm	820
E	mm	600
F	mm	525

AREAS OF PROTECTED ZONE FAILURES

A. Provide Coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield.

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

X	Y

DATA SHEET NO. 15 ... (CONTINUED)

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

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.1° C Test Time: 1:52 PM

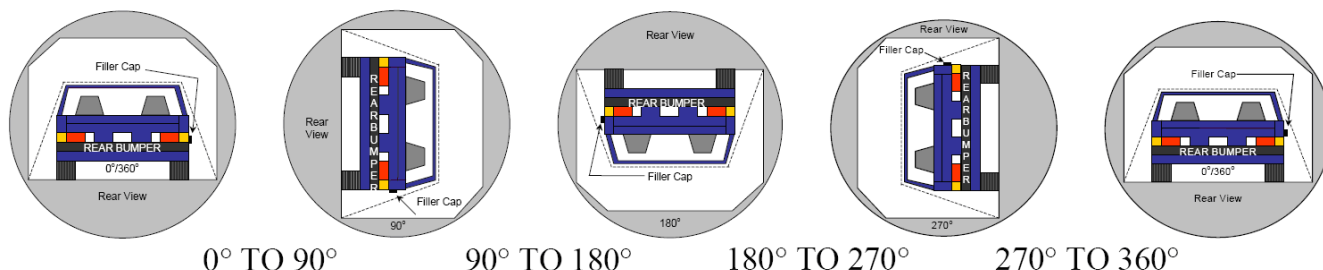
Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: There was no Stoddard solvent spillage.

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard solvent spillage: There was no Stoddard solvent spillage.

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	80	300	380
90° To 180°	83	300	383
180° To 270°	78	300	378
270° To 360°	83	300	383

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

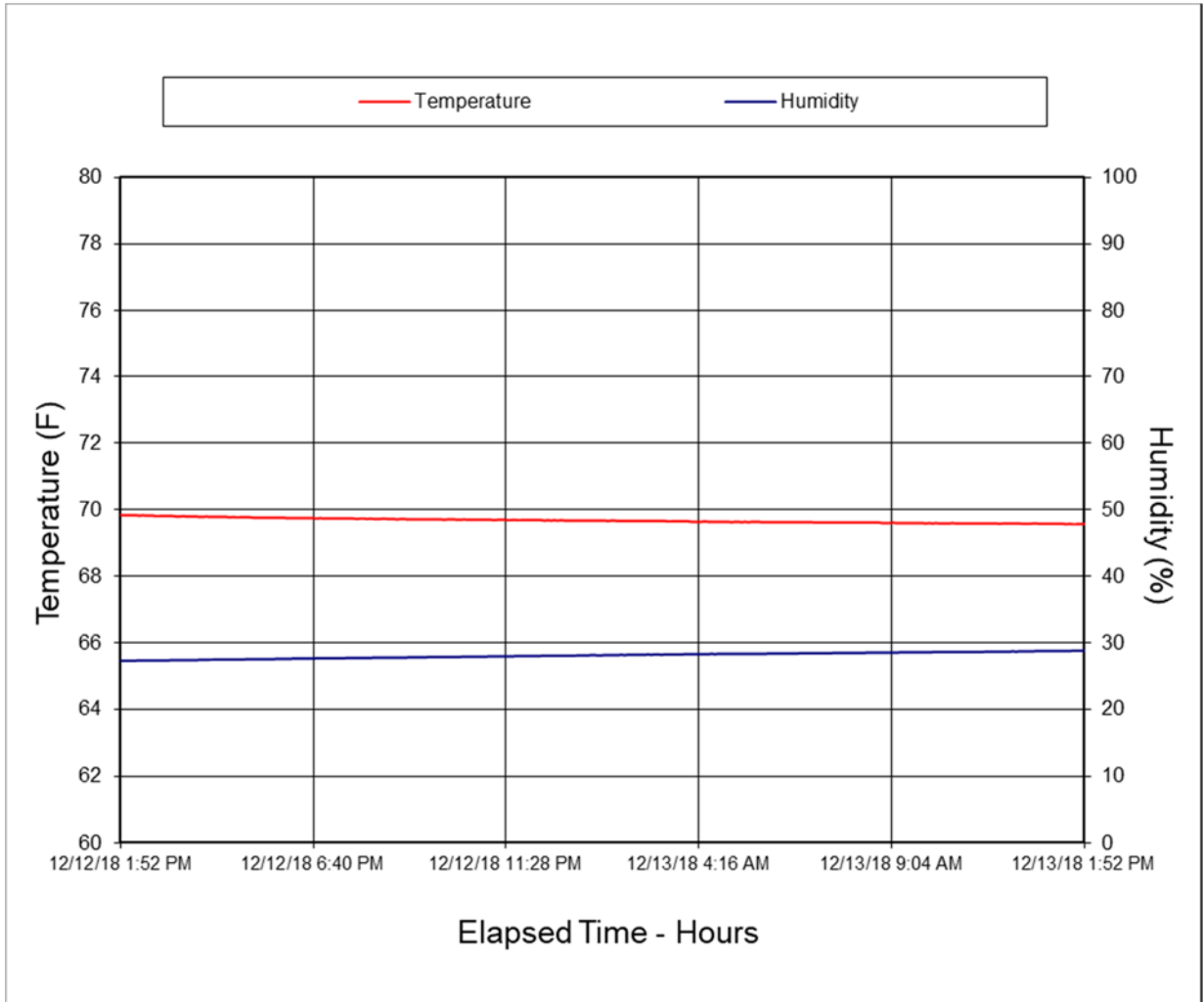
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2019 Subaru Forester 5-Door MPV NHTSA No.: O20195500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/13/18



**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. Load Cell Location

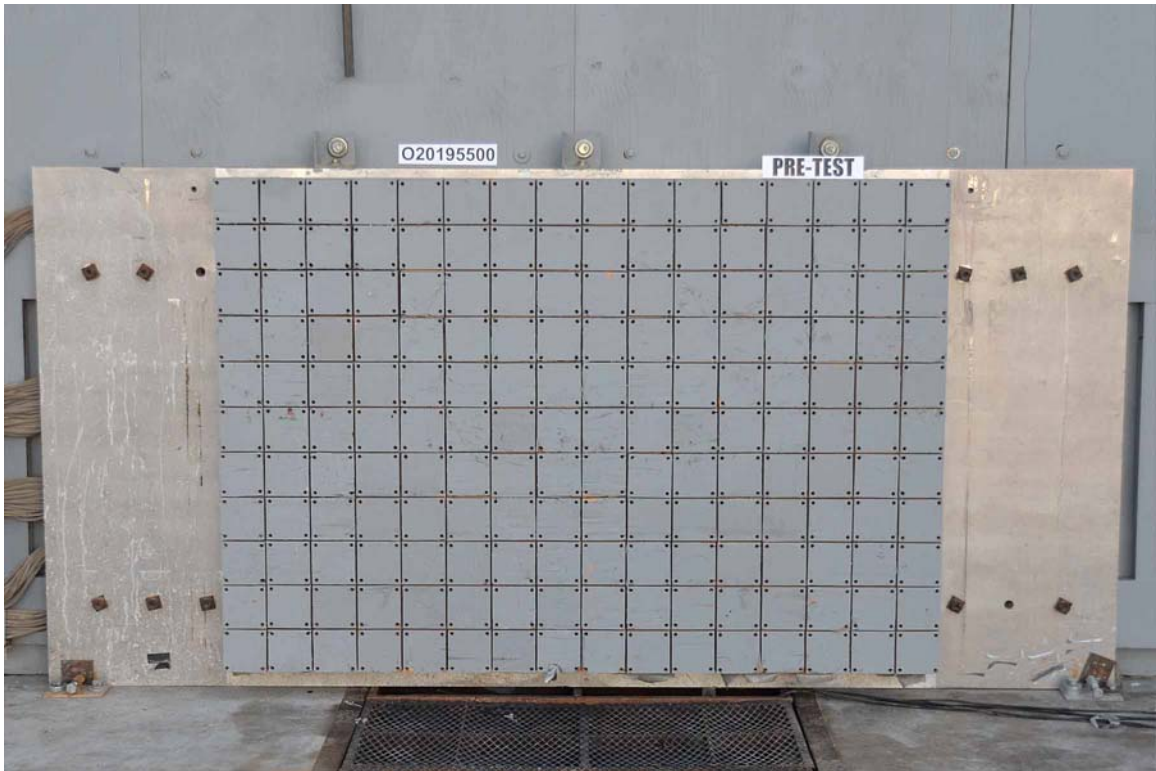


FIGURE 2. Pre-Test Load Cell Wall



FIGURE 3. Post-Test Load Cell Wall

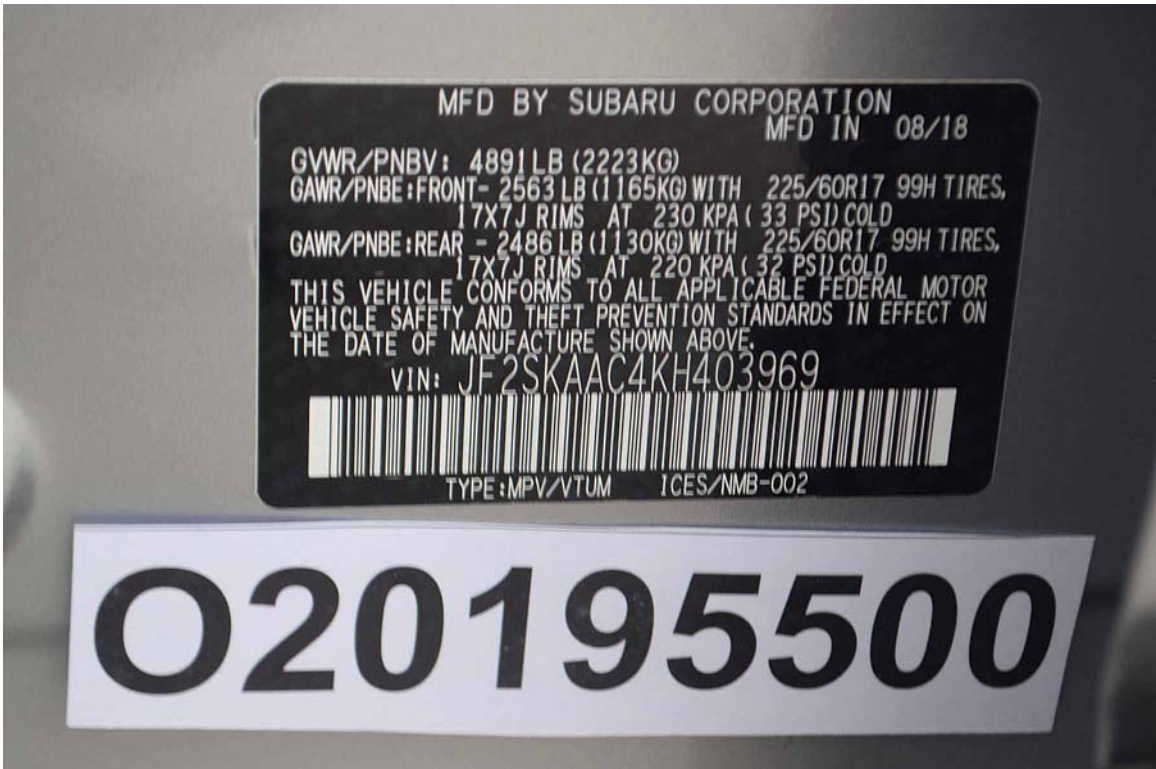


FIGURE 4. Manufacturer's Label

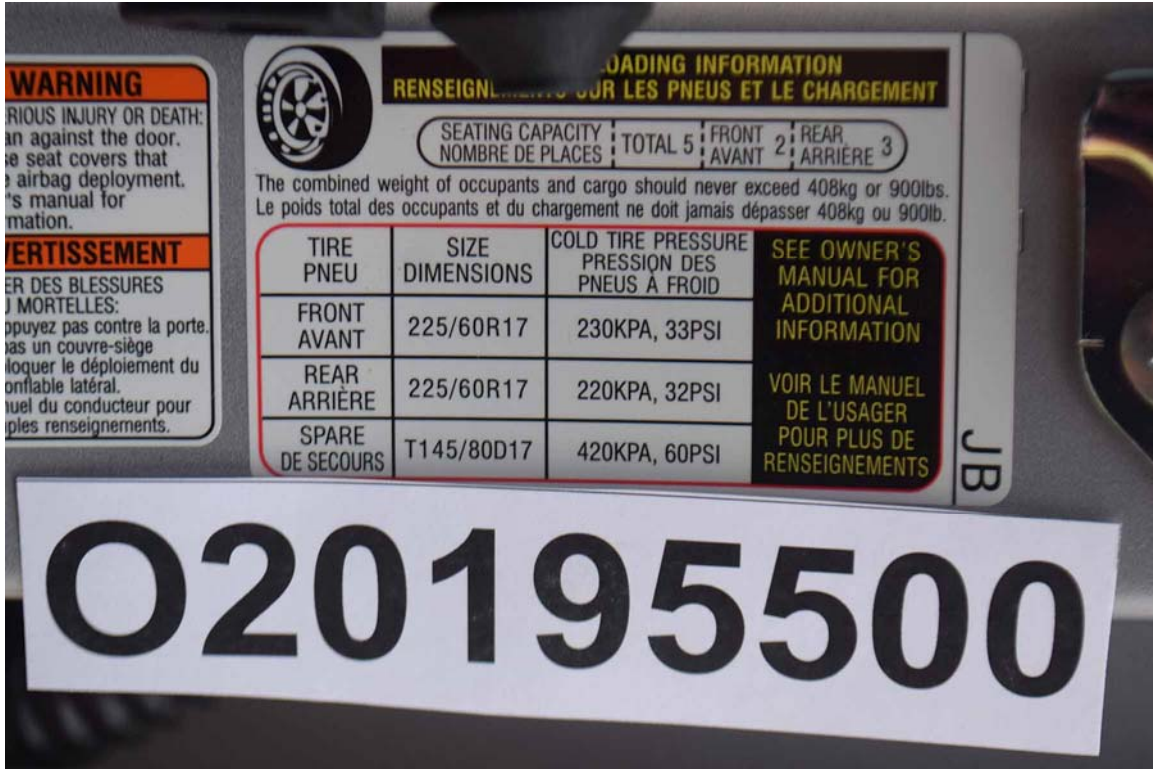


FIGURE 5. Tire Placard



FIGURE 6. 2018 Subaru Forester Frontal as Delivered



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

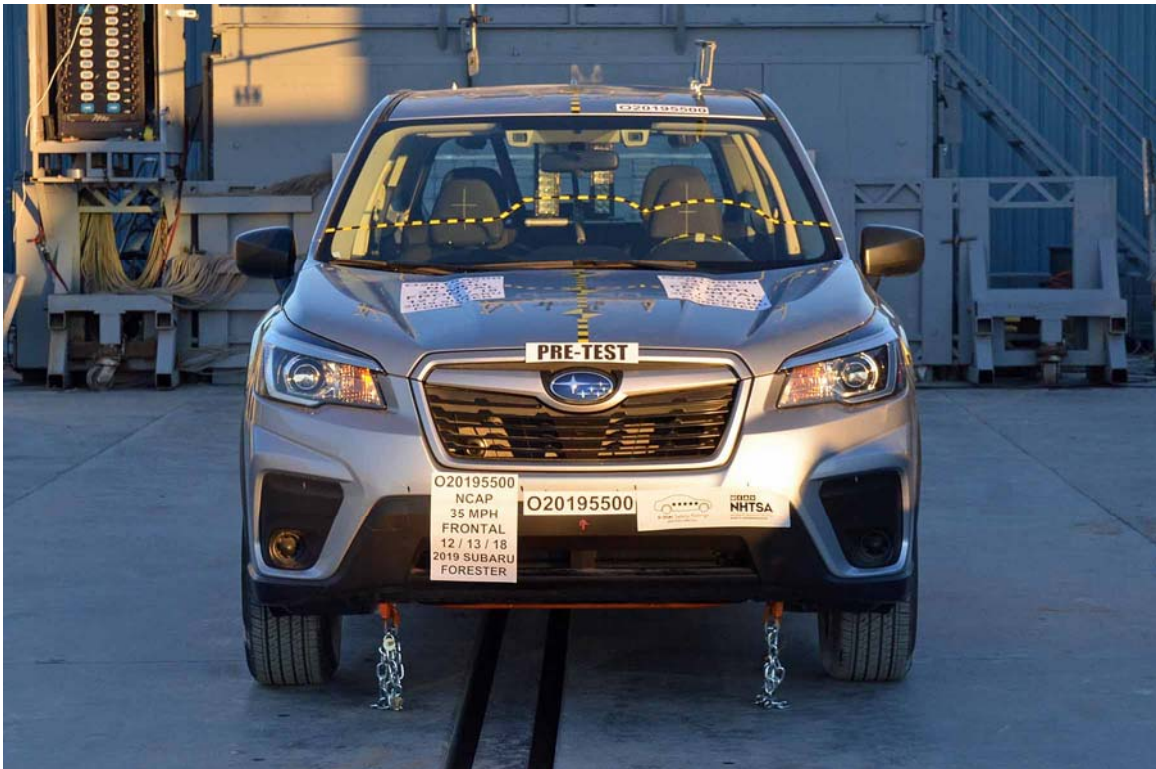


FIGURE 8. Pre-Test Front View of Test Vehicle



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

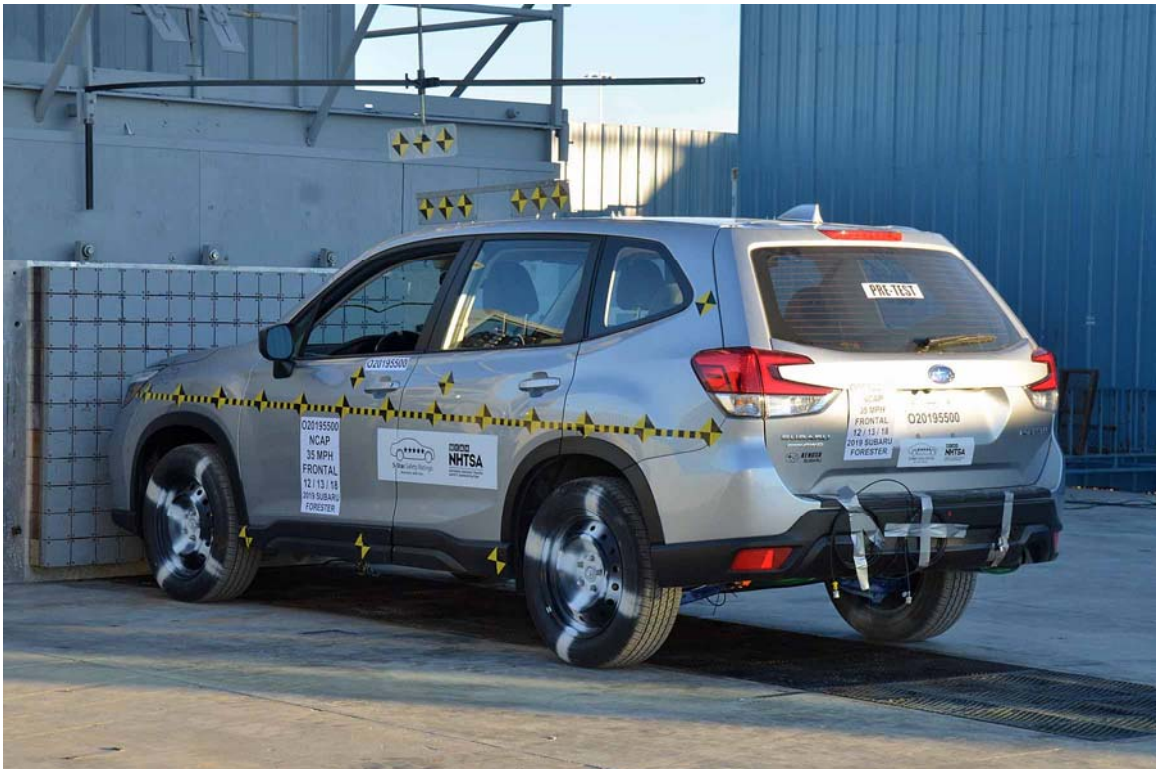


FIGURE 16. Pre-Test Left Rear $\frac{3}{4}$ View



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

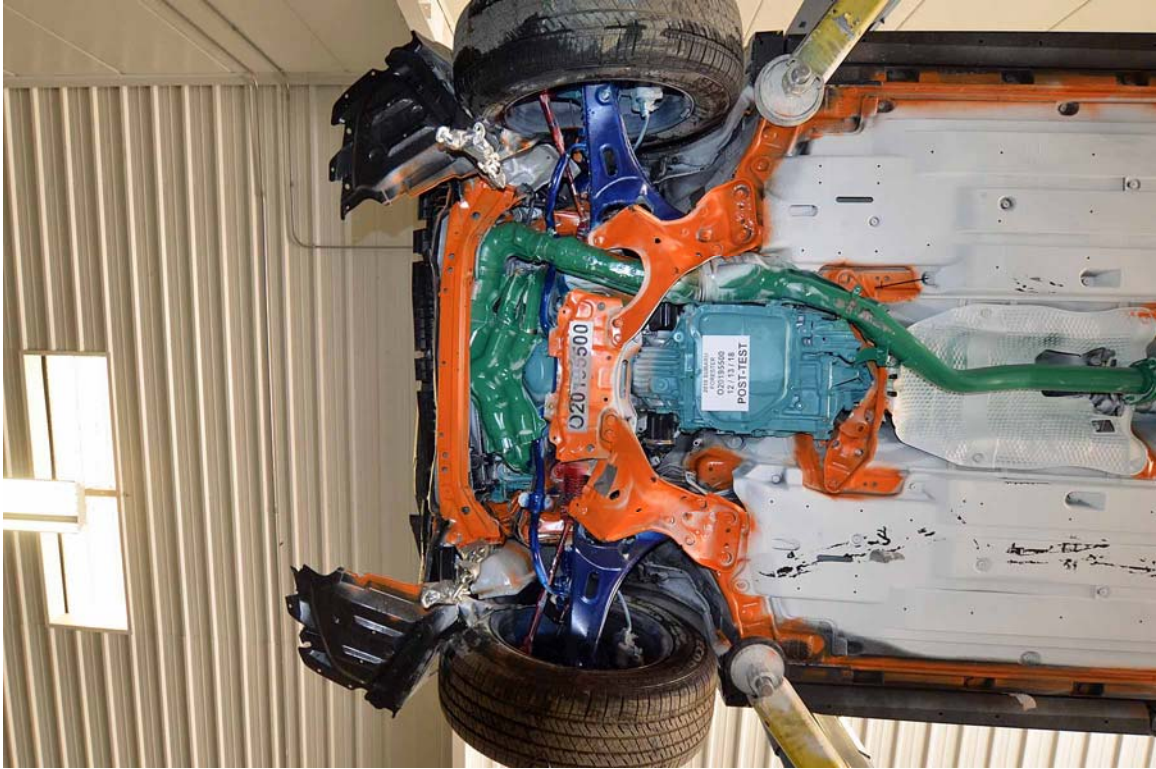


FIGURE 25. Post-Test Front Underbody View

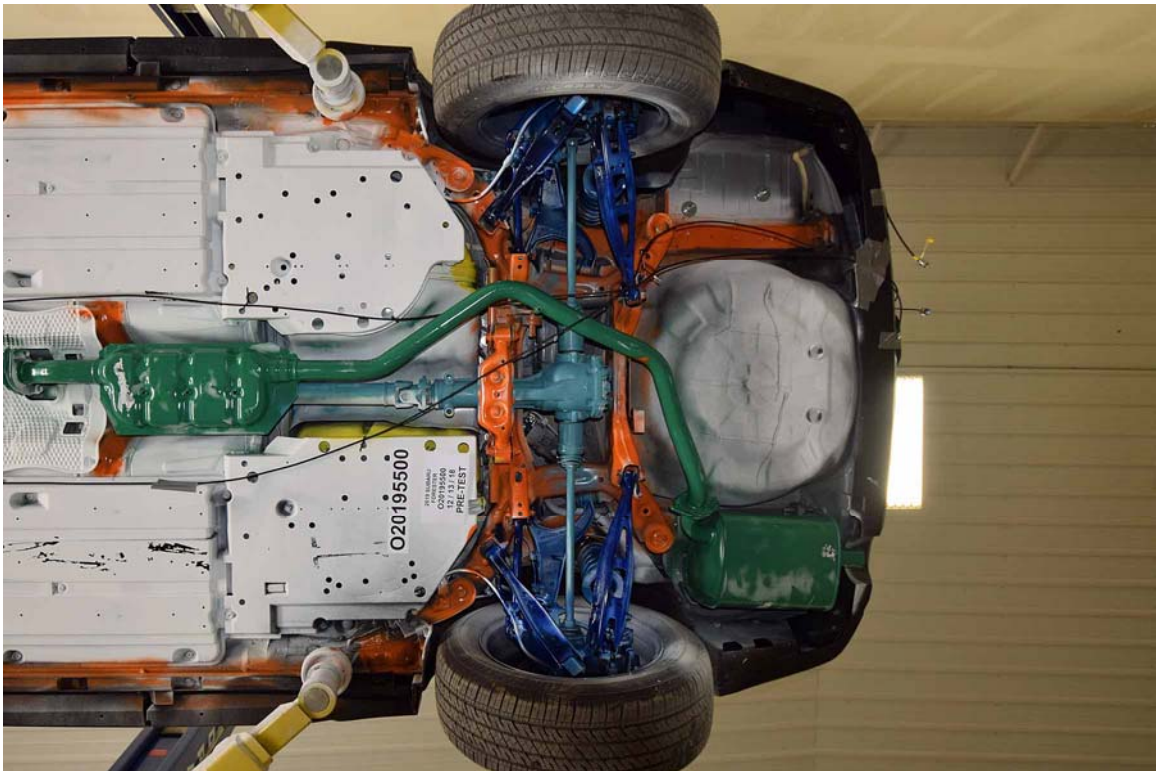


FIGURE 26. Pre-Test Rear Underbody View

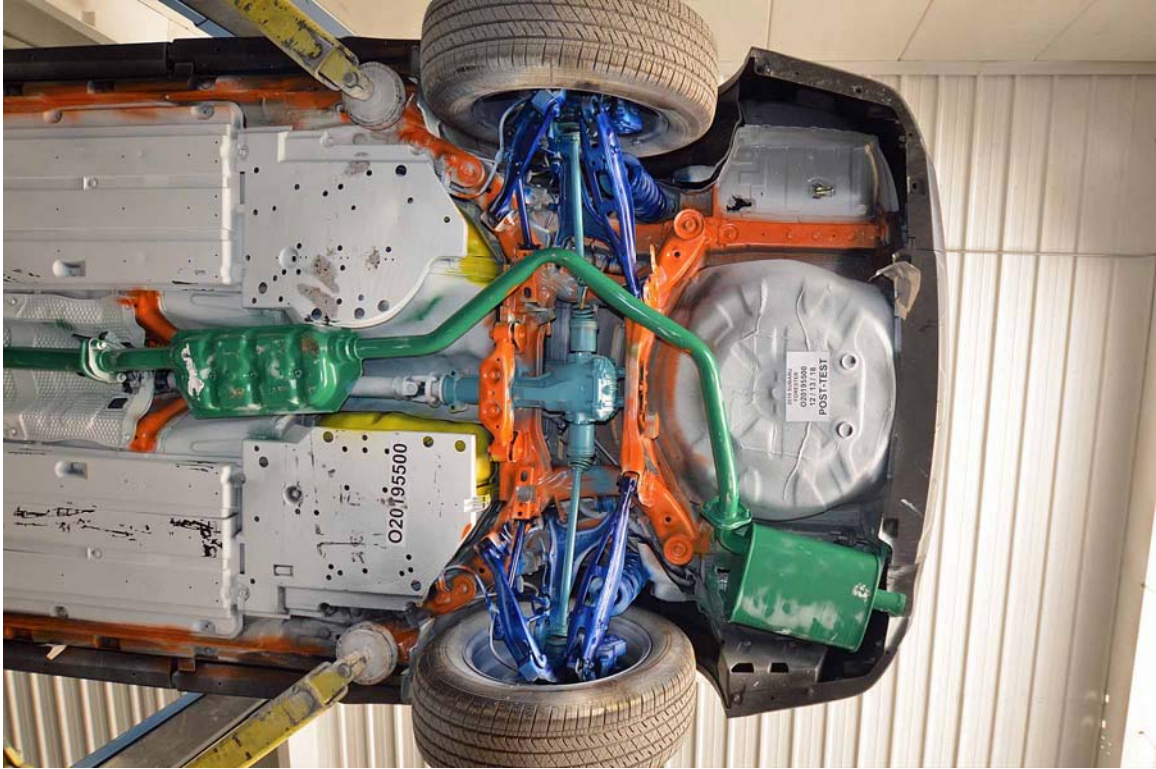


FIGURE 27. Post-Test Rear Underbody View

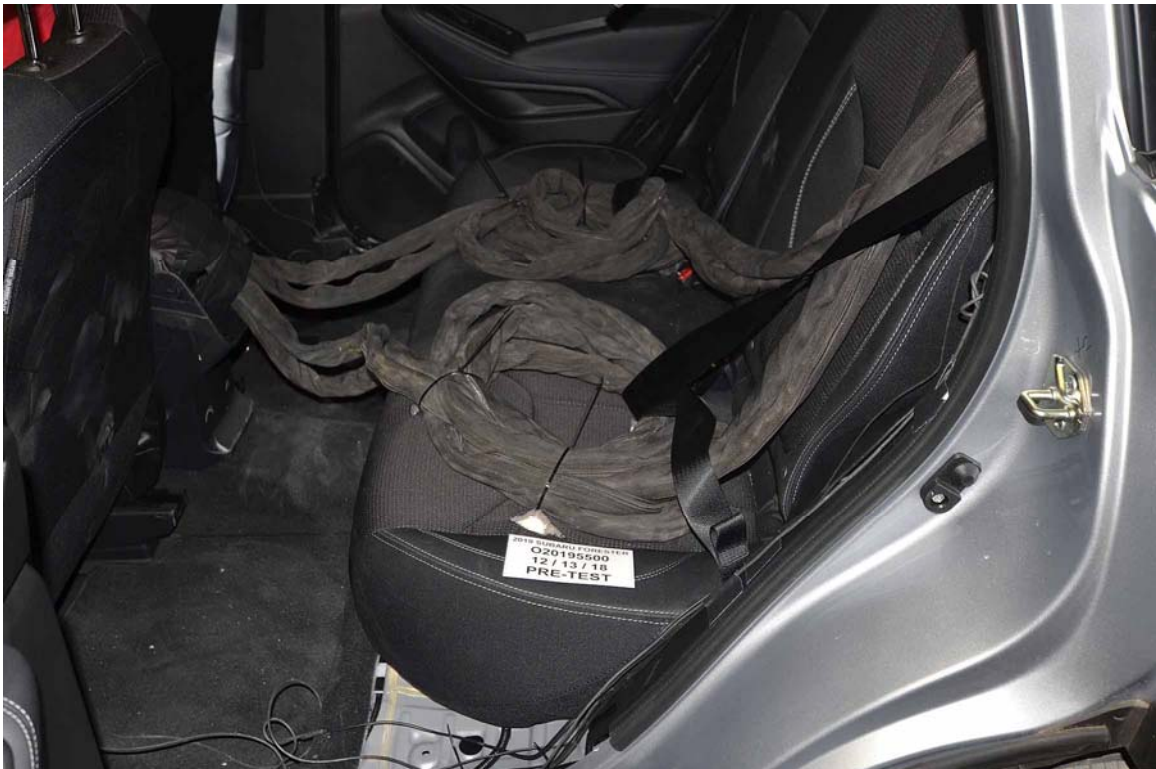


FIGURE 28. Pre-Test Dummy Cable Routing



FIGURE 29. Post-Test Dummy Cable Routing



FIGURE 30. Pre-Test Driver Dummy Front View



FIGURE 31. Post-Test Driver Dummy Front View



FIGURE 32. Pre-Test Driver Dummy Window View



FIGURE 33. Post-Test Driver Dummy Window View



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



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



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



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



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



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



FIGURE 40. Pre-Test Driver Dummy Feet



FIGURE 41. Post-Test Driver Dummy Feet



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



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



FIGURE 44. Pre-Test Driver's Side Floorpan



FIGURE 45. Post-Test Driver's Side Floorpan



FIGURE 46. Post-Test Driver Dummy Face



FIGURE 47. Post-Test Driver Dummy Contact with Airbag



FIGURE 48. Post-Test Driver Dummy Contact with Headrest



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



FIGURE 49. Pre-Test View of the Steering Wheel



FIGURE 50. Post-Test View of the Steering Wheel



FIGURE 51. Pre-Test Passenger Dummy Front View



FIGURE 52. Post-Test Passenger Dummy Front View



FIGURE 53. Pre-Test Passenger Dummy Window View



FIGURE 54. Post-Test Passenger Dummy Window View



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



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



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



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



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



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



FIGURE 61. Pre-Test Passenger Dummy Feet



FIGURE 62. Post-Test Passenger Dummy Feet



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



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



FIGURE 65. Pre-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger's Side Floorpan



