REPORT NUMBER: SINCAP-CAL-20-011

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

Nissan Motor CO. LTD
2020 Nissan LEAF PLUS (62 kWh Battery)
Five Door Hatchback

NHTSA No: O20205201

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225

October 20, 2020

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NRM-110
1200 NEW JERSEY AVE SE, ROOM W43-410
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Prepared by: Matthew Pronko Date: October 20, 2020
Matthew Pronko, Test Engineer

Approved by: Vanessa Hansen Date: October 20, 2020
Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SINCAP-CAL-20-011	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2020 Nissan LEAF PLUS (62 kWh Battery) Five Door Hatchback NHTSA No.: O20205201		***5. Report Date*** October 20, 2020 ***6. Performing Organization Code*** CAL
Matthew Pronko, Test Engineer Vanessa Hansen , Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2020-001
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** DTNH22-14-D-00352
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report May 19, 2020 - October 20, 2020 ***14. Sponsoring Agency Code*** NRM-110
15. *Supplementary Notes*		

16. Abstract

A 55/28, (61.90kph / 38.5 mph), 90^0 Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2020 Nissan LEAF PLUS Five Door Hatchback in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 19, 2020.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.01 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 274 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	112.483
Maximum Thoracic Rib Deflection	mm	44	19.830
Total Abdominal Force	N	2500	572.869
Pubic Symphysis Force	N	6000	1535.272

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	149.676
Lower Spine Resultant Acceleration	G	82	42.112
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3562.546
Maximum Thoracic Rib Deflection	mm	38*	16.529
Maximum Abdominal Rib Deflection	mm	45*	20.419

* *Proposed IARV*

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave. SE Washington, D.C. 20590

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UNCLASSIFIED	UNCLASSIFIED	218	

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2020 Nissan LEAF PLUS Five Door Hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A 2020 Nissan LEAF PLUS Five Door Hatchback was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.01 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on May 19, 2020. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 9 high-speed and 2 real-time cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen forward, middle, and rear y-axis load cells
Lower spine (T12) tri-axial accelerometers
Public symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen upper rib and lower rib y-axis displacement potentiometers
Lower spine (T12) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in APPENDIX C of this report. Appendix D of this report contains the test equipment and instrumentation calibration data.

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	112.483
Maximum Thorax Rib Deflection	mm	44	19.830
Combined Abdominal Force	N	2500	572.869
Pubic Symphysis Force	N	6000	1535.272

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	149.676
Lower Spine (T12) Resultant Acceleration	G	82	42.112
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3562.546
Maximum Thoracic Rib Deflection	mm	38*	16.529
Maximum Abdominal Rib Deflection	mm	45*	20.419

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Air bag	Yes	No		
Knee Air bag	Yes	No		
Side Air bag 1 - Curtain	Yes	Yes	Yes	Yes
Side Air bag 2 – Torso/Pelvis Air bag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

GENERAL COMMENTS:

1. P1 serial number – F034
2. P4 serial number – 300

Data Anomalies:

The following channel was questionable for

- Left B-Pillar Lower Y Acceleration,Exceeded calibration range at 8.2 ms 12 ms 15 ms
- Left B-Pillar Middle Y Acceleration,Exceeded calibration range and saturated at 9.6 ms
- Left Rear Sill Y Acceleration,Exceeded calibration range at 4.3 ms
- LEFT MID A-Pillar Ay, Questionable data

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 - General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and Instrumentation Data

Data Sheet No. 6 – Test Vehicle Accelerometer Locations

Data Sheet No. 7 – MDB Accelerometer Locations

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – MDB Summary of Results

Data Sheet No. 10 – Test Vehicle Profile Measurements

Data Sheet No. 11 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 – MDB Exterior Static Crush Measurements

Data Sheet No. 13 – Vehicle and MDB Damage Profile Distances

Data Sheet No. 14 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 15 – Dummy/Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20205201
Test Date: 5/19/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20205201
Model Year	2020
Make	Nissan
Model	LEAF PLUS
Body Style	Five Door Hatchback
VIN	1N4BZ1CP7LC302343
Body Color	Gray
Odometer Reading (km/mi)	66 miles
Engine Displacement (L)	EV
Type/No. Cylinders	EV
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	Direct Drive
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	-
Driver Front Air bag	Yes
Driver Curtain Air bag	Yes
Driver Head/Torso Air bag	No
Driver Torso Air bag	No
Driver Torso/Pelvis Air bag	Yes
Driver Pelvis Air bag	No
Driver Knee Air bag	Yes
Rear Pass. Curtain Air bag	Yes
Rear Pass. Head/Torso Air bag	No
Rear Pass. Torso Air bag	No
Rear Pass. Torso/Pelvis Air bag	Yes
Rear Pass. Pelvis Air bag	No
Driver Seat Belt Pretensioners	Yes
Rear Pass. Seat Belt Pretensioners	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	-

Does owner's manual provide instructions to turn off automatic door locks?	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co. LTD
Date of Manufacture	01/20
Vehicle Type	Passenger Car

GVWR (kg)	2200
GAWR Front (kg)	1140
GAWR Rear (kg)	1080

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	-	5	
Capacity Weight (VCW) (kg)				390	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				49.8	(A-B)

VEHICLE SEAT TYPE

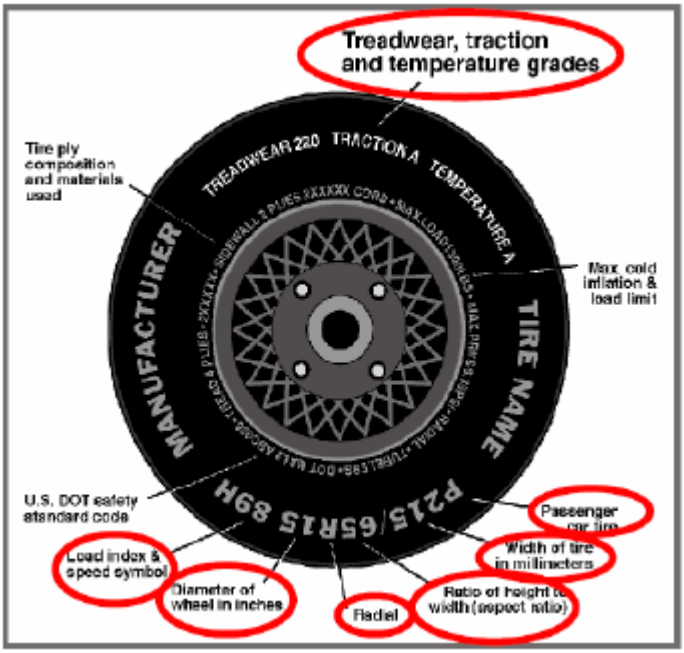
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X						X
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

VEHICLE TIRE INFORMATION

Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	250	250
Recommended Tire Size	P215/50R17	P215/50R17
Tire Size on Vehicle	P215/50R17	P215/50R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Energy Saver A/S	Energy Saver A/S
Treadwear	480	480
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 1 Polyamide, 2 Steel	1 Polyester, 1 Polyamide, 2 Steel
Load Index/Speed Symbol	90V	90V
Tire Material	Rubber	Rubber
DOT Safety Code Left	B33800KX4419	B33800KX4419
DOT Safety Code Right	B33800KX4419	B33800KX4419

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

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	292	293	282	272
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	507	384		556	439		549	462	
Right	kg	504	376		527	418		524	418	
Ratio	%	57.1	42.9		55.8	44.2		54.9	45.1	
Totals	kg	1011	760	1771	1083	857	1940	1073	880	1953

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1771	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	49.8	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1947.8	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range
(i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement**
LF	mm	708	701	Yes
RF	mm	713	709	Yes
RR	mm	711	705	Yes
LR	mm	701	696	Yes
Vehicle CG (Aft of Front Axle)	mm	1216	1193	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	27	20	

**** The "As Tested" vehicle attitude measurements must be equal to or within ± 10mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirements".*

Test height adjustable suspension setting, if applicable: N/A

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

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	7.5
Passenger Rear Window	2.5
Ballast / Equipment Added	0

DATA SHEET NO. 2
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passengers' seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	22.5	16.3	19.4
Front Passenger Seat	Not Adjustable		
Front Center Seat*			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

**if applicable*

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	19.4	16	Max	39	48	57
			Mid	24	32	40
			Min	8	16	25
Front Passenger Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Center Seat*	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat*	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

**if applicable*

DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

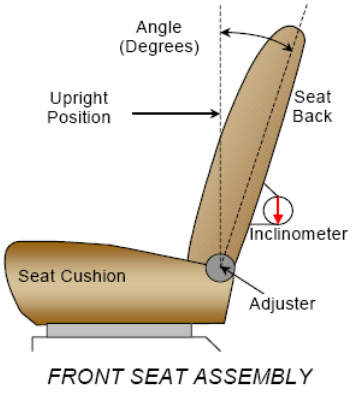
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	N/A	120	N/A
Front Passenger Seat	210	22 (0-21)	110	11
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat*	FIXED	FIXED	FIXED	FIXED

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck side rear seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	57.7	N/A	9.4	N/A
Front Passenger Seat	55.9	N/A	8.5	5
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat w/ Seated Dummy	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat*	FIXED	FIXED	FIXED	FIXED

**if applicable*

DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. For this test zero is defined as the uppermost position.

	Total # of Positions	Placed in Position #
Driver Seat	6 (0-5)	Uppermost
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

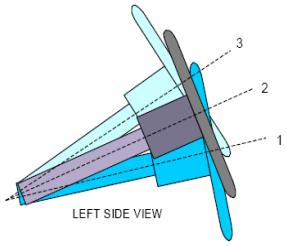
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	4 (0-3)	0
Rear Seat	1	Lowermost

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	20.4	
Geometric Center – Position 2	23.2	
Uppermost – Position 3	26.3	
Telescoping Steering Wheel Travel		30
Test Position	23.2	15

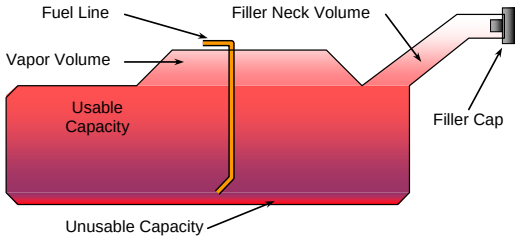


STEERING COLUMN ASSEMBLY

FUEL PUMP

Describe the fuel pump type, details about how it operates, and the location of the fuel filler neck.

The vehicle is equipped with an electric charge port. Which is located on the front of the vehicle. This is a full electric vehicle so there is no fuel pump or gas tank.



VEHICLE FUEL TANK ASSEMBLY

DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

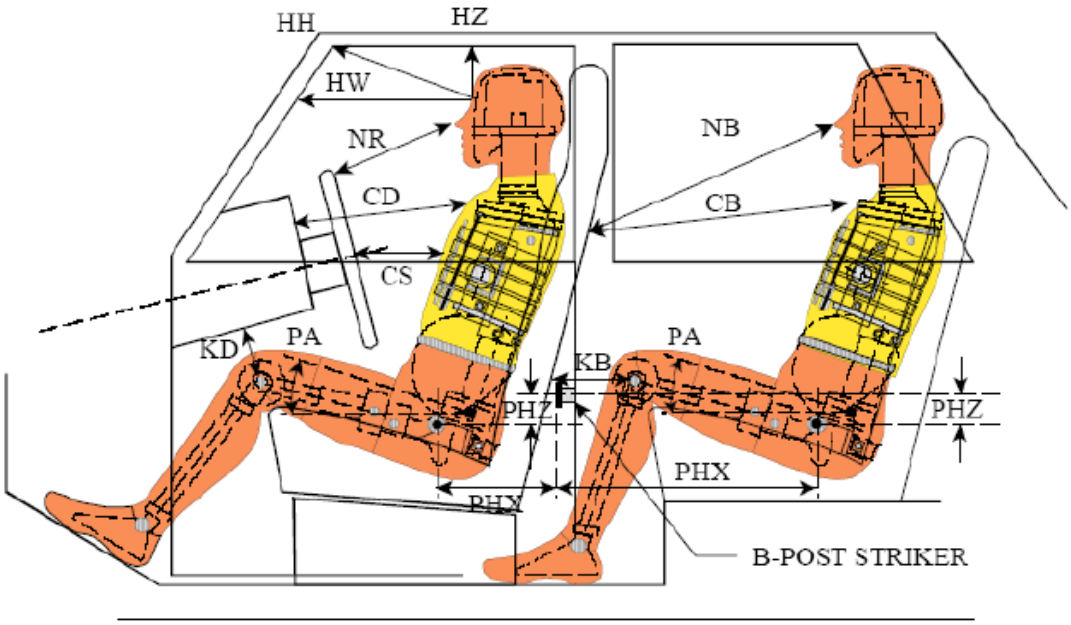
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	N/A
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	N/A
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	N/A
Actual Amount of Solvent Used in Test	N/A
1/3 of Usable Capacity	N/A

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in Form No. 1? [X] **Yes** [ ] **No**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20205201
Test Date: 5/19/2020



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

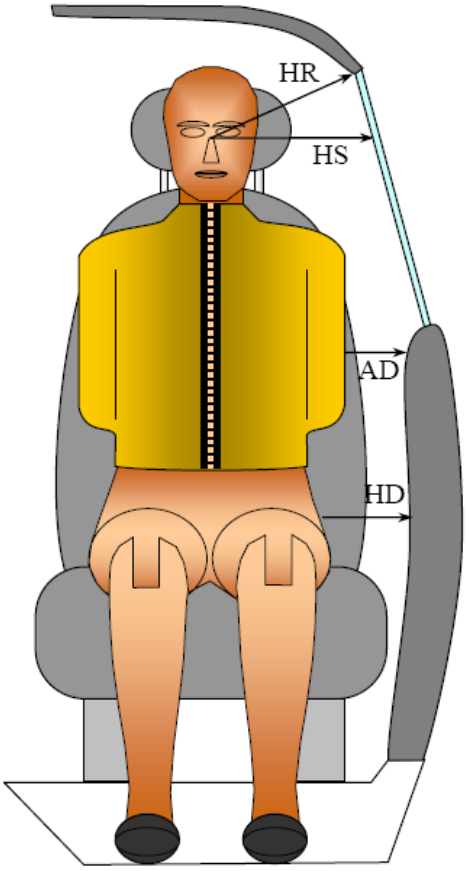
LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F034)		Passenger (Serial No.300)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	397			
HW		Header to Windshield	707			
HZ	HZ	Head to Roof Liner	187		238	
NR	NB	Nose to Rim/Seat Back	397		605	
CD	CB	Chest to Dash/Seat Back	525		598	
CS		Chest to Steering Wheel	307			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	126	30.4	312	0
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	128	27.4	309	0
PAX°	PAX°	Pelvic Tilt Angle X		22.6		21.7
	PAY°	Pelvic Tilt Angle Y				0.3
PHX	PHX	Hip Point to Striker (X-Axis)	267		290	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	160		280	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



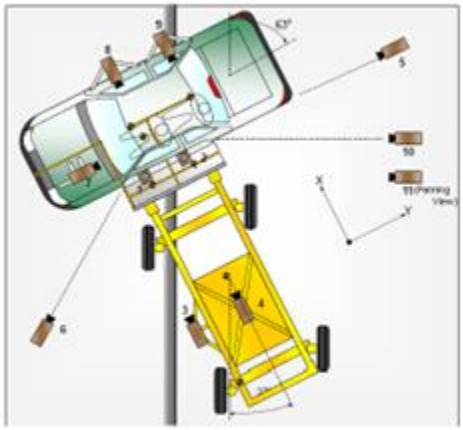
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F034)	Passenger (Serial No. 300)
HR	Head to Side Header	mm	210	228
HS	Head to Side Window	mm	320	354
AD	Arm to Door	mm	85	133
HD	Hip Point to Door	mm	140	155

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8264	12.5	1000
2	Overhead Close-up	0	0	-8264	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	7772	-1255	24	1000
6	Left Front	-3591	-5928	-1405	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In run				Zoom	60

Notes: *Reference: Impact Point projected to Ground*
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down
**All measurements accurate to ± 6 mm.*

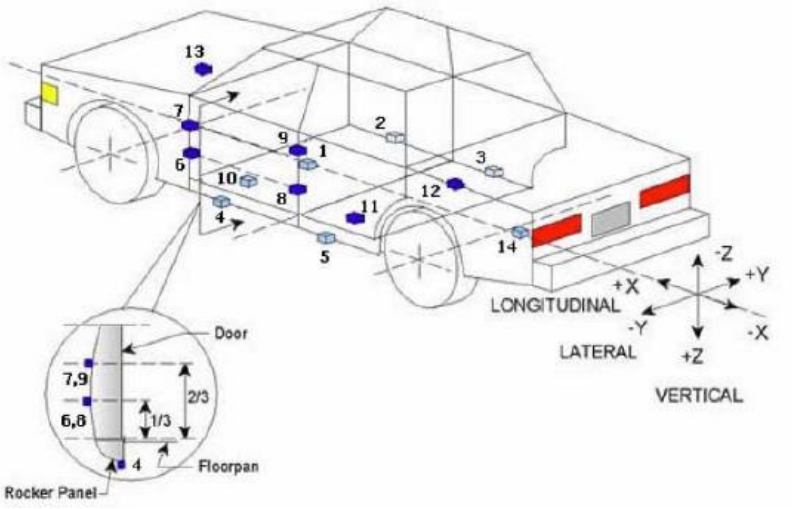
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	7
Total	62

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020



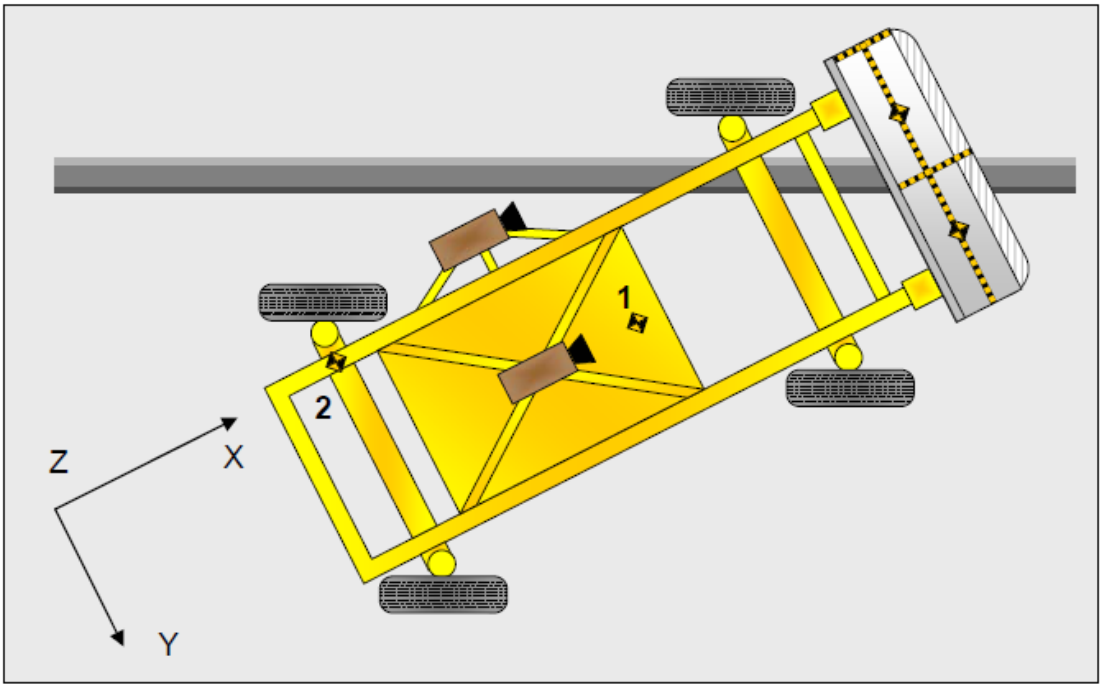
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2350	19	-40
2	Right Sill at Front Seat	2655	650	258
3	Right Sill at Rear Seat	1785	660	212
4	Left Sill at Front Door	2643	-650	258
5	Left Sill at Rear Door	1780	-661	209
6	A-Post Lower	3006	-582	10
7	A-Post Middle	3148	-614	-483
8	B-Post Lower	1975	-637	-114
9	B-Post Middle	1903	-640	-419
10	Front Seat Track	2210	-541	166
11	Rear Seat Structure	1563	-438	26
12	Rt. Rear Occ. Compartment	1806	348	257
13	Engine Block	3581	215	-257
14	Rear Above Axle	770	11	130

Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	None
Top of Head	Curtain Airbag & Side Header	Side Header
Left Side of Head	Curtain Airbag	Curtain Airbag & Side Header
Back of Head	Curtain Airbag, Side Header & Headrest	Curtain Airbag, Side Header & Headrest
Left Shoulder	Curtain Airbag	Seatback & Torso/Pelvis Airbag
Upper Torso	Seatback, Torso/Pelvis Airbag	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback	Seatback & Torso/Pelvis Airbag
Left Hip	Seat pan & Torso/Pelvis Airbag	Seatpan & Torso/Pelvis Airbag
Left Knee	Driver Door	Passenger Door

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	0	0	0	0	0

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Driver Window Shattered
Other Notable Effects	Driver outer door skin detached from main body

DATA SHEET NO. 8 … (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Air bag	Yes	No		
Knee Air bag	Yes	No		
Side Air bag 1 - Curtain	Yes	Yes	Yes	Yes
Side Air bag 2 - Torso/Pelvis Air bag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2701
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		410
Actual Impact Point (Aft of Frontal Axle)	mm		401
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+9
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	+1

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1,250
Overall Length Including Honeycomb Frame	4,120
Wheelbase of Framework Carriage	2,600
CG Location of Front Axle	1,120

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	392.5	297.5	690.0
Right	kg	386.0	291.5	677.5
Ratio	%	57.4%	42.6%	100.0%
Totals	kg	778.5	589.0	1367.5

SPEED AND ANGLE AT IMPACT DATA

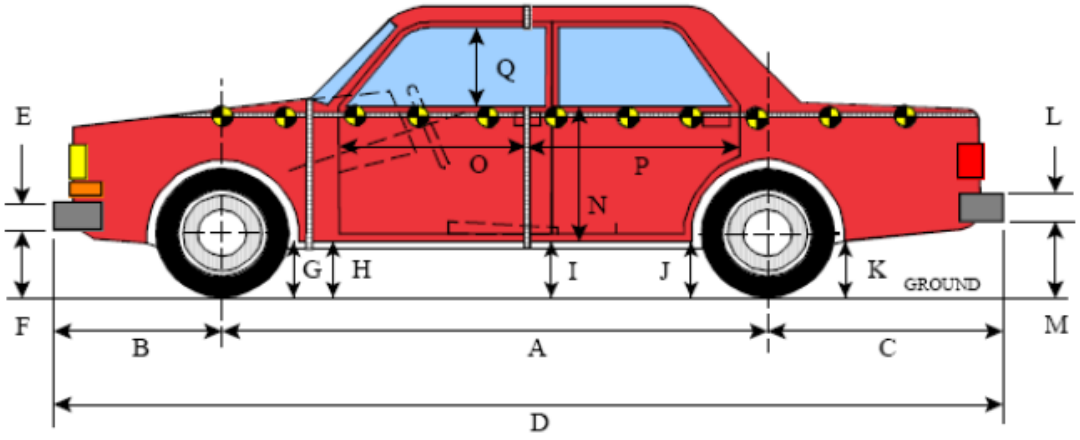
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.01
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	61.91
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	221
B	Top of Bumper	533	800	Right	136
C	Mid-Level	686	800	Right	123
D	Top of Stack	813	800	Right	152

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



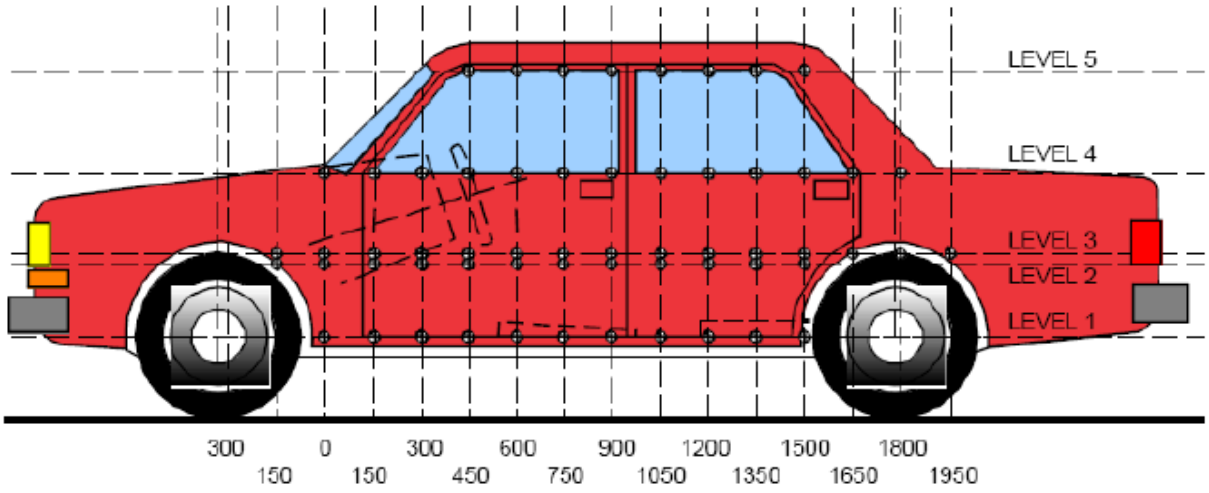
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2701	2705	4
B	Front Axle to FSOV	995	991	-4
C	Rear Axle to RSOV	786	789	3
D	Total Length at Centerline	4478	4485	7
E	Front Bumper Thickness	210	210	0
F	Front Bumper Bottom to Ground	278	285	7
G	Sill Height at Front Wheel Well	170	137	-33
H	Sill Height at Front Door Leading Edge	168	179	11
I	Sill Height at B Pillar	178	200	22
J1	Sill Height at Rear Wheel Well	195	213	18
J2	Pinch Weld Height at Rear Wheel Well	182	200	18
K	Sill Height Aft of Rear Wheel Well	266	210	-56
L	Rear Bumper Thickness	235	235	0
M	Rear Bumper Bottom to Ground	420	425	5
N	Sill Height to Window Bottom of Front Window Sill	870	829	-41
O	Front Door Leading Edge to Impact CL	786	736	-50
P	Rear Door Trailing Edge to Impact CL	1302	1267	-35
Q	Front Window Opening	471	485	14
R	Right Side Length	4371	4376	5
S	Left Side Length	4370	4374	4
T	Maximum Vehicle Width	1775	1567	-208

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	281	16	1650
2	Driver Hip Point	mm	598	266	1650
3	Mid-Door	mm	665	274	1650
4	Window Sill	mm	969	116	1800
5	Window Top	mm	1481	15	1350

*window top level bent outward from original position

NOTE: *The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.*

DATA SHEET NO. 11 … (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback
NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test
Test Date: 5/19/2020

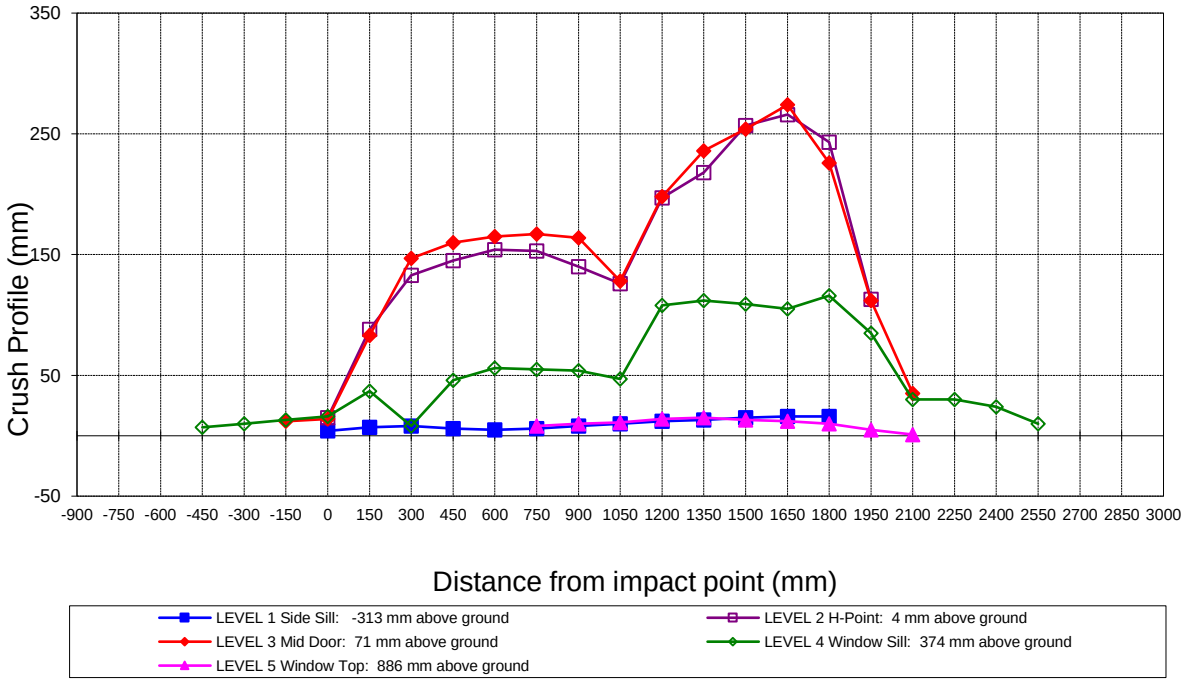
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450				772					765					7	
-300				793					783					10	
-150			887	781				875	768				12	13	
0	862	884	884	789		858	869	868	773		4	15	16	16	
150	837	879	879	799		830	791	796	762		7	88	83	37	
300	833	880	882	809		825	747	735	801		8	133	147	8	
450	831	882	884	819		825	737	724	773		6	145	160	46	
600	831	884	886	827		826	730	721	771		5	154	165	56	
750	832	885	887	835	602	826	732	720	780	594	6	153	167	55	8
900	833	885	888	843	612	825	745	724	789	602	8	140	164	54	10
1050	834	885	888	847	615	824	759	760	800	604	10	126	128	47	11
1200	835	884	887	850	617	823	687	689	742	603	12	197	198	108	14
1350	834	881	885	851	617	821	663	649	739	602	13	218	236	112	15
1500	835	882	885	852	613	820	625	631	743	600	15	257	254	109	13
1650	836	885	888	851	605	820	619	614	746	593	16	266	274	105	12
1800	842	891	893	850	594	826	648	667	734	584	16	243	226	116	10
1950		896	897	869	576		783	785	784	571		113	112	85	5
2100			897	842	541			862	812	540			35	30	1
2250				834					804					30	
2400				829					805					24	
2550				826					816					10	
2700															
2850															
3000															

NOTE: *Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition.*
Vehicle measurements forward of the vertical impact reference line are negative.
The crush profile grid is established prior to test based on an estimated impact point.

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

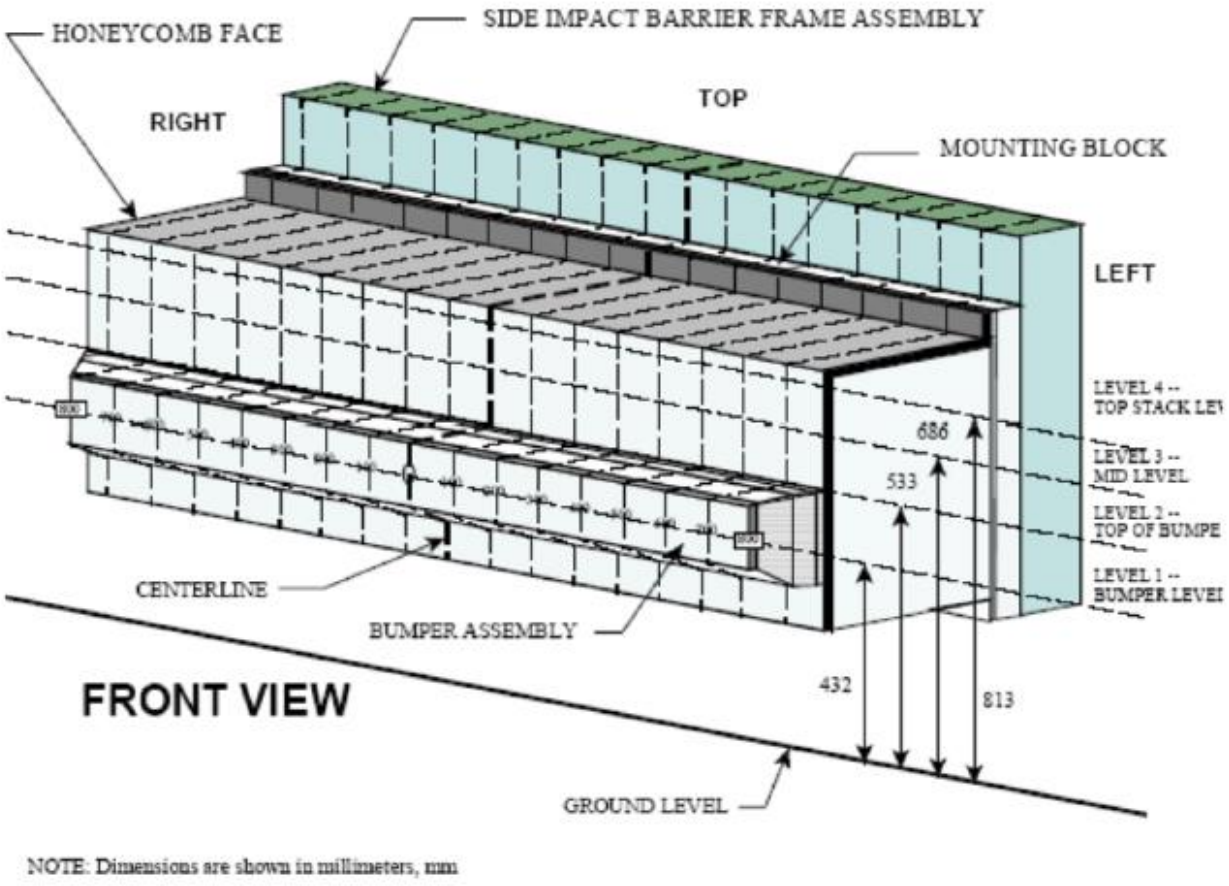
Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



NOTE: Dimensions are shown in millimeters, mm

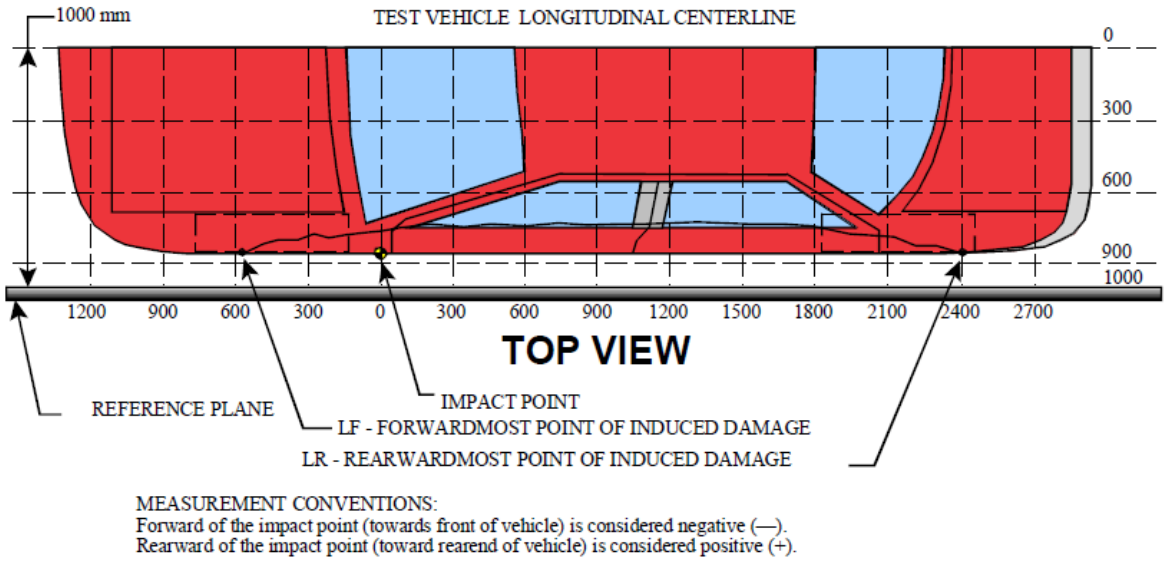
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	217	205	196	196	198	200	202	204	208	208	211	219	214	214	215	216	221
2	136	123	121	117	115	115	112	102	102	107	116	111	102	103	112	115	120
3	123	74	56	47	42	36	37	47	67	99	89	86	55	46	39	36	46
4	152	94	76	64	57	55	69	70	74	112	137	114	75	58	52	53	73

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

For guidance regarding damage profile distance measurements, pelase refer to the latest version of the *NHTSA Test Reference Guide, Volume 1: Vehicle Tests.*



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	125	113	12
2	300	3	265	118	147
3	750	3	280	113	167
4	1200	3	311	113	198
5	1650	3	386	112	274
6	2100	3	138	103	35

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)*
1	800 mm left of center	1	221
2	480 mm left of center	1	214
3	160 mm left of center	1	210
4	160 mm right of center	1	203
5	480 mm right of center	1	197
6	800 mm right of center	1	217

DATA SHEET NO. 14
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020
Test Time:	9:35 AM	Temperature:	21˚C

A. From impact until vehicle motion ceases: (Maximum allowable is 1 oz.) — 0 oz.

B. For the 5-minute period after motion ceases: (Maximum allowable is 5 oz.) — 0 oz.

C. For the following 25 minutes: (Maximum allowable is 1 oz./minute) — 0 oz.

D. Spillage Details: — No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	71	300	371
90° to 180°	63	300	363
180° to 270°	64	300	364
270° to 360°	69	300	369

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

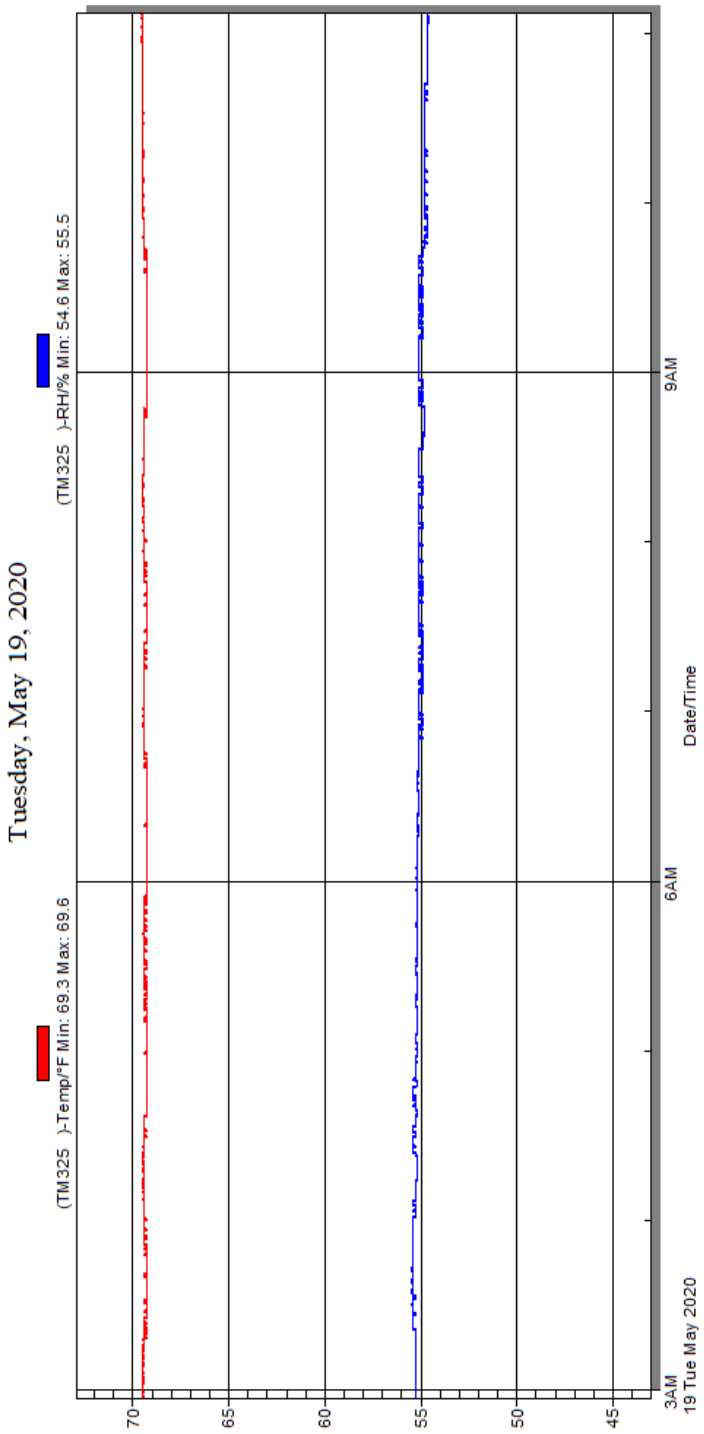
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020



Temperature and Humidity Stabilization Chart/Data for Dummies and Test Vehicle

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

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Laminated Lithium-Ion
Nominal Voltage (Volts)	360
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside Battery Pack
Auxiliary Battery Type	12V Lead Acid

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Organic Electrolyte
Electrolyte Fluid Specific Gravity	1.206 g/cc
Electrolyte Fluid Kinematic Viscosity (centistokes)	4.6 cP
Electrolyte Fluid Color	Clear
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Air
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	0
Maximum State of Charge	V	403
95% of Maximum	V	382.85
Test Voltage *	V	402.5
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery :		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* *For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range*.

DATA SHEET NO. 305-2
PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

VEHICLE CHASSIS GROUND PT(S) LOCATION(S) & PROPULSION BATTERY SYSTEM

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Ground wire attached to rear vehicle chassis
Details of Propulsion Battery Components	Components are all internal to the battery pack system.

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 87
Serial No.		65280327
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		7/10/2019

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	403
Propulsion Battery Voltage : (ready to drive position)	V_b	V	402.5
Propulsion Battery to Vehicle Chassis	V_1	V	172.4
Propulsion Battery to Vehicle Chassis	V_2	V	181.5
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	203300
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	9.78
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	10.3
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	6939000
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	6589000
Lesser value of R_{i1} and R_{i2}	R_i	Ω	6589000
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	16370

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

NOTES:

- *The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.*
- *If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.*
- *The known resistance Ro (in Ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2020 Nissan LEAF PLUS Five Door Hatchback	NHTSA No.:	O20205201
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/19/2020

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 87
Serial No.		65280327
Internal Impedance Value	MΩ	10
Nominal Propulsion Battery Voltage (V_b)	V	0.01

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_1 =	0.008	V	Time:	3	Minutes	20	Seconds
V_2 =	0.004	V	Time:	3	Minutes	38	Seconds
$R_{o\,=}$	203300	Ω	Time:		Minutes		Seconds
V_1' =	0.001	V	Time:	3	Minutes	55	Seconds
V_2' =	0.002	V	Time:	4	Minutes	15	Seconds
R_{i1} =	2135000	Ω	Time:	3	Minutes	56	Seconds
R_{i2} =	610000	Ω	Time:	4	Minutes	15	Seconds
R_i =	610000	Ω	Time:	4	Minutes	15	Seconds
R_i/V_b =	60990000	Ω/V	Time:	4	Minutes	15	Seconds

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)?	X	Yes		No (Fail)

NOTES:

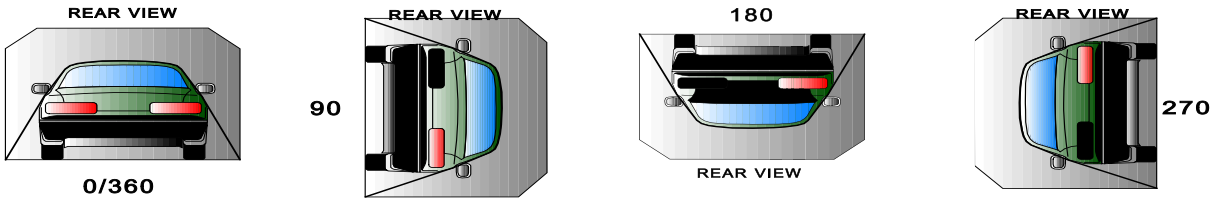
- *R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1'], R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical Isolation Value is 500 Ω/V*

. **PROPULSION BATTERY SYSTEM COMPONENTS**

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	No Movement	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	No Intrusion	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?		X	

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020



Rear View

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	11	5	6	11	7
90° to 180°	1	3	5	6	3	7
180° to 270°	1	4	5	6	4	7
270° to 360°	1	9	5	6	9	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0.0	Liters	None
90° to 180°	0.0	Liters	None
180° to 270°	0.0	Liters	None
270° to 360°	0.0	Liters	None
Total Spillage	0.0	Liters	None

** FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is **5.0 Liters***

Is the total spillage of propulsion battery electrolyte greater than 5.0 Liters? [ ] Yes (Fail) [X] No
Is propulsion battery electrolyte spillage visible in the passenger compartment? [ ] Yes (Fail) [X] No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 87
Serial No.		65280327
Internal Impedance Value	MΩ	10
Nominal Propulsion Battery Voltage (V_b)	V	4.23

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

Test Vehicle: 2020 Nissan LEAF PLUS Five Door Hatchback NHTSA No.: O20205201
Test Program: NCAP Side MDB Impact Test Test Date: 5/19/2020

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
V_1 =	90°	1.49	V	Time:	2	6
	180°	1.49	V		8	18
	270°	1.49	V		14	17
	360°	1.49	V		20	52
V_2 =	90°	1.5	V	Time:	2	22
	180°	1.5	V		8	35
	270°	1.5	V		14	36
	360°	1.5	V		20	58
V_1' =	90°	0.088	V	Time:	3	29
	180°	0.088	V		8	48
	270°	0.088	V		14	46
	360°	0.09	V		21	02
V_2' =	90°	0.088	V	Time:	3	35
	180°	0.088	V		8	59
	270°	0.088	V		14	55
	360°	0.088	V		21	17
R_{i1} =	90°	6500000	Ω	Time:	3	27
	180°	6500000	Ω		8	49
	270°	6500000	Ω		14	47
	360°	6346000	Ω		21	09
R_{i2} =	90°	6502000	Ω	Time:	3	35
	180°	6502000	Ω		9	0
	270°	6502000	Ω		14	56
	360°	6502000	Ω		21	19
R_i =	90°	6500000	Ω	Time:	3	35
	180°	6500000	Ω		9	0
	270°	6500000	Ω		14	56
	360°	6346000	Ω		21	19
R_i/V_b =	90°	1536552	Ω/V	Time:	3	35
	180°	1536552	Ω/V		9	0
	270°	1536552	Ω/V		14	59
	360°	1500263	Ω/V		21	19

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

APPENDIX A

PHOTOGRAPHS

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Figure A-3: Pre-Test Frontal View of Test Vehicle

Figure A-4: Post-Test Frontal View of Test Vehicle

Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle

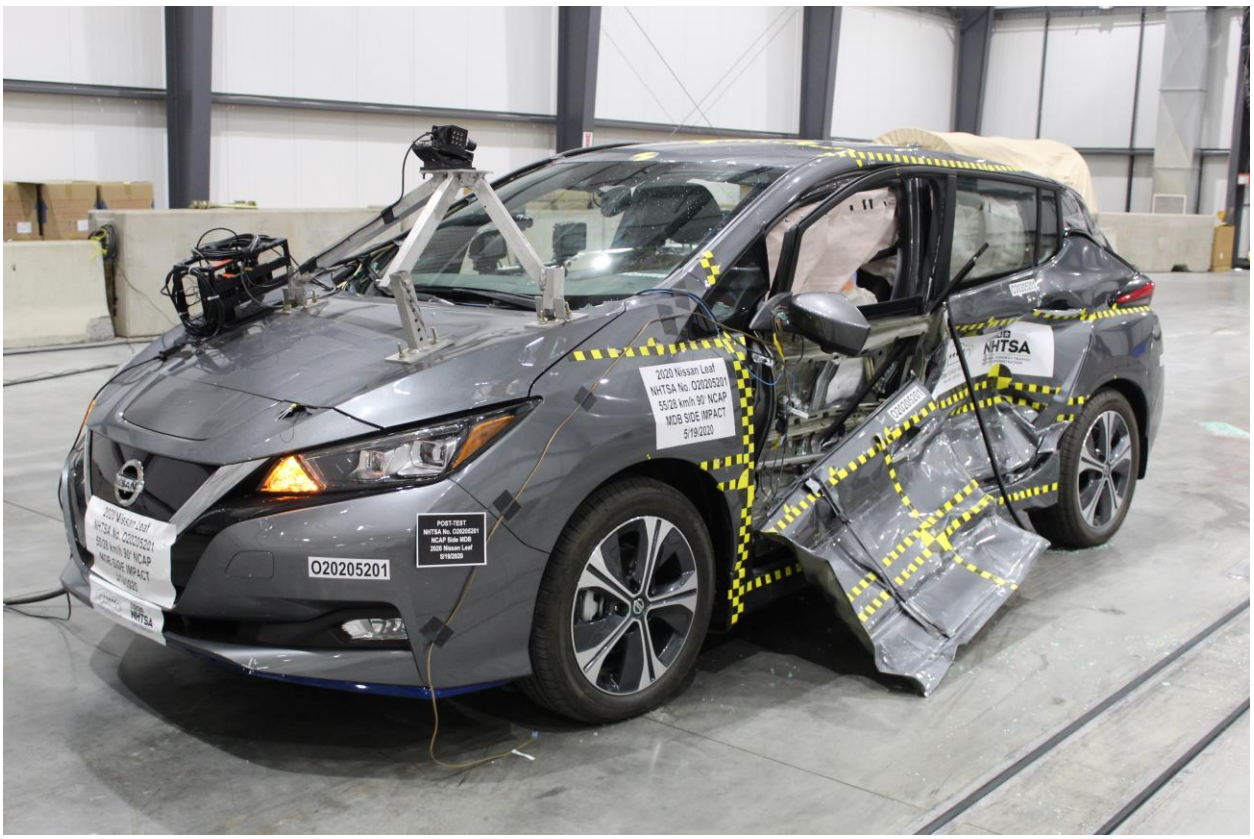

Figure A-6: Post-Test Left Front ¾ View of Test Vehicle

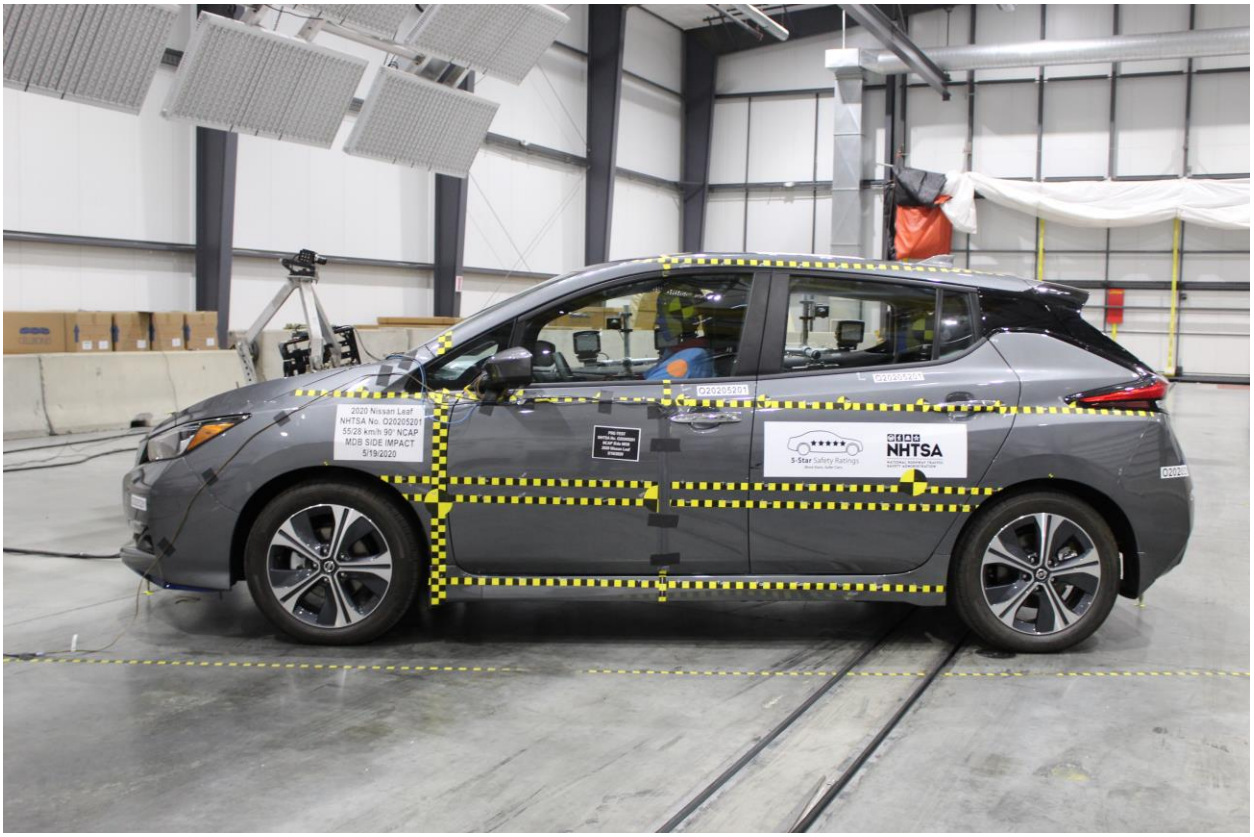

Figure A-7: Pre-Test Left Side View of Test Vehicle

Figure A-8: Post-Test Left Side View of Test Vehicle

Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle

Figure A-10: Post-Test Left Rear ¾ View of Test Vehicle

Figure A-11: Pre-Test Rear View of Test Vehicle

Figure A-12: Post-Test Rear Side View of Test Vehicle

Figure A-13: Pre-Test Right Side View of Test Vehicle

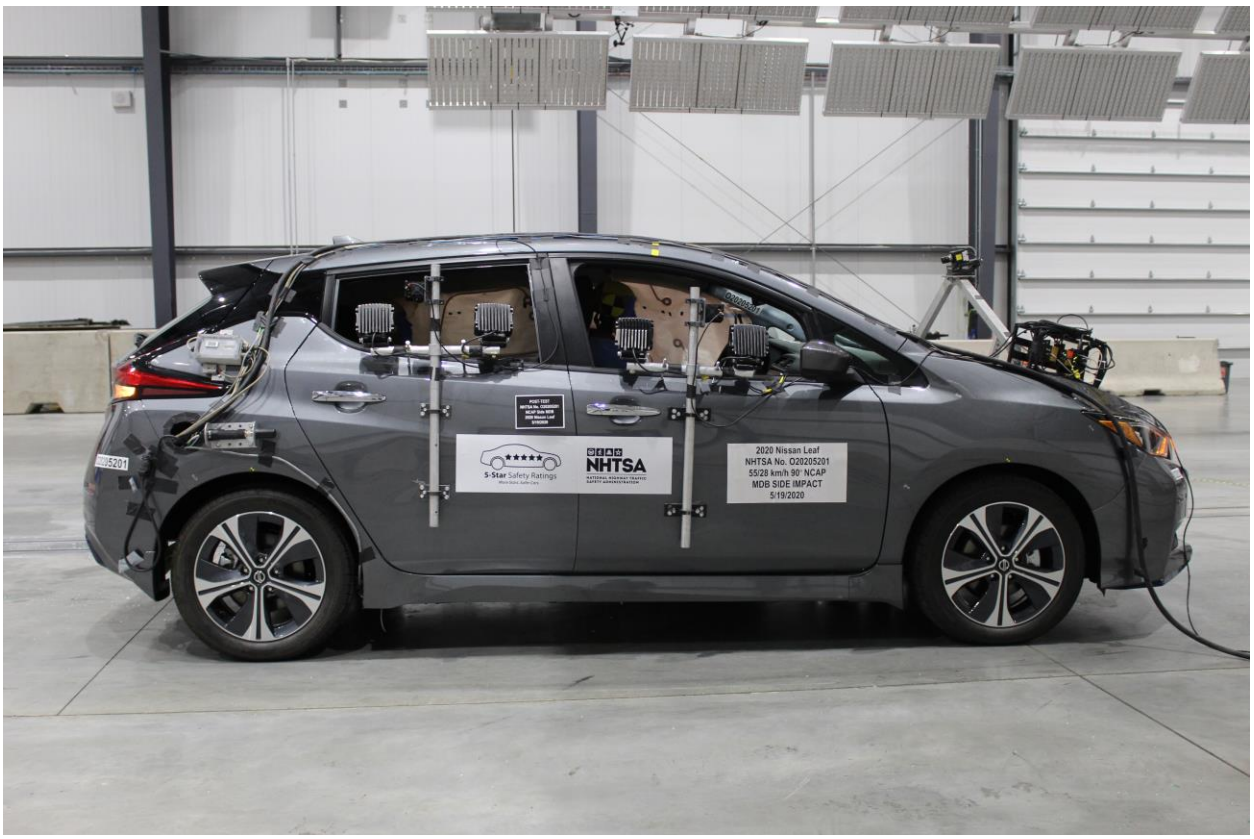

Figure A-14: Post-Test Right Side View of Test Vehicle

Figure A-15: Pre-Test Overhead View of the Test Area

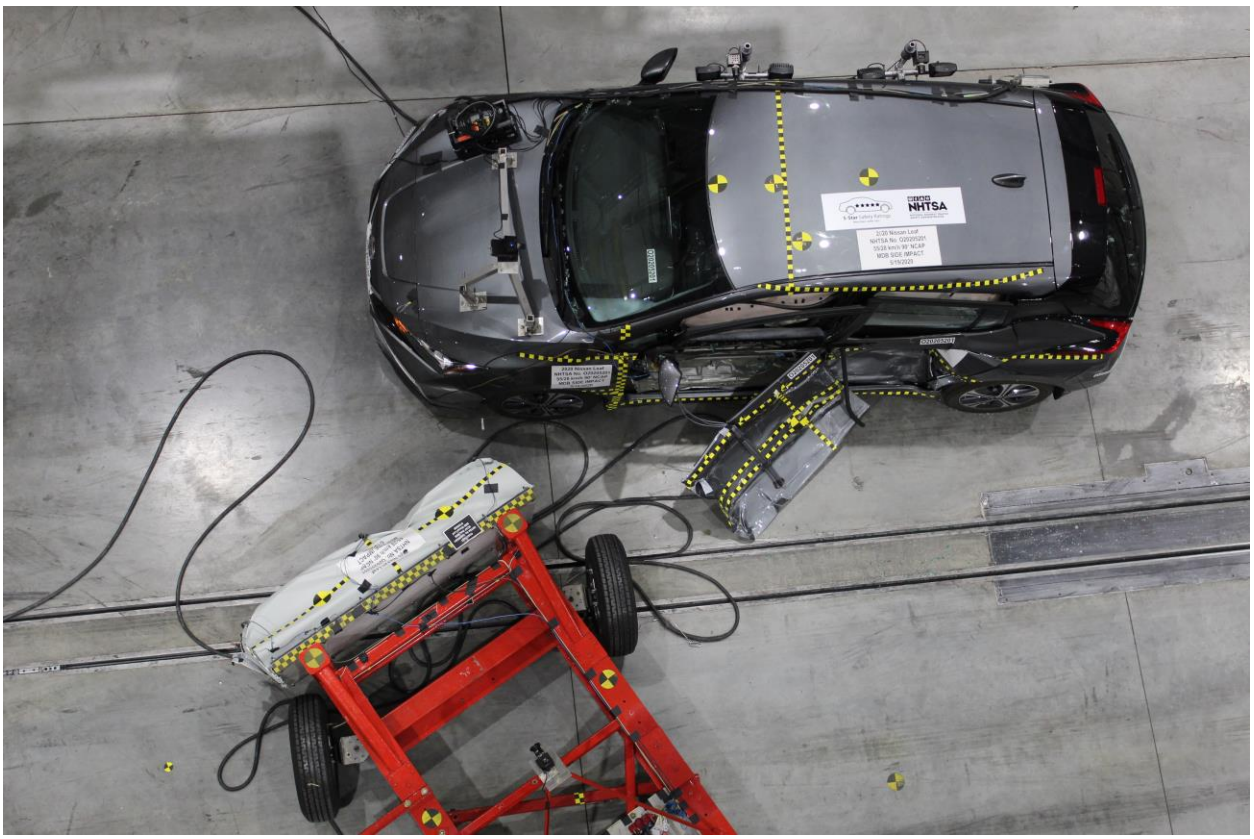

Figure A-16: Post-Test Overhead View of Test Area

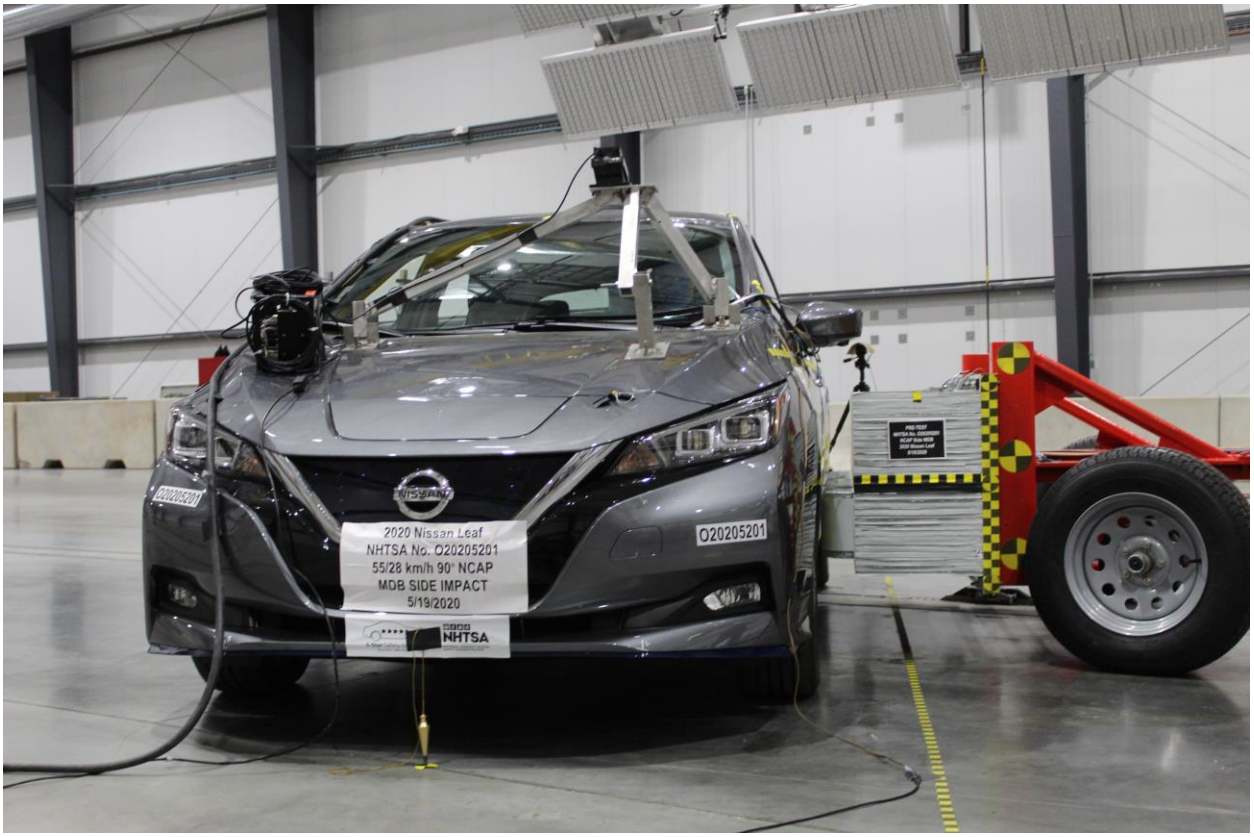

Figure A-17: Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle

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Figure A-19: Pre-Test Close-up View of Impact Point Target