FIGURE 67. Post-Test Passenger Dummy Face



FIGURE 68. Post-Test Passenger Dummy Contact with Airbag



FIGURE 69. Post-Test Passenger Dummy Contact with Headrest



FIGURE 69a. Post-Test Passenger Dummy Contact with Knee Bolster

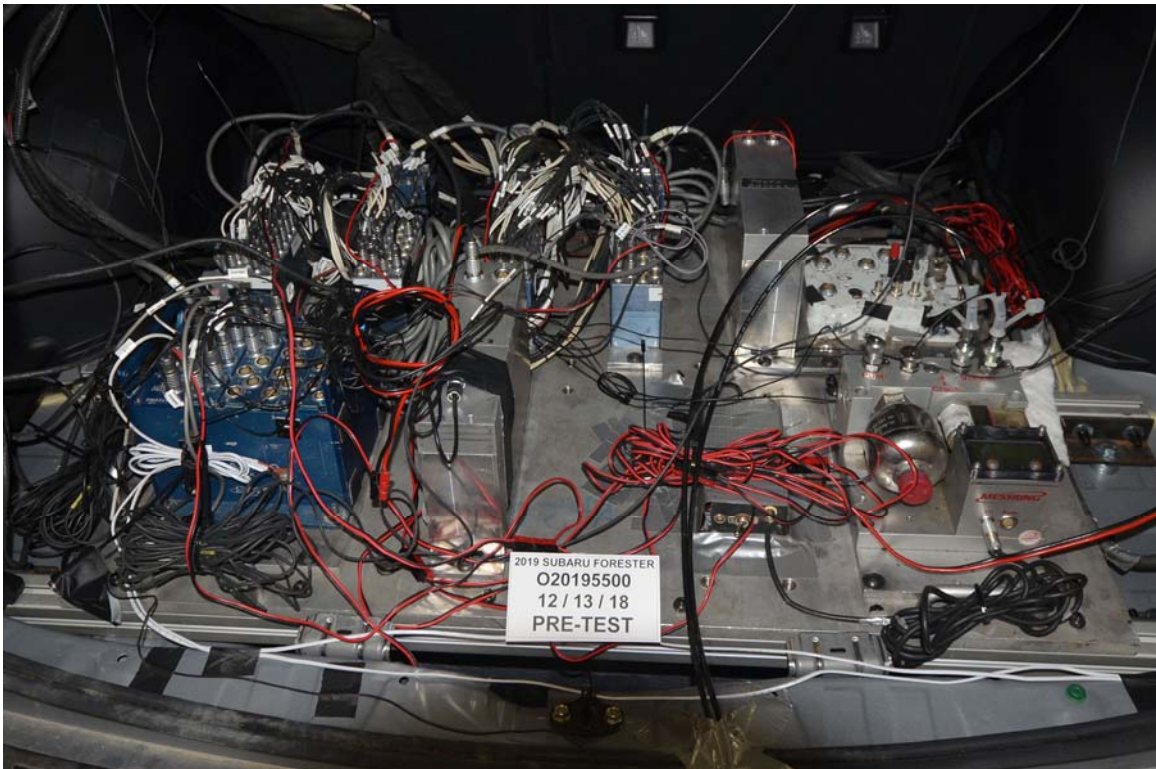


FIGURE 70. Photograph of Ballast Installed in Vehicle

Photograph Not Applicable

No Stoddard Solvent Spillage

FIGURE 71. Post-Test Stoddard Solvent Spillage Location View



FIGURE 72. Post-Test Speed Trap Read-Out



FIGURE 73. Vehicle at 0° on Static Rollover Device



FIGURE 74. Vehicle at 90° on Static Rollover Device



FIGURE 75. Vehicle at 180° on Static Rollover Device

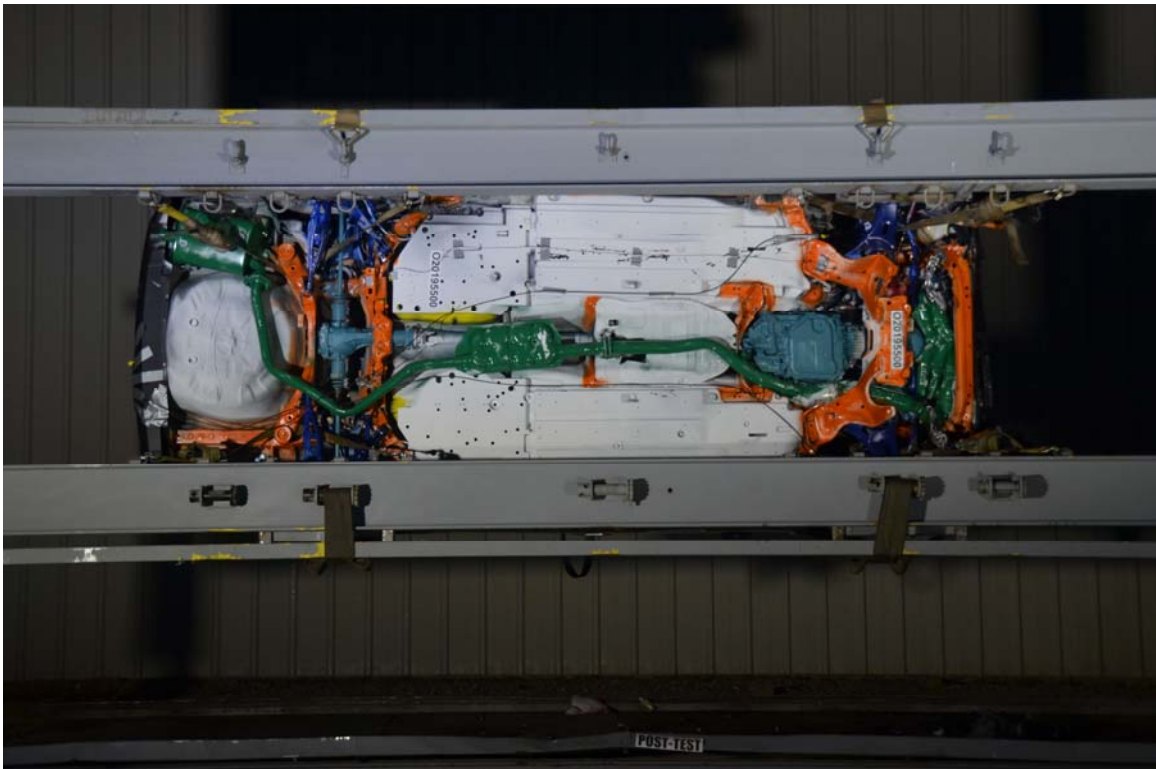


FIGURE 76. Vehicle at 270° on Static Rollover Device



FIGURE 77. Vehicle at 360° on Static Rollover Device



FIGURE 78. 2018 Subaru Forester Frontal Impact Event

FORESTER VIN: JF2SKAAC4KH403969
 Model/Code: 2018 SUBARU FORESTERV8
 Port/Assembly: VANCOUVER, WA
 Deliver by/Carrier: TRUCK / 601-621061

SHIP TO: 401289
 KENOSHA IL BARU
 7900 120TH AVE
 KENOSHA, WI 53142

SOLD TO: 401289
 KENOSHA SUBARU
 7900 120TH AVE
 KENOSHA, WI 53142

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
 Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver	Not Rated
	Passenger	Not Rated

Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash	Front seat	Not Rated
	Rear seat	Not Rated

Based on the risk of injury in a side impact.

Rollover Not Rated
 Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.
 Source: National Highway Traffic Safety Administration (NHTSA)
 www.safercar.gov or 1-888-327-4236

Protect Your Investment

Subaru Added SecuritySM
 The Only Extended Service Agreement Backed By Subaru

- Protection designed to fit your driving needs, up to 10 years/100,000 miles of coverage
- Maintenance plans also available
- We use Genuine Subaru replacement parts - only the best
- We use technicians trained by Subaru - those who know your vehicle best
- Towing, rental and trip interruption benefits available
- Transferable to the next owner
- Ask your sales representative for more details

Accept nothing less than Added SecuritySM

STANDARD EQUIPMENT

SAFETY
 Symmetrical All-Wheel Drive (AWD)
 Vehicle Dynamics Control (VDC)
 EyeSight Driver-Assist System
 6-Wheel Anti-Lock (ABS) Disc Brakes w/ Brake Assist
 Electronic Brake-Force Distribution
 Brake Override System
 Subaru Advanced Frontal Airbag System
 Driver's Side Knee Airbag
 Front Seat Side (Pelvis/Torso) Airbags
 Side-Curtain Airbags w/ Rollover Sensor
 Anti-Theft Alarm & Immobilizer System
 Daytime Running Lights
 Whiplash Protection Front Seats
 Safety Pedal System

PERFORMANCE AND EXTERIOR
 2.5L Horizontally-Opposed DOHC Engine w/ Auto Start-Stop
 Lineartronic Continuously Variable Transmission (CVT)
 17" Steel Wheels w/ Wheel Covers
 LED Headlights
 Variable Intermittent Windshield Wipers
 Electric Power-Assisted Steering
 Roof Rack Mounting Brackets
 Folding Exterior Mirrors

COMFORT, CONVENIENCE & INTERIOR
 Automatic Climate Control w/ Air Filtration System
 3.5" Infotainment System w/ CD, HD Radio & Dual USB Ports
 STARLINKSM Smartphone Connectivity/Apple SiriusXM Radio, Sports and Weather 4-Months Free
 Bluetooth Hands-Free Phone Connectivity
 18 Telescopically Steering Wheel w/ Bluetooth & Audio Switches
 Adaptive Cruise Control
 Power Door Locks and Dual Power Mirrors
 Remote Keyless Entry System
 Power Windows with Driver's Auto-Up/Down
 60/40 Split Fold-Down Rear Seatback
 Multi-Function Display
 Rear Vision Camera
 12V Outlet in Dash, Console & Cargo Area
 Electronic Parking Brake w/ Auto Vehicle Hold (AVH)
 8-Drive
 Automatic On/Off Headlights
 Height Adjustable Driver's Seat

LIMITED WARRANTY/ROADSIDE ASSISTANCE
 3 Years / 36,000 Miles Basic
 3 Years / 60,000 Miles Powertrain
 3 Years/Unlimited Mileage Rust Perforation
 3 Yrs / 36,000 24/7 Roadside Assistance
 See Owner info Kit & Warranty For Details

OPTIONAL EQUIPMENT AND OTHER ITEMS

Manufacturer's Suggested Retail Price	\$24,295.00
Exterior Color: Ice Silver Metallic	
Full Tank of Gas	INCL
Standard Option: 01	
All Weather Floor Mats	\$132.00
Rear Bumper Cover	\$118.00
Cargo Tray	\$81.00

Fuel Economy and Environment

Fuel Economy **29** MPG
 SMALL SUVs cars range from 18 to 37 MPG. The best vehicle rates 136 MPG.
 combined city/hwy 26 city 33 highway
 3.4 gallons per 100 miles

You save \$500
 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel Cost \$1,300

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

This vehicle emits 310 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions, learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.50 per gallon. MPG is miles per gallon equivalent. Vehicle emissions are a significant factor of climate change and smog.

fueleconomy.gov
 Calculate personalized estimates and compare vehicles

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS COUNTRY: U.S./CANADIAN PARTS CONTENT: 0%
 MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN: 85%

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: OTA, GUNMA, JAPAN
 COUNTRY OF ORIGIN: ENGINE: JAPAN
 TRANSMISSION: JAPAN

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

Destination and Delivery \$975.00
Total Suggested Retail Price \$25,601.00

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FIGURE 79. Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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

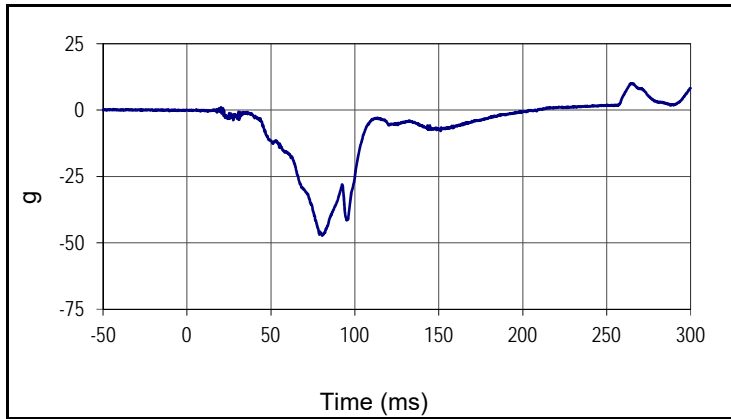
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

Driver Head X Acceleration Redundant
Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Force Z Redundant
Driver Right Femur Force Z Redundant
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Shoulder Belt Force
Driver Lap Belt Force
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant

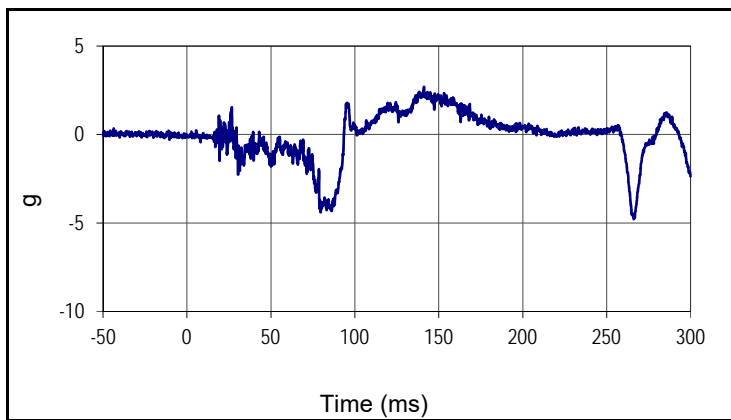
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Redundant
Passenger Right Femur Force Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
Load Cell Barrier Forces and Moments

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

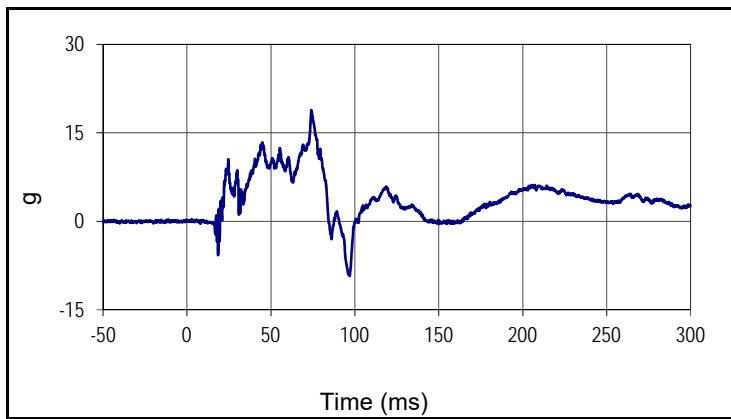
NHTSA No.: O20195500
 Test Date: 12/13/18



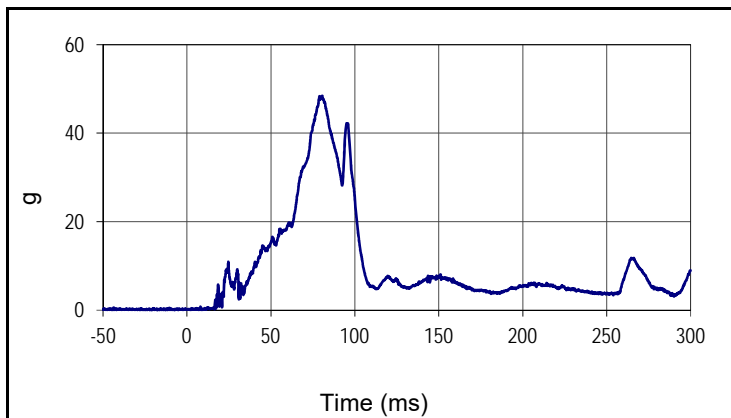
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Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
10.1	264.6	-47.3	80.6



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
2.7	141.2	-4.8	266.1



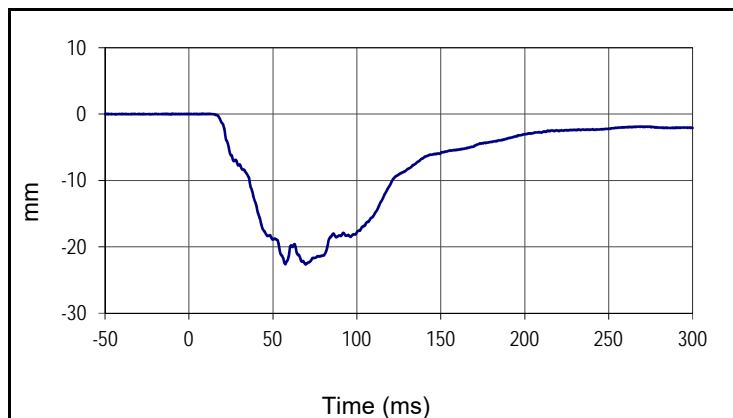
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
18.9	74.0	-9.3	96.9



Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
48.4	80.5	0.1	9.4

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

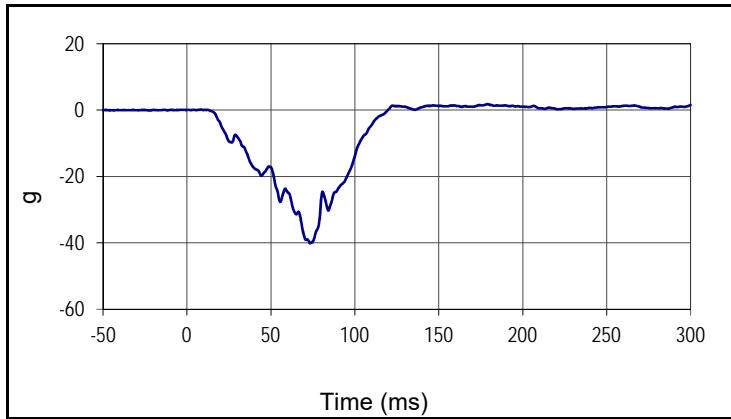
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 Test Date: 12/13/18



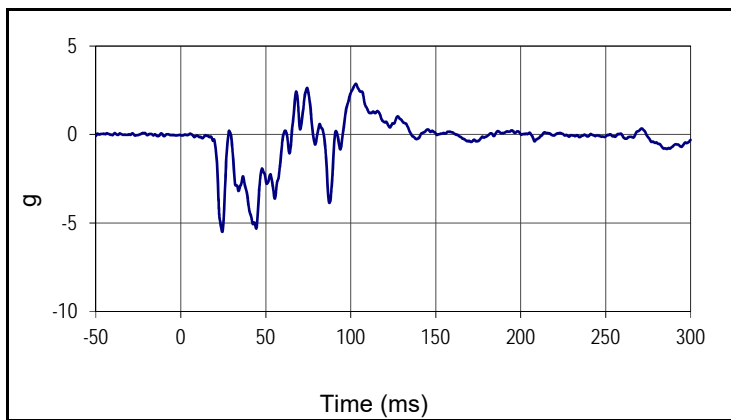
Curve Description			
Driver Chest Deflection			
Plot No.		SAE Class	Units
005		600	mm
Max	Time	Min	Time
0.1	8.0	-22.7	69.5

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

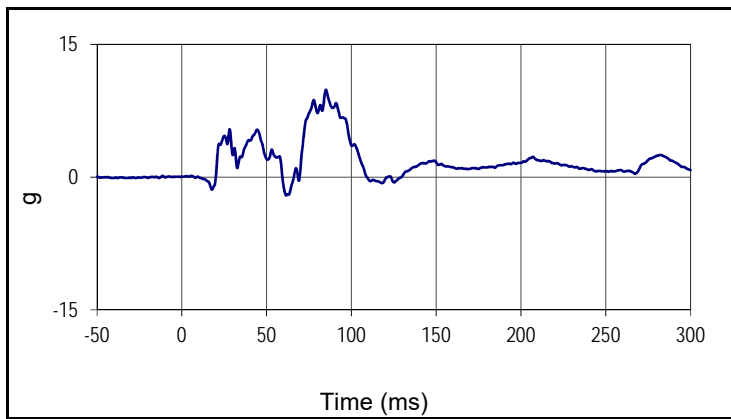
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 Test Date: 12/13/18



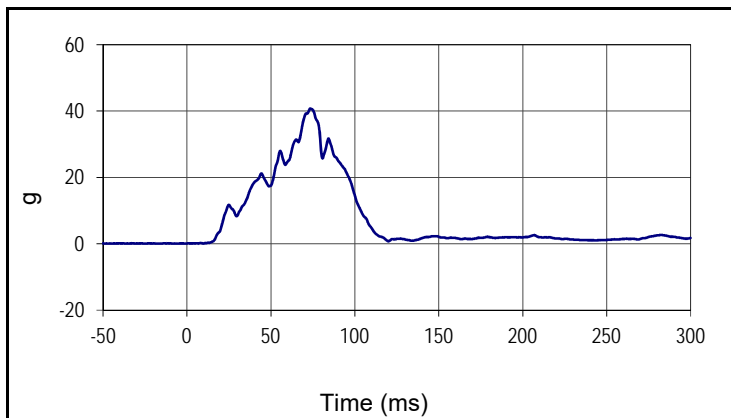
Curve Description			
Driver Chest Acceleration X Primary			
Plot No.		SAE Class	Units
006		180	g
Max	Time	Min	Time
1.8	179.0	-40.1	73.4



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
007		180	g
Max	Time	Min	Time
2.9	103.0	-5.5	24.3



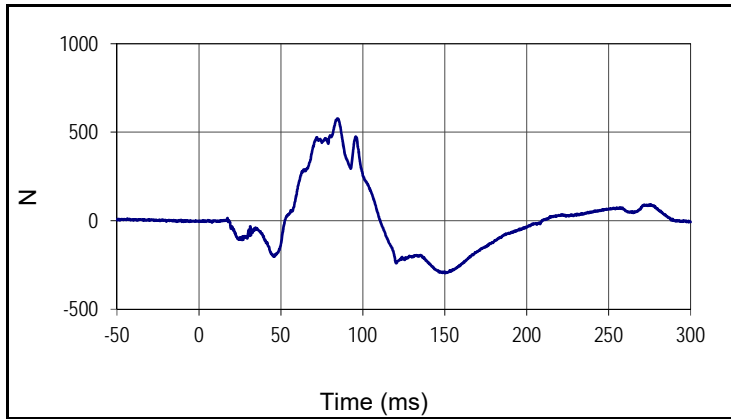
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Driver Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
008		180	g
Max	Time	Min	Time
9.9	85.0	-2.1	61.5



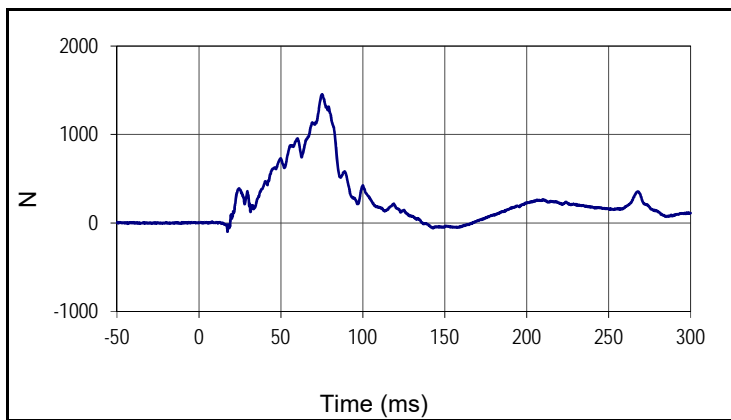
Curve Description			
Driver Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
009		180	g
Max	Time	Min	Time
40.7	73.4	0.1	9.8

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

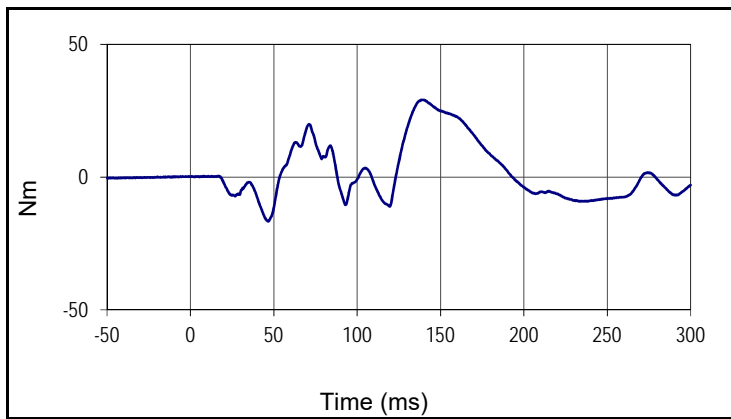
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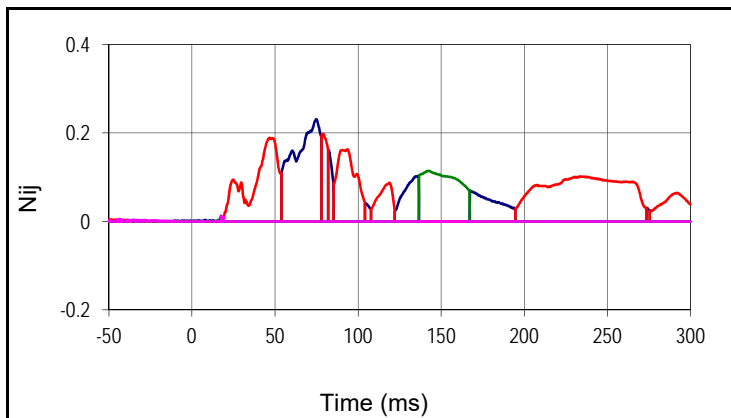
Curve Description			
Driver Upper Neck Force X			
Plot No.		SAE Class	Units
010		1000	N
Max	Time	Min	Time
577.2	84.5	-296.3	150.1



Curve Description			
Driver Upper Neck Force Z			
Plot No.		SAE Class	Units
011		1000	N
Max	Time	Min	Time
1452.2	75.0	-98.8	17.4



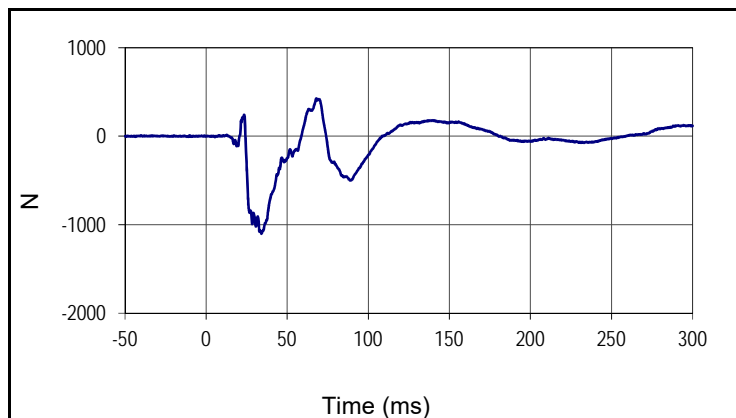
Curve Description			
Driver Upper Neck Moment Y			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
29.1	139.6	-16.7	46.7



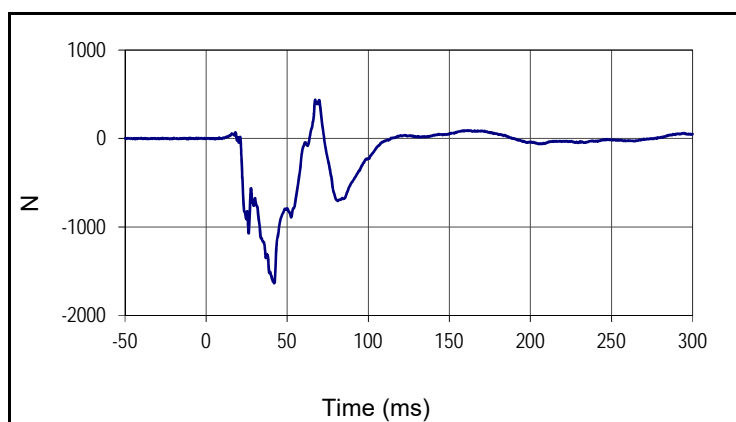
Curve Description		
Driver Nij		
Units	Max	Time
Ntf	0.23	74.8
Nte	0.20	79.2
Ncf	0.11	142.6
Nce	0.01	17.6

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20195500
 Test Date: 12/13/18



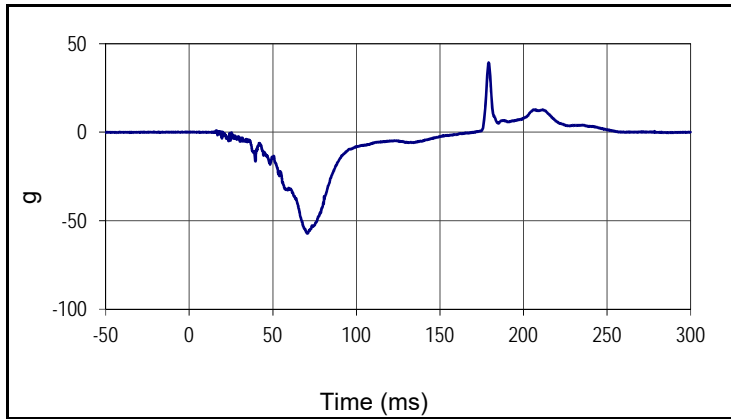
Curve Description			
Driver Left Femur Force Z			
Plot No.		SAE Class	Units
014		600	N
Max	Time	Min	Time
426.7	68.0	-1101.8	34.1



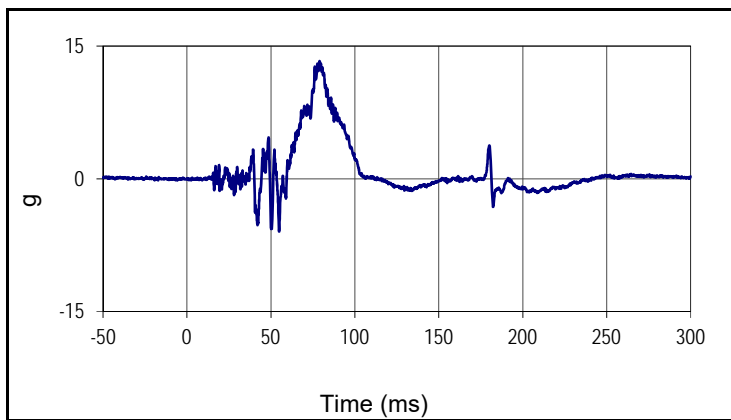
Curve Description			
Driver Right Femur Force Z			
Plot No.		SAE Class	Units
015		600	N
Max	Time	Min	Time
438.3	67.3	-1636.2	42.0

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

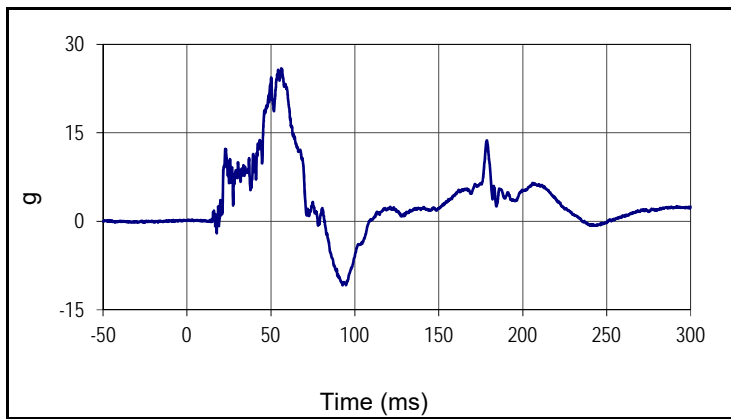
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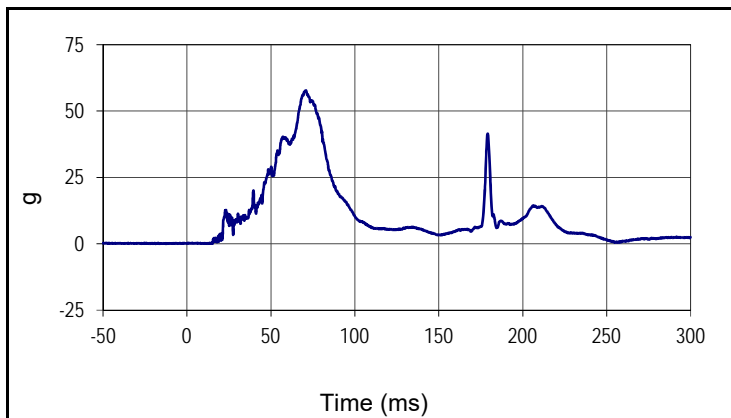
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
39.3	179.1	-57.3	70.9



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
13.3	79.0	-6.0	54.9



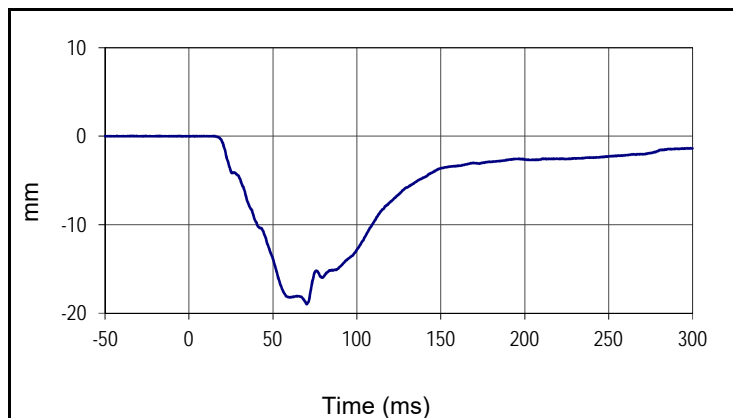
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
018		1000	g
Max	Time	Min	Time
25.9	56.2	-10.8	92.7



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
019		1000	g
Max	Time	Min	Time
57.7	70.9	0.0	8.5

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

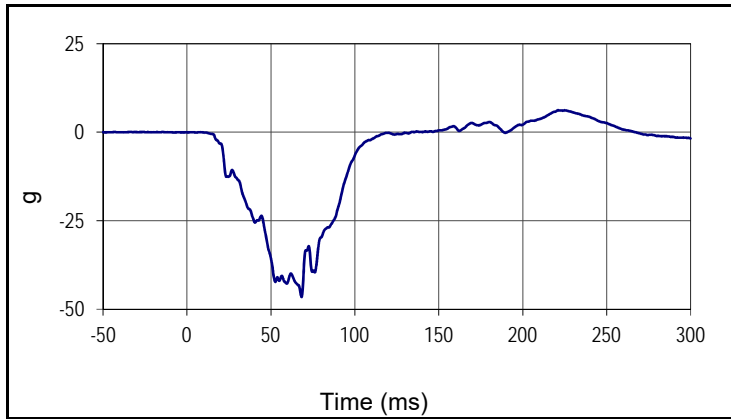
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 Test Date: 12/13/2018



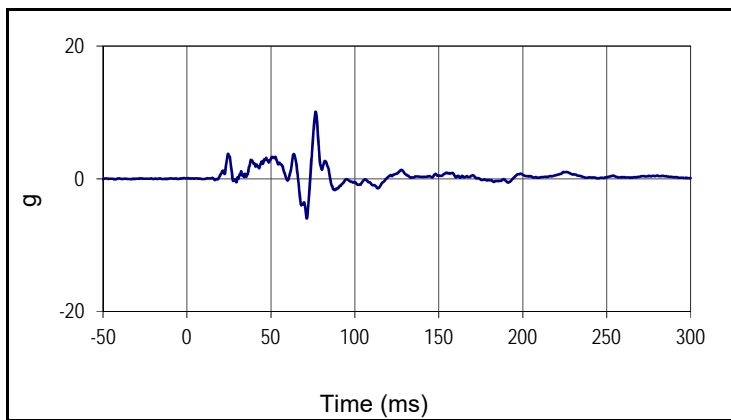
Curve Description			
Passenger Chest Deflection			
Plot No.		SAE Class	Units
020		600	mm
Max	Time	Min	Time
0.0	14.5	-19.0	70.1

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

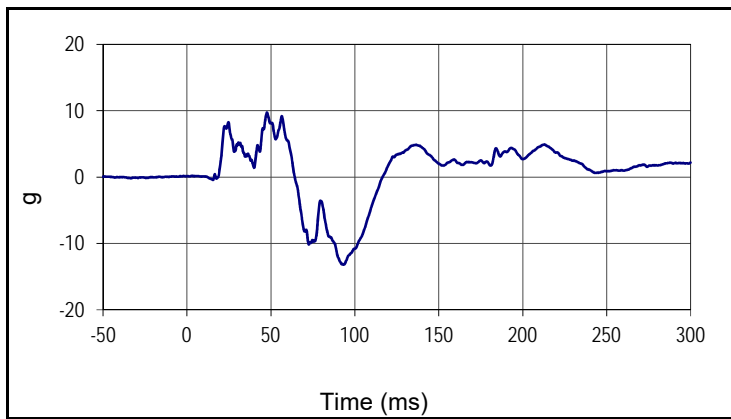
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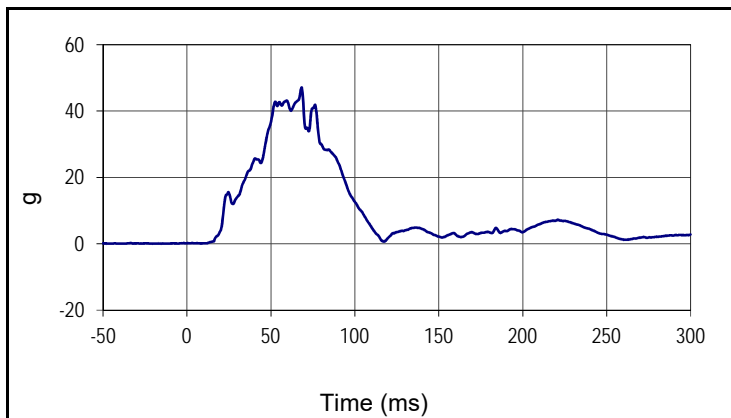
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
6.2	221.1	-46.6	68.2



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.		SAE Class	Units
022		180	g
Max	Time	Min	Time
10.1	76.6	-6.0	71.4



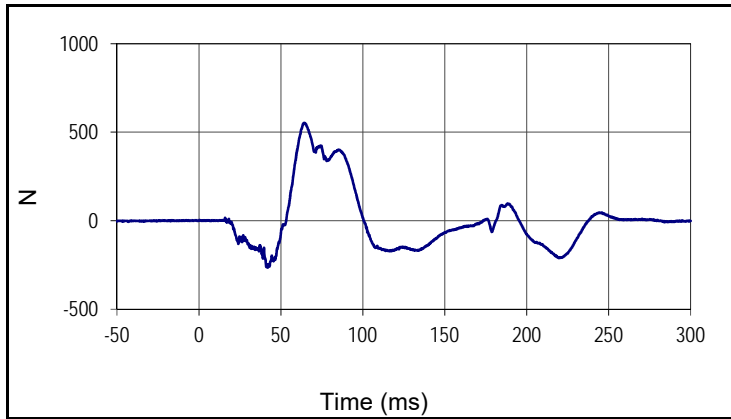
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.		SAE Class	Units
023		180	g
Max	Time	Min	Time
9.7	47.6	-13.2	93.2



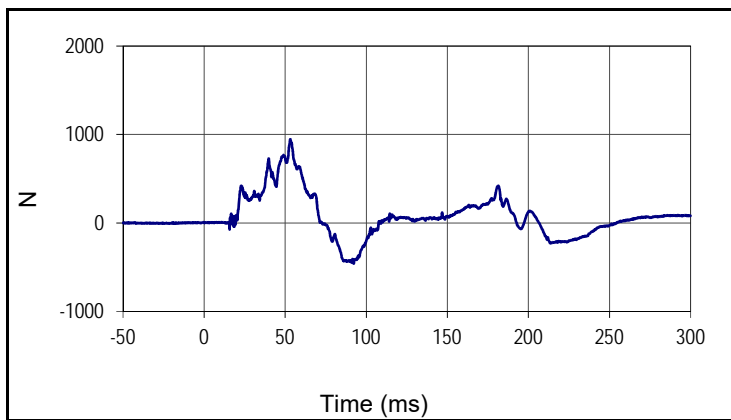
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.		SAE Class	Units
024		180	g
Max	Time	Min	Time
47.1	68.3	0.1	8.6

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

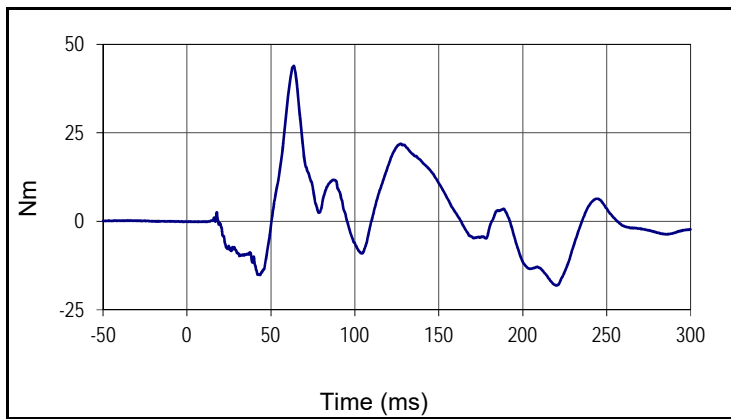
NHTSA No.: O20195500
 Test Date: 12/13/2018



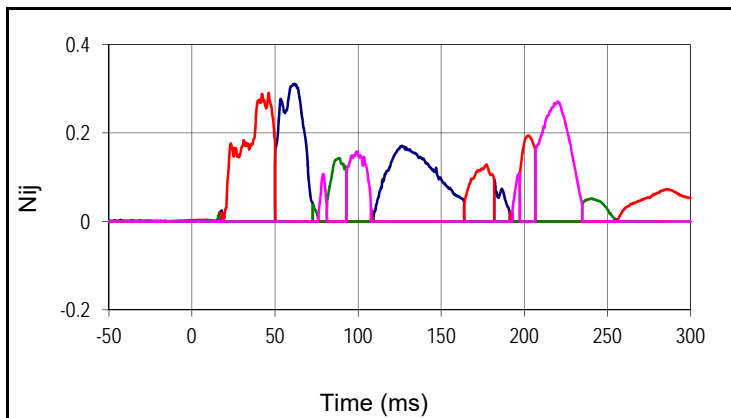
Curve Description			
Passenger Upper Neck Force X			
Plot No.		SAE Class	Units
025		1000	N
Max	Time	Min	Time
553.0	64.2	-264.4	42.0



Curve Description			
Passenger Upper Neck Force Z			
Plot No.		SAE Class	Units
026		1000	N
Max	Time	Min	Time
947.1	53.2	-458.4	92.2



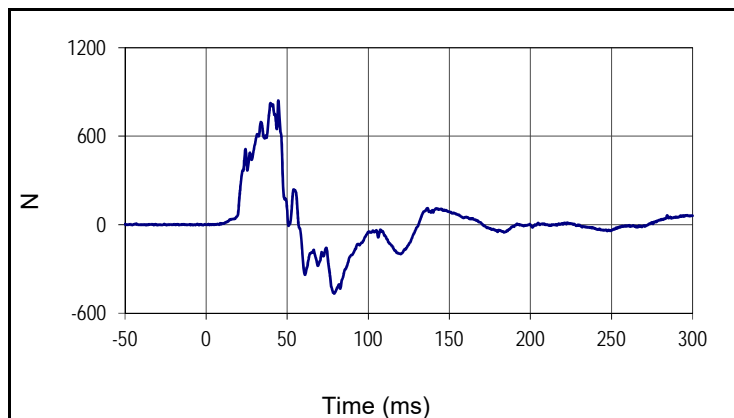
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.		SAE Class	Units
027		600	Nm
Max	Time	Min	Time
43.9	63.6	-18.2	220.1



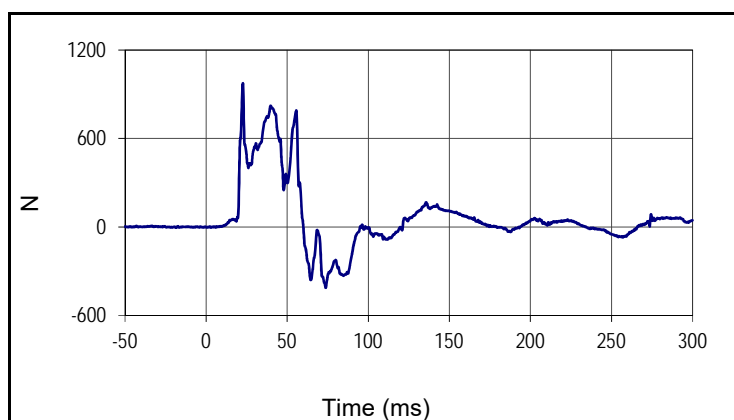
Curve Description		
Passenger Nij		
Units	Max	Time
Ntf	0.31	61.7
Nte	0.29	46.1
Ncf	0.14	88.8
Nce	0.27	220.2

Test Vehicle: 2019 Subaru Forester 5-Door MPV
 Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20195500
 Test Date: 12/13/2018



Curve Description			
Passenger Left Femur Force Z			
Plot No.		SAE Class	Units
029		600	N
Max	Time	Min	Time
842.1	44.6	-467.5	79.0



Curve Description			
Passenger Right Femur Force Z			
Plot No.		SAE Class	Units
030		600	N
Max	Time	Min	Time
974.8	22.7	-412.3	73.8

APPENDIX C
ATD CALIBRATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

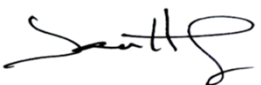



ATD Serial No.: 360

Test Date: 2018-11-20

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:

Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

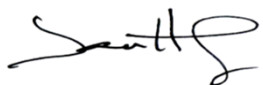



**Hybrid III 50th Percentile Male
 External Measurements**

ATD Serial No.: 360

Test Date: 2018-11-20

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	20	Pass
A - Total sitting height	mm	879	889	886	Pass
B - Shoulder pivot height	mm	505	521	518	Pass
C - 'H' point height	mm	84	89	87	Pass
D - 'H' point location from backline	mm	135	140	139	Pass
E - Shoulder pivot from backline	mm	84	94	88	Pass
F - Thigh clearance	mm	140	155	149	Pass
G - Back of elbow to wrist pivot	mm	290	305	296	Pass
H - Head back to backline	mm	41	46	45	Pass
I - Shoulder to elbow length	mm	330	345	341	Pass
J - Elbow rest height	mm	190	211	205	Pass
K - Buttock to knee length	mm	579	604	599	Pass
L - Popliteal length	mm	429	455	443	Pass
M - Knee pivot height	mm	485	500	497	Pass
N - Buttock popliteal length	mm	452	477	461	Pass
O - Chest depth without jacket	mm	213	229	222	Pass
P - Foot length	mm	251	267	263	Pass
V - Shoulder breadth	mm	422	437	426	Pass
W - Foot breadth	mm	91	107	96	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	991	Pass
Z - Waist circum.	mm	836	866	859	Pass
AA - Location for chest circum.	mm	429	434	431	Pass
BB - Location for waist circum.	mm	226	231	230	Pass
Overall Test Results					Pass

Technician: 
 J. Hernandez

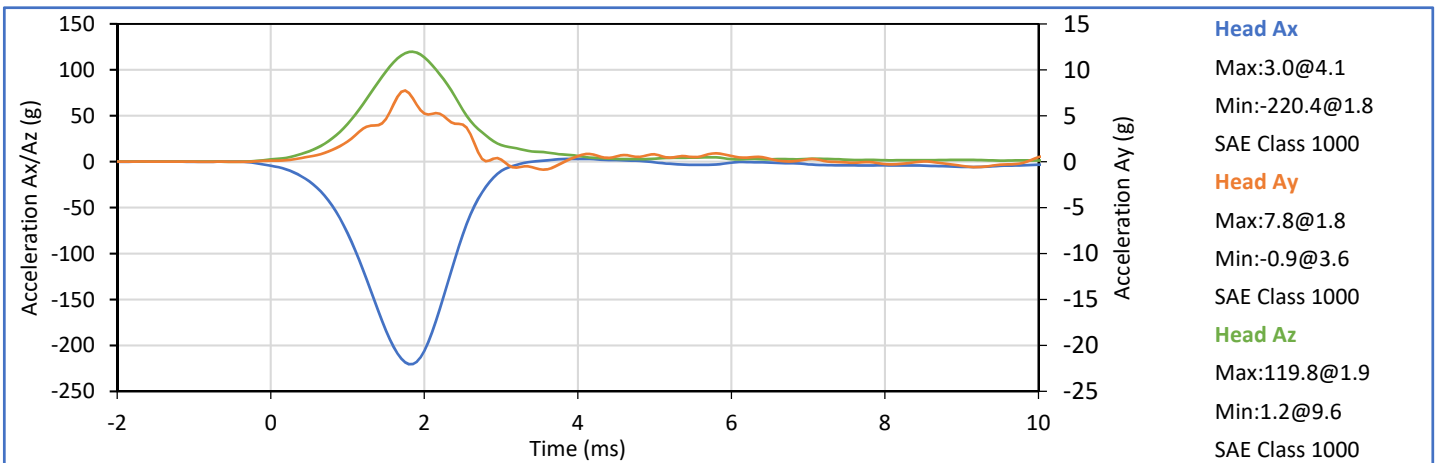
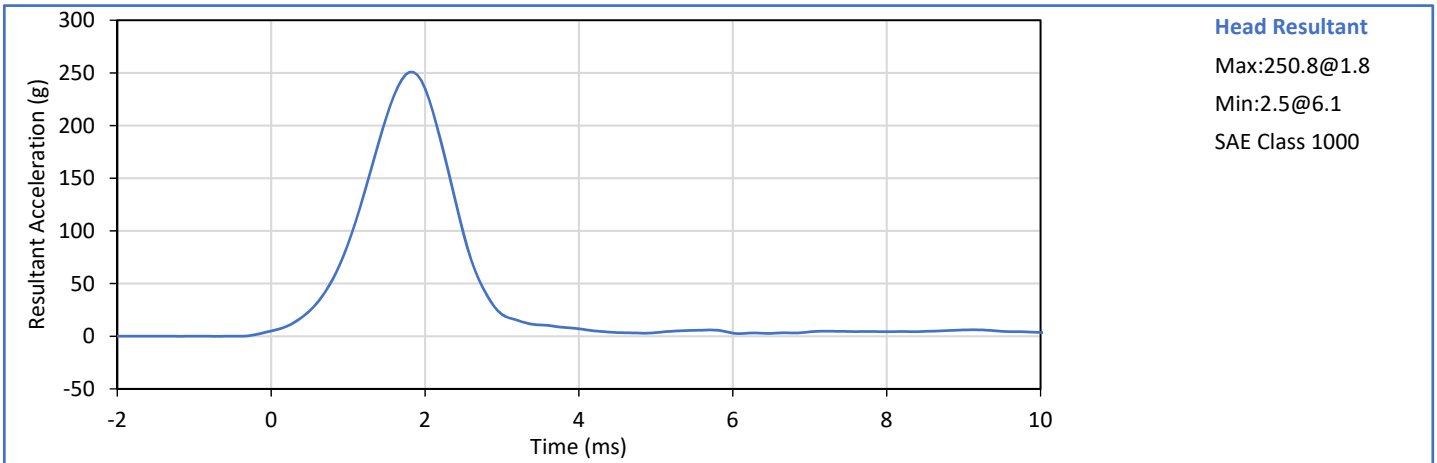
Approved By: 
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.9	Pass
Laboratory Humidity	%	10	70	19	Pass
Peak Resultant Acceleration	g	225.0	275.0	250.8	Pass
Peak Lateral Acceleration	g	-15.0	15.0	7.8	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*
 J. Hernandez

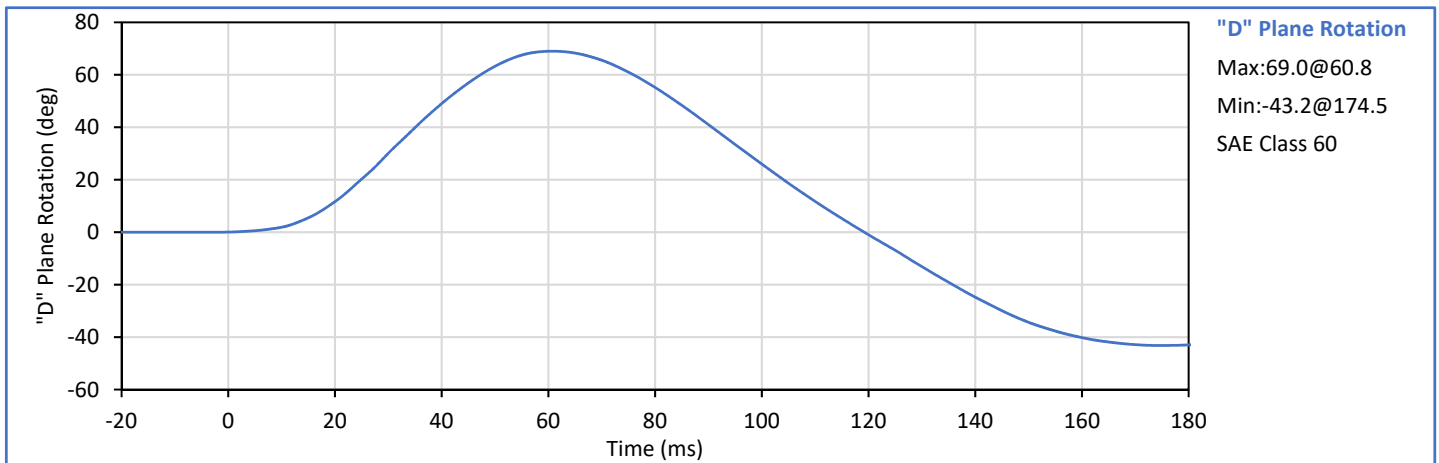
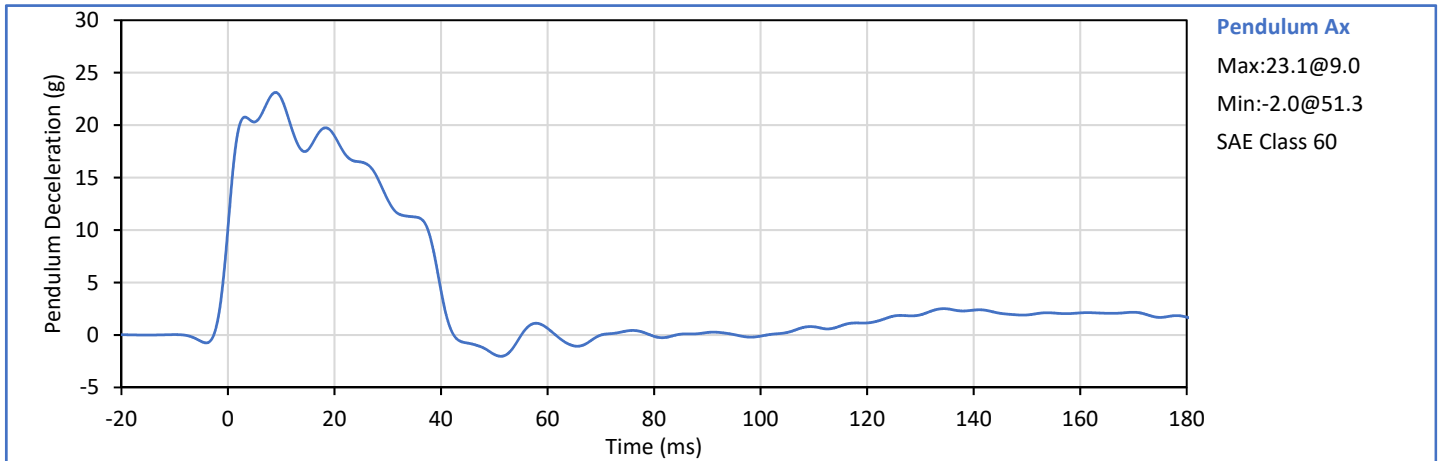
Approved By: *P. Puzzuto*
 P. Puzzuto

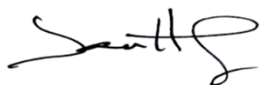



ATD Serial No.: 360

Test Date: 2018-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	6.89	7.13	6.99	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	22.6	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	19.0	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	12.9	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	12.9	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	39.7	Pass
"D" Plane Rotation peak	deg	64.0	78.0	69.0	Pass
	ms	57.0	64.0	60.8	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	119.3	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	90.0	Pass
	ms	47.0	58.0	56.5	Pass
Moment Decay, Peak to Zero	deg	97.0	107.0	99.2	Pass
Overall Test Results					Pass