Figure A-20: Post-Test Close-up View of Impact Point Target

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Figure A-23: Pre-Test Left Rear Door Latch Close-Up

Figure A-24: Post-Test Left Rear Door Latch Close-Up

Figure A-25: Pre-Test Front Close-up View of Driver Dummy

Figure A-26: Post-Test Front Close-up View of Driver Dummy

Figure A-27: Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking

Figure A-28: Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

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Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

Figure A-32: Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

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Figure A-34: Pre-Test Placement of Driver Dummy's Feet

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Figure A-37: View of Disengaged Parking Brake

Figure A-38: Pre-Test View of Parking Brake

Figure A-39: Pre-test Close-Up Left Side View of Driver Seat Track

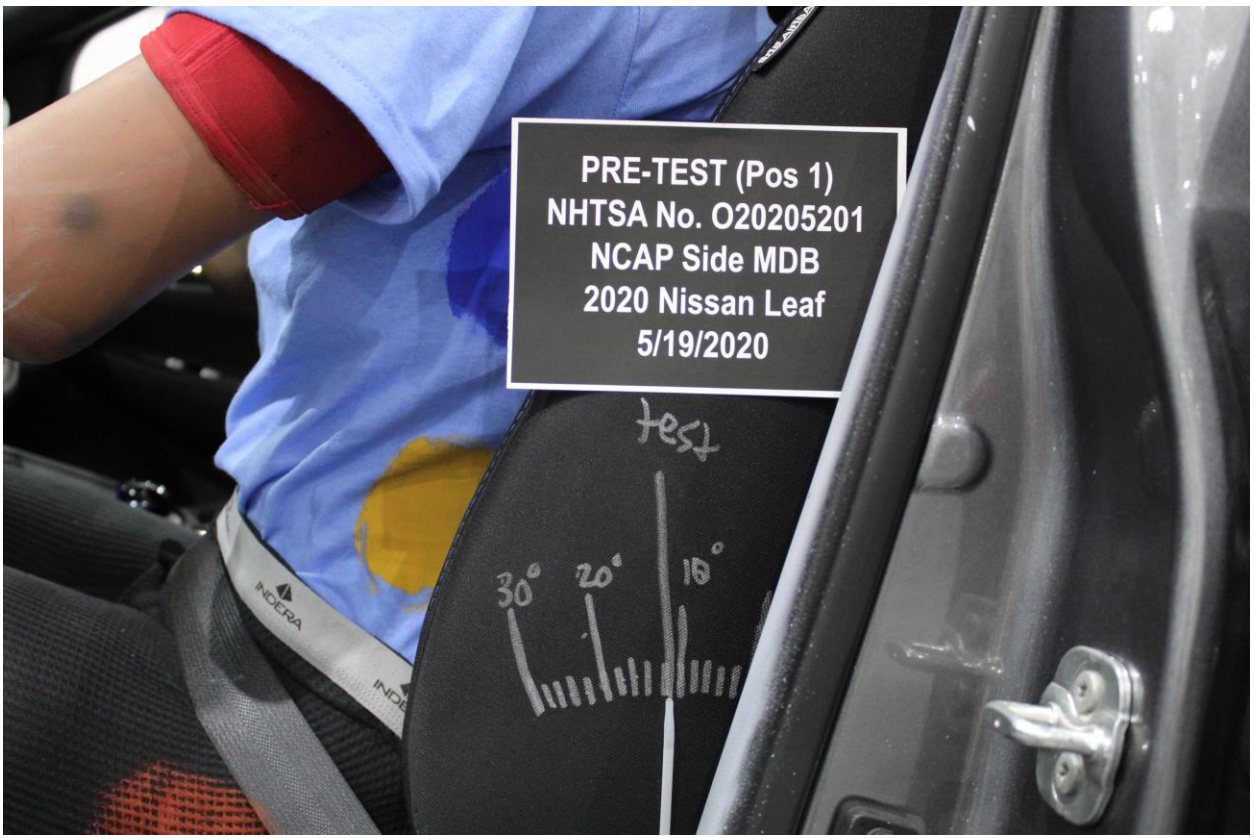

Figure A-40: Pre-Test Close-Up Left Side View of Driver Seat Back

Figure A-41: Pre-Test Close-Up View of Driver Seat Back or Head Restraint

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Figure A-44: Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

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Figure A-46: Pre-Test Driver Inner Door Panel View

Figure A-47: Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations

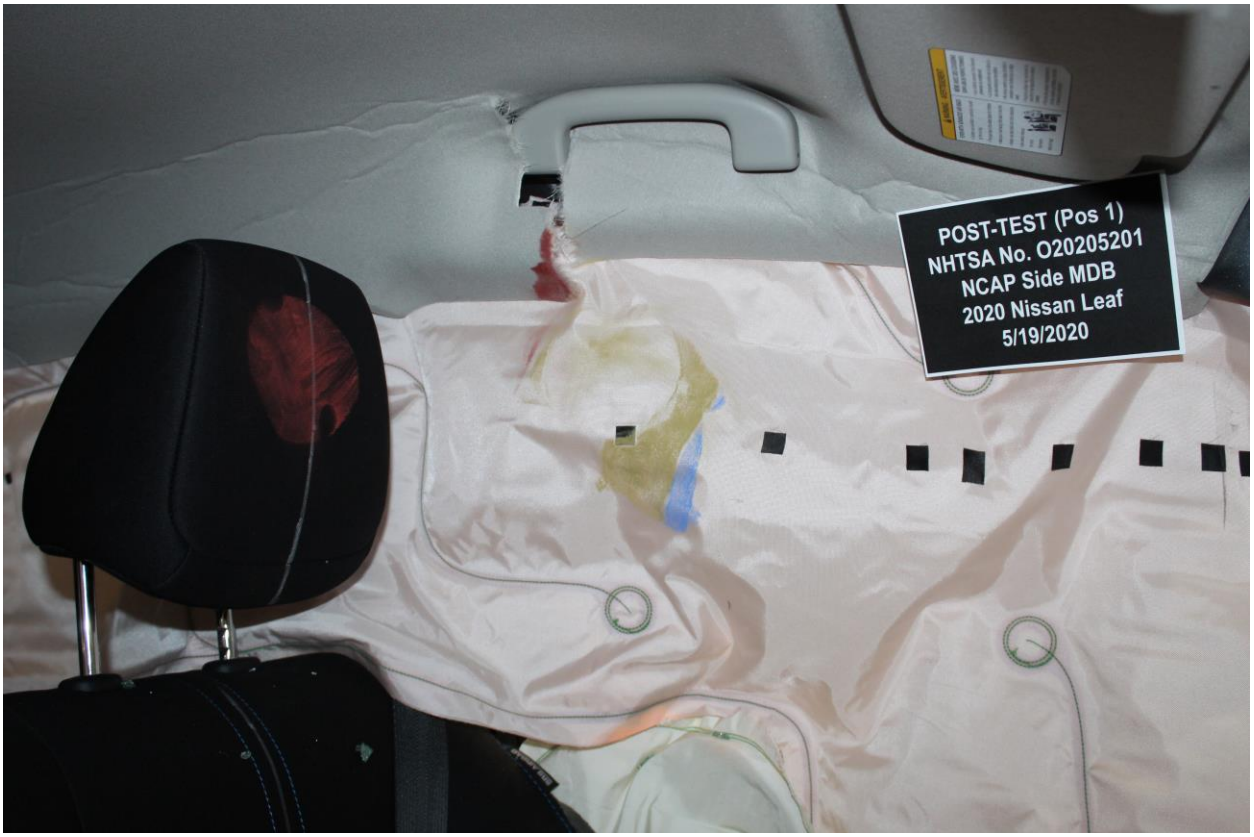

Figure A-48: Post-Test Driver Dummy Close-Up Head Contact with Vehicle View

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Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

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Figure A-73: Pre-Test Rear Passenger Inner Door Panel View

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Figure A-75: Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View

Figure A-76: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air bag View

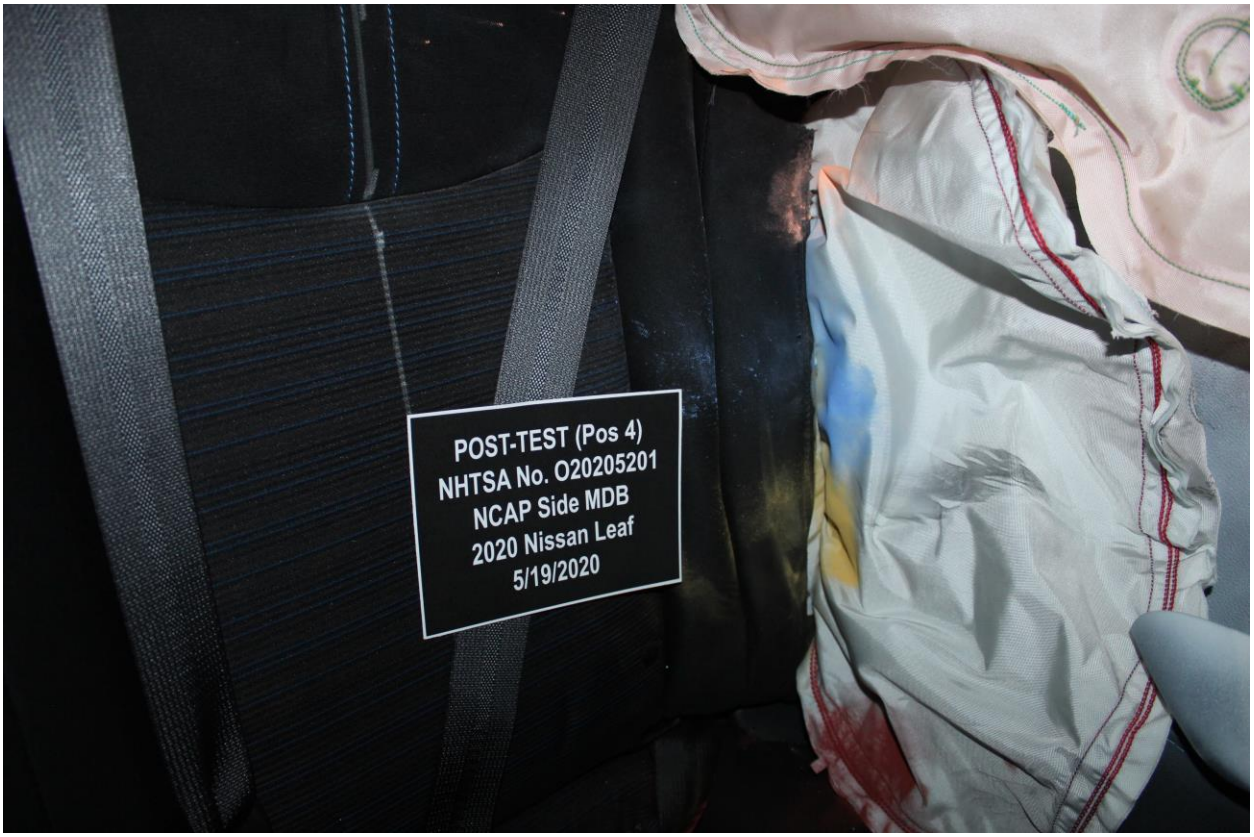

Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

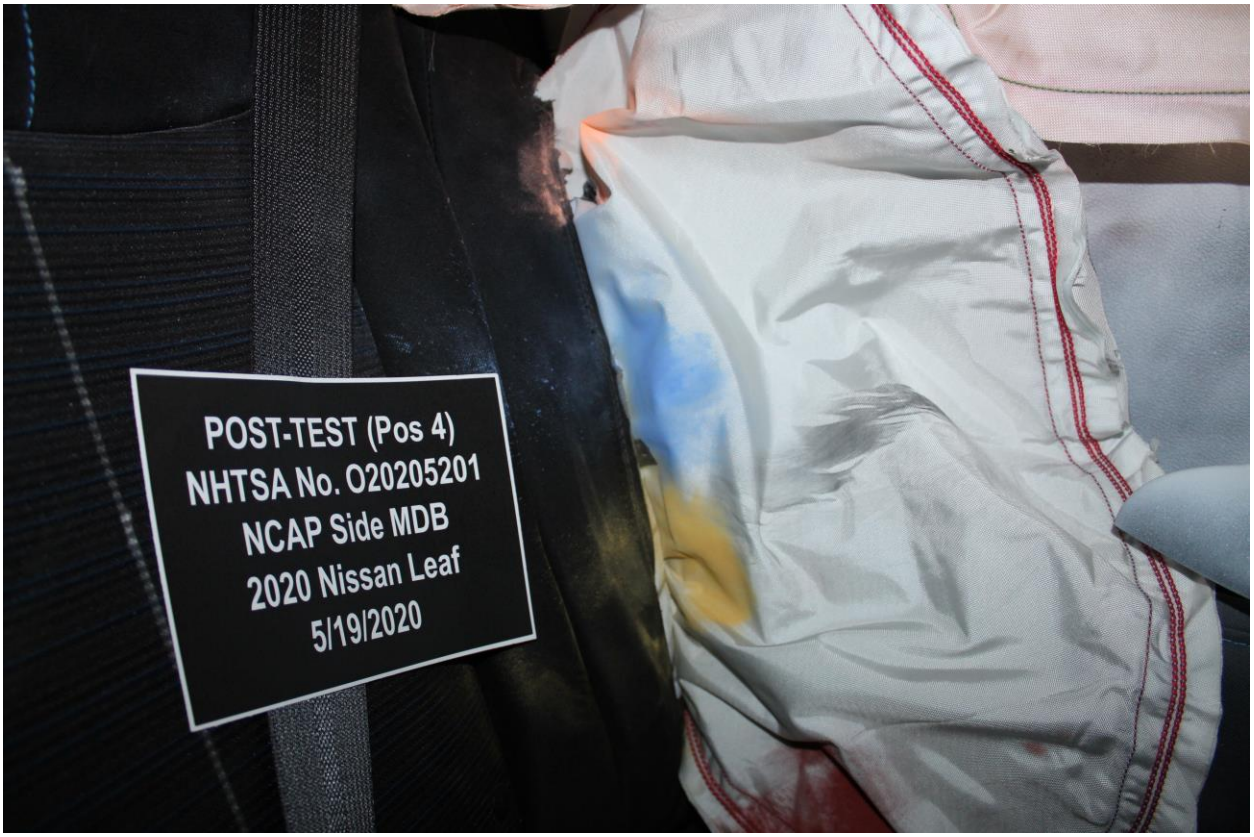

Figure A-78: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air bag View

Figure A-79: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

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Figure A-81: Post-Test Rear Passenger Dummy Close-Up Knee Contact View

Figure A-82: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

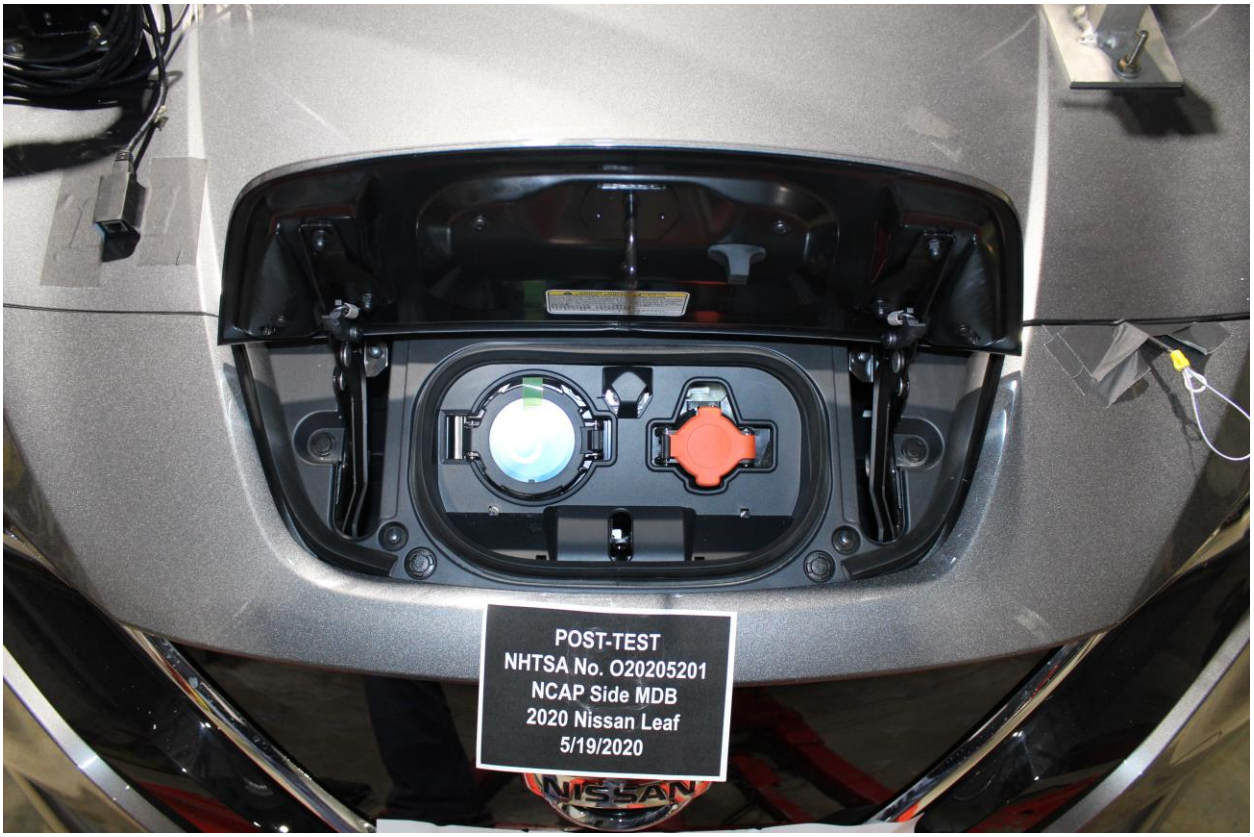


Figure A-83: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-84: Pre-Test Front View of MDB Impactor Face

Figure A-85: Post-Test Front View of MDB Impactor Face

Figure A-86: Pre-Test Top View of MDB Impactor Face

Figure A-87: Post-Test Top View of MDB Impactor Face

Figure A-88: Pre-Test Left Side View of MDB Impactor Face

Figure A-89: Post-Test Left Side View of MDB Impactor Face

Figure A-90: Pre-Test Right Side View of MDB Impactor Face

Figure A-91: Post-Test Right Side View of MDB Impactor Face

Figure A-92: Close-Up View of Vehicle's Certification Label

Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

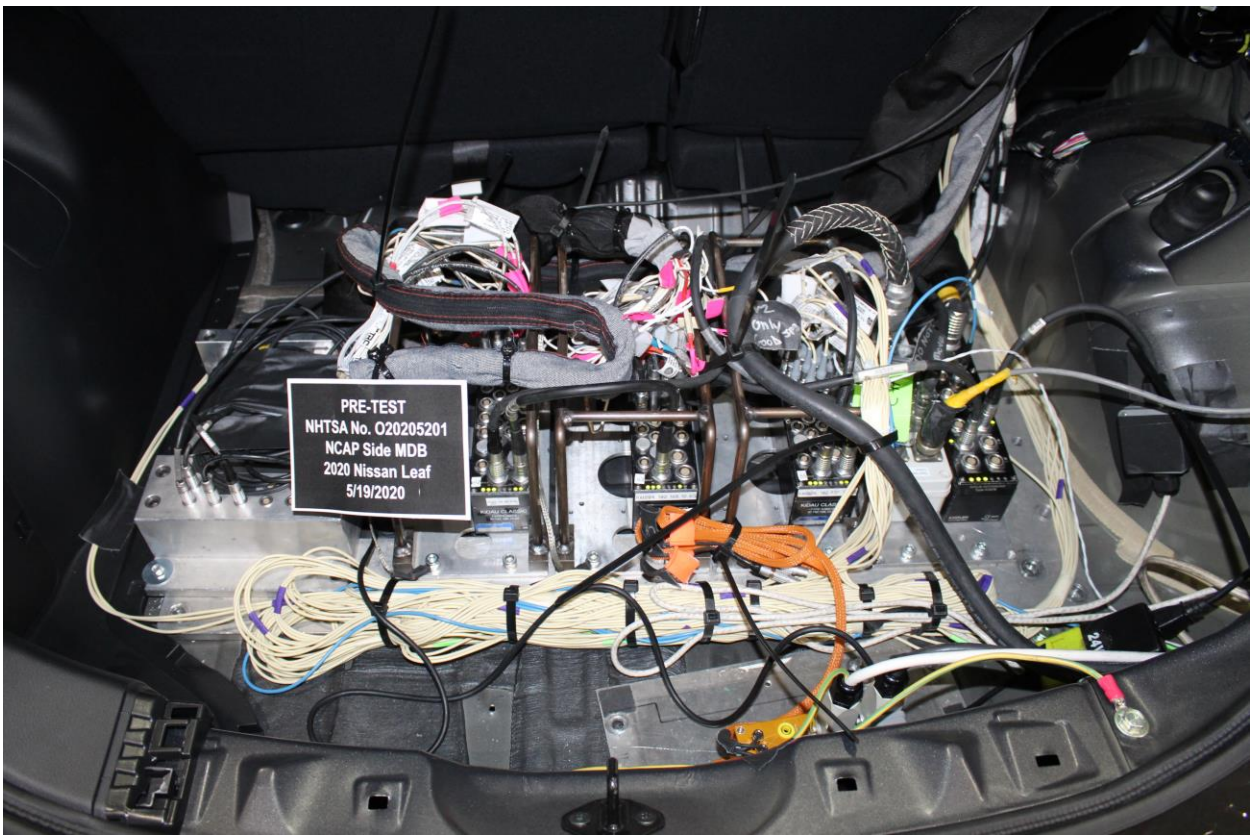


Figure A-94: Pre-Test Ballast View

Figure A-95: Post-Test Primary and Redundant Speed Trap Read-Out

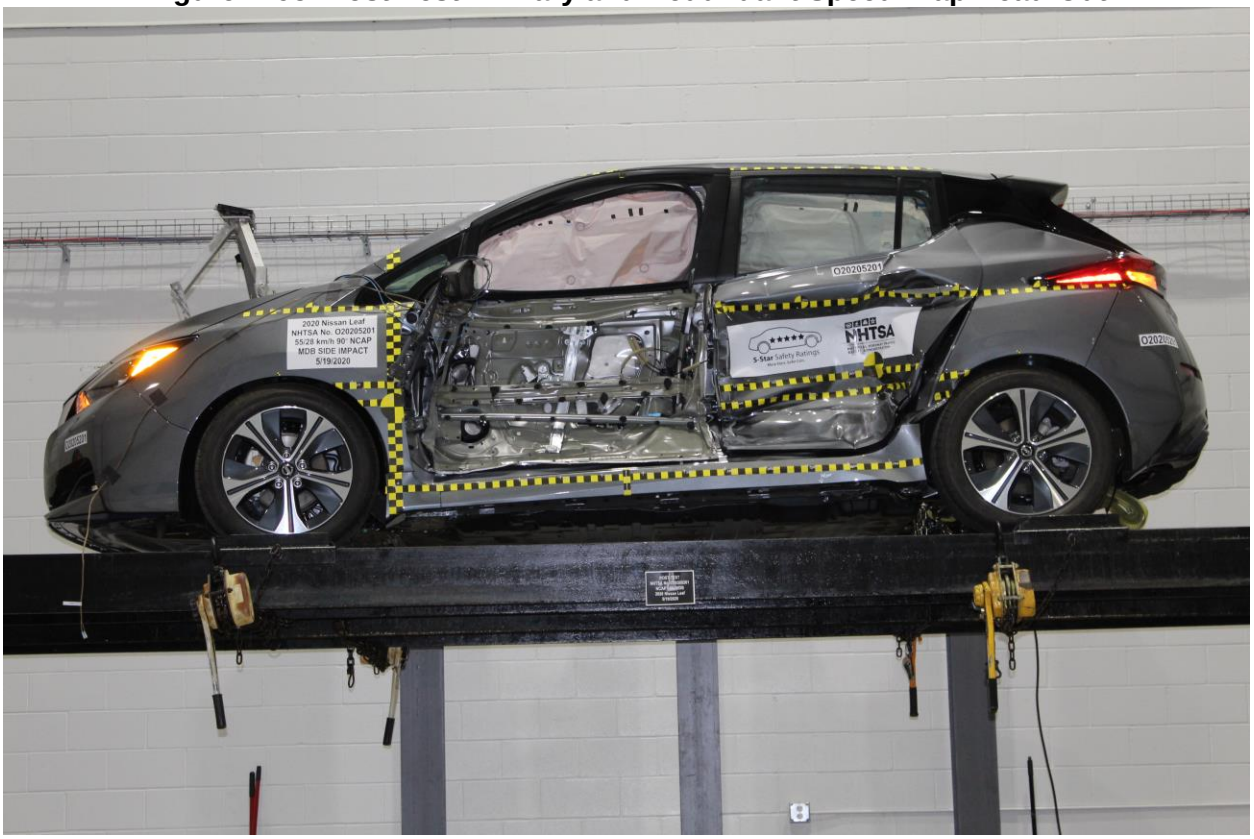


Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

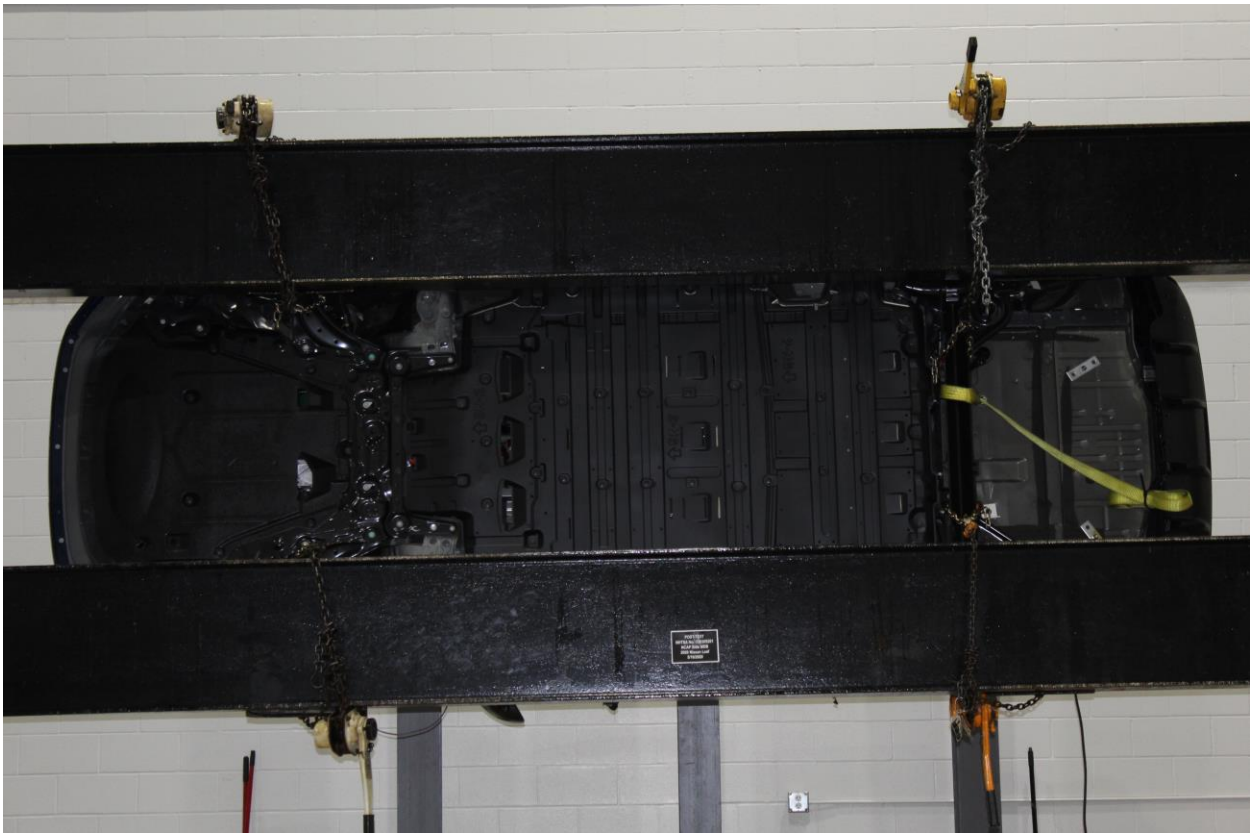


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

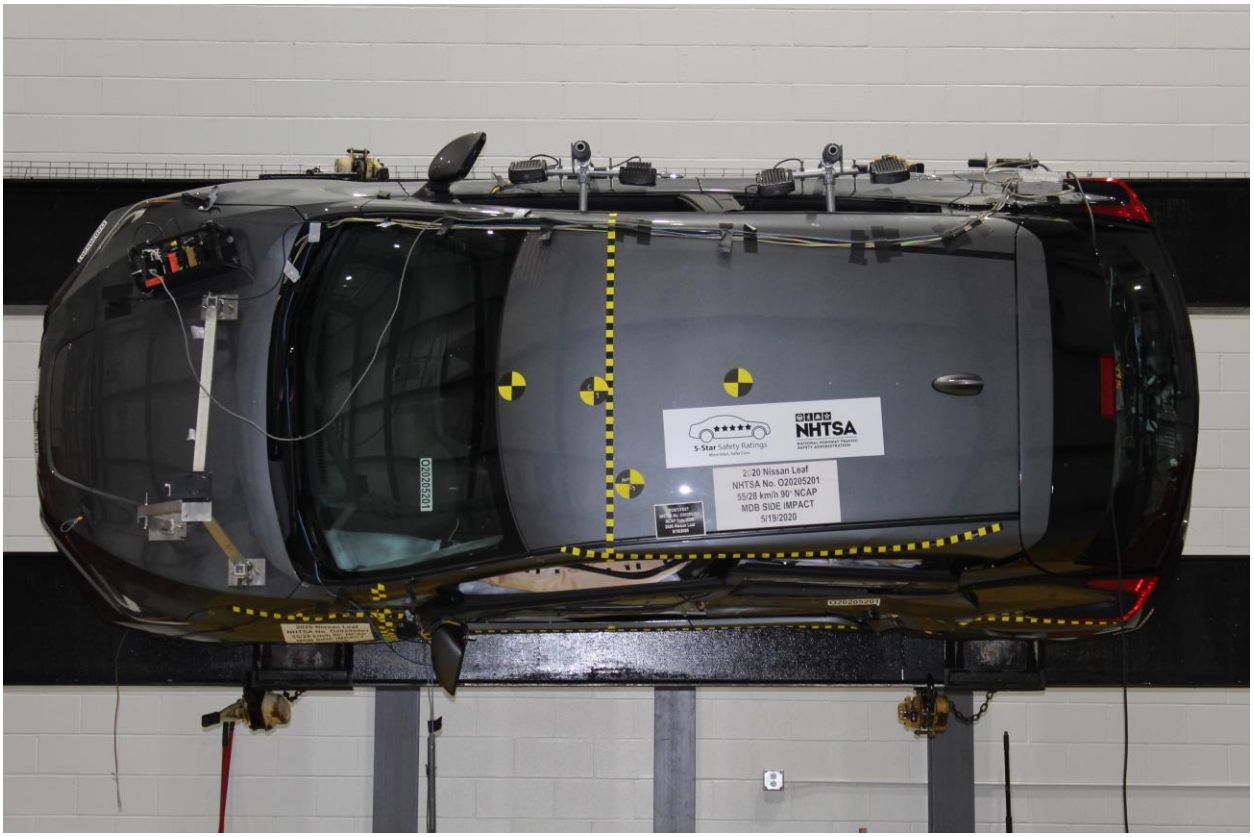


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

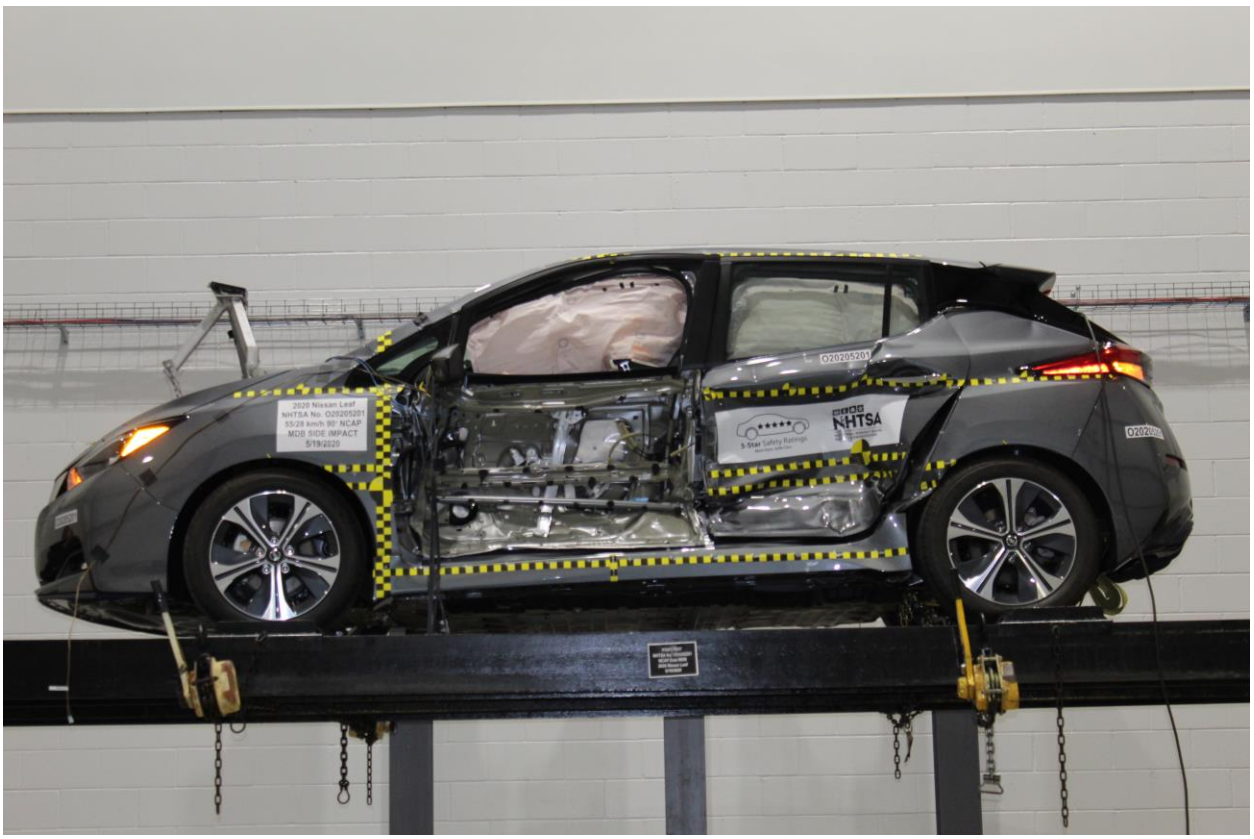


Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees

Figure A-101: Impact Event

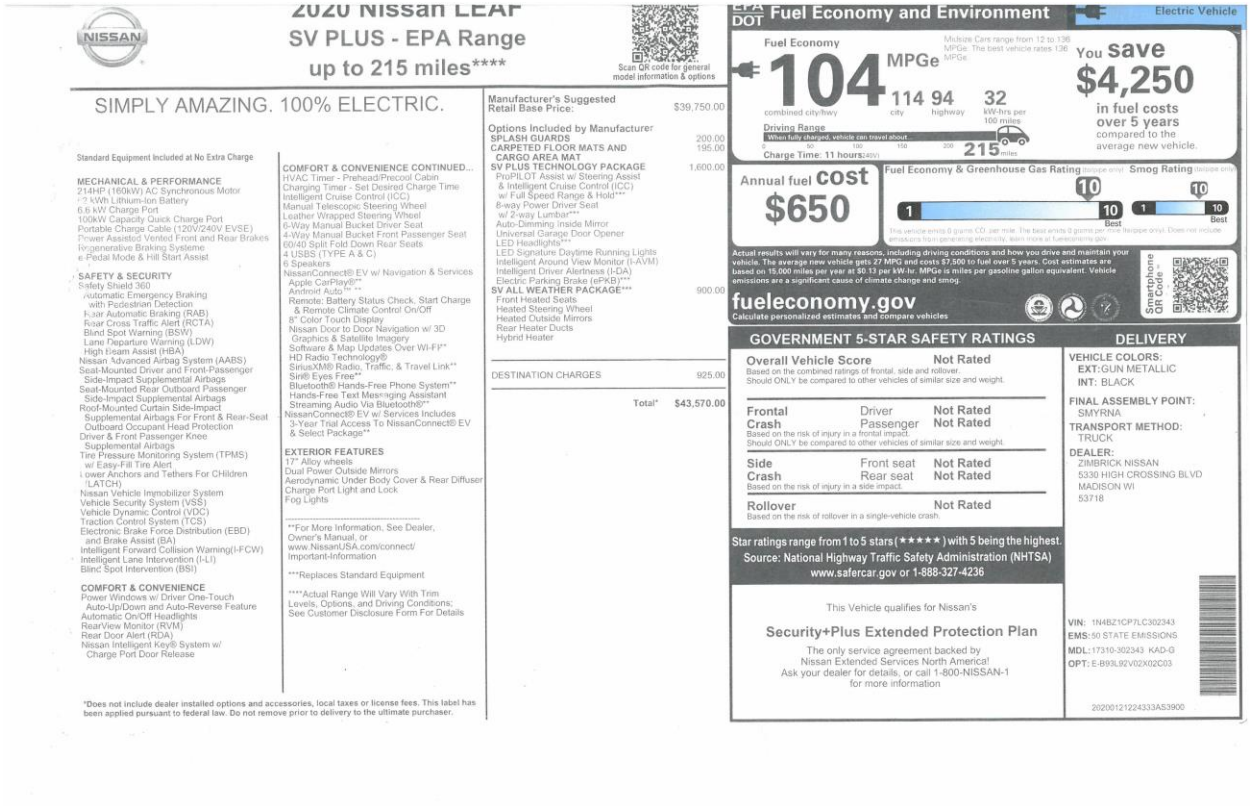
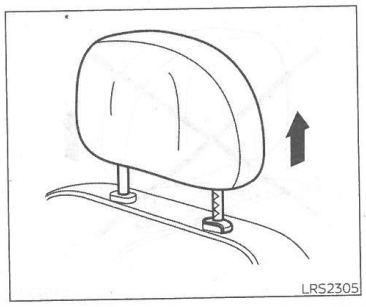


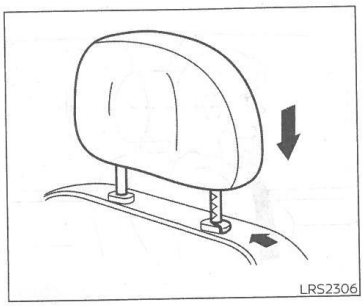
Figure A-102: Monroney Label



Raise

To raise the head restraint/headrest, pull it up.

Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.



Lower

To lower, push and hold the lock knob and push the head restraint/headrest down

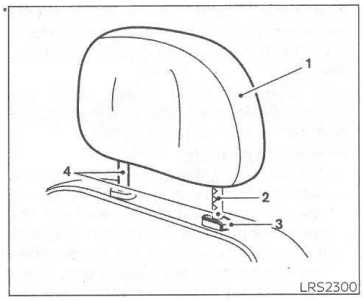
Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.

PRECAUTIONS ON SEAT BELT USAGE

If you are wearing your seat belt properly adjusted, and you are sitting upright and well back in your seat with both feet on the floor, your chances of being injured or killed in an accident and/or the severity of injury may be greatly reduced. NISSAN strongly encourages you and all of your passengers to buckle up every time you drive, even if your seating position includes a supplemental air bag.

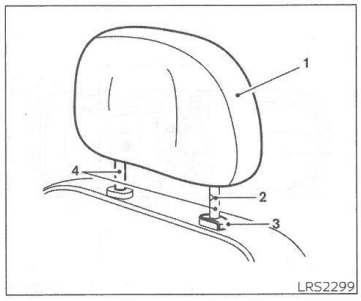
Most U.S. states and Canadian provinces or territories specify that seat belts be worn at all times when a vehicle is being driven.

Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



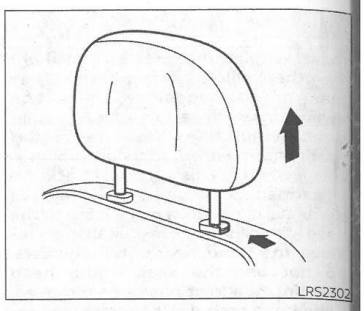
ADJUSTABLE HEAD RESTRAINT/ HEADREST COMPONENTS

1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks



NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

1. Removable head restraint/headrest
2. Single notch
3. Lock knob
4. Stalks



REMOVE

Use the following procedure to remove the head restraint/headrest.

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not loose in the vehicle.
5. Reinstall and properly adjust the head restraint/headrest before an occupant uses the seating position.

Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual-Rear Restraints Not Adjustable

Figure 305-1: Auxiliary Power Module Warning Label

Figure 305-2: Power Inverter Warning Label

Photo Not Applicable

Figure 305-3 First Responder Warning Label

Photo Not Applicable

Figure 305-4: First Responder Warning Label Location

Figure 305-5: Other Vehicle Label Related to Electric Propulsion System

Figure 305-6: Manual High Voltage Service Disconnect in Place

Figure 305-7: Manual High Voltage Service Disconnect Removed (Show Plug)

Figure 305-8: Manual High Voltage Service Disconnect Removed Location

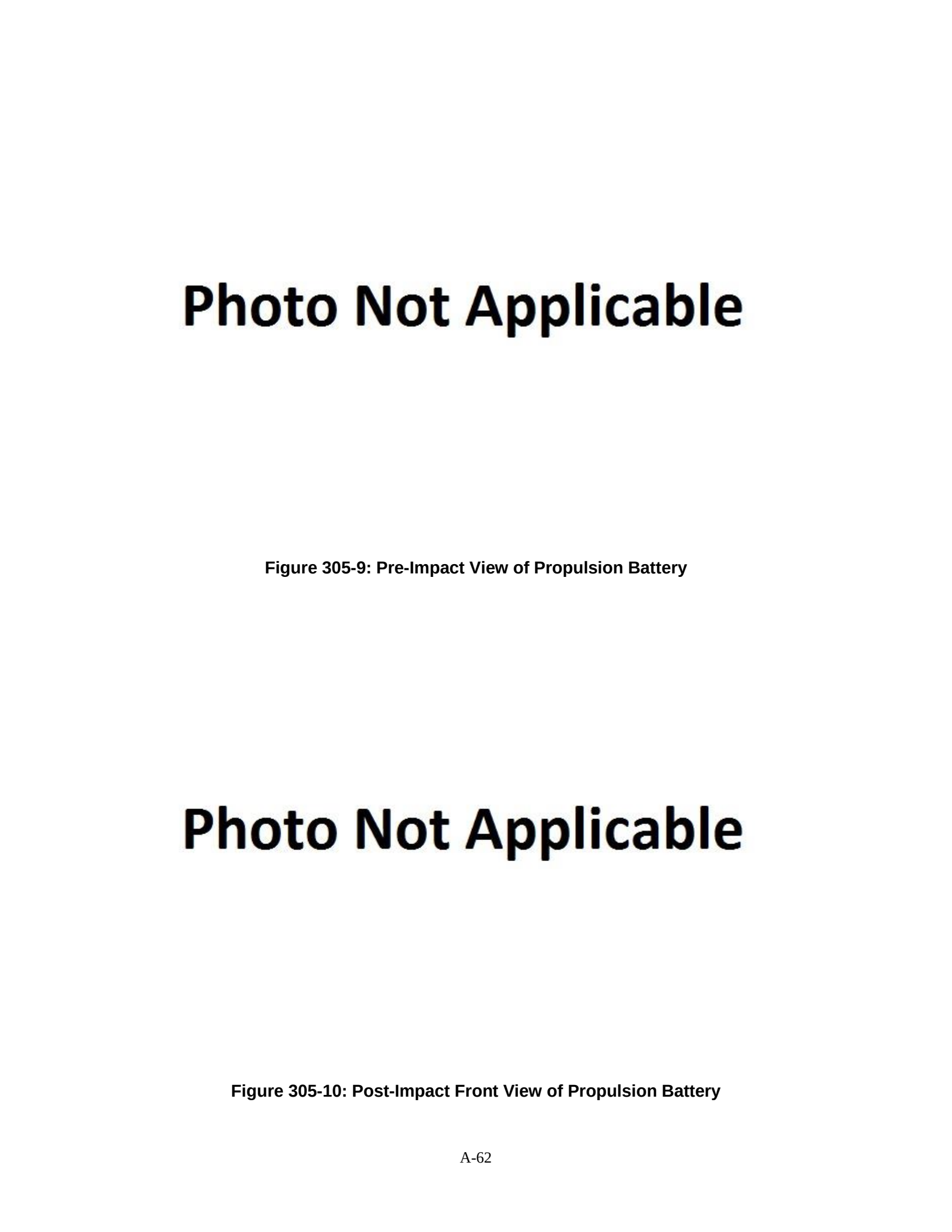


Figure 305-9: Pre-Impact View of Propulsion Battery

Figure 305-10: Post-Impact Front View of Propulsion Battery

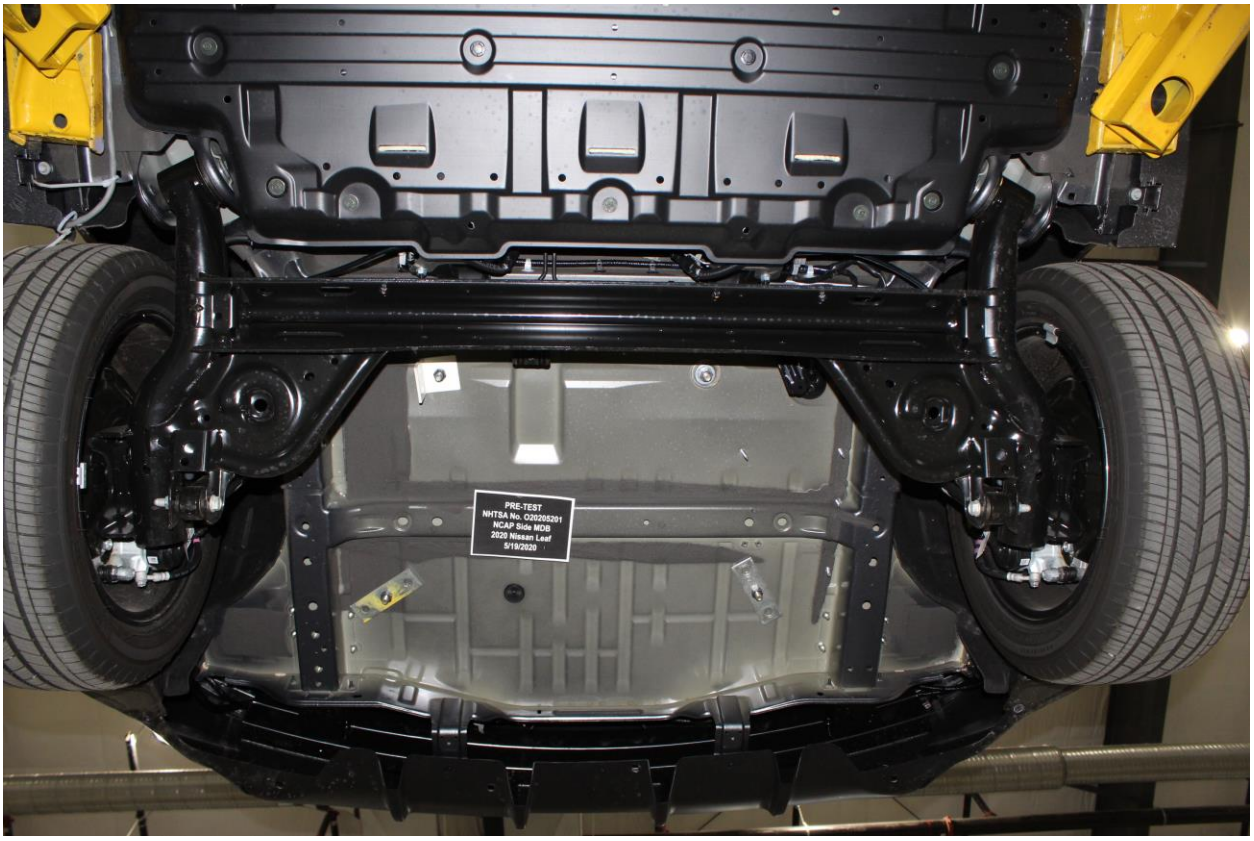


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

Photo Not Available

Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

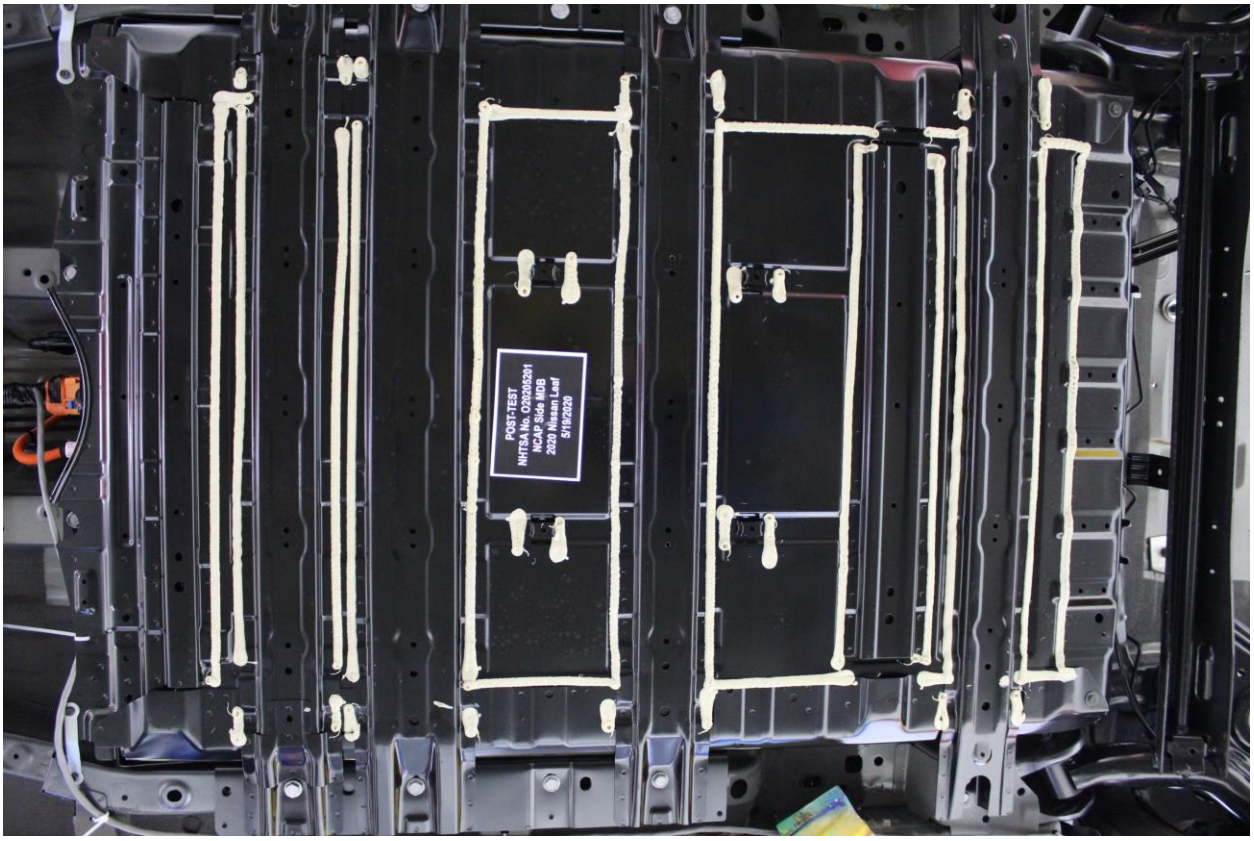


Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Photo Not Applicable

Figure 305-14: Pre-Impact View of Propulsion Battery Module(s)

Photo Not Applicable

Figure 305-15: Post-Impact View of Propulsion Battery Module(s)