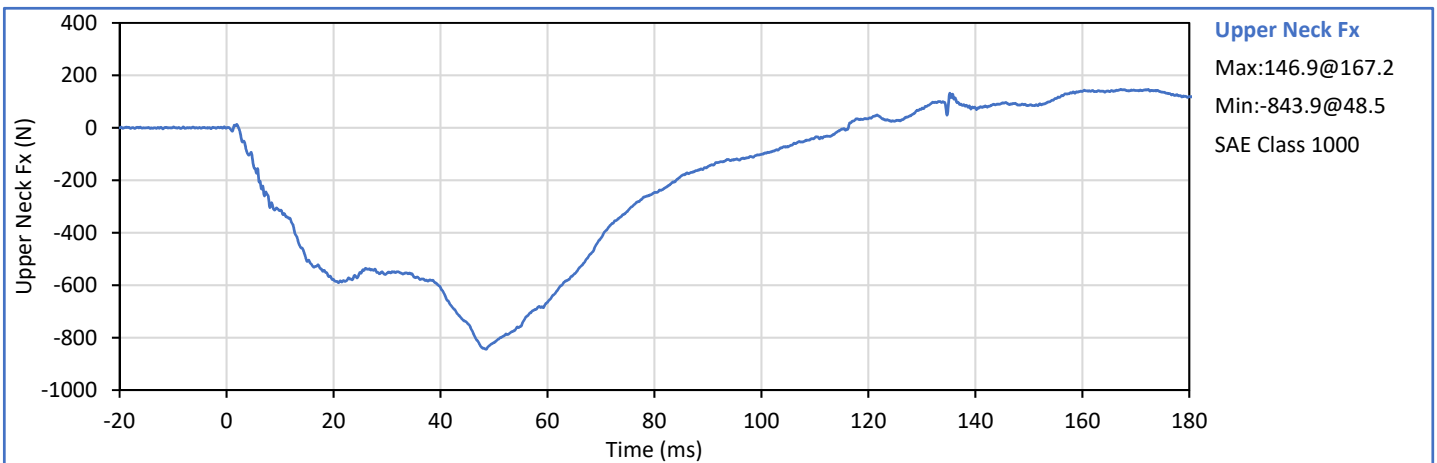
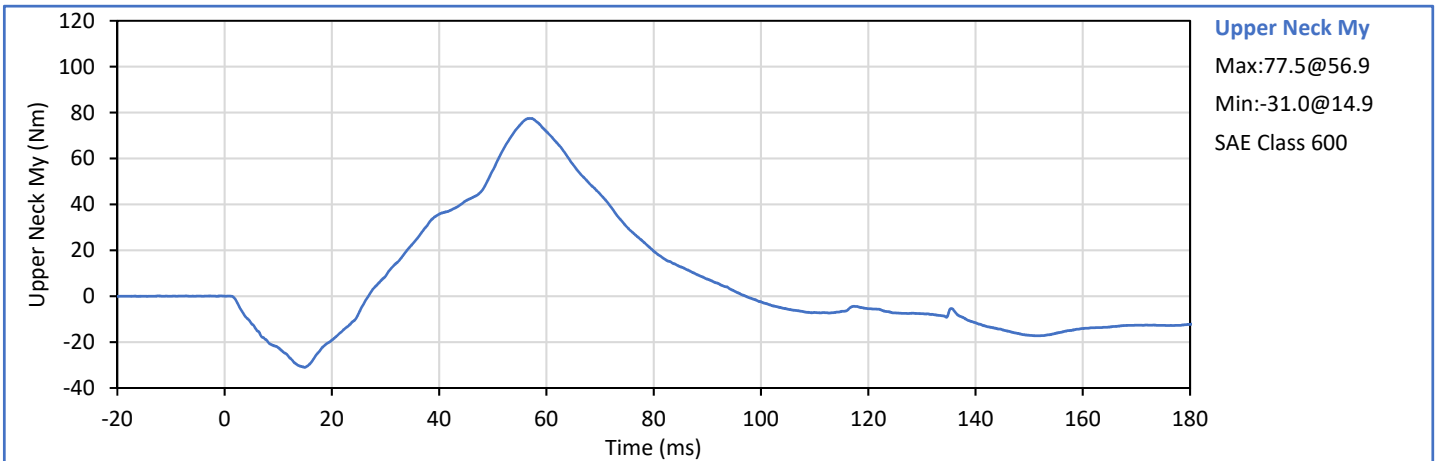
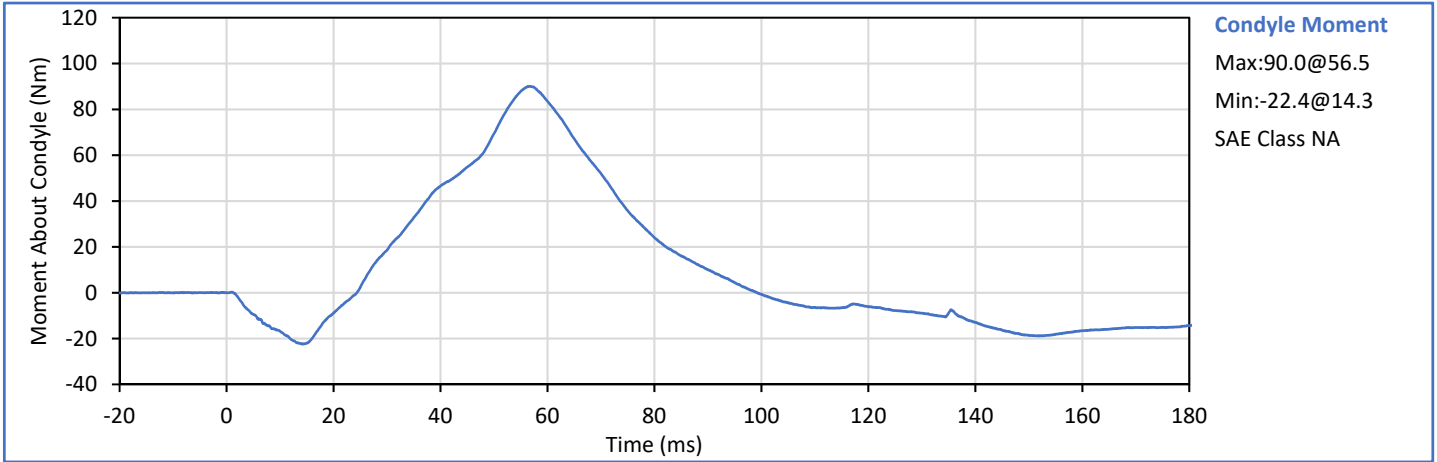
Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-11-21

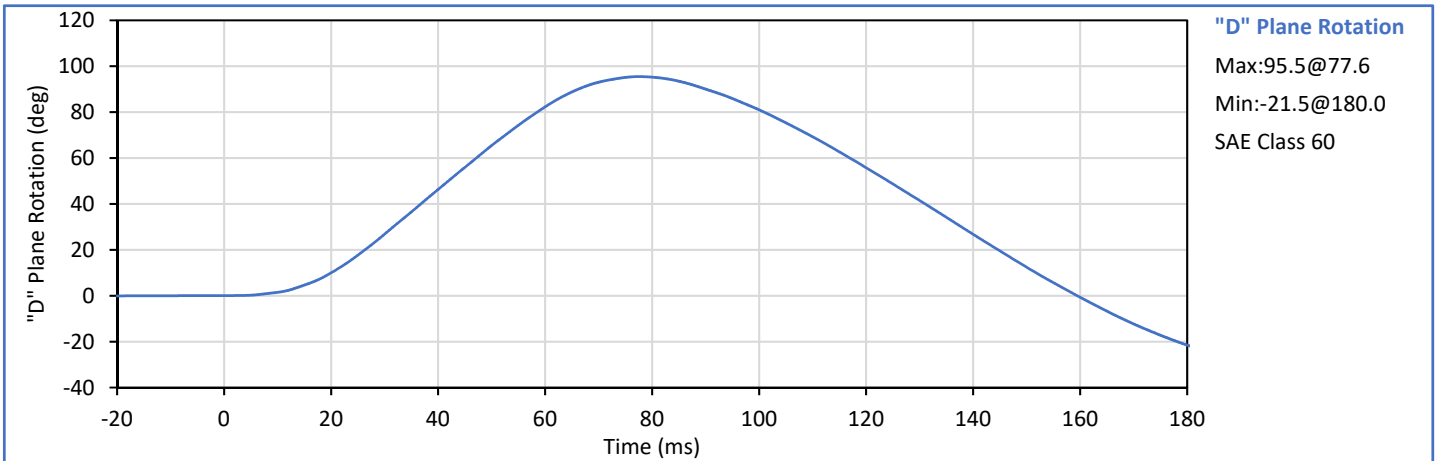
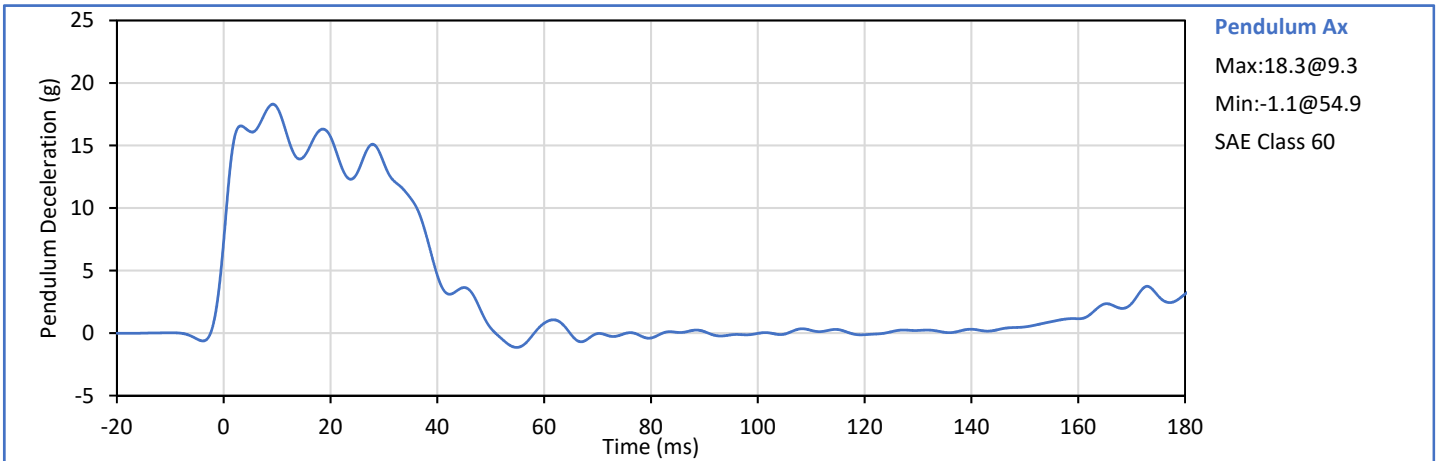


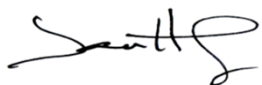



ATD Serial No.: 360

Test Date: 2018-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	5.94	6.19	6.00	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	18.0	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	15.7	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	13.6	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	13.6	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	39.7	Pass
"D" Plane Rotation peak	deg	81.0	106.0	95.5	Pass
	ms	72.0	82.0	77.6	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	159.5	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-59.1	Pass
	ms	65.0	79.0	71.5	Pass
Moment Decay, Peak to Zero	deg	120.0	148.0	139.5	Pass
Overall Test Results					Pass



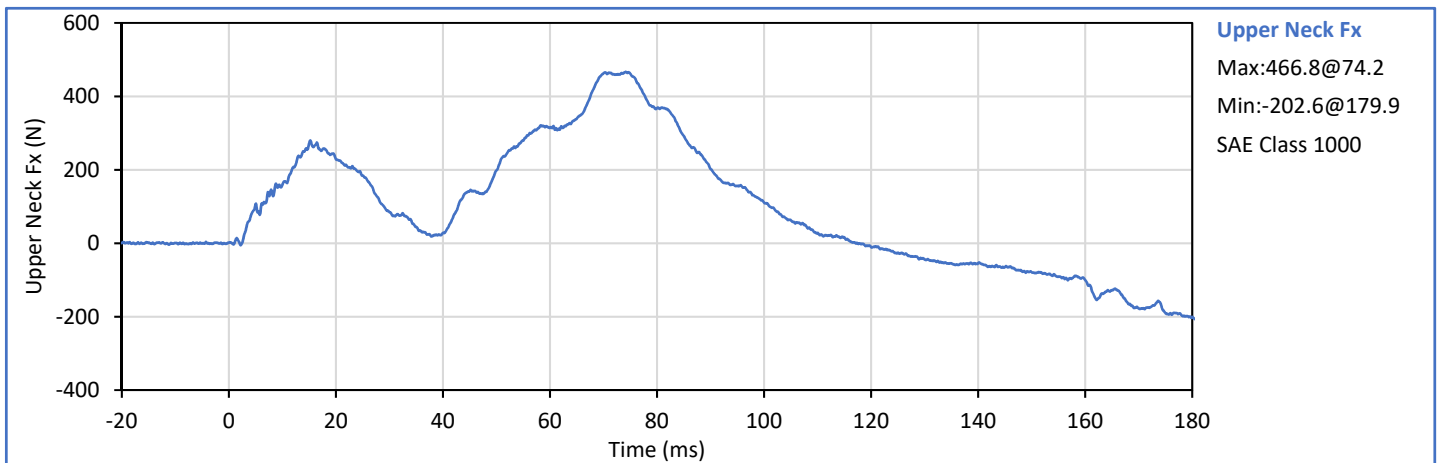
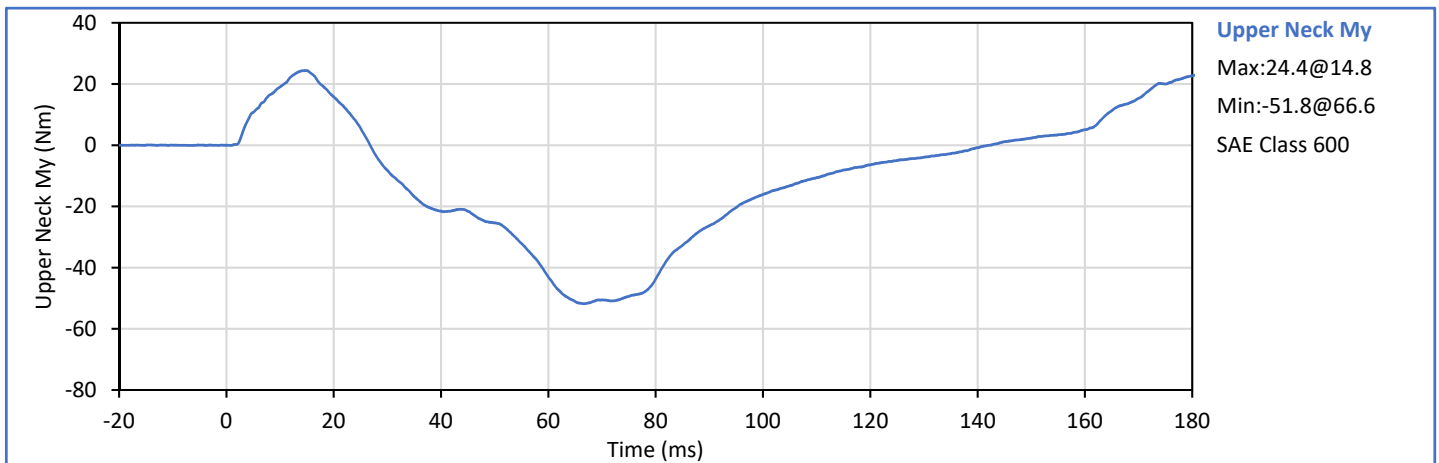
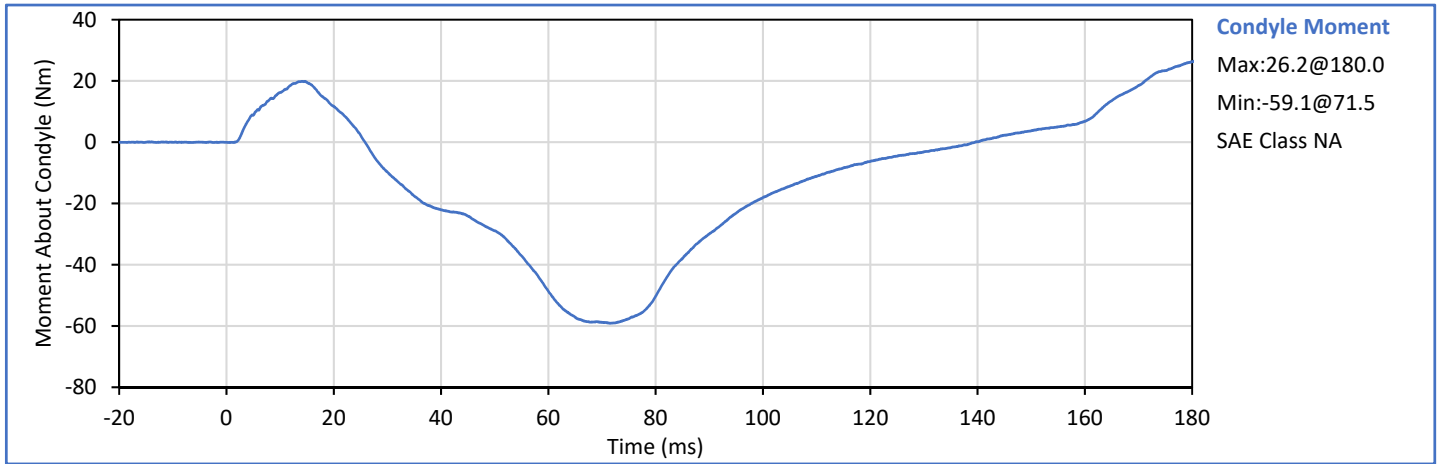
Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-11-21

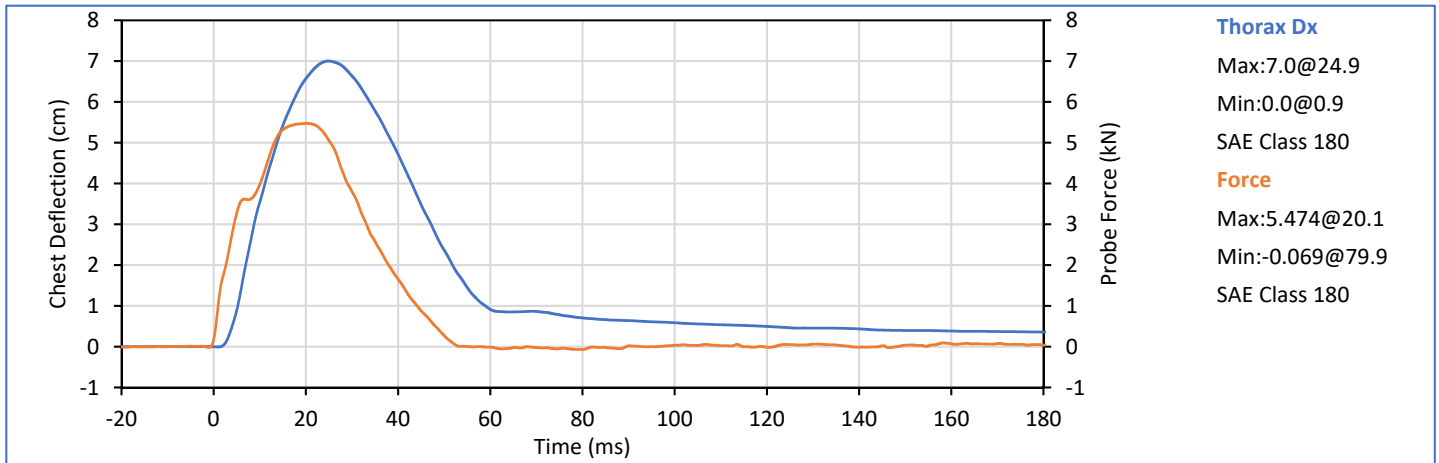
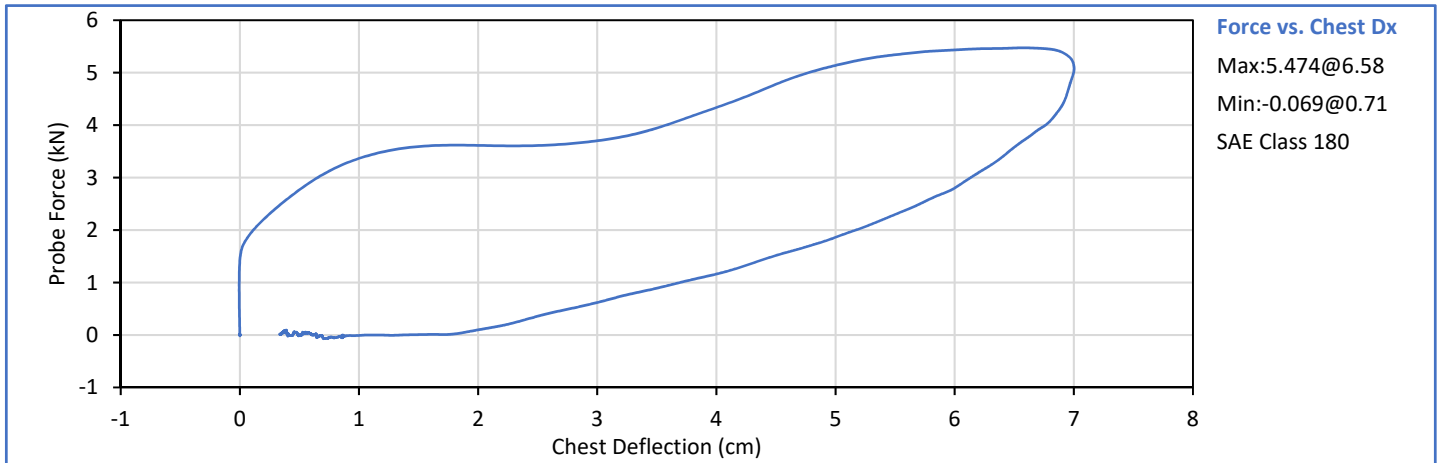




ATD Serial No.: 360

Test Date: 2018-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	20	Pass
Probe Velocity	m/s	6.58	6.82	6.75	Pass
Peak Chest Deflection	cm	6.35	7.26	7.00	Pass
Peak Probe Force	kN	5.159	5.893	5.474	Pass
Internal Hysterisis	%	69.0	85.0	70.4	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

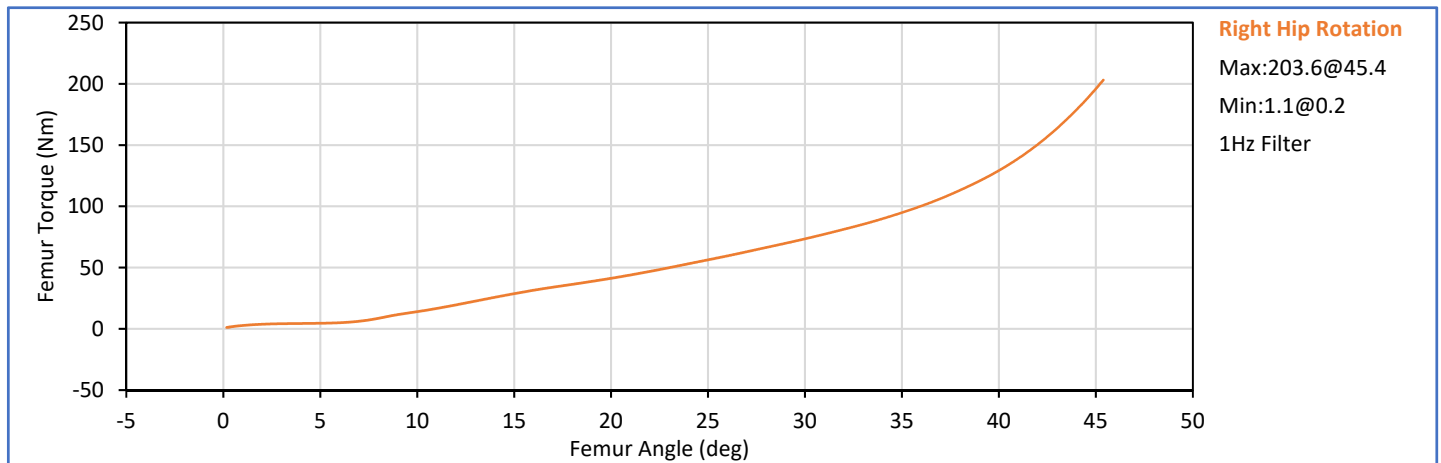
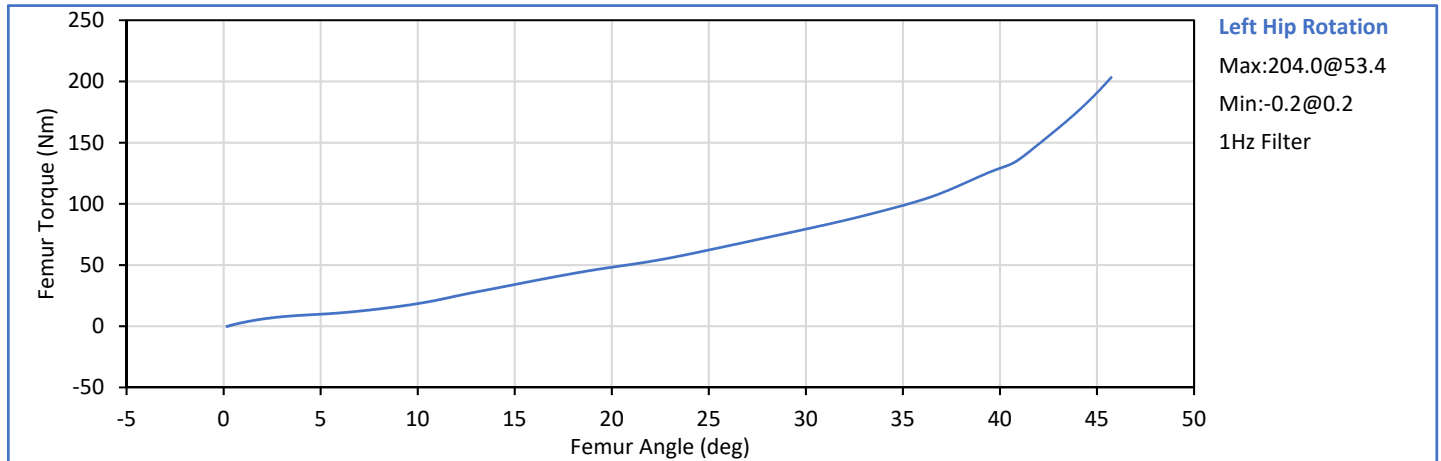
Approved By:
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-11-21

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Humidity	%	10	70	21	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	79.4	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	45.7	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	73.5	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.4	Pass
Overall Test Results						Pass



Technician:
 J. Hernandez

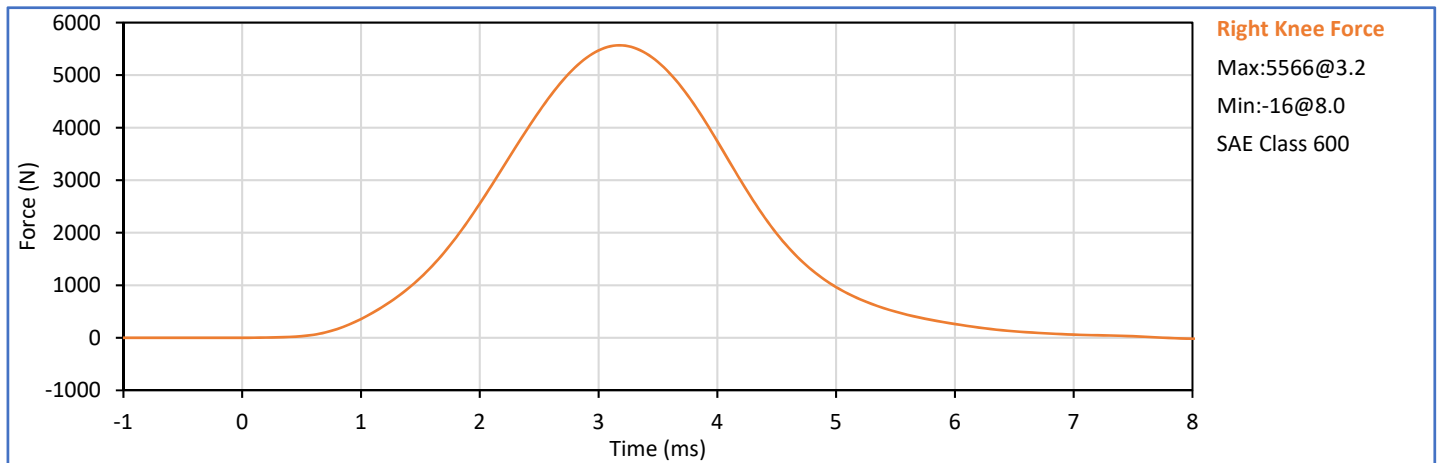
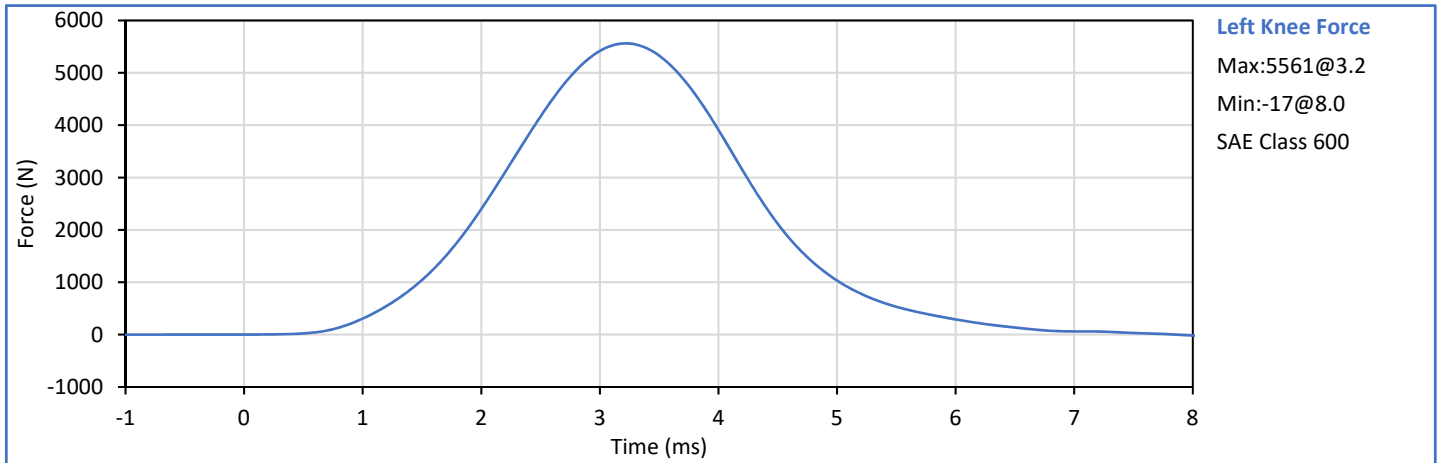
Approved By:
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-11-20

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.4	Pass
	Laboratory Humidity	%	10	70	20	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.093	Pass
Knee	Peak Resistive Force	N	4715	5782	5561	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.096	Pass
Knee	Peak Resistive Force	N	4715	5782	5566	Pass
Overall Test Results						Pass



Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto



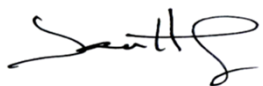
**Hybrid III 5th Percentile Female
 Damage Checklist**


ATD Serial No.: 141

Test Date: 2018-11-27

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

Describe any repairs or replacement of parts or other findings:

Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

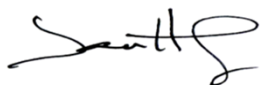



**Hybrid III 5th Percentile Female
 External Measurements**

ATD Serial No.: 141

Test Date: 2018-11-27

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

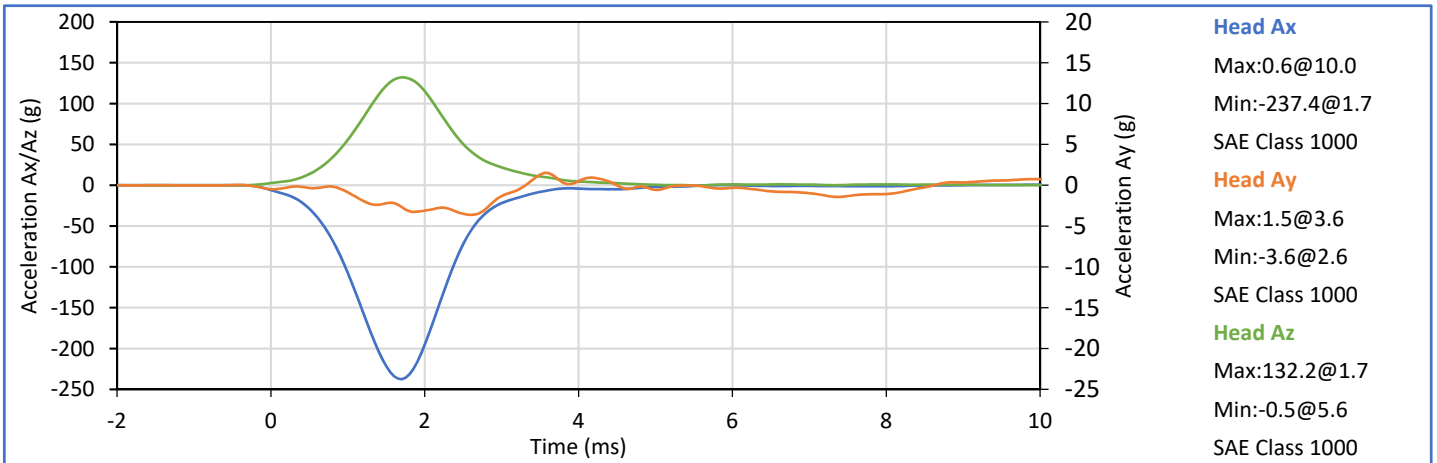
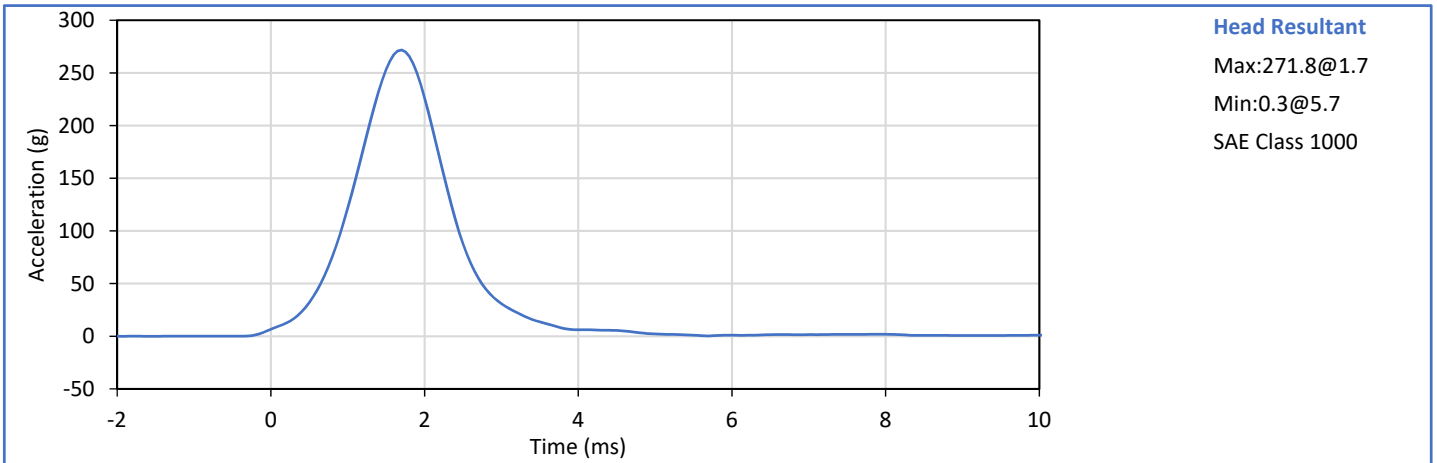
Approved By: 
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-11-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.8	Pass
Laboratory Humidity	%	10	70	19	Pass
Peak Resultant Acceleration	g	250.0	300.0	271.8	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-3.6	Pass
Oscillations After Main Pulse	%	0.0	10.0	0.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

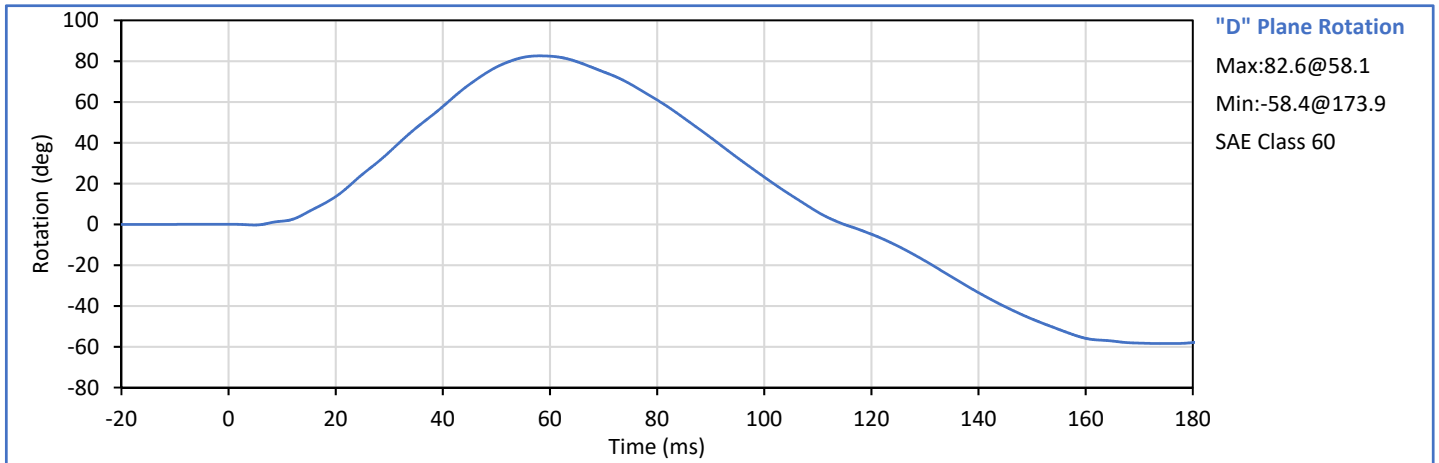
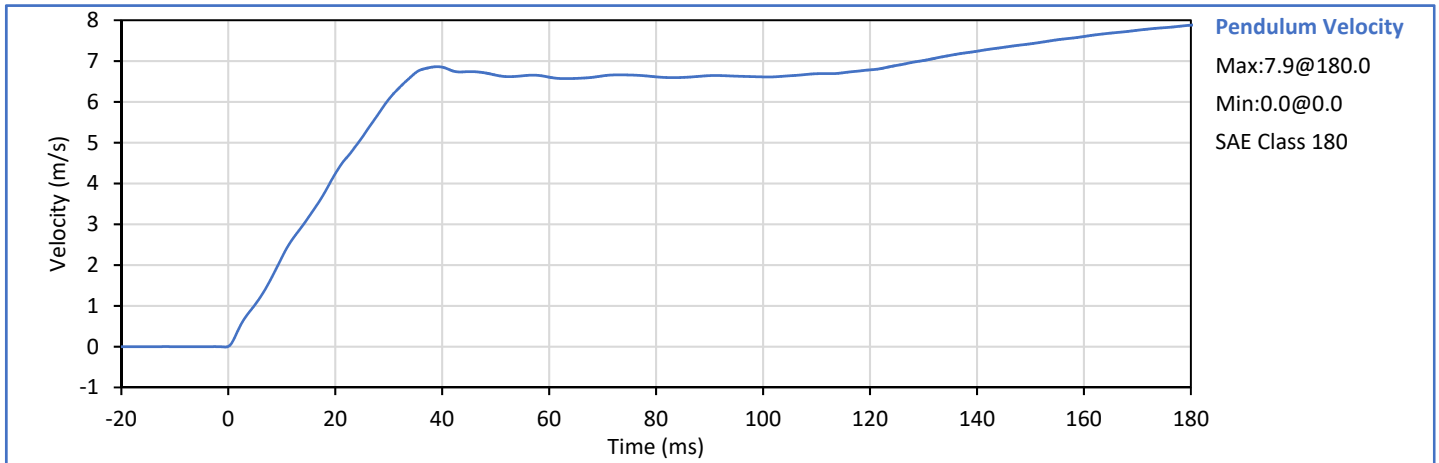
Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-11-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	6.89	7.13	6.99	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.18	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.24	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.06	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	82.6	Pass
Peak Moment in Rotation	Nm	69.0	83.0	81.5	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	86.8	Pass
Overall Test Results					Pass



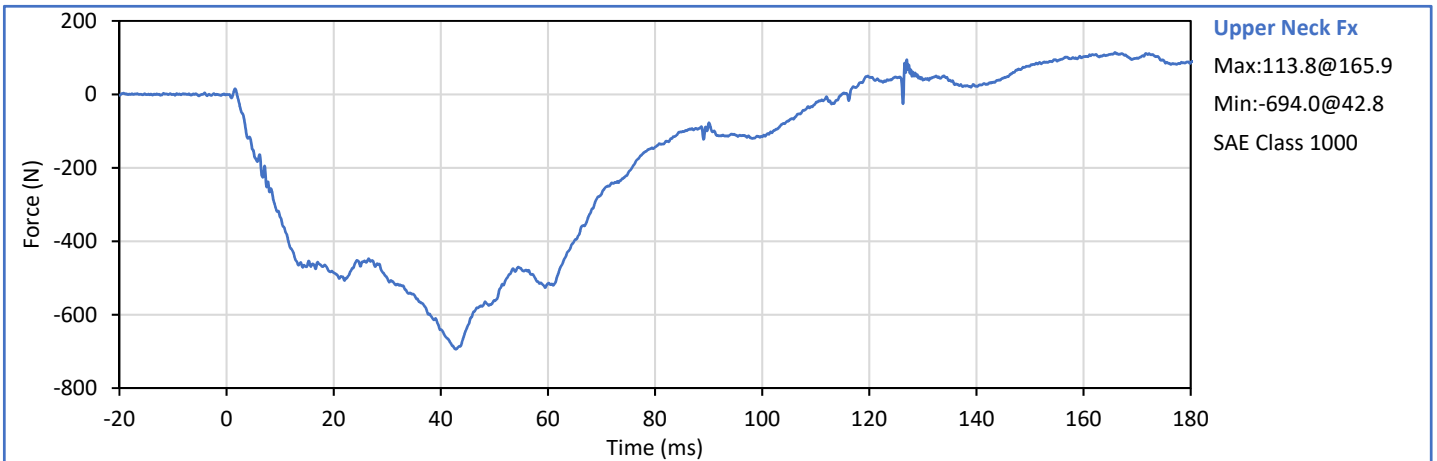
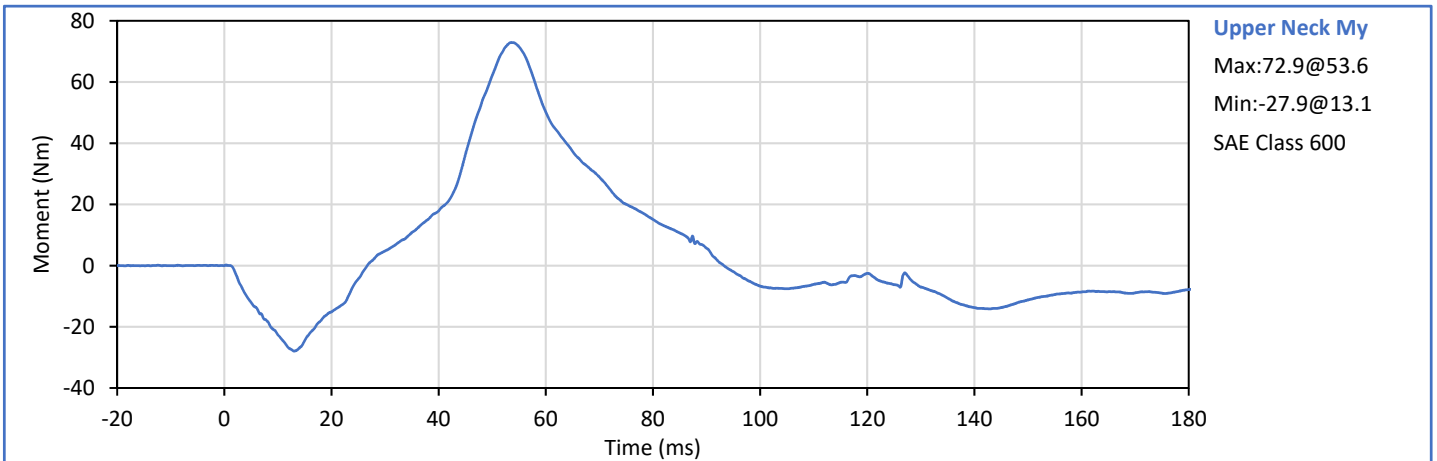
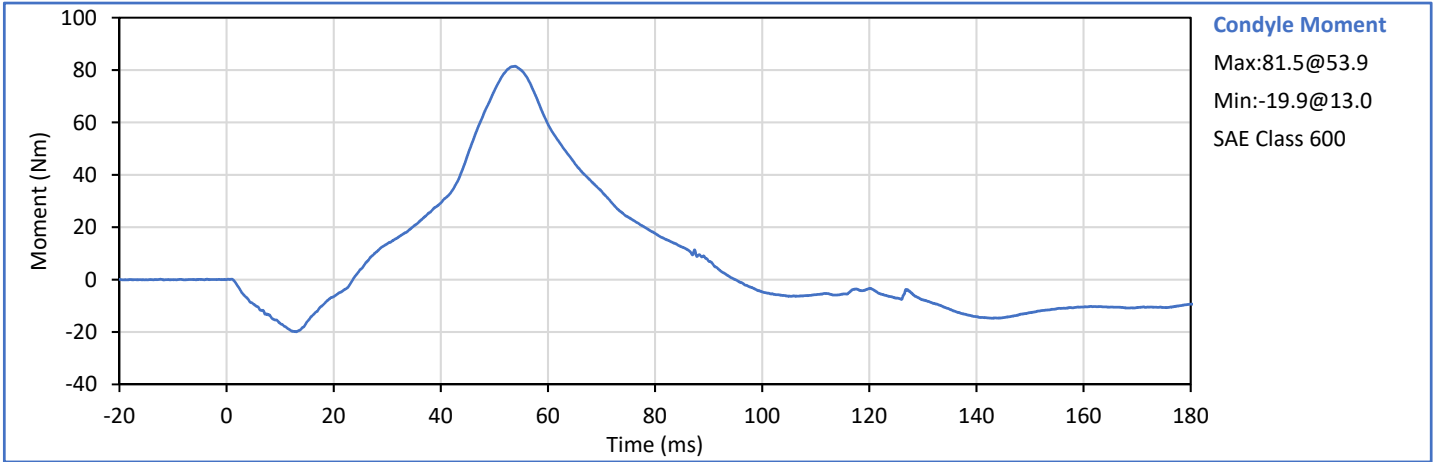
Technician:
 J. Hernandez

Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-11-28

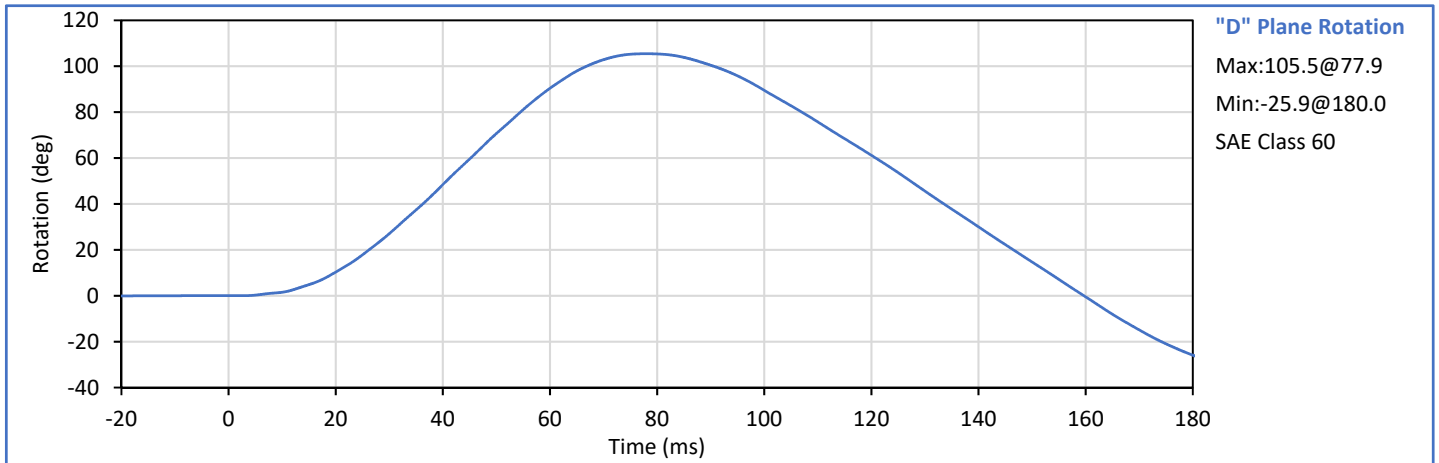
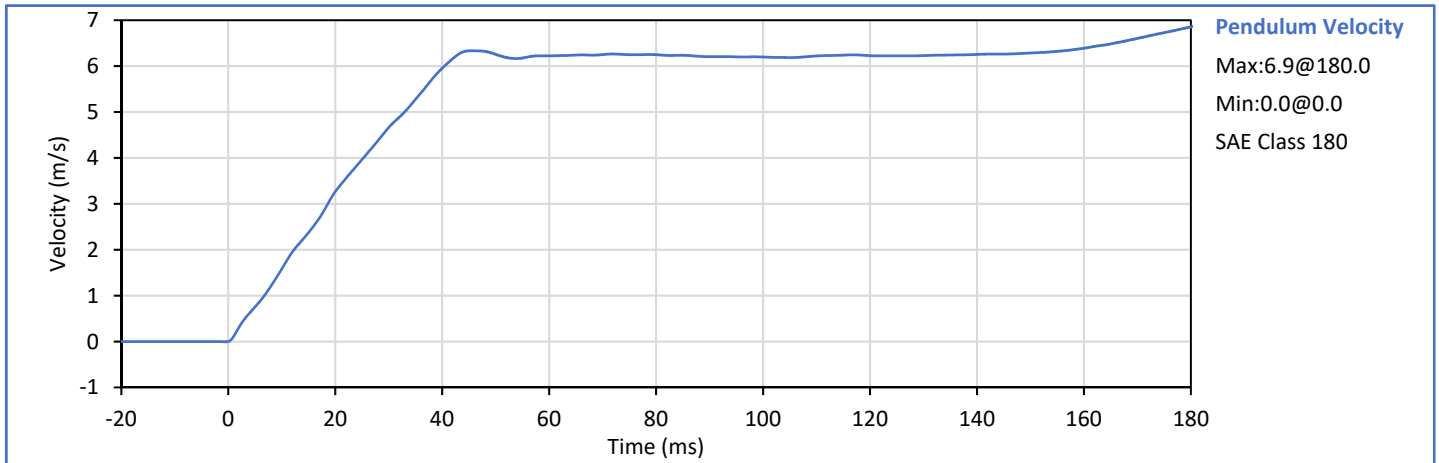




ATD Serial No.: 141

Test Date: 2018-11-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	5.95	6.19	6.03	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.58	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.26	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	4.66	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	105.5	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-53.0	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	105.8	Pass
Overall Test Results					Pass



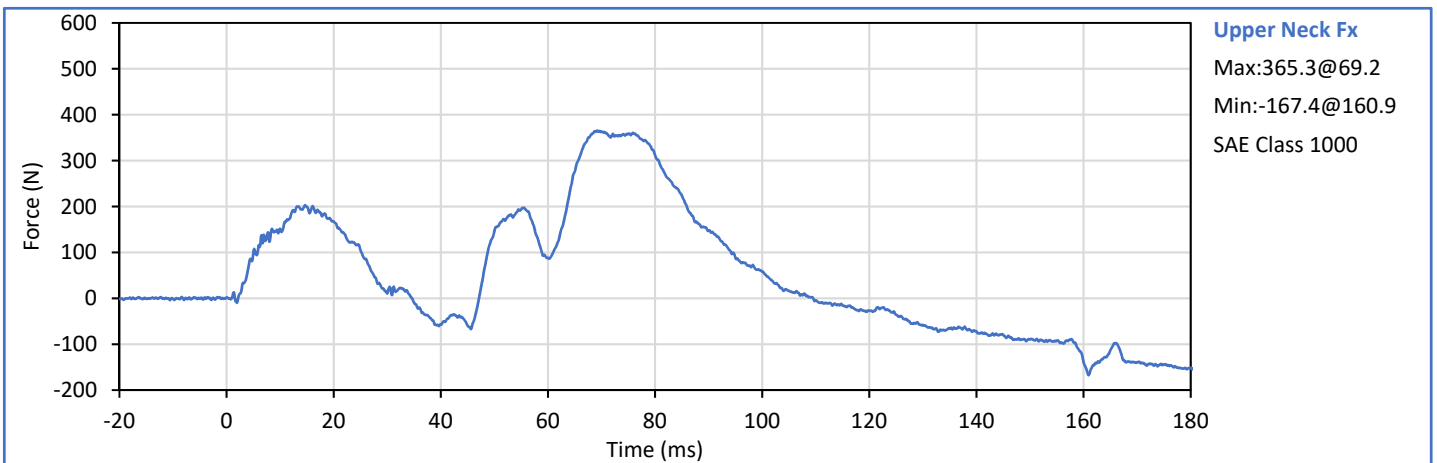
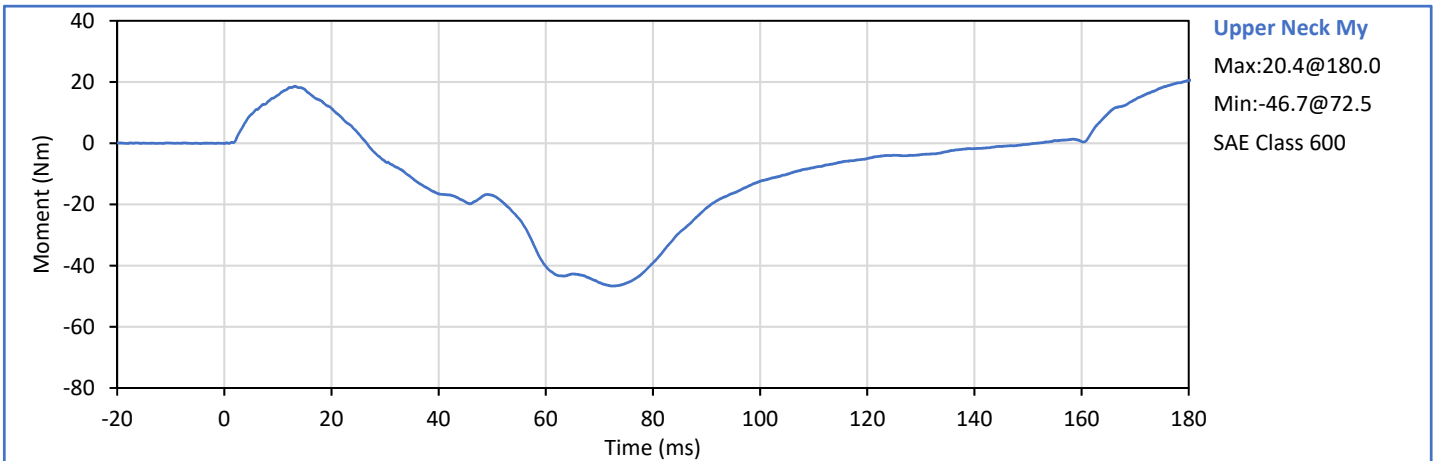
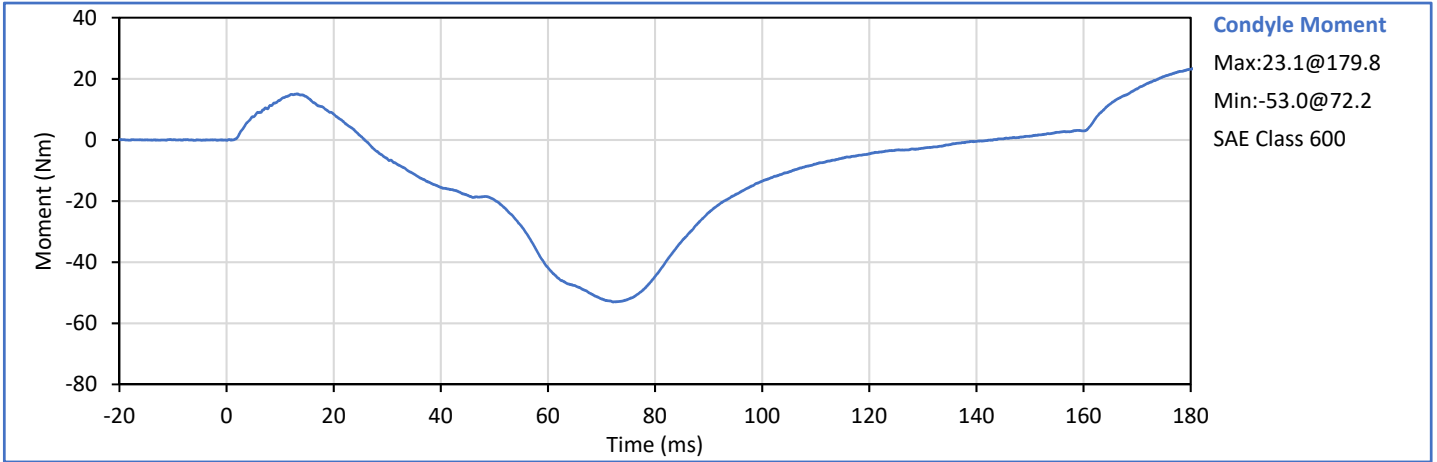
Technician:
 J. Hernandez

Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-11-28

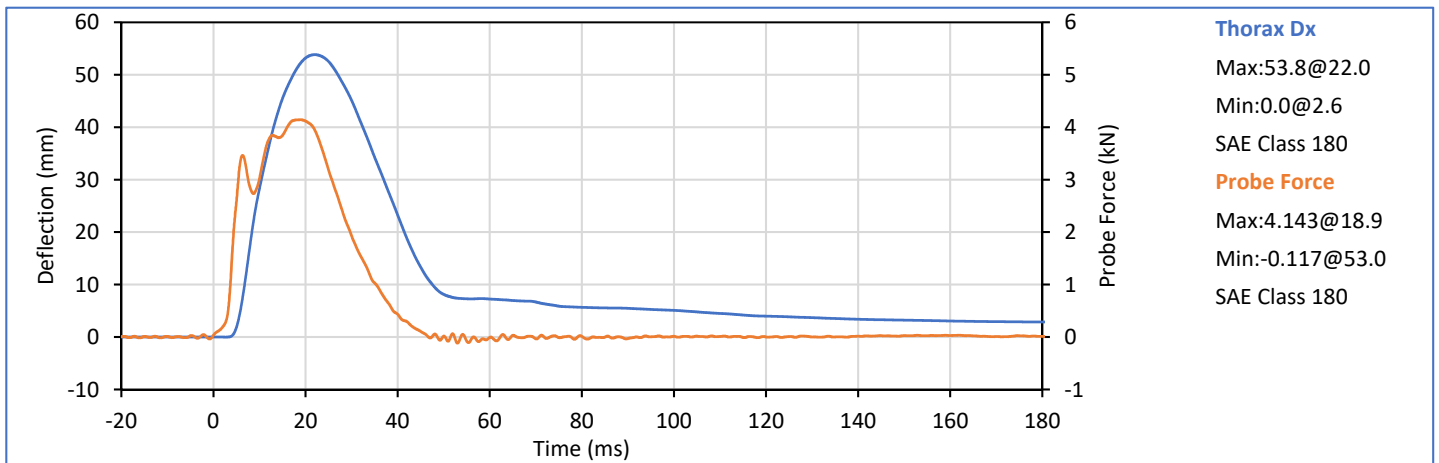
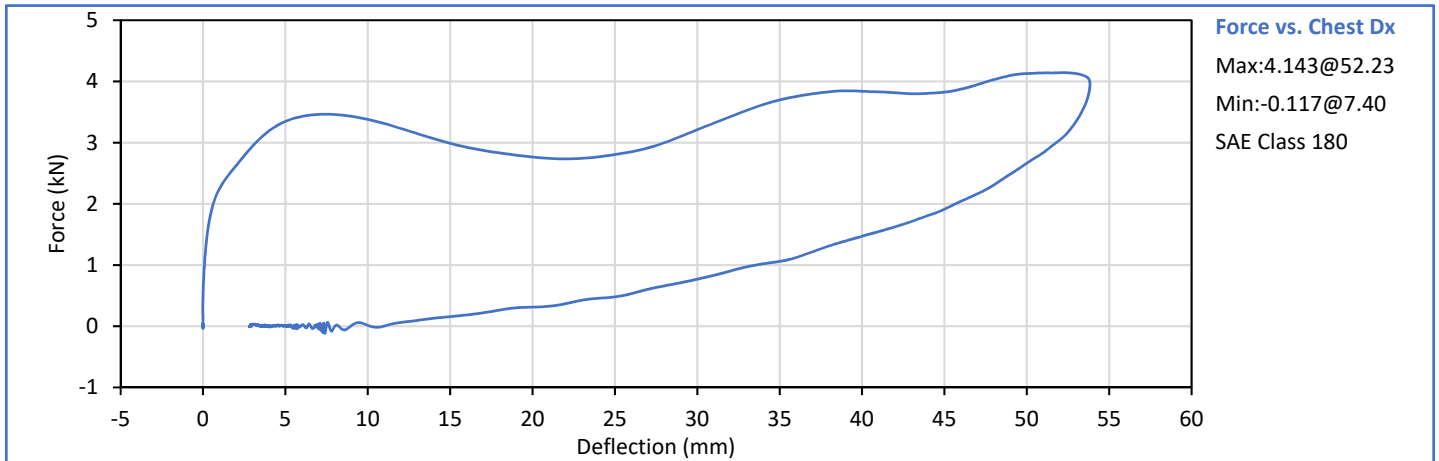




ATD Serial No.: 141

Test Date: 2018-12-08

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	33	Pass
Probe Velocity	m/s	6.59	6.83	6.65	Pass
Peak Chest Deflection	mm	50.0	58.0	53.8	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.143	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.128	Pass
Internal Hysterisis	%	69.0	85.0	72.7	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