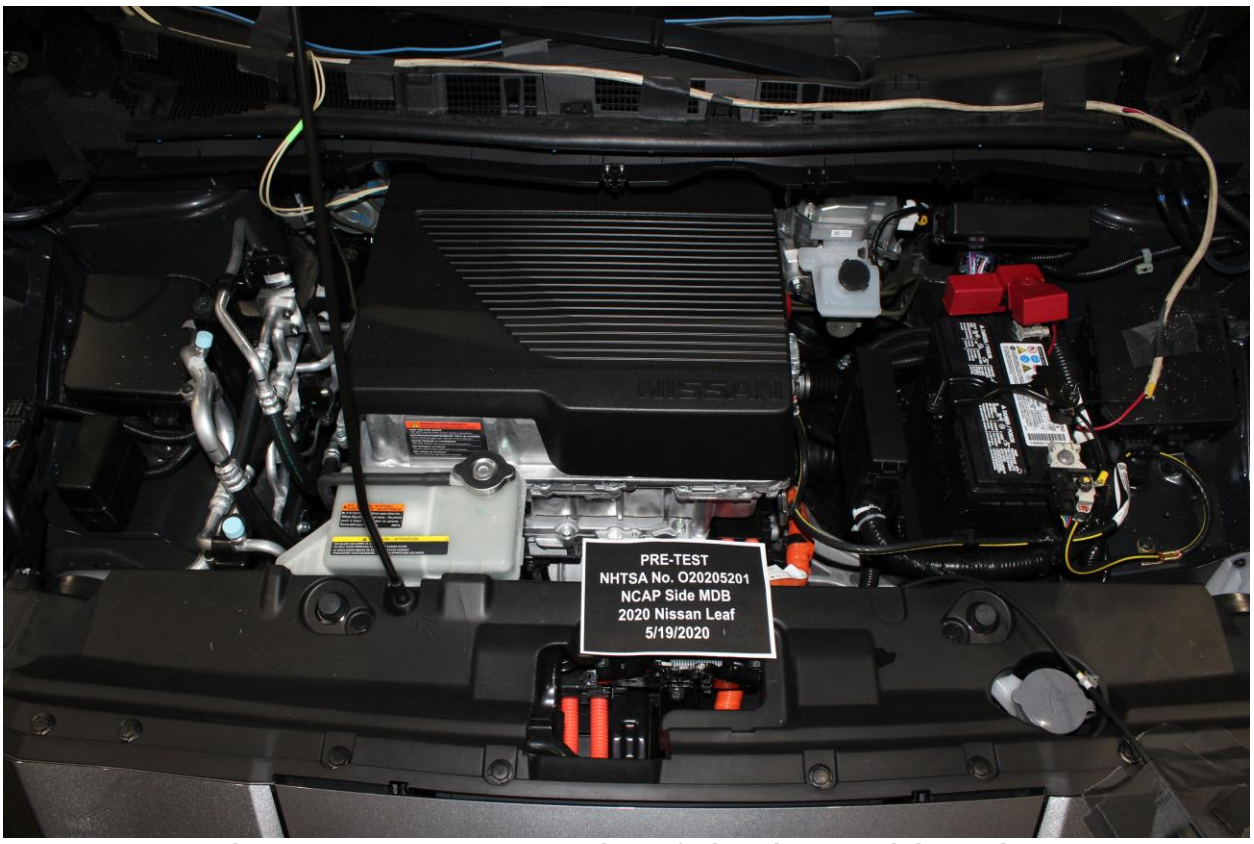


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

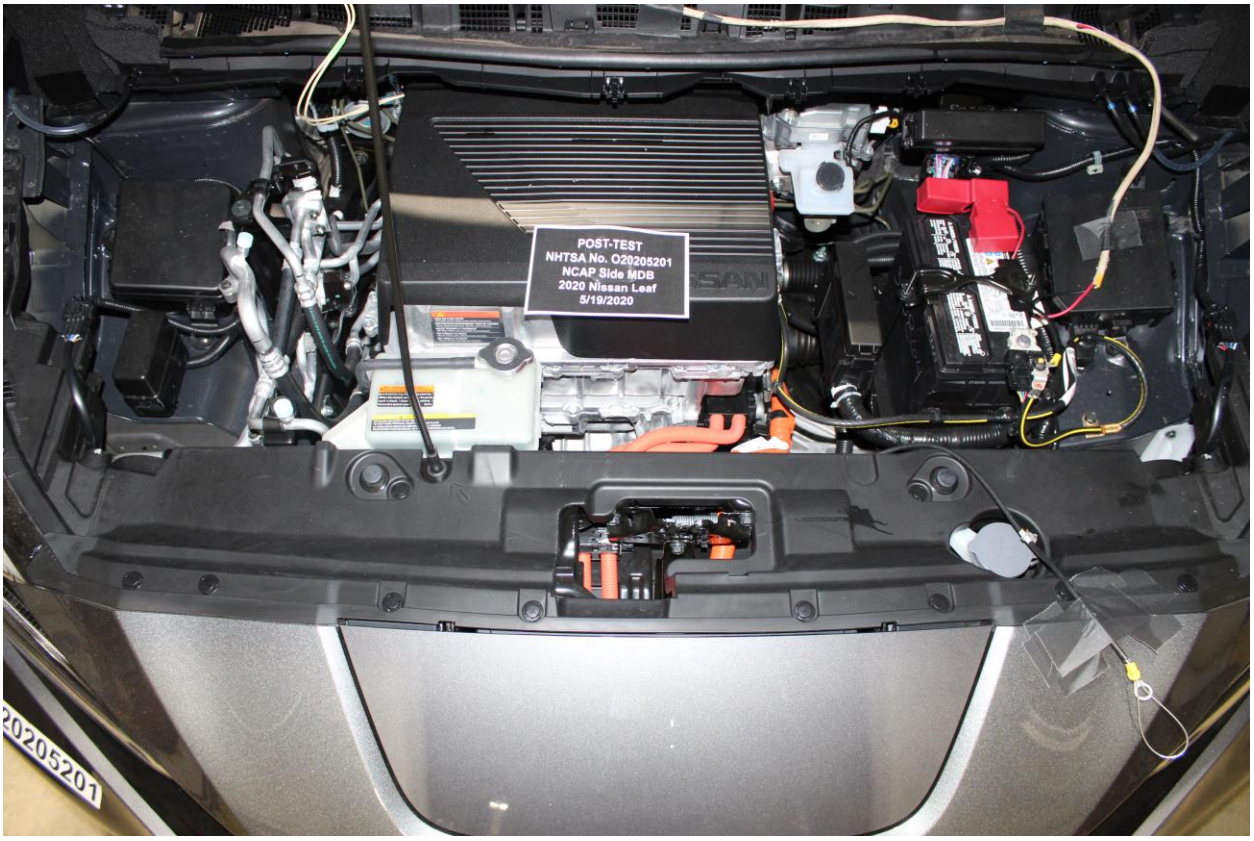


Figure 305-17: Post-Impact View of Electric Propulsion Drive

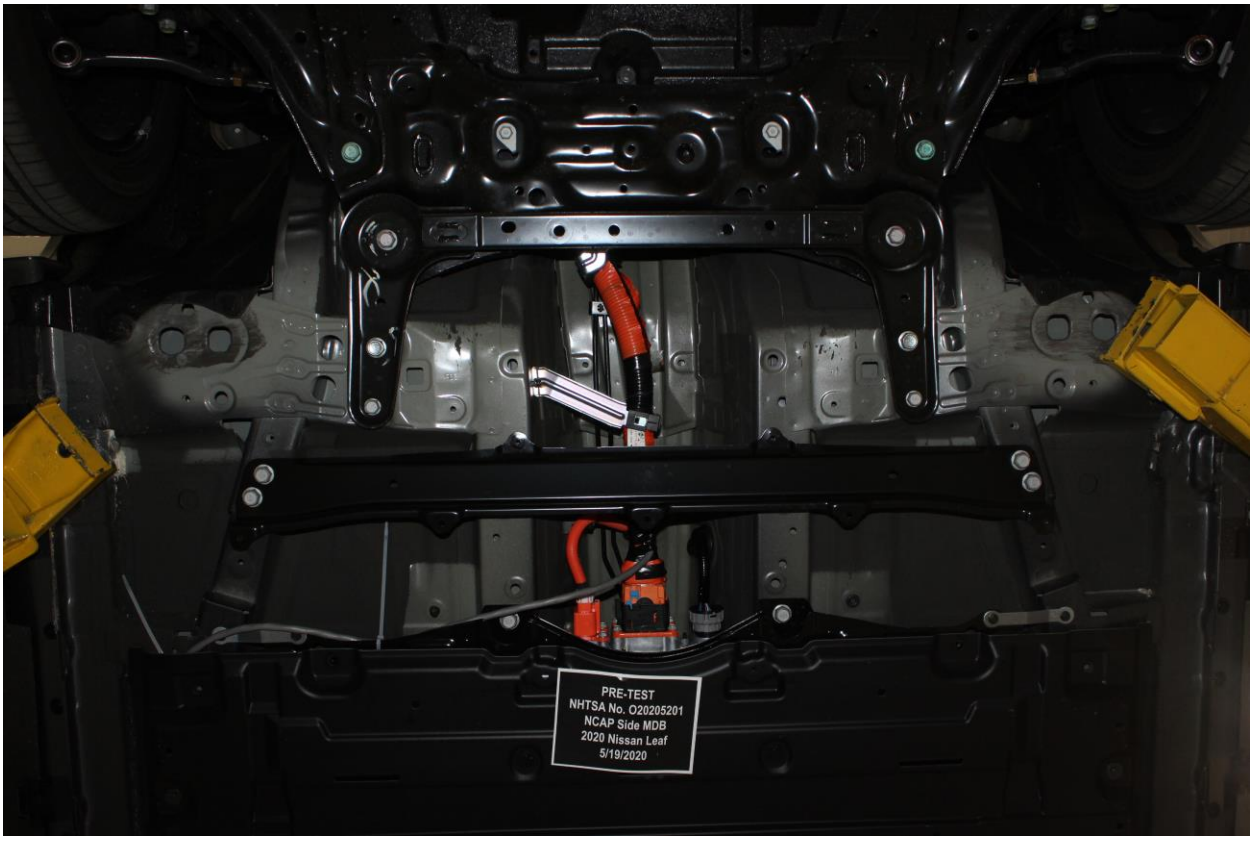


Figure 305-18: Pre-Impact View of High Voltage Interconnects

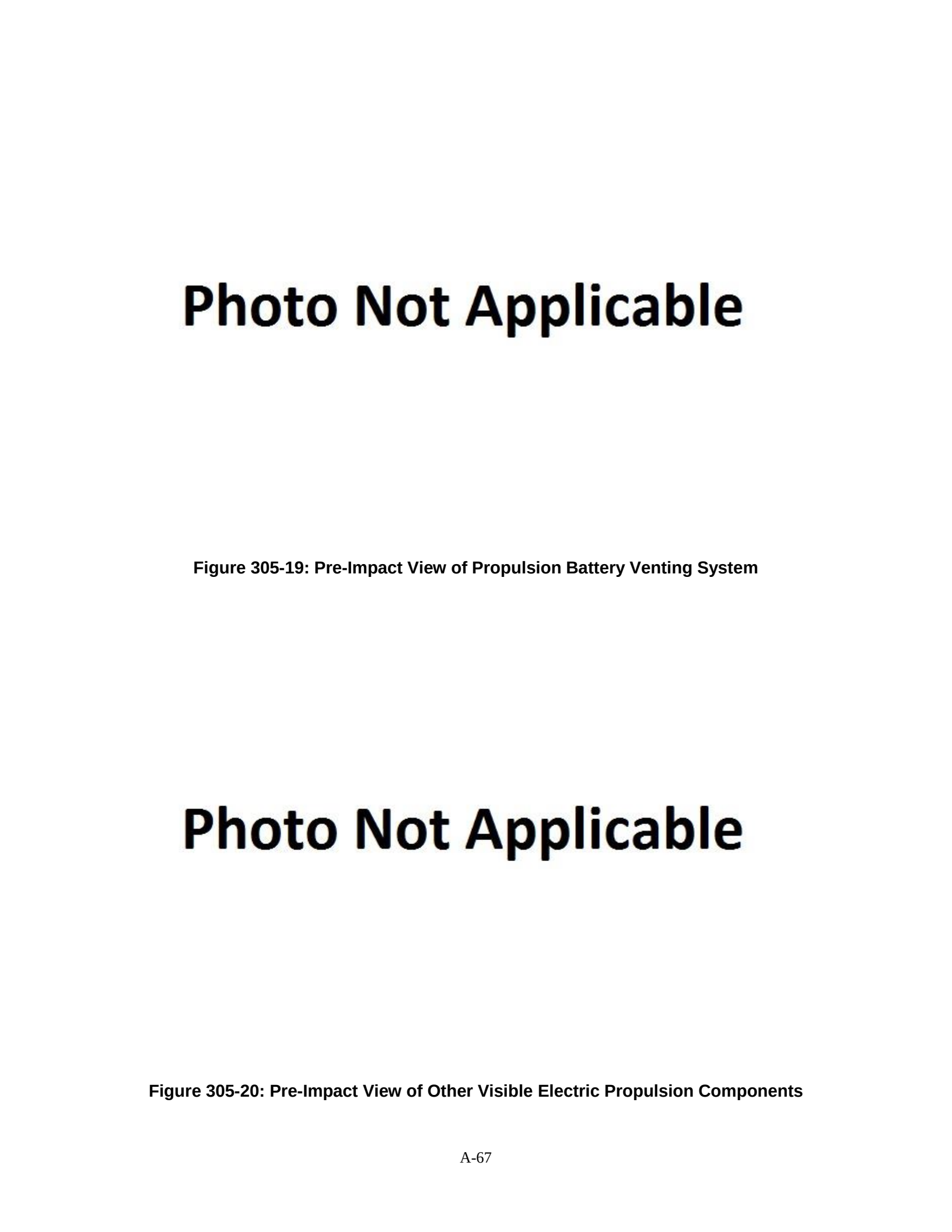


Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components

Photo Not Available

Figure 305-21: Pre-Impact View of Ground Lead Attached

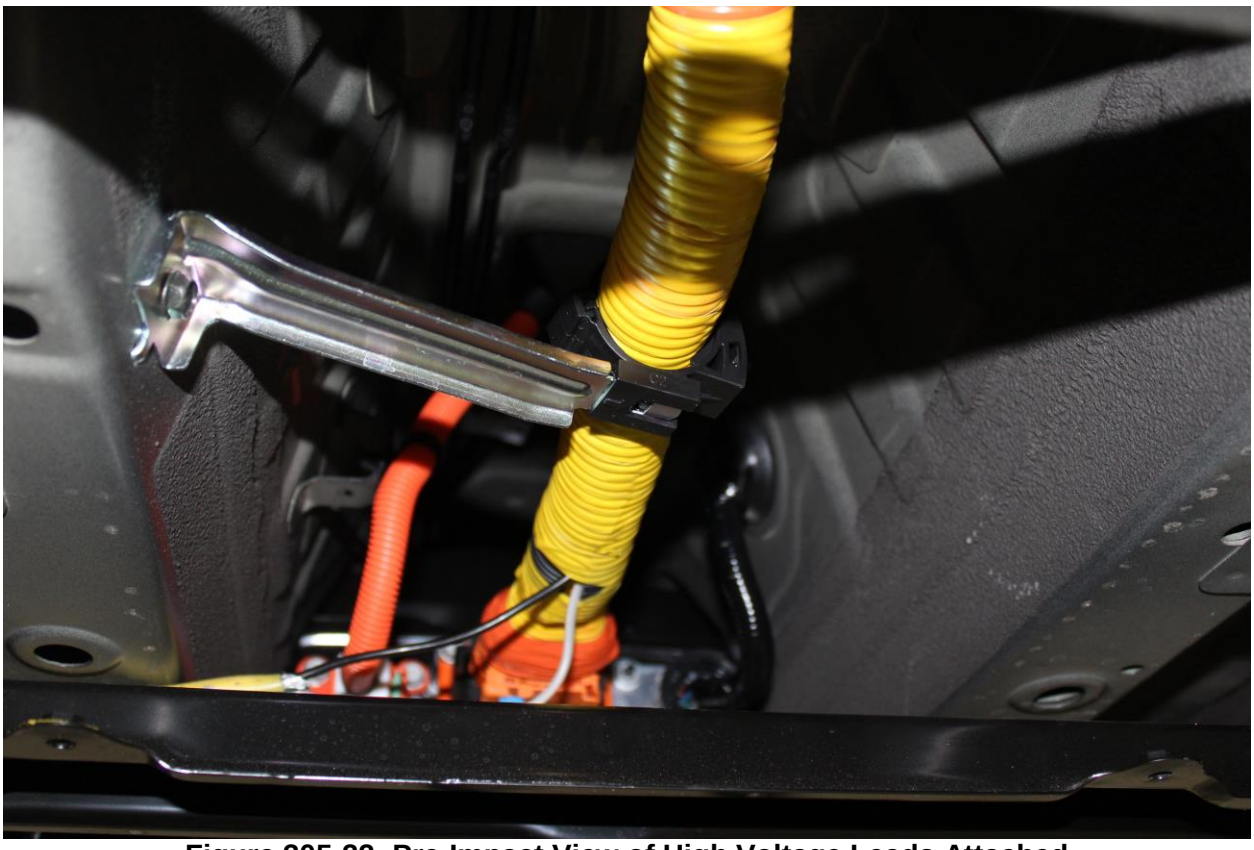


Figure 305-22: Pre-Impact View of High Voltage Leads Attached

Figure 305-23: Pre-Impact Close Up View of High Voltage Leads Attached

Photo Not Available

Figure 305-24: Pre-Impact View of Installed Test Interface Port

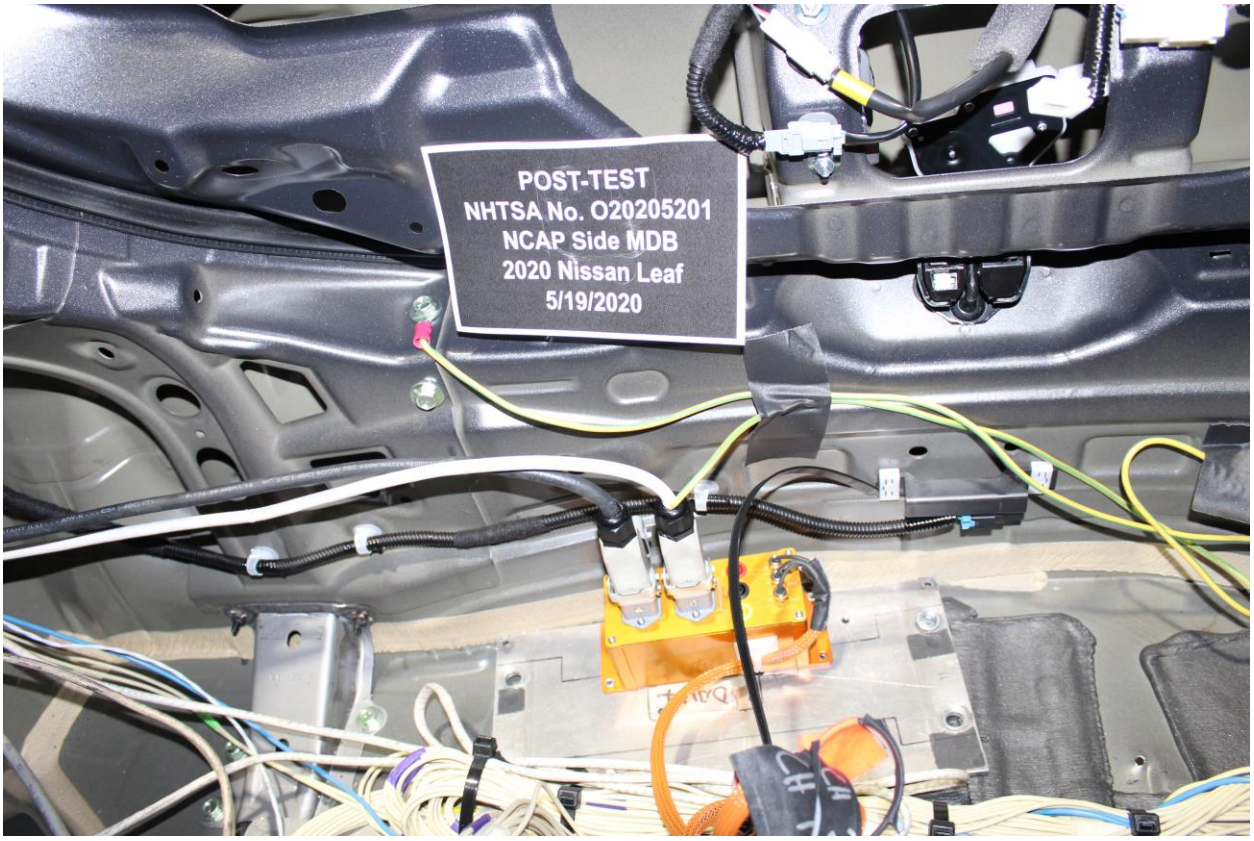


Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

Figure 305-26: Pre-Impact View of Other Test Devices

Photo Not Applicable

Figure 305-27: Post-Impact View of Other Test Devices

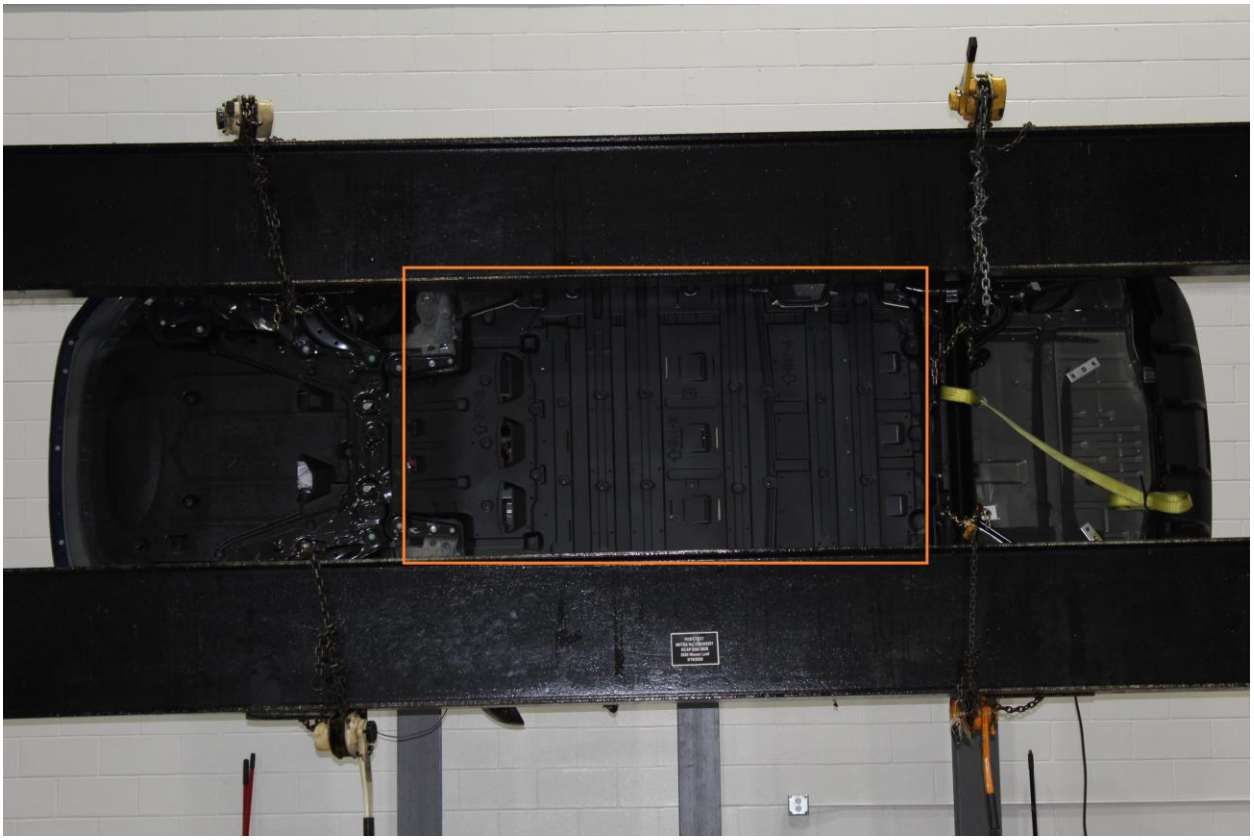


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

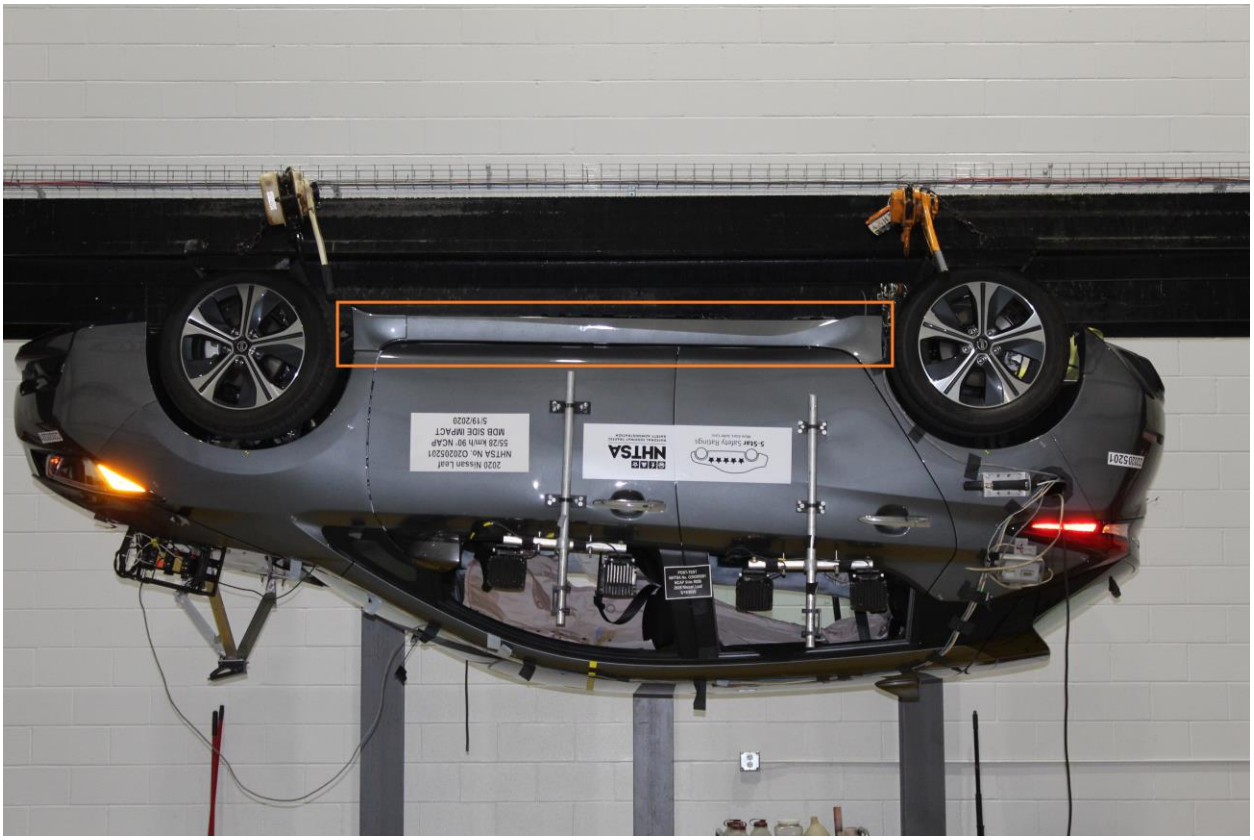


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

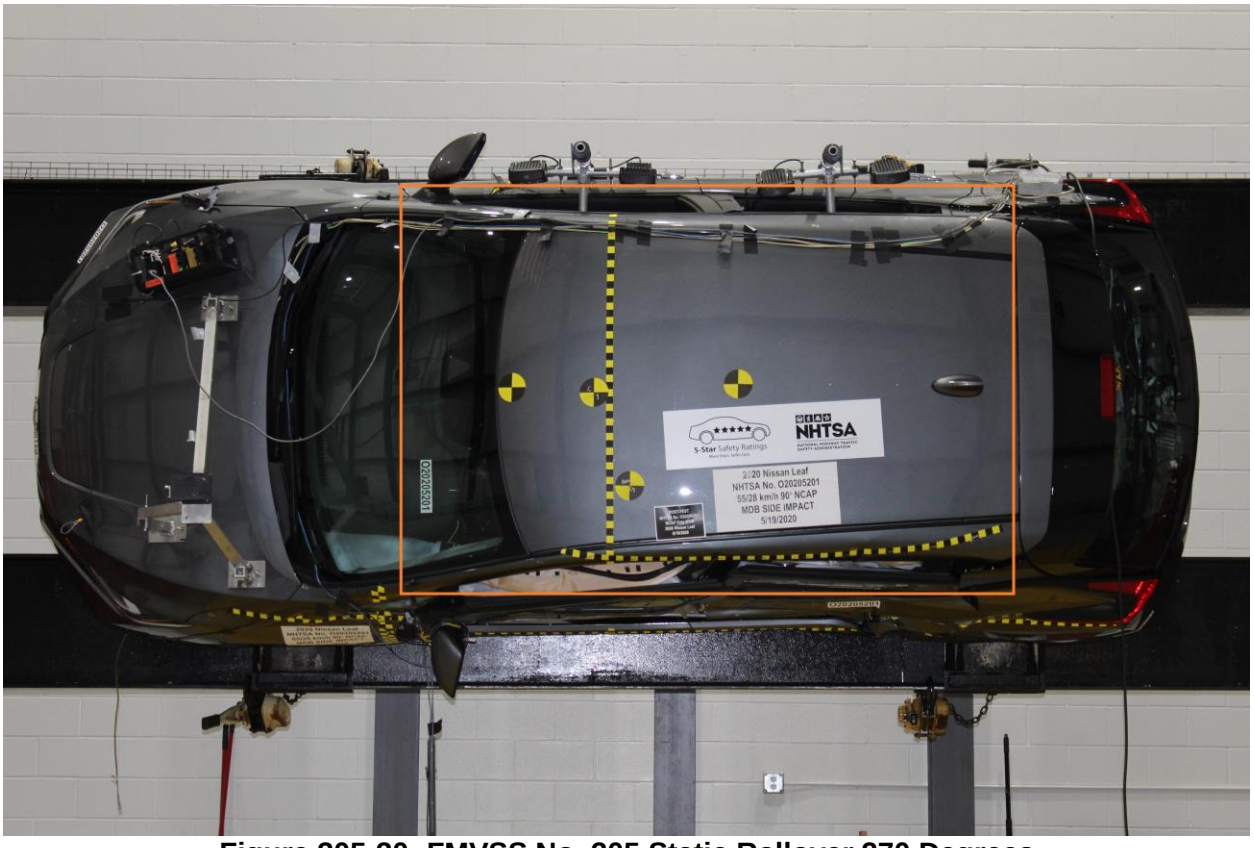


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

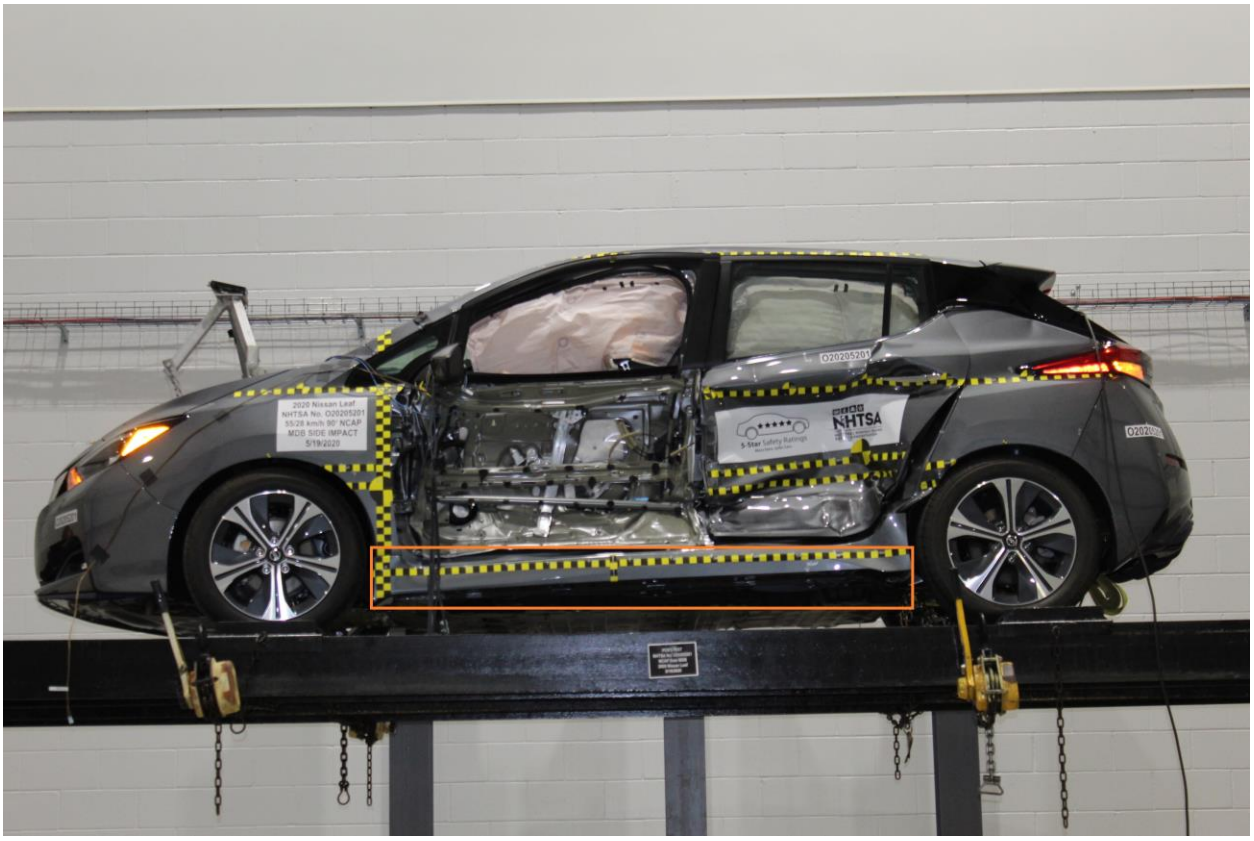


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees

Figure 305-32: Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Figure 305-33: Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photo Not Applicable

Figure 305-34: Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

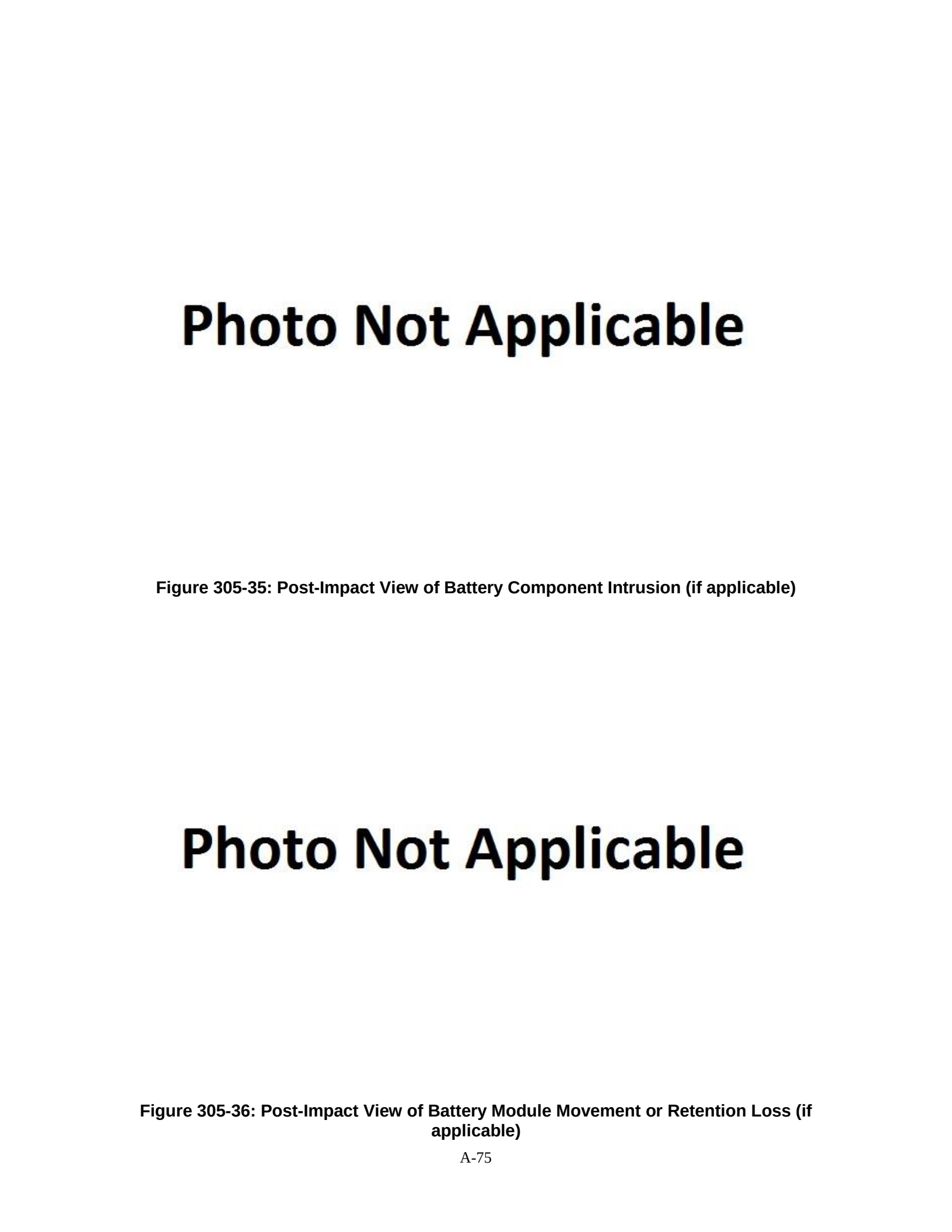


Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

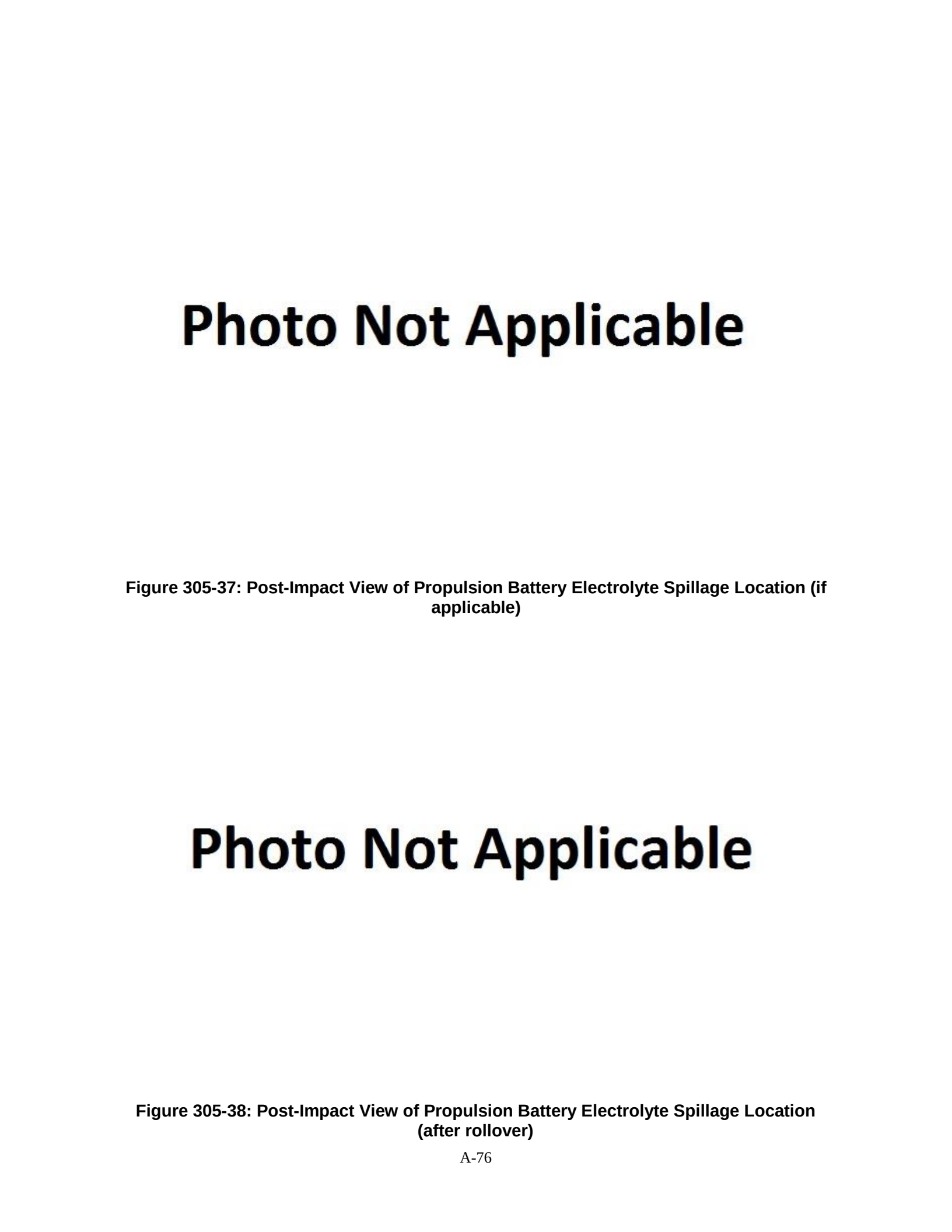


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (after rollover)

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.gov.

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

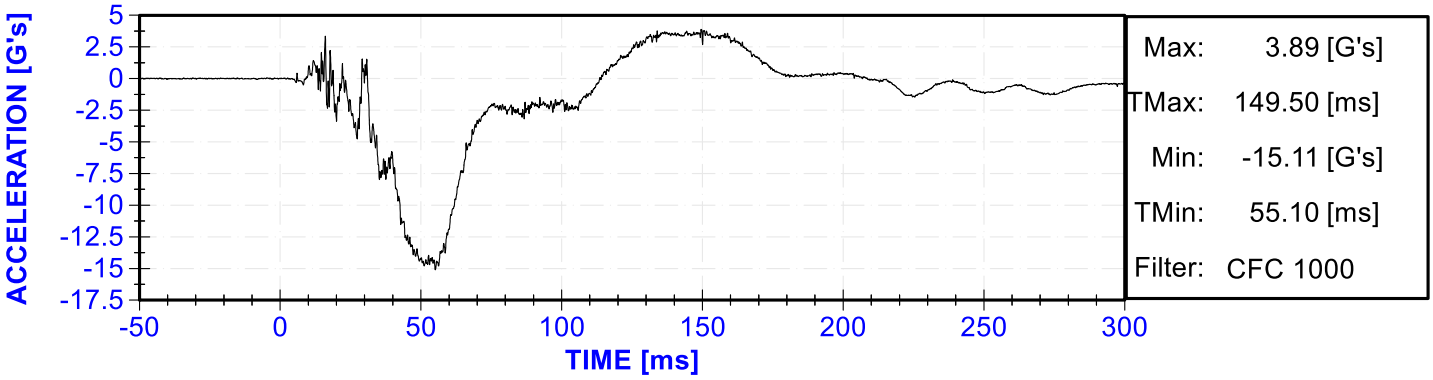
Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

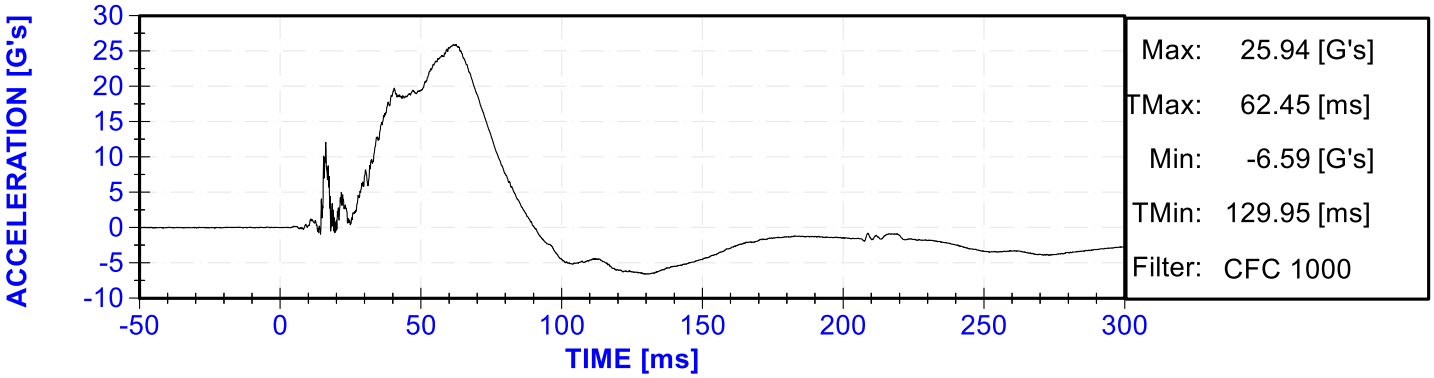
MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

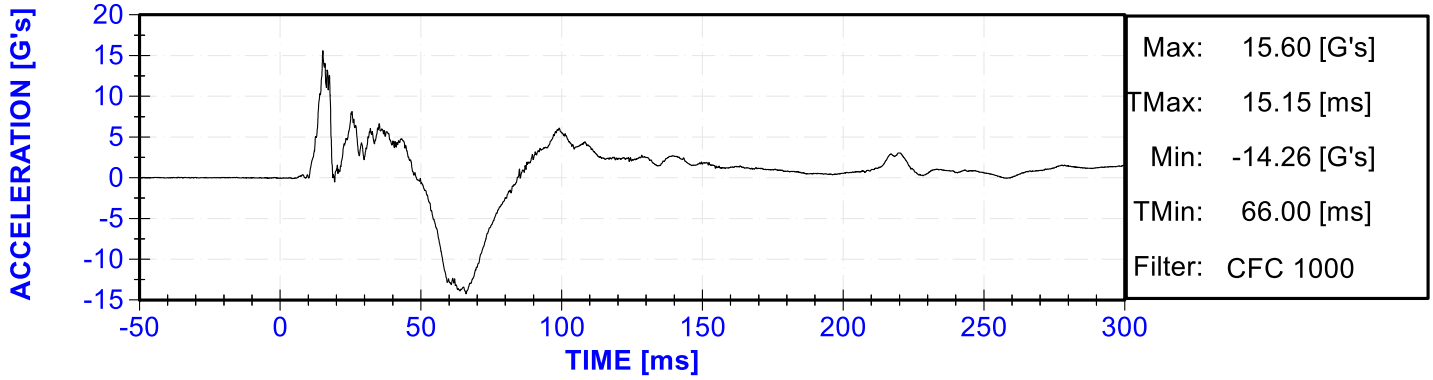
Driver Head Acceleration (X) Primary vs. Time



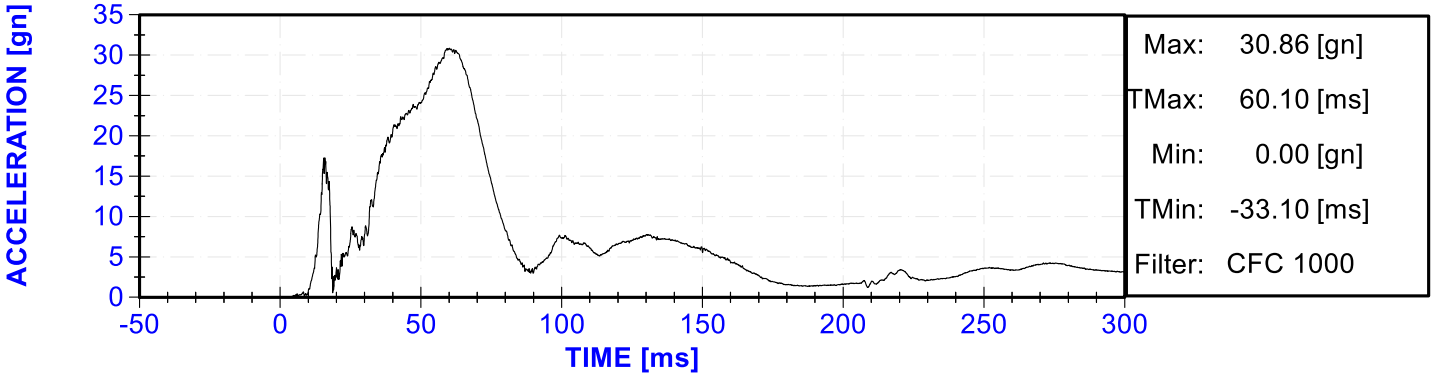
Driver Head Acceleration (Y) Primary vs. Time



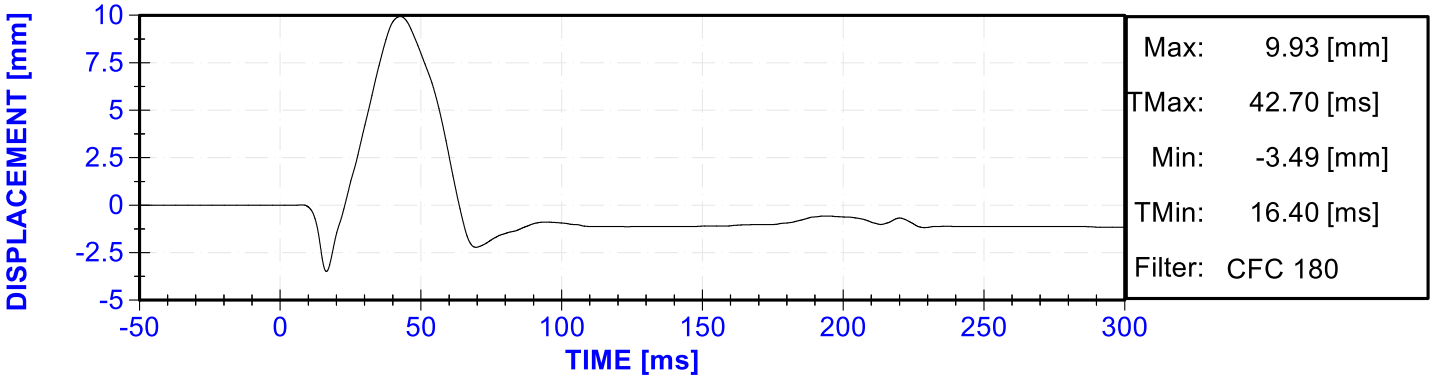
Driver Head Acceleration (Z) Primary vs. Time



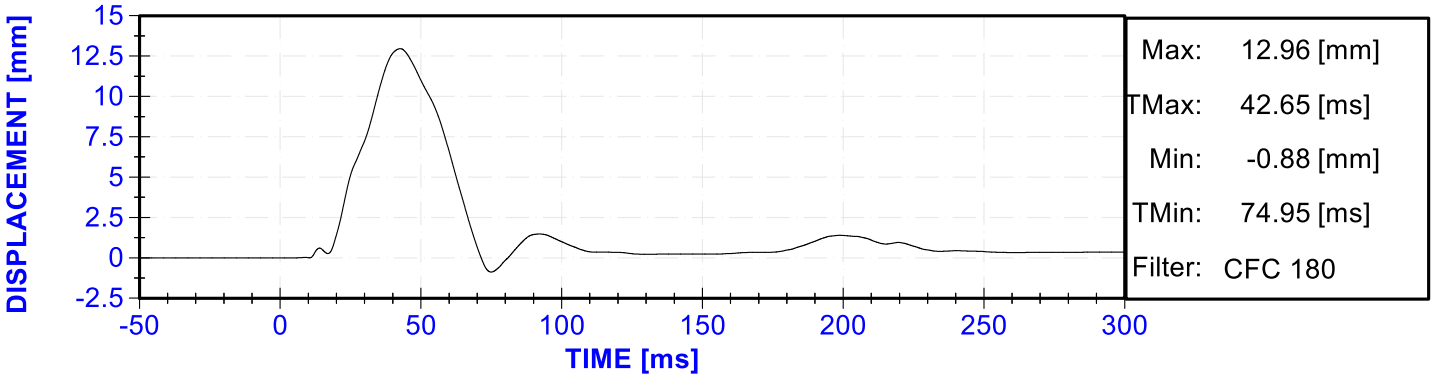
Driver Head Resultant Acceleration Primary vs. Time



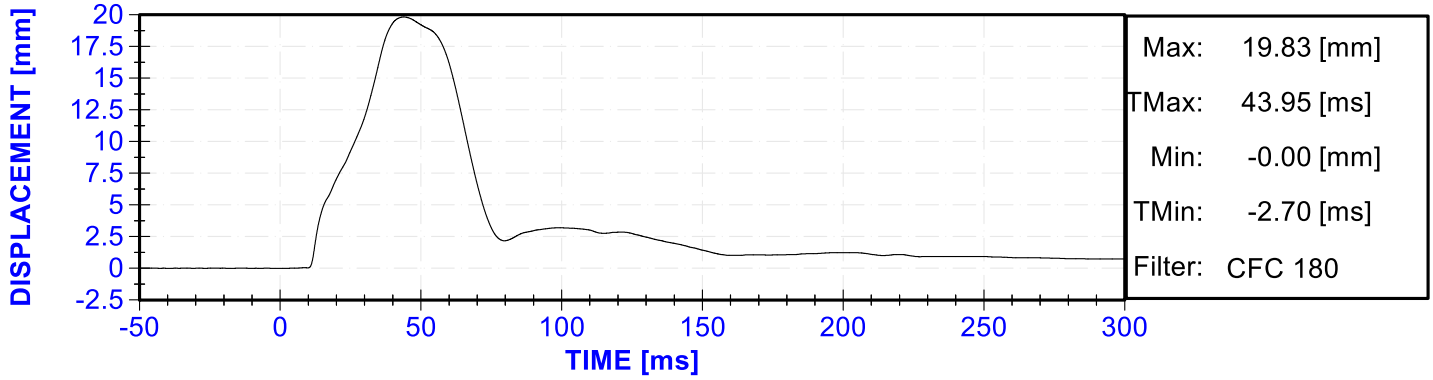
Driver Upper Thorax Rib Deflection (Y) vs. Time



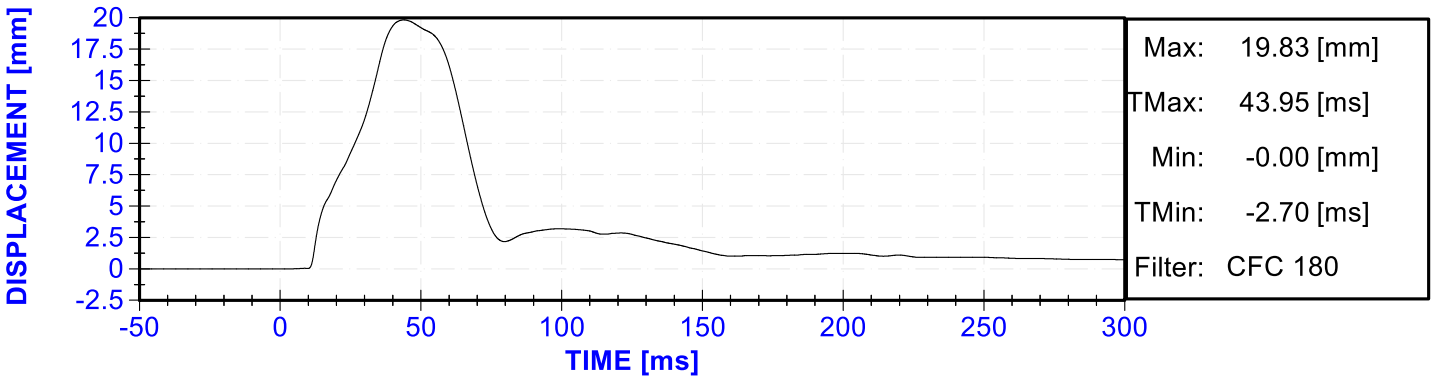
Driver Middle Thorax Rib Deflection (Y) vs. Time



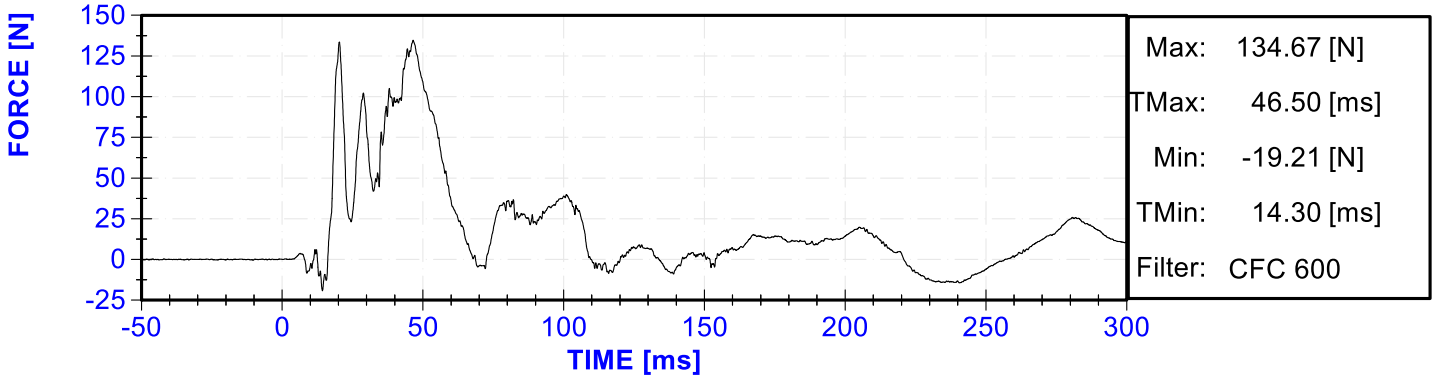
Driver Lower Thorax Rib Deflection (Y) vs. Time



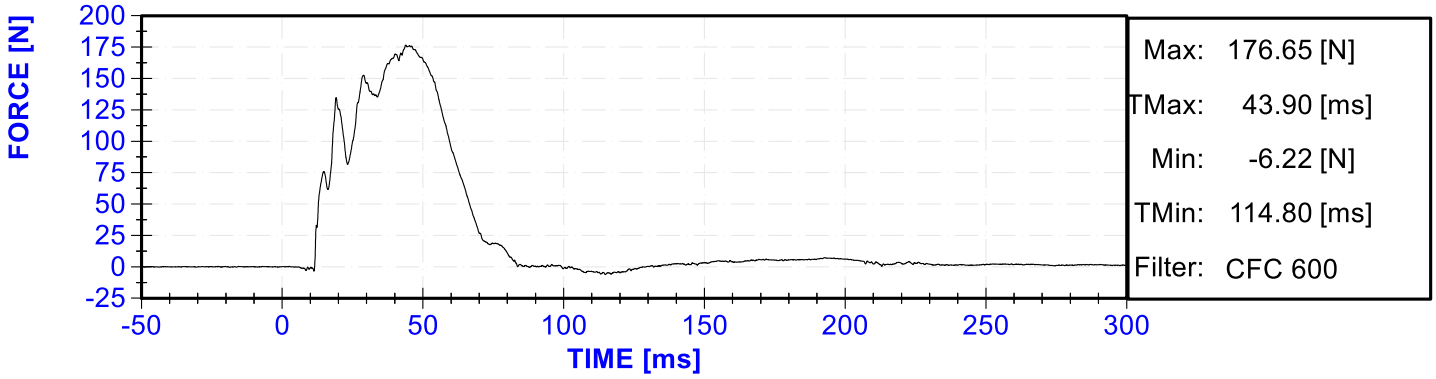
Driver Thorax Rib Deflection Maximum vs. Time



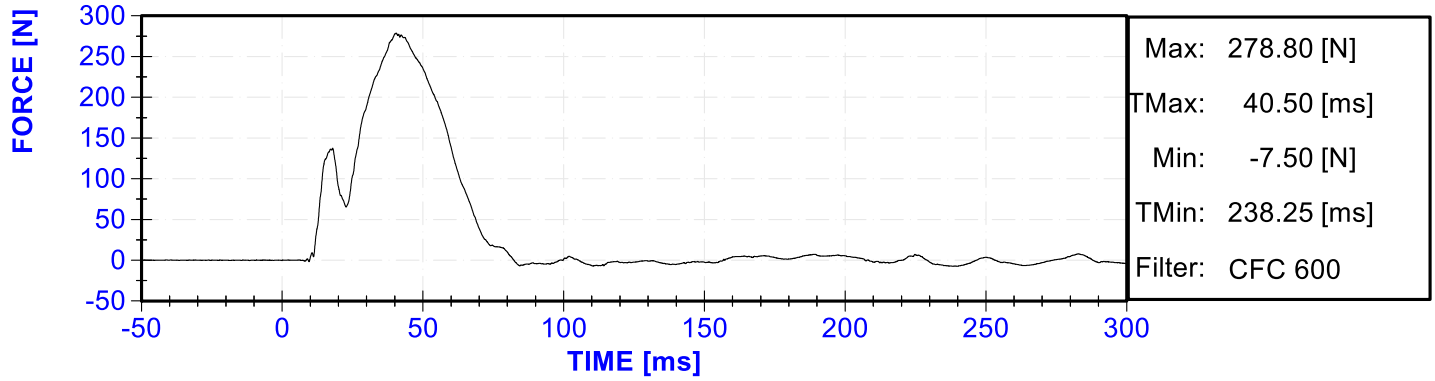
Driver Anterior Abdominal Force (Y) vs. Time



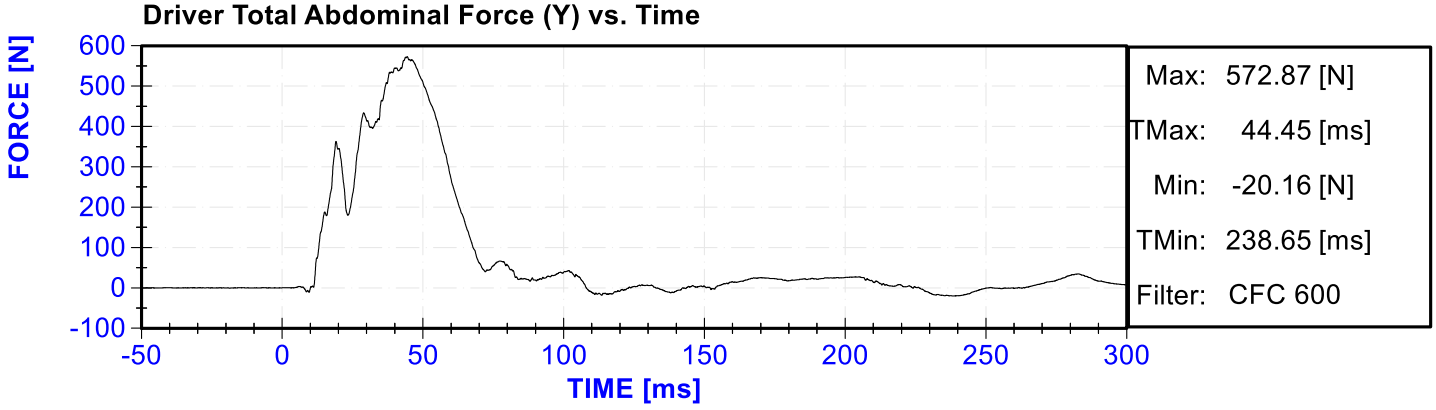
Driver Middle Abdominal Force (Y) vs. Time



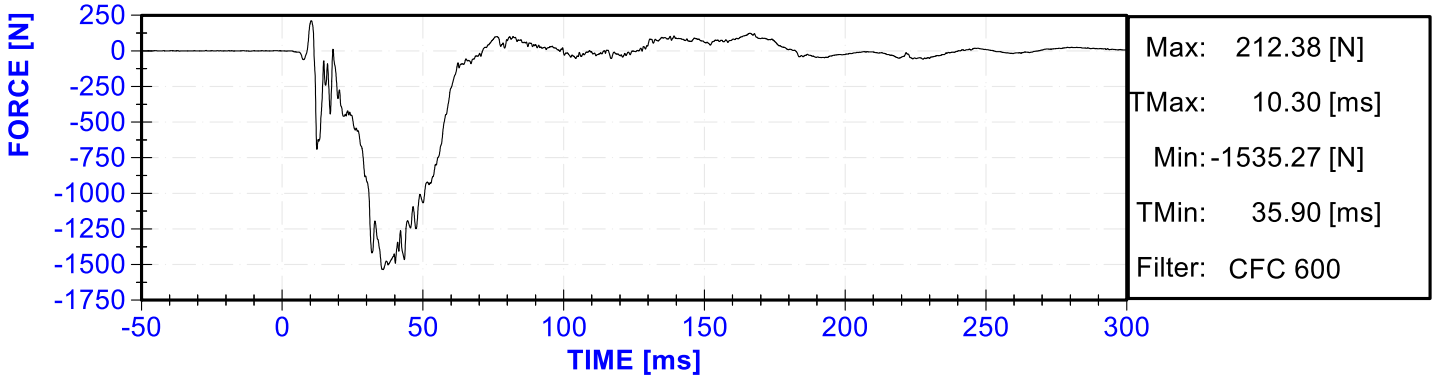
Driver Posterior Abdominal Force (Y) vs. Time



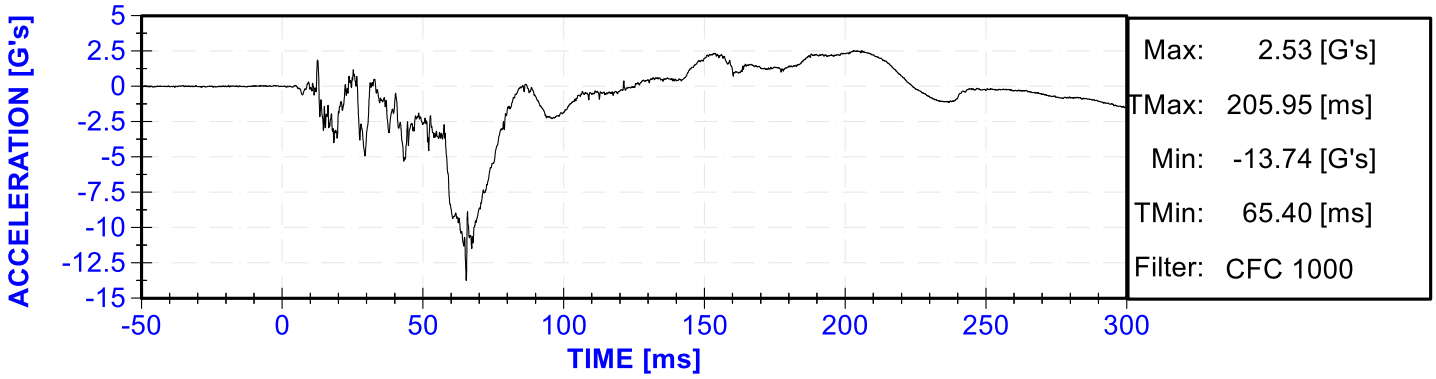
Driver Total Abdominal Force (Y) vs. Time



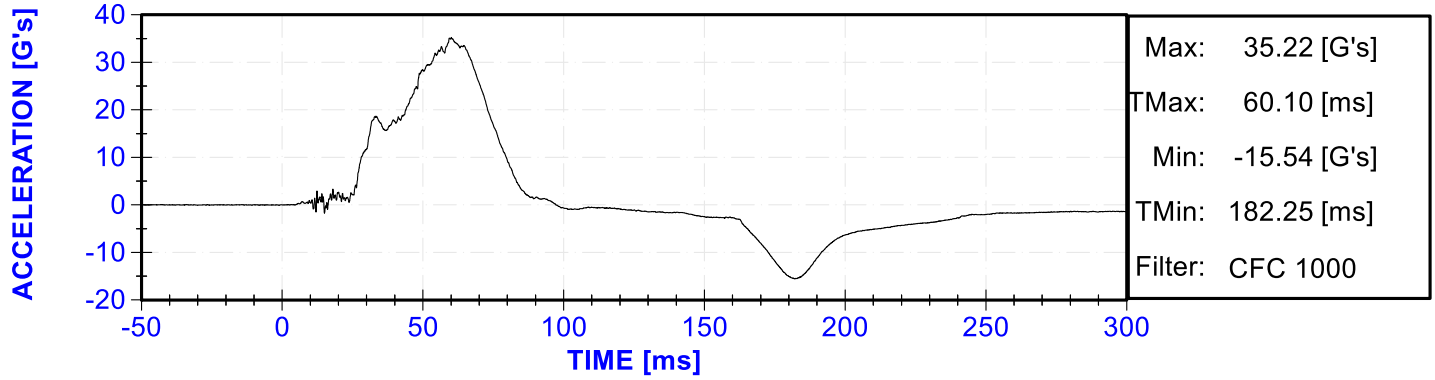
Driver Pubic Symphysis Force (Y) vs. Time



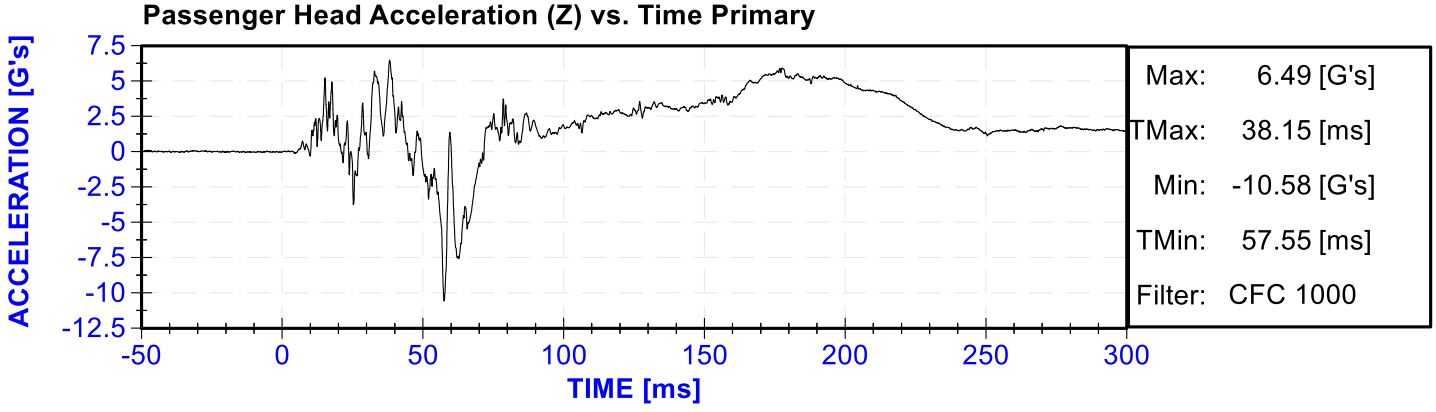
Passenger Head Acceleration (X) vs. Time Primary



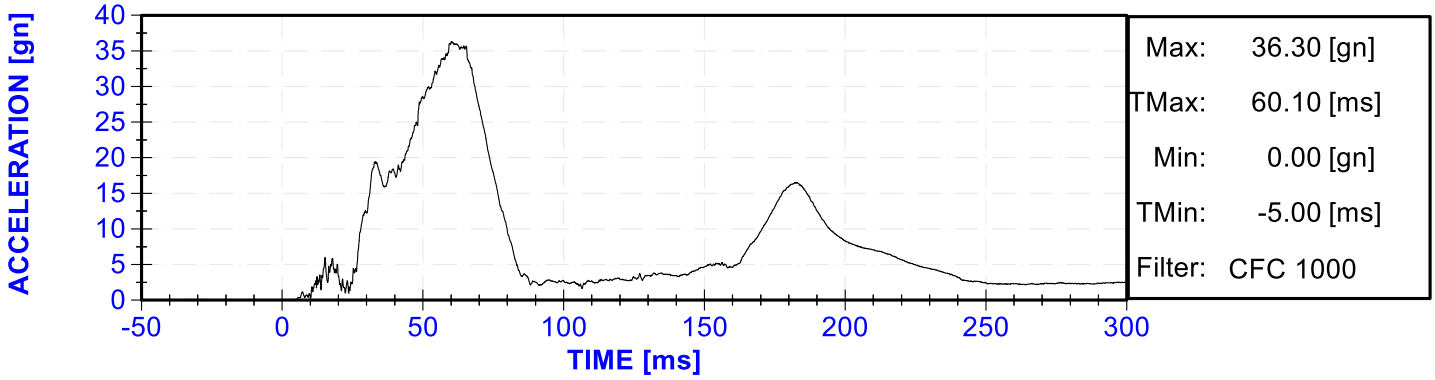
Passenger Head Acceleration (Y) vs. Time Primary



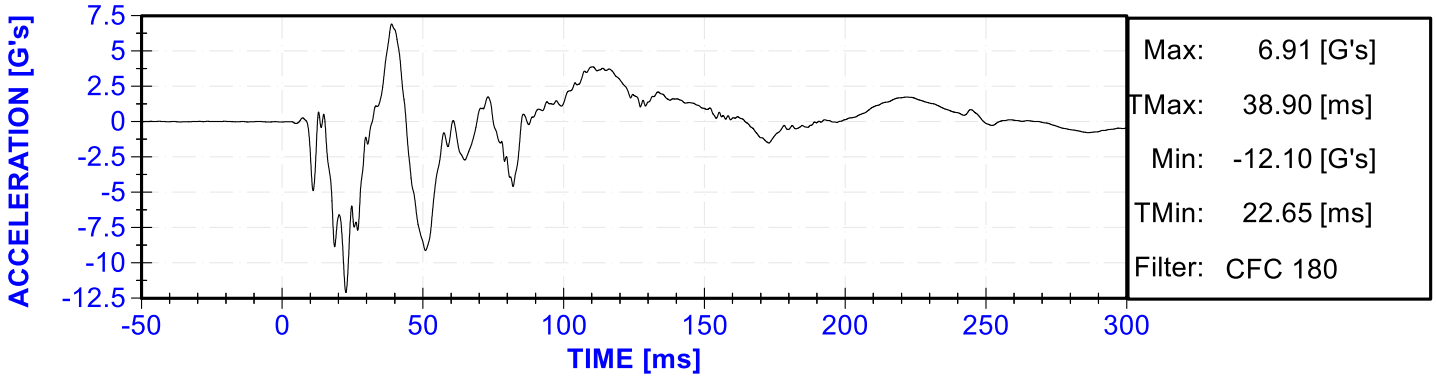
Passenger Head Acceleration (Z) vs. Time Primary



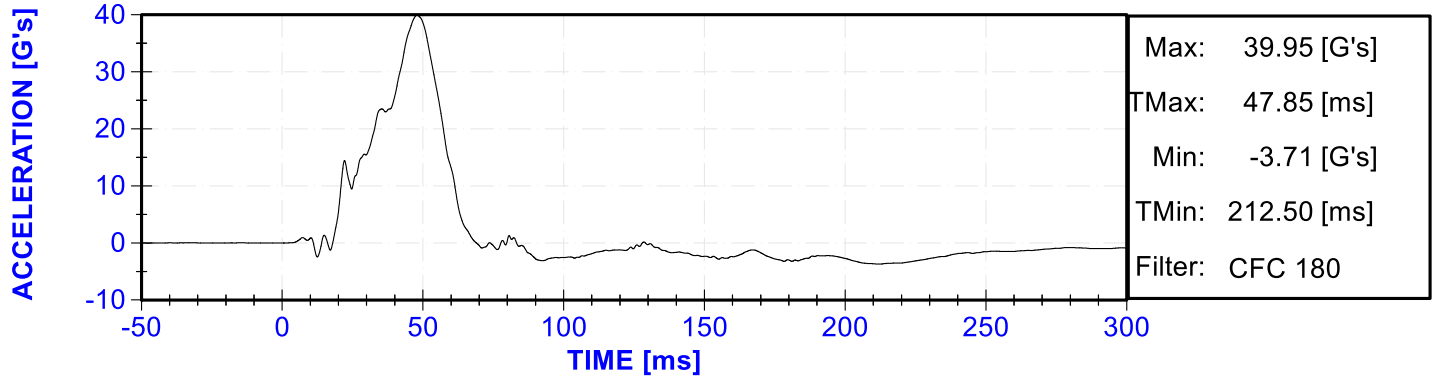
Passenger Head Resultant Acceleration Primary vs. Time



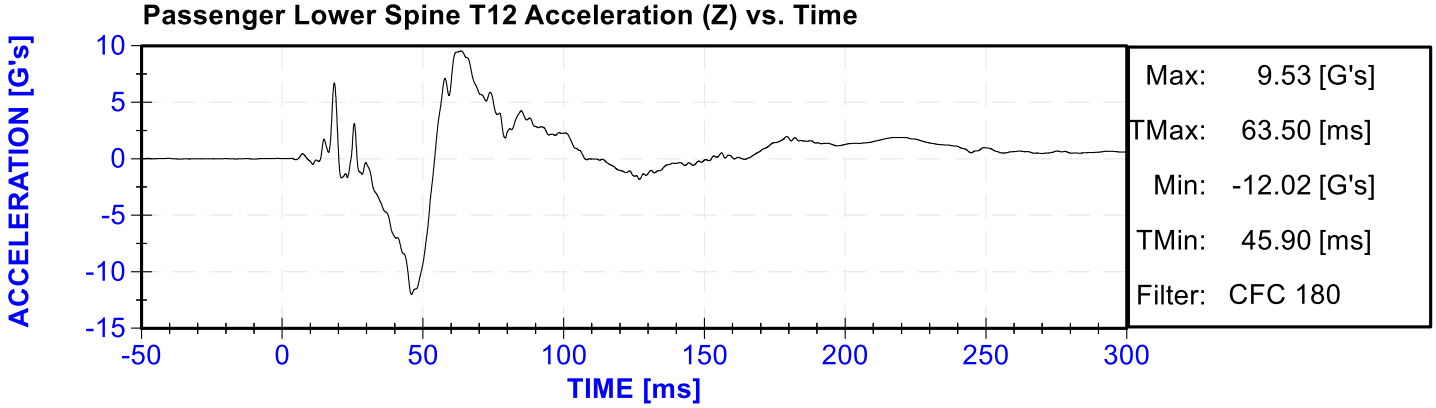
Passenger Lower Spine T12 Acceleration (X) vs. Time



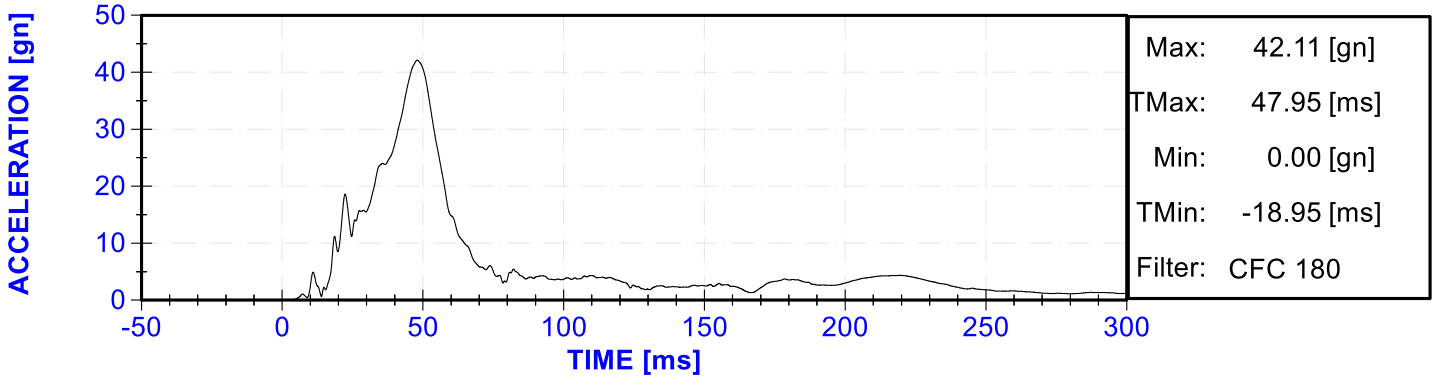
Passenger Lower Spine T12 Acceleration (Y) vs. Time



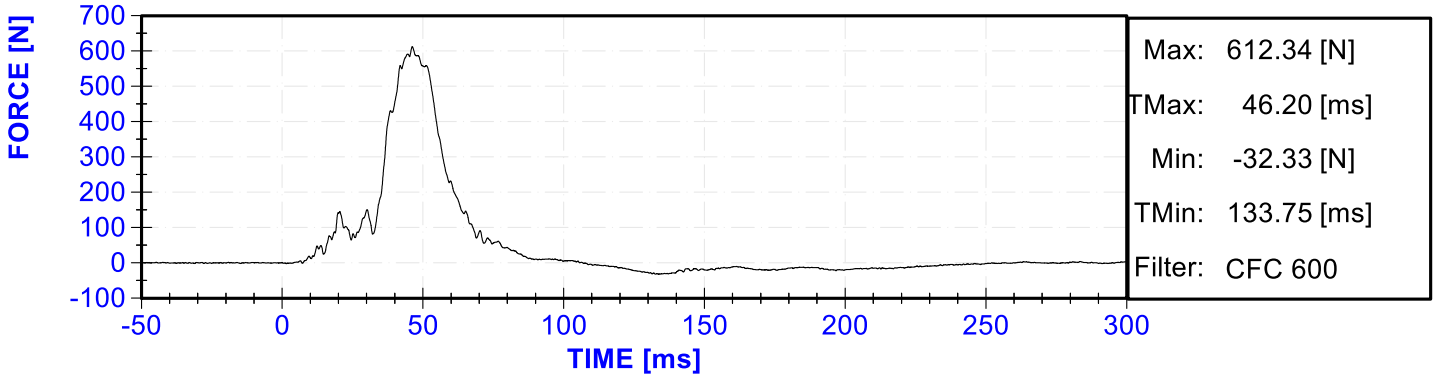
Passenger Lower Spine T12 Acceleration (Z) vs. Time



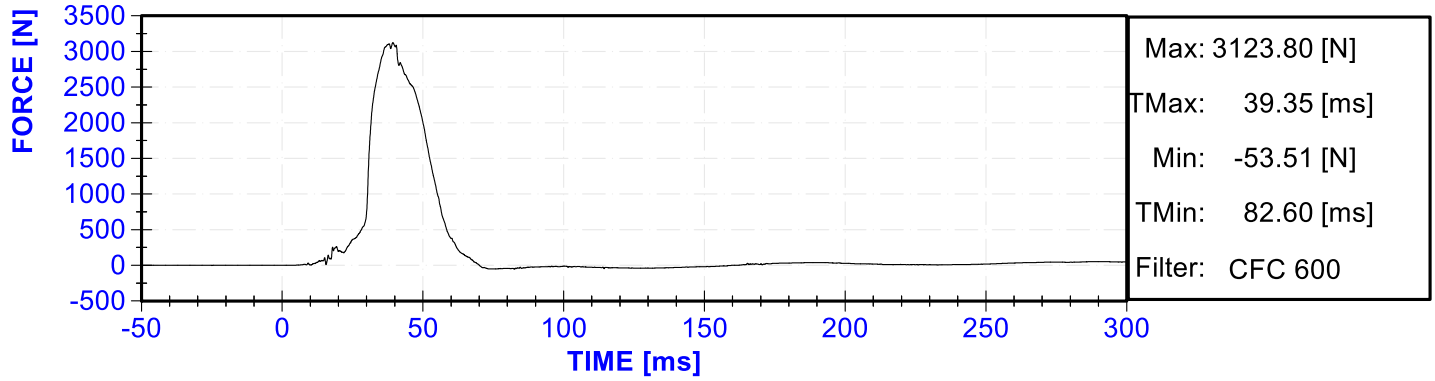
Passenger Lower Spine T12 Resultant Acceleration vs. Time



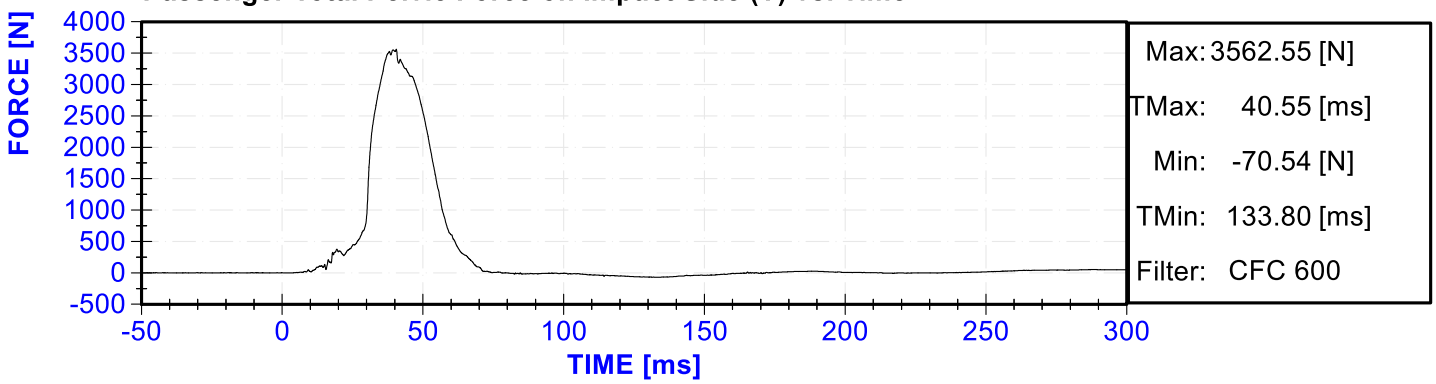
Passenger Iliac Force on Impact Side (Y) vs. Time



Passenger Acetabulum Force on Impact Side (Y) vs. Time



Passenger Total Pelvic Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

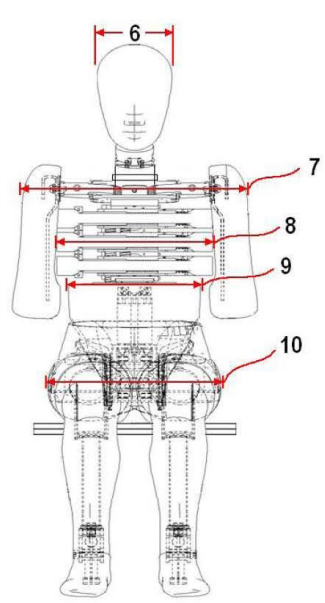
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

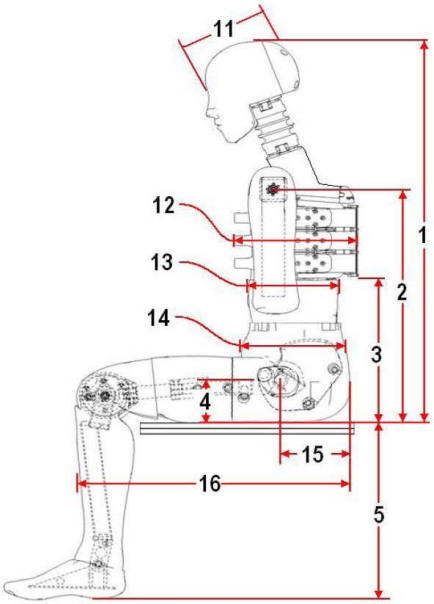
External Measurements - EuroSID-2re

Technician: K. Dutton Date: 05/15/2020

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	569	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	101	Pass
5	Sole to Seat, Sitting	333	451	421	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	204	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

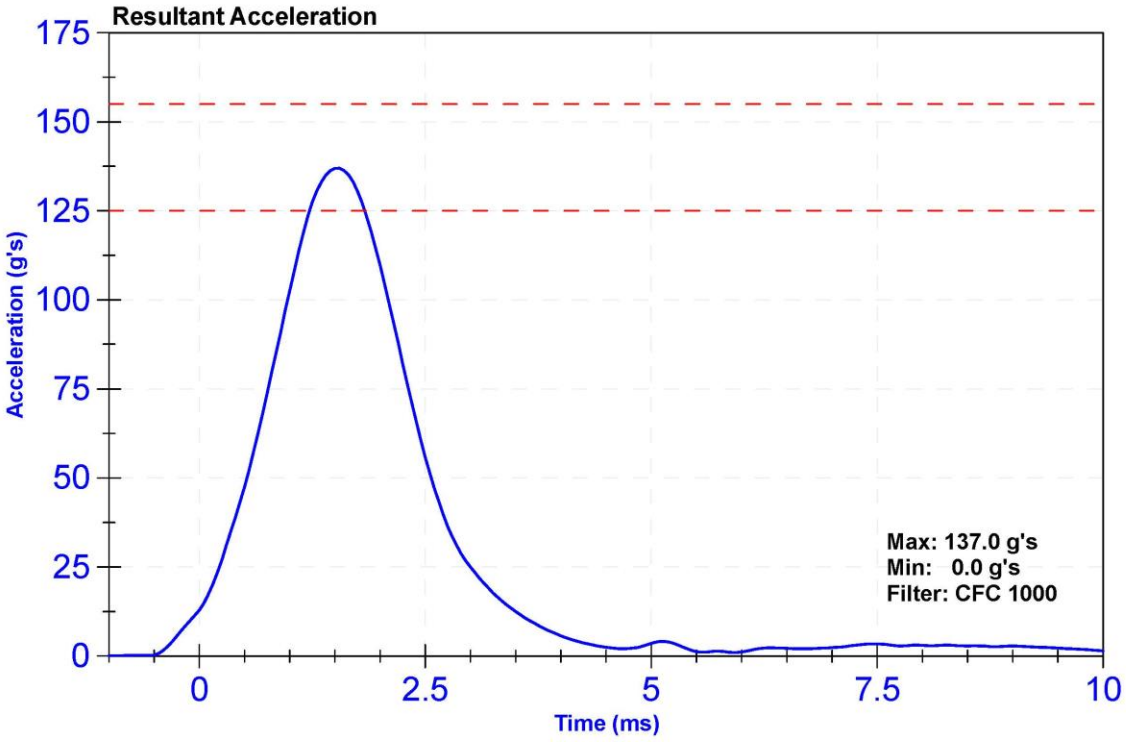
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

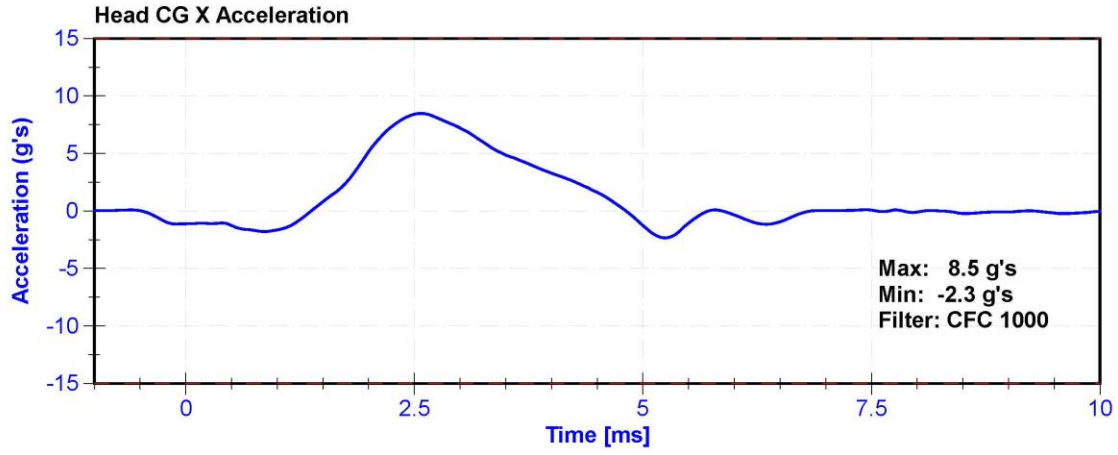
Results

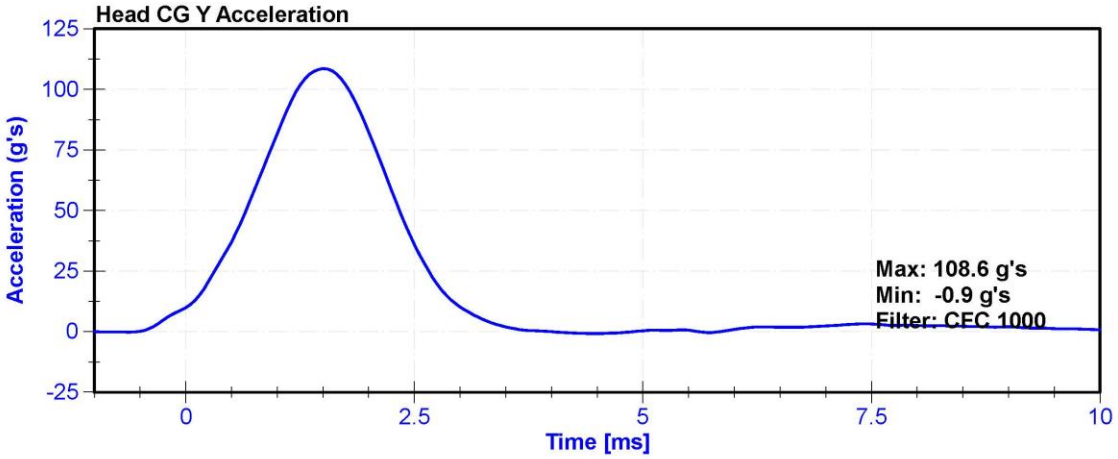
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	42.0	Pass
Resultant Acceleration	125	155	g's	137.0	Pass
Oscillation	0	15	%	2.99	Pass
Fore-Aft Acceleration	-15	15	g's	8.5	Pass

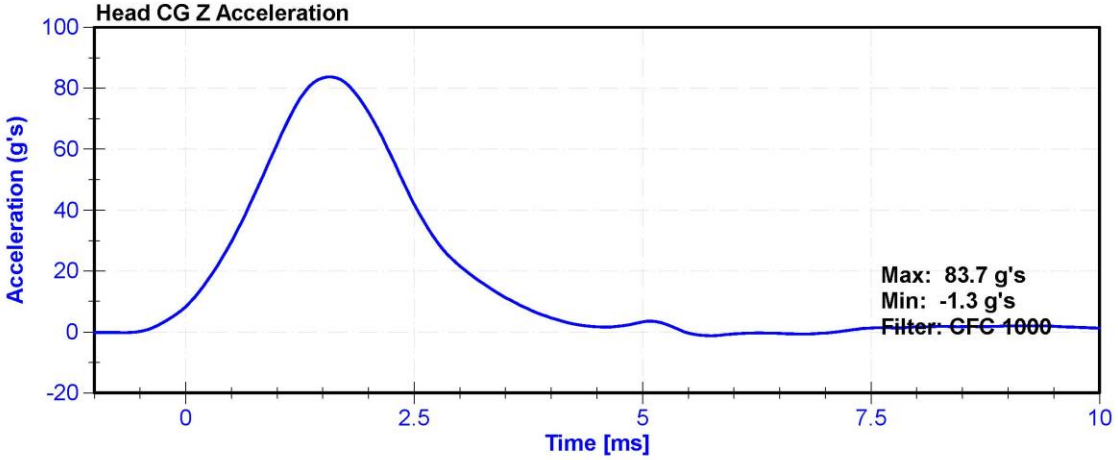
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P49204	4/15/2020	10/14/2020
Y Accelerometer	ENDEVCO 7264	AC-P83437	4/15/2020	10/14/2020
Z Accelerometer	ENDEVCO 7264	AC-P64007	4/15/2020	10/14/2020




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 8.5 g's
Min: -2.3 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 108.6 g's
Min: -0.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 83.7 g's
Min: -1.3 g's
Filter: CFC 1000

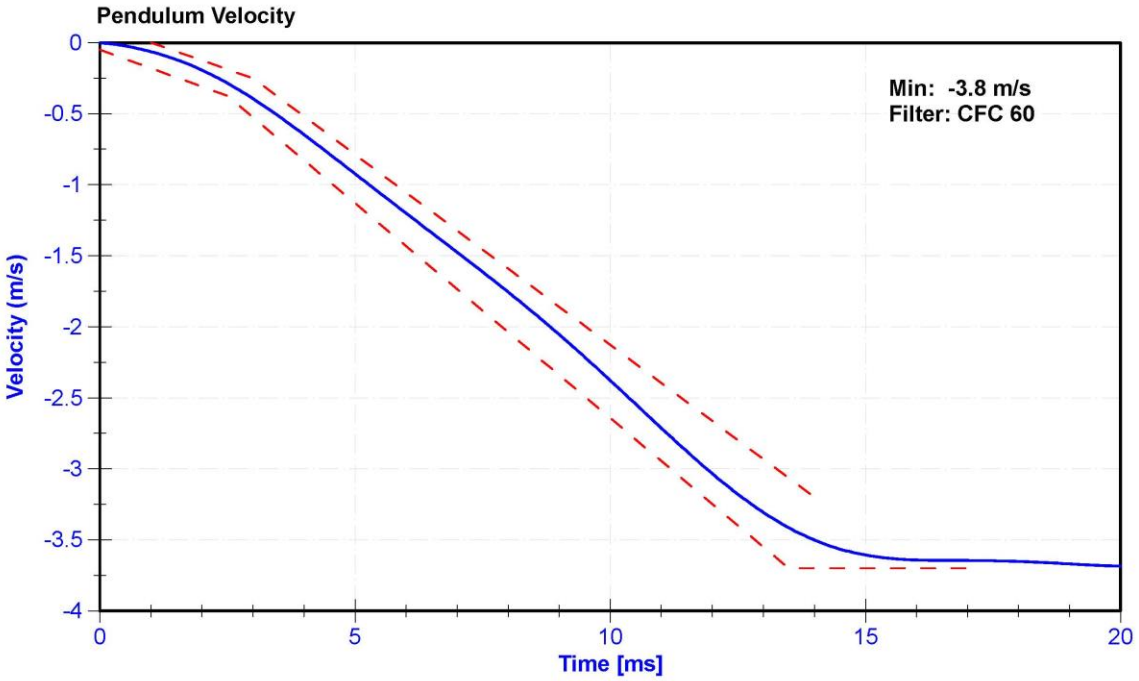
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

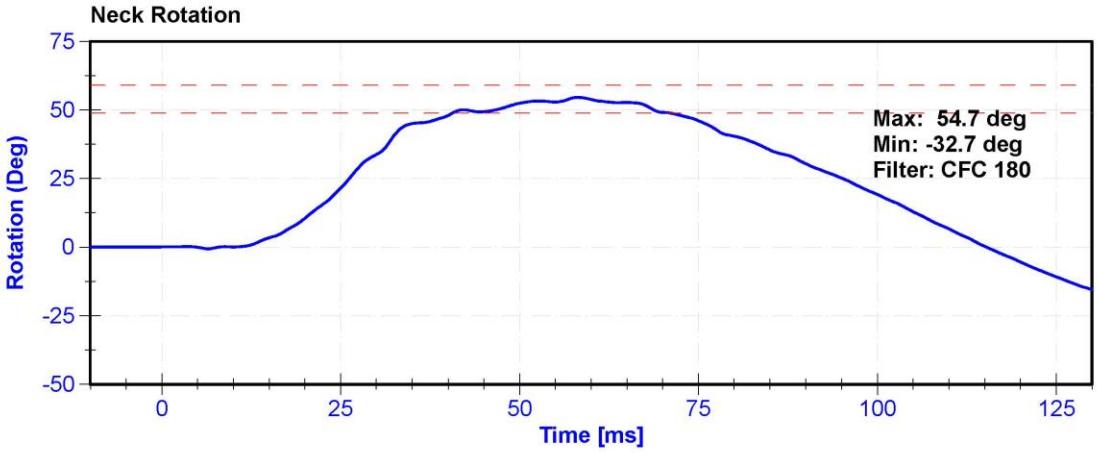
Results

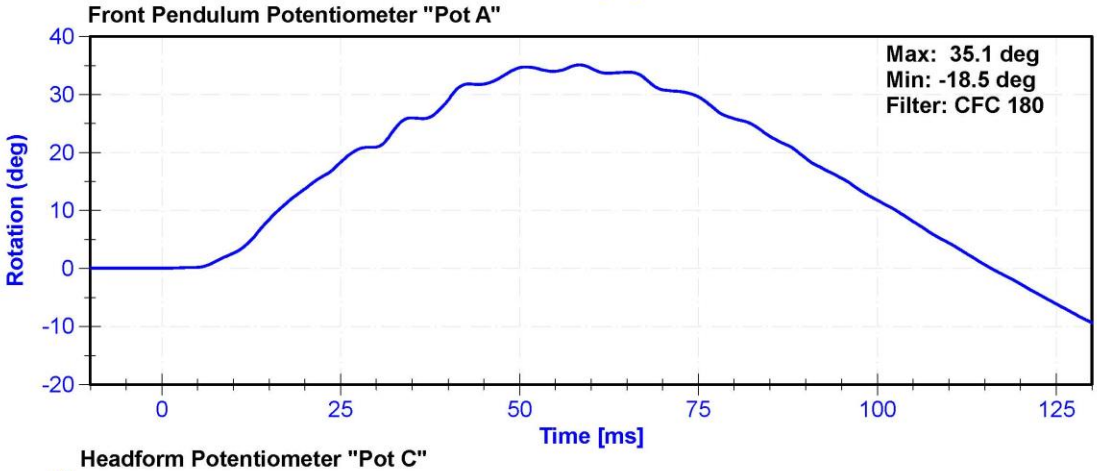
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	53.1	Pass
Velocity	3.3	3.5	m/s	3.40	Pass
Lateral Neck Rotation	49	59	deg	54.7	Pass
Time at Maximum Rotation	54	66	ms	58.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.2	Pass

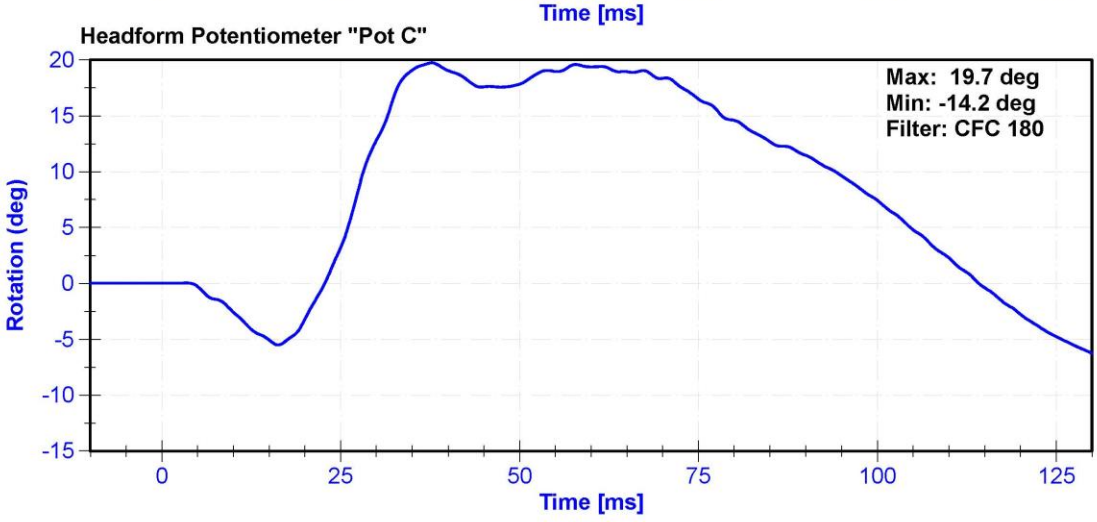
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9	1/30/2020	1/29/2021
Front Pendulum Potentiometer	SP22G	DS-094	10/31/2019	10/30/2020
Headform Potentiometer	SP22G	DS-095	10/31/2019	10/30/2020




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 54.7 deg
Min: -32.7 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 35.1 deg
Min: -18.5 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 19.7 deg
Min: -14.2 deg
Filter: CFC 180

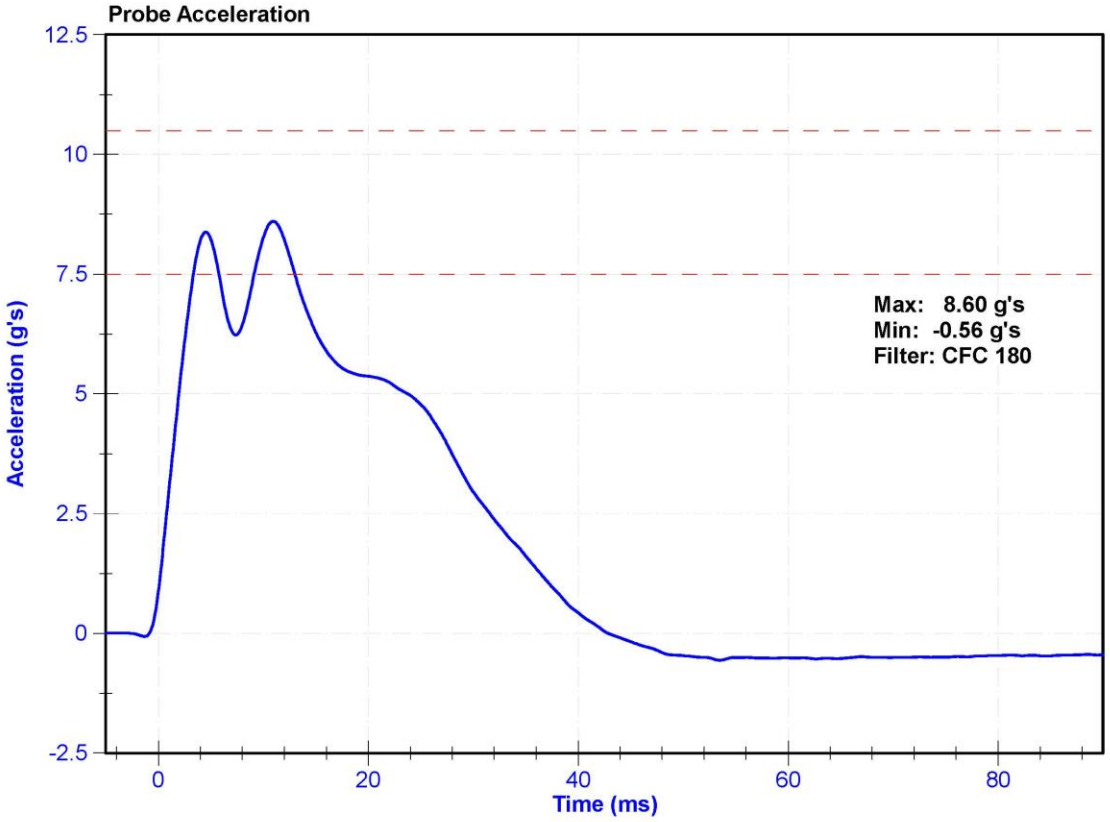
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	51.0	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	7.5	10.5	g's	8.60	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021



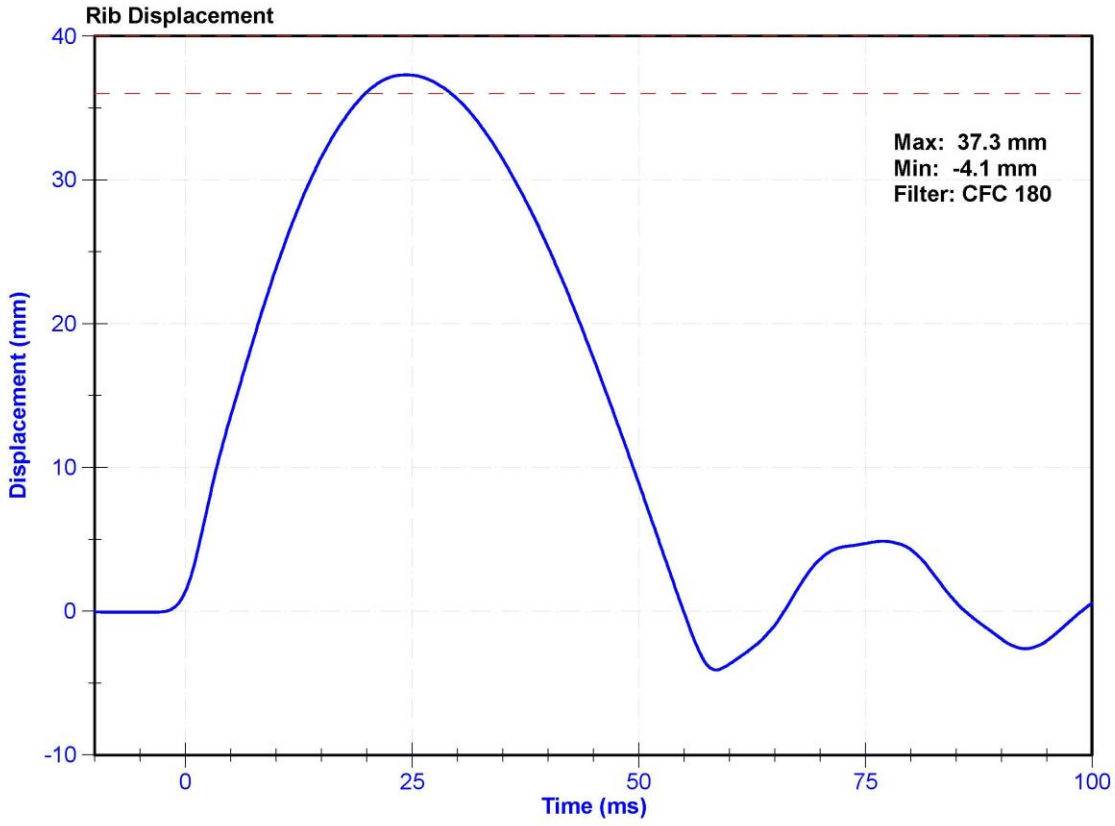
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	52.1	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020



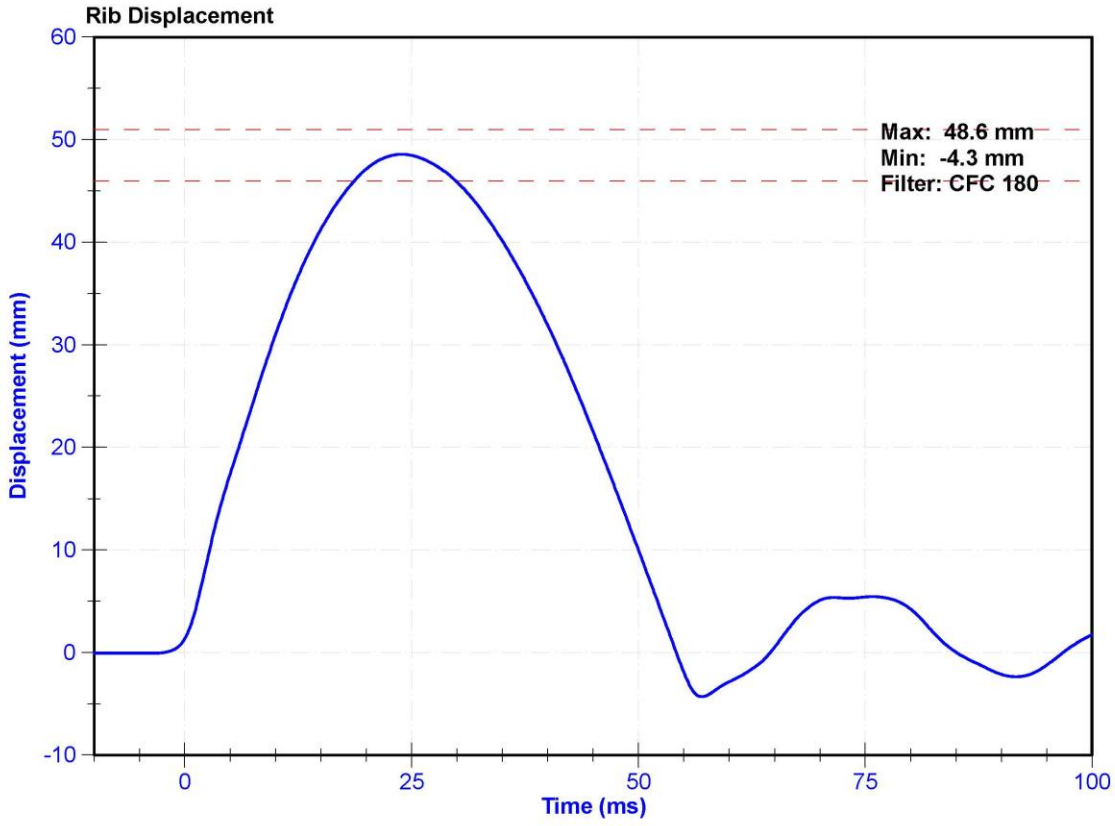
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	52.1	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020



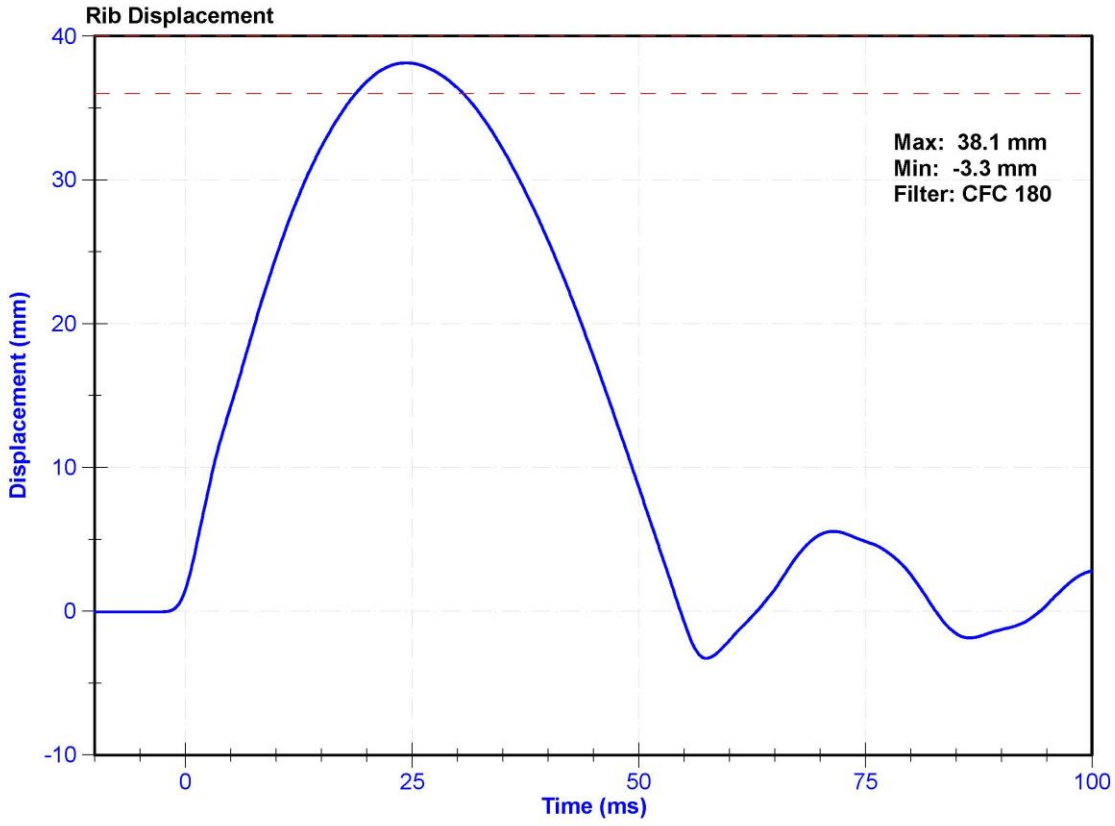
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	51.3	Pass
Rib Displacement	36	40	mm	38.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020



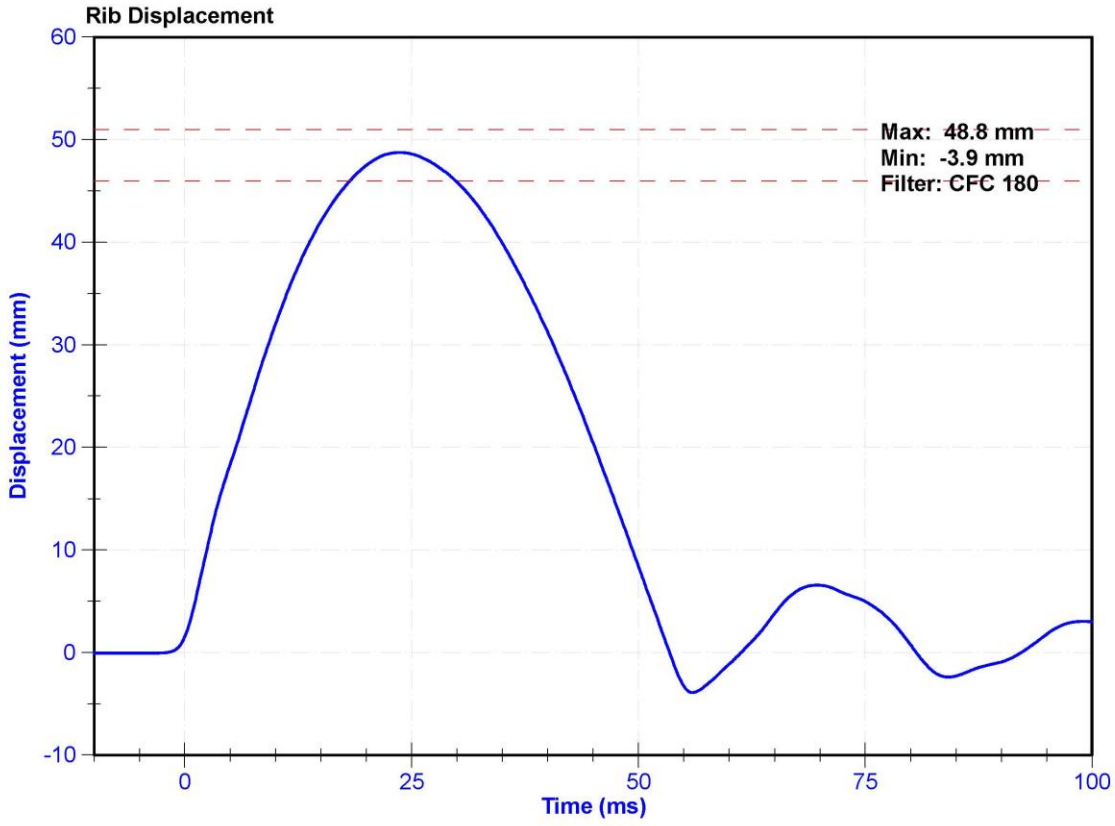
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	51.3	Pass
Rib Displacement	46	51	mm	48.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020



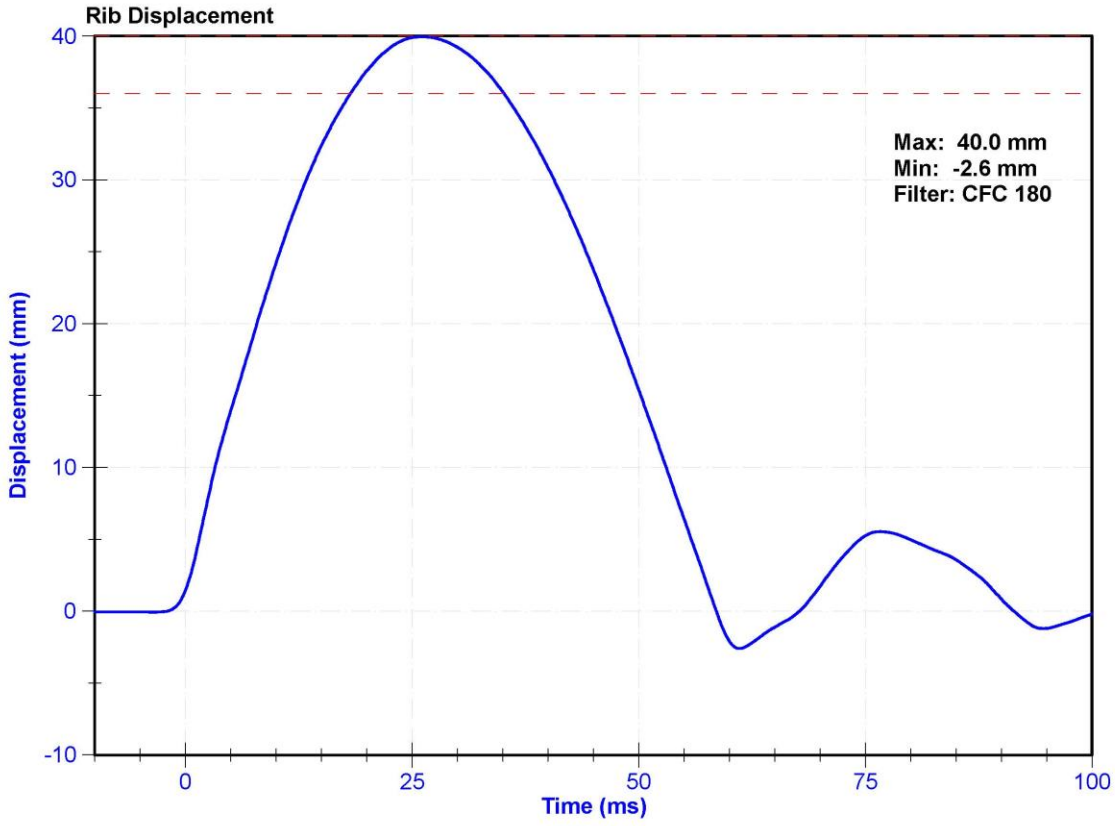
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	51.1	Pass
Rib Displacement	36	40	mm	40.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020



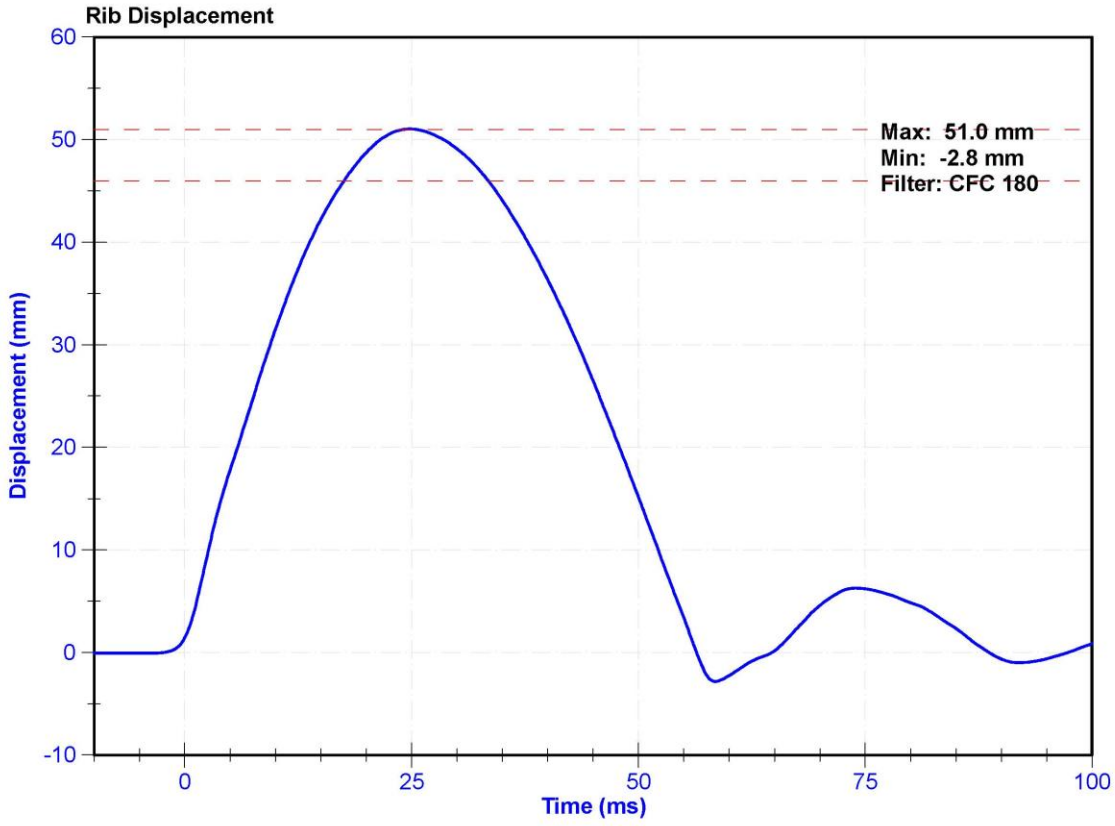
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	51.1	Pass
Rib Displacement	46	51	mm	51.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020



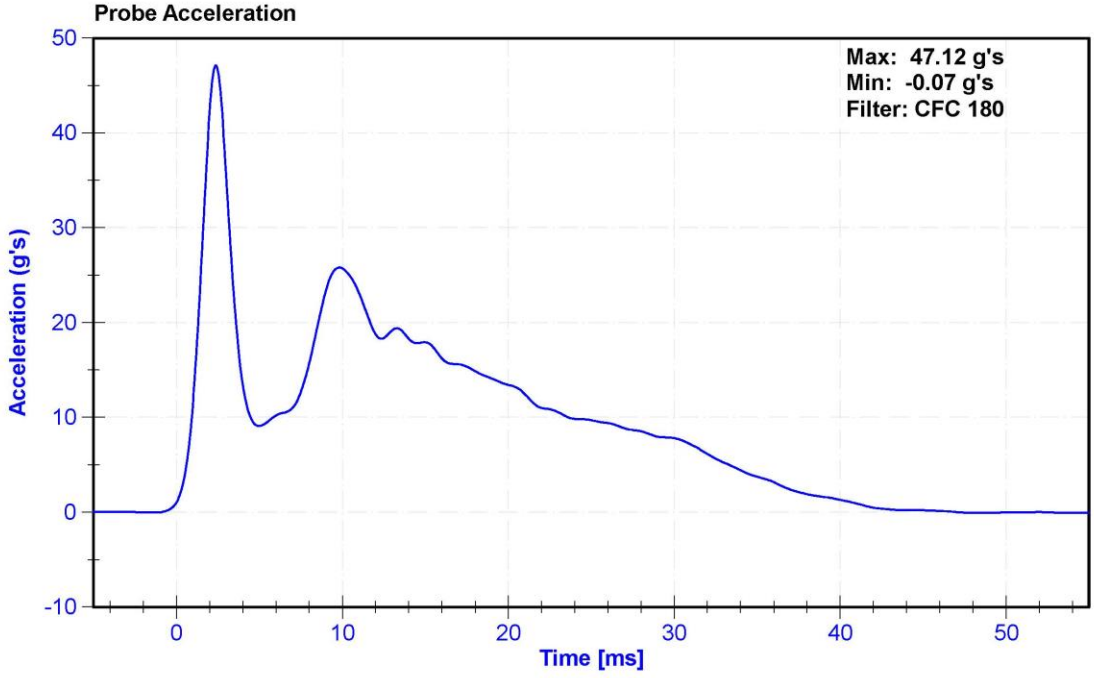
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

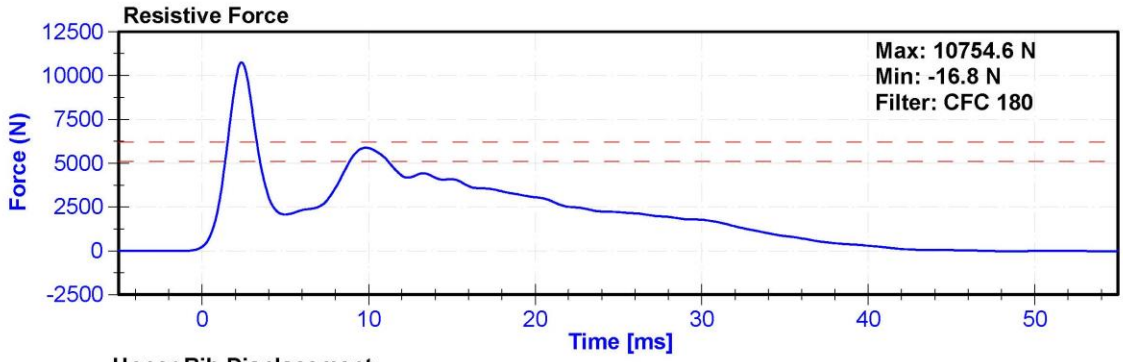
Results

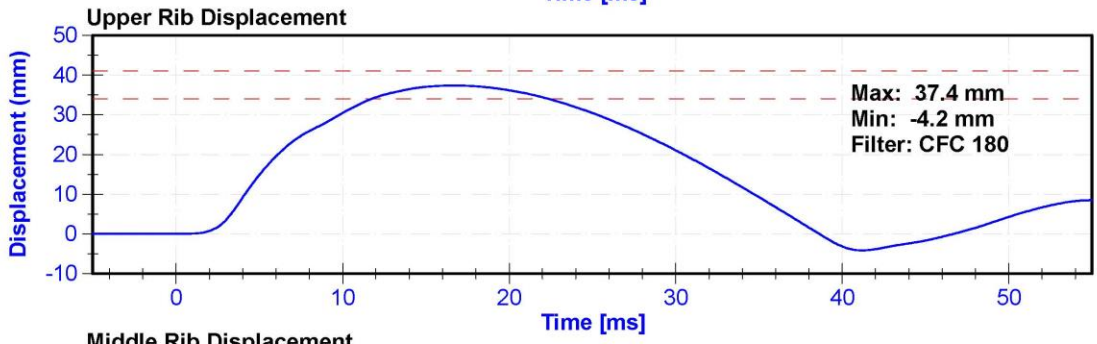
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	51.0	Pass
Velocity	5.4	5.6	m/s	5.42	Pass
Resistive Force after 6ms	5100	6200	N	5887.7	Pass
Upper Thorax Rib Deflection	34	41	mm	37.4	Pass
Mid Thorax Rib Deflection	37	45	mm	40.2	Pass
Lower Thorax Rib Deflection	37	44	mm	39.8	Pass

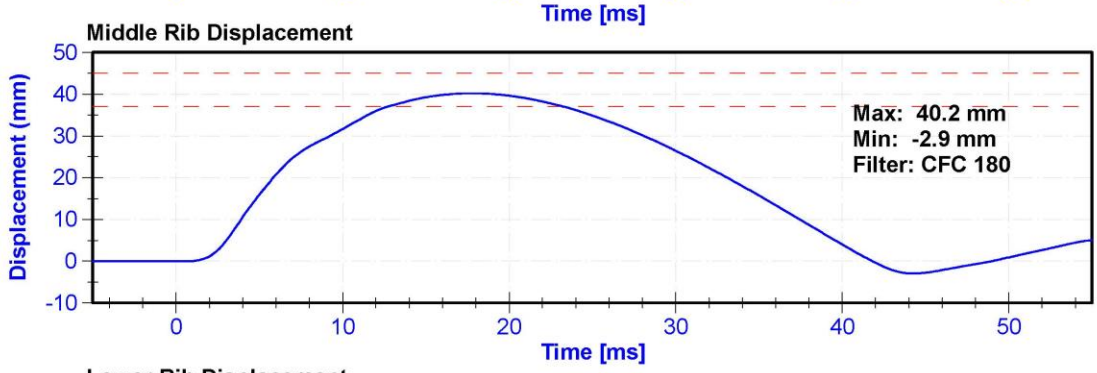
Transducer Calibrations

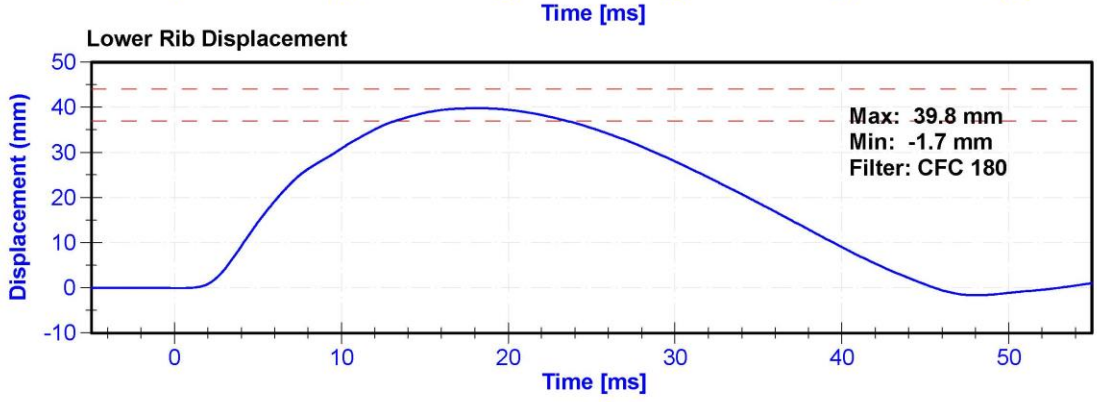
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020




Resistive Force
Force (N)
Time [ms]
Max: 10754.6 N
Min: -16.8 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.4 mm
Min: -4.2 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.2 mm
Min: -2.9 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.8 mm
Min: -1.7 mm
Filter: CFC 180

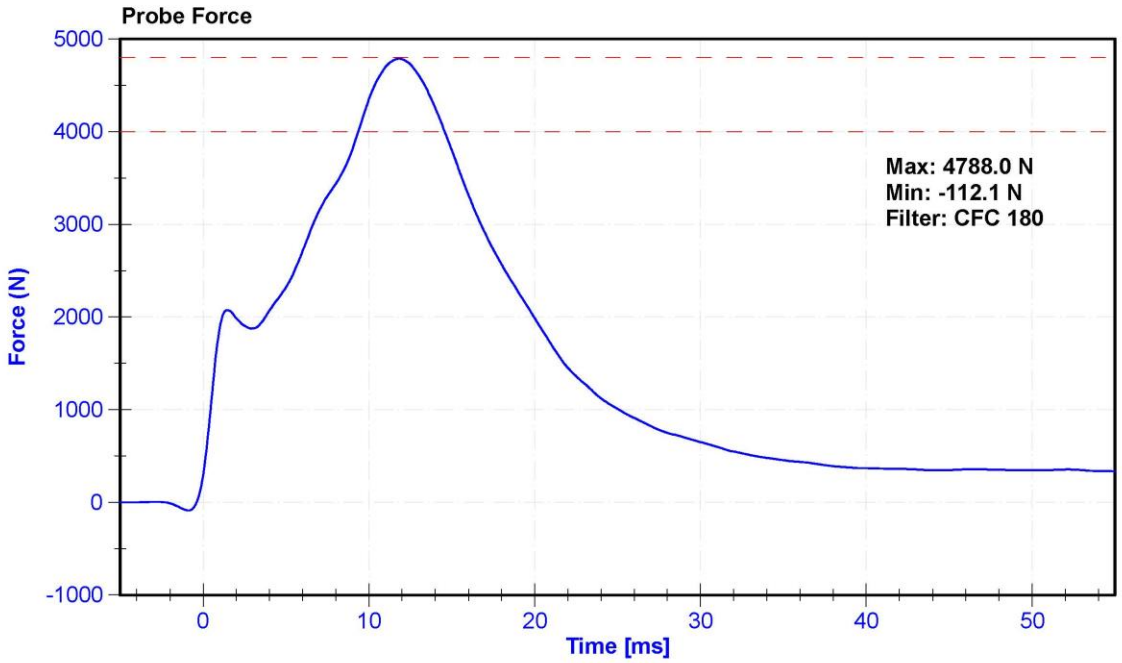
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K.Brogan

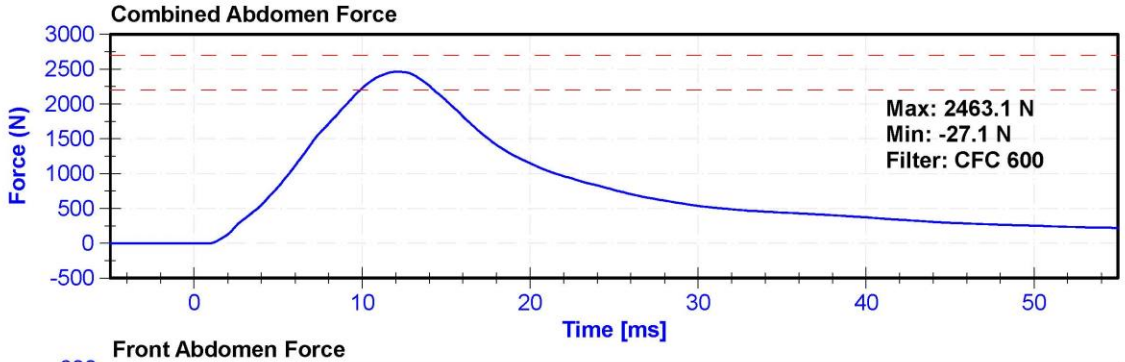
Results

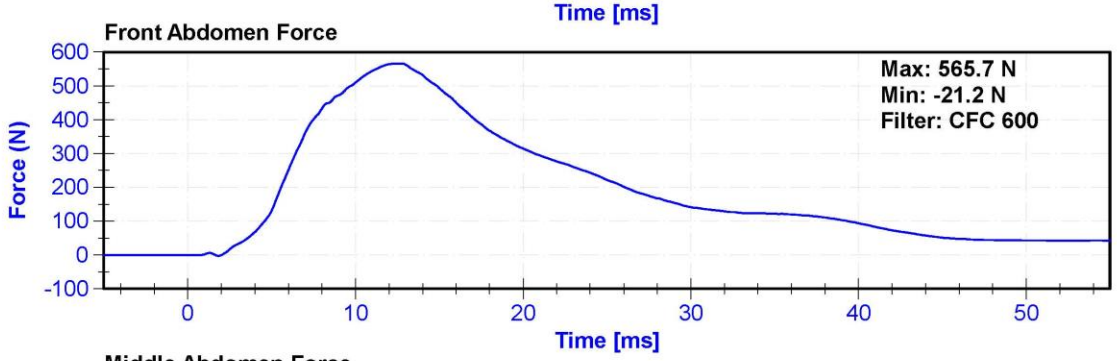
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	29	Pass
Velocity	3.9	4.1	m/s	4.07	Pass
Combined Abdomen Force	2200	2700	N	2463.1	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	12.10	Pass
Resistive Probe Force	4000	4800	N	4788.0	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.80	Pass