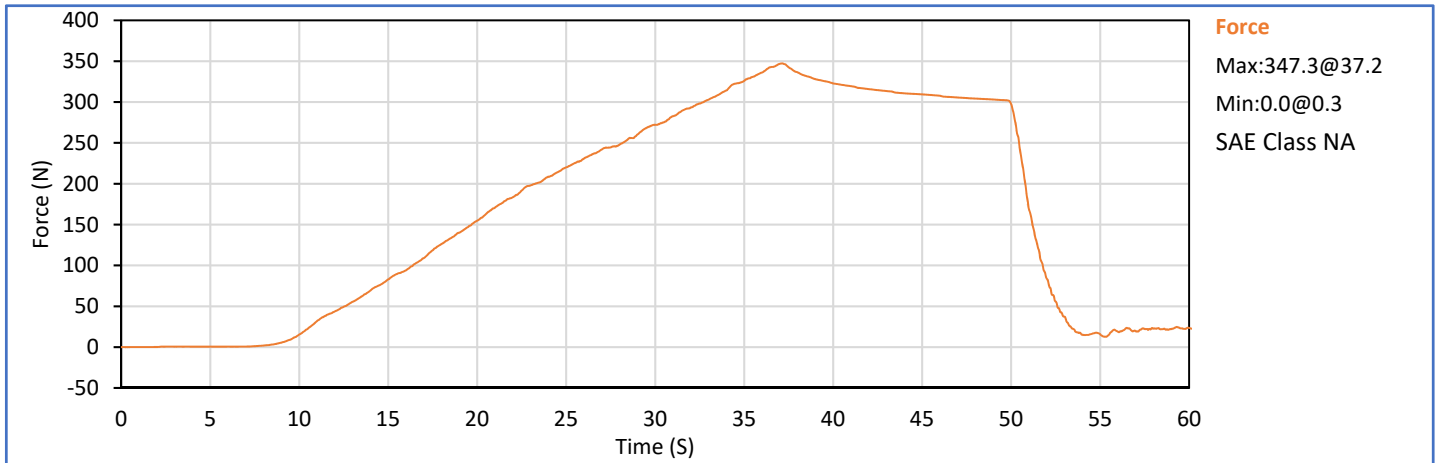
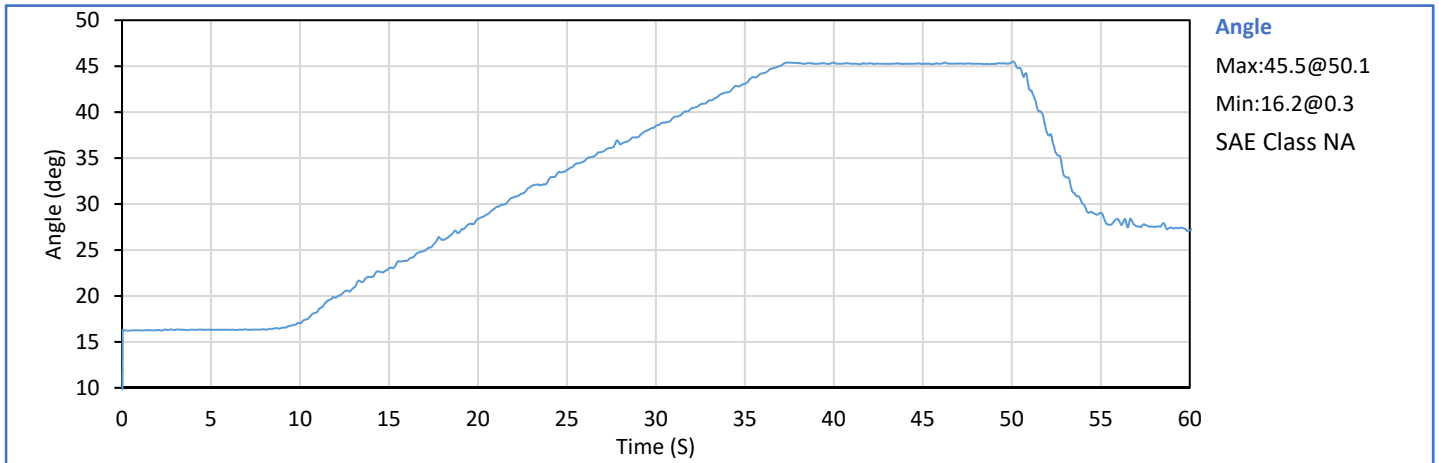
Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Orientation Angle	deg	0.0	20.0	15.9	Pass
Test Initial Angle	deg	11.0	19.0	16.3	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	346.2	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.03	Pass
Final Reference Plane Angle	deg	-8.0	8.0	3.5	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

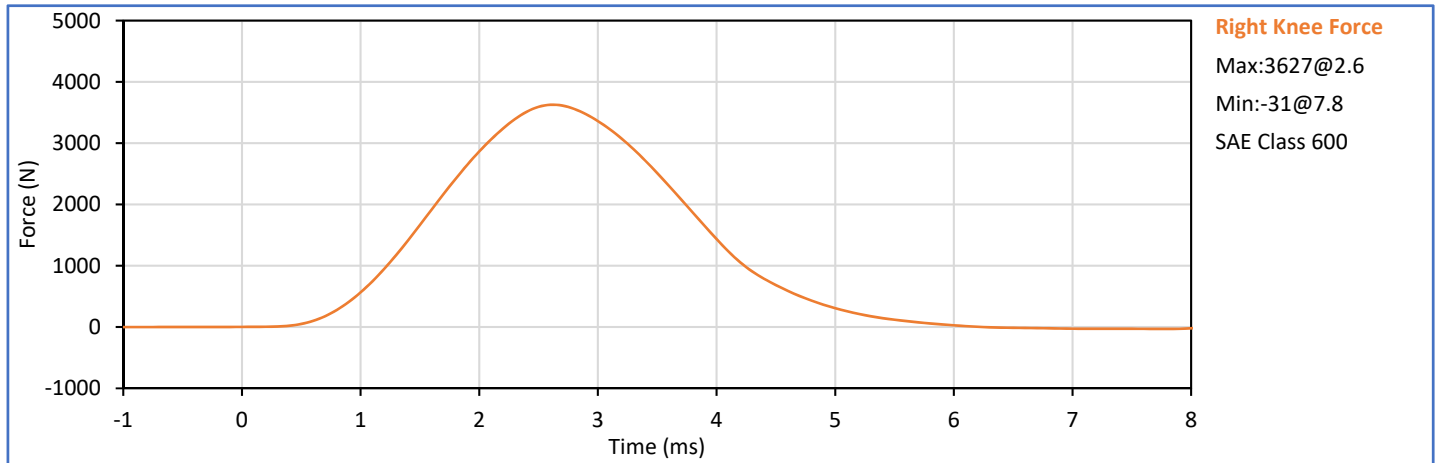
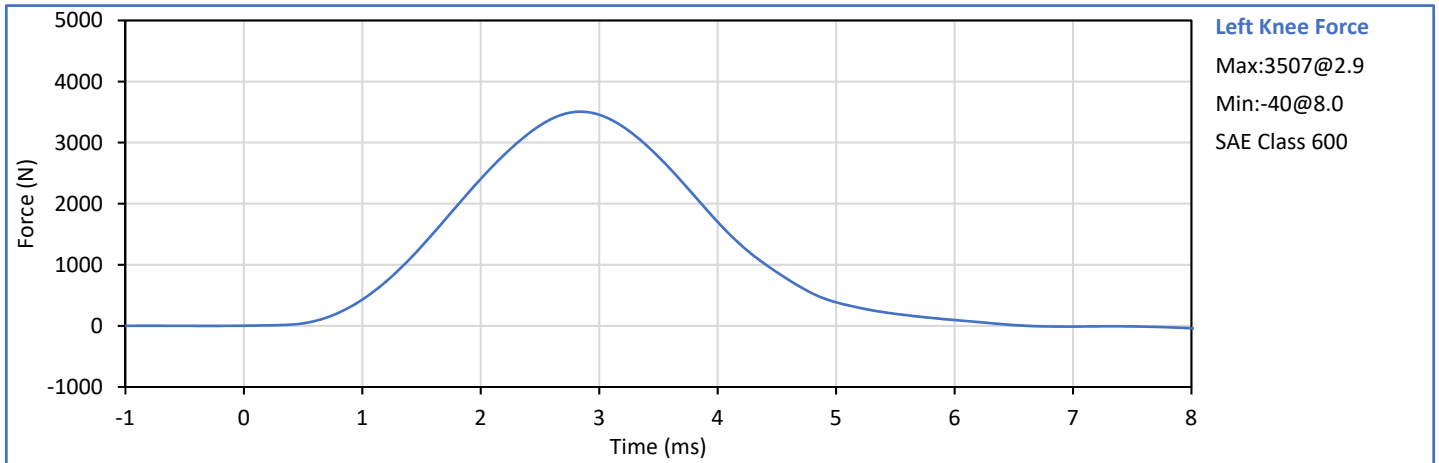
Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-08

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Left Knee Probe Velocity	m/s	2.070	2.130	2.101	Pass
Left Knee Peak Resistive Force	N	3450	4060	3507	Pass
Right Knee Probe Velocity	m/s	2.070	2.130	2.100	Pass
Right Knee Peak Resistive Force	N	3450	4060	3627	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

Approved By:
 P. Puzzuto

APPENDIX C
POST-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

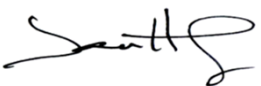



ATD Serial No.: 360

Test Date: 2018-12-19

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

Describe any repairs or replacement of parts or other findings:

Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

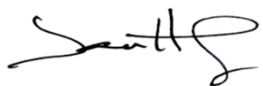



**Hybrid III 50th Percentile Male
 External Measurements**

ATD Serial No.: 360

Test Date: 2018-12-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
A - Total sitting height	mm	879	889	888	Pass
B - Shoulder pivot height	mm	505	521	518	Pass
C - 'H' point height	mm	84	89	88	Pass
D - 'H' point location from backline	mm	135	140	137	Pass
E - Shoulder pivot from backline	mm	84	94	89	Pass
F - Thigh clearance	mm	140	155	151	Pass
G - Back of elbow to wrist pivot	mm	290	305	296	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	204	Pass
K - Buttock to knee length	mm	579	604	586	Pass
L - Popliteal length	mm	429	455	445	Pass
M - Knee pivot height	mm	485	500	495	Pass
N - Buttock popliteal length	mm	452	477	469	Pass
O - Chest depth without jacket	mm	213	229	225	Pass
P - Foot length	mm	251	267	259	Pass
V - Shoulder breadth	mm	422	437	427	Pass
W - Foot breadth	mm	91	107	102	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	977	Pass
Z - Waist circum.	mm	836	866	851	Pass
AA - Location for chest circum.	mm	429	434	431	Pass
BB - Location for waist circum.	mm	226	231	230	Pass
Overall Test Results					Pass

Technician: 
 J. Hernandez

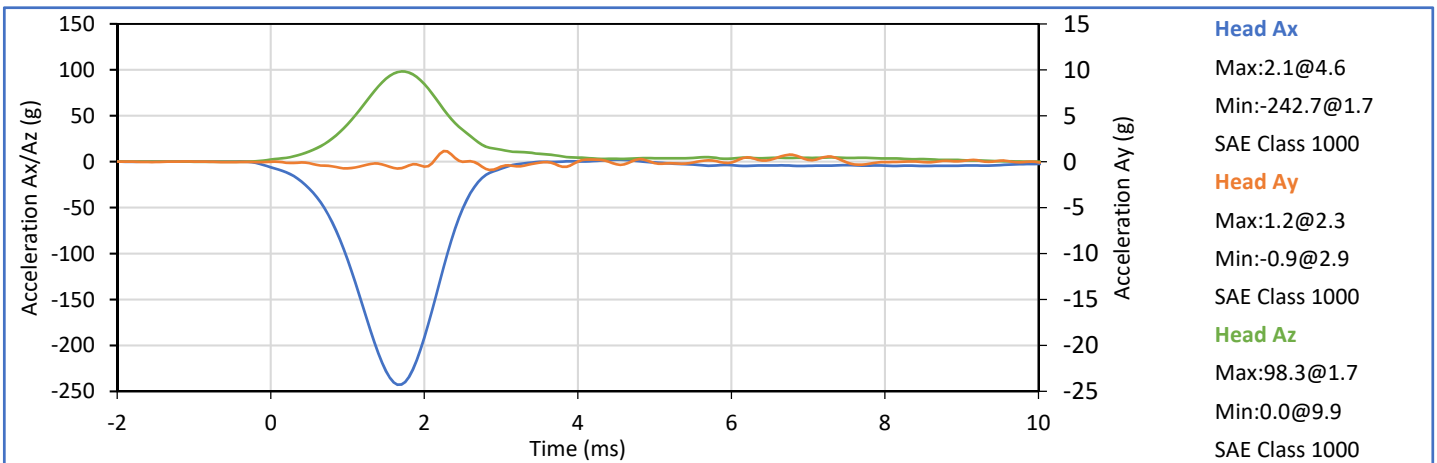
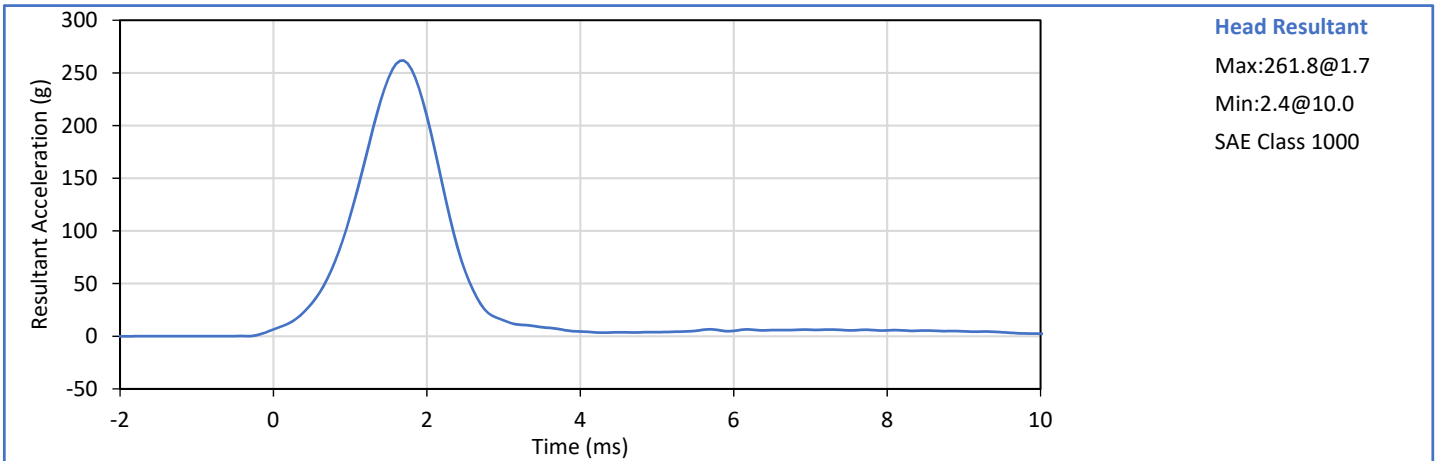
Approved By: 
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-12-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	35	Pass
Peak Resultant Acceleration	g	225.0	275.0	261.8	Pass
Peak Lateral Acceleration	g	-15.0	15.0	1.2	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

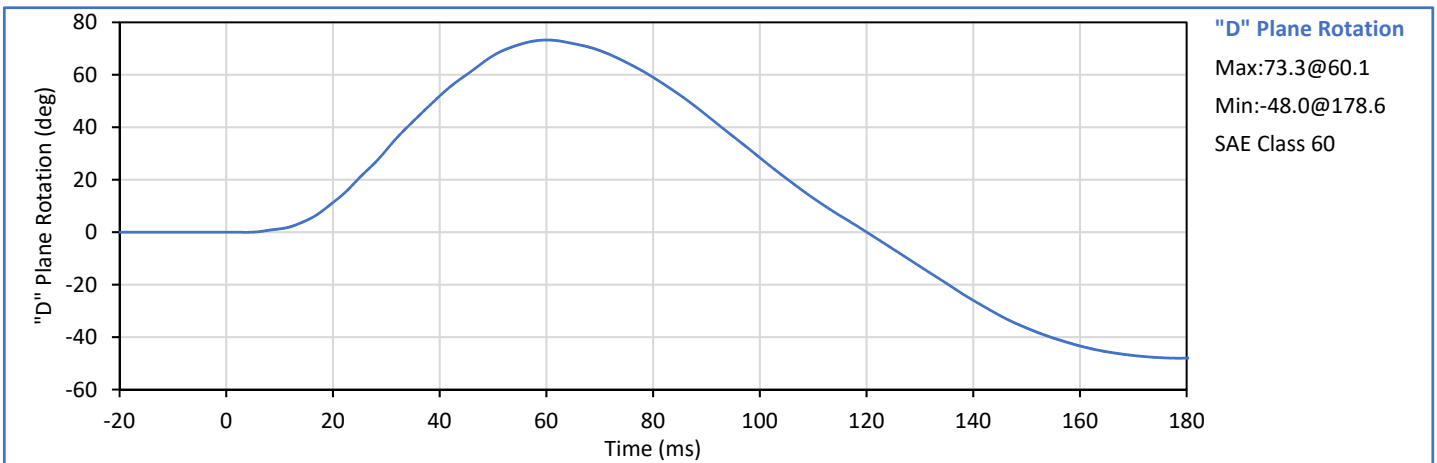
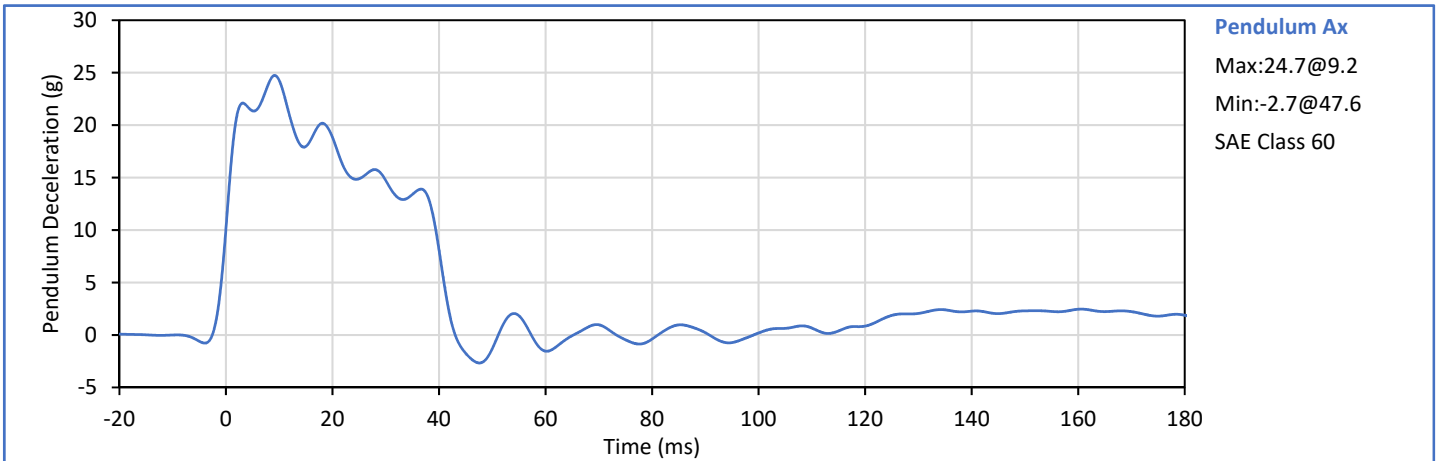
Approved By:
 P. Puzzuto




ATD Serial No.: 360

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	6.98	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	24.3	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	18.8	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	14.7	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	14.7	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	40.9	Pass
"D" Plane Rotation peak	deg	64.0	78.0	73.3	Pass
	ms	57.0	64.0	60.1	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	120.1	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	99.4	Pass
	ms	47.0	58.0	54.1	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	100.0	Pass
Overall Test Results					Pass



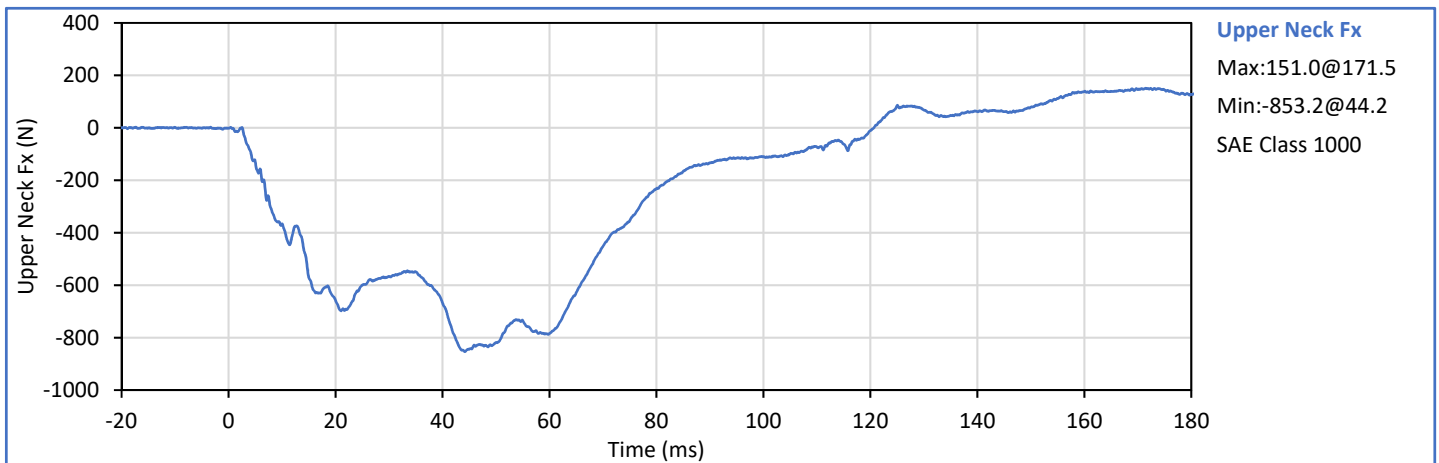
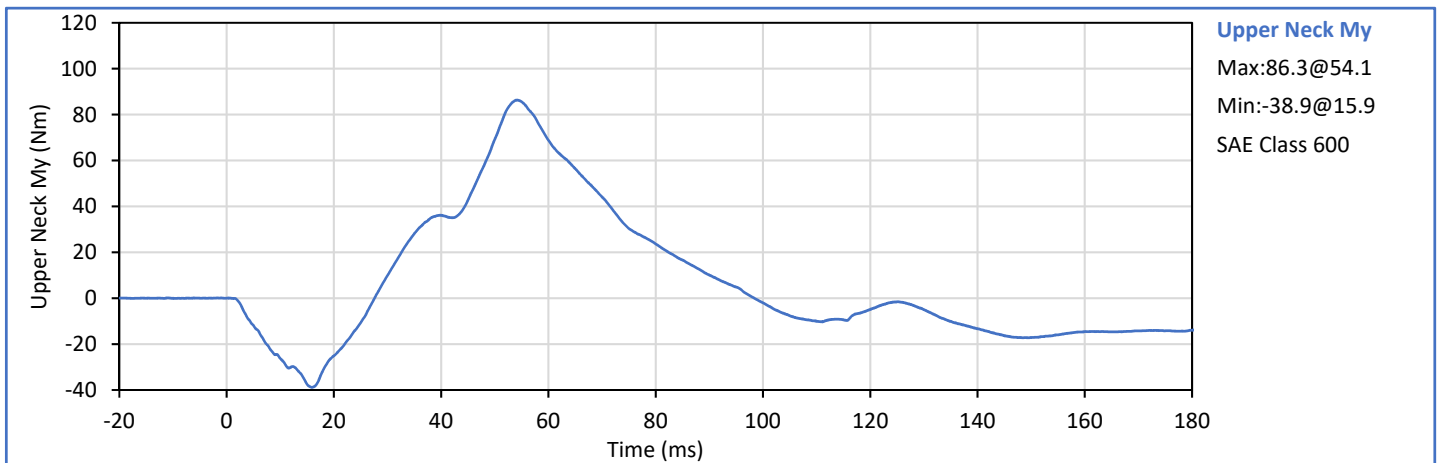
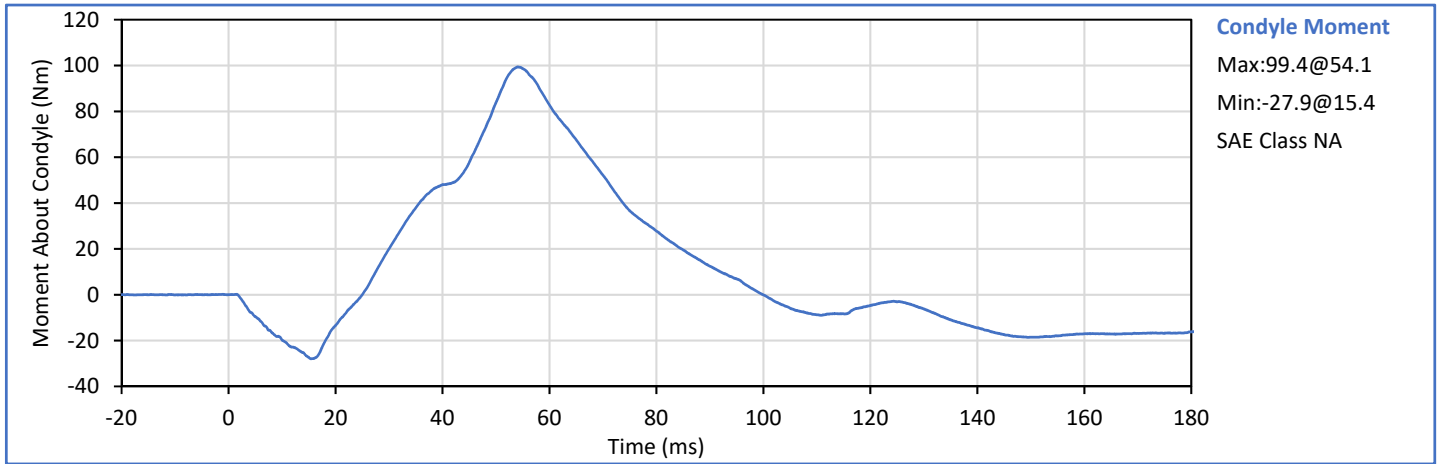
Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-12-21

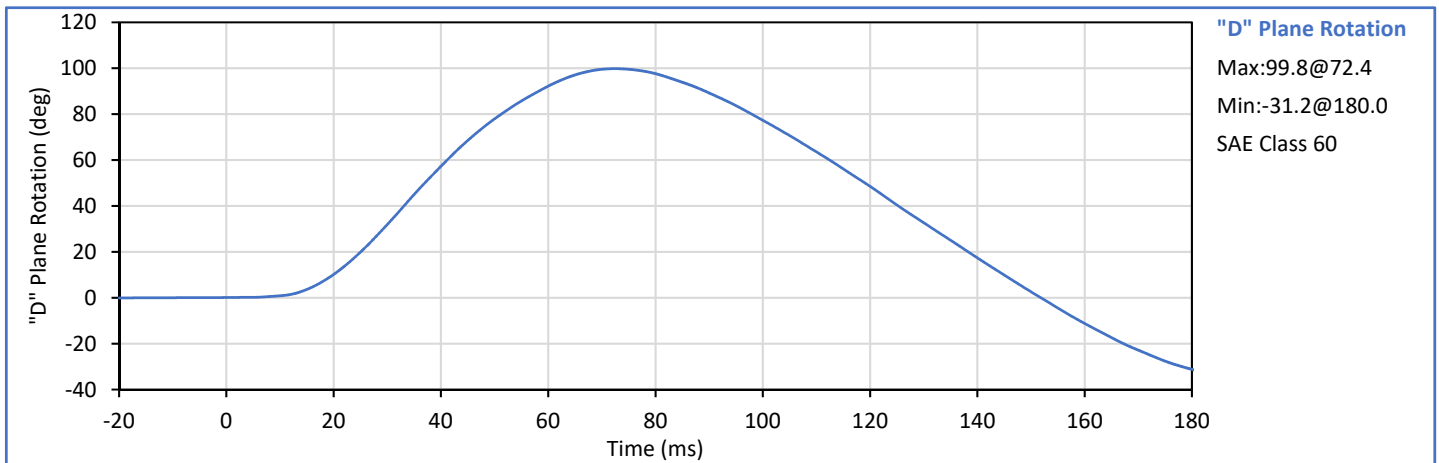
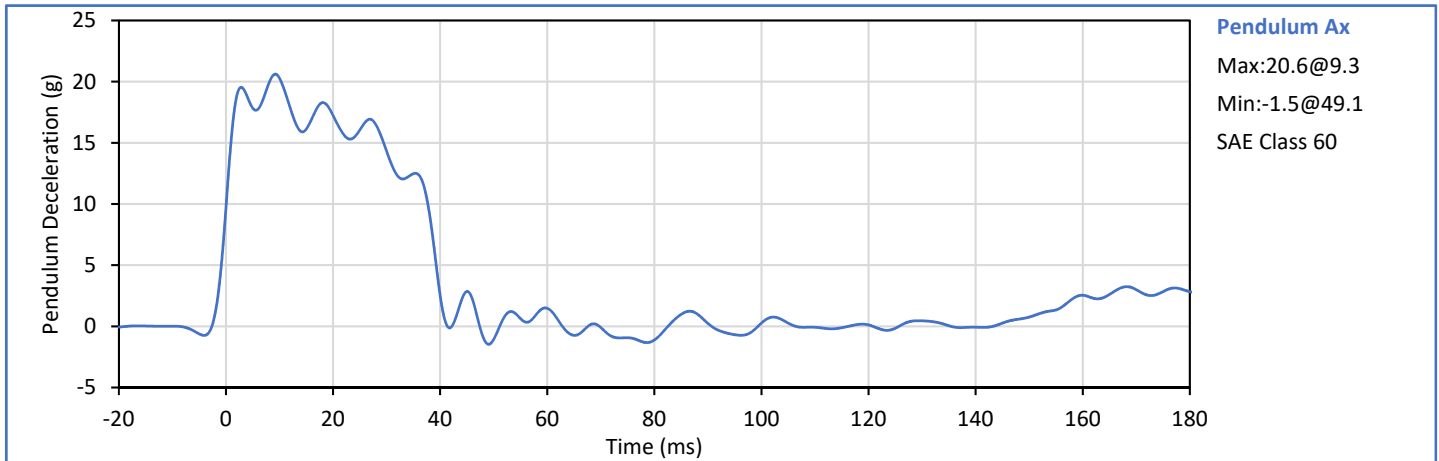