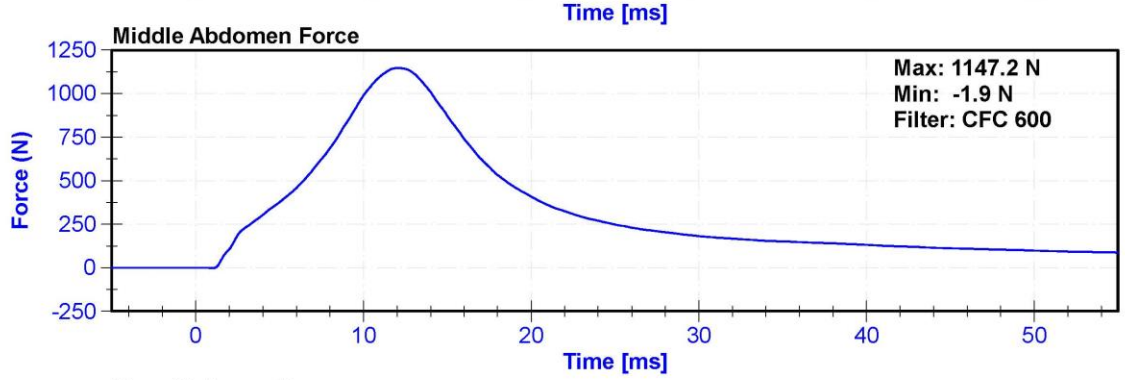
Transducer Calibrations

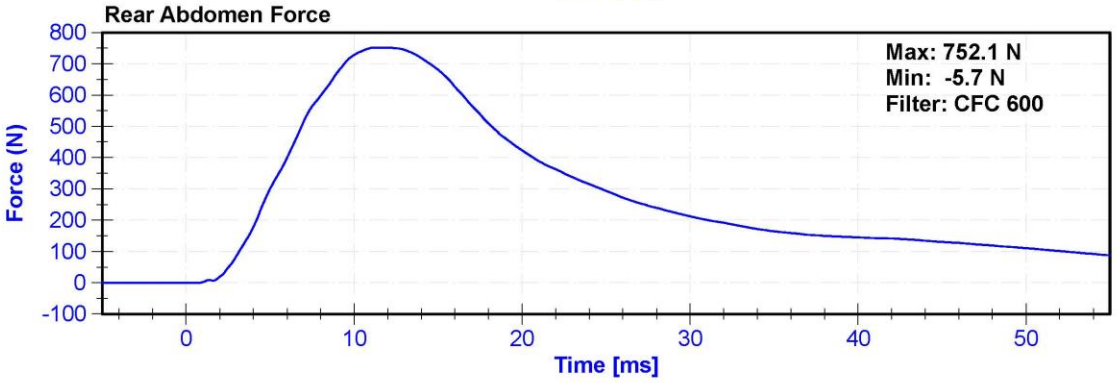
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Front Abdomen Load Cell	DENTON 2631	LC-1440	6/14/2019	6/13/2020
Middle Abdomen Load Cell	DENTON 2631	LC-1525	6/5/2019	6/4/2020
Rear Abdomen Load Cell	DENTON 2631	LC-1528	6/14/2019	6/13/2020




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2463.1 N
Min: -27.1 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 565.7 N
Min: -21.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1147.2 N
Min: -1.9 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 752.1 N
Min: -5.7 N
Filter: CFC 600

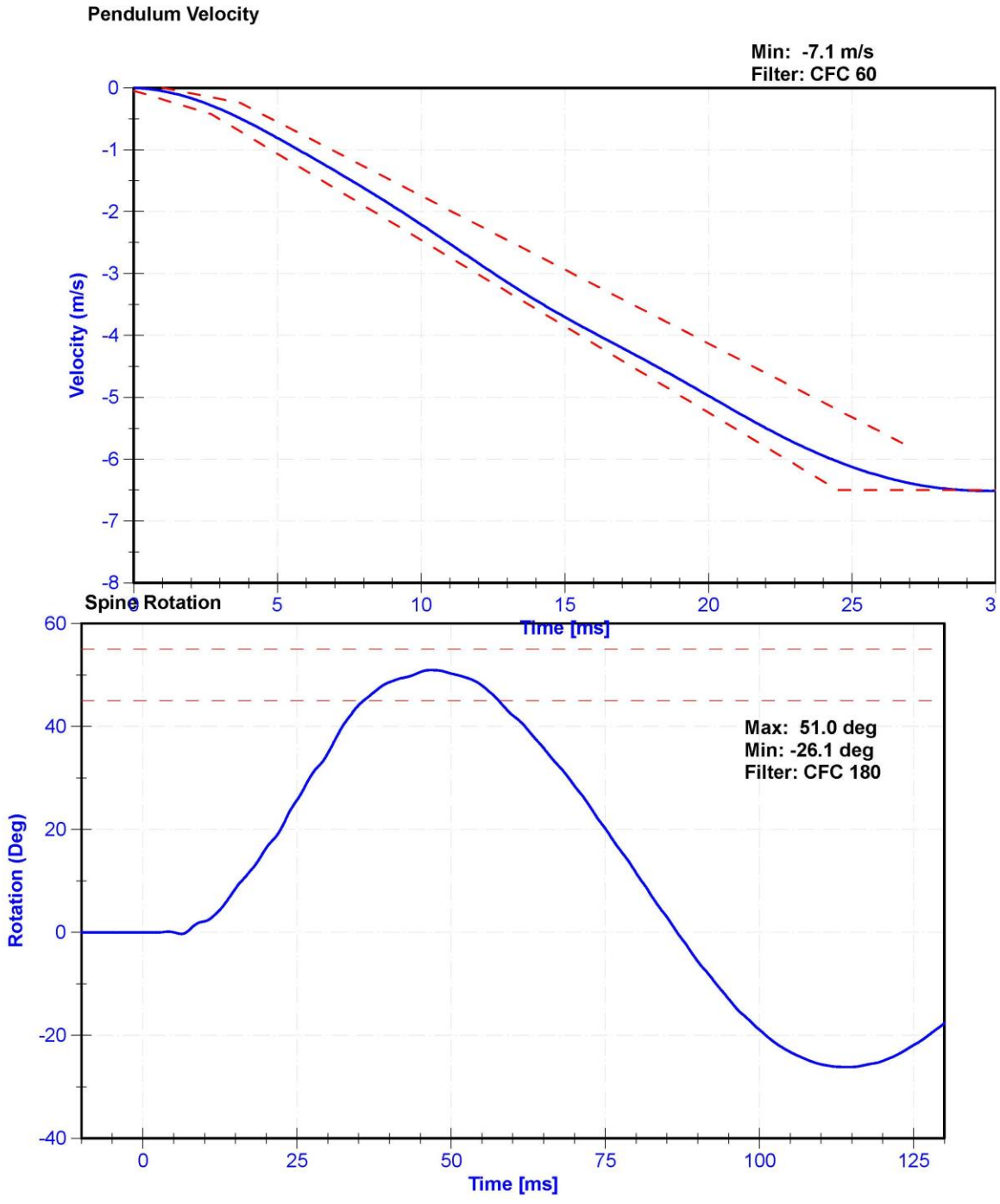
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

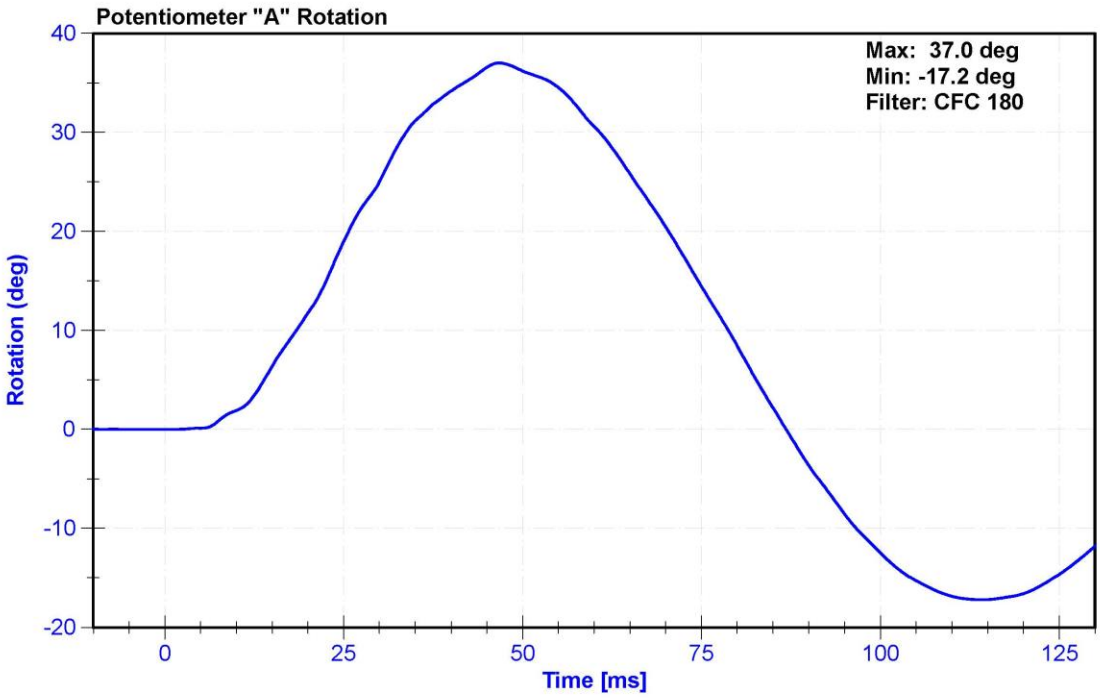
Results

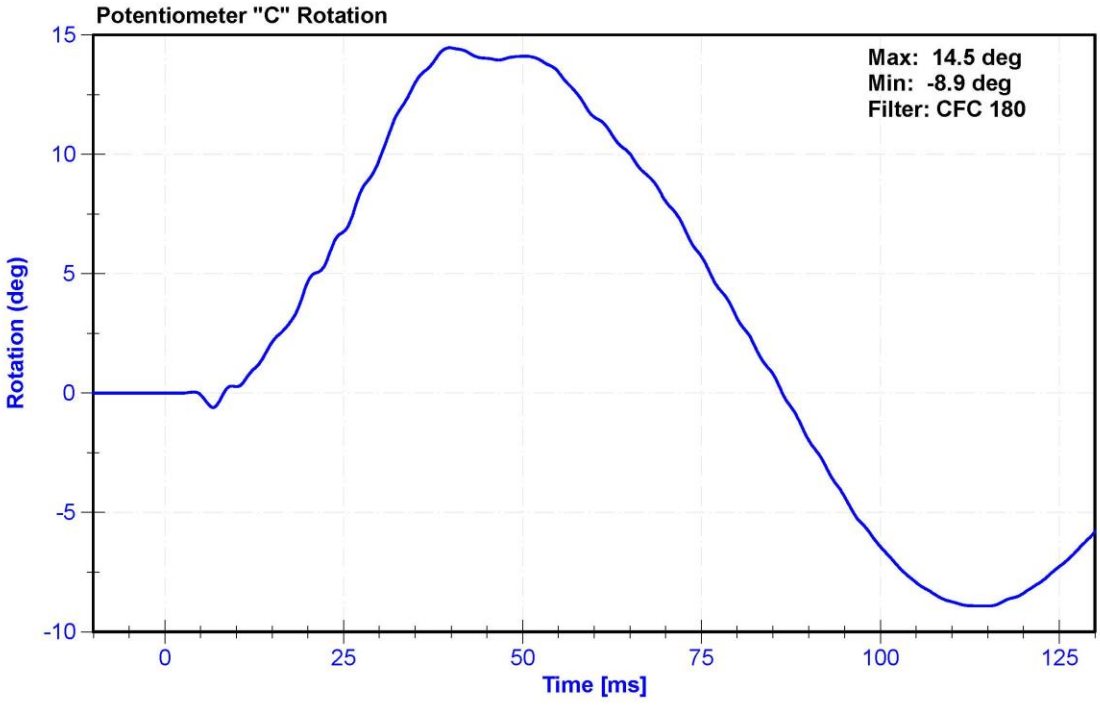
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	52.3	Pass
Velocity	5.95	6.15	m/s	6.005	Pass
Lateral Spine Rotation	45	55	deg	51.0	Pass
Time at Maximum Rotation	39	53	ms	46.7	Pass
Time of Decay to Zero Degrees	37	57	ms	40.0	Pass
Pulse within Corridor?	-	-	-		

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum "A" Potentiometer	SP22G	DS-094	10/31/2019	10/30/2020
Condyle "B" Potentiometer	SP22G	DS-095	10/31/2019	10/30/2020


Pendulum Velocity
Min: -7.1 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
-8
5
10
15
20
25
Time [ms]
Spine Rotation
Max: 51.0 deg
Min: -26.1 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 37.0 deg
Min: -17.2 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 14.5 deg
Min: -8.9 deg
Filter: CFC 180
Rotation (deg)
15
10
5
0
-5
-10
0
25
50
75
100
125
Time [ms]

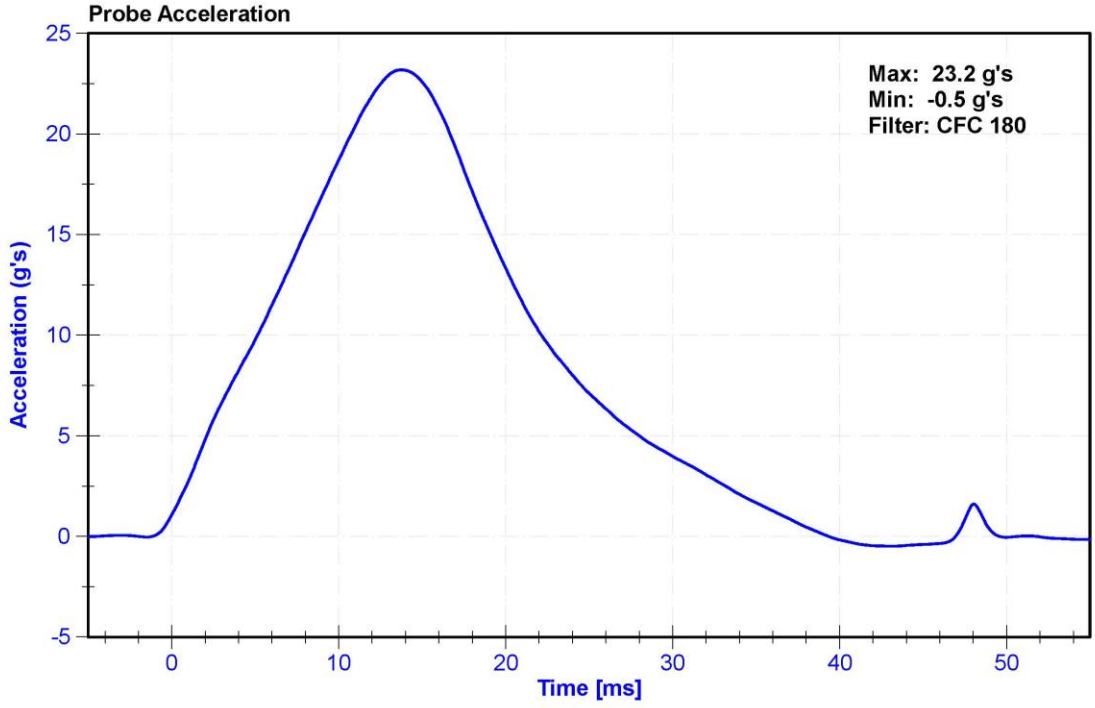
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

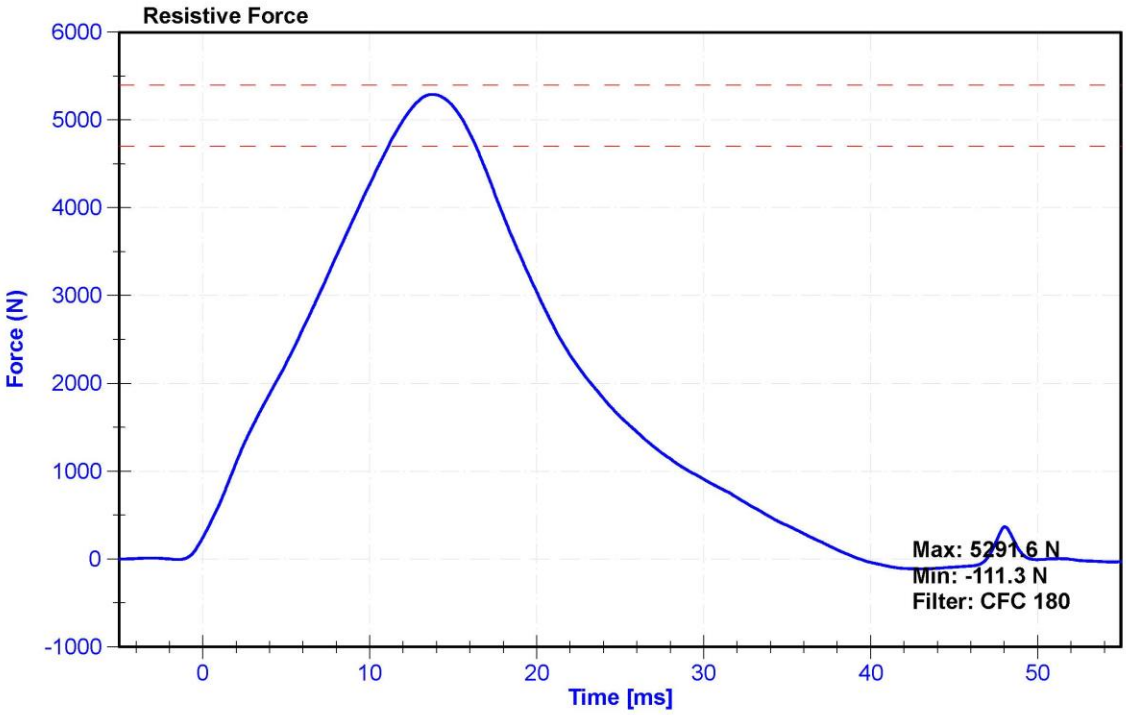
Results

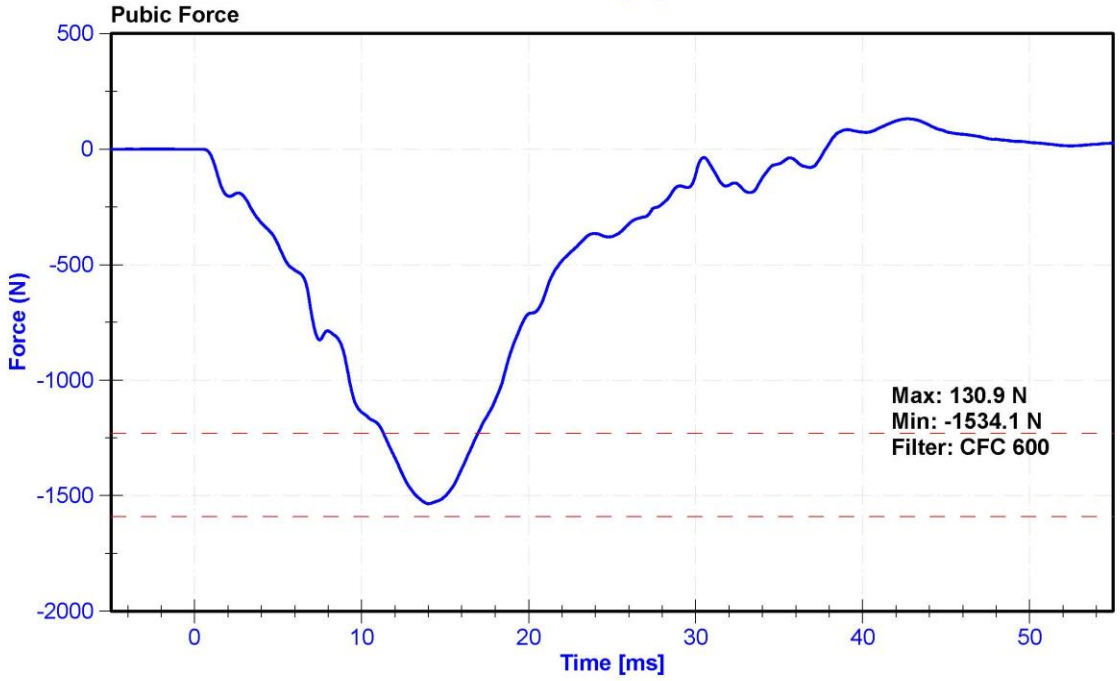
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	51.3	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	5291.6	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.75	Pass
Pubic Force	-1590	-1230	N	-1534.1	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.00	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Pubic Load Cell	Denton 3096JFL	LC-464fy	6/14/2019	6/13/2020




Resistive Force
Force (N)
Time [ms]
Max: 5291.6 N
Min: -111.3 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 130.9 N
Min: -1534.1 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

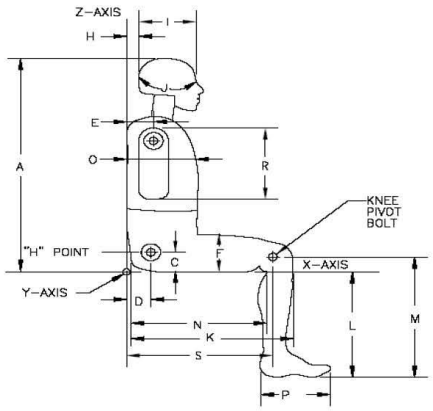
SERIAL No: 300

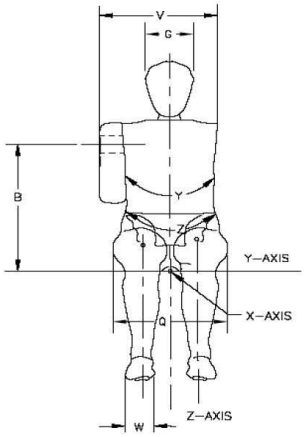
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Dutton Date: 05/15/2020

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	450	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	186	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	772	Pass

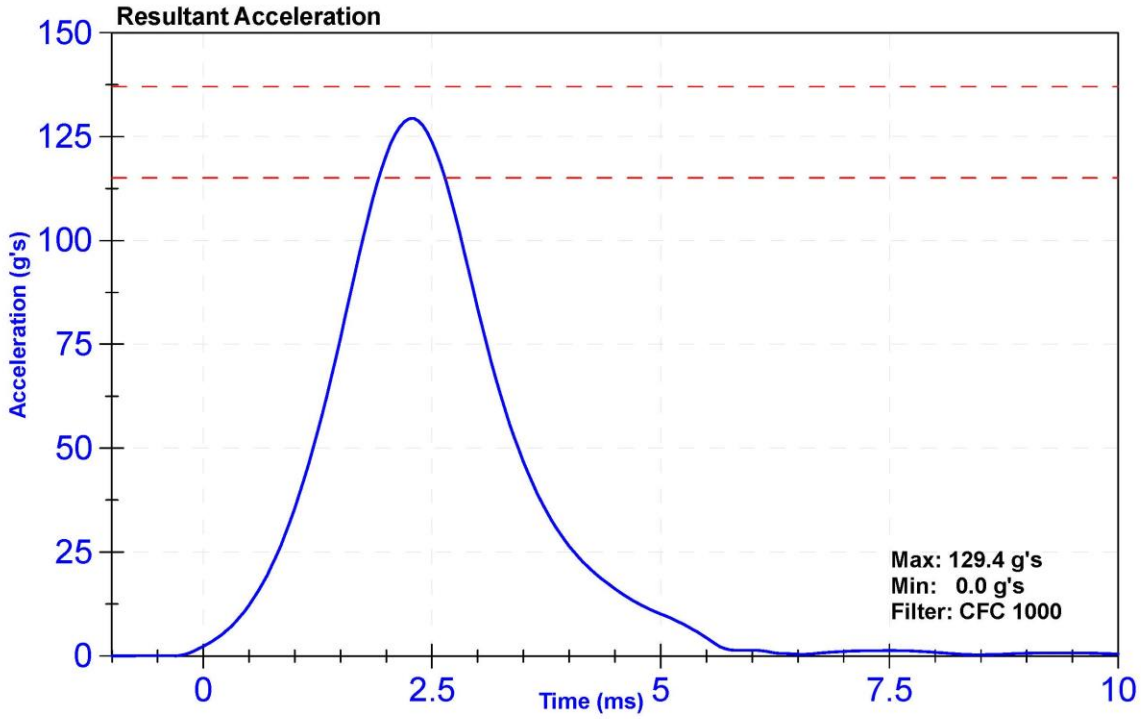
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

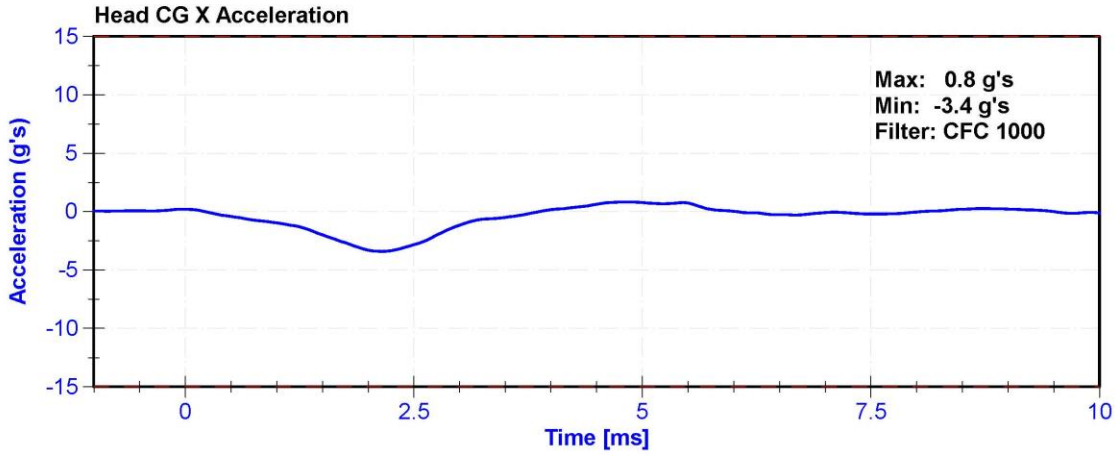
Results

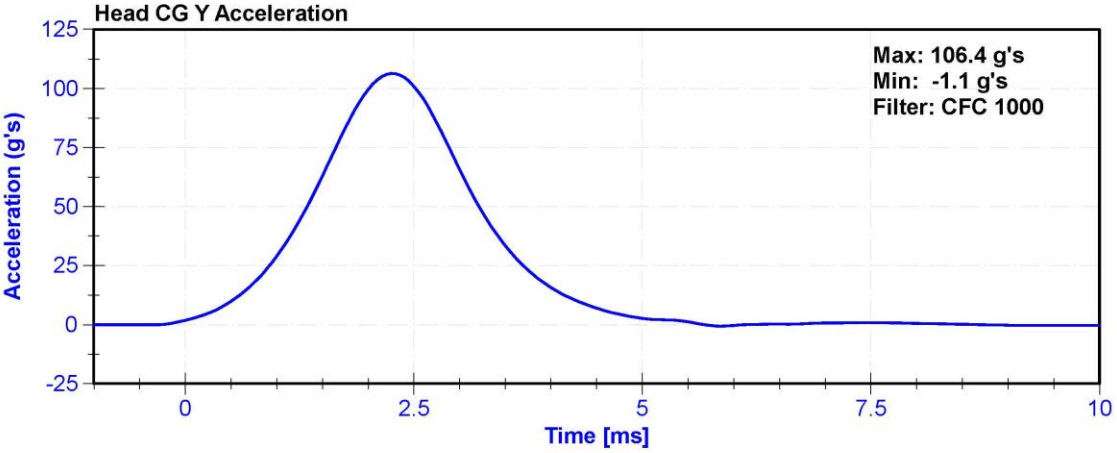
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	35.6	Pass
Resultant Acceleration	115	137	g's	129.4	Pass
Oscillation	0	15	%	1.0	Pass
Fore-Aft Acceleration	-15	15	g's	-3.4	Pass

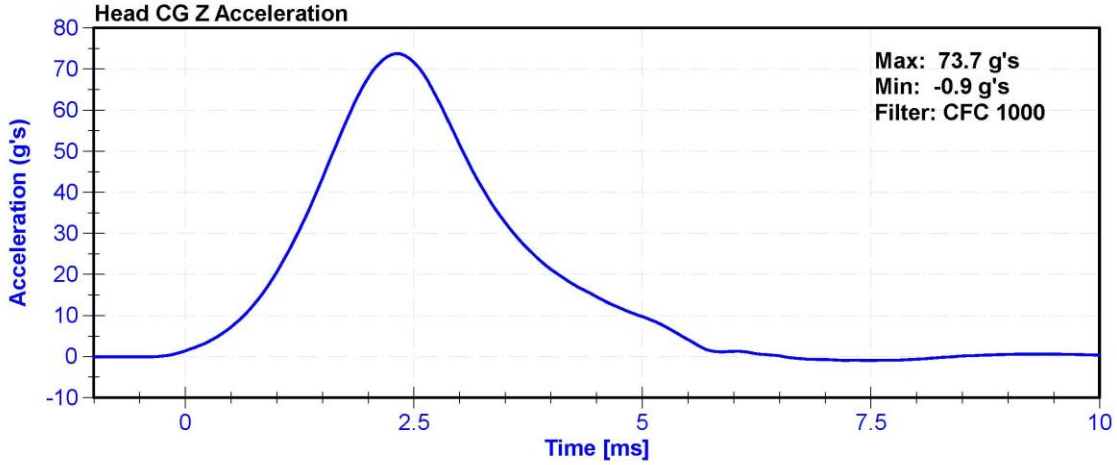
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P68057	4/20/2020	10/19/2020
Y Accelerometer	ENDEVCO 7264	AC-P79189	4/20/2020	10/19/2020
Z Accelerometer	ENDEVCO 7264CT	AC-P52095	4/20/2020	10/19/2020




Head CG X Acceleration
Max: 0.8 g's
Min: -3.4 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 106.4 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 73.7 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

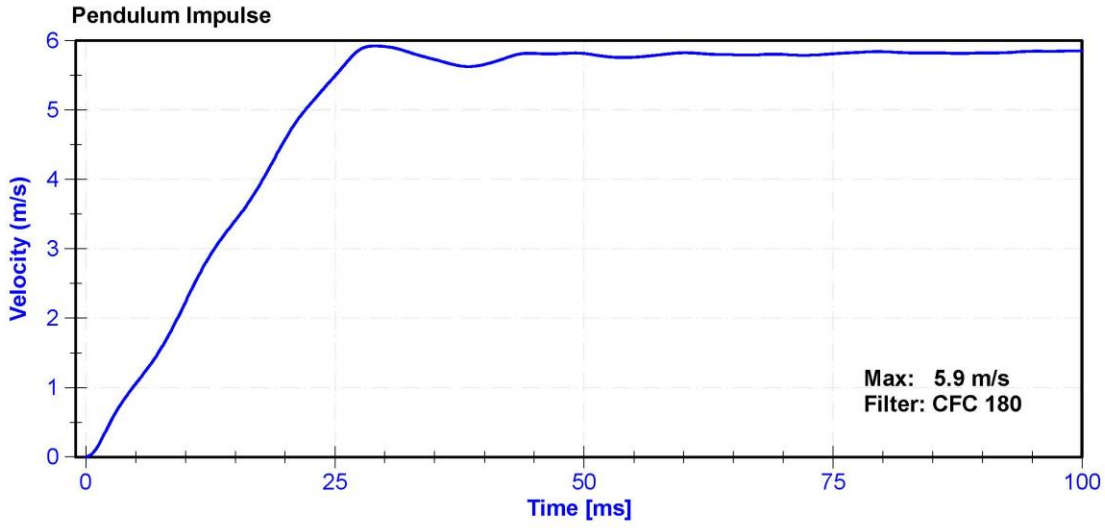
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

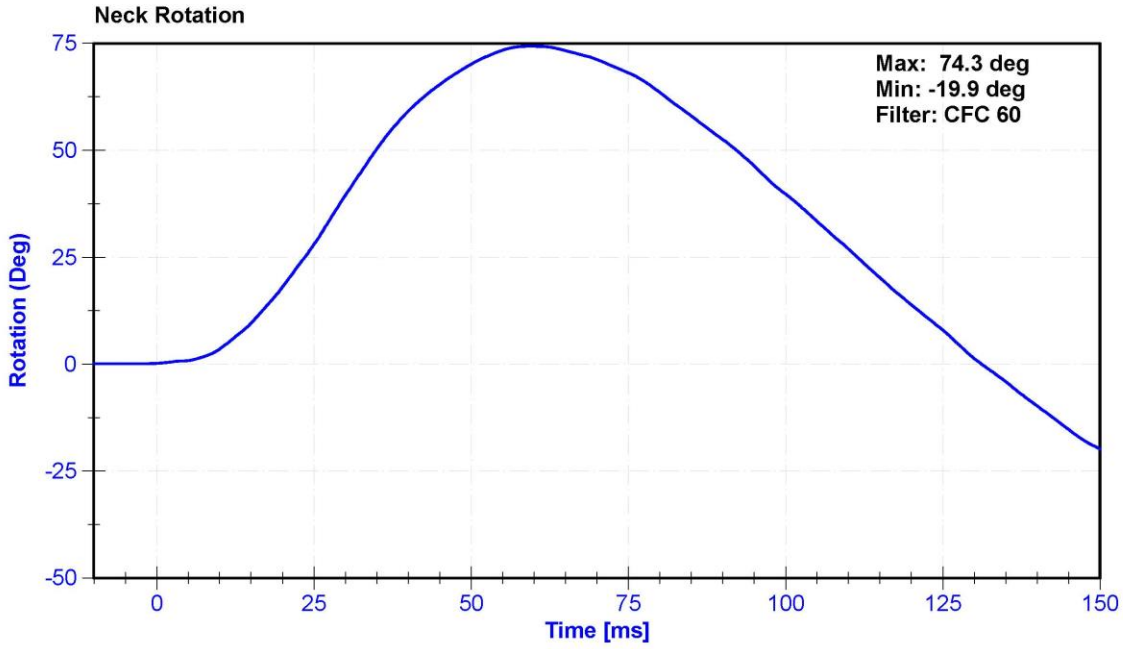
Results

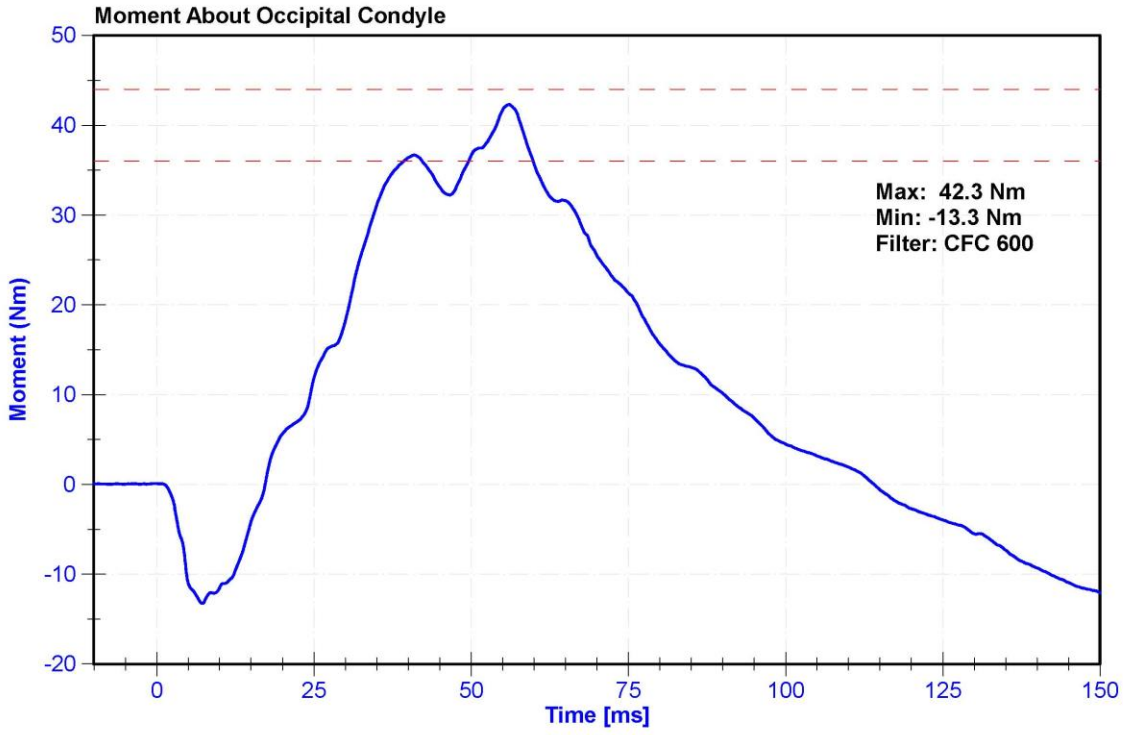
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	32.4	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.23	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.41	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.57	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.49	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.92	Pass
Neck Rotation	71	81	deg	74.3	Pass
Time at Maximum Rotation	50	70	ms	59.3	Pass
Moment about the OC	36	44	Nm	42.3	Pass
Moment Decay to 0 Nm	102	126	ms	114.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/4/2019	11/3/2020
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/4/2019	11/3/2020
Upper Neck Load Cell	Denton 1716A	LC-2192Fy	6/20/2019	6/19/2020




Neck Rotation
Max: 74.3 deg
Min: -19.9 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.3 Nm
Min: -13.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

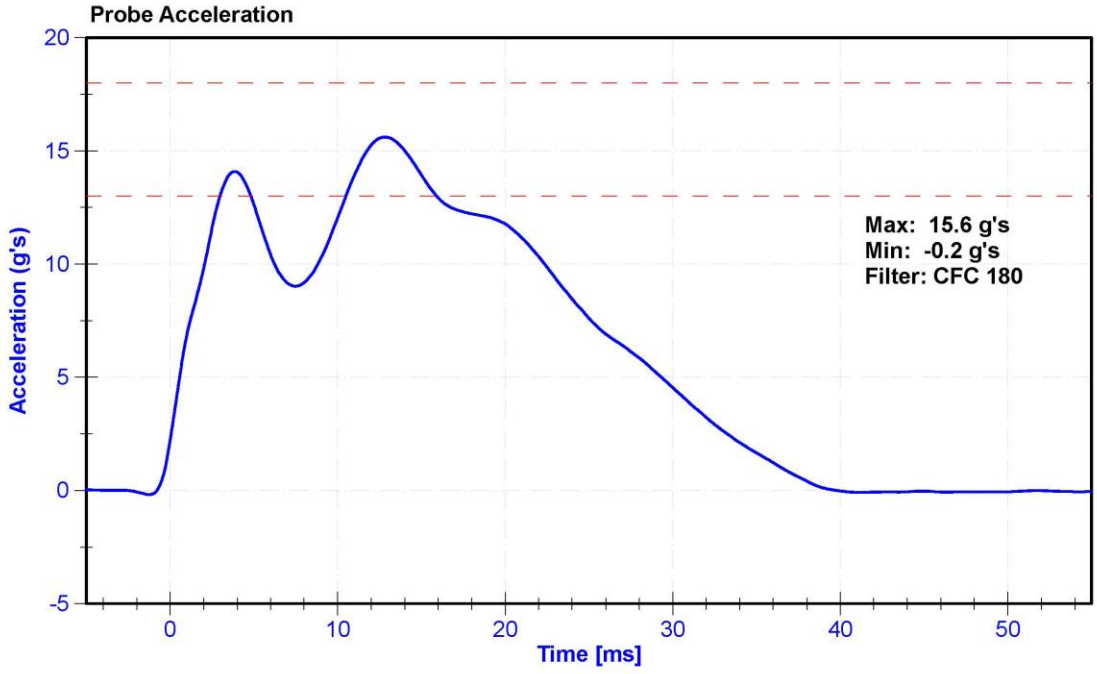
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

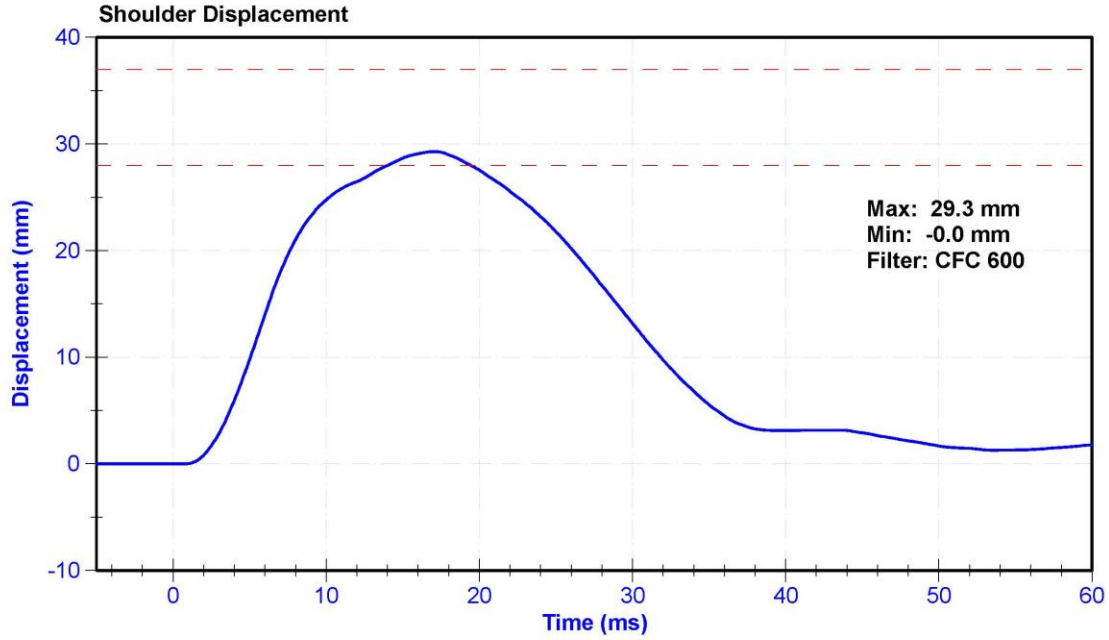
Results

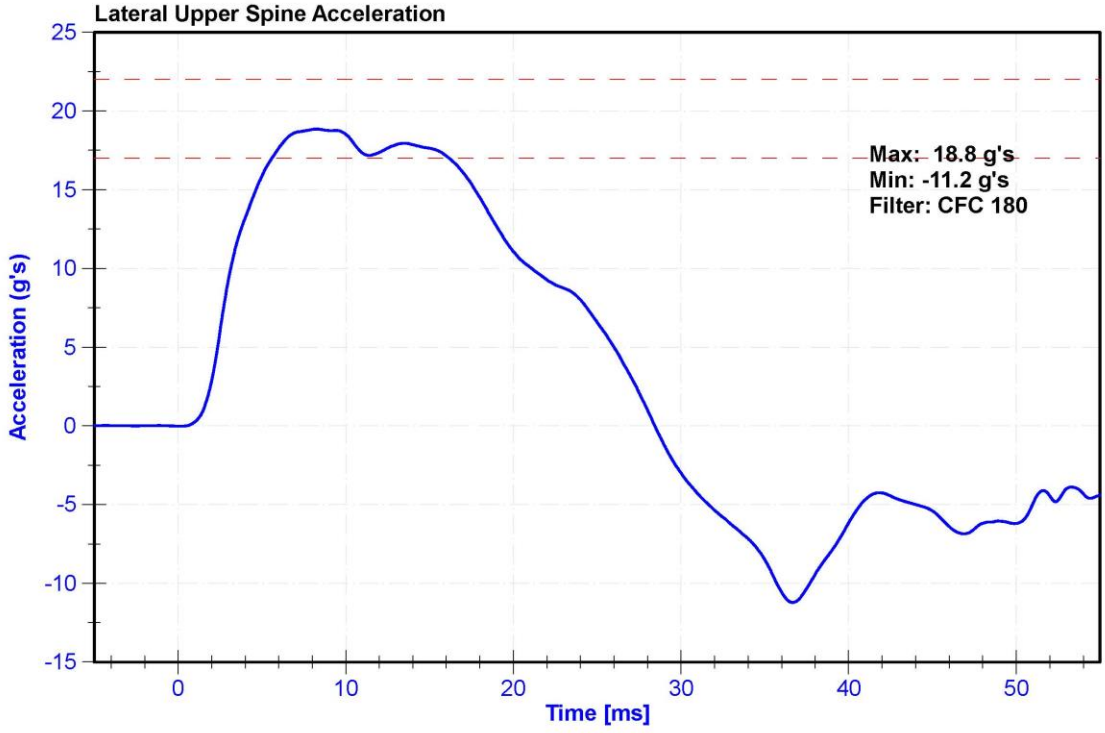
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	34.5	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	29.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.3 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 18.8 g's
Min: -11.2 g's
Filter: CFC 180

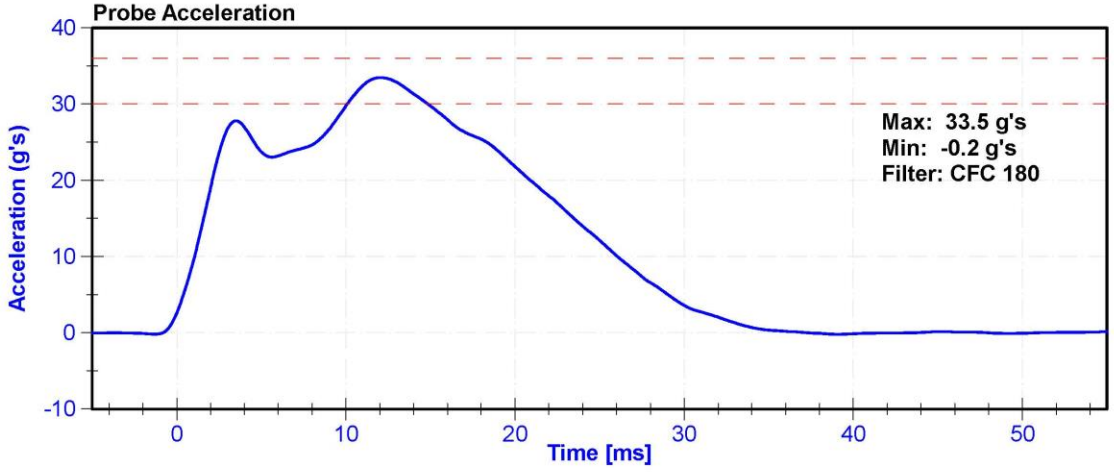
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

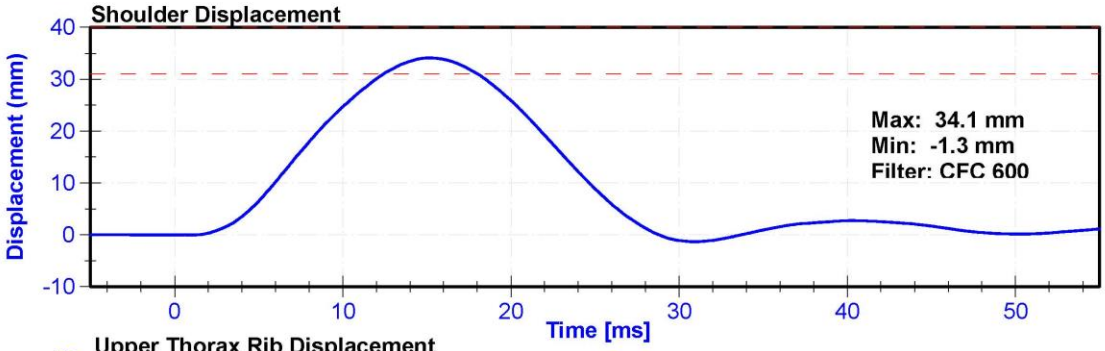
Results

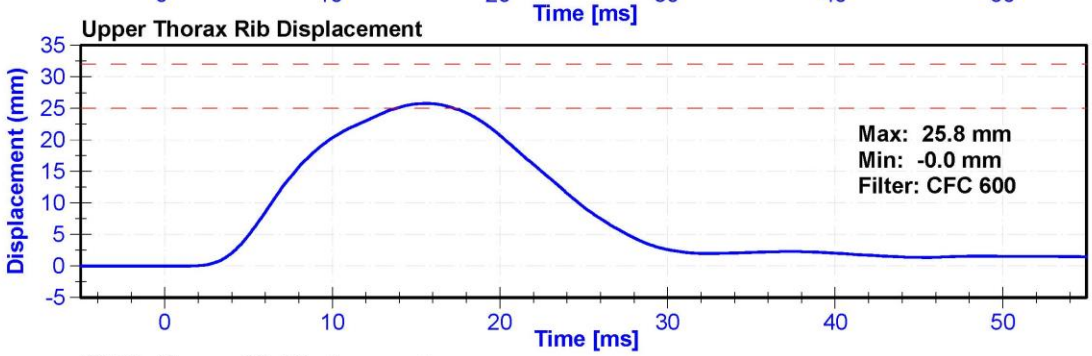
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	29.0	Pass
Velocity	6.6	6.8	m/s	6.71	Pass
Probe Acceleration after 5 ms	30	36	g's	33.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.0	Pass
Shoulder Deflection	31	40	mm	34.1	Pass
Upper Thorax Rib Deflection	25	32	mm	25.8	Pass
Mid Thorax Rib Deflection	30	36	mm	30.5	Pass
Lower Thorax Rib Deflection	32	38	mm	32.6	Pass

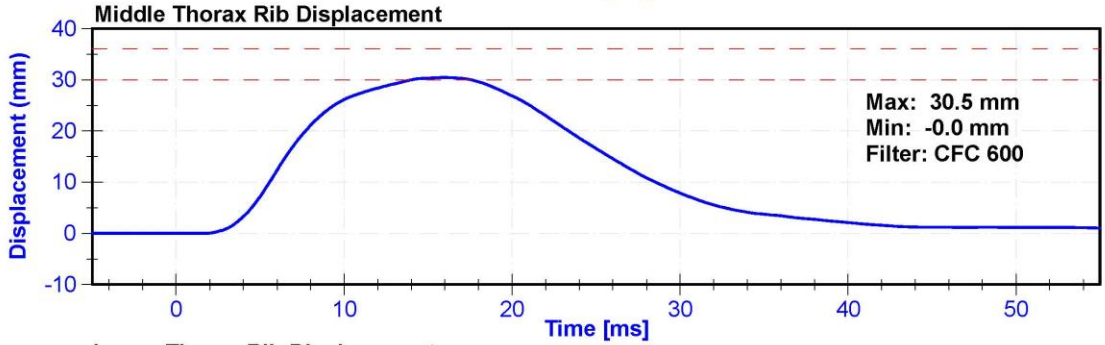
Transducer Calibrations

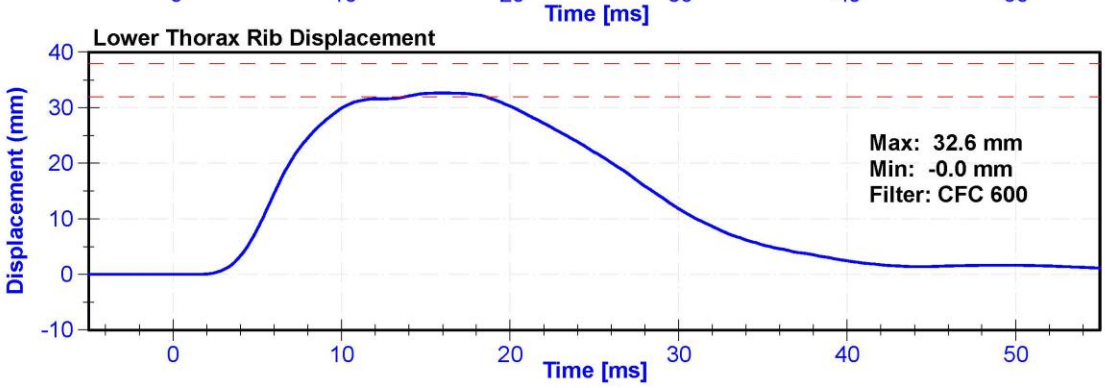
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020

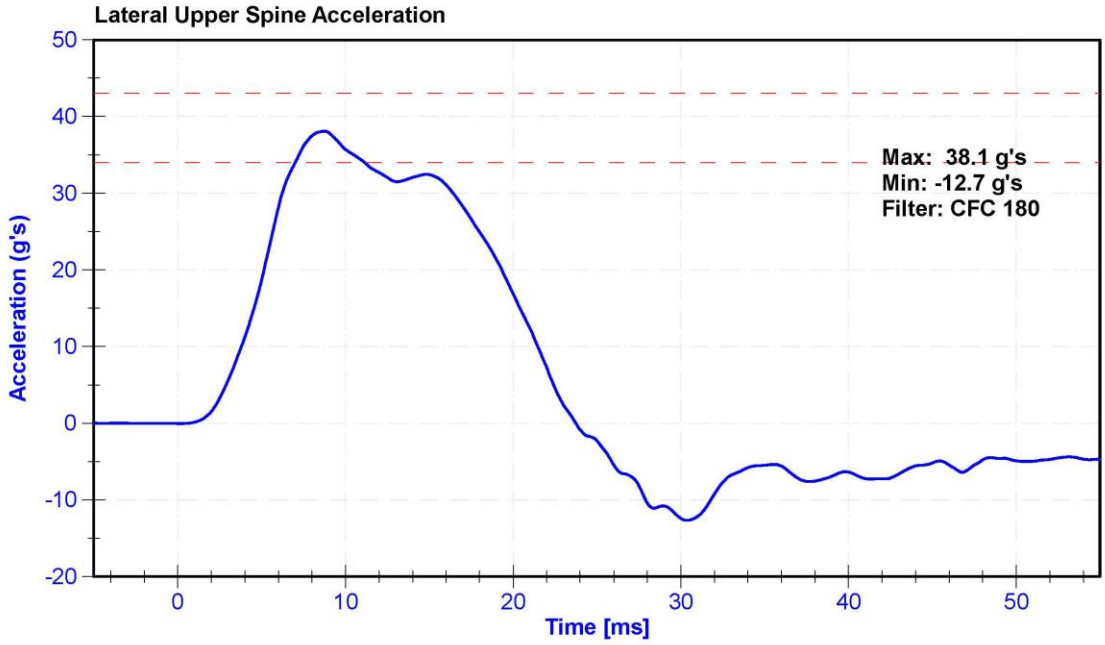


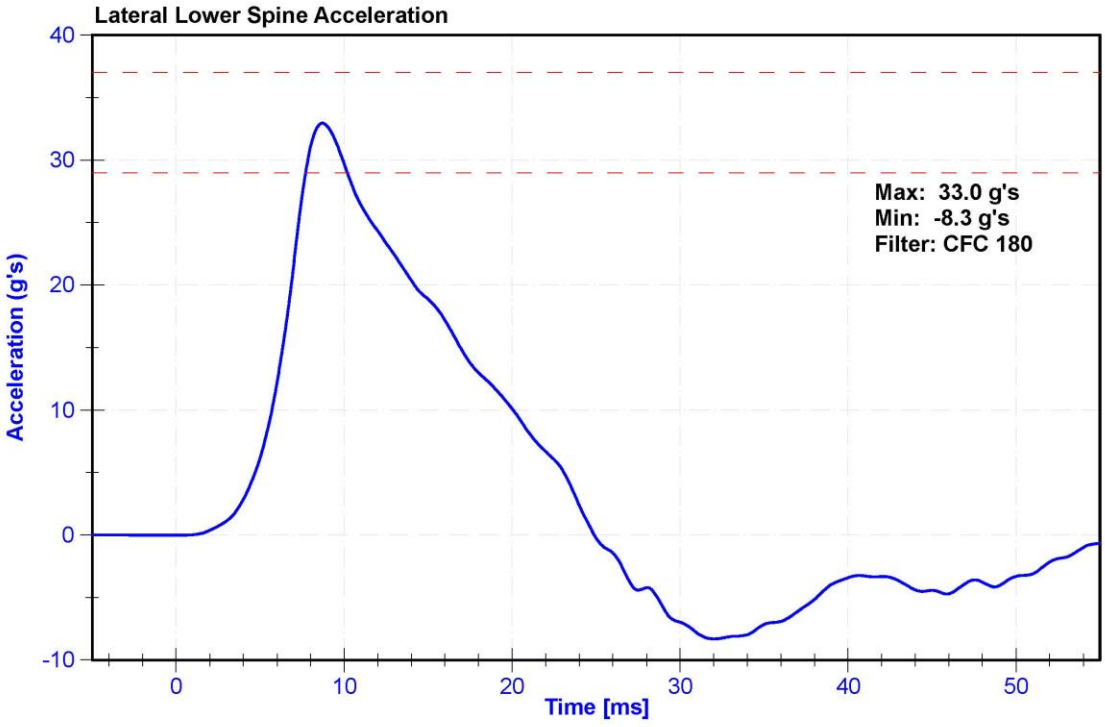

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.1 mm
Min: -1.3 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 25.8 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.5 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.6 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.1 g's
Min: -12.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 33.0 g's
Min: -8.3 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

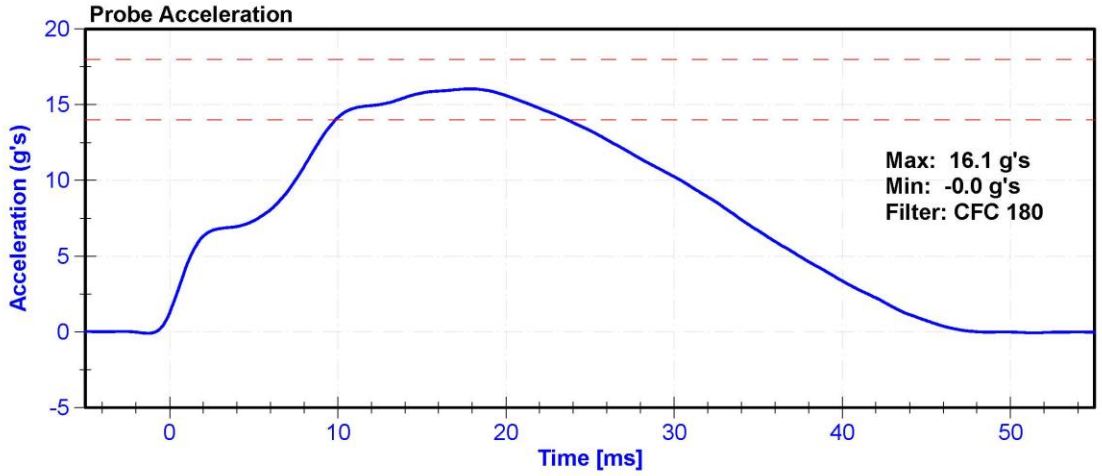
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

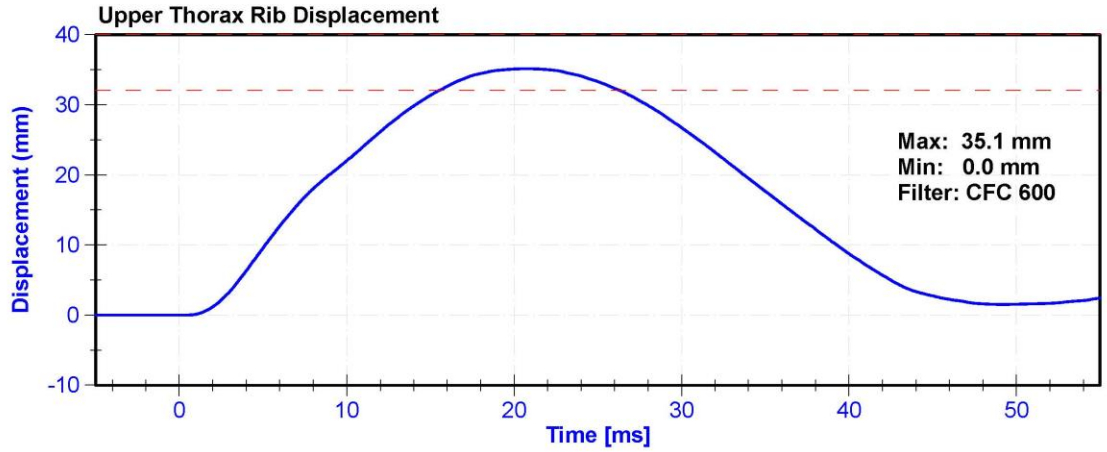
Results

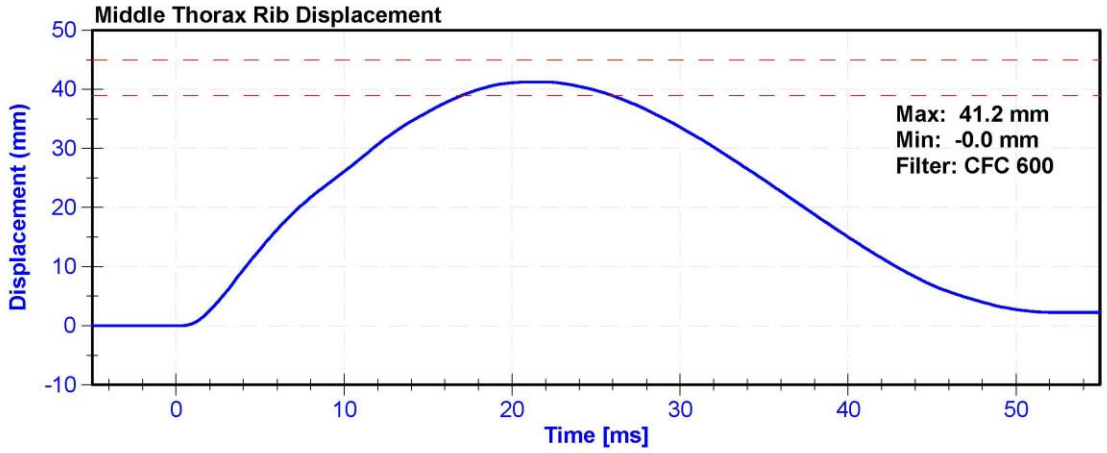
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	35.1	Pass
Middle Thorax Rib Deflection	39	45	mm	41.2	Pass
Lower Thorax Rib Deflection	35	43	mm	38.2	Pass

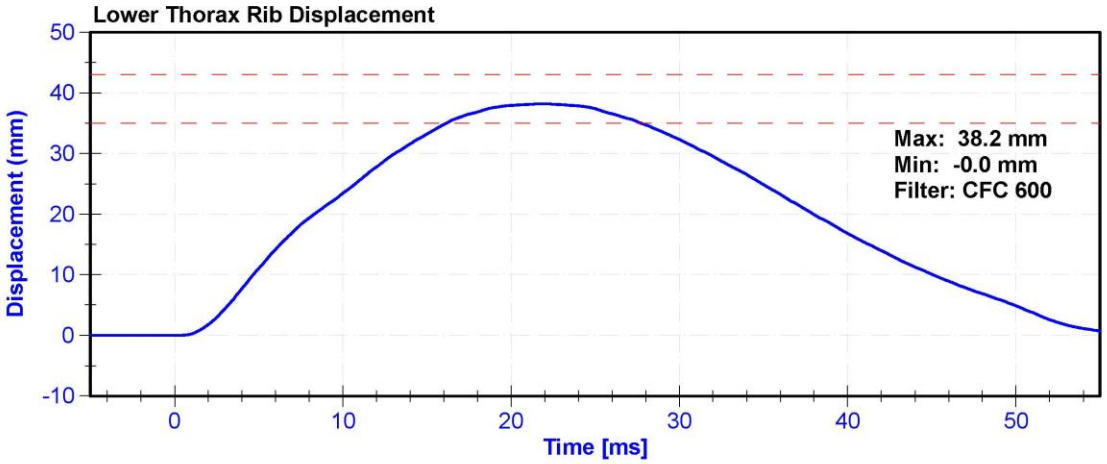
Transducer Calibrations

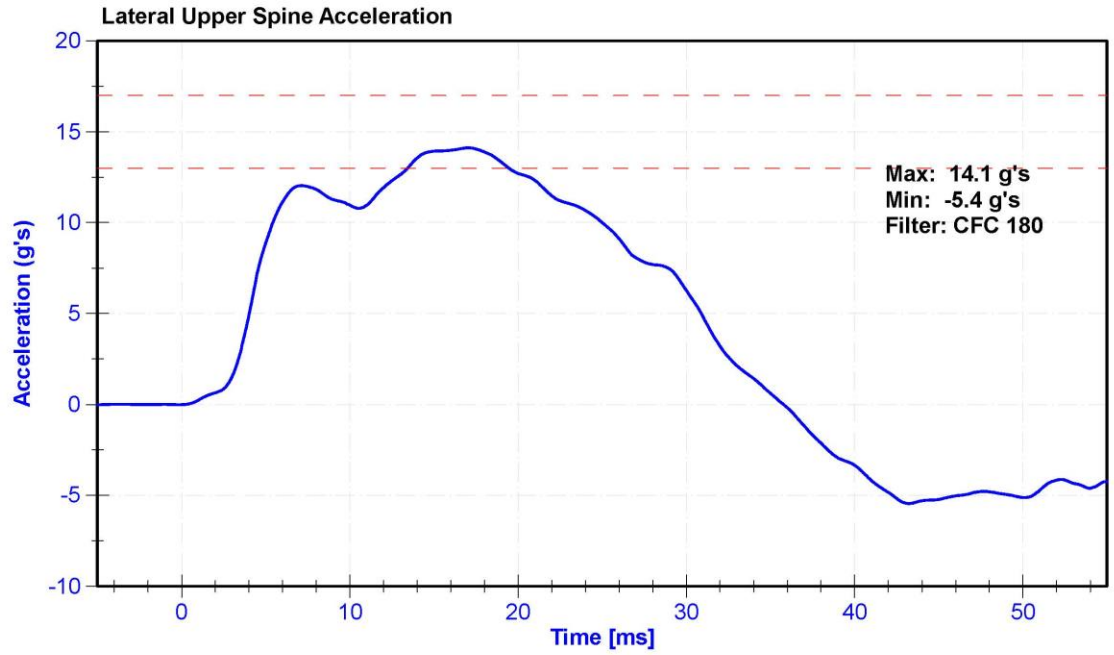
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020

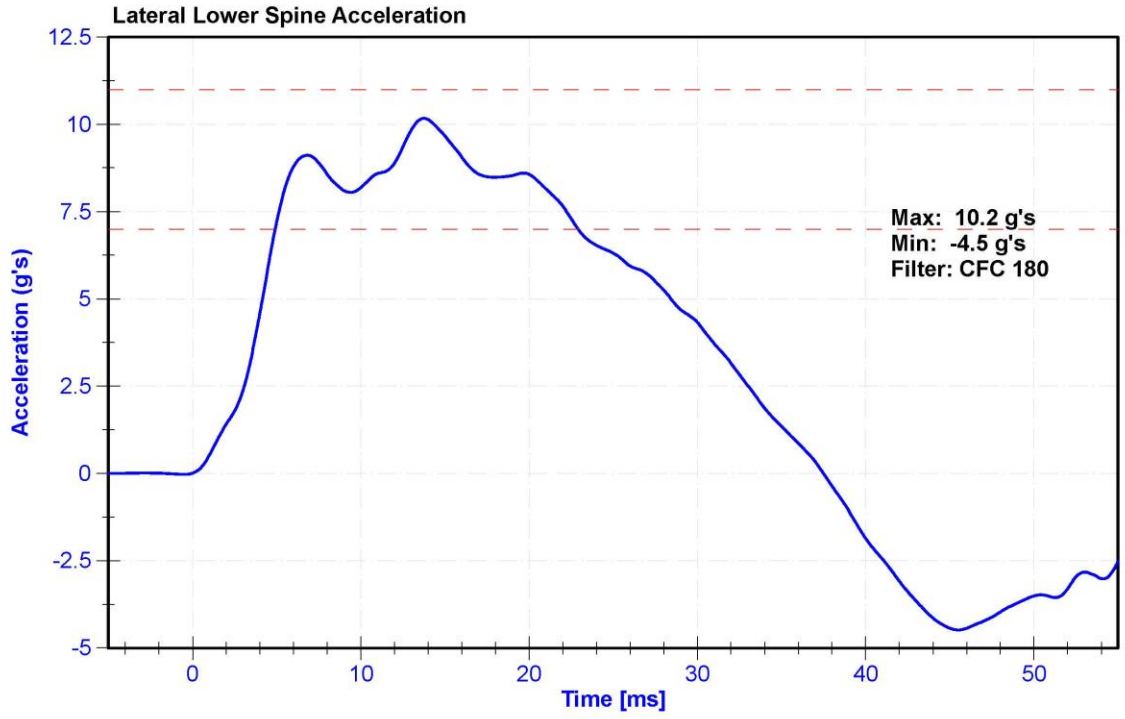



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.1 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.2 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.1 g's
Min: -5.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 10.2 g's
Min: -4.5 g's
Filter: CFC 180

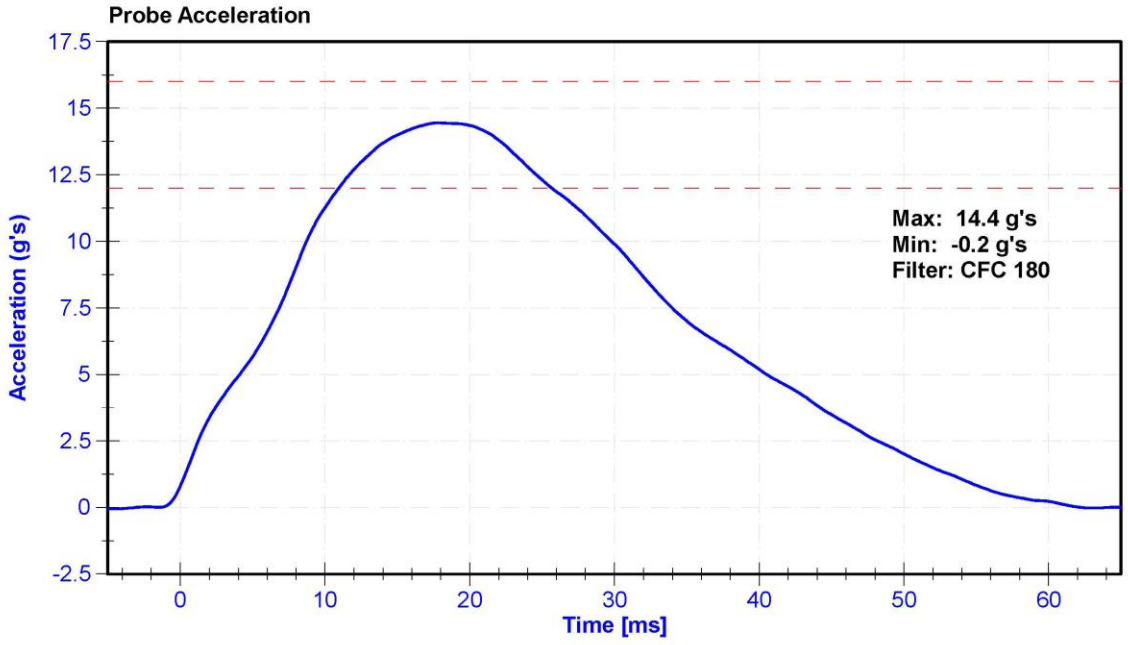
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

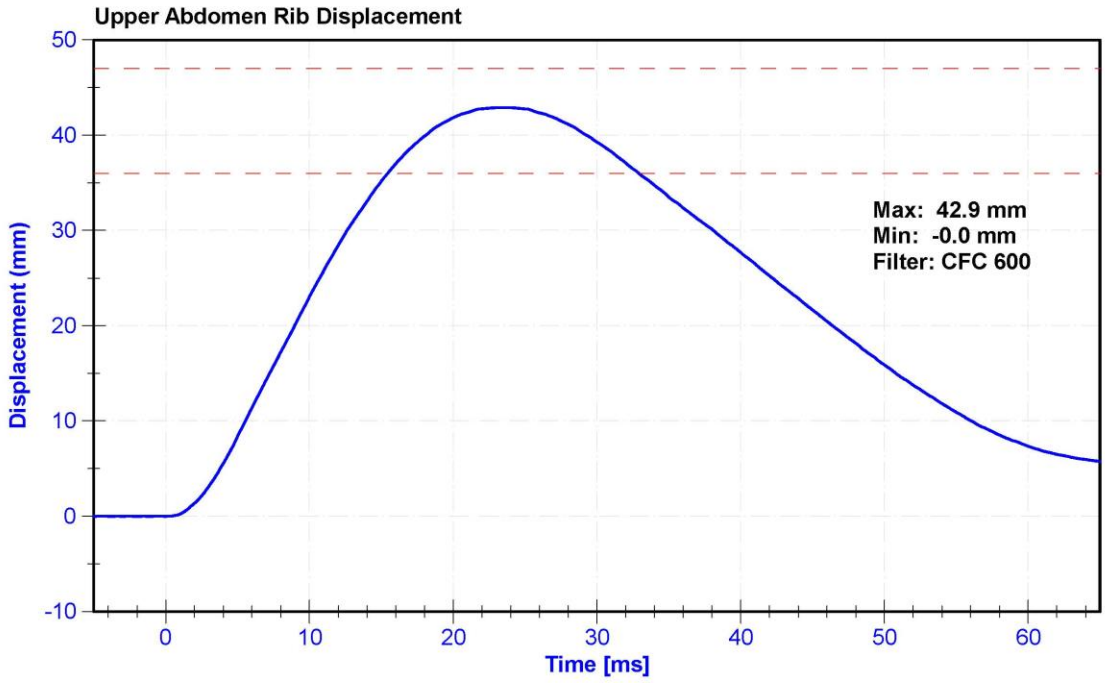
Results

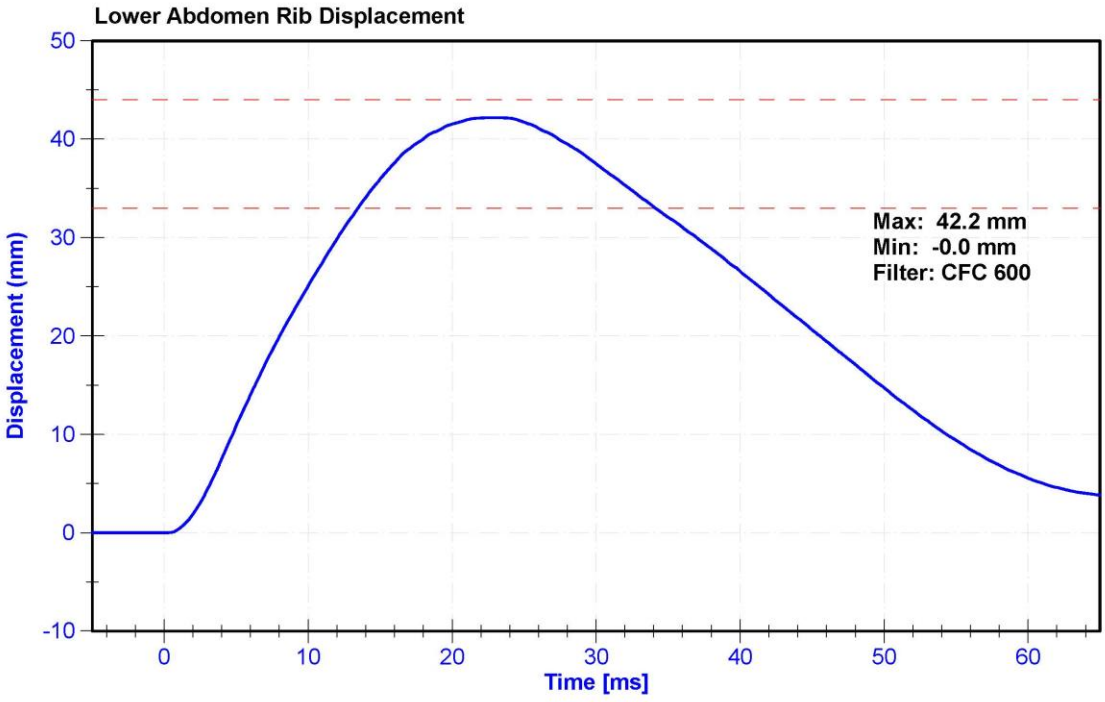
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	30.0	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	12	16	g's	14.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	42.2	Pass

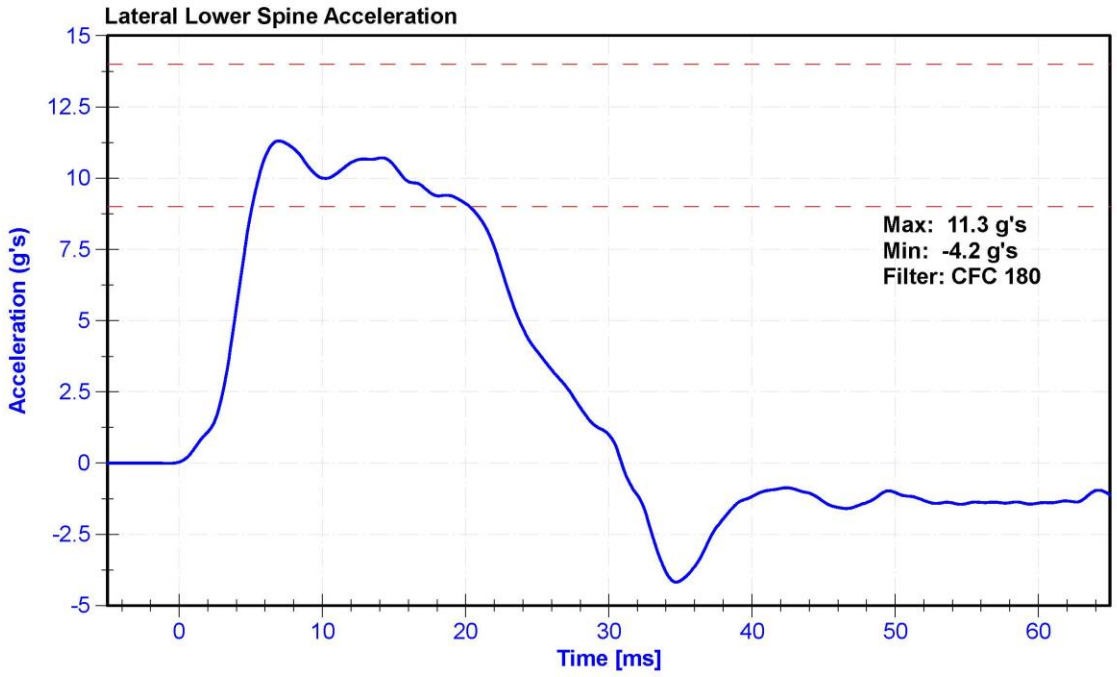
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	4/30/2020	10/29/2020
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	4/30/2020	10/29/2020




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.9 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.3 g's
Min: -4.2 g's
Filter: CFC 180

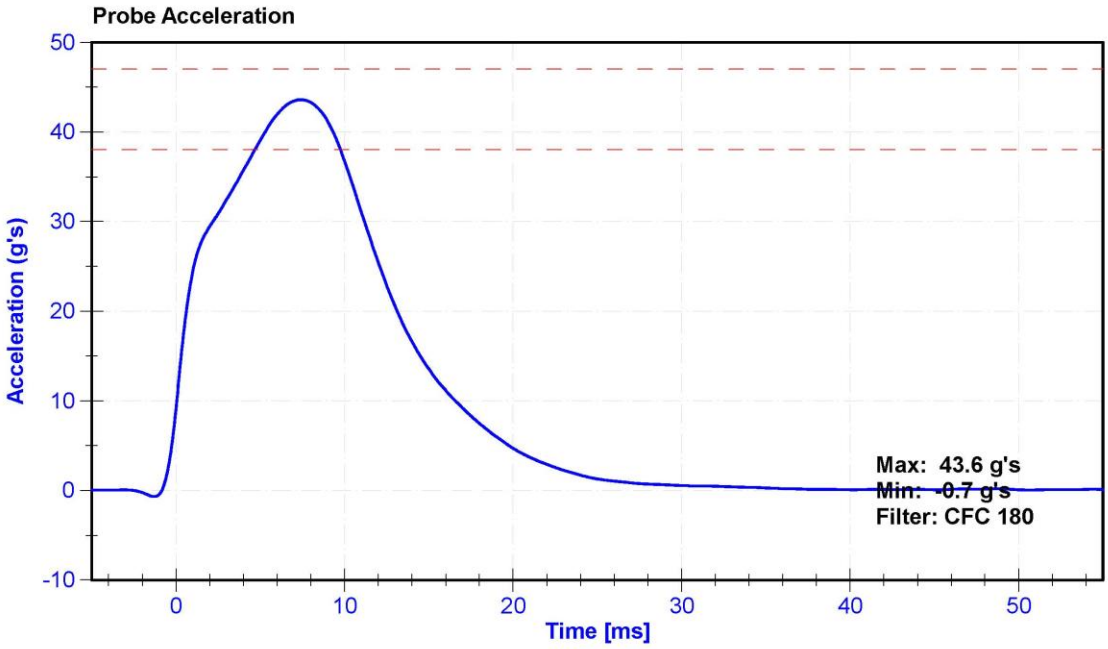
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

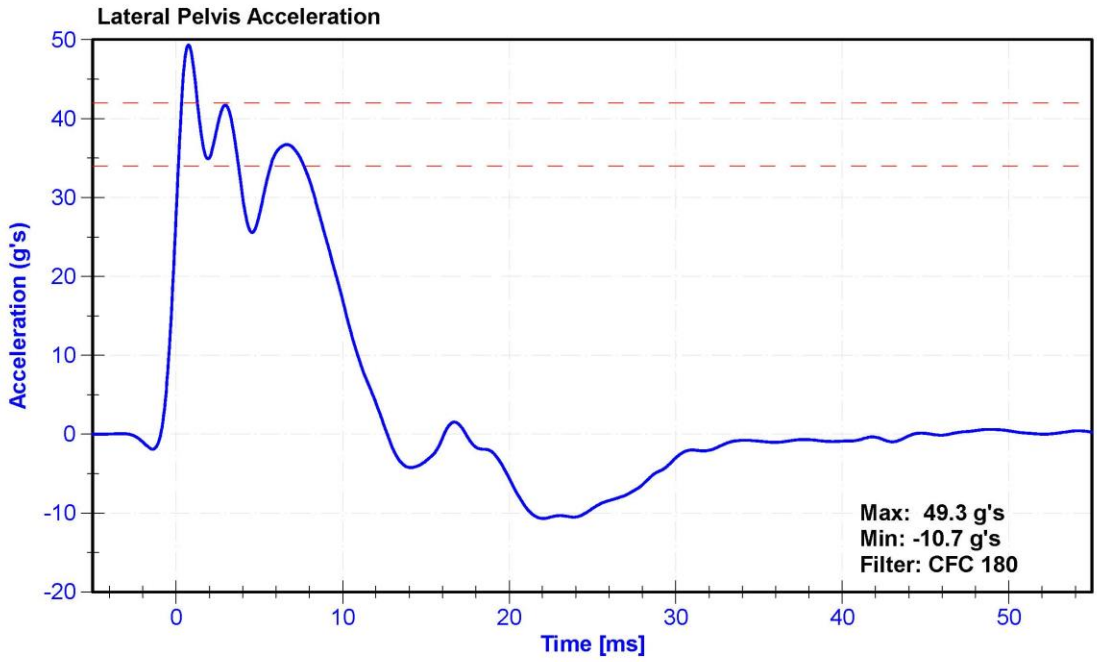
Results

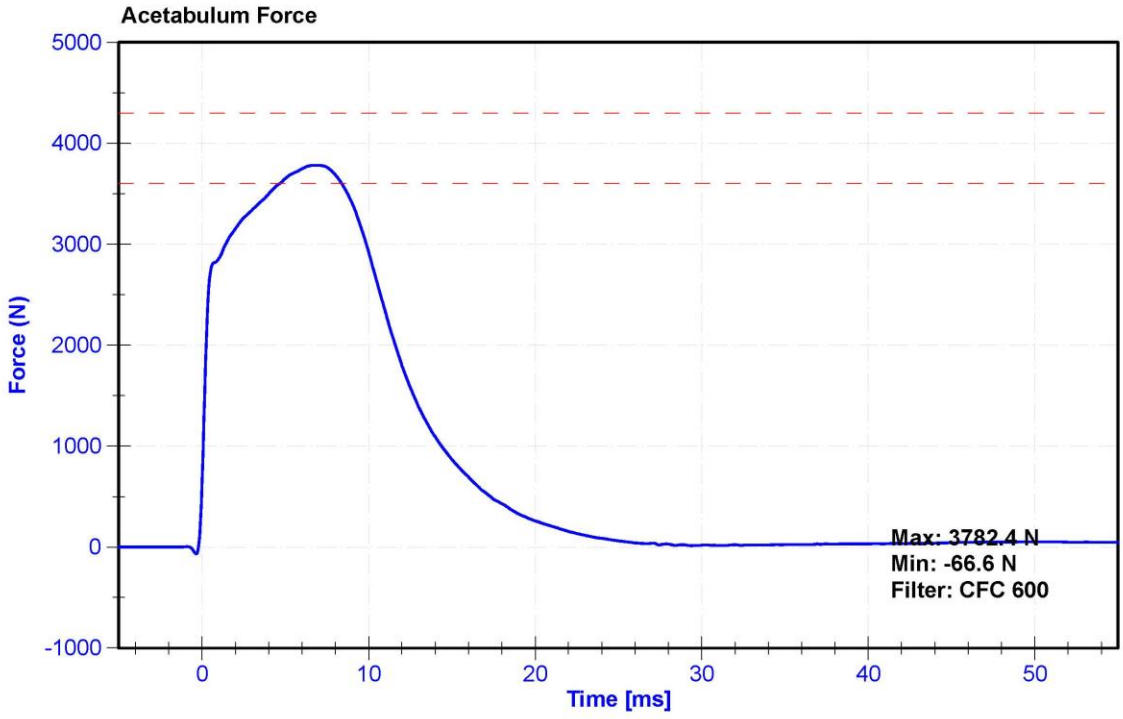
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	29	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	43.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.7	Pass
Acetabulum Force	3600	4300	N	3782.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51731	4/20/2020	10/19/2020
Acetabulum Load Cell	Denton 3249J	LC-276Fy	9/24/2019	9/23/2020
Certification Plug	SACO	13602	9/25/2019	N/A
Crash Test Plug	SACO	13594	9/25/2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 49.3 g's
Min: -10.7 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3782.4 N
Min: -66.6 N
Filter: CFC 600

SACO RESEARCH

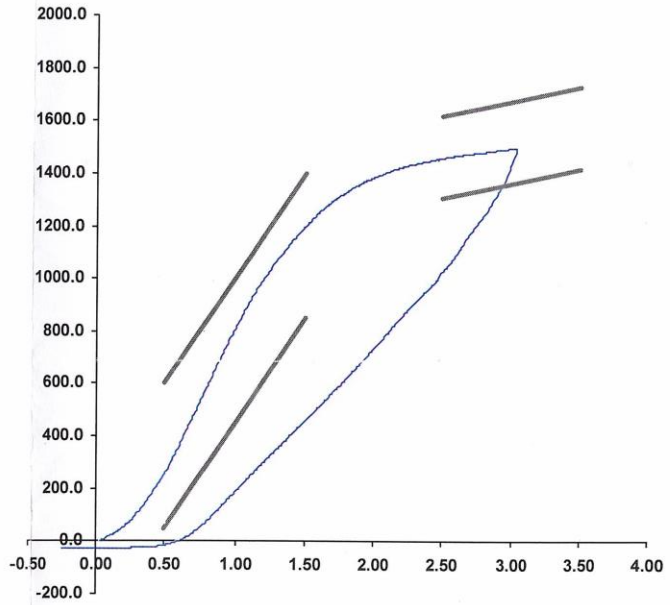
300 ~~Crash~~ DB Cert
5-18-2020

SID-IIs Pelvis Plug Certification Test

Plug S/N 13602
Test Number 11246
Report Number 11284
Test Date 9/25/2019 12:58:43 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	267.22	50.00	600.00
Force @ 1.5 mm (N)	1,199.91	850.00	1,400.00
Force @ 2.5 mm (N)	1,459.89	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,497.08	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS 1000

Crosshead Speed (mm / min) or Rat 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107 25-Sep-19
SACO Research

By : DC Date : 9/25/2019

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

300
Crash
5/15/20

SID-IIs Pelvis Plug Certification Test

Plug S/N 13594
Test Number 11238
Report Number 11276
Test Date 9/25/2019 12:47:15 PM

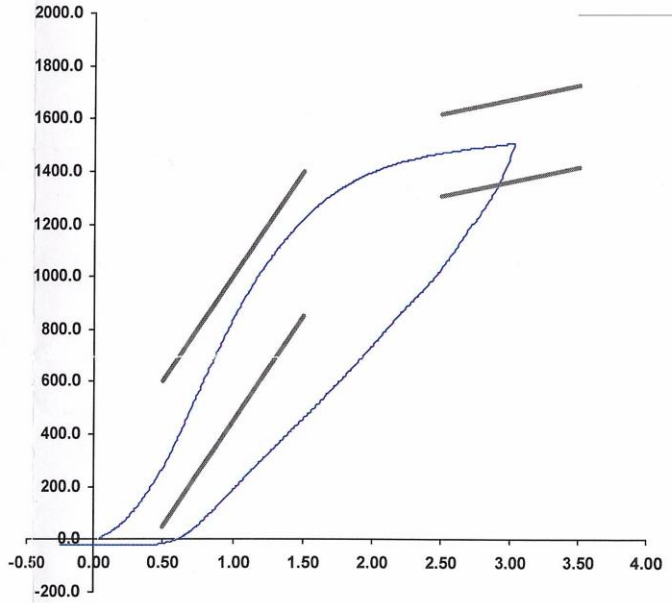
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	283.57	50.00	600.00
Force @ 1.5 mm (N)	1,221.04	850.00	1,400.00
Force @ 2.5 mm (N)	1,471.82	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,508.04	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS 1000

Crosshead Speed (mm / min) or Rat 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 25-Sep-19
SACO Research

By : DC Date : 9/25/2019

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

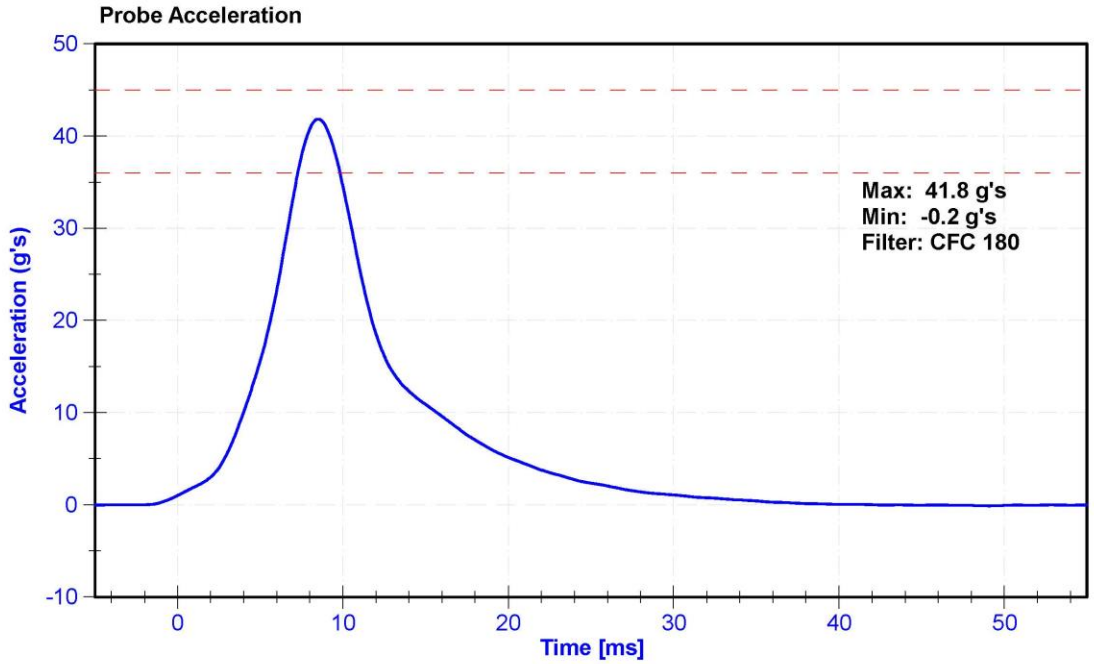
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D.Reinhard

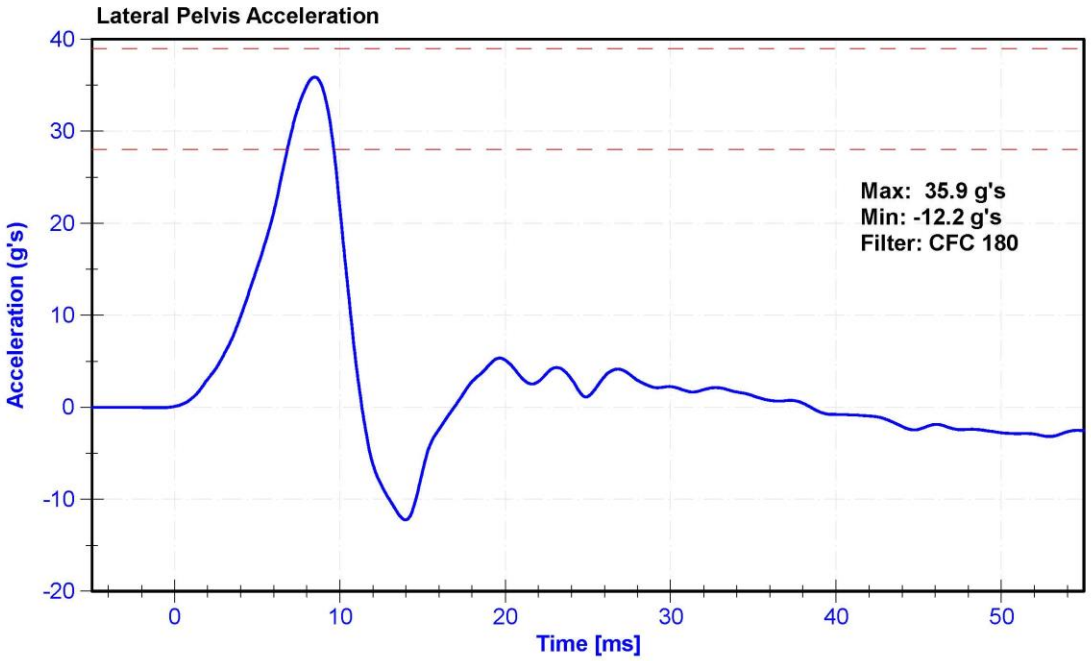
Results

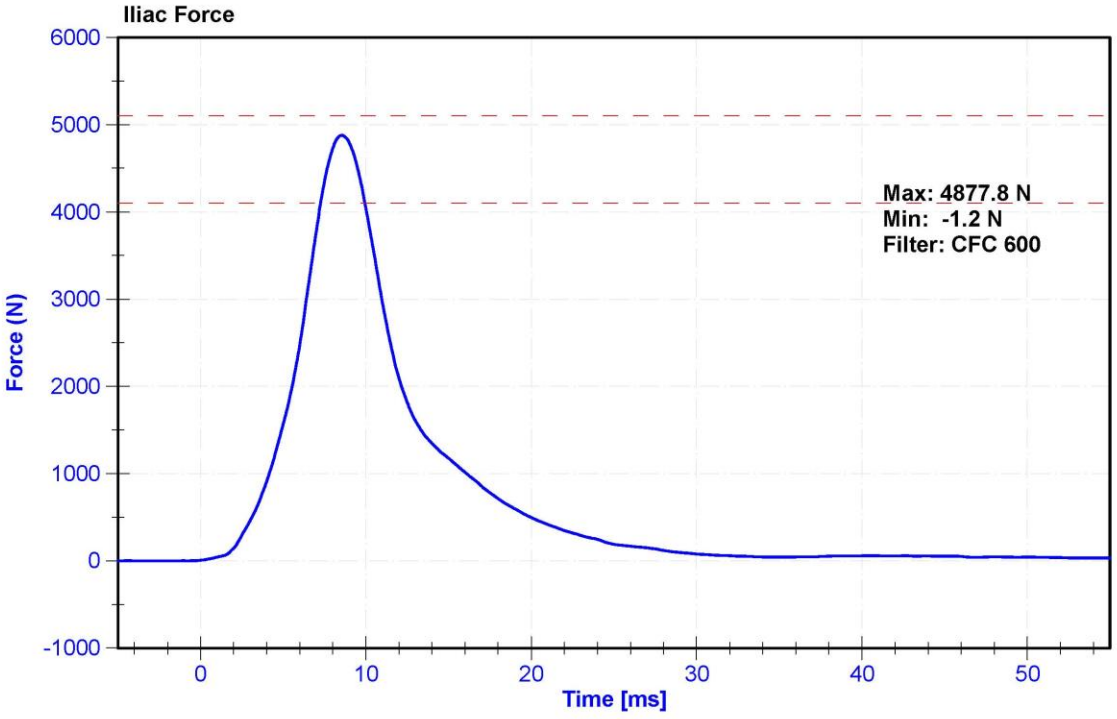
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	29.0	Pass
Velocity	4.2	4.4	m/s	4.20	Pass
Probe Acceleration	36	45	g's	41.8	Pass
Lateral Pelvis Acceleration	28	39	g's	35.9	Pass
Iliac Force	4100	5100	N	4877.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51731	4/20/2020	10/19/2020
Iliac Load Cell	DENTON 3228J	LC-280Fy	6/20/2019	6/19/2020




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 35.9 g's
Min: -12.2 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4877.8 N
Min: -1.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

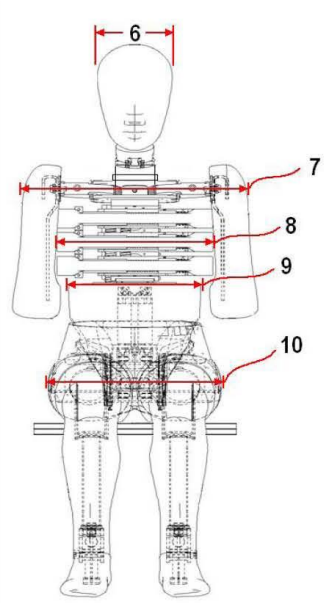
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

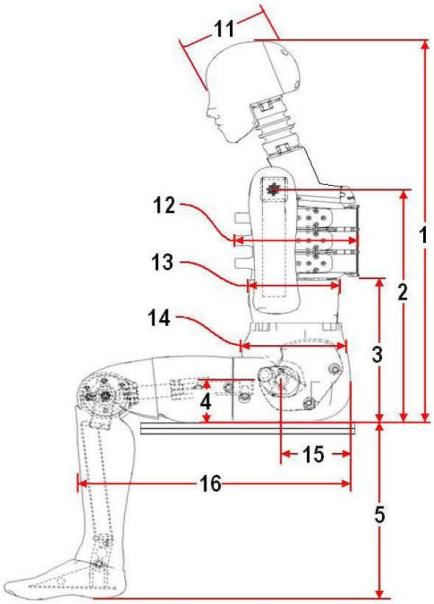
External Measurements - EuroSID-2re

Technician: K. Dutton Date: 05/20/2020

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	569	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	101	Pass
5	Sole to Seat, Sitting	333	451	421	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	203	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

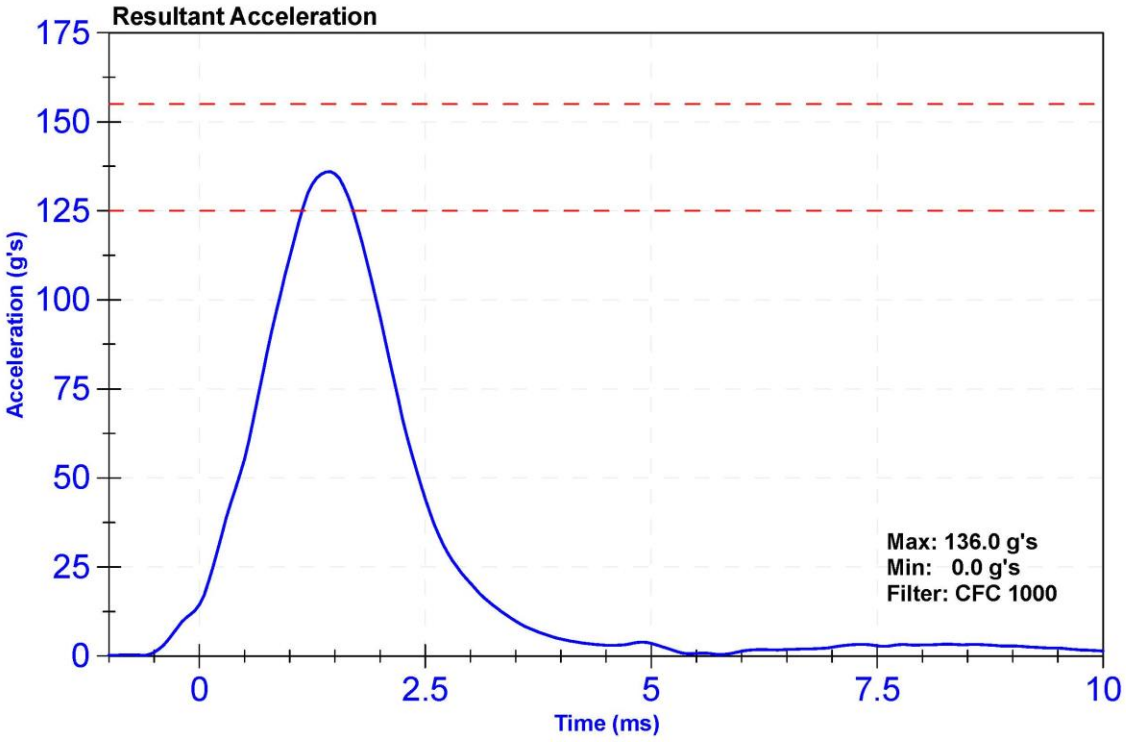
ATD Manufacturer	FTSS	Test Technician	K.Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

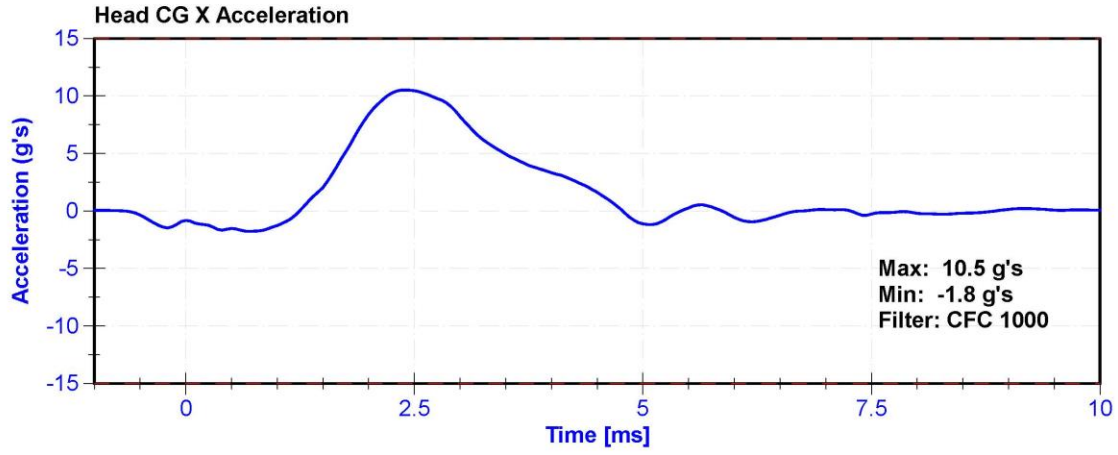
Results

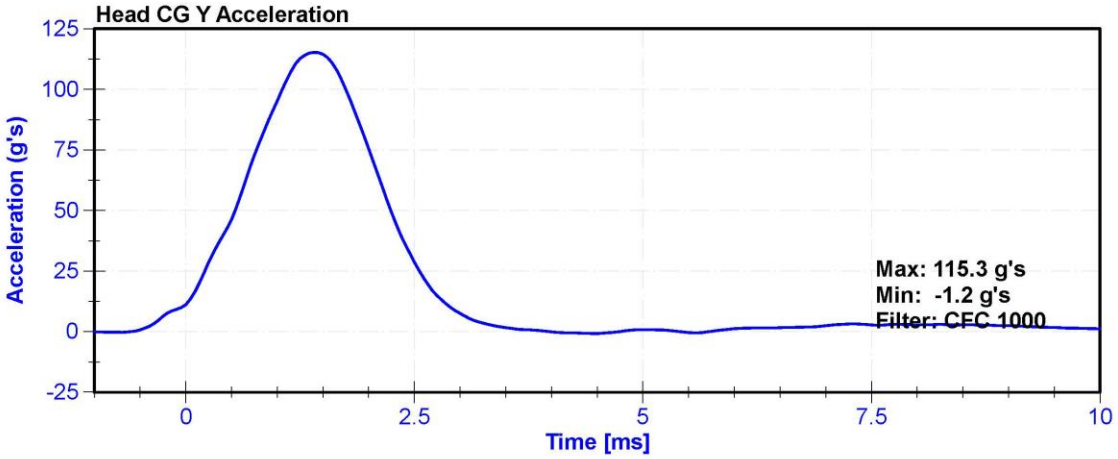
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	53.5	Pass
Resultant Acceleration	125	155	g's	136.0	Pass
Oscillation	0	15	%	2.86	Pass
Fore-Aft Acceleration	-15	15	g's	10.5	Pass

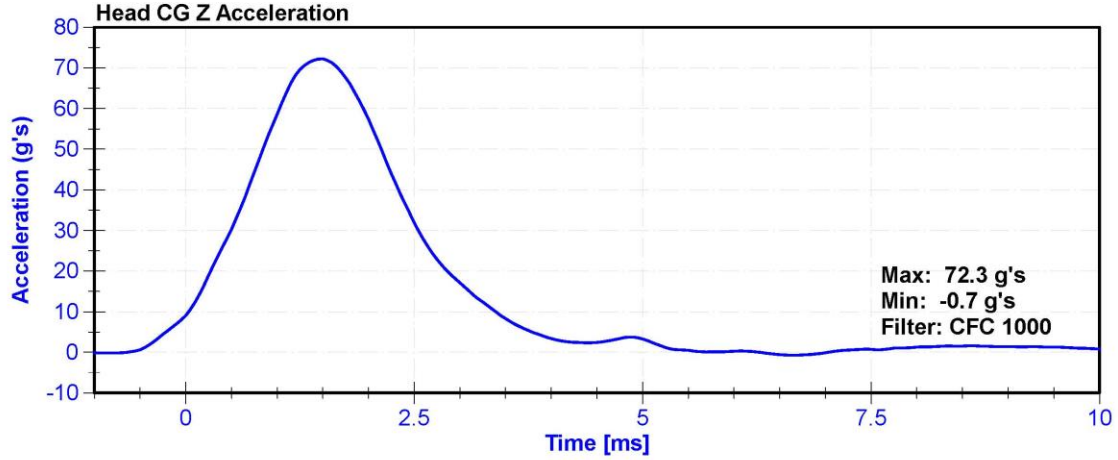
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P49204	4/15/2020	10/14/2020
Y Accelerometer	ENDEVCO 7264	AC-P83437	4/15/2020	10/14/2020
Z Accelerometer	ENDEVCO 7264	AC-P64007	4/15/2020	10/14/2020




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 10.5 g's
Min: -1.8 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 115.3 g's
Min: -1.2 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 72.3 g's
Min: -0.7 g's
Filter: CFC 1000

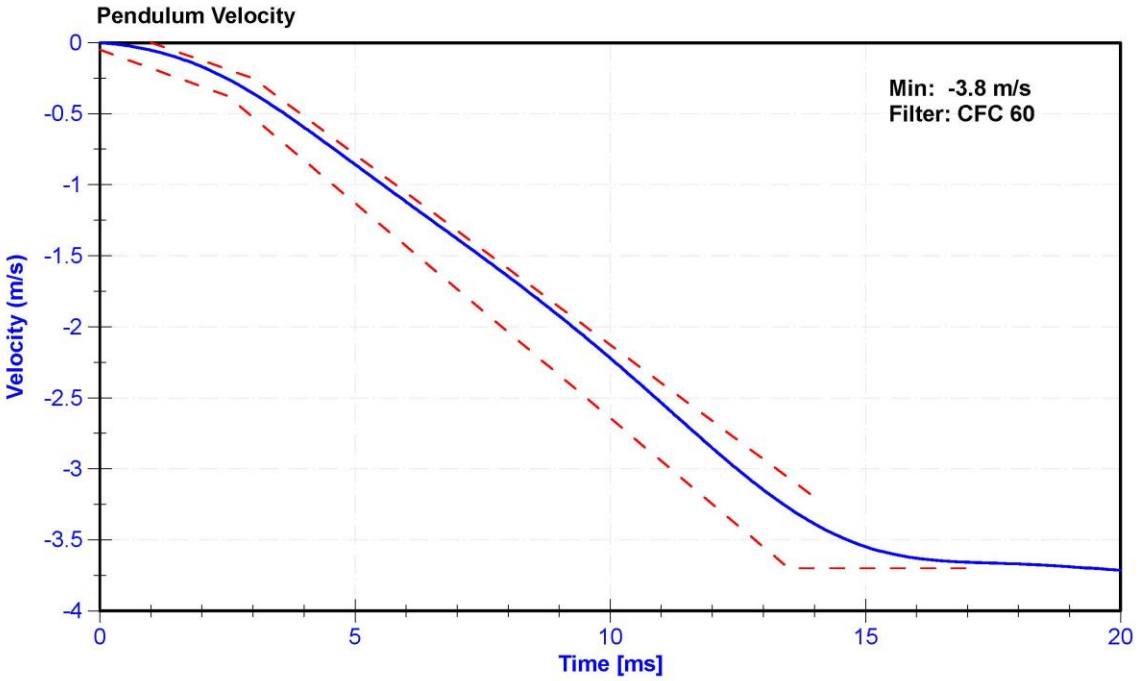
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

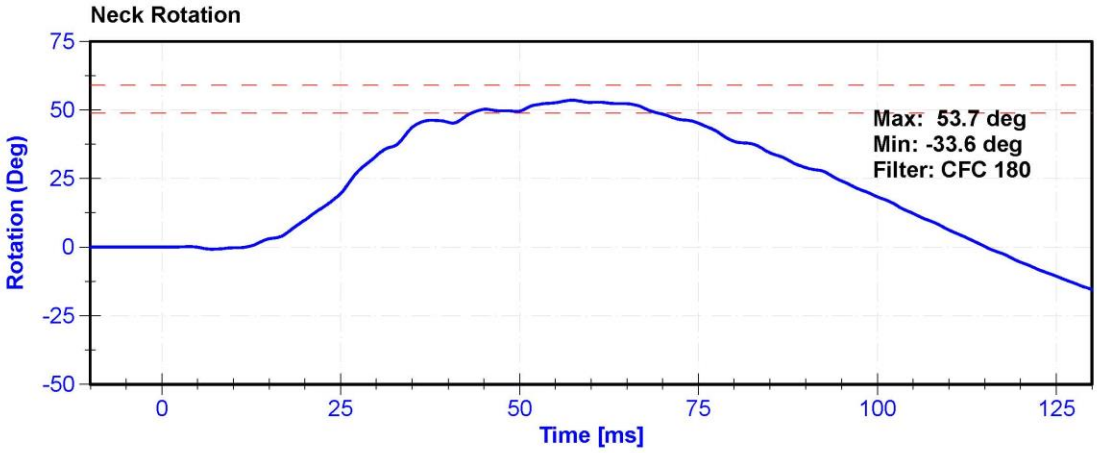
Results

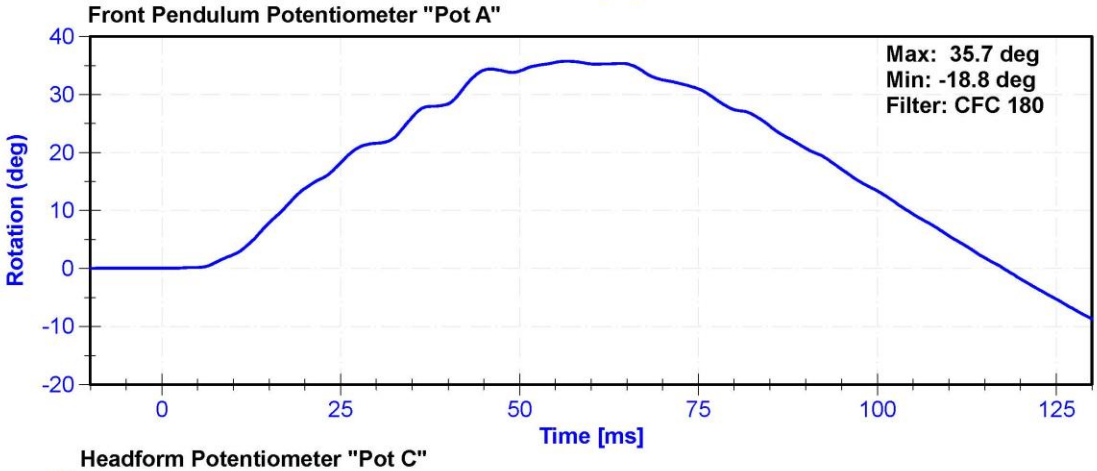
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	35.8	Pass
Velocity	3.3	3.5	m/s	3.40	Pass
Lateral Neck Rotation	49	59	deg	53.7	Pass
Time at Maximum Rotation	54	66	ms	57.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.9	Pass

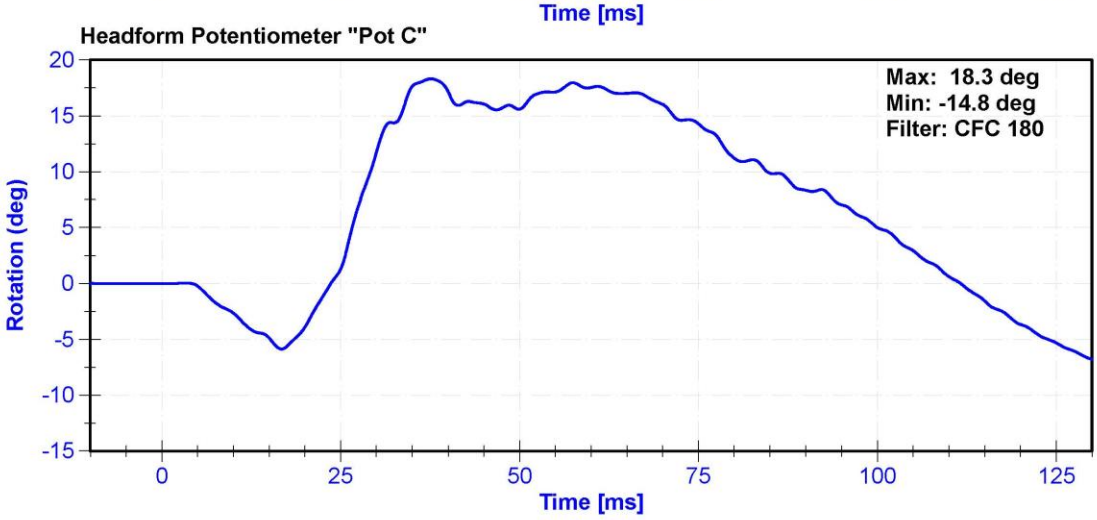
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CTAC-AH5M9 Pend		1/30/2020	1/29/2021
Front Pendulum Potentiometer	SP22G	DS-094	10/31/2019	10/30/2020
Headform Potentiometer	SP22G	DS-095	10/31/2019	10/30/2020




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 53.7 deg
Min: -33.6 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 35.7 deg
Min: -18.8 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 18.3 deg
Min: -14.8 deg
Filter: CFC 180

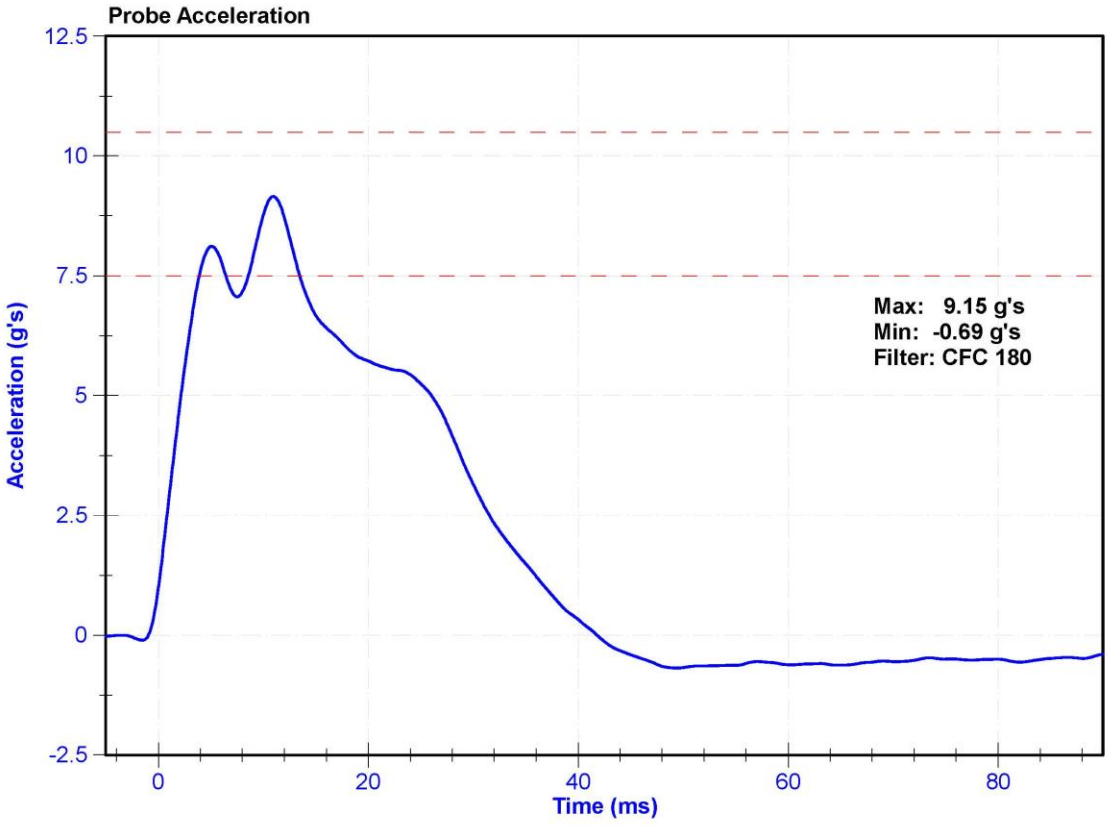
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	54.3	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	7.5	10.5	g's	9.15	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021



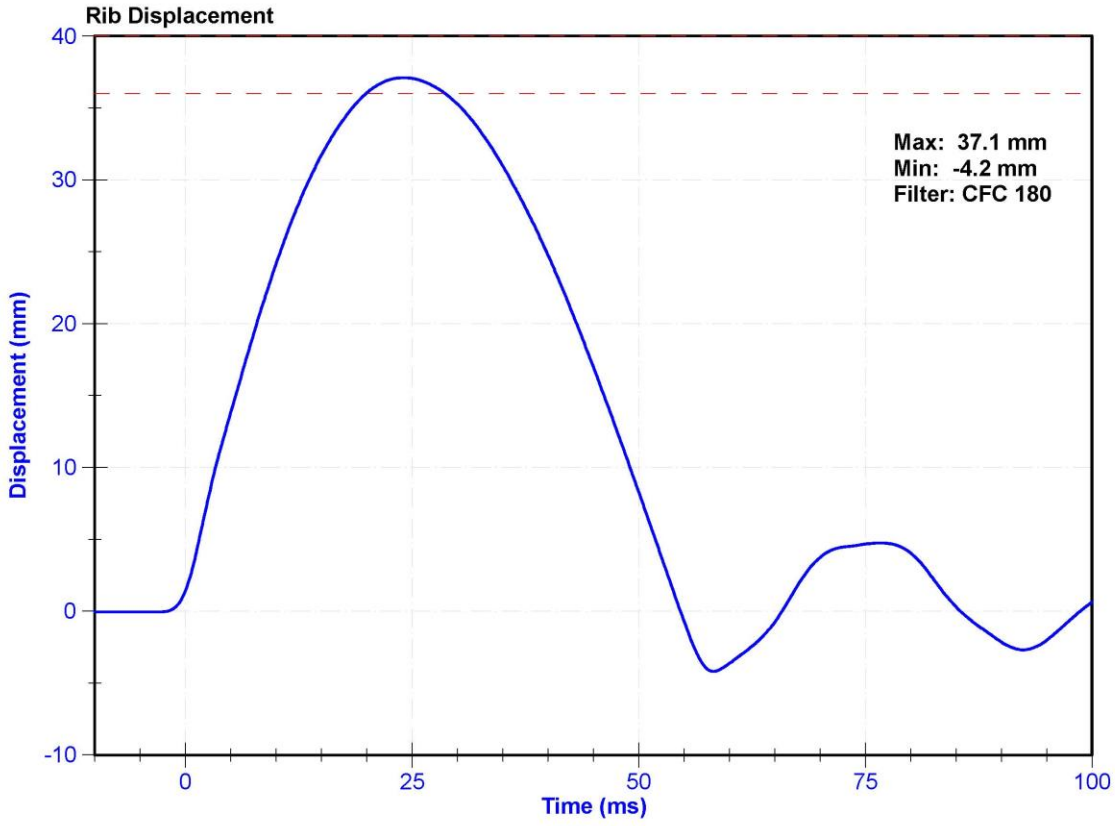
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	53.7	Pass
Rib Displacement	36	40	mm	37.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020



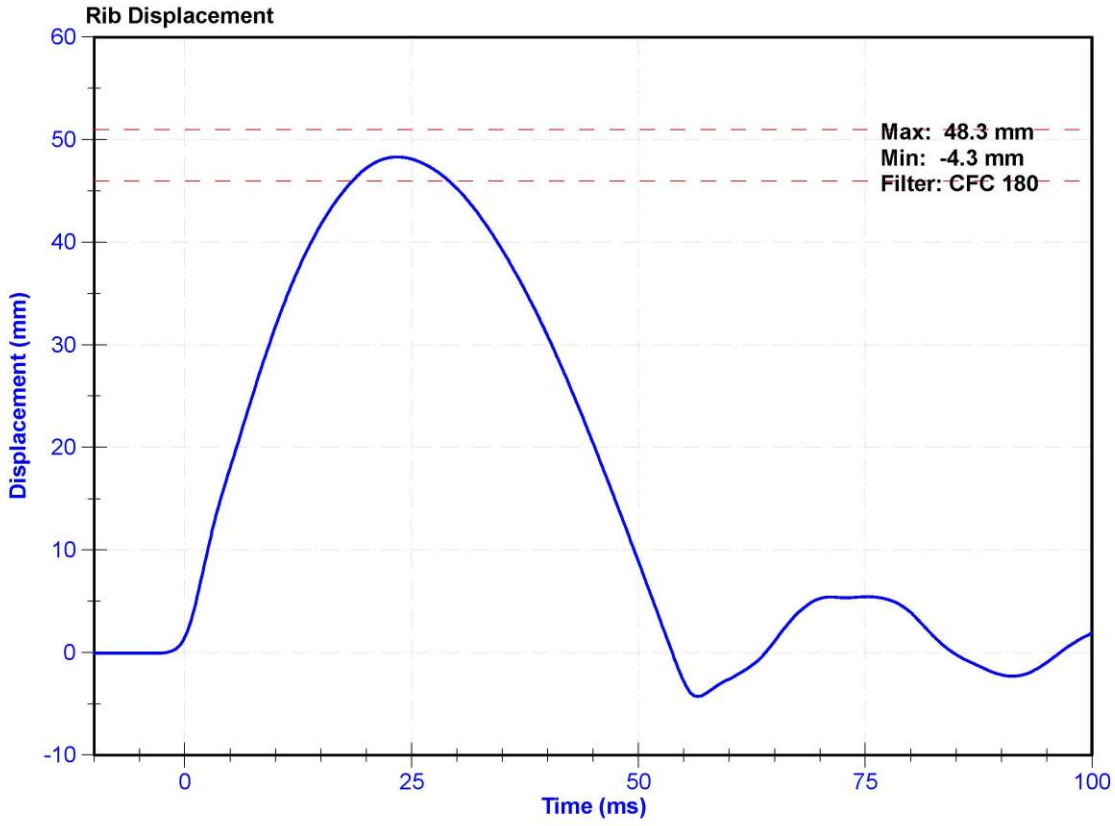
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	53.7	Pass
Rib Displacement	46	51	mm	48.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020



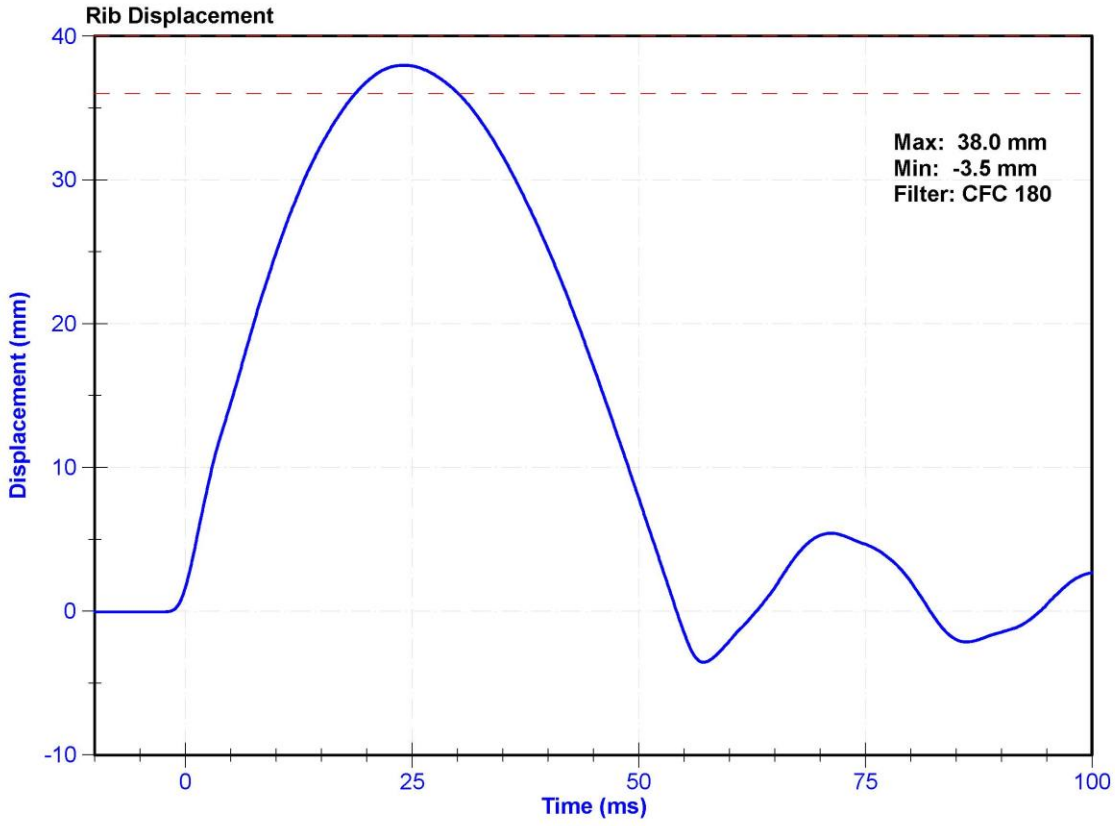
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	53.8	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020