ATD Serial No.: 360

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.94	6.19	6.03	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	20.3	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	17.2	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	14.3	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	14.3	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	39.3	Pass
"D" Plane Rotation peak	deg	81.0	106.0	99.8	Pass
	ms	72.0	82.0	72.4	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	151.9	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-75.1	Pass
	ms	65.0	79.0	67.1	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	132.6	Pass
Overall Test Results					Pass



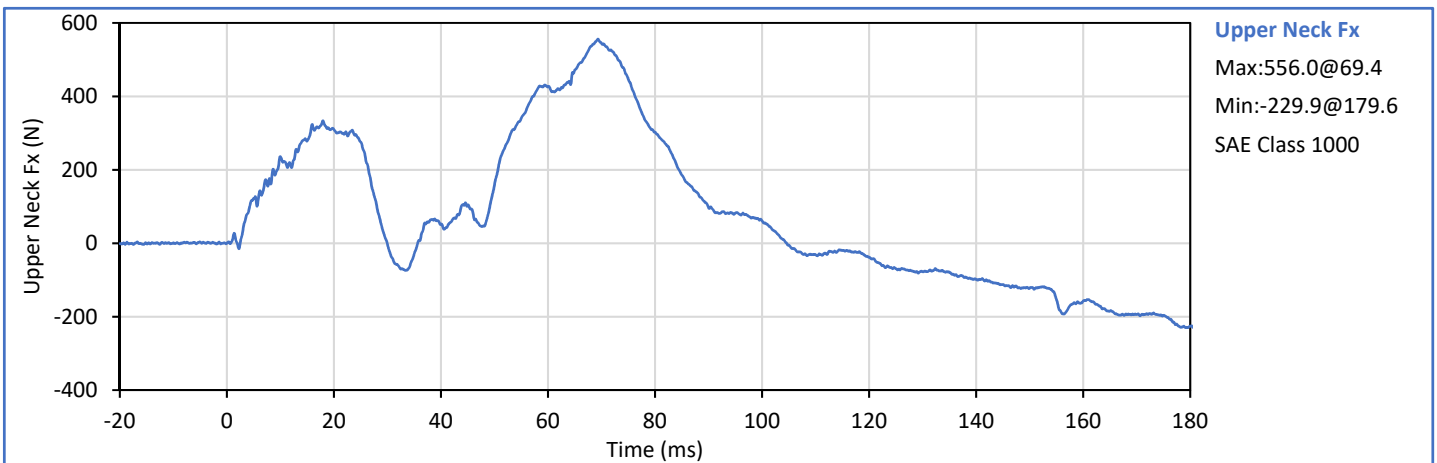
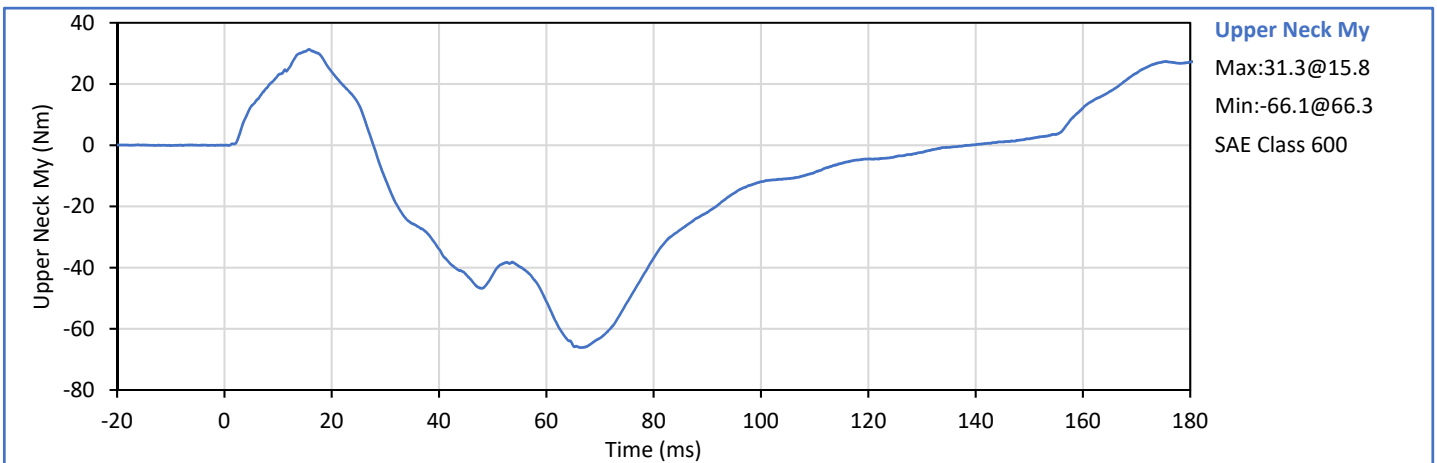
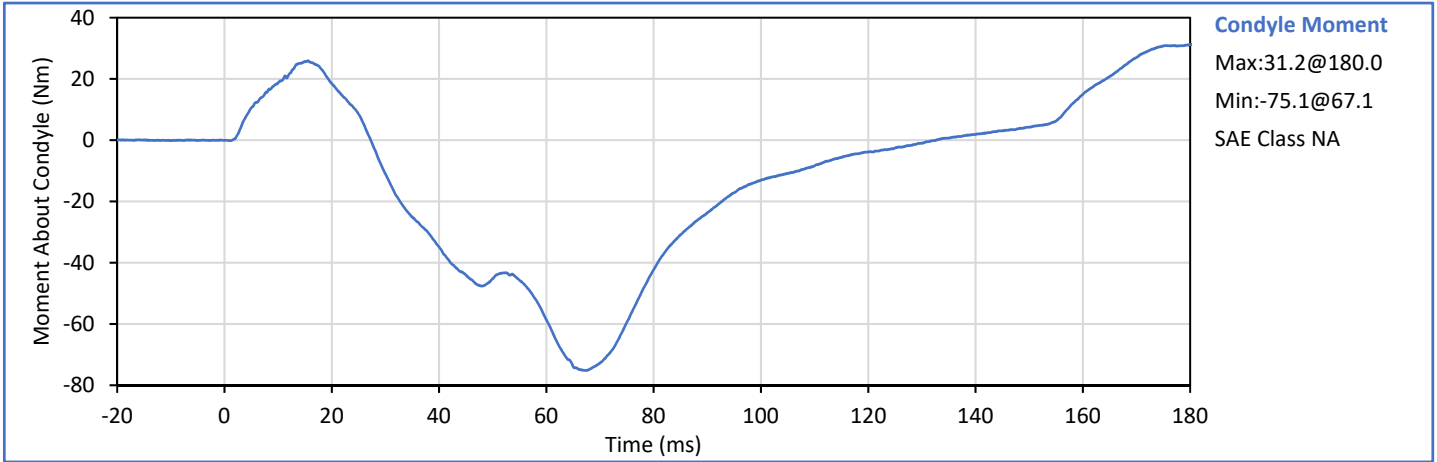
Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-12-21

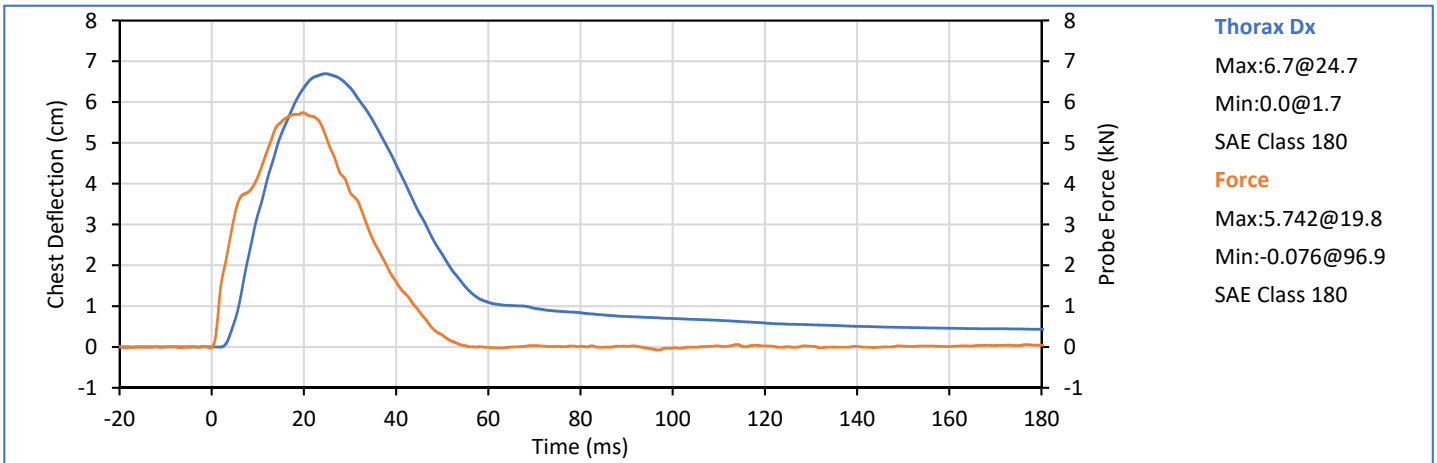




ATD Serial No.: 360

Test Date: 2018-12-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.58	6.82	6.68	Pass
Peak Chest Deflection	cm	6.35	7.26	6.70	Pass
Peak Probe Force	kN	5.159	5.893	5.742	Pass
Internal Hysterisis	%	69.0	85.0	71.4	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

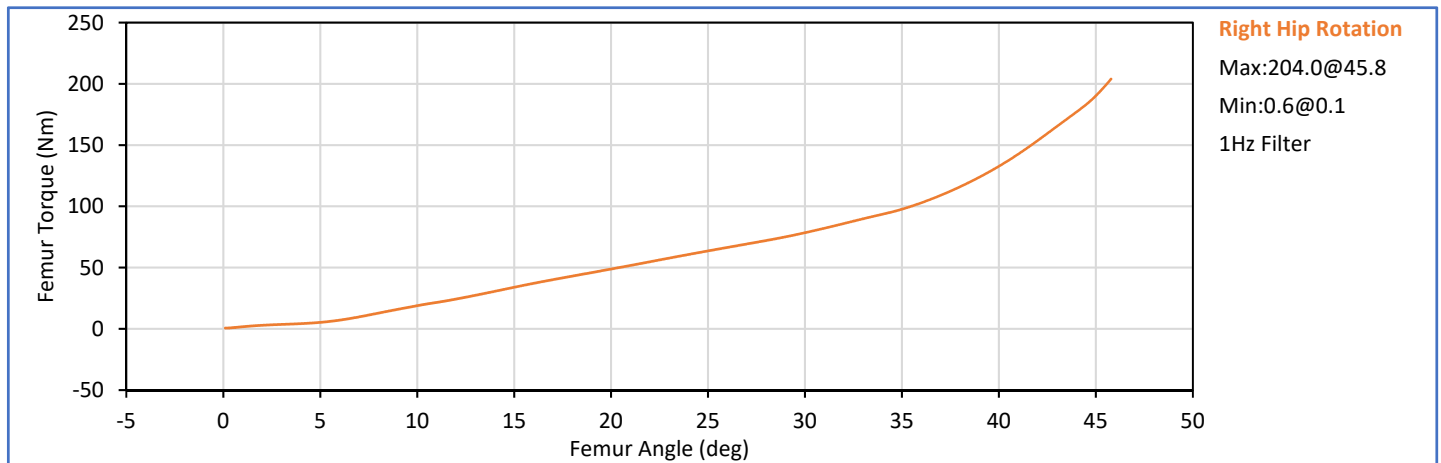
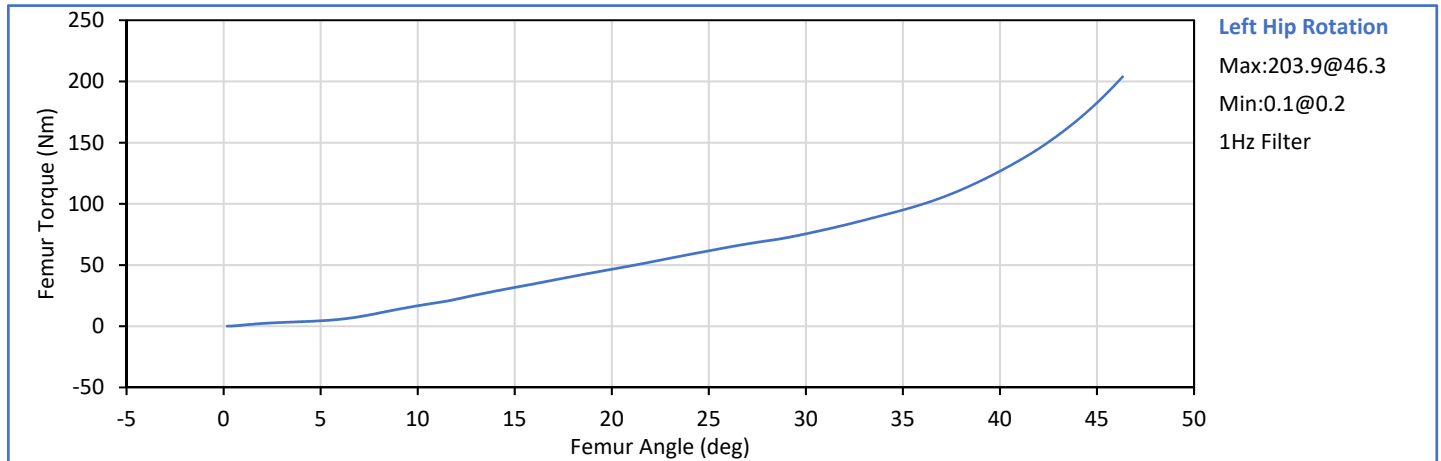
Approved By:
 P. Puzzuto



ATD Serial No.: 360

Test Date: 2018-12-21

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Humidity	%	10	70	30	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	75.5	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	46.3	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	78.6	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.7	Pass
Overall Test Results						Pass



Technician:
 J. Hernandez

Approved By:
 P. Puzzuto

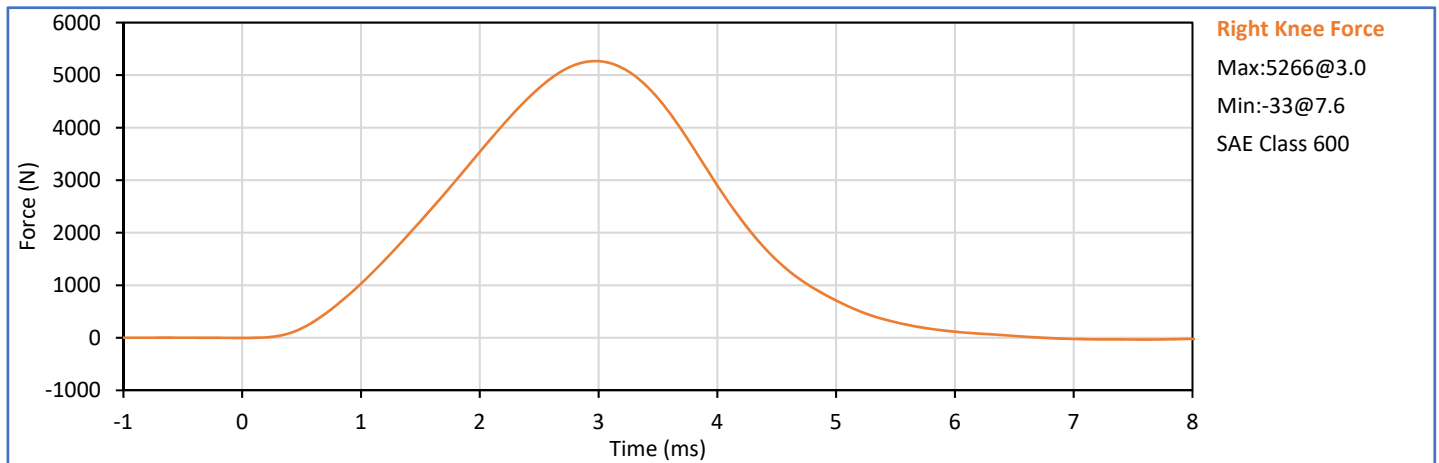
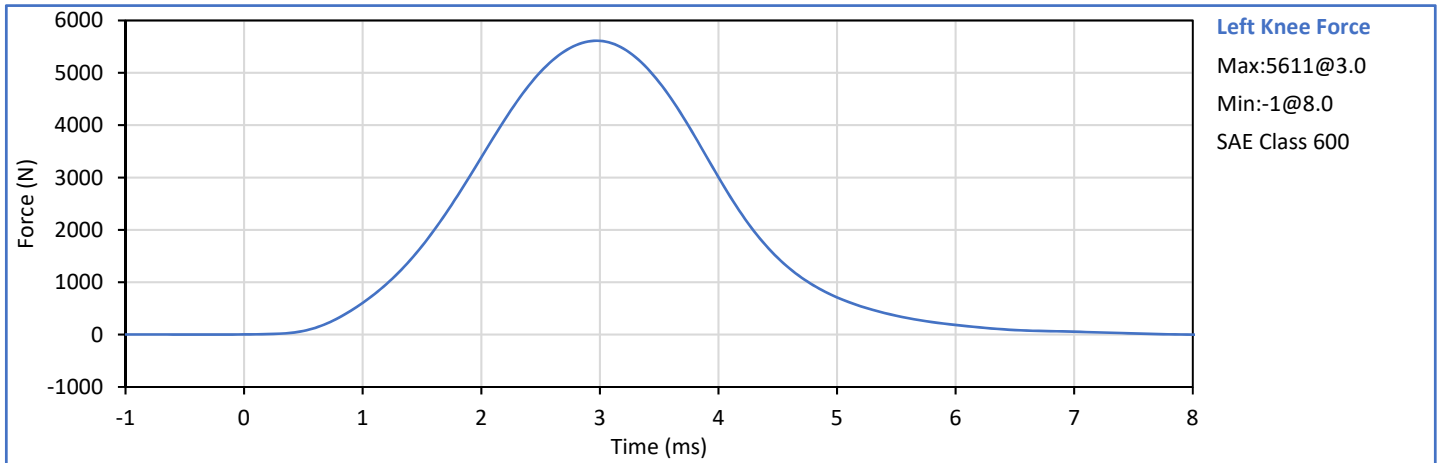



**Hybrid III 50th Percentile Male
 Knee Impact (Left/Right)**


ATD Serial No.: 360

Test Date: 2018-12-21

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Humidity	%	10	70	21	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.085	Pass
Knee	Peak Resistive Force	N	4715	5782	5611	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.087	Pass
Knee	Peak Resistive Force	N	4715	5782	5266	Pass
Overall Test Results						Pass



Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



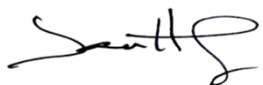
**Hybrid III 5th Percentile Female
 Damage Checklist**


ATD Serial No.: 141

Test Date: 2018-12-16

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

Describe any repairs or replacement of parts or other findings:

Technician: 
 J. Hernandez

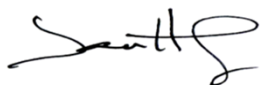
Approved By: 
 P. Puzzuto




ATD Serial No.: 141

Test Date: 2018-12-16

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
A - Total sitting height	mm	775	800	783	Pass
B - Shoulder pivot height	mm	432	457	444	Pass
C - 'H' point height	mm	81	86	85	Pass
D - 'H' point location from backline	mm	145	150	146	Pass
E - Shoulder pivot from backline	mm	69	84	80	Pass
F - Thigh clearance	mm	119	135	128	Pass
G - Back of elbow to wrist pivot	mm	244	259	256	Pass
H - Head back to backline	mm	41	46	44	Pass
I - Shoulder to elbow length	mm	277	297	285	Pass
J - Elbow rest height	mm	183	203	196	Pass
K - Buttock to knee length	mm	521	546	531	Pass
L - Popliteal length	mm	356	376	369	Pass
M - Knee pivot height	mm	394	419	411	Pass
N - Buttock popliteal length	mm	414	439	426	Pass
O - Chest depth without jacket	mm	175	191	187	Pass
P - Foot length	mm	219	234	231	Pass
R - Buttock to Knee Pivot Length	mm	457	483	472	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	181	Pass
U - Hip Breadth	mm	300	315	304	Pass
V - Shoulder breadth	mm	351	366	363	Pass
W - Foot breadth	mm	79	94	85	Pass
X - Head circum.	mm	528	549	539	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	871	Pass
Z - Waist circum.	mm	760	790	769	Pass
AA - Location for chest circum.	mm	333	358	343	Pass
BB - Location for waist circum.	mm	160	170	168	Pass
Overall Test Results					Pass

Technician: 
 J. Hernandez

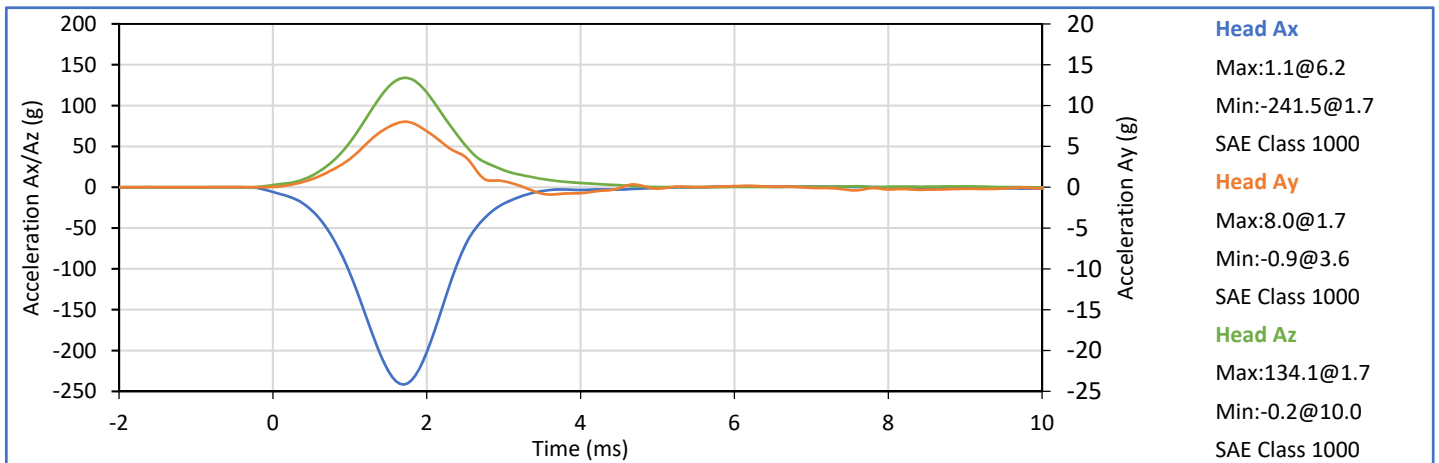
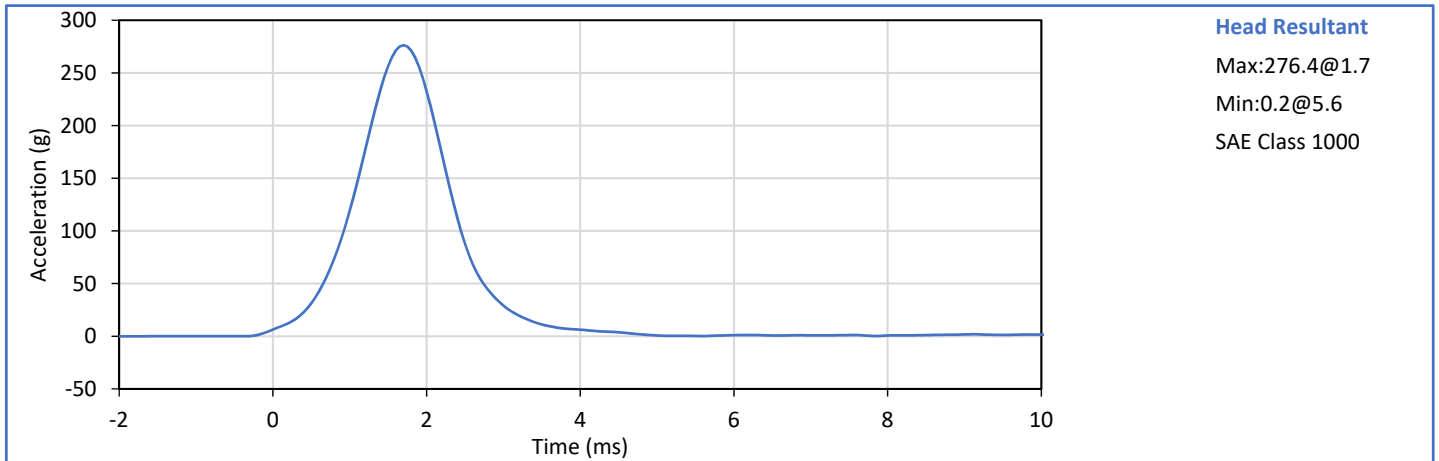
Approved By: 
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	250.0	300.0	276.4	Pass
Peak Lateral Acceleration	g	-15.0	15.0	8.0	Pass
Oscillations After Main Pulse	%	0.0	10.0	0.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

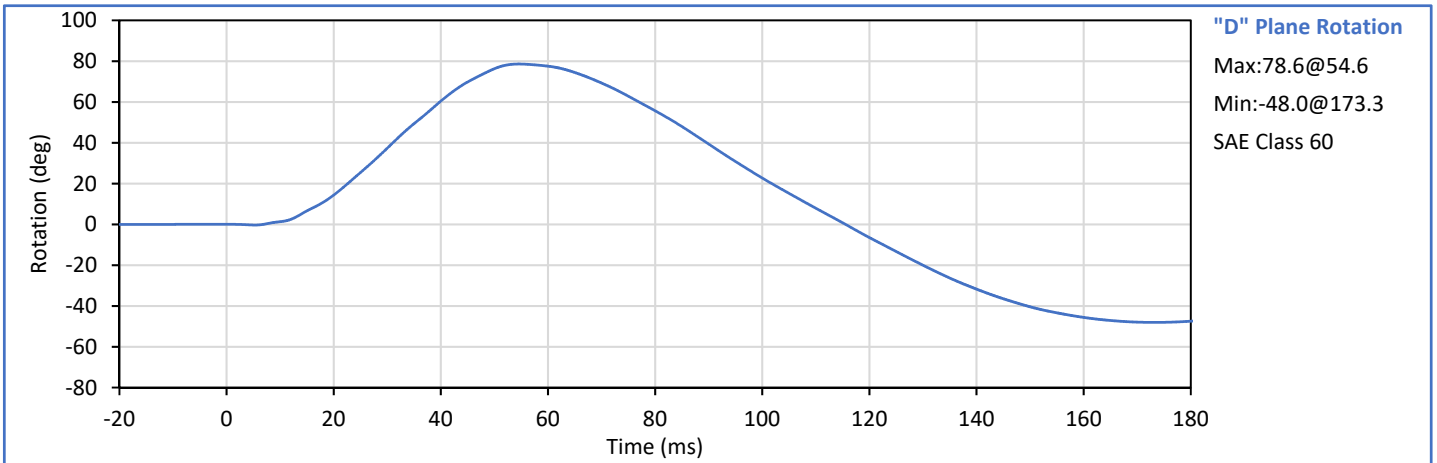
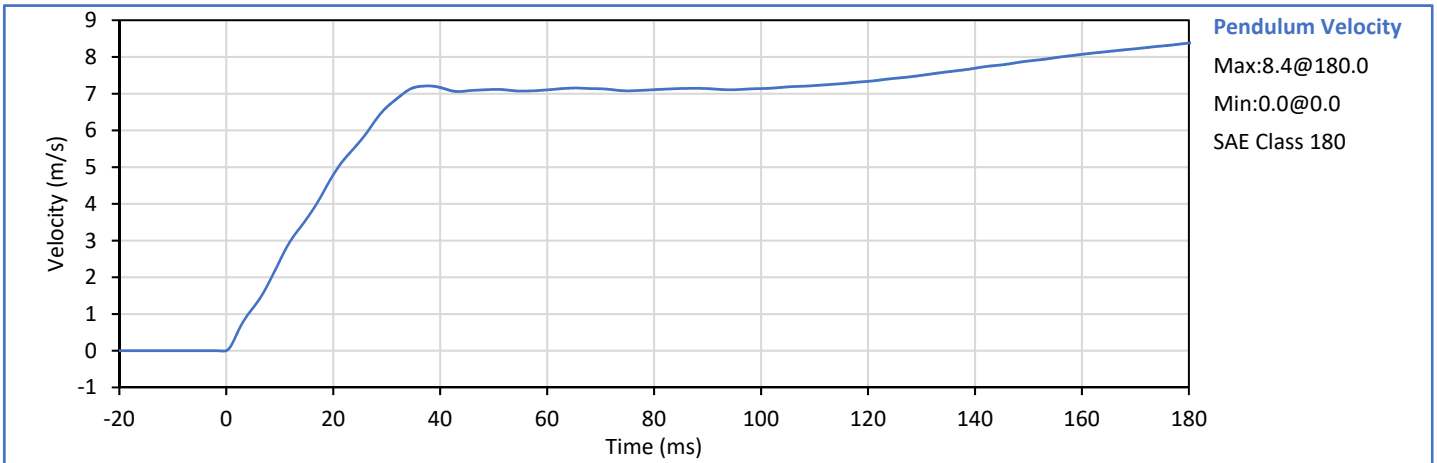
Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	6.89	7.13	6.98	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.45	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.79	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.63	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	78.6	Pass
Peak Moment in Rotation	Nm	69.0	83.0	79.3	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	82.7	Pass
Overall Test Results					Pass