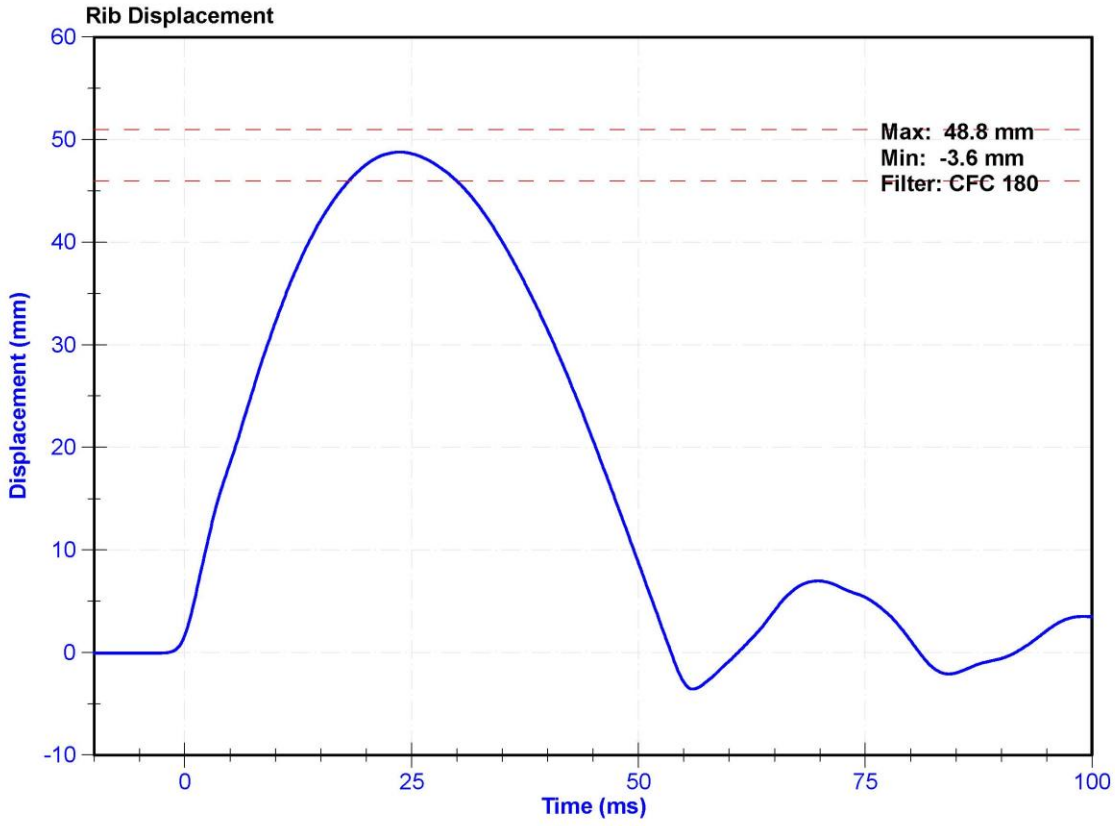
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	53.7	Pass
Rib Displacement	46	51	mm	48.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020



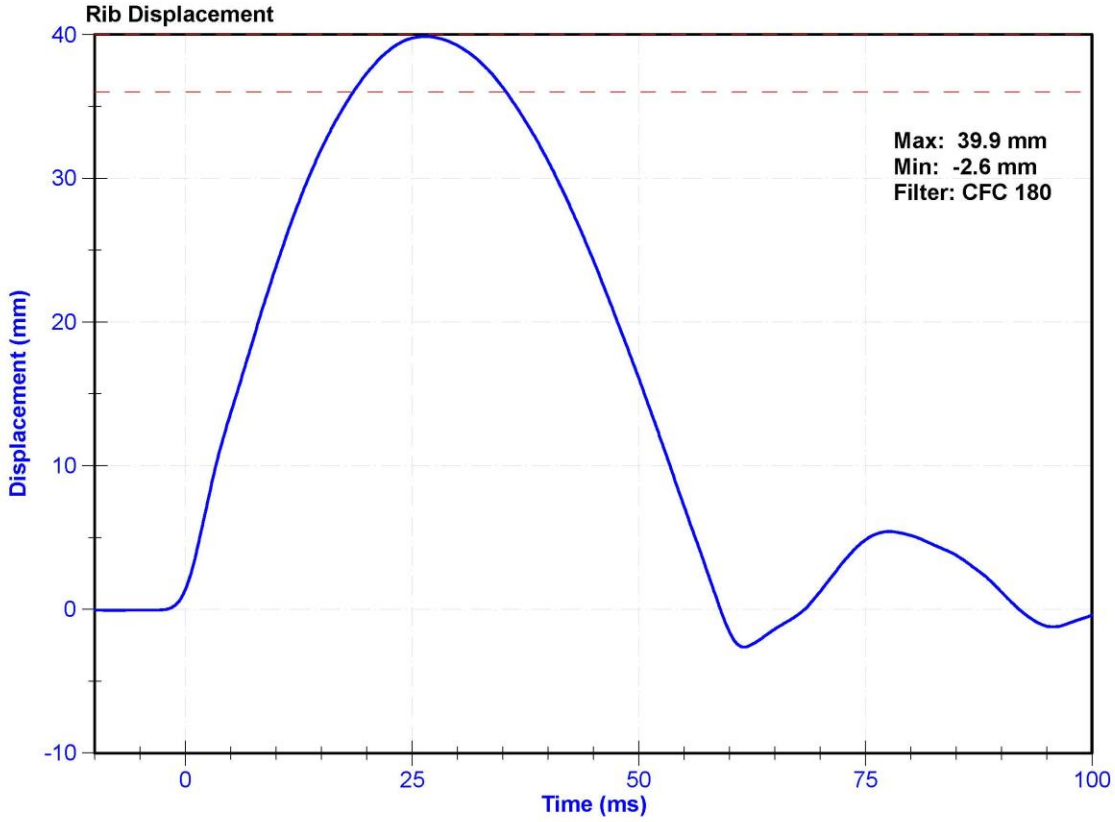
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.6	Pass
Humidity	10	70	%	53.6	Pass
Rib Displacement	36	40	mm	39.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020



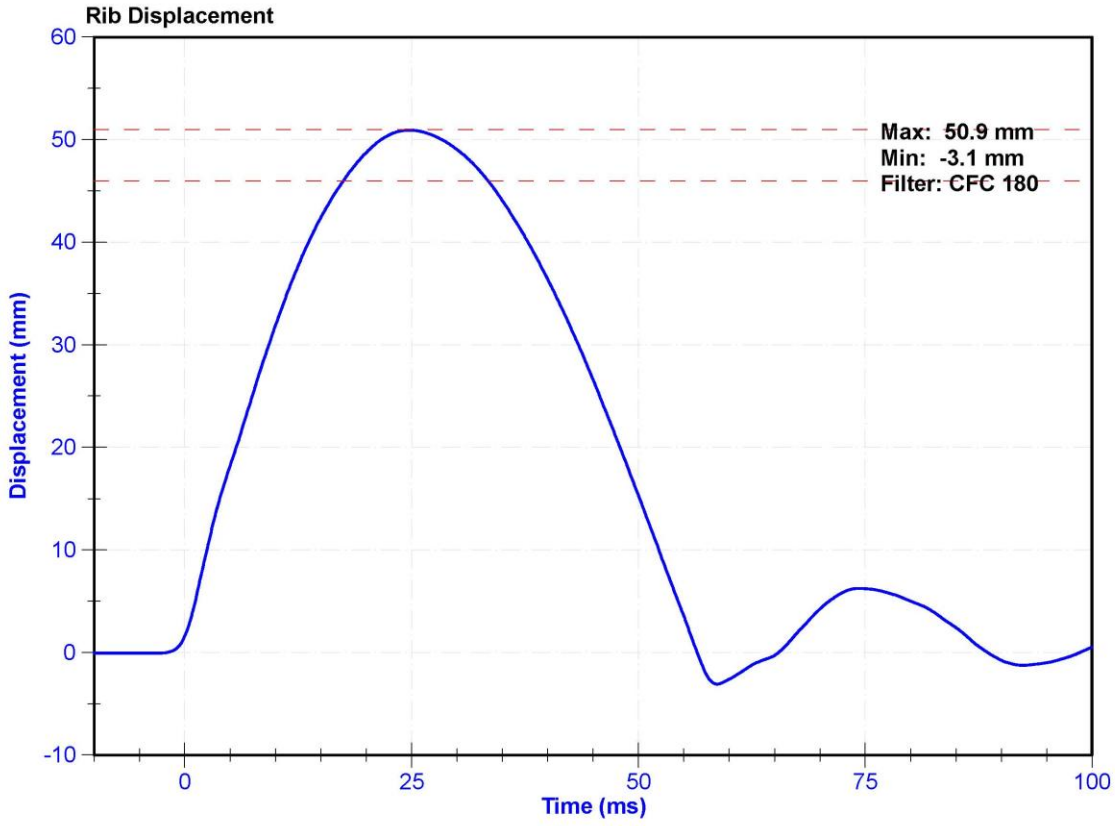
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	53.2	Pass
Rib Displacement	46	51	mm	50.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020



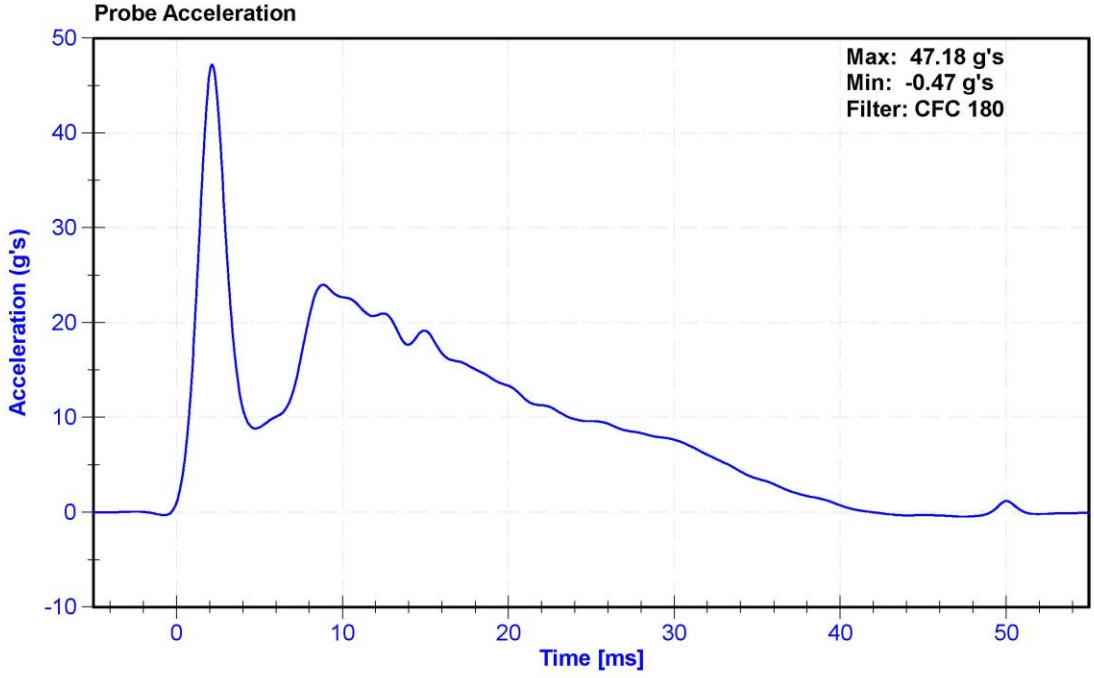
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

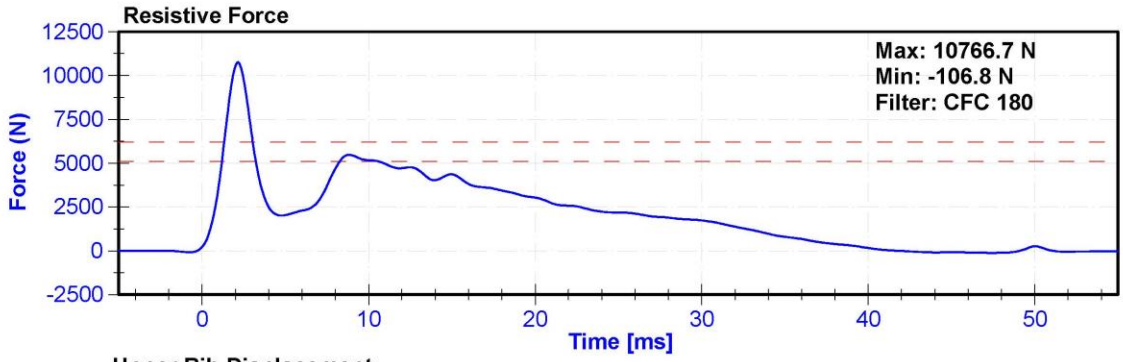
Results

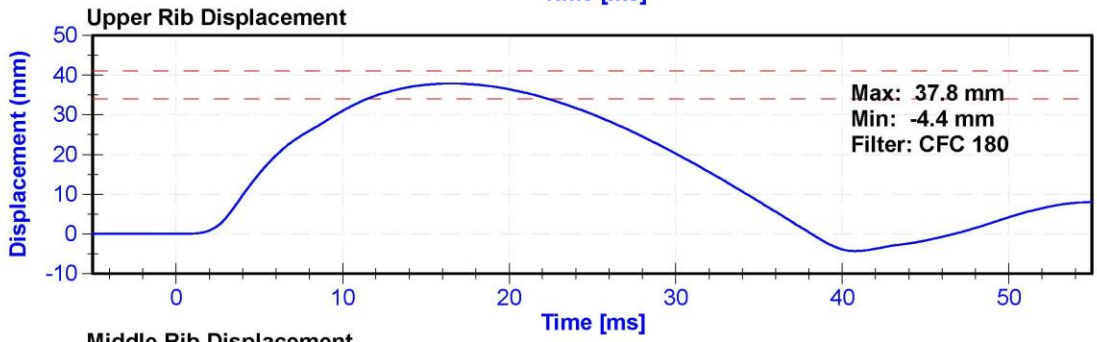
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	54.1	Pass
Velocity	5.4	5.6	m/s	5.42	Pass
Resistive Force after 6ms	5100	6200	N	5471.7	Pass
Upper Thorax Rib Deflection	34	41	mm	37.8	Pass
Mid Thorax Rib Deflection	37	45	mm	41.0	Pass
Lower Thorax Rib Deflection	37	44	mm	40.6	Pass

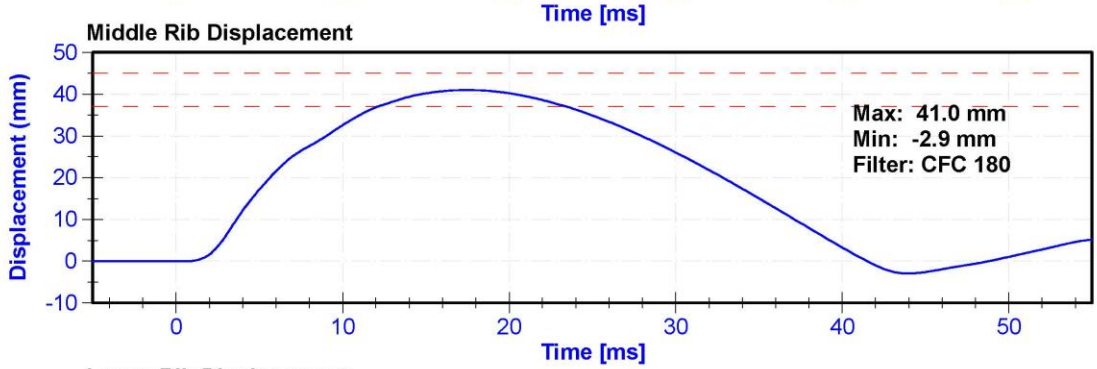
Transducer Calibrations

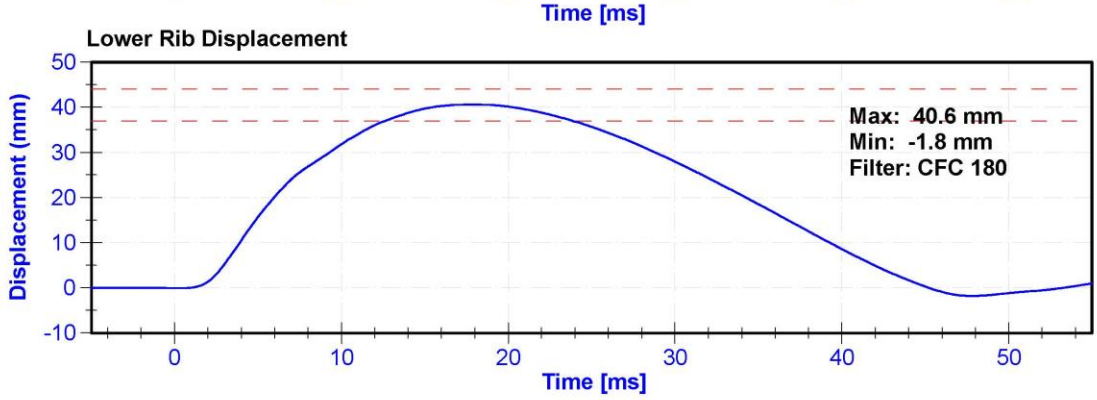
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	4/14/2020	10/13/2020
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	4/14/2020	10/13/2020
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	4/14/2020	10/13/2020




Resistive Force
Max: 10766.7 N
Min: -106.8 N
Filter: CFC 180
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]


Upper Rib Displacement
Max: 37.8 mm
Min: -4.4 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Middle Rib Displacement
Max: 41.0 mm
Min: -2.9 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Lower Rib Displacement
Max: 40.6 mm
Min: -1.8 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]

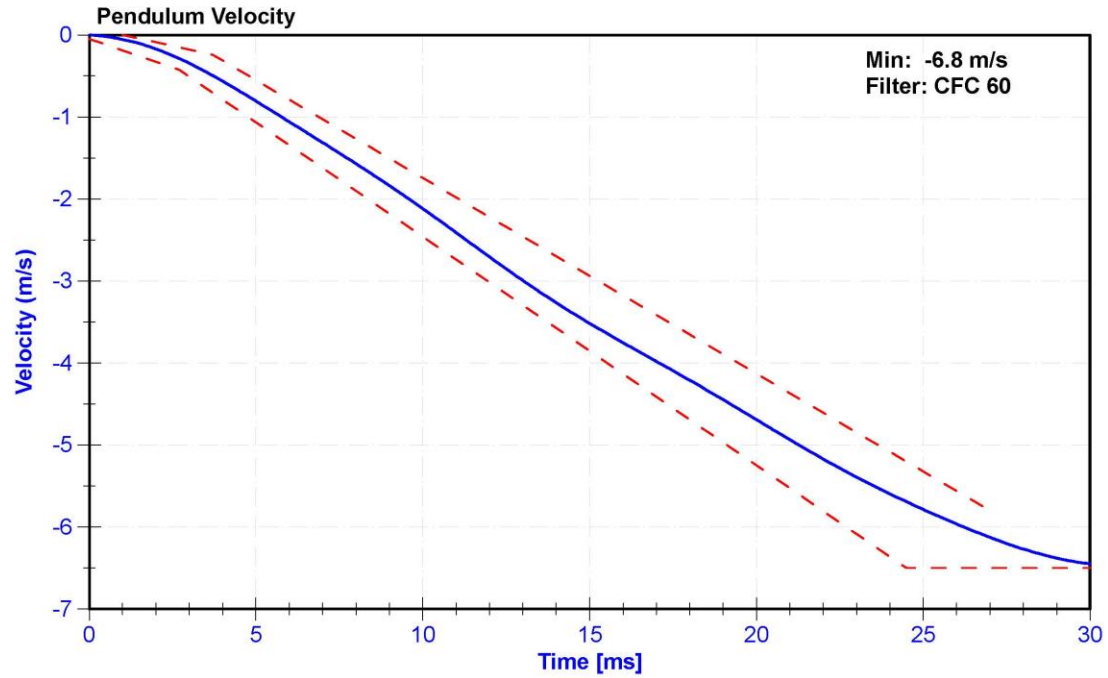
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

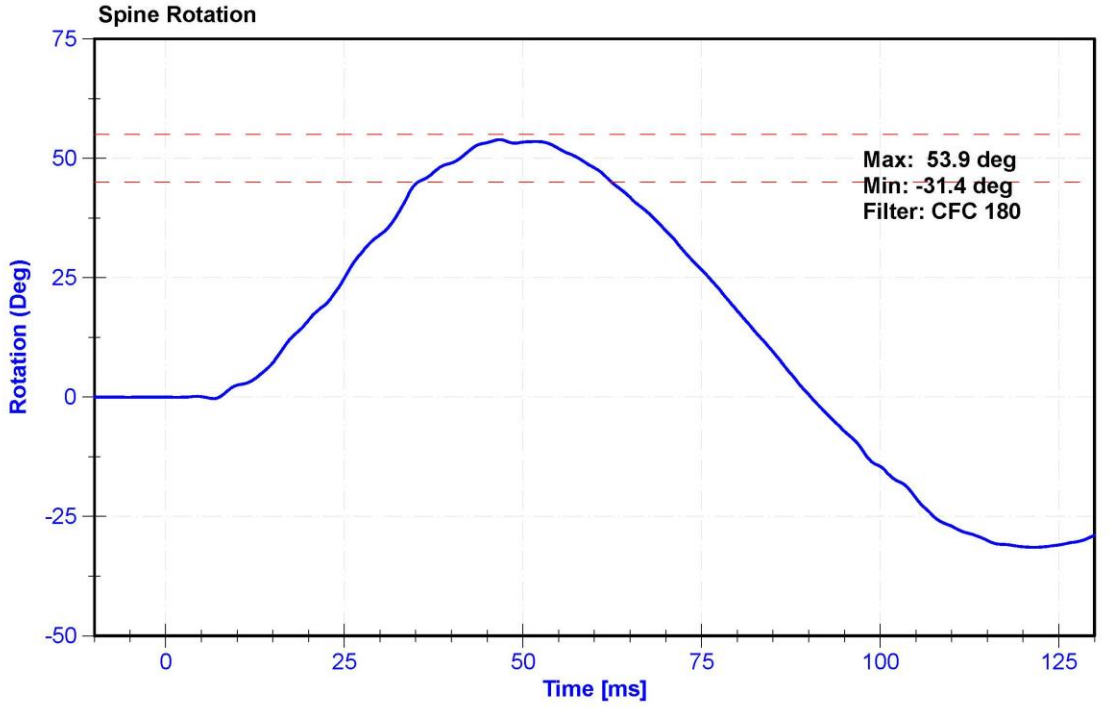
Results

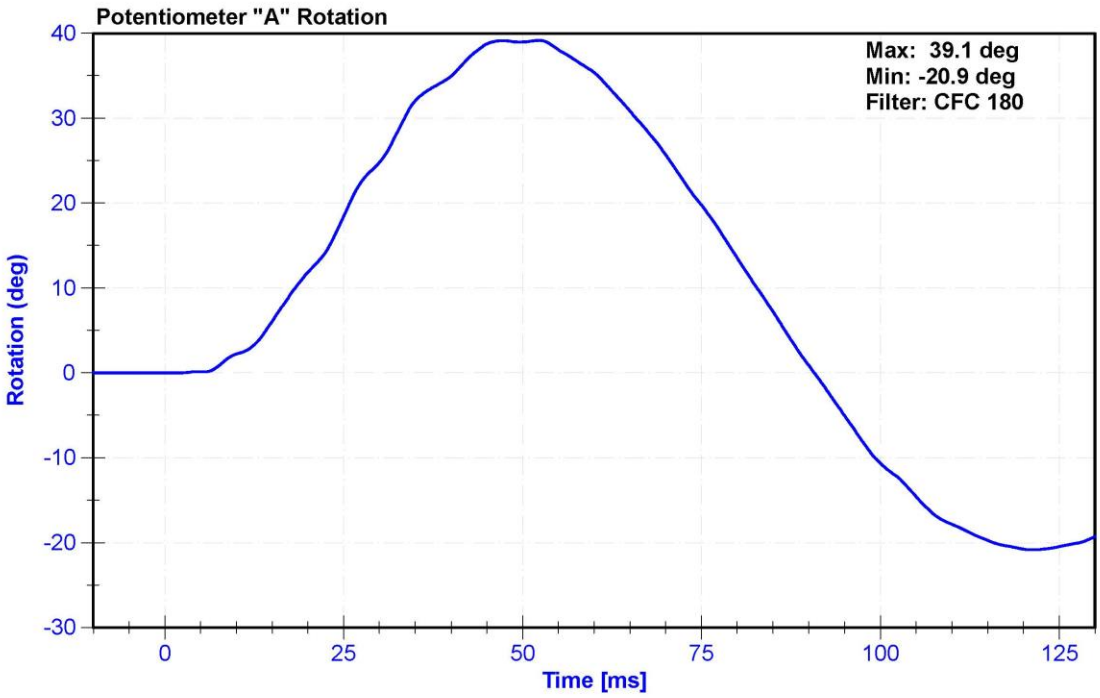
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.6	Pass
Humidity	10	70	%	36.4	Pass
Velocity	5.95	6.15	m/s	6.005	Pass
Lateral Spine Rotation	45	55	deg	53.9	Pass
Time at Maximum Rotation	39	53	ms	46.7	Pass
Time of Decay to Zero Degrees	37	57	ms	43.6	Pass
Pulse within Corridor?	-	-	-		

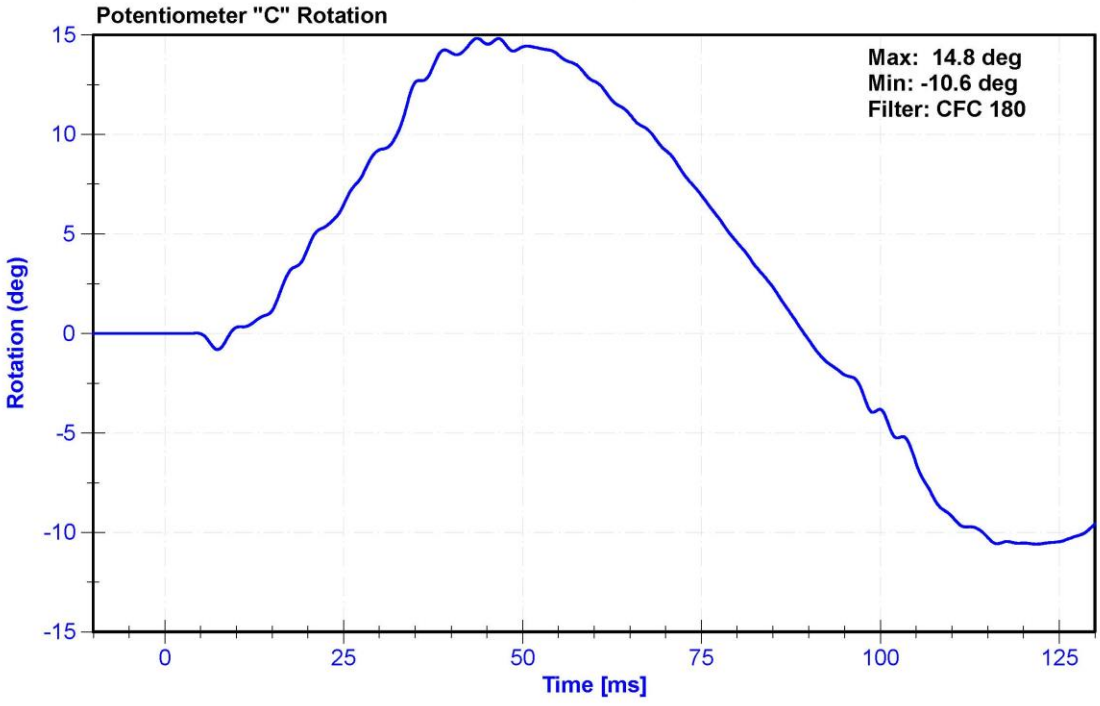
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum "A" Potentiometer	SP22G	DS-094	10/31/2019	10/30/2020
Condyle "B" Potentiometer	SP22G	DS-095	10/31/2019	10/30/2020


Pendulum Velocity
Min: -6.8 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 53.9 deg
Min: -31.4 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 39.1 deg
Min: -20.9 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
-30
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 14.8 deg
Min: -10.6 deg
Filter: CFC 180
Rotation (deg)
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]

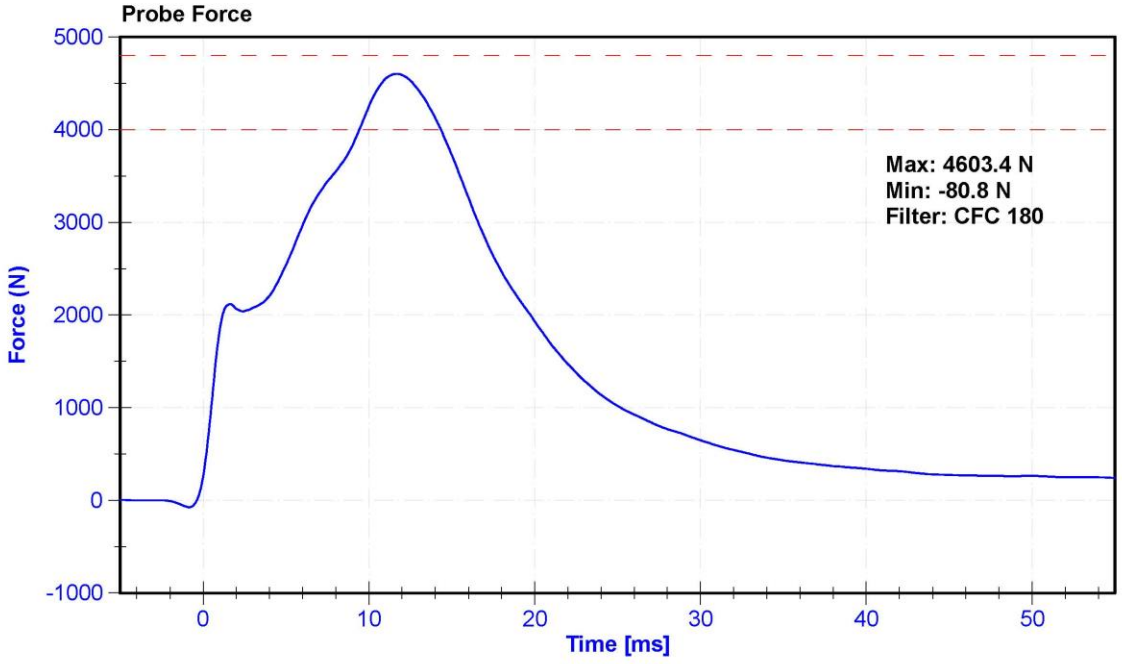
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K.Brogan

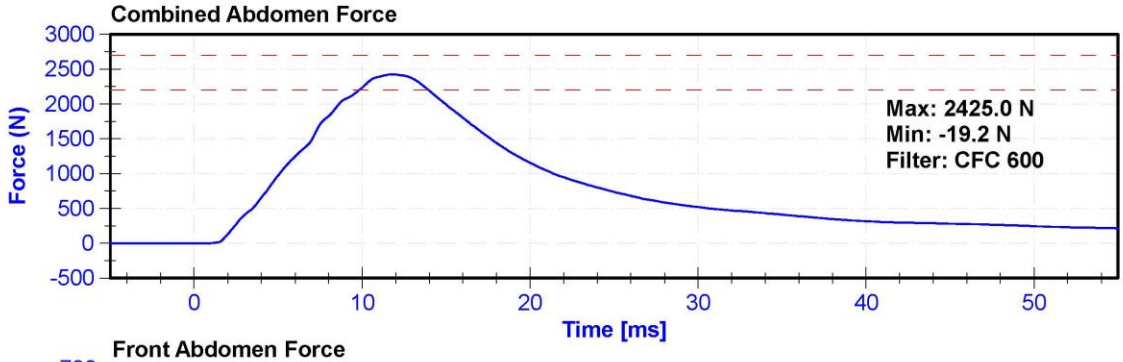
Results

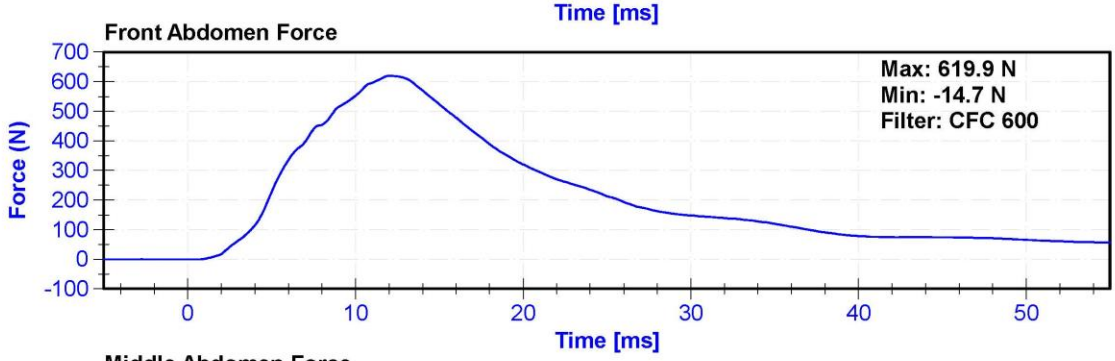
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	54.2	Pass
Velocity	3.9	4.1	m/s	4.10	Pass
Combined Abdomen Force	2200	2700	N	2425.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.80	Pass
Resistive Probe Force	4000	4800	N	4603.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.65	Pass

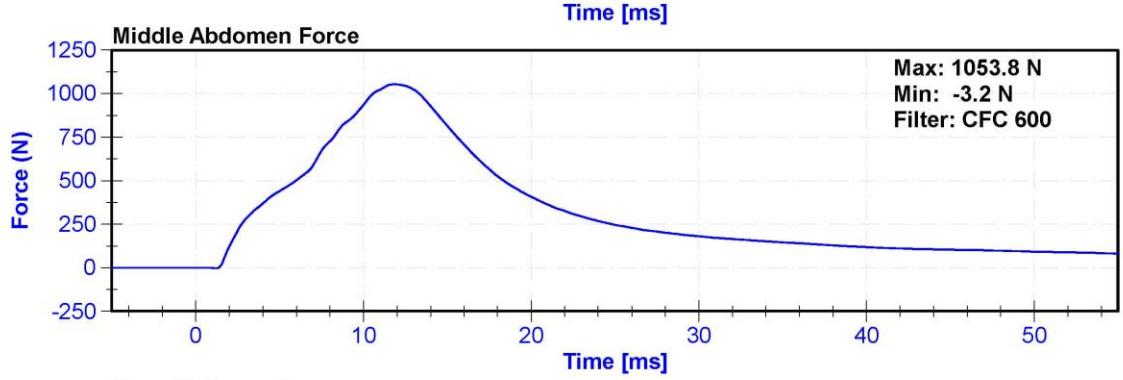
Transducer Calibrations

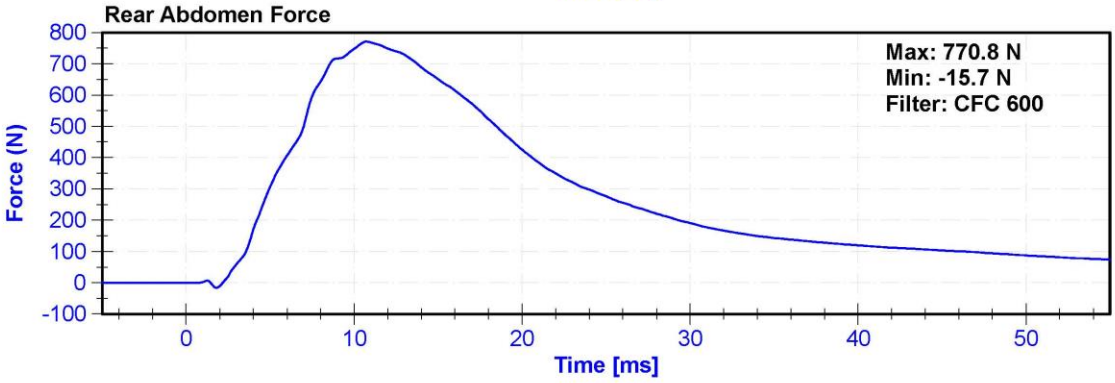
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Front Abdomen Load Cell	DENTON 2631	LC-1440	6/14/2019	6/13/2020
Middle Abdomen Load Cell	DENTON 2631	LC-1525	6/5/2019	6/4/2020
Rear Abdomen Load Cell	DENTON 2631	LC-1528	6/14/2019	6/13/2020




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2425.0 N
Min: -19.2 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 619.9 N
Min: -14.7 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1053.8 N
Min: -3.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 770.8 N
Min: -15.7 N
Filter: CFC 600

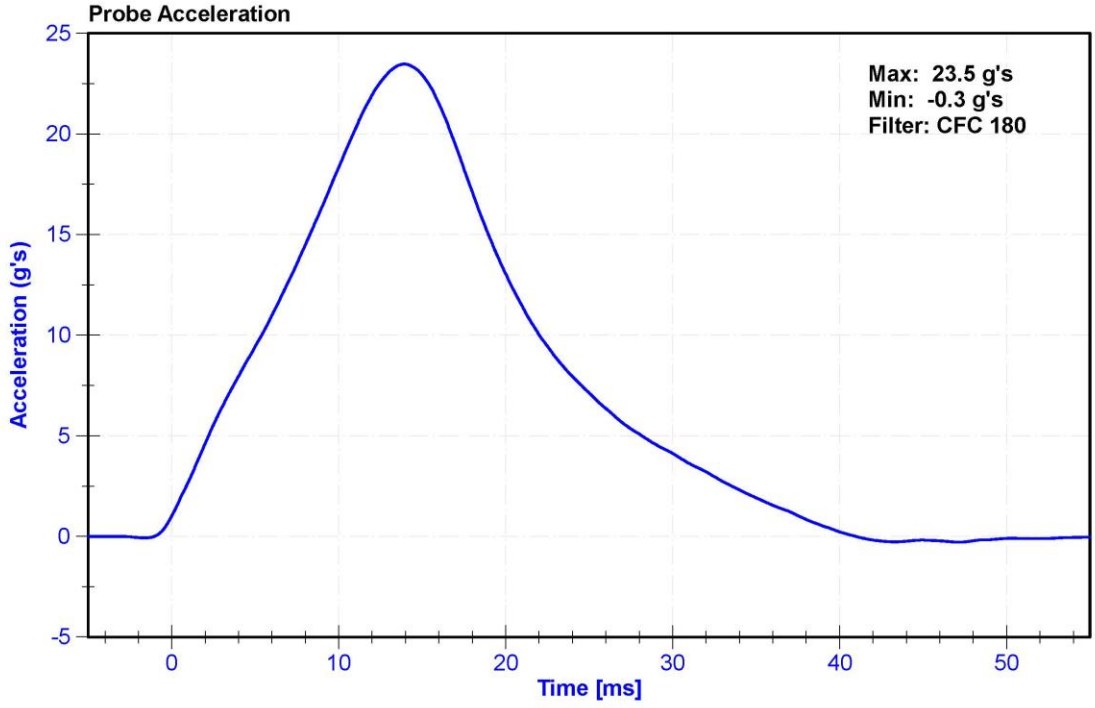
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

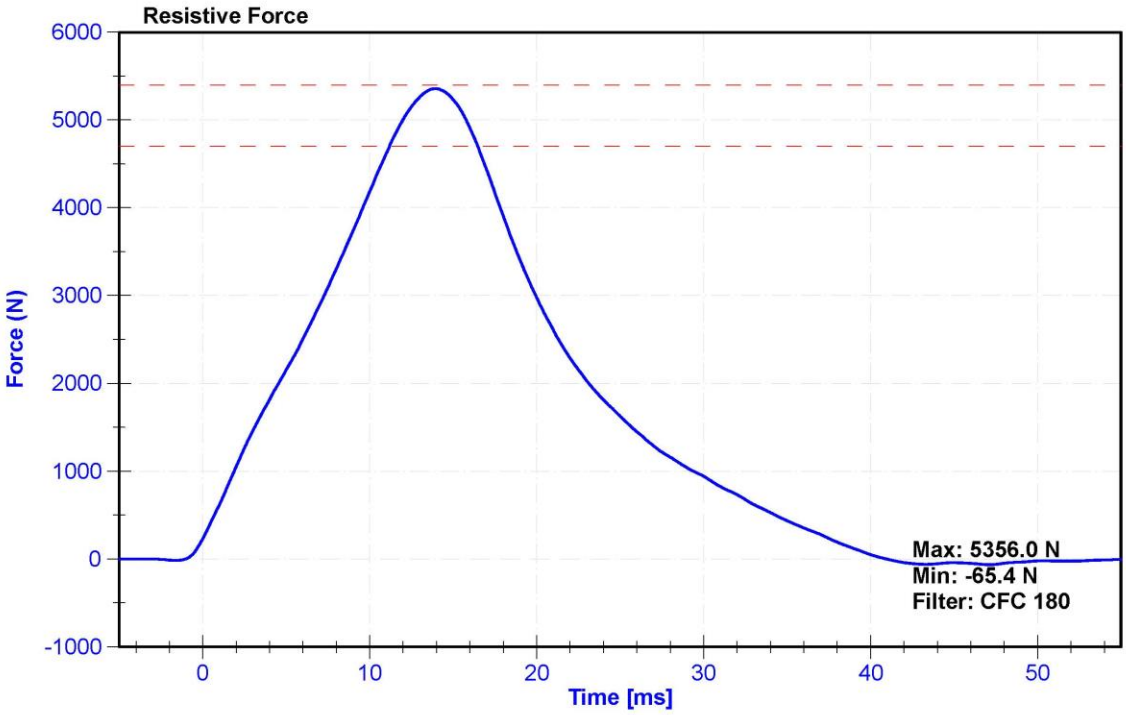
Results

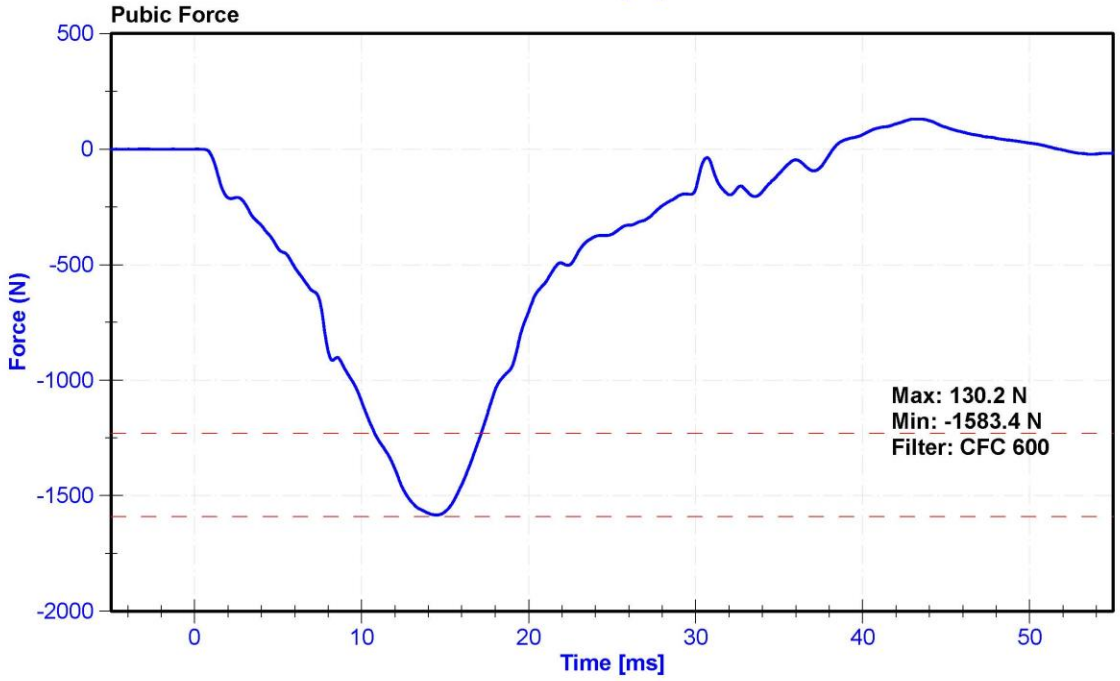
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.6	Pass
Humidity	10	70	%	53.4	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	5356.0	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.90	Pass
Pubic Force	-1590	-1230	N	-1583.4	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.50	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A279031	5/8/2020	5/8/2021
Pubic Load Cell	Denton 3096JFL	LC-464fy	6/14/2019	6/13/2020




Resistive Force
Force (N)
Time [ms]
Max: 5356.0 N
Min: -65.4 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 130.2 N
Min: -1583.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

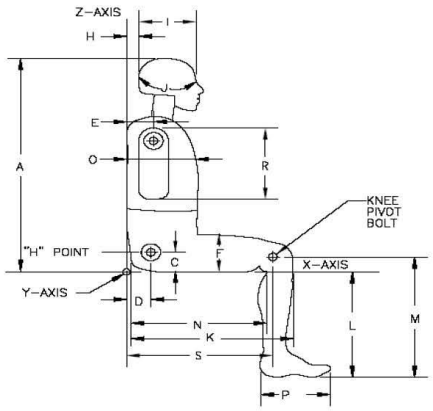
SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

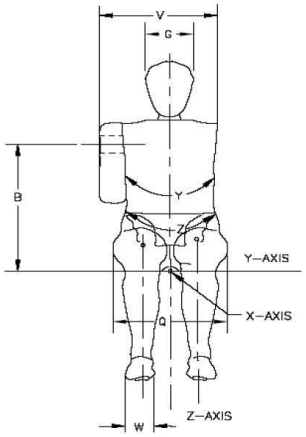
SERIAL No: 300

External Measurements - SID-IIs

Technician: K. Dutton Date: 05/19/2020

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	450	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	186	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	772	Pass

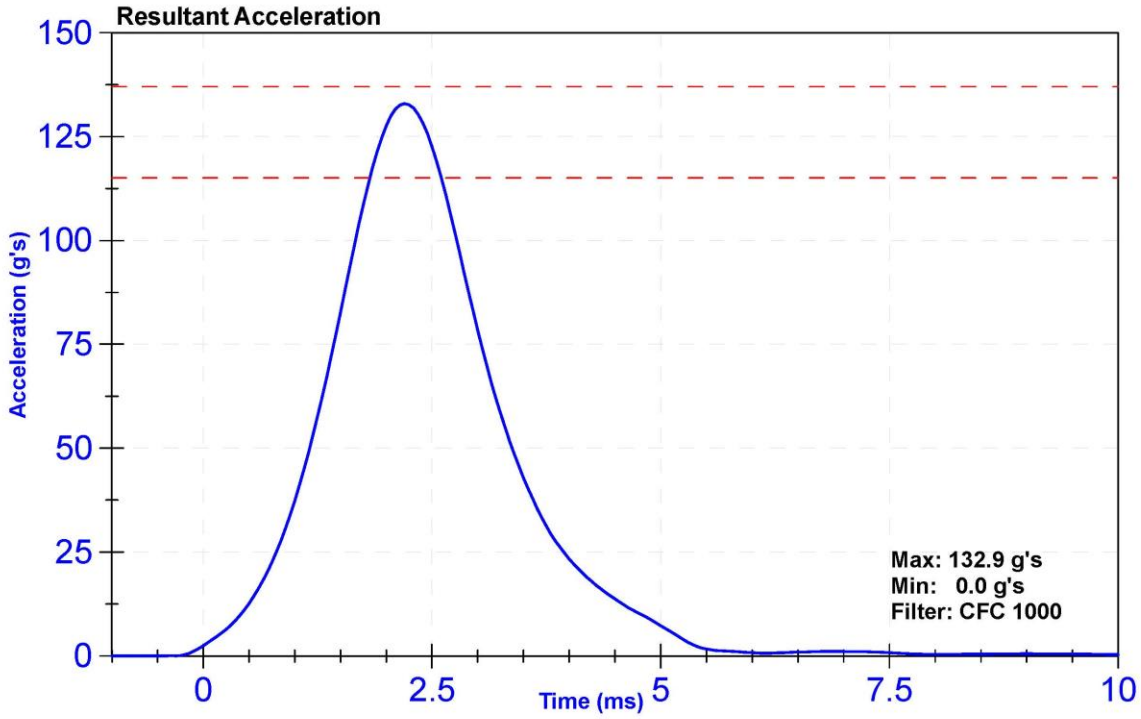
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

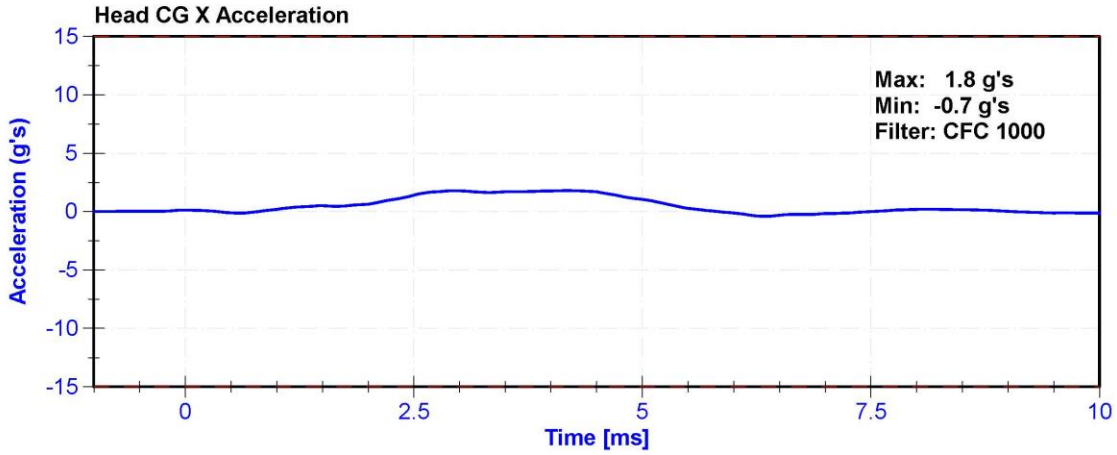
Results

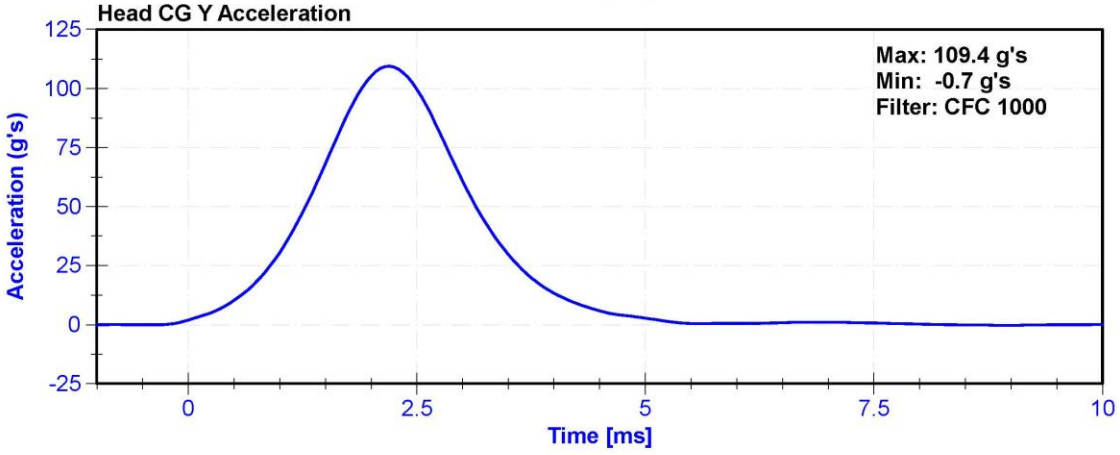
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	53.2	Pass
Resultant Acceleration	115	137	g's	132.9	Pass
Oscillation	0	15	%	0.8	Pass
Fore-Aft Acceleration	-15	15	g's	1.8	Pass

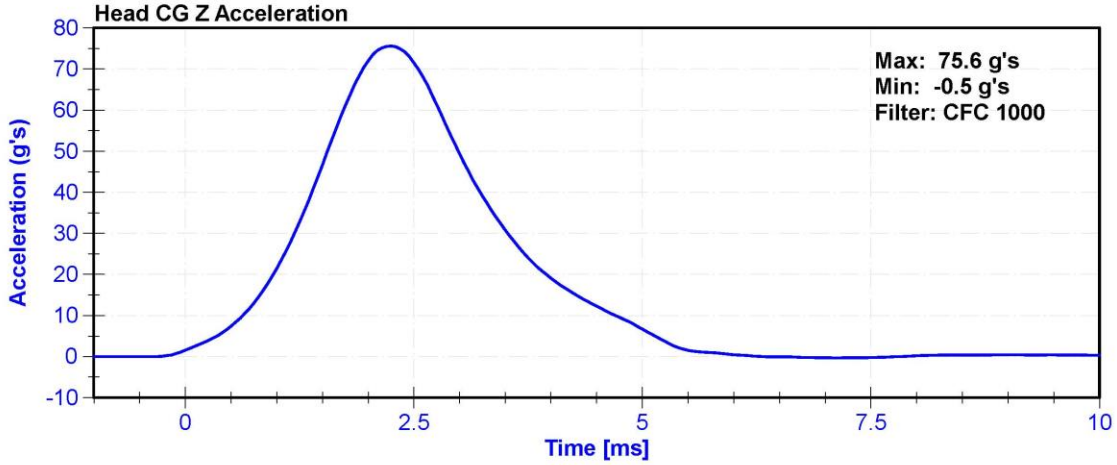
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	4/20/2020	10/19/2020
Y Accelerometer	ENDEVCO 7264	AC-P79189	4/20/2020	10/19/2020
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	4/20/2020	10/19/2020




Head CG X Acceleration
Max: 1.8 g's
Min: -0.7 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 109.4 g's
Min: -0.7 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 75.6 g's
Min: -0.5 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

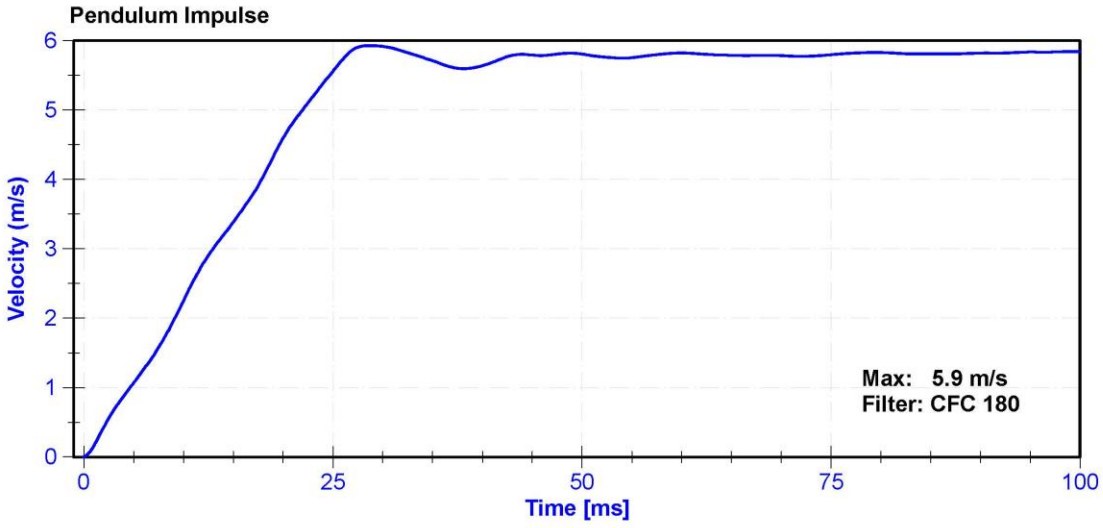
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

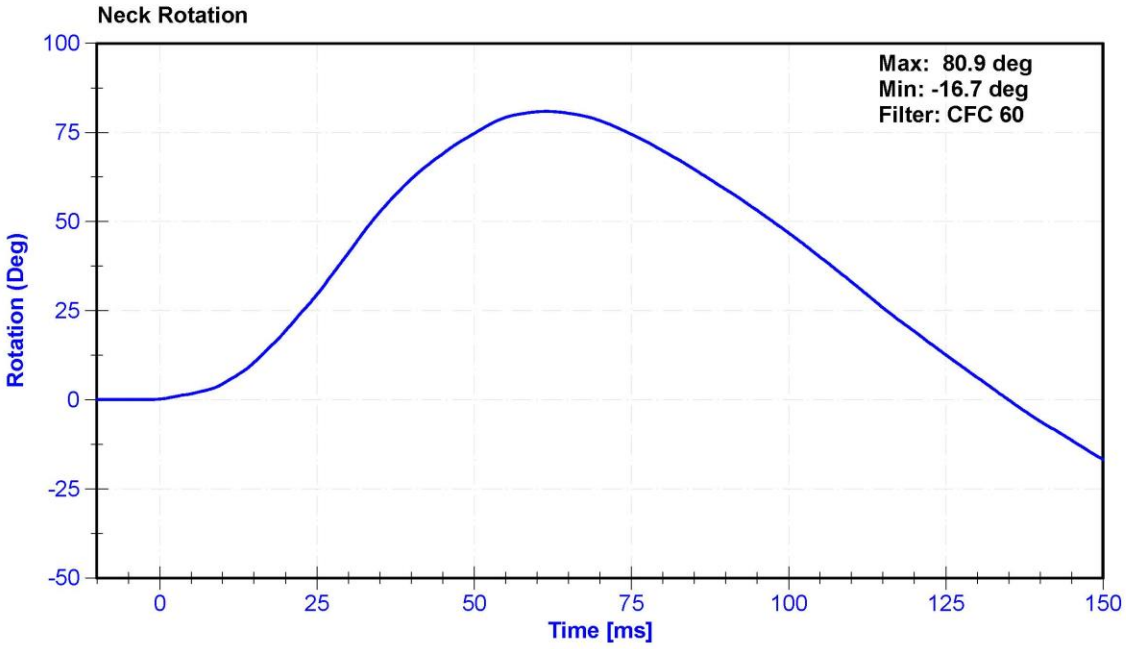
Results

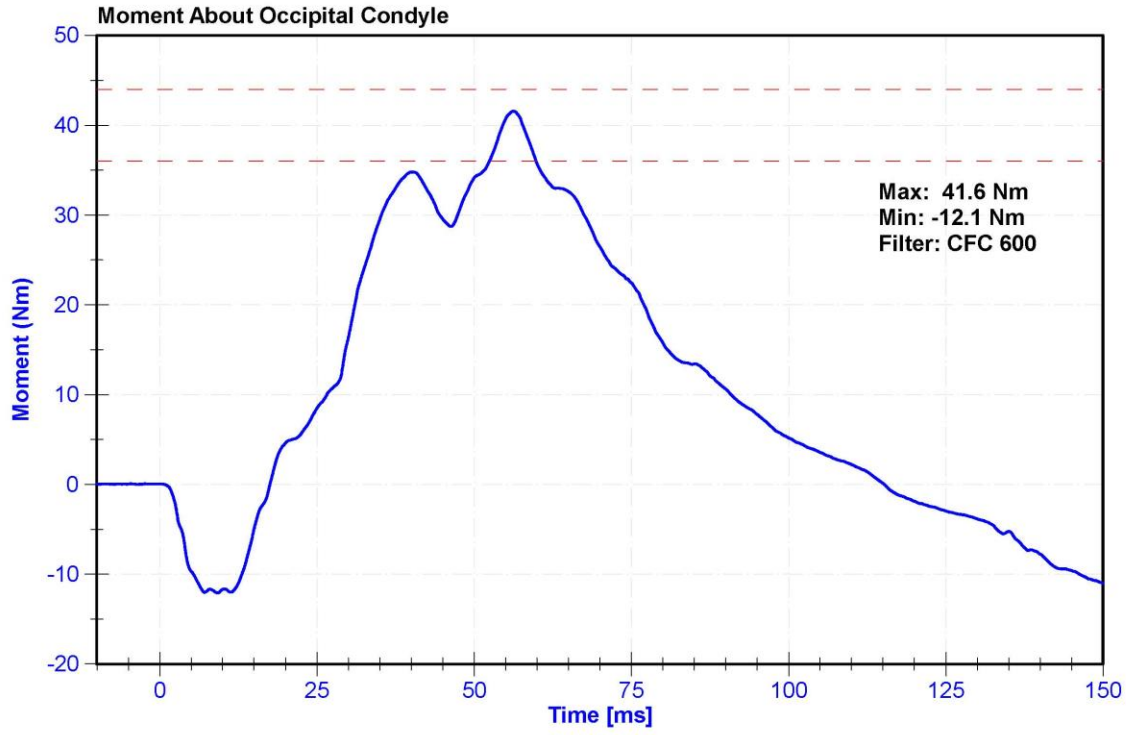
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	52.7	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.25	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.38	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.59	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.56	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.92	Pass
Neck Rotation	71	81	deg	80.9	Pass
Time at Maximum Rotation	50	70	ms	61.5	Pass
Moment about the OC	36	44	Nm	41.6	Pass
Moment Decay to 0 Nm	102	126	ms	115.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/4/2019	11/3/2020
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/4/2019	11/3/2020
Upper Neck Load Cell	Denton 1716A	LC-2192Fy	6/20/2019	6/19/2020




Neck Rotation
Max: 80.9 deg
Min: -16.7 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 41.6 Nm
Min: -12.1 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

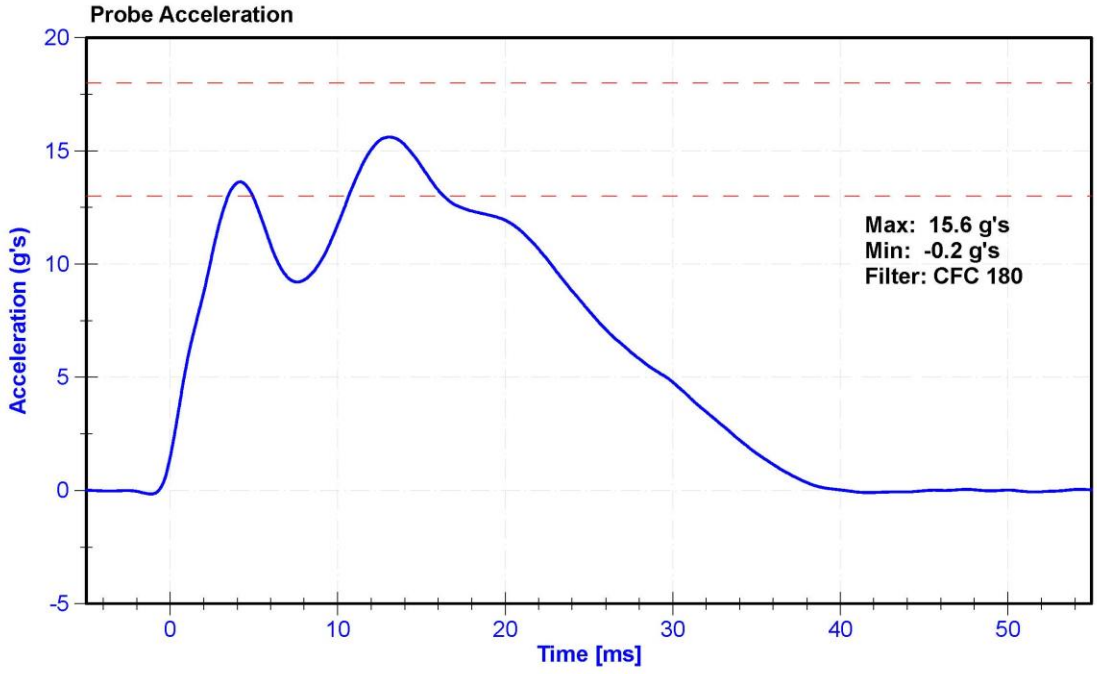
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

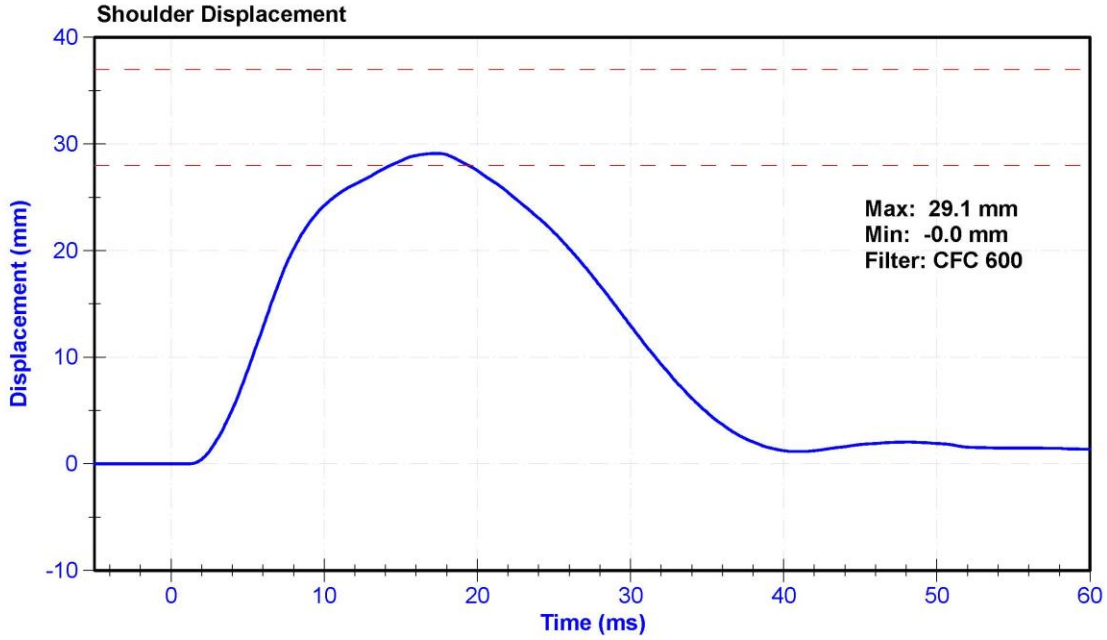
Results

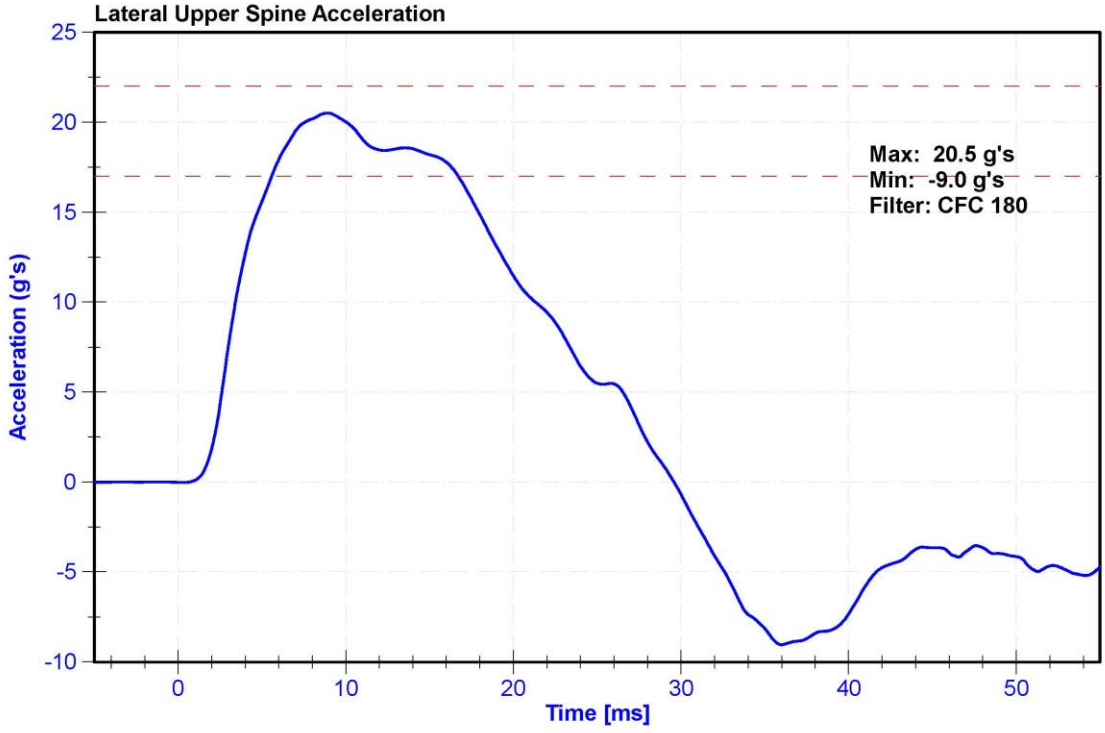
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	29.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.1 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.5 g's
Min: -9.0 g's
Filter: CFC 180

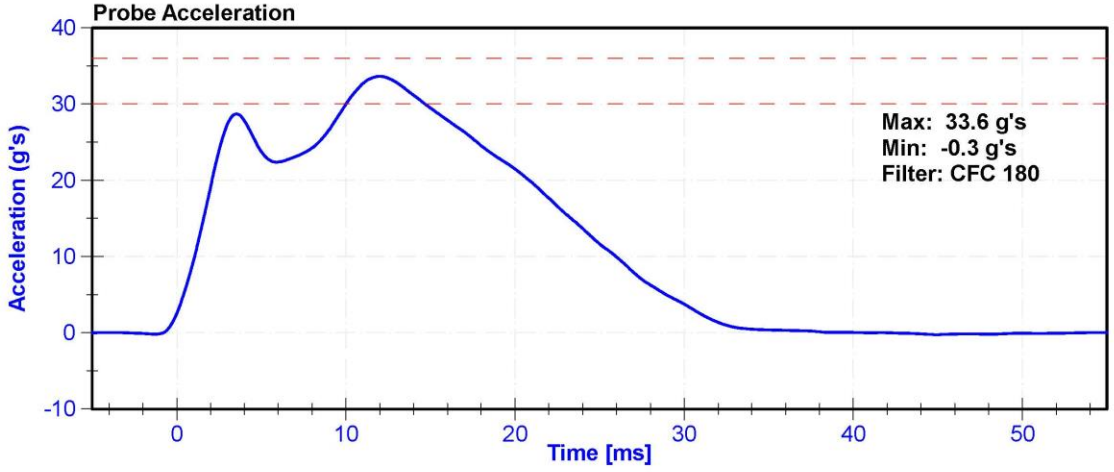
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

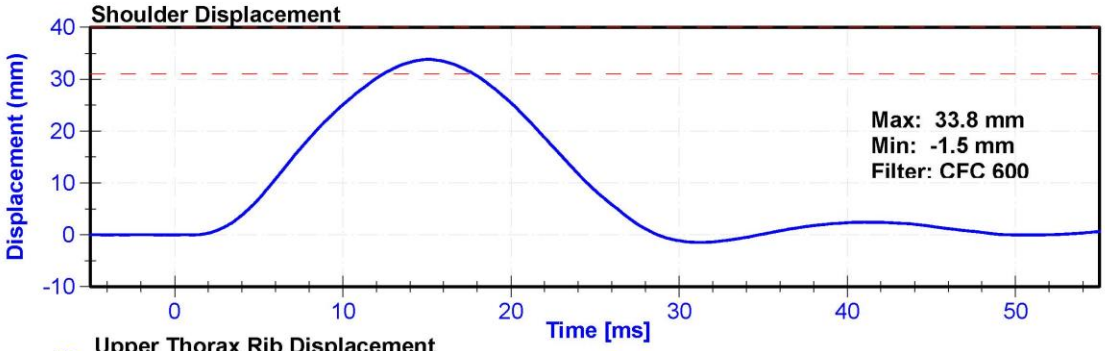
Results

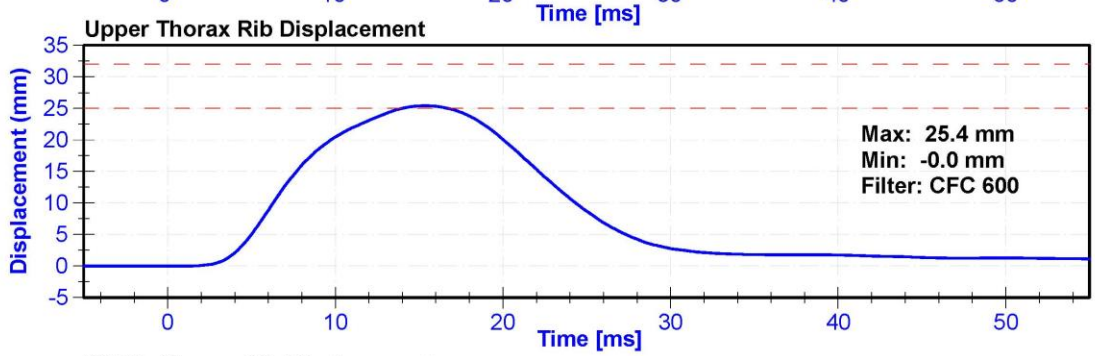
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	34.0	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	40.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.8	Pass
Shoulder Deflection	31	40	mm	33.8	Pass
Upper Thorax Rib Deflection	25	32	mm	25.4	Pass
Mid Thorax Rib Deflection	30	36	mm	30.4	Pass
Lower Thorax Rib Deflection	32	38	mm	32.2	Pass

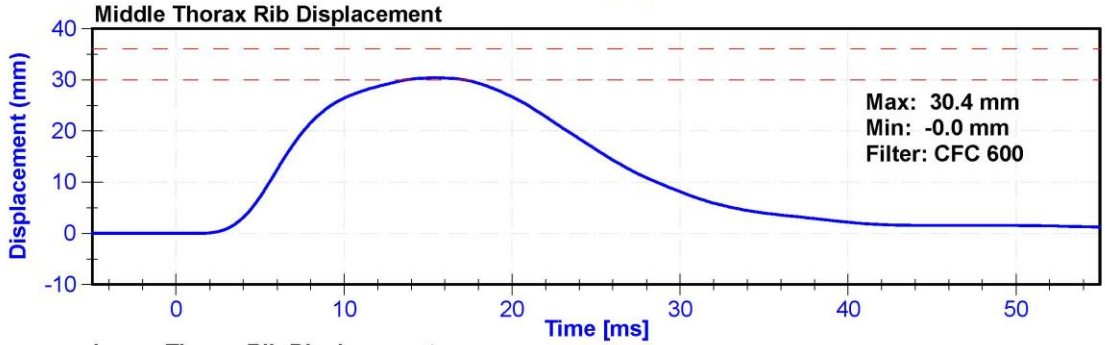
Transducer Calibrations

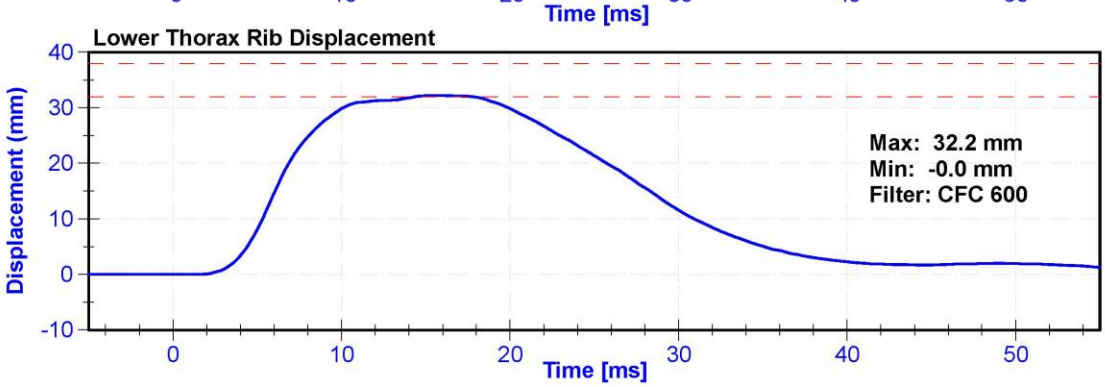
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020

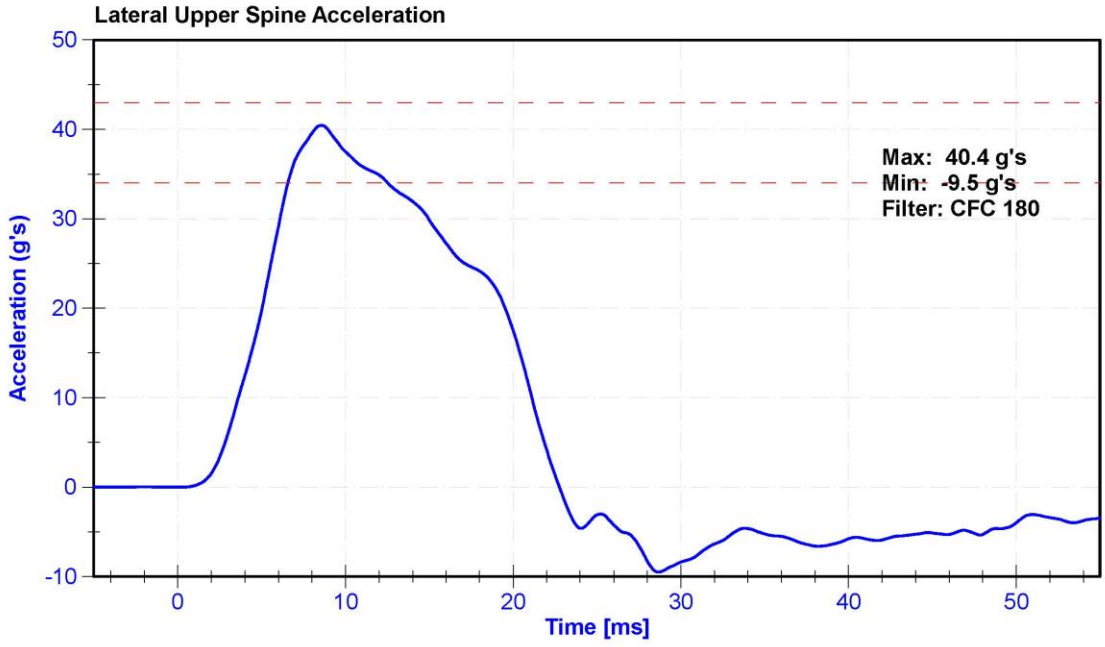


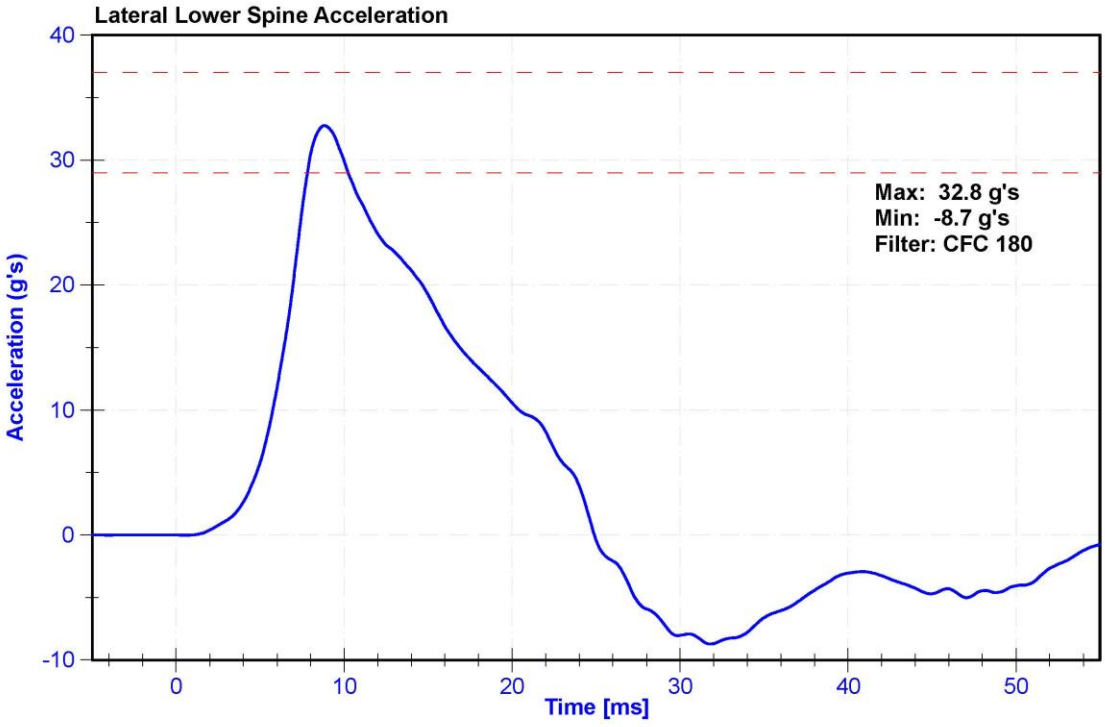

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.8 mm
Min: -1.5 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 25.4 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.4 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 40.4 g's
Min: -9.5 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 32.8 g's
Min: -8.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

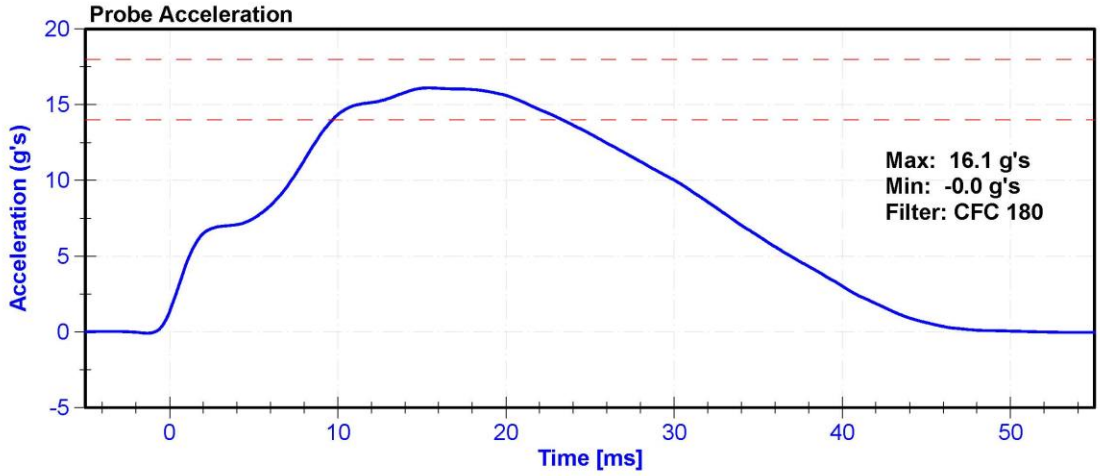
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

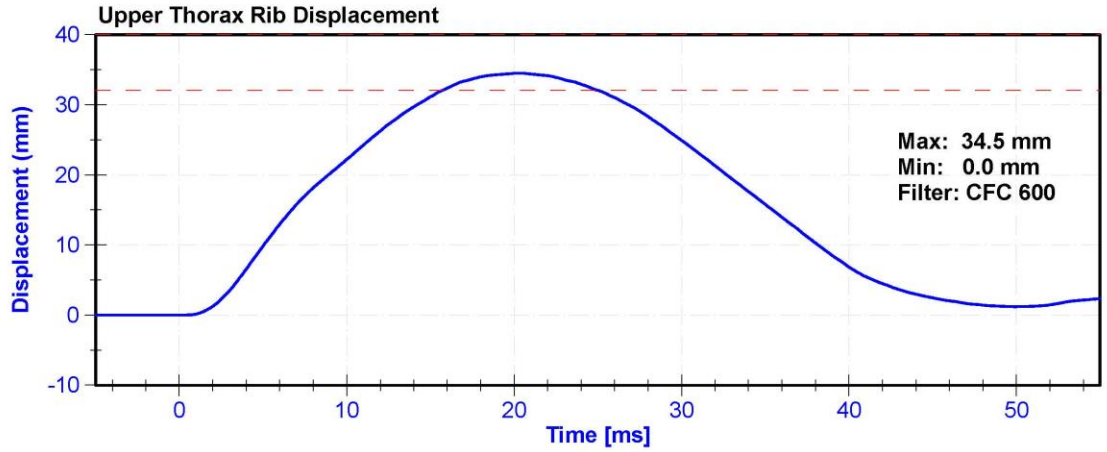
Results

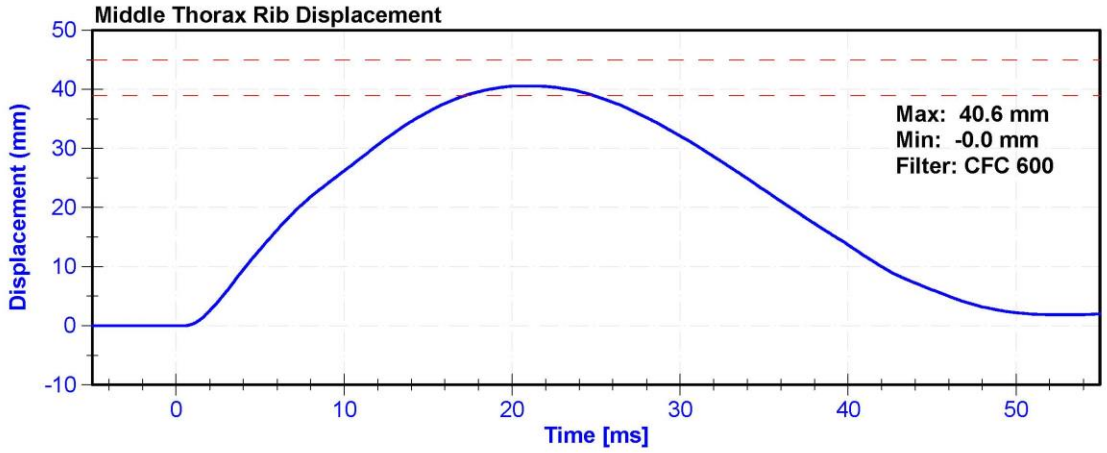
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	35.7	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.0	Pass
Upper Thorax Rib Deflection	32	40	mm	34.5	Pass
Middle Thorax Rib Deflection	39	45	mm	40.6	Pass
Lower Thorax Rib Deflection	35	43	mm	37.9	Pass

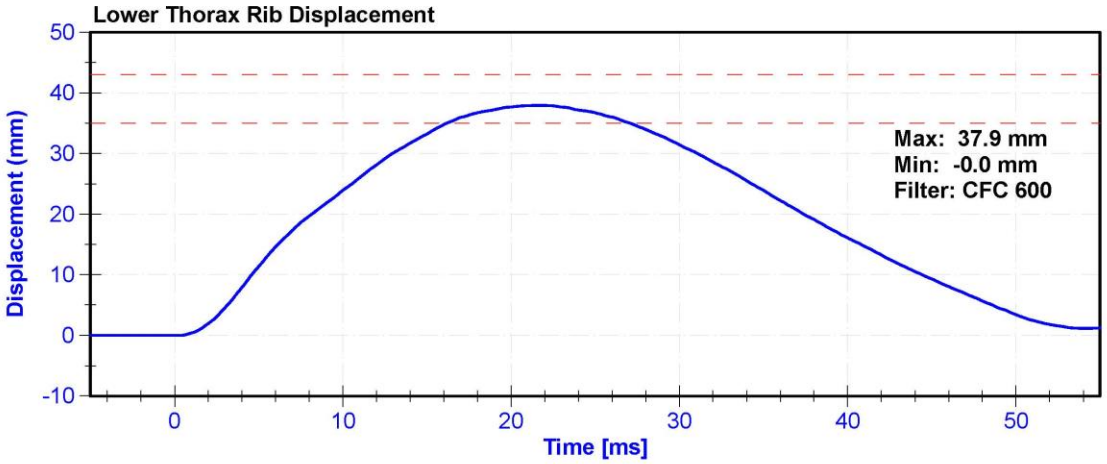
Transducer Calibrations

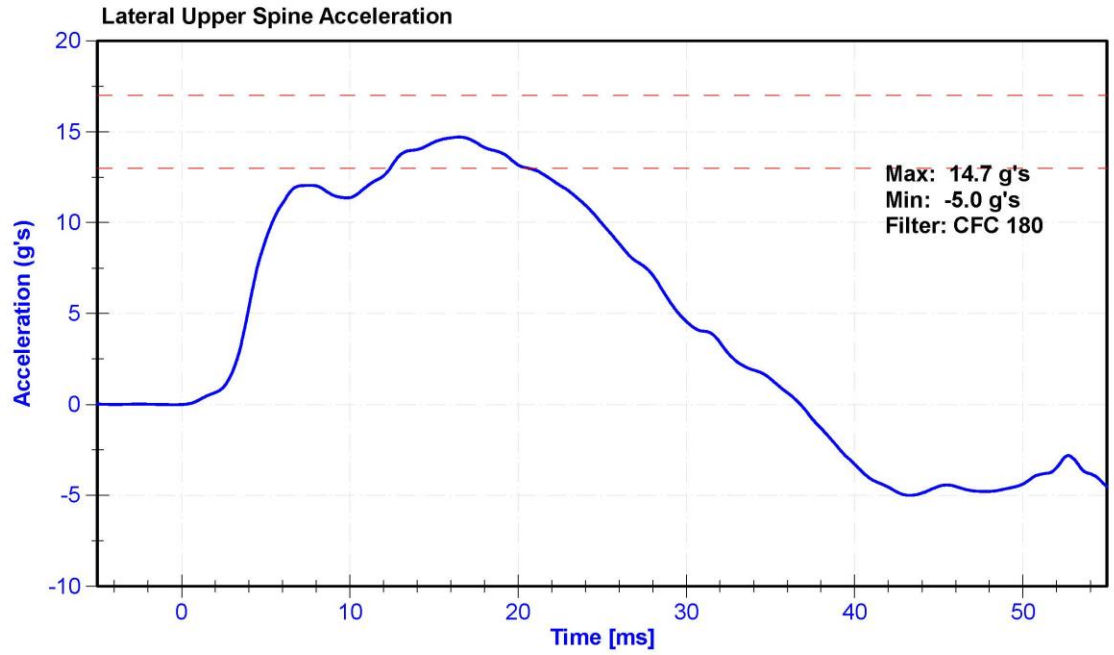
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020

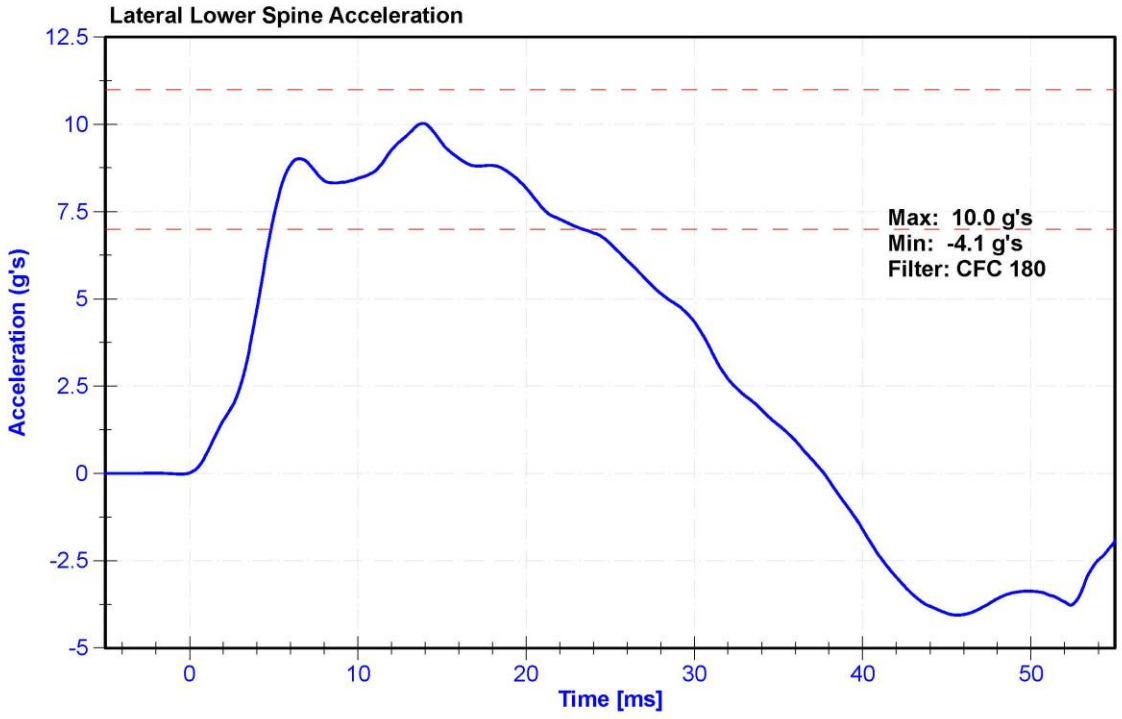



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.5 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.6 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.9 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 14.7 g's
Min: -5.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 10.0 g's
Min: -4.1 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

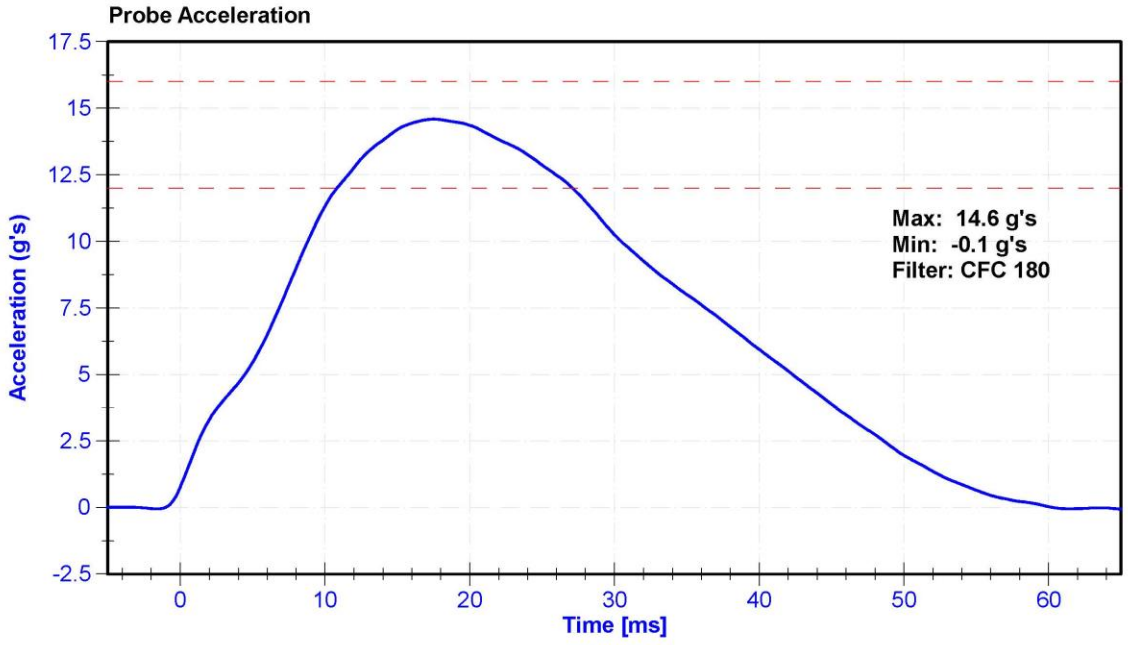
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

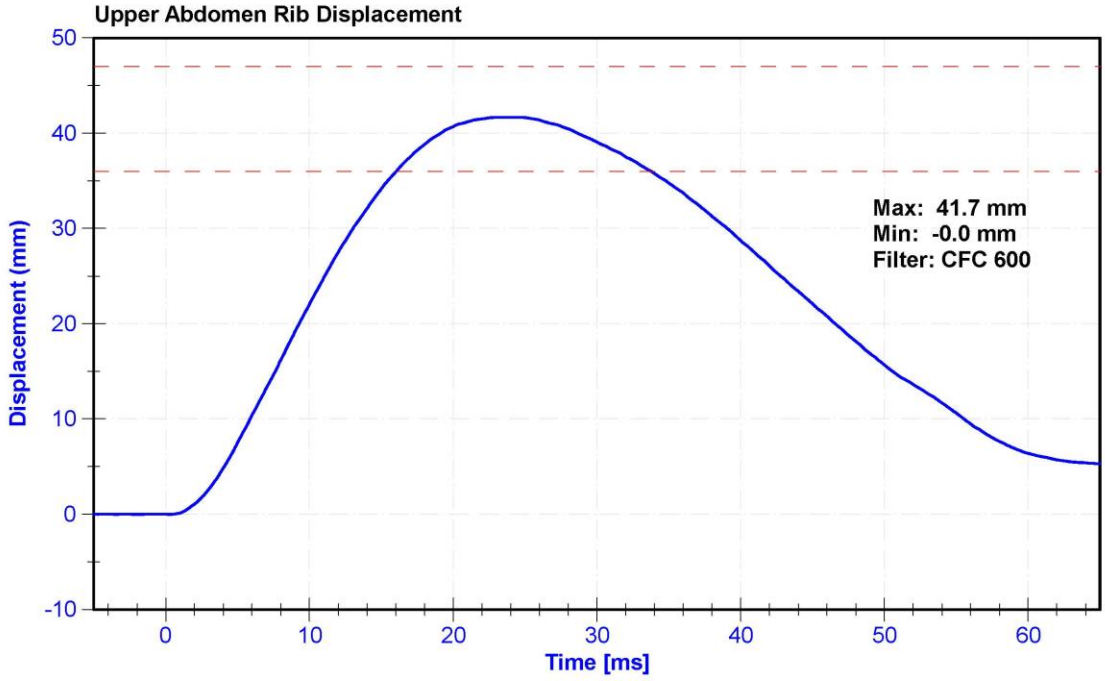
Results

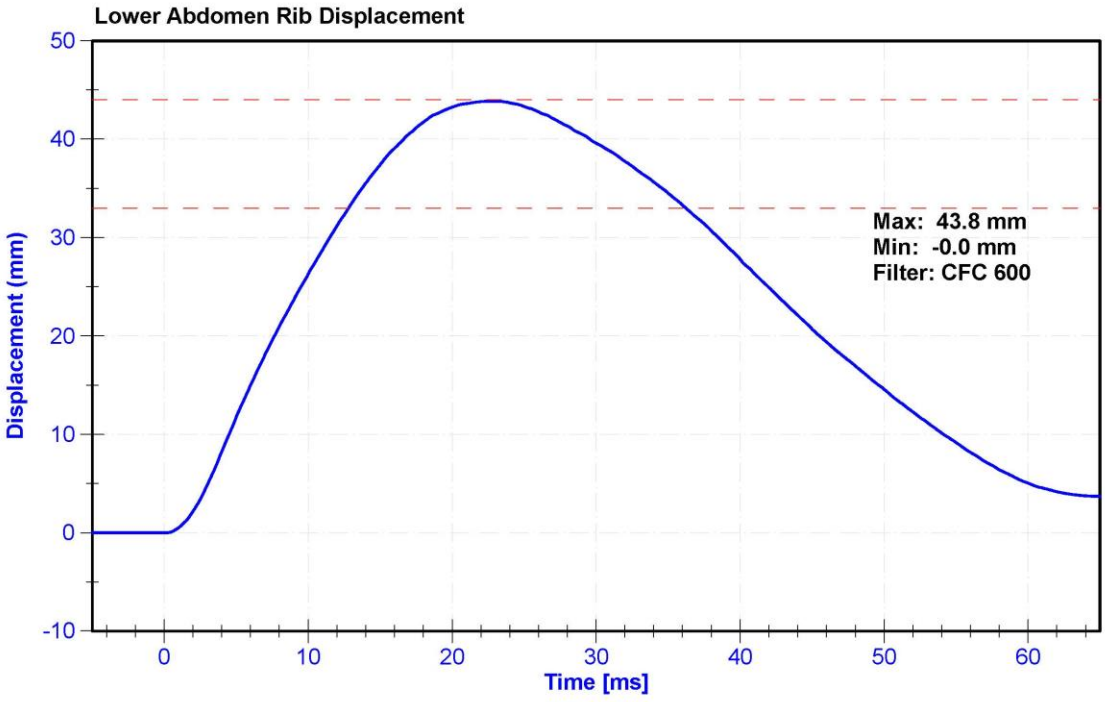
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.7	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.8	Pass

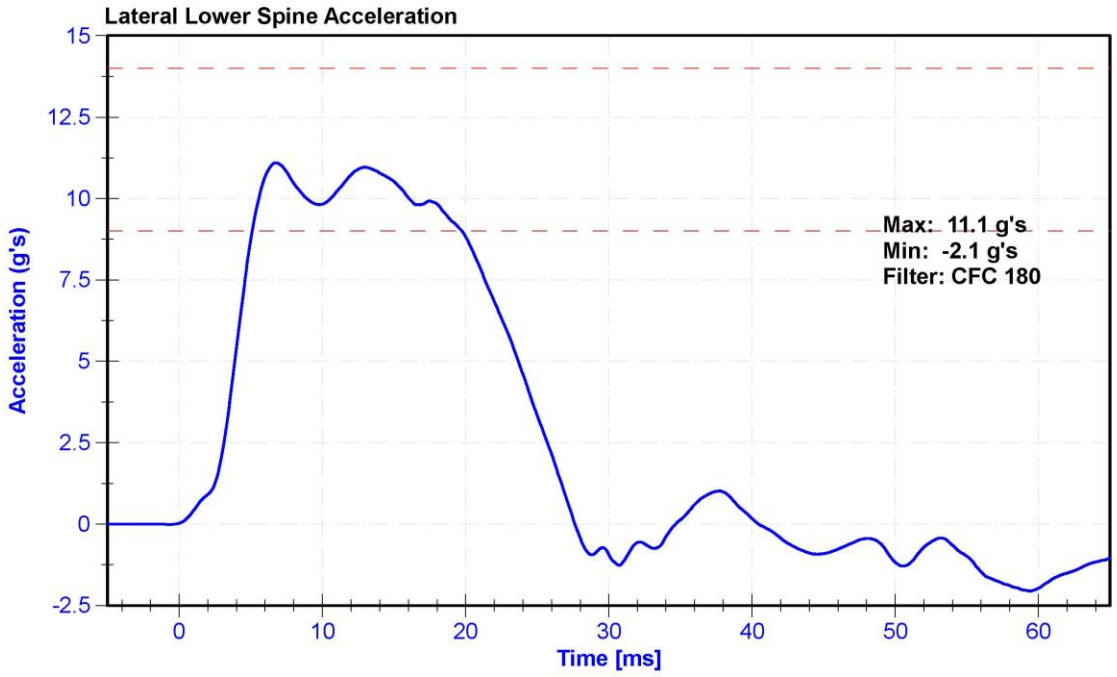
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	4/30/2020	10/29/2020
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	4/30/2020	10/29/2020




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.7 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.8 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 11.1 g's
Min: -2.1 g's
Filter: CFC 180

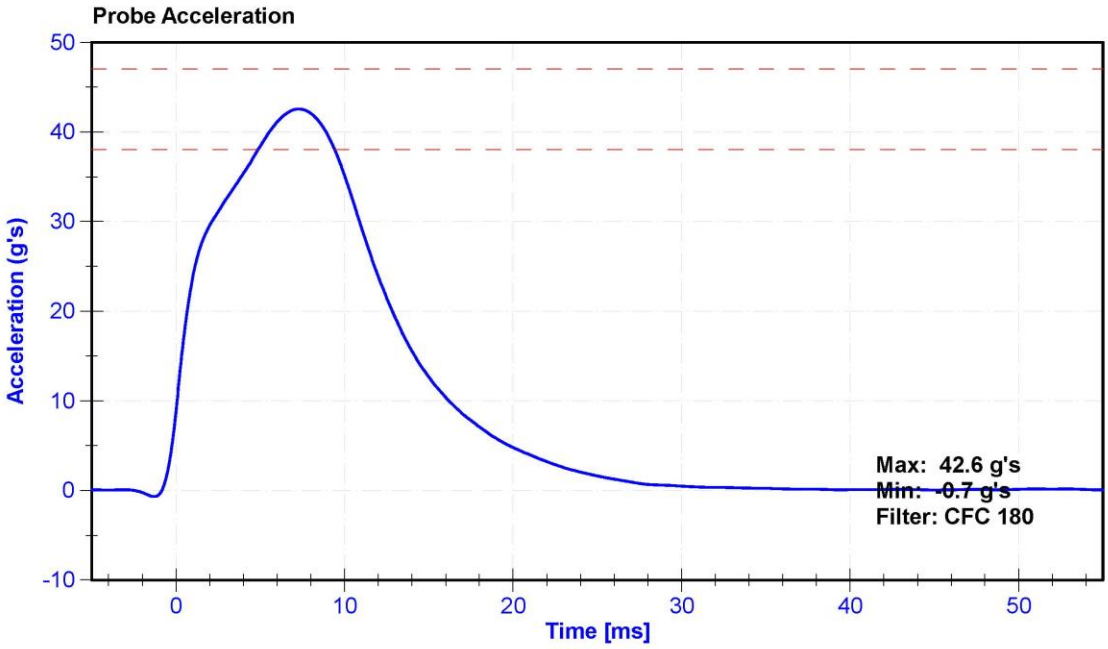
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

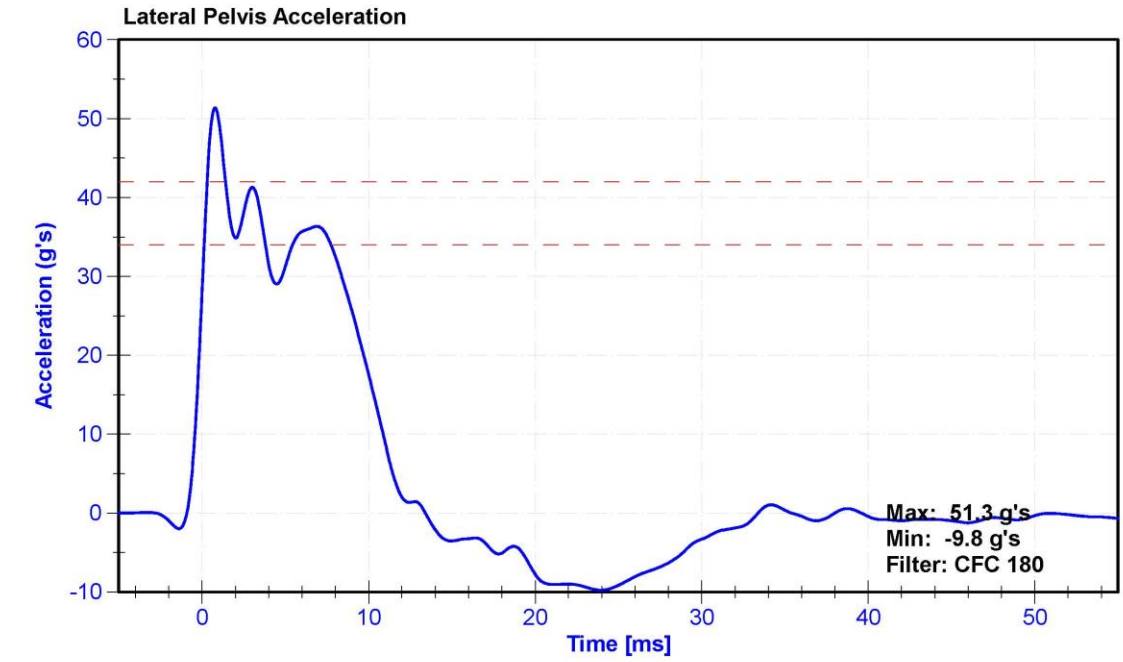
Results

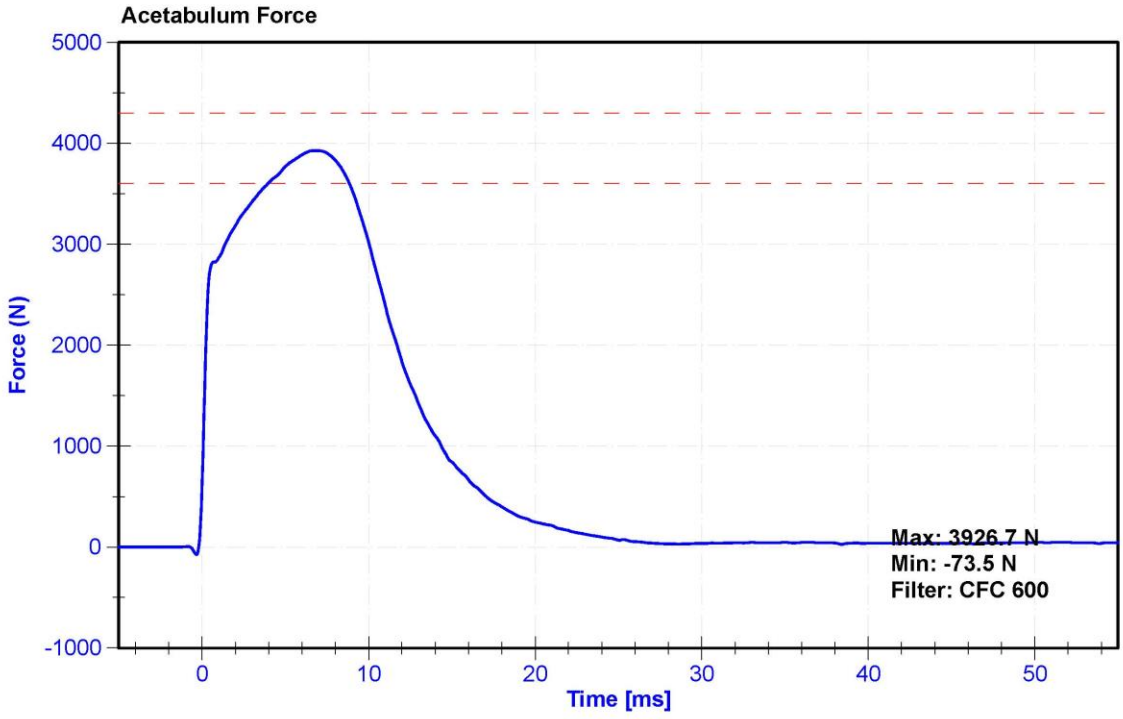
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.7	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	42.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.3	Pass
Acetabulum Force	3600	4300	N	3926.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51731	4/20/2020	10/19/2020
Acetabulum Load Cell	Denton 3249J	LC-276Fy	9/24/2019	9/23/2020
Certification Plug	SACO	13191	8/8/2019	N/A
Crash Test Plug	SACO	13195	8/8/2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 51.3 g's
Min: -9.8 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3926.7 N
Min: -73.5 N
Filter: CFC 600

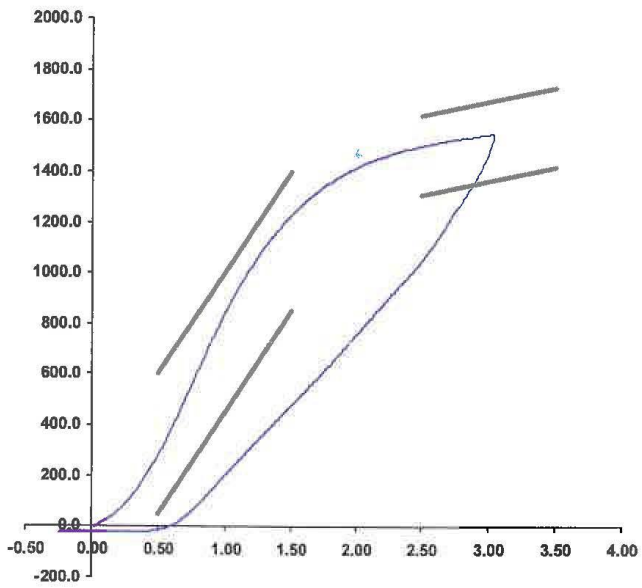
300
Crash
5/20/2020

SID-IIs Pelvis Plug Certification Test

Plug S/N 13195
Test Number 10590
Report Number 10625
Test Date 8/8/2019 12:52:11 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	290.69	50.00	600.00
Force @ 1.5 mm (N)	1,226.96	850.00	1,400.00
Force @ 2.5 mm (N)	1,502.27	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,547.32	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator 131

Part Number 180-4450

Template No 107 08-Aug-19
SACO Research

By : DC Date : 8/8/2019

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

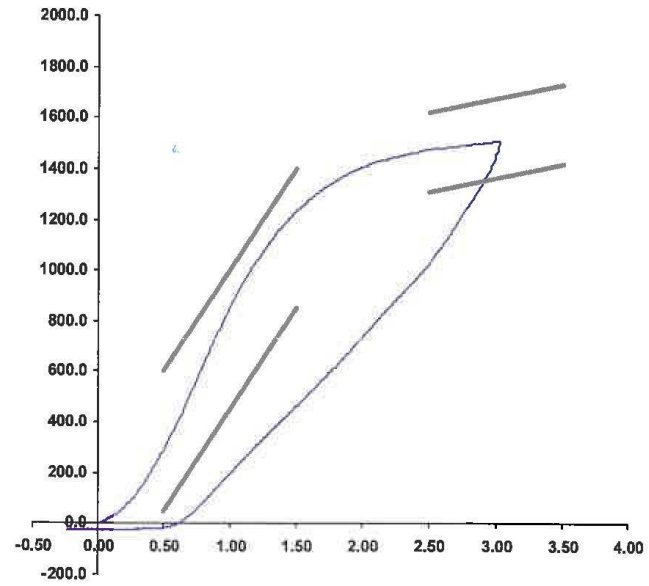
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13191
Test Number 10586
Report Number 10621
Test Date 8/8/2019 11:40:07 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	303.35	50.00	600.00
Force @ 1.5 mm (N)	1,236.42	850.00	1,400.00
Force @ 2.5 mm (N)	1,475.82	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,507.76	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator 131

Part Number 180-4450

Template No 107 08-Aug-19
SACO Research

By : DC Date : 8/8/2019

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

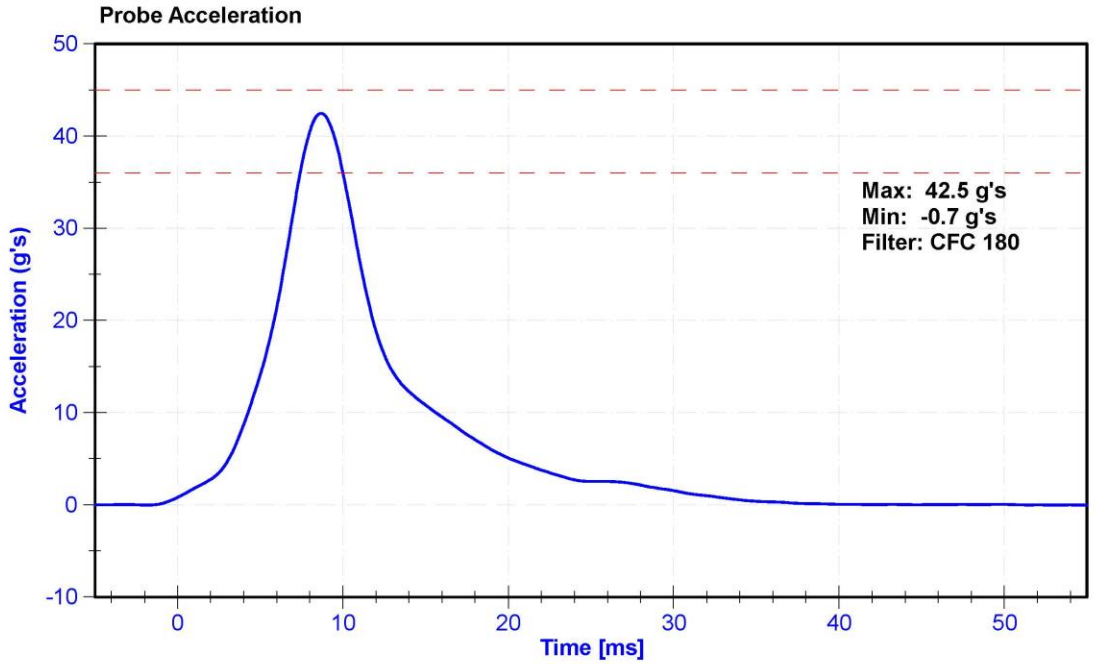
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D.Reinhard

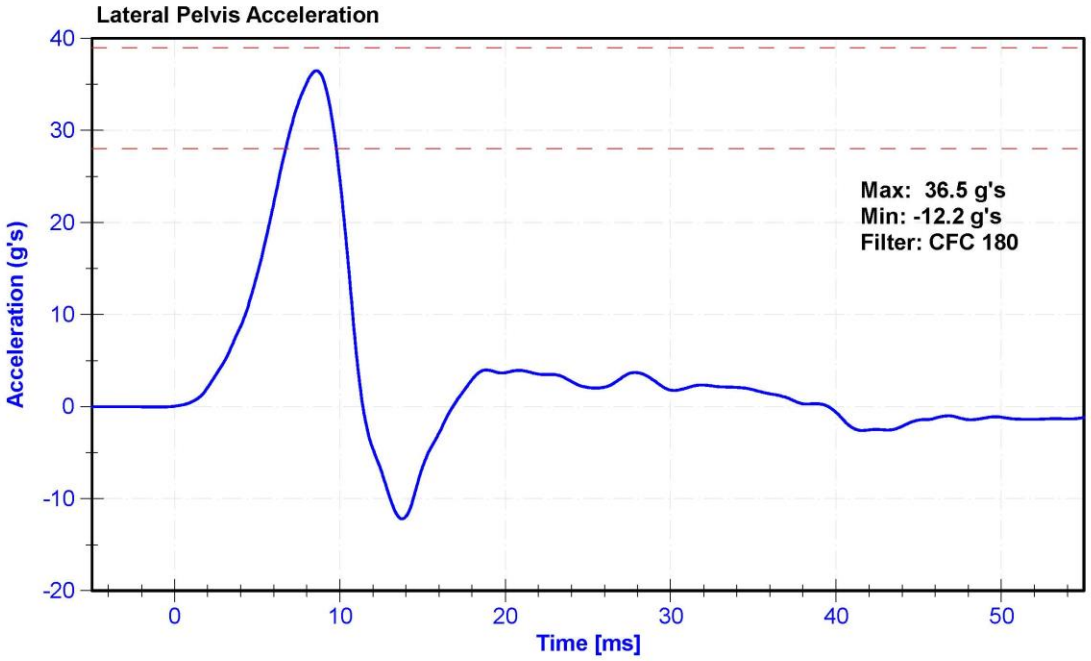
Results

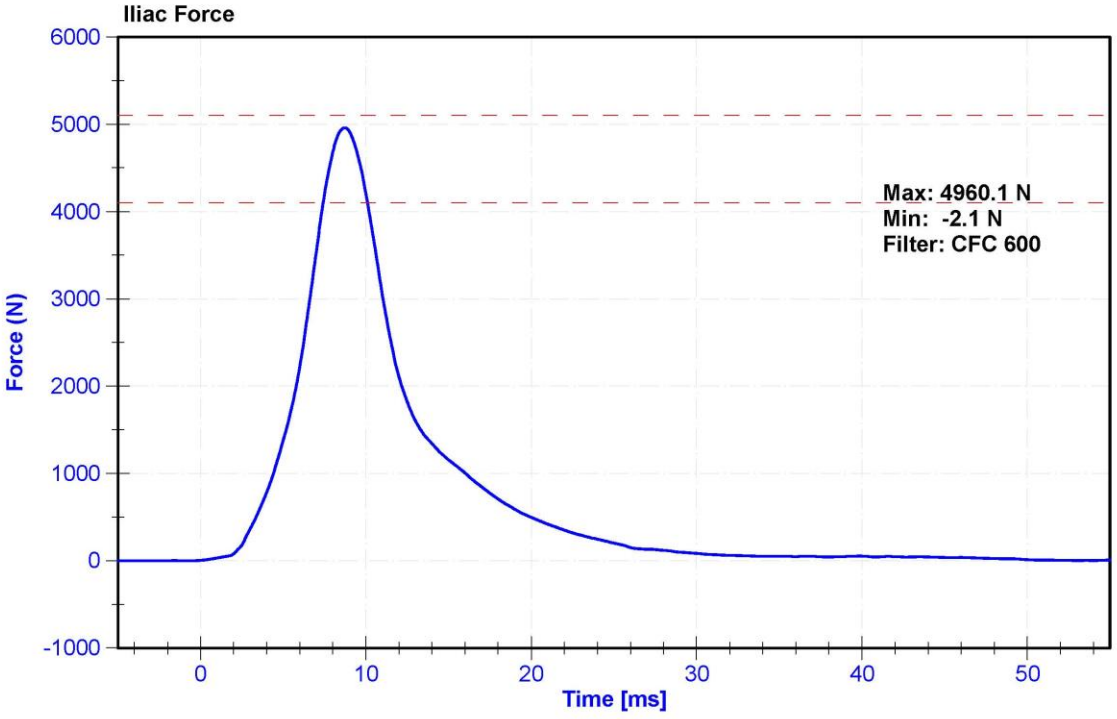
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	36.0	Pass
Velocity	4.2	4.4	m/s	4.20	Pass
Probe Acceleration	36	45	g's	42.5	Pass
Lateral Pelvis Acceleration	28	39	g's	36.5	Pass
Iliac Force	4100	5100	N	4960.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51731	4/20/2020	10/19/2020
Iliac Load Cell	DENTON 3228J	LC-280Fy	6/20/2019	6/19/2020




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 36.5 g's
Min: -12.2 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4960.1 N
Min: -2.1 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: F034		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers	Primary	X	AC-P49204	ENDEVCO	4/15/2020
		Y	AC-P83437	ENDEVCO	4/15/2020
		Z	AC-P64007	ENDEVCO	4/15/2020
	Redundant	X	AC-P52003	ENDEVCO	4/15/2020
		Y	AC-P63981	ENDEVCO	4/15/2020
		Z	AC-P51962	ENDEVCO	4/15/2020
Thorax Rib Displacement Potentiometers	Upper	Y	DS-183GFE	Honeywell	4/14/2020
	Middle	Y	DS-184GFE	Honeywell	4/14/2020
	Lower	Y	DS-182GFE	Honeywell	4/14/2020
Abdomen Load Cells	Forward	Y	LC-1440	DENTON	6/14/2019
	Middle	Y	LC-1525	DENTON	6/5/2019
	Rear	Y	LC-1528	DENTON	6/14/2019
Lower Spine Accelerometers (T12)		X	AC-P17299	ENDEVCO	4/15/2020
		Y	AC-P39731	ENDEVCO	4/15/2020
		Z	AC-P22639	ENDEVCO	4/15/2020
Pubic Symphysis Load Cell		Y	LC-464fy	DENTON	6/14/2019

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	AC-P59018	ENDEVCO	4/20/2020
			Y	AC-P79189	ENDEVCO	4/20/2020
			Z	AC-P58777	ENDEVCO	4/20/2020
		Redundant	X	AC-P68057	ENDEVCO	4/20/2020
			Y	AC-P58986	ENDEVCO	4/20/2020
			Z	AC-P52095	ENDEVCO	4/20/2020
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-451GFE	Servo	4/30/2020
		Middle	Y	DS-040GFE	Servo	4/30/2020
		Lower	Y	DS-1156GFE	Servo	4/30/2020
	Abdominal Rib	Upper	Y	DS-308GFE	Servo	4/30/2020
		Lower	Y	DS-307GFE	Servo	4/30/2020
Lower Spine Accelerometers (T12)			X	AC-P64003	ENDEVCO	4/20/2020
			Y	AC-P64147	ENDEVCO	4/20/2020
			Z	AC-P58786	ENDEVCO	4/20/2020
Acetabulum Load Cell			Y	LC-276Fy	DENTON	9/24/2019
Iliac Wing Load Cell			Y	LC-280Fy	DENTON	6/20/2019
Pelvis Plug (struck side)				13594	SACO	9/25/2019
Pelvis Plug (non-struck side)				-	-	-

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A315967	MSI 1201-1000	3/6/2020
	Vehicle Center of Gravity	Y	A315973	MSI 1201-1000	3/6/2020
	Vehicle Center of Gravity	Z	A315975	MSI 1201-1000	3/6/2020
2	Right Sill at Front Seat	X	A315704	MSI 1201-1000	1/29/2020
	Right Sill at Front Seat	Y	A315782	MSI 1201-1000	1/28/2020
	Right Sill at Front Seat	Z	A315844	MSI 1201-1000	3/9/2020
3	Right Sill at Rear Seat	X	A315083	MSI 1201-1000	3/16/2020
	Right Sill at Rear Seat	Y	A315092	MSI 1201-1000	3/16/2020
	Right Sill at Rear Seat	Z	A315919	MSI 1201-1000	3/16/2020
4	Left Sill at Front Door	Y	A315846	MSI 1201-1000	3/31/2020
5	Left Sill at Rear Door	Y	A315124	MSI 1201-1000	3/11/2020
6	Left A-Post Lower	Y	A315768	MSI 1201-1000	9/24/2019
7	Left A-Post Middle	Y	A315716	MSI 1201-1000	4/1/2020
8	Left B-Post Lower	Y	A315746	MSI 1201-1000	3/30/2020
9	Left B-Post Middle	Y	A315113	MSI 1201-1000	3/24/2020
10	Front Seat Track	Y	A315800	MSI 1201-1000	3/11/2020
11	Rear Seat Track or Structure	Y	A315011	MSI 1201-1000	3/7/2020
12	Right Rear Occ. Compartment	Y	A315801	MSI 1201-1000	3/11/2020
13	Engine Block	X	A315190	MSI 1201-1000	3/30/2020
	Engine Block	Y	A315867	MSI 1201-1000	3/30/2020
14	Rear Floorpan Above Axle	X	A315015	MSI 1201-1000	3/7/2020
	Rear Floorpan Above Axle	Y	A315196	MSI 1201-1000	3/6/2020
	Rear Floorpan Above Axle	Z	A315961	MSI 1201-1000	3/7/2020

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A315087	MSI 1201-1000	3/16/2020
MDB Center of Gravity	Y	A315096	MSI 1201-1000	3/17/2020
MDB Center of Gravity	Z	A315733	MSI 1201-1000	3/17/2020
Left Frame at Rear Axle Centerline	X	A315182	MSI 1201-1000	3/30/2020
Left Frame at Rear Axle Centerline	Y	A315715	MSI 1201-1000	3/30/2020