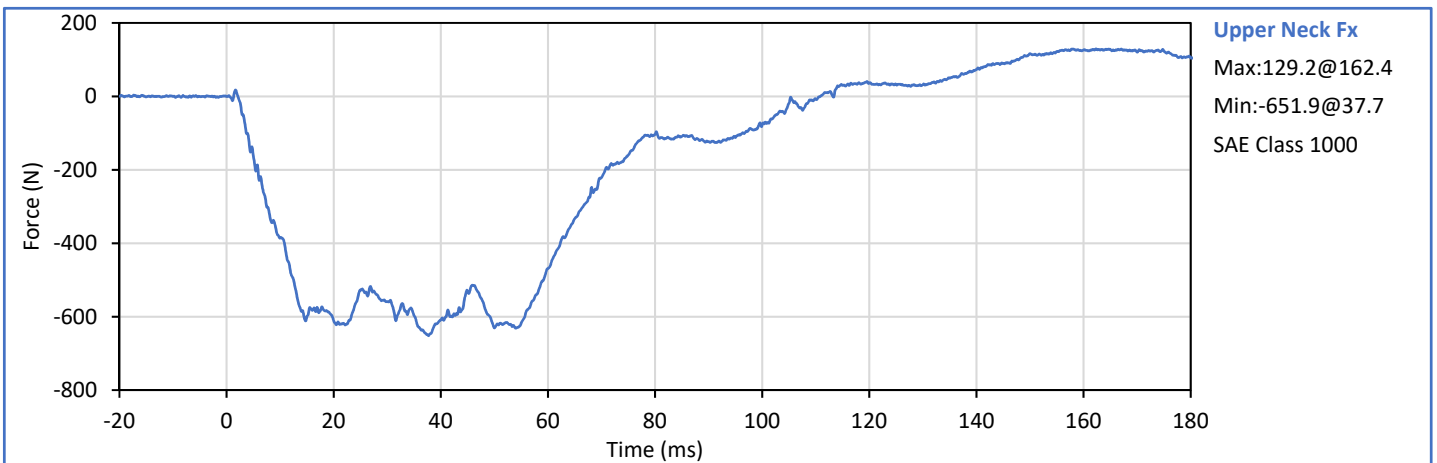
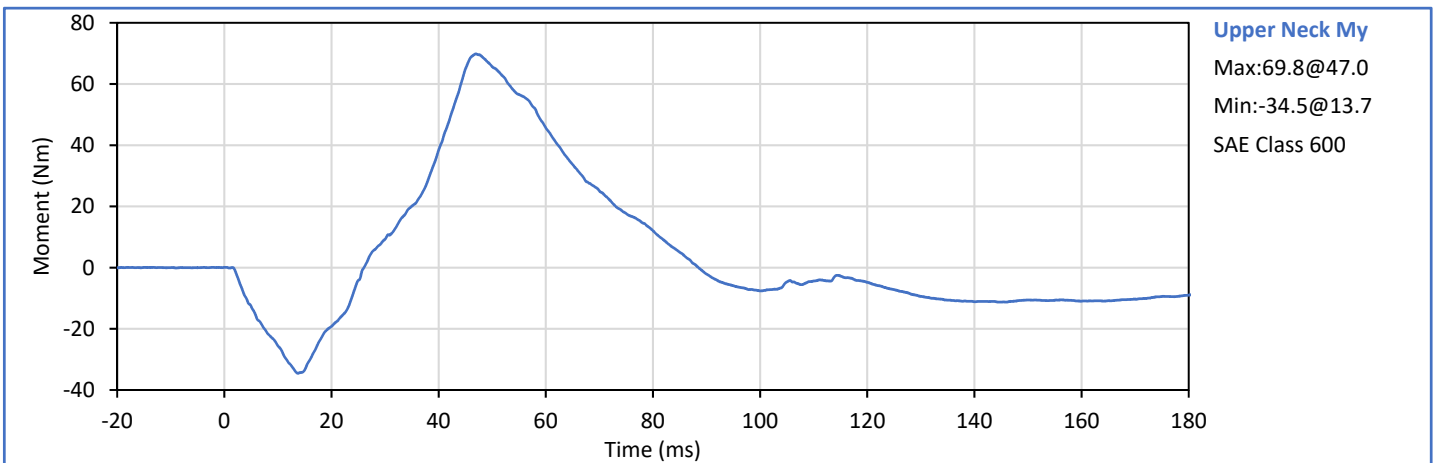
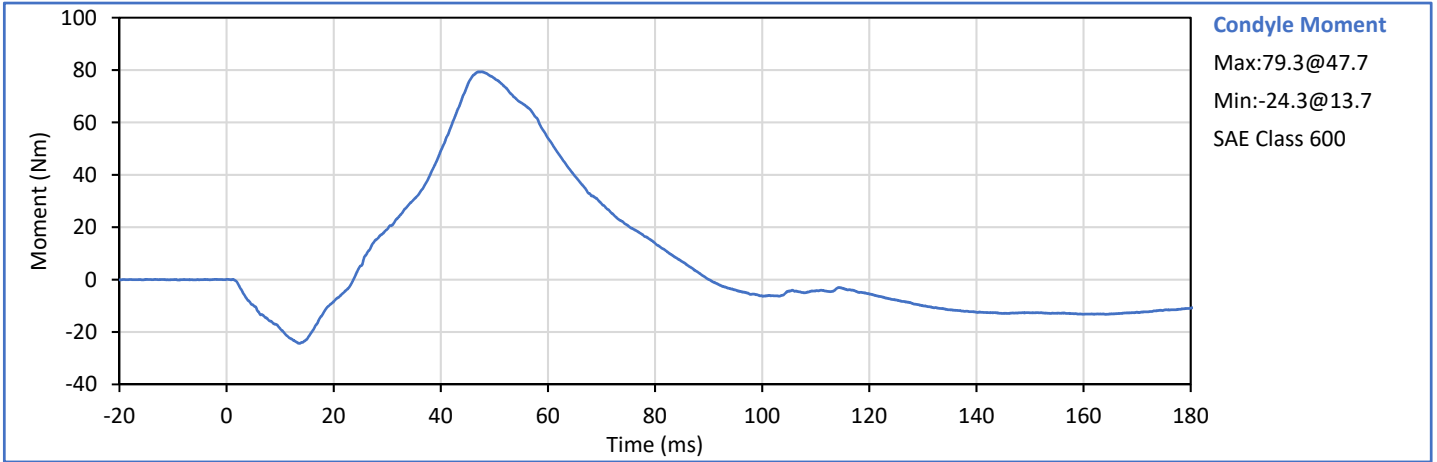
Technician:
 J. Hernandez

Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-21

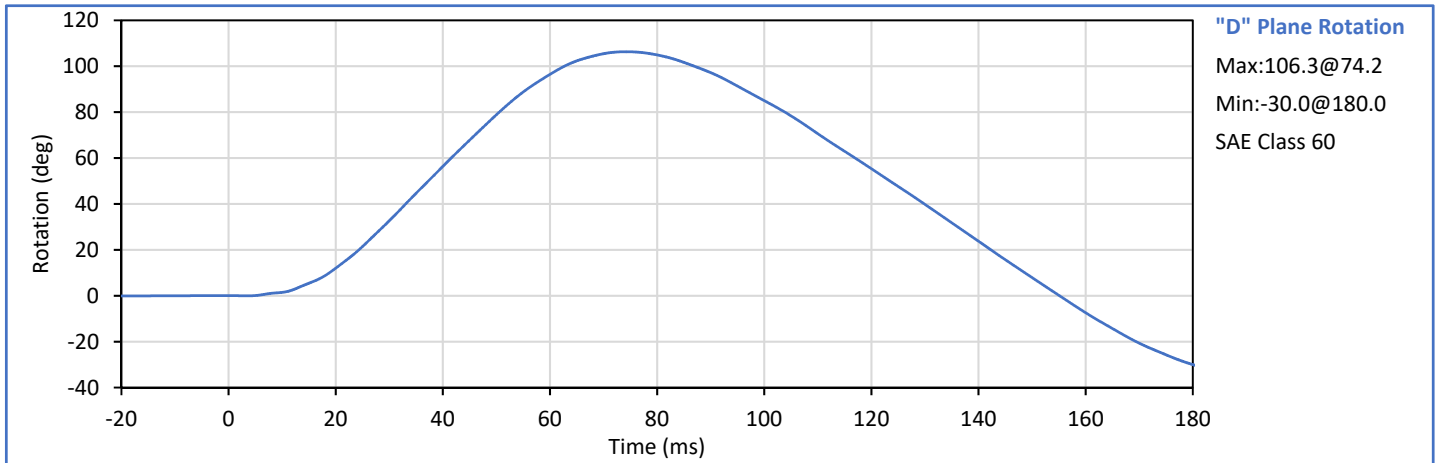
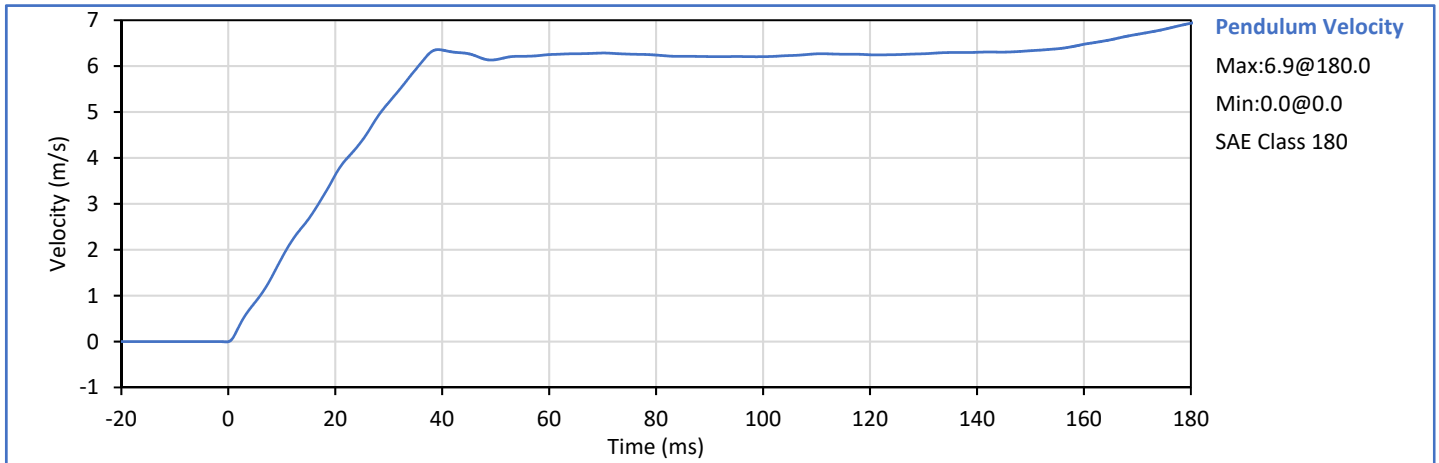


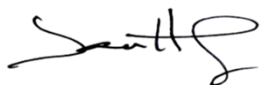



ATD Serial No.: 141

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.95	6.19	6.12	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.82	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.63	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.21	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	106.3	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-57.2	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	101.3	Pass
Overall Test Results					Pass



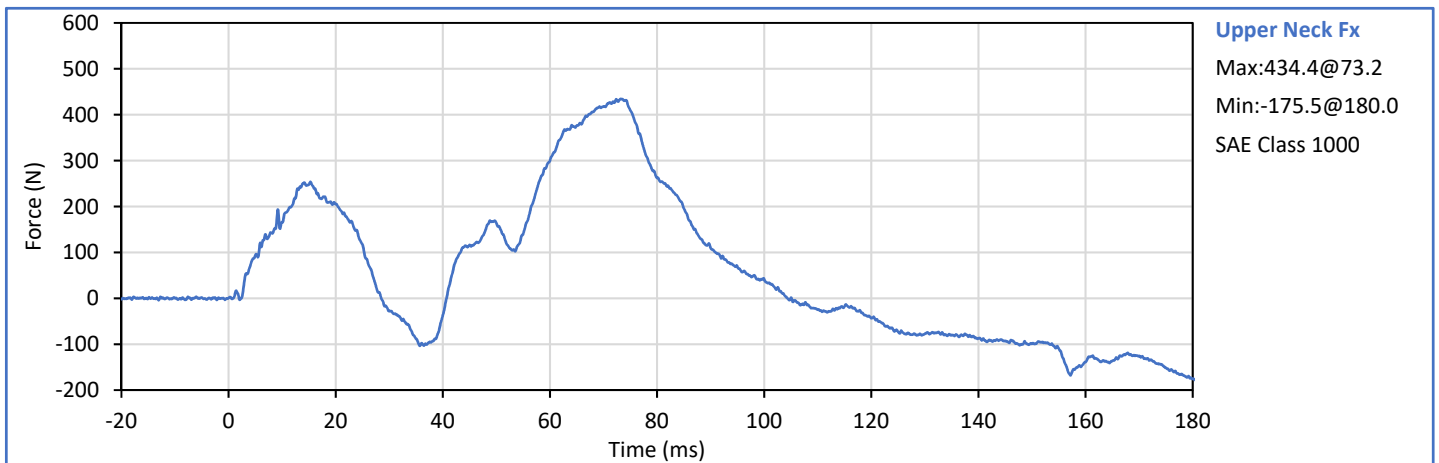
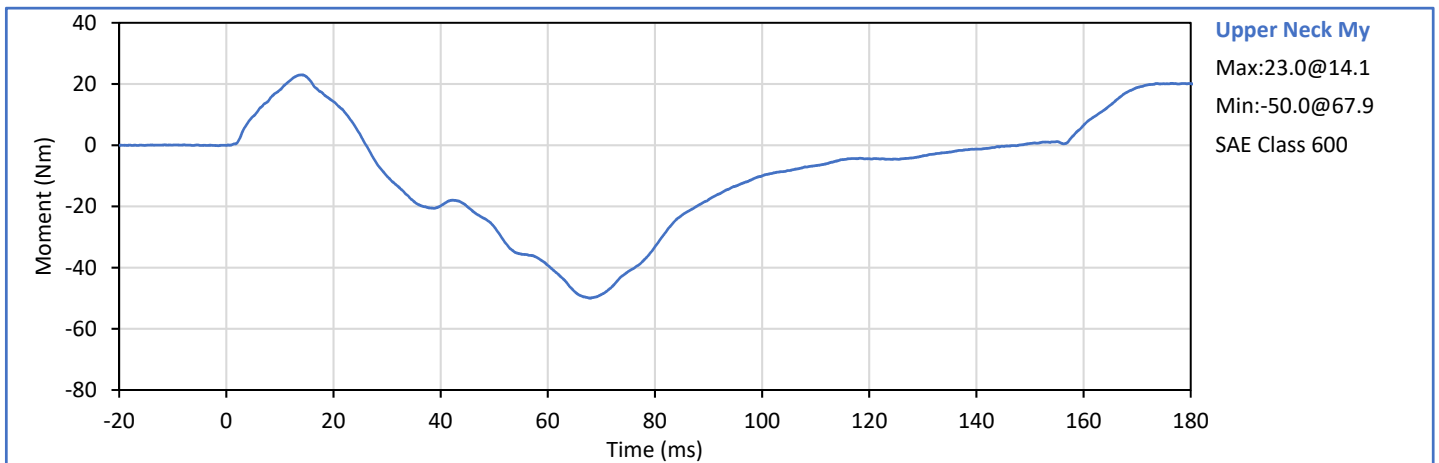
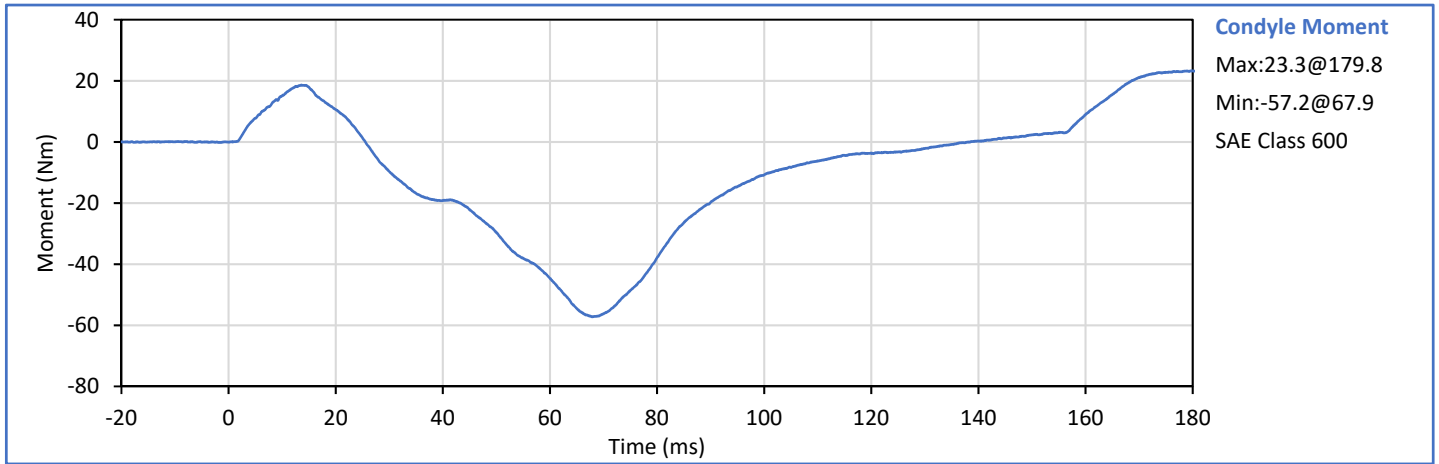
Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-21

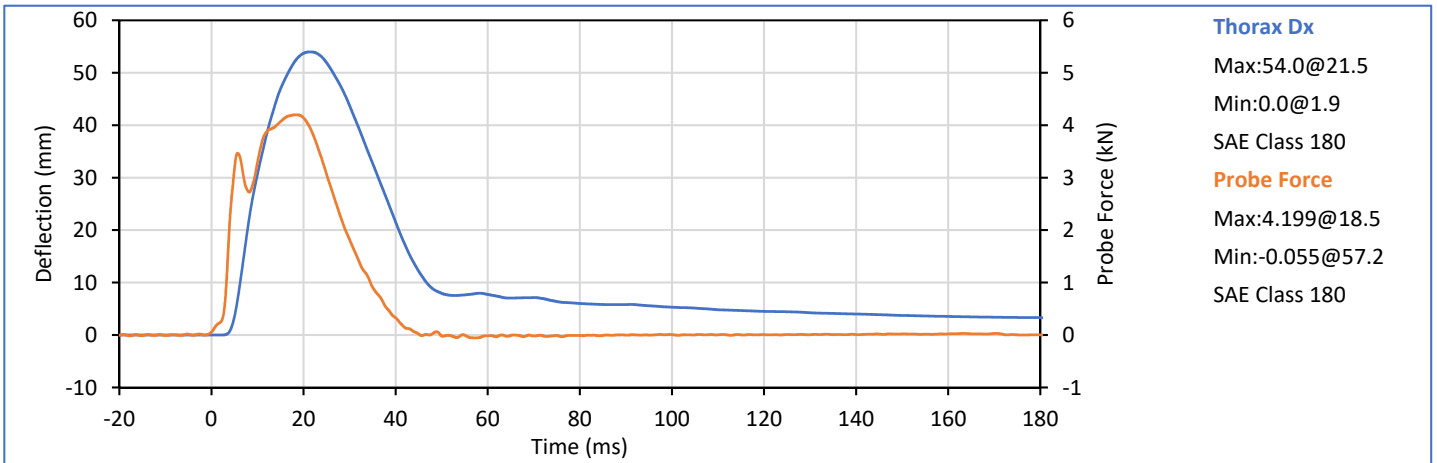
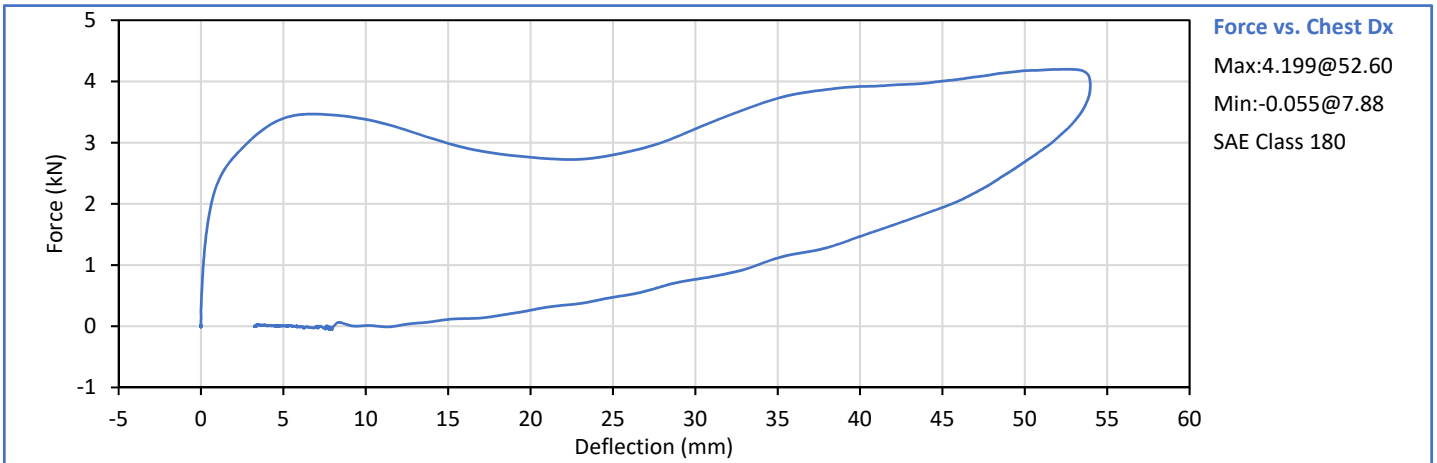




ATD Serial No.: 141

Test Date: 2018-12-16

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	27	Pass
Probe Velocity	m/s	6.59	6.83	6.64	Pass
Peak Chest Deflection	mm	50.0	58.0	54.0	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.199	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.176	Pass
Internal Hysterisis	%	69.0	85.0	73.1	Pass
Overall Test Results					Pass



Technician: J. Hernandez

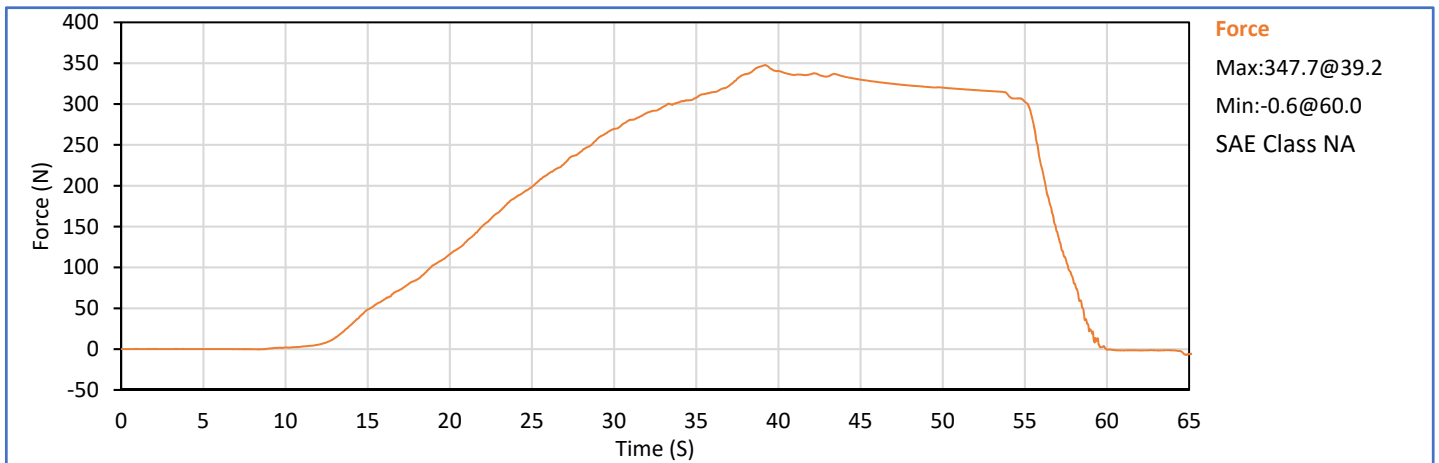
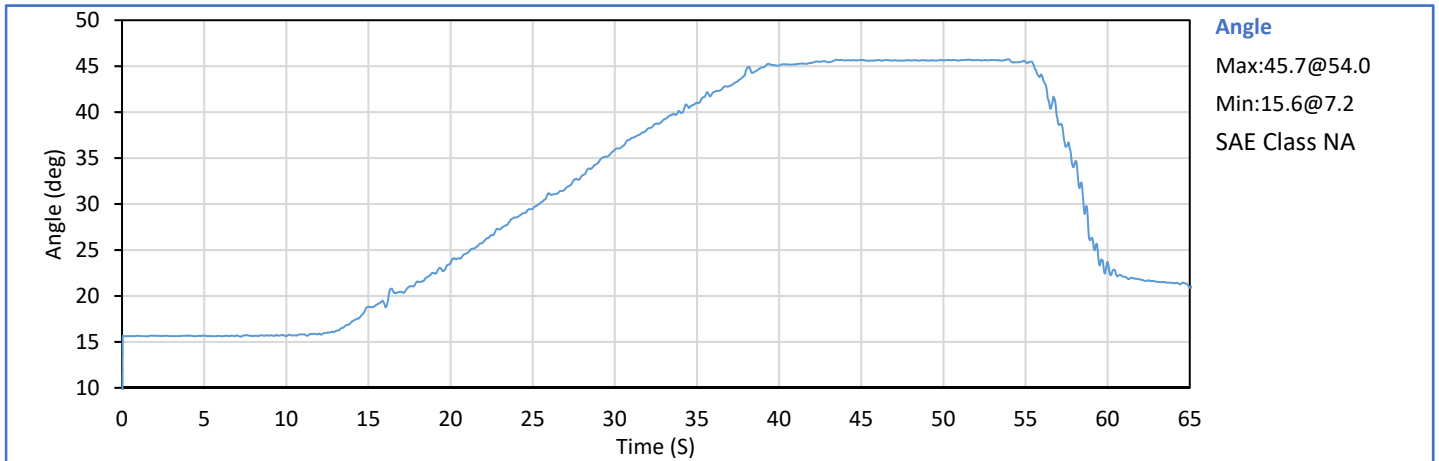
Approved By: P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	30	Pass
Orientation Angle	deg	0.0	20.0	13.5	Pass
Test Initial Angle	deg	11.0	19.0	15.6	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	347.5	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.11	Pass
Final Reference Plane Angle	deg	-8.0	8.0	4.0	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

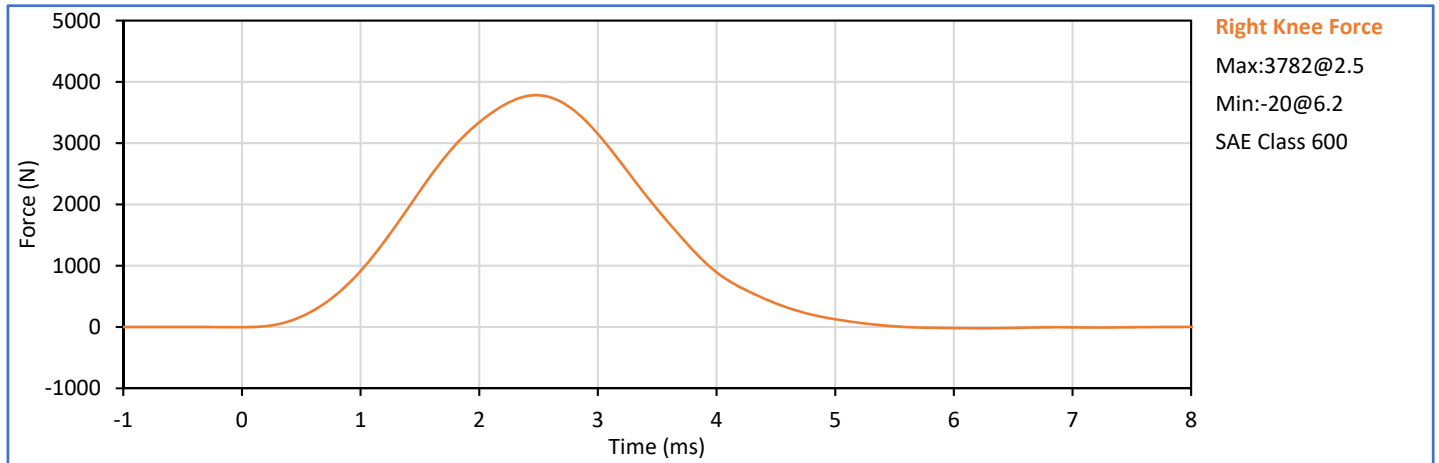
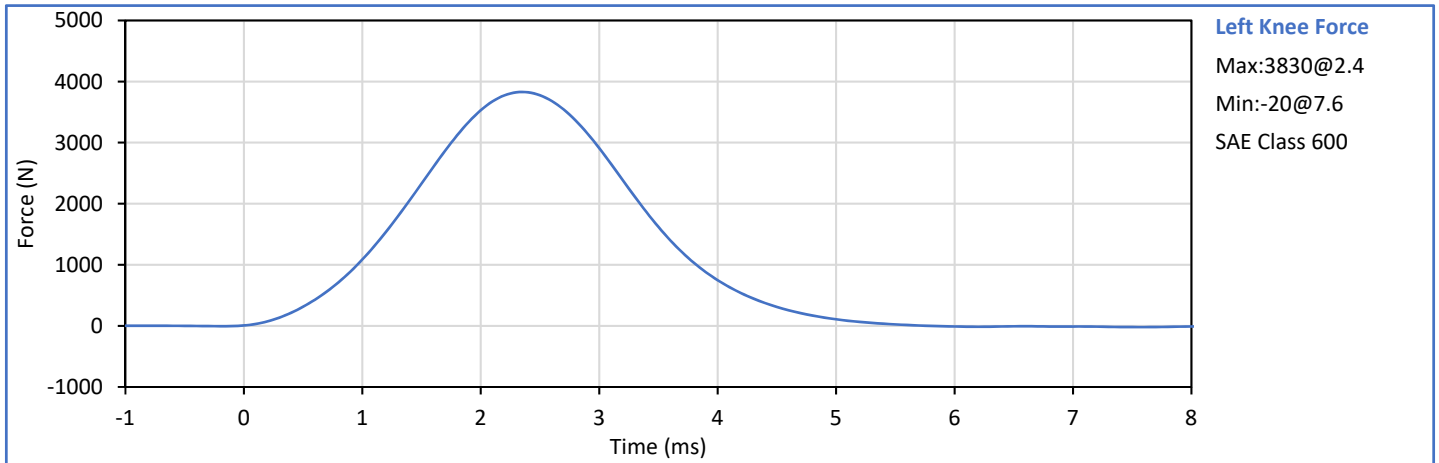
Approved By:
 P. Puzzuto



ATD Serial No.: 141

Test Date: 2018-12-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Left Knee Probe Velocity	m/s	2.070	2.130	2.078	Pass
Left Knee Peak Resistive Force	N	3450	4060	3830	Pass
Right Knee Probe Velocity	m/s	2.070	2.130	2.070	Pass
Right Knee Peak Resistive Force	N	3450	4060	3782	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